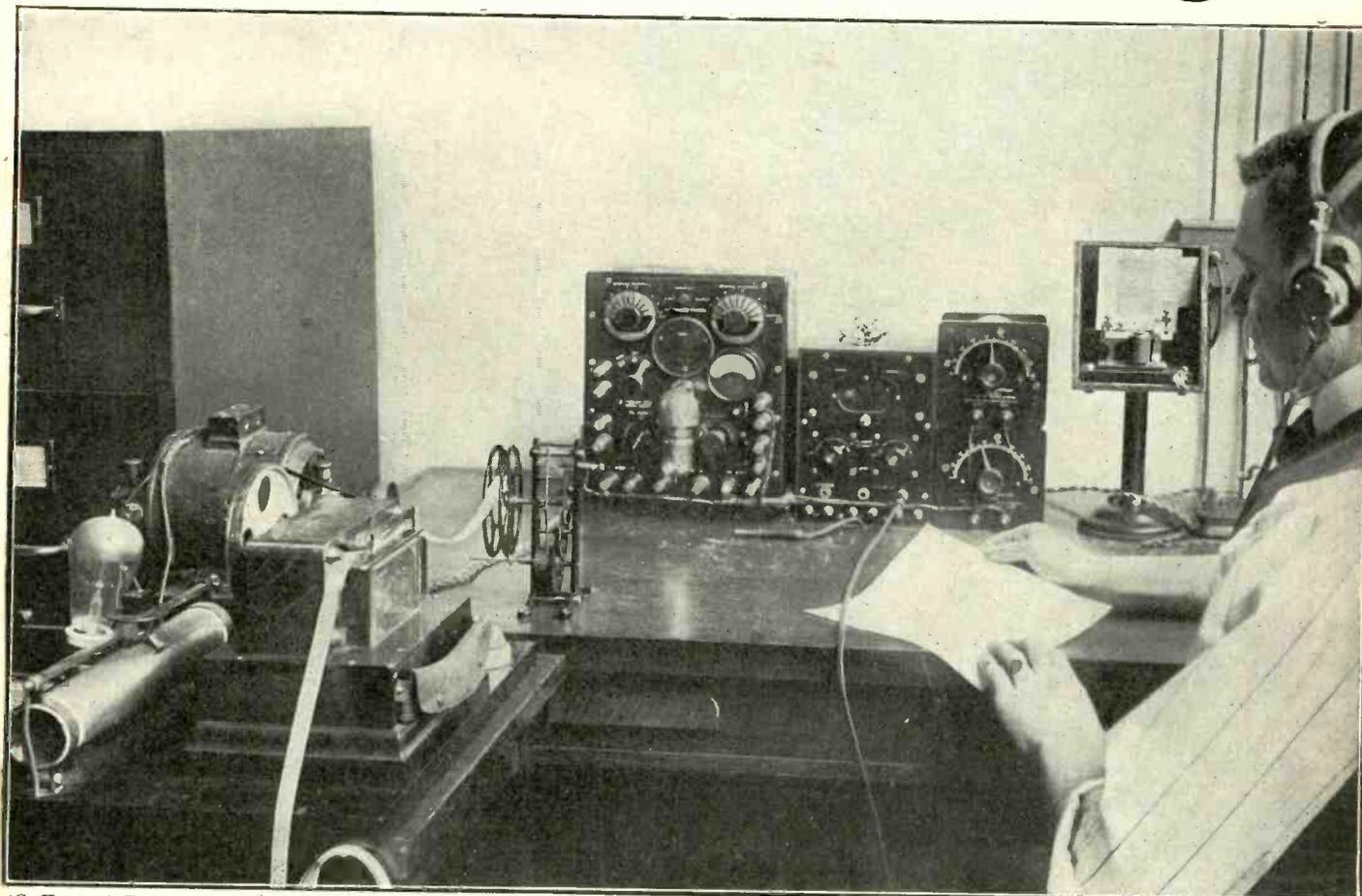


# RADIO WORLD

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

I L L U S T R A T E D

## Checking Naval Radio Messages



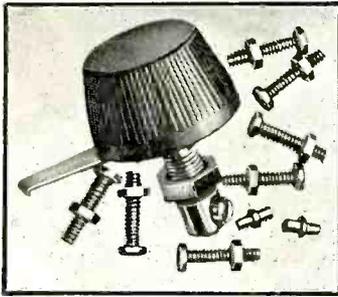
(C. Harris & Ewing, Washington, From Paul Thompson, N. Y.)

Interior of one of the remote-control stations of the United States Navy. This photograph shows no machinery for transmission—only the tape machine on the extreme left. Through local distance-wires dots and dashes are carried into the radio room of a distant transmitting-station. By means of necessary switches the operator can start the machine, which, in turn, broadcasts the messages. By this method all broadcast matter is checked up.

WHEN YOUR "MOVIES" COME BY RADIO

See Page 4

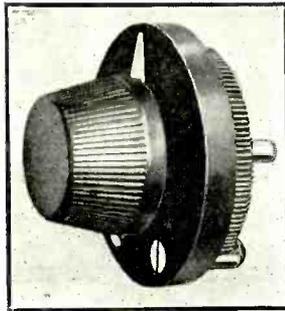
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**Amateurs, Start Training!**

THE radio art owes a great deal to the American amateur. He has made valuable contributions to the science. He is an ambitious worker who takes a very serious interest in everything he does, says "The Evening Mail Radio Review," New York.

In the past, American amateurs have paid particular attention to their transmitting outfits. To most of them, their receivers were a sort of necessary evil. Transmitting was their special hobby, and as a result of this interest long distance receiving records and the development of receiving circuits have been greatly neglected.

Radio is a twoended proposition. The most powerful and efficient radio transmitter would amount to nothing unless the receiver used to intercept its impulses were sensitive and selective. Sending efficiency depends largely upon receiving efficiency. In fact the development of sensitive receivers is more important than the perfection of transmitters. Ultra-sensitive receivers will make it possible to transmit over long distances by the use of very small power, an dthis in turn means small and inexpensive transmitting stations.

Following the line of reasoning, it would seem more logical for our American amateurs to devote their time to the perfection of radio receivers. This is especially true when we consider the international aspect of the radio situation. Before long a large number of radio broadcasting stations will be operating in England and other places on the continent. Our amateurs would do well to start training for the important work that is ahead of them.

**"Radiotron"**

AMERICA has just added a word which may come to be one of the most potent, in what it connotes, of all the new words in the English tongue. The scientific parents of the bit of apparatus to which this new name was given at one time had about decided to christen it "pliotron." Some of the neighbors called it a "triode valve," others just a plain "electron tube." But at last the name "radiotron" was compounded, and so the tube of copper and glass was named after both "radio" and "electron," as godfather and godmother of the prodigy. One would like to find in the "tron" a memory of an old dialect English and Scotch word, now obsolete, "tron" or "trone," meaning a trench or a trough; for is not this tube a trench of radiant but noiseless energy? At any rate, here is a new word, "native-born of foreign parentage."

And now even the young Russian physical chemist who, coming out of Petrograd, said to a representative of *The Times* at Reval a year ago that Russia did not know what had been going on in the scientific world for four years, and that he himself, in his field, did not know "what LANGMUIR was doing in Schenectady"—now even he will soon know it. And if this number of *The Times* reaches the Technical Institute in Petrograd, not only may the few students who are left in its laboratories be able to learn of the latest achievements in wireless, but they will know that some day, and perhaps soon, it will probably be possible for their teacher to talk directly by telephone with LANGMUIR or MARCONI.

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

Subscribe for **RADIO WORLD**. \$6.00 a year, \$3.00 six months, \$1.50 three months.

# RADIO WORLD

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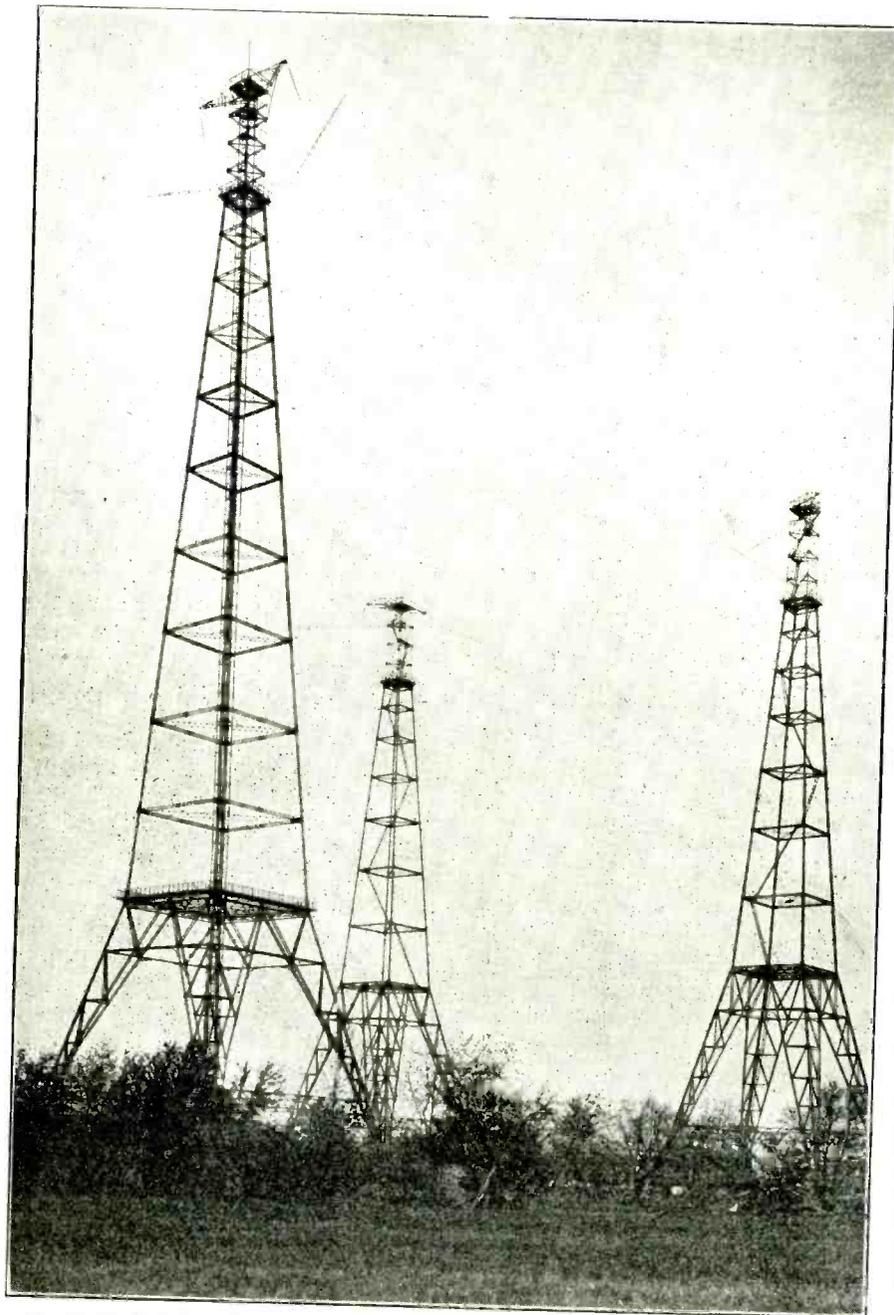
A Weekly Journal, Published Every Wednesday and Dated Saturday, By Radio World Company, from Publication Office, 1493 Broadway, New York, N. Y. Telephone: Bryant 4796

Vol. 1, No. 17

July 22, 1922

15c. per copy, \$6.00 a year

## Etched Against the Sky, These Huge Aerials Give a Sense of the Infinite



These high-flung, picturesque, powerful aerials of the United States Navy, erected on the long stretch of lowlands circumjacent to Arlington, Virginia, truly give one a sense of the infinite as he gazes upward at them—the same sense that church spires often fail to bring, that many a church service does not. A sense of the wonderful future is in these wires, too; a feeling that we are on the threshold of stranger things than either philosophy or physics ever dreamed of. These massive wires are operated by the United States Navy. Whatever radio throws

broadcast it is possible for them to hold. They can fling sound as far as any other transmitting medium on earth. They were built strong and durable. They are to inhale and breathe the radio messages of the world until they can be supplanted by simpler, better devices. But let us not consider their usefulness so much as their beauty and inspiration. Certainly nothing else in the world today can give a greater thrill or bespeak in more perfect mechanism the greatest wonder and mystery of creation—a wonder and mystery that is slowly unfolding to the greater light.

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

IT is evident that radio is going to prove one of the greatest crime deterrents ever known. Heretofore, it has always been impossible for the law, or the inventor, to get very far ahead of the criminal—the crook has generally managed to outwit every device that was pitted against him. Already, radio has shown that it is difficult for the criminal to escape from its far-reaching tentacles that penetrate every hamlet—every cor-

### Radio Will Get 'Em

ner of the earth at all hours of the day or night. The criminal has no time for sleep, no time to collect his senses, no time to feel safe or that the law is not at his heels. Even if he should escape to the faraway and apparent safety of the sunny isles of the South Pacific—even there will radio rout him out. Our late news this week records the cable of

Commissioner of Police Enright, from London, regarding radio fingerprints. This remarkable system is being perfected in Copenhagen. As a means of identification it will save days in time and untold expense. Already a number of escaping miscreants have been captured because of radio. One who imagined himself safe—having gone in a direction opposite to that of his pursuers—was so surprised by radio interception that he gave up.

# When Your "Movies" Come by Radio

By Stanley Bryant

WHEN M. Belin, an eminent French radio physicist, in 1920, succeeded in transmitting the facsimile signature of General Pershing from this country to Paris, and in 1921 when the same experimenter took a forward step by sending a photograph of President Harding by radio over 1,800 miles of the Atlantic Ocean, the events were of considerable newspaper importance; but their value to commercial art was negligible.

The Belin process is necessarily complicated. It is a combination of the chemical (photographic,) mechanical, and electrical. First the photograph is taken and a special gelatine print made from the negative. The gelatine print like a bas-relief is wrapped around a cylinder resembling, to a great extent, the revolving cylinder of the old-time phonograph. A sensitive needle is adjusted to rest lighting on the gelatine print; then as the cylinder and print are rotated, the needle moves up and down as it strikes the peaks and valleys of the bas-relief. These movements are transmitted over a radio, as dots and dashes. At the further end, a similar machine in perfect synchronism draws a record of the same dots and dashes on a photosensitive strip of paper.

But now comes an American inventor, C. Francis Jenkins, with a mechanism which not only transmits photographs by radio but, according to the inventor, will transmit motion-pictures just as easily and well.

The secret of Mr. Jenkins's device is an ingenious glass prism which, although perfectly conceived in the inventor's brain, could not be tried out in actual practice until a machine could be perfected to grind the intricate lens surfaces.

Suppose that a bar of optical glass, about 3 feet long, 1 inch wide and  $\frac{1}{2}$  an inch thick were ground with a bevel on both sides at one end and in the opposite direction at the other end.

Then suppose that the surfaces between these two ends were ground so that the change from one prism to the other was gradual. Finally, suppose the finished glass rod were bent around the outer edge of a flat disc of glass or metal. The result would be a Jenkins prism, one foot in diameter.

Now, if the prism were rotated and a light beam projected through the prism the image on the screen would oscillate up and down. It is this feature that is incorporated in the new tele-transmission of photographs.

For the sake of clearness the transmission of a simple photograph will be described first. From that point on, the sending of motion pictures becomes merely a problem of securing the necessary speed in order to accommodate the succession of picture images, which, in the case of the movies, move at the rate of 16 a second.

When Mr. Jenkins wishes to send a picture by radio, the picture is placed before the rotating prisms and brightly illuminated. Two of the prisms are



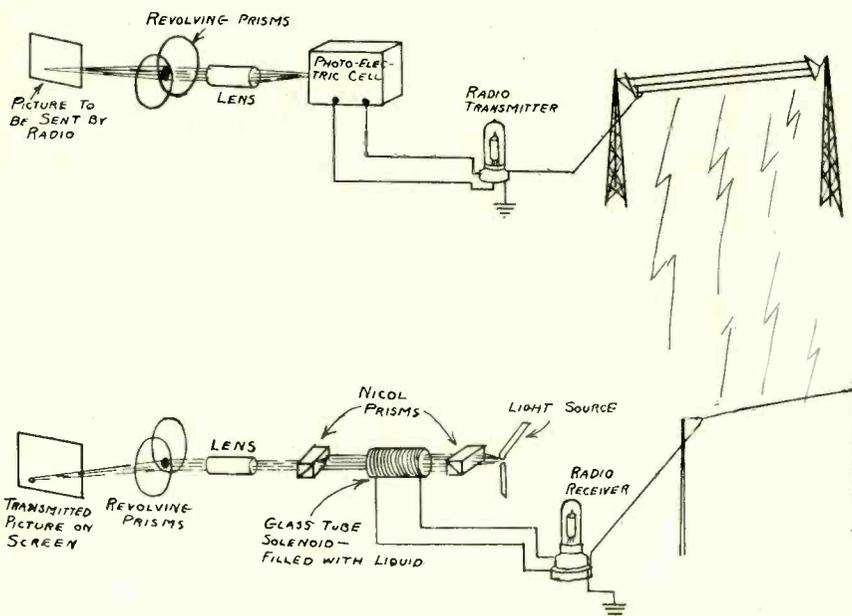
C. FRANCIS JENKINS  
American inventor of the new device for transmitting photographs and moving pictures by radio waves.

set in front of the photograph. One of the prisms runs a hundred times faster than the other, and is also so positioned that whereas the first prism would make the image pass from the top of the screen to the bottom the other would give it a side-to-side motion. Thus when the two prisms rotate together at their widely differing speeds, the effect is the same as if the photograph were partitioned off into a hundred narrow strips.

As the prisms pick up each spot comprising the separate strips, the amount of light reflected from that spot is projected onto a selenium or other photoelectric cell. These cells have the strange power of varying their electrical resistance according to the amount of light falling on them. When the cells are in darkness their resistance becomes in the order of millions of ohms, but brilliant sunlight will cause them to become very good conductors of electric currents.

The light reflected from each spot on the photograph allows a certain quantity of current to flow through the photoelectric cell and from there into a vacuum tube where the impulses set up radio-frequency currents which, in turn, are sent out onto the aerial to the receiving station. That is all there is to the transmission of photographs by the Jenkins system.

At the receiving end, the radio impulses, like any radio message, are first tuned to resonance and then converted to audio frequency by a vacuum tube. Then they are conducted to a glass tube containing a



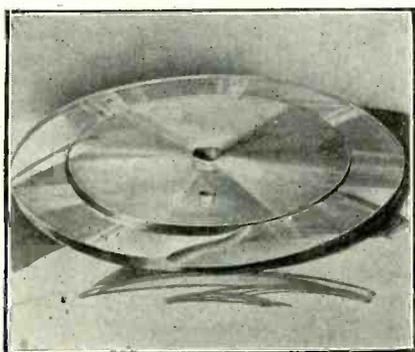
Schematic diagram showing the operation of the invention of C. Francis Jenkins which not only transmits photographs by radio but, the inventor claims, will transmit motion-pictures as well. Follow the course of the diagram from the upper left-hand corner to the right, downward, and then left to the lower left-hand corner.

(Continued from preceding page)

secret chemical, said to be carbon bisulphide, and wound with many turns of fine magnet-wire. The radio impulses cause a magnetic field of varying strength to be set up within this chemical core-solenoid.

Near the receiving instrument is a powerful arc-light producing a beam of light of great intensity. This beam of light is projected through a piece of iceland spar which polarizes the light waves. A light ray is said to be polarized when its vibrations take place only in one direction—at right angles—to the axis of travel of the ray. But if this polarized light is again passed through a second piece of iceland spar, no light whatever will succeed in passing through the combination.

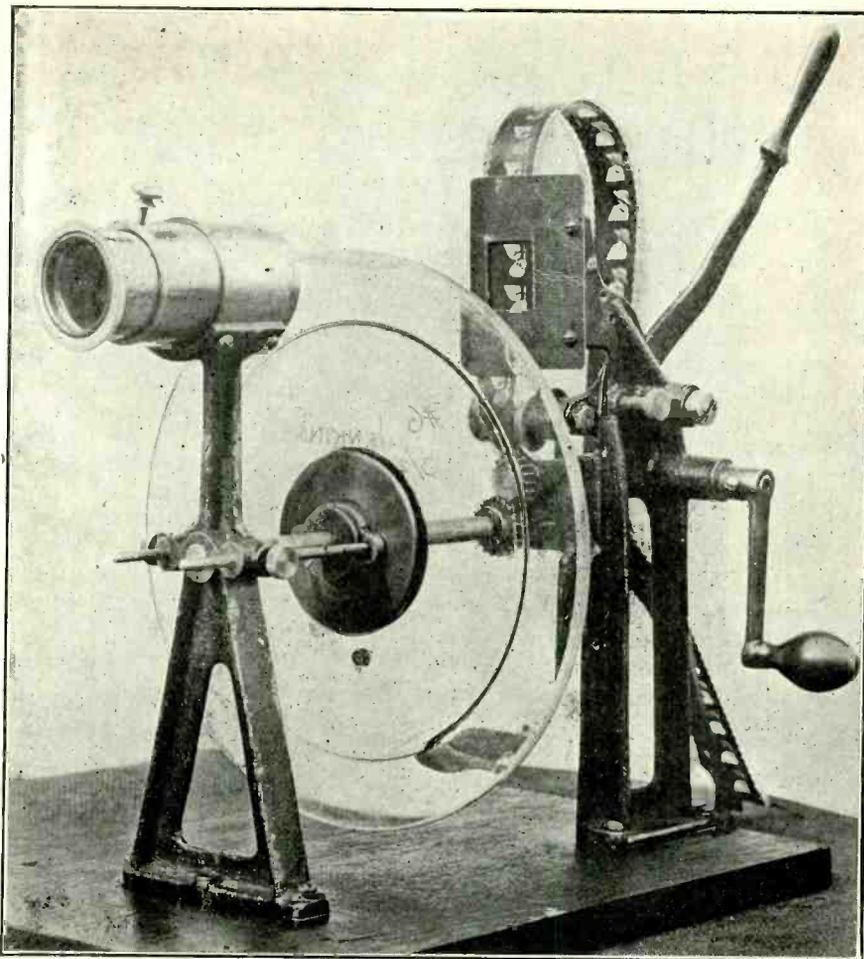
Seventy-seven years ago, Michael Farady discovered that if a beam of polarized light is sent through a transparent substance through which lines of magnetic force are passing, the effect on the light beam is the same as if the first piece of iceland spar had been slightly twisted.



Glass prism with which Mr. Jenkins is able to transmit photographs by radio. Note the peculiar OG curve in the foreground where the two prisms of different shapes form a junction.

The finest details of the Jenkins method have never been made public, but it is believed that he makes use of the reaction between polarizer, carbon bisulphide, and an analyzer. The light from the arc lamp is sent through the polarizer and then into the chemical solution. Through the latter, magnetic lines of force produced by the radio impulses are constantly passing. The impulses varying with the amount of light reflected from a given spot or spots on the photograph at the transmitting station, are always changing the magnetic field, thus the effect on the polarized beam of light is always changing in unison.

When there is no magnetic field, no light reaches the sensitive paper waiting to receive the transmitted photograph. But when an impulse arrives a certain amount of light passes through the second spar crystal or analyzer. After passing this crystal it is directed to its proper place on the



Apparatus to be used by the inventor to convert the high lights and shadows of motion pictures into electric waves for transmission by radio. In the illustration, one of the two circular glass-discs has been removed. The cylinder at the upper left is the lens. The motion-picture film is seen at upper right.

the picture by two rotating glass prisms exactly similar to those used at the transmitting station. In this way the light intensity, whether it be a shadow, high light, or half tone, is exactly reproduced at the receiving station.

Mr. Jenkins has already been successful in sending photographs by radio. By altering the design of the transmitting and receiving prisms—so that there are 8 or 10 complete prisms during one circumference of the disc—he believes that it will be as simple to transmit the 16 pictures a second, required in motion-picture work, as it is to send a solitary photograph with his present apparatus.

This is not the time or place to discuss the wonderful possibilities of the invention. With its perfection, motion

pictures in the home would be certain to come. Every radiophone station would have an attachment by which the two persons conversing could see before them, in a mirror or on a screen, a perfect likeness of the other. Motion-picture firms who are now called on to send a duplicate print of a film picture to a city several hundred miles away, will invoke the Jenkins radio "movie" to send the entire strip of pictures through the air. But this is only conjecture. The real possibility can be foreseen by no man. It is doubtful if the inventor himself, farseeing as he has shown himself to be in perfecting the prisms and polarizing apparatus, dares to predict what his revolutionizing invention will mean to the general public—perhaps, a few years hence.

## One-Wire Aerial Better than Two

NOTWITHSTANDING the fact that RADIO WORLD has published a number of important articles on the construction of the aerial, letters still continue to come to the editors asking if two wires, each fifty feet long, will give the same result as one wire 100 feet long. The answer is, emphatically, NO! The beginner should take this

warning and erect his aerial about 100 feet long, one wire, and in a straight line. Be careful to take the lead-in from the end only. If taken from the center only one-half of the aerial will be in use. In most cases the lead-in is taken from the end. But always write us if you are in trouble. We take pleasure in helping our readers.

# Underlying Principles of the Vacuum Tube

By George W. May, R. E.

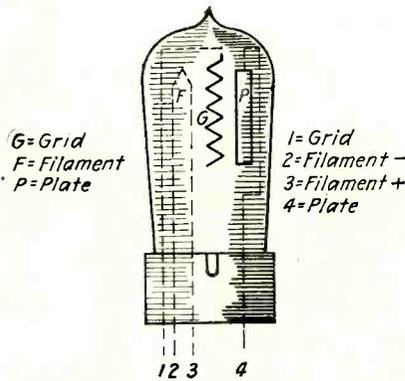


Figure 1—Diagram showing the elements of the vacuum tube which makes long-distance radio possible. Suggested by G. W. May. Drawn by S. Newman.

IN studying the underlying principles of the vacuum tube, we must deal first with the smaller elements such as matter, molecule, and the atom. Matter is divided into molecules. Molecules are divided into atoms, while atoms consist of a nucleus and a definite number of negative charges of electricity surrounding it. Matter is composed of molecules and atoms. The molecule may consist of a number of atoms, still the atom is assumed to be the smallest quantity of an element that can exist. The atom may be divided into corpuscles or particles termed "electrons." The electron is the smallest part of an element known, carrying the smallest known charge of negative electricity. Molecules and atoms have definite weight and mass, according to the substance of which they are a part. The electron is the same, no matter from what substance it is obtained. Electrons are grouped about a central nucleus having a positive charge and are in constant motion or vibration around a central nucleus. So long as none of the electrons is thrown off or detached in any way, the molecule is said to be neutral or normal. But when the electrons can be thrown off, the atom left is said to be positively charged and is termed a positive ion. In other words, a negative charge is an atom containing an excess or superabundance of electrons, while the positive charge is an atom containing a lesser, or a deficiency, of the electron.

Electrons tend to flow from a higher level; that is, from a superabundance or a negatively charged atom to one containing a deficiency or positively charged atom. An electron is about one-eighteen-hundredth part of an

atom of hydrogen, the smallest of chemical atoms known.

The electrons surrounding the central nucleus are constantly vibrating, or whirling, around an orbit. They are attracted to the center by the positive charged center, but are kept apart from one another an equal distance, due to all being negatively charged. The more electrons in an atom the greater the activity and wider the orbit.

An atom may be decomposed by two or more well-known ways: first, by x-ray; second, by heating. Heating of the filament, in a tube, to incandescence will cause ions to be thrown into space. The vacuum tube is not a perfect vacuum, but as near perfect as possible.

The tube forms a very high resistance due to no conducting gases. If gases remained in the tube, they would become ionized by the heat and difference of potential between two elements of the tube. The ionized gases form a good conductor, but if gases were allowed to remain in the tube they would move about in certain ways, causing a disturbance of the electrons thrown off the filament. Therefore, there would be no sure calculations. Ionization is said to be the action of decomposing, or breaking up, of an atom into electrons and ions or positively and negatively charged bodies.

Conductivity is that property to conduct or allow electrons or electricity to pass freely through it, while retentivity is that property of matter which retains or holds whatever it may possess. Now, to understand the action of a tube, it is necessary to remember the following facts:

A current of electricity is simply a flow of electrons, the electrons flowing in one direction which makes a current which is said, then, to flow in an opposite direction. Electrons, then, are small charges of negative electricity. Most all material contains electrons which travel at a high rate of speed. If any air, or gas, is present, the electrons strike the minute particles of the air, or gas, about and are soon stopped. There are two kinds of electricity: namely, positive and negative. Like poles repel while unlike poles attract. These facts must be understood fully if the action of the tube is to be clearly realized.

The tube has three elements, better known as grid, plate, and filament. The grid is a fine-wire mesh usually placed between the plate and the fila-

ment of the tube. The plate is solid, sometimes corrugated, and is the first thing that the eye sees when looking through a tube. The filament lies in the inner of the tube and is usually a tungsten or carbon wire so constructed that when heated it can be distinctly seen.

In the accompanying sketch, the mark F is heated so that it becomes red or white hot. This is usually done by an electric current furnished by a battery. The battery is about six volts. In the tube we put a potential (positive) on the plate in order to produce a difference of potential. We also place a negative charge on the filament, thus producing a difference of potential between the plate and filament. We then can cause electrons to be thrown off the filament in two ways: that is, increase the flow of

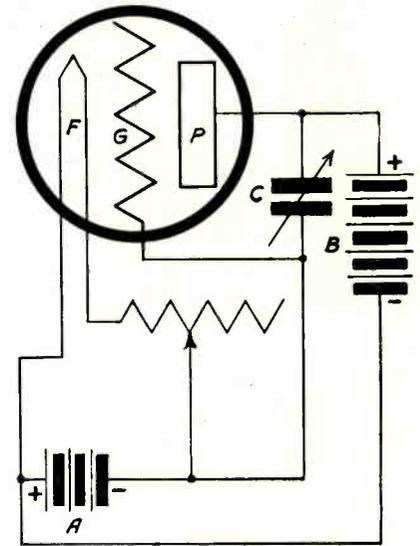
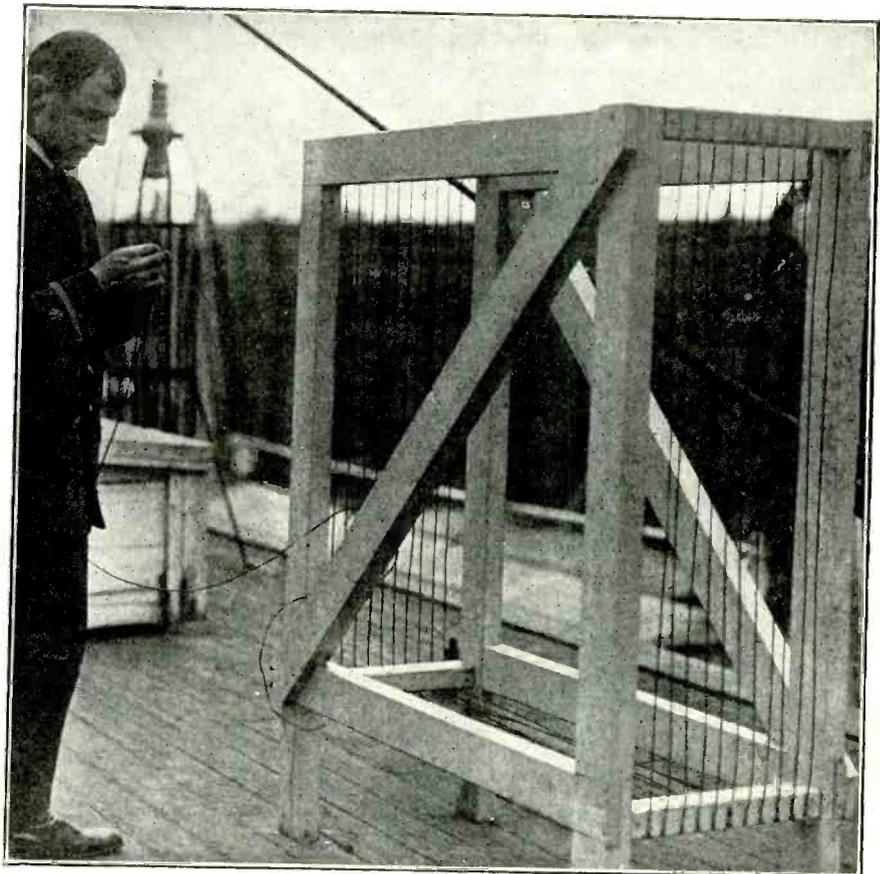
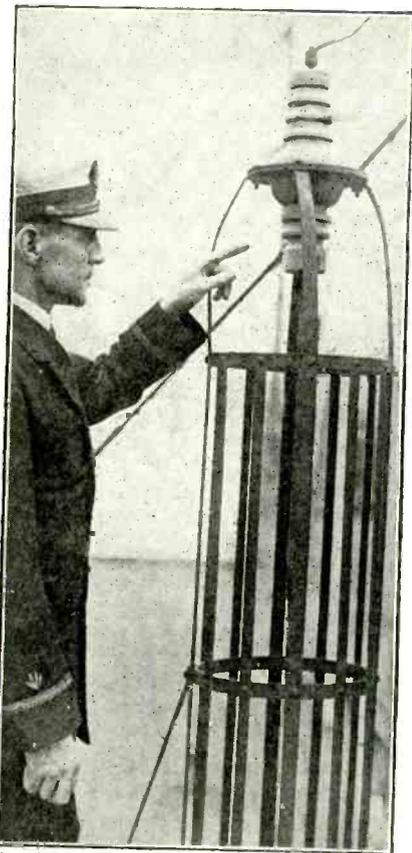


Figure 2—Schematic diagram showing the laboratory connections of the tube with the correct batteries needed. Note the variable condenser across grid and plate circuit. Suggested by G. W. May. Drawn by S. Newman.

electrons from filament to plate. The first way is to increase heating the filament by allowing more current to flow in the filament circuit. This circuit is termed the A circuit. The second way is to increase the potential between the plate and filament, by increasing the B battery voltage. This method is termed the B battery circuit. By inserting the third element in the tube called the grid, we further effect the flow of electrons due to any potential we may put on the grid. The grid potential, therefore, is first positive and then negative, or alternating in character.

The grid first assists and then retards the flow of electrons, depending on the polarity charge received from the antenna. A positive charge on the grid increases the density of the electrostatic field between the filament and plate, while a negative charge reduces the density. Suppose that the filament

# High-Tension Lead-in of the "America"



(C. Kadel & Herbert News Service.)

When the steamer "America" was some hundred miles off the United States Coast, it was possible to hear passengers aboard her talk to land by radiophone. The "America" is equipped with the most modern radiophone sets of any steamship afloat. In fact, it is the only ship which actually has radiophone equipment through which one may talk to a person on shore while the steamer is in mid-ocean. The reason that this vessel can be heard at such a great distance is due to the fact that loop aerials are employed. With the aid of this type of aerial it is possible for the operator to weed out the interference from other stations. The photograph on the right shows the loop aerial which is used for the reception of long-distance telephony; and, on the left, is the high-tension lead-in used to carry the high power to the aerials.

(Continued from preceding page)  
is hot and the grid and plate are connected to outside circuits. Then the electrons are thrown off the filament and strike both the grid and plate. These acquire a negative charge, as they have acquired electrons. The space inside the tube has, also, a negative charge as the space is filled with electrons. As poles repel, so the negative charge on the plate, the negative charge on the grid, and the negatively charged space inside the tube are all repelling electrons, while the hot filament is trying to throw them off. As each electron is thrown off the filament it adds its charge either to the plate, grid, or space. The stronger charge causes a stronger repulsion of the escaping electrons. In a very short time, the repulsion is strong enough to prevent the escape of any more electrons from the filament.

It may be seen easily that if the plate is negative, nothing will work as the poles are all negatively charged. If the plate could be supplied externally by a positive charge, or voltage, then, perhaps, something could be done. Evidently something does happen; be-

cause when the plate is charged positively, we have a negative filament and

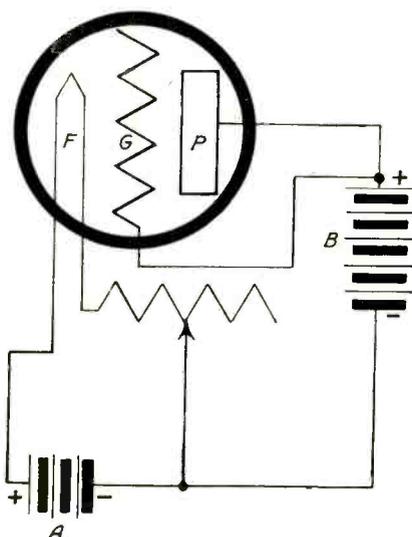


Figure 3—Schematic diagram similar to Figure 2. The difference is that the grid of the tube is connected with the plate circuit. This renders the plate and grid positively charged. This would tend to make a negative filament with grid and plate positive. Suggested by G. W. May. Drawn by S. Newman.

a positive plate. Thus the combination of the heated filament, and the vacuum, and the positively charged plate have caused a current to flow—completed the circuit which contains an external voltage known as a B battery.

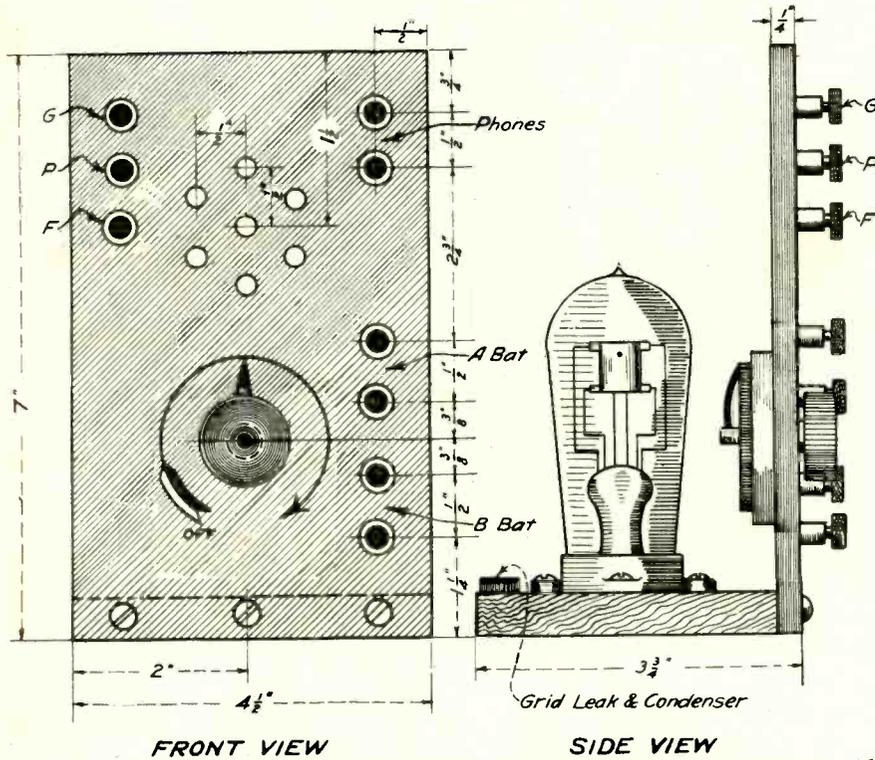
A current flows in the tube because the filament emits electrons. The electrons pass from the filament to the plate and grid. Neither the plate nor the grid can emit electrons, as they are not heated. This means that electrons can pass only in one direction through the tube. This allows the current to pass also.

This is exactly what happens with the crystal detector. A vacuum tube with filament and plate may be used in place of a crystal detector. Such a tube may be used also as a rectifier of alternating currents.

The use of the grid when employed in a vacuum tube impresses the action of the tube which has a tendency to rectify, oscillate and amplify. The vacuum tube with the three elements employed is in use, to-day, the world over, and is the finest instrument ever invented so far as radio is concerned.

# Practical V-T Detector Control Panel

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



Figures 1 and 2 show the front panel and side view of the control panel. All the necessary dimensions are carefully indicated, giving the position of binding posts and rheostat. Suggested by Frederick J. Rumford. Drawn by S. Newman.

I AM presenting, in this article, a description and designs for constructing a practical vacuum-tube detector control-panel. In designing this panel, I have endeavored to take the following facts into consideration, namely: space occupied by the panel; efficiency; and, most important to the average beginner, cost. It should be good news to learn that this panel can be made up at a cost of less than five dollars. It is very compact and efficient. It is also constructed along unit lines, meaning that, at any time, an amateur wishing to connect either a one- or two-stage amplifier in conjunction with this panel in unit form may do so at a slight additional cost.

There is another advantage in regard to this panel: the wiring, parts, etc., are at all times accessible for changing the tube or renewing a worn-out part. The necessary parts and their respective costs are listed below:

1 panel 4 x 7 x 3/4, either formica or celeron .....	\$ .75
1 rheostat .....	1.00
1 vacuum-tube socket .....	.75
1 grid leak and grid condenser .....	.50

9 binding posts .....	@ 5c.	.45
Wire, screws and accessories .....		.50
Total cost .....		\$3.95

Of course, a builder may have to

pay a little more for some of the above items. It all depends on where they are purchased.

First, a panel of the above size is marked off and drilled as shown in Figure 1. The panel is then rubbed with No. 0 sandpaper and oil, which will give it a dull finish; but should the builder desire, he may leave the finish just as he bought it. Next mount the binding posts and rheostat.

The builder should now purchase a piece of soft wood of the following dimensions: 4 inches long, 3 3/4 inches wide, and 1/2 inch thick. He may give this two coats of good shellac. When dry, he should mount his panel on it, as shown in Figure 2 by means of the three small wood-screws. The grid leak and the grid condenser can be mounted on the base at the back of the V-T socket, as also shown in Figure 2. This is done by means of two small wood-screws. The vacuum-tube socket should be mounted, also, on the base.

The panel is now ready for the internal wiring of the hook-up. This should be done with No. 14 covered wire, and should be run as straight as possible. Be careful not to have any kinks in the wire. It would be advisable for the builder to solder small copper terminals on the ends of the wire, which will easily fit over the binding-post screws. This makes a cleaner and more positive connection at the respective posts or connections. Care must be taken that the high-voltage battery, or what is better known as the B battery, does not get in contact with the vacuum-tube filament. If such a thing should occur, it would be the finish of the tube. This would necessitate the purchase of a new tube, or the repair of the burnt-out one, which is almost as bad so far as the financial end is concerned.

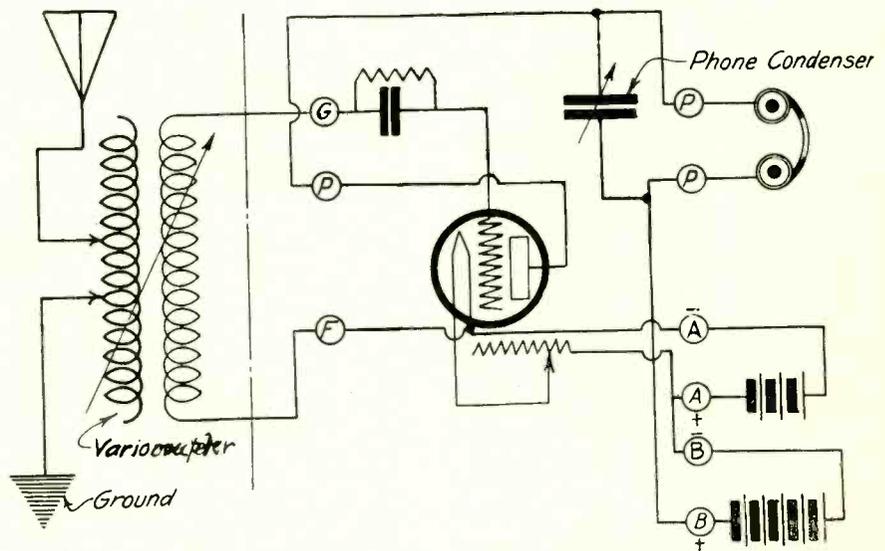


Figure 3—Schematic diagram showing the necessary wiring of the detector and control panel. Suggested by Frederick J. Rumford. Drawn by S. Newman.

First Words Heard by Wireless

ON Sunday, February 15, 1880, Dr. Alexander Graham Bell received the first words ever spoken over a wireless phone. The words spoken and received were heralded by a flash of light through his laboratory window, writes Donald Wilhelm in "Radio Broadcast." Then he distinctly heard, he told me: "Mr. Bell, Mr. Bell, if you hear me, come to the window and wave your hat!"

The man who spoke these words was Charles Sumner Taintor. He was on the top of the Franklin School, Thirteenth and K street, N. W., Washington. Mr. Bell was in his laboratory on L street, between Thirteenth and Fourteenth, on the north side of the street.

The instrument devised by Dr. Bell, by which for the first time in history words were transmitted beyond the power of the human voice and without the use of wires, might have been called a light-phone, was at both the Louisiana Purchase Exposition and the World's Fair displayed as the radiophone, and without question projected speech on electro magnetic waves, though not, of course, by means of high frequencies or a modern tuned circuit.

(Continued from preceding page)

Figure 3 shows the proper external connections of this panel assembled in conjunction with the variocoupler—which I described fully in RADIO WORLD No. 5, dated April 29; but, of course, there are many other hook-ups that may be used in conjunction with this panel.

In conjunction with this variocoupler, I have heard WGI at Medford Hillside, Mass., also WBZ, Springfield, Mass., and KDKA, Pittsburgh.

The radiotron tube used with this particular panel was a U-V 200, which requires a plate voltage ranging from 18 volts to 22½ volts, being variable by means of a variable B battery, or in series with a small potentiometer. The lighting filament requires a voltage ranging from four to six volts, having a battery rheostat in series, which is shown on the panel.

I advise the builder to purchase a storage battery with a six-volt power, either forty or sixty amperes, as using four dry cells, wired in series, is an expensive proposition as they burn out or run down pretty fast. This means the purchase of additional dry batteries; whereas, when a storage battery runs low, it may be charged easily at a small cost. Better still, if you have house current in your home, by purchasing a few lamps you can make a bank and you can charge the battery yourself. The initial cost of the battery may seem large, but to any one intending to keep his radiophone in constant use, it is really the best buy in the end.

This above covers practically everything necessary to build this panel. Any one following my directions should meet with no difficulties.

The Radio Will Find a Way



—From "The Evening Mail" Radio Review.

The Lightning Fallacy

TO the general public wireless and lightning seem to be twin brothers, probably because the manifestations of both are somewhat mysterious. Hoisting a radio antenna over one's property is the safest precaution that can be undertaken, whether it is to be used for radio or as a lightning rod. An aerial acts in a way similar to a lightning rod applied to a church steeple, a tower, or a building. Here the rod, or aerial, is used for protection; but because we use it for radio reception, it at once becomes dangerous! This is positively ridiculous.

During a heavy electrical storm why doesn't a heavy steel bridge collapse? Why doesn't the ocean greyhounds turn to splintered steel? Simple because they are properly grounded! It is a fact that their foundation is in the ground—having a metallic structure. Once the lightning strikes a metallic

structure, this metallic structure, being a conductor, passes the lightning safely to the ground.

This same principle applies to the aerial on your home. Study lightning, if you will, before you install a radio set. We all know that most metals are conductors of electricity. It is electricity that we must deal with.

Suppose your home is of wood, stone, or brick, and is not equipped with an aerial for radio. But next door to you is a home that is equipped with an aerial for radio. During the night a heavy electrical storm occurs, and both homes are under the terrific barrage of the storm. Which is the safest home in which to seek shelter? Naturally, and without a question, the home equipped with the aerial. Why? For the simple reason that if the strays from the lightning come in your direction, the house with the aerial would pick up these strays and absorb them.

# The Radio Primer

The beginner who follows regularly this department in RADIO WORLD will secure a liberal education in the applied principles of radio science

## Radio World's Revised Radio Dictionary

By Fred. Chas. Eblert

**Galena (Crystal)**—Native lead sulphate occurring in cubic, or octahedral, crystals or in a mass. It is the chief ore of lead, and, frequently, contains enough silver to rank as silver ore. It is the best-known rectifier used in a radio crystal receiving-set. It is bluish gray with metallic luster and shows highly perfect cubic cleavage.

**Henry**—The unit of inductance. When one volt of pressure is required to make a change of one ampere in one second of time, that circuit is said to have inductance of one henry.

**Harmonics**—When C-W, or undamped waves, are employed, harmonics, as they are called, refer to the incidental waves most noticeable when receiving with this method of C-W. These harmonics differ in wave length and frequency. At times, amateurs will hear the harmonic from some high-power long-distance stations while their sets are set for shorter waves.

**Hertzian Waves**—Electromagnetic waves named for the German discoverer, Professor Herman Hertz, in 1887. These waves are the basis which made radio possible.

**Heterodyne**—A method of detecting received oscillations in such a manner,

usually undamped, so as to cause them to interact with other locally produced sustained oscillations of slightly different frequency, and generally built up of greater amplitude. The heat, or resultant note, is the difference between the frequencies of the two independent oscillations.

**Head phones**—The detector, or receiver, which makes it possible to hear signals, speech, or other sounds. Telephone receivers used for radio reception are of the double watch-case type, having a band which fits over the head. The resistance usually employed is from 1,500 to 3,000 ohms to each case.

**High-Frequency Currents**—This term is used when several thousand or more oscillations take place in a second of time.

**Hook-up**—A schematic diagram showing the wiring of any receiving or transmitting station. Diagrams of this kind make use of certain symbols which represent the various pieces of apparatus.

**Hysteresis**—In an electromagnetic circuit, when a change of condition takes place, we encounter a slowness or lagging behind. This is hysteresis.

## The Beginner's Catechism

By Edward Linwood

**W**HAT does the variable condenser do in a circuit?

The variable condenser supplies an electrical quantity called capacity. Radio circuits are made up of capacity and inductance. Tuning coils supply much of the inductance while the condensers are depended upon to supply the capacity. Perhaps a clearer idea of capacity could be gathered if a condenser were to be considered as a miniature storage-battery which catches and holds the minute electrical impulses until they are sufficient to make impression in the head-phones.

\* \* \*

What decreases the range of a station in connection with aerials? Has the insulation of the antenna any effect on the range of the station?

If the insulation of a receiving aerial is poor, the range of the station is reduced considerably. Time after time, amateurs request more data on what

they could do to increase their range. This insulation is an important factor, and should be inspected occasionally.

\* \* \*

What kind of aerial is best for receiving station?

This depends on the location and erection of the station desired. If the amateur is located more than fifty miles from any broadcasting station, he should not attempt to receive with anything less than an outdoor aerial con-

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

sisting of one copper wire, 100 or more feet in length. An indoor aerial may be considered if the amateur is located within fifty miles of a broadcasting station and he intends to install an outfit with one or more stages of amplification.

\* \* \*

Why is the one-wire aerial preferred?

Because it eliminates much of the static. Most amateurs are concerned in the broadcasts which are sent out, with few exceptions, on a 360-meter wave-length. The one-wire aerial is preferred because it responds to such short wave-lengths.

\* \* \*

What is the operation of a crystal detector? What makes it a rectifier?

Numerous minerals such as galena, silicon, bornite, zincite, carborundum, and others have been found to possess the property of rectification of high-frequency oscillations. The ordinary crystals are not suitable for long distances, because no means are provided for amplifying signals after they have been rectified. By using these crystals in series with the head phones, they will permit the current to flow in one direction only; that is, the incoming oscillations may have their positive or negative currents cut off which will operate the phones with a pulsating current (direct), which makes the incoming signal audible.

\* \* \*

How could one test out a variable condenser to see if it is shortened?

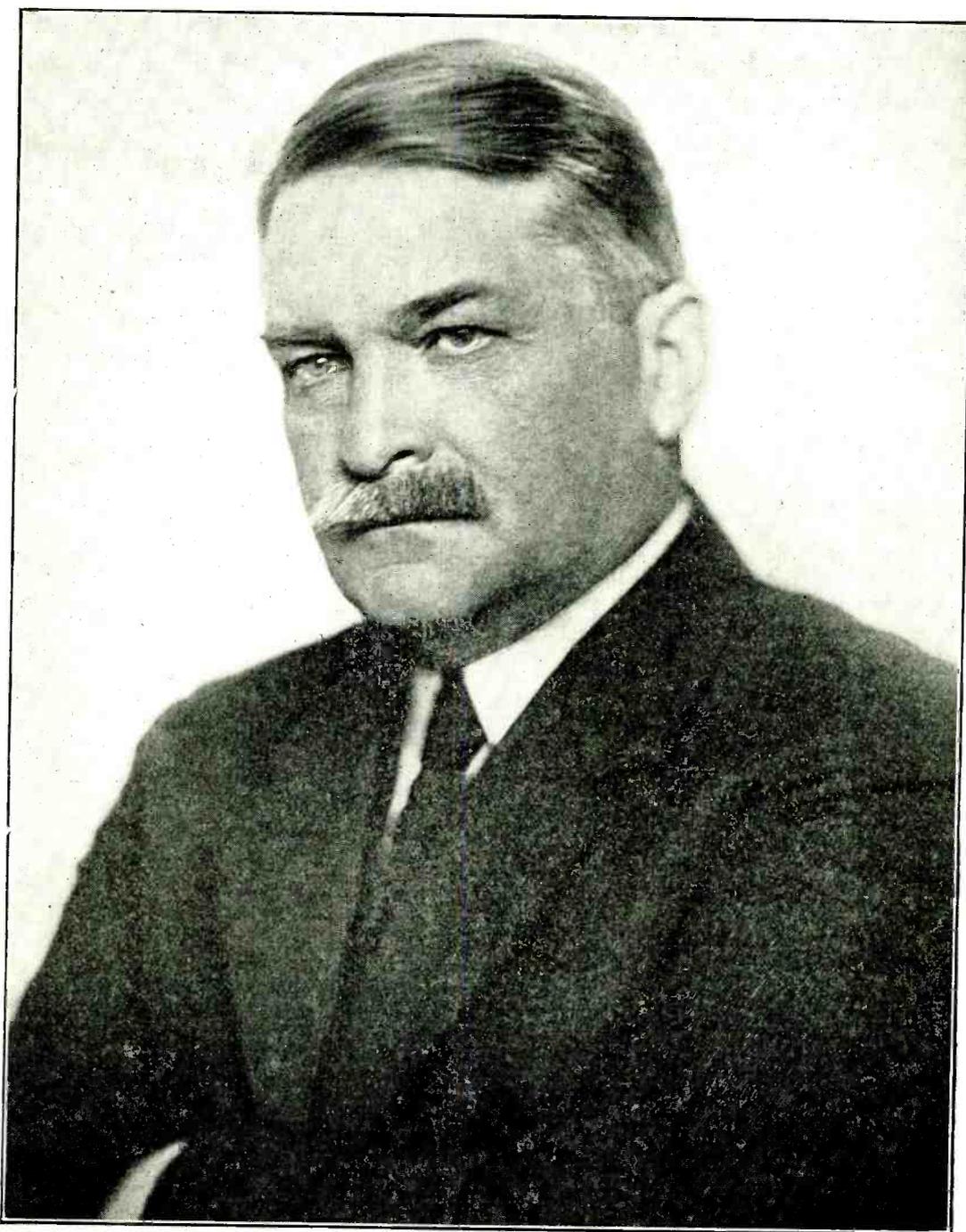
The variable condenser consists of two sets of plates, one movable and one stationary. Connect in series with this condenser, a buzzer and battery. Revolve, or turn, the set of movable plates very slowly. If shortened there will be a buzz. The spot should be noticed in the condenser where the "short" is. By using a jackknife the plate shortened may be widened so as to prevent a short circuit when using it in a set.

## The Growth of Radio Uses

By Harold Day

**S**TARTLING developments have resulted in the application of radiotelephony to the practical problems of everyday existence. Various news despatches have testified to its utility in direct communication between a ship and a business office, in the detection of crime, broadcasting of market reports, and expediting official business. While the interest in radio broadcasting has in no way abated—in fact, it is increasing at greater and greater speed—it is encouraging to note that believers in the practical uses of radio are becoming increasingly justified in their faith. Thousands, today, are equipping their homes with radio receiving sets.

## Radio World's Hall of Fame



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

### Dr. S. W. STRATTON

#### *Uncle Sam's Right Arm of Radio*

Dr. S. W. Stratton, director of the United States Bureau of Standards, the clearing house of radio in America, and chairman of the Radio Technical Conference Committee, appointed by Herbert R. Hoover, Secretary of Commerce, to formulate a national radio policy. Dr. Stratton suggested constructive modifications for present radio laws to improve on those passed in 1913. He maintains that private property rights never can be maintained in the ether. He is the chairman of the new interdepartmental conference just called by Secretary Hoover (see page 22 of this issue of *Radio World*). The Bureau of Standards, of which he is the head, is responsible for all governmental radio work. Notable development and improvements have been made by this department in all branches of radio. It has designed various radio devices now used throughout the world, including most everything from amateur sets to the intricate and powerful transmitting sets used in both branches of the national service.

# How Uncle Sam Proposes to Control Irrigation by Radio

By Carl Hawes Butman

WASHINGTON, D. C.—Radio control of an irrigation project comprising some 200,000 acres of reclaimed land in Arizona, is the latest use to which overworked radio has been put by the government. The Salt River Valley Water Users' Association, which is a local agency controlling the Salt River Irrigation Project, for the Interior Department, has installed and equipped a radio house toward the source of the Verde River, its natural water supply. There is no railroad or means of communication between Phoenix, Arizona, and the upper reaches of the river where sudden storms cause the ordinarily low water to rise with great rapidity, frequently flooding the ranches and farms below and causing enormous damage.

Believing that a radio service would provide a timely warning, the operators of the project have taken up the latest means of quick and direct communication, and received the approval of Secretary Fall of the Interior De-

partment. Gauges are placed in the upper Verde and also at Cave Creek, so that any appreciable rise can be noted and broadcast from the station to the manager's office in Phoenix and to all ranch owners who listen in.

There is also another phase of usefulness to the credit of the new radio station. When the Verde River, which flows into the Salt River, near Phoenix, is supplying plenty of water only a little is used from the reservoir back of the big Roosevelt Dam. In the future, the inlet from the reservoir will be controlled by telephone from Phoenix, based on reports from the radio station as to the state of the water in the Verde. When the storage water is not needed, or the radio station advises the operator at Phoenix that rain is falling in the Verde basin, the inlet to the system from the Roosevelt Dam will be closed and nature will take care of the irrigation, but when the Verde is low, the inlet at the dam will be opened by telephone orders

from Phoenix. This control will conserve considerable of the valuable storage supply for emergencies.

Some estimate of the project and its value may be realized when it is known that, in this territory, practically built up since 1900, 196,350 acres are cropped annually out of a total acreage of 205,060, and that the crops in 1920 were valued at \$18,551,800. The land included in the Salt River Project comprises 4,200 farms with a population of 31,600, includes 14 towns with 57 schools, 62 churches and 20 banks. During the past two decades, the section has been transformed from an arid territory into a high state of cultivation. Its banks have gained \$22,927,767 in deposits since 1920.

In the past, there have been some bad years, when the water was short, but with the new radio control and communication it is believed that the water can be so conserved as to insure a steady and lasting supply.

Another branch of the Interior Department, the Bureau of Mines, is seriously considering the problem of equipping mines with radio apparatus for use in the event of a cave-in or other accident. The stringing of wires for an ordinary telephone service is impossible, but officials state that it would be fairly simple to equip certain distant rooms or chambers with crystal receiving sets so that rescue parties may communicate with imprisoned miners. The real problem, they say, is to find a simple and portable transmitting set by which the miners may communicate with the mouth of the mine or the outside world, in the event of being injured in or imprisoned after an accident. There is no room for a large transmitting set, they point out, and the danger of a transmitting spark igniting gases or coal dust complicates the problem, although a tube set might be used if the necessary power could be supplied for its operation without lengthy power-wires which would be in constant danger of being cut, just as telephone lines would be cut or broken by the mining operations. Mining engineers are studying the problem. It is possible that a means of efficient operation will be found before long.

Another scheme which is appealing to the safety branch of the Bureau is the installation of a broadcasting set at each mine to advise the safety squads and first-aid man of accident, so they may start, without delay, for the scene with their equipment.

## Radio Has Reached India



(C. Kadel & Herbert News Service.)

Radio has taken a foothold in India. The big British possession in the East has put the new science to some important uses, following in the footsteps of other countries. Here is a photograph of Prince Ranjitsinji, one of the richest men of his country—famous as a cricketer, and one of the first of his countrymen to be graduated from Oxford—seated by a Marconi Wireless Telegraph car, transmitting to his friend, the Marajah of Kutch. This radio-equipped car travels from place to place, daily, and its arrival means that he who has a radio message to send many stop it—broadcast a signal—transmit the message—and pay the price. What could be simpler?

# Importance of Aerials to Radiation

By C. White

THE sole purpose of an aerial is to radiate, or dispense, electromagnetic waves. Such a function cannot be performed unless we have some method of changing our ordinary dynamic, or power, electricity into magnetic waves. The average student in electricity knows that when a current is established in a wire an electromagnetic field is immediately set up in the space surrounding it; but so soon as this current reached a steady state in the wire the electromagnetic waves also cease to move. Therefore, to keep a wire in a continual state of radiation we must have a continually alternating current within the same; meaning that we must apply an alternating electromotive force to the radiating system.

Another way to visualize this action of the antenna is to consider the same as a small condenser which is alternately charged and discharged by the applied electromotive force, and, of course, with each charge and discharge there is a flow of current in the connecting wire, or wires, which, in turn, sets up the traveling magnetic-waves.

The actual amount of current and, hence, the amount of electromagnetic energy radiated depends on the frequency of the source. More power is radiated at high frequencies than low, because the actual amount and change in the charging, or aerial current, is correspondingly larger. Many amateurs and radio experimentors are accustomed to look on an aerial as having a certain fictitious resistance, called the radiation resistance, and the power radiated by a network is equal to this resistance multiplied by the square of the charging current.

There are many types of aerials now in use, depending largely on the type of service required and the type of equipment in the station. A few of these types are: The single vertical-wire, the inverted L, the T, the fan, the umbrella, the loop, and the multiple-tuned types. I shall outline the characteristics and advantages of each type.

\* \* \*

**A single vertical-wire** hanging in a plane perpendicular to the ground, forms a fairly good aerial radiating or receiving radiated energy equally from all points. This aerial is very undirectional and its sole disadvantage lies in the fact that, in order to obtain sufficient length of wire, great height must be reached. It is a good temporary aerial for those who wish to operate a set in a high office-building.

\* \* \*

**The inverted-L type** aerial consists of a horizontal leg of the L composed of one or more wires and the vertical leg, which is known as "lead

in." This aerial is claimed by some to be very directional, but the relative amount of "directionality" may be said to depend on the relative length of the horizontal leg as compared with the "lead in"; when the former is very long, compared with the latter, the aerial is claimed to receive stations better that lie along a line pointing from the open end of the horizontal section towards the "lead in." This type is used by the Marconi Company, and is a favorite with amateurs. But I would advise all to remember that a long horizontal leg of single wire is far better than a short leg of multiple parallel wires, although the total amount of wire used is the same.

\* \* \*

**The T type** is essentially nothing more than the inverted L with the "lead in" placed at the center to form the letter T. This aerial does not pro-

## Employing Two Circuit Receivers

RADIO WORLD has received numerous complaints about interference by the commercial, naval, and amateur stations. Of course, some of the complaints are serious, but there are a great many listeners who expect too much from their receivers. If a single-circuit tuner is in use, the listener is held responsible for this, as this tuner lacks the inability to tune out unwanted stations. The single circuit has been used and worked to death. If the two-circuit tuner is applied, much of this interference can be eliminated. This is a point for the manufacturer to consider.

## Dr. Steinmetz on Lightning

DR. STEINMETZ'S experiments are important. He hopes to contribute to the development of lightning arresters. Nature's bolts, it is maintained, can never be harnessed and used by man, for they come and go in an incalculable fraction of a second. But Dr. Steinmetz may discover how lightning may be rendered so harmless that the insurance companies would no longer class it as a risk.

**America leads the world in many fields of radio.**

—Marconi.

duce a very uniform field near the station; but, at a distance, the field is uniform due to its own corrective action. This type is not as directional as the inverted L, but is largely used on ships and with portable sets.

\* \* \*

**The fan type** is so called since the wires are shaped like a fan and are in an inclined vertical plane. This antenna radiates its energy in a plane perpendicular to the sides of the wires. It is slightly directional; that is, working better with stations in line with the direction in which it is inclined. Its main disadvantage lies in the fact that great height is needed in order to get the proper radiation resistance.

\* \* \*

**The umbrella aerial** is mostly used with portable field sets. It is very useful in signaling aeroplanes, since it radiates most of its waves vertically. But if the legs of the spreaders are brought very close together and the lower edge of the same comes close to the ground, practically no energy will be radiated since most of the magnetic field will then be confined to the space between the spreaders and the ground.

\* \* \*

**The loop, or coil, antenna** is always pointed toward the direction in which it is desired to receive. Stations forming an angle of 15 degrees with the direction of the coil will practically offer no interference. Therefore, this aerial is decidedly directional and, due to its size and shape, it can not be satisfactorily used in large outdoor sizes. This type of aerial has recently received quite a boost because it does away with grounding, eliminating static to a marked degree; but, owing to the fact that it is relatively small as compared with the outdoor types, radio-frequency amplification is required on distant stations. Generally a variable or fixed condenser is placed in series with the loop because of the large inherent inductance of the same.

\* \* \*

**The multiple-tuned antenna** is of quite recent design, and consists of a long horizontal aerial tapped to ground at different points with an inductance. The source of excitation is placed in one of the taps. The net result is that each of the vertical wires acts as a vertical antenna and the combined resistance to ground is very low since there are many multiple paths. The capacity of each horizontal section and the inductance in the grounding circuit must be tuned or in resonance; so that each vertical section is radiating its energy at the same instant.

This type of aerial is now in successful operation at the New Brunswick, New Jersey transatlantic station.

# Radiograms

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

**T**HE Marconi Yacht "Electra" picked up radio signals 3,480 miles away while at anchor in New York Harbor. She "listened in" on signals from a new French station at St. Assise, twenty-five miles South of Paris. The signals came in clear and strong.

Il Senatore and his party departed from the United States on Saturday, July 8. The "Electra" was given a warm reception as she passed out to sea. Her destination is England.

**Dr. Charles P. Steinmetz has been nominated for Engineer and Surveyor of the State of New York** by the Socialist and Farmer Labor Parties. The chief engineer of the General Electric Company says he is too busy, however, to conduct a campaign.

**Radio messages broadcast in the name of the District Attorney of New York**, to intercept the expected sea flight of Isidor Nathan, accused of a fraud amounting to \$60,000, were picked up in Albany, New York, and Nathan was captured in that city.

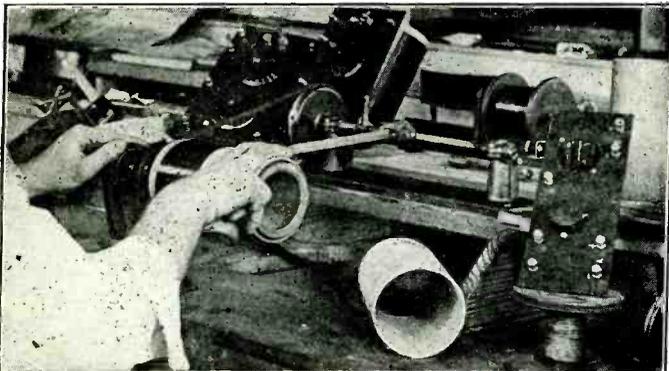
**The President of the Allied Police Commission, at Constantinople, has prohibited the sale of wireless apparatus in Constantinople and in the zone of Allied military occupation.** The notice permits the sale of wireless apparatus outside the zone occupied by the Allies, but requires firms wishing to make such a sale to obtain permission from the Allied Police Commission, Constantinople, before making delivery of the goods, giving the name and full particulars concerning the buyer and of the destination of their apparatus.

**There is an increasing interest in Santiago, Cuba, in radiotelegraphy and radiotelephony**, according to United States Consul Harold D. Clum. It is intended to install a broadcasting station powerful enough to be heard in every town in Oriente Province. The majority of receiving stations now in use have been constructed by amateurs, or assembled from parts obtained from the United States; but as American firms are oversold, much difficulty has been experienced in getting deliveries on orders placed in this country. The proximity of Cuba to the broadcasting facilities of the United States adds to the possibilities for developing a market there for radio sets.

**The Naval radio station at Great Lakes began broadcasting news and weather and crop bulletins for the Department of Agriculture on June 16**, handling about 3,200 words daily with a 30 k.w. arc on a wave length of 4,900 meters. A new 750-watt telephone transmitting set is being installed at the Great Lakes Station.

**Not to be outdone in radio activities** by the Agricultural, Post Office, Commerce and other civil departments, Secretary Davis has decided that it would be a good scheme to get the Labor Department on the radio map and tell the world what it is doing. To this end, he has officially asked the Navy Depart-

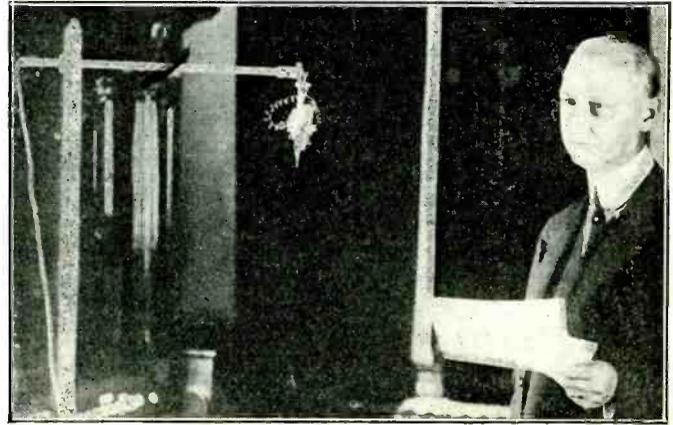
## "Close Up" of a Radio Winder



(C. Kael & Herbert News Service.)

Most every radio fan would like to visit a factory where radio sets are made and assembled, but few have the opportunity. Here is a "close-up" of a winding machine by means of which coils used in radio sets are wired.

## Tell It By Radio!



(C. Wide World Photos.)

**Frank W. Smith, president of the National Electric Light Association, giving a lecture, by radio, on "What the Public Utilities Mean to the Public."** Mr. Smith has just completed a tour of 9,000 miles, visiting the great power-companies and stations, and, in his talk by radio, he once more covered the same territory in a few minutes by voice, which required several weeks by train to travel over.

ment to aid in the broadcasting of activities relating to immigration quotas, labor arbitration, employment, and child labor, as well as other official business.

**Gloucester fishermen have taken up radio with great enthusiasm.** Owners of the large fleets that sail from the Massachusetts port are planning to use the radiophone for the direction of their vessels, and they hope to be able to save thousands of dollars by the direct touch with their floating outposts which radio should give them.

**Radio is recognized as the logical agency** for checkmating the motor-car thief, according to John Wall, president of the Kansas Branch of the Anti-Horse-Thief Association, which has become—in these changing times—the Anti-Motor-Car-Thief Association, without surrendering its honored title. Says Mr. Wall:

"If we could have radiophone communication between the various police stations in the State it would be the end of motor-car stealing. By broadcasting instantaneously the information of a theft, we would have every sheriff and peace officer in the State looking for the thieves. I believe the plan has great possibilities and I am going to try and develop it."

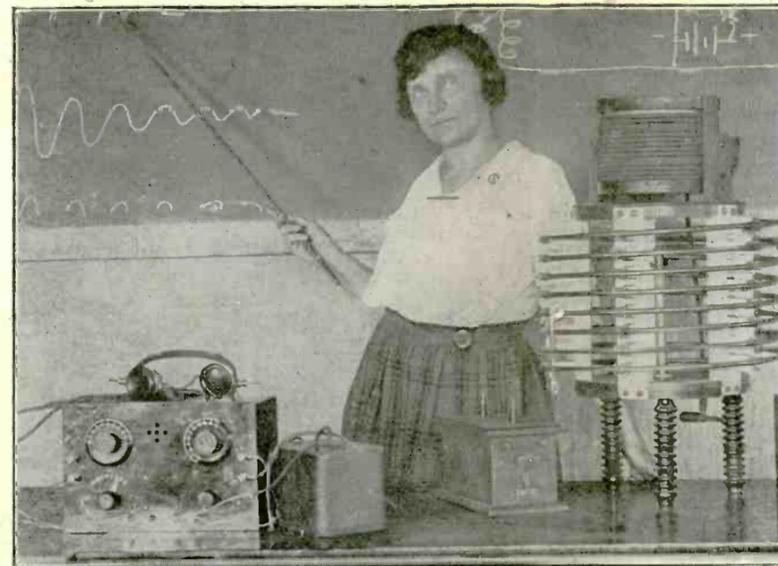
**The fifteen radio stations maintained by the Postoffice Department** in connection with the operation of the air mail service will probably be changed gradually to provide both radio telegraph and radio telephone service, according to an announcement by Postmaster General Work. The Washington station has had both radio telegraph and radio telephone service for nine months.

In addition to maintaining an hour to hour record of the progress of the airplanes carrying mail the Postoffice Department stations now send out complete weather reports, data concerning grain, dairy, and livestock.

**Radio and the telephone engaged in a race, and radio won.** The event took place on the Pacific Coast, under the auspices of the United States Shipping Board. The contest was to determine which was the most efficient and cheaper method of communication between coast ports. Radio tolls were 40 per cent less, and it was found to be the speediest by long odds.

**British radio fans now receive one concert a week.** Twenty-five minutes is the duration of the program. But in spite of this, people are buying receiving sets madly. A report states that radio interest is sweeping through the country like a forest fire.

# Weekly Photographic Evidence of Radio's Various Uses and Growing Popularity



(Right) A radio stock-ticker on ocean liners is the latest passenger necessity. A powerful transmitter has been erected on the roof of the Hotel Commodore, New York, from which stock quotations and other important market news is broadcast on a wave length of 1900 meters. Radio operator, Marshall C. Wright, photographed, is in charge.

(C. Kadel & Herbert News Service.)

(Left) Here is a striking photograph of the only woman, to date, who manages a school of radio engineering. Miss Mary T. Loomis, daughter of Dr. Mahlon Loomis, one of the pioneers of radiotelegraphy, and who had a practical working of wireless before Marconi was born, not only conducts her school at Washington, D. C., but is instructress as well.

(C. Fotograms, N. Y.)

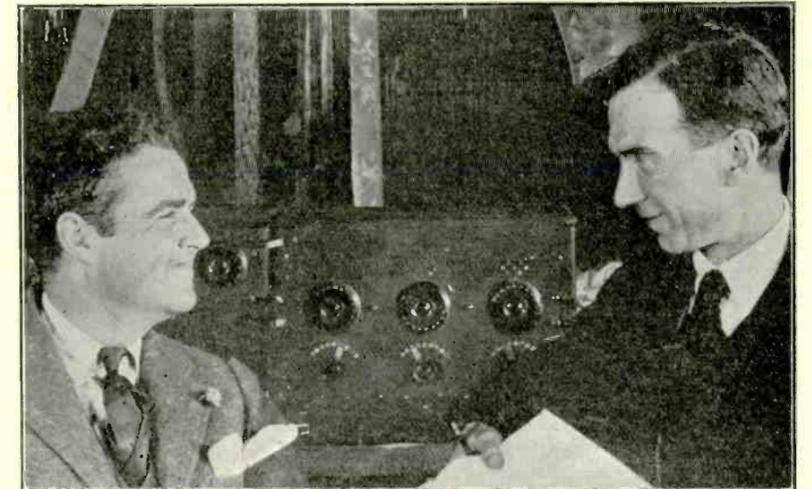
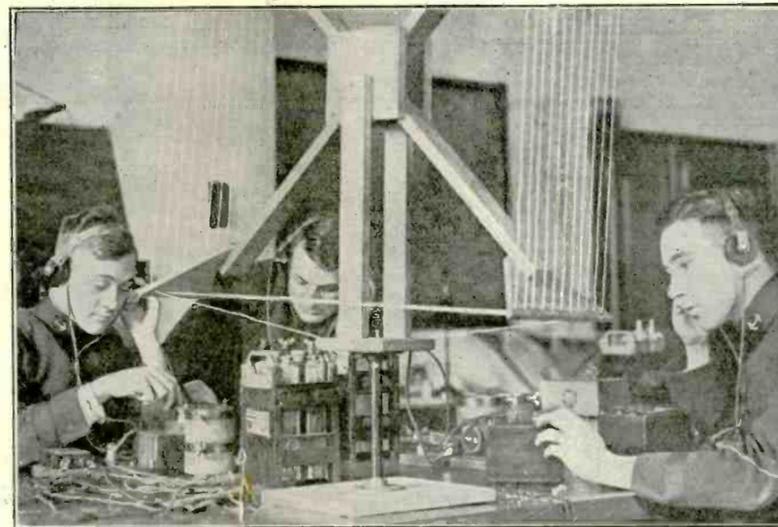


(Left) No. This is not a photograph of the interior of a sitting room. It is the interior of the main cabin of a motor launch equipped with radio. And, it is reported, there are few more pleasant ways of passing the summer than plowing through the blue waters with a radio set at your elbow. Can you imagine a more cozy corner than this?

(C. International.)

(Right) A man-of-war's radio man in the making! This is a corner of the radio classroom in the United States Naval Academy, Annapolis, Md., where radio is an integral part of the curriculum that makes the men who must conduct Uncle Sam's big ships. Here is a photograph that was taken by special permission.

(“P. & A. Photos.”)

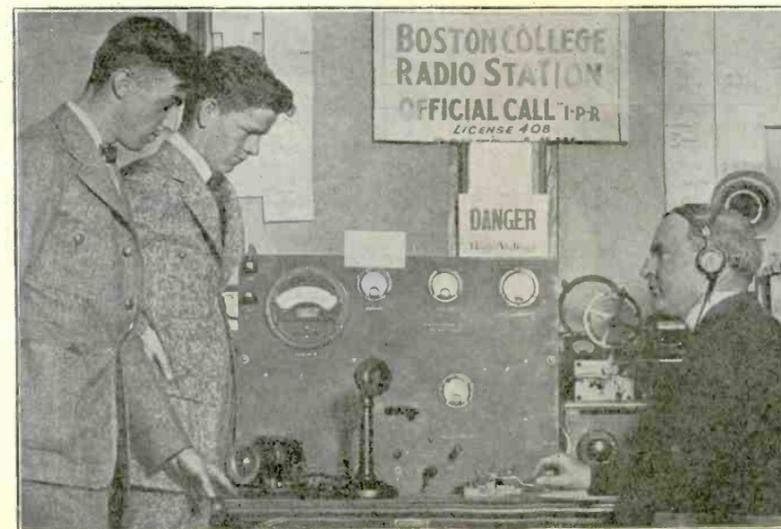


(C. Fotograms, N. Y.)

Marshall Neilan (left) moving picture actor, and Hugh Wiley, author, are hearing something from over the Hertzian waves that sounds good.



(C. Kadel & Herbert News) This ingenious young man has invented a loud-speaker for crystal radio-sets. What was considered almost impossible, Sterling S. Sears, of New York, has accomplished. He utilizes a special electrodynamic receiving unit and a small low-potential battery, and horn.



(Left) Father Lynch, of Boston College, broadcasting a radio invitation to all police chiefs in the United States—from the station in Boston College—to attend the meeting of the International Association of Chiefs at San Francisco. S. J. Connolly, chief operator of the college, and Charles E. Duffy, second operator, are standing by.

(C. International.)

(Right) Here is a real human aerial! A new amplifier recently put out by the Marconi Instrument Company, is so sensitive that messages may be received at sea by a wire wound around the operator's body. The operator photographed is in communication with ships in the North Sea, his body acting as an aerial.

(“P. & A. Photos.”)



## Answers to Readers

I HAVE a receiving-set outfit composed of a tuner made up of two variometers and one variocoupler. The balance of the outfit is composed of a detector tube and three stages of amplification. I am using a UV-200 detector—UV-201 for two stages amplification and UV-202 for the last step. I can get concerts from Pittsburgh and Schenectady very well on the two stages, but can notice no improvement by using three stages. I have 22 volts on the detector tube, and 45 volts on the rest of the tubes. What is the proper voltage and hook-up for this outfit?—Captain C. A. Durkee, Sudbury, Ontario.

The detector tube would operate better between the plate voltages of 17 and 19 volts, the next two amplifiers between 40 and 45. With the last tube, you could experiment with about 90 volts. The last step using this type tube will create quite a bit of distortion, but the proper plate-voltages should be found along with the proper tuning.

Send me a hook-up for a crystal set containing a variable condenser, single-slide tuning coil, crystal detector (galena) and phones.—Thomas Kearny, Central Park, N. Y.

See RADIO WORLD, No. 11, dated June 10. "Single and Two-Slide Tuning Coils," by George W. May, R. E.

I have two steps of audio frequency and a magnavox loud-speaker. Could I obtain the same results if I change the audio to radio frequency?

Could a single wire, 250 feet long, be used for short-wave reception?

Is there a power tube for amplification, which has a filament voltage of six volts?—William Steimbuhler, Titusville, Pennsylvania.

Radio frequency may be employed, but it is merely in an experimental stage. I would suggest that you stick to your audio-frequency set unless you care to dig in and experiment.

A single wire may be used with a short-wave receiver, but a variable condenser may have to be placed in series with the antenna for reducing down to some of the shorter wave-lengths.

There is a power tube on the market. Some amateurs have found that it makes a good amplifier.

What is the difference between a short-wave receiving-set and a long-wave receiving-set?

Why is it that when we get something on it it fades away, but returns only to fade away again?

Why is it that when we get a speaker on that we can hear the voice plain enough, but not sufficient to understand what is being said?—Black and Marshall, Lewisburg, Tenn.

The difference between a short- and long-wave receiver is just this difference. With the short wave, we are able only to pick up messages using wave lengths from 200 to 2500 meters, while with the long-wave receiver we can intercept messages from 2500 meters to most any wave desired. A number of people are under the impression that this short- and long-wave name pertains to distance. This is absolutely erroneous. The wave means the size of the wave in length.

"Fading" is what this is called. When receiving over long-distance—say several hundred miles—obstacles come between the transmitter and the receiver. These effects are more apparent in summer time

than in winter. Unfortunately, there is no way of avoiding this difficulty at the present time. It is what we call "radio fog." It lies in patches. Sometimes it is strong; at other times, weak. If the receiving station is in a line with this fog and the transmitting station, "fading" will be noticed.

I have a regenerative set and am thinking of using 110 volts for the filament, this being taken from the lighting circuit. What I want to be sure of is whether it makes any difference which way the wires are connected to the filament; or, is there such a thing as positive and negative in A.C. current?

In a set employing a V-T detector and two stages of amplification, should I have a rheostat for each unit?—William Nissman, Dixon, Illinois.

You cannot employ a 110-volt lighting circuit with your filaments and secure results. In the first place, if a transformer is used to reduce the power, the hum obtained from the generators of the power station would be heard in the head phones. Stick to the old storage-battery.

The answer to your second question is "No." There is no positive or negative with alternating current. In using two stages, or any number of stages of amplification, always use a rheostat with each tube used.

What is a counterpoise, and why used?—Stephen Ransom, Bay Shore, L. I.

A counterpoise is an artificial ground, such as a large piece of sheet metal, or a number of wires, spread out and insulated from the ground. The counterpoise is just beneath the aerial. In large commercial stations, this type ground was used in preference to the earth and it was claimed that receiving range was considerably increased. Have the counterpoise longer and larger than the copper the aerial contains. The idea is to have the aerial and counterpoise act as a capacity in the circuit.

## Coming Events

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

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

CHICAGO RADIO SHOW, Coliseum, Chicago, Ill., October 4 to 22. U. J. Hermann, managing director, 549 McCormick Building.

INTERNATIONAL RADIO EXPOSITION, Grand Central Palace, New York, December 21 to 30.

KANSAS RADIO EXPOSITION will be held at the Kansas State Fair, Hutchinson, Kansas, September 16 to 22 inclusive. A. L. Sponsler, secretary.

MERCHANTS' COOPERATIVE ADVERTISING AGENCY RADIO SHOW, Robert Treat Hotel, Newark, N. J. Date not set. Will be held this year.

"RADIO DAY," Pittsburgh, Westview Park, August 24. Under auspices of Radio Engineering Society. C. E. Urban, secretary.

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

CLEVELAND RADIO AND ELECTRICAL EXPOSITION, Cleveland Public Auditorium, Cleveland, O., August 26 to September 4, inclusive.

INTERNATIONAL RADIO CONGRESS (Radio Pageant of Progress), Municipal Pier, Chicago, August 6, 7 and 8. John F. Delaney, director of publicity, 7 West Madison St., Chicago, Ill.

KANSAS RADIO LEAGUE SHOW, Convention, W. L. Harrison, vice-president.

## The Radio "Colyum"

WIFE in Washington, D. C., sues husband for divorce. Claims that he spends all his time and money on radio. Friend we told this to says: "Well, it is becoming useful isn't it?"

F. P. A., remarks that Dr. Charles P. Steinmetz should poll a good many votes." He will if he stands for the American ohm.

*The curfew tolls the knell of parting day,  
The lowing herd winds slowly o'er the lea;  
But up to date I haven't quite found out  
What is the matter with my battery B.*

"This business revival," says the Toledo "News-Bee," "could stand a little more shouting." Why not tell the broadcasting stations.

They're all getting the fever. The markets editor of a rural paper wrote it: "Broadcast on Tomatoes" instead of "Forecast on Tomatoes."

No, Rollo, "In Tune with the Infinite," by Ralph Waldo Trime, is not a book on radio.

In Portland, Oregon, arrangements were made recently whereby scores of dances were conducted to the same broadcast music "On with the dance! Let radio be unconfined."

Menu of a South American liner announces in the dessert column: "Radio pie with currents." Who will be the first to ask: "Were the currents picked at sea?"

A fan in St. Louis recorded a radio selection upon a phonograph record and then passed it along, says the Providence, R. I., "Journal." He suggests sending it back to its place of origin by the same process. The first thing we know a fellow talking by wireless around the world will be bothered by the sound of his own voice received at the same time it is sent. And that's going some.

"Former Kaiser Spends Much of His Time Reading Bible,"—headline. Too bad it couldn't have been broadcast to him eight years ago.

If radio enthusiasts keep on inventing these smallest sets, we will be rushing to the Smithsonian Institute to see the prize one installed, most likely, in a mosquito's right ear.

### Our Own Broadcasting Station

OUCH for week beginning July 24, 1922  
7:00—Grandpa's folding bed-time stories. Specially designed by the Grand Rapids Furniture Manufacturers' Amalgamation.

7:22—Very sentimental ballad: "Don't Pay Back That Dollar You Owe Me; Because I Must, Then, Lend You Five."

7:30—Lecture: "When Prohibition Comes," by William Jennings Bryan.

7:43—New York Cabaret Songs (Specially deleted for children.)

8:02—Cornet solo (unrehearsed). "The Cake Eater's Sabbath," by Houdini wearing handkerchiefs.

8:05—Recipes I Have Never Tried: "How to Make a Tripe Omelette without Eggs," by Kit Chenstove.

8:24—The Philadelphia lullaby: "Come Back Before the Scapple Gets too Cold."

8:32—Address: "Are We a Free People?" by the framers of the Volstead act.

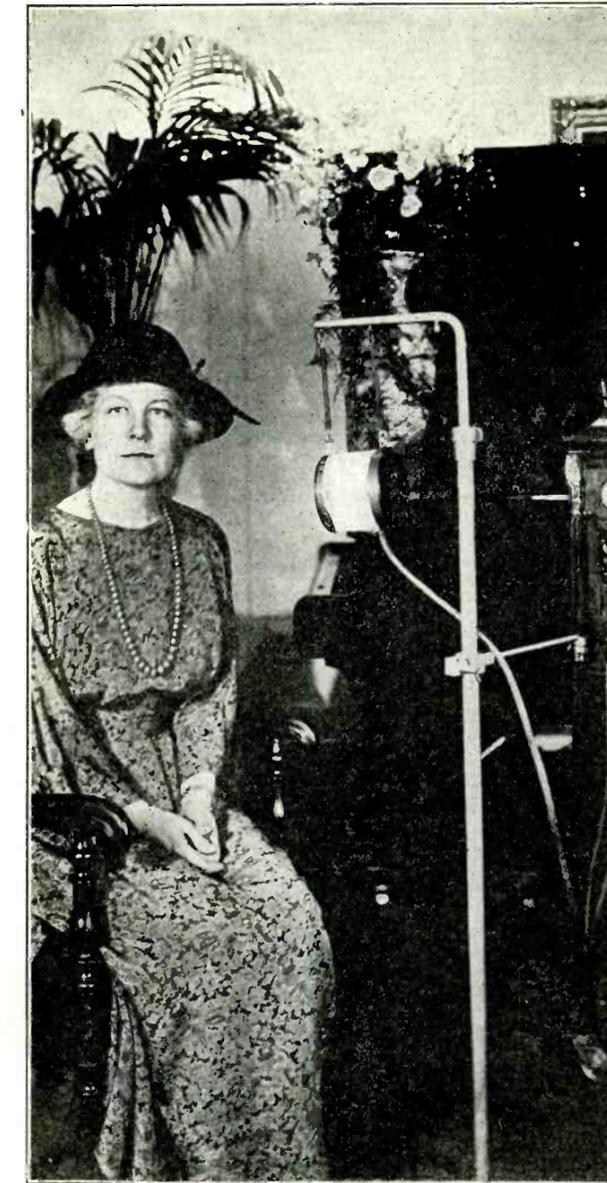
10:00—Correct time from the Zeigfeld chorus.  
ROBERT MACKAY.

## Radio and the Woman *By Crystal D. Tector*

A WOMAN claims, that through radio, she may have discovered the source of life. Mrs. Maud Dickinson, the British scientist, of Brighton, England, states that she has unearthed a certain "minute something," resembling, in form, a "self-created" scarab, or beetle, of ancient Egypt, the properties of which are as marvelous as any that the Egyptians attributed to their chief amulet. It forms crystals outside and away from the bottle in which it is contained. If these crystals are placed in a sealed test tube and the tube is dipped in water, the water acquires, it is said, inexplicable radioactive power.

This is the news cabled to "The Times," New York. It is mighty interesting. We do not know what radio may yet reveal. Its wonders are being brought to light more and more every day.

But to go into Mrs. Dickinson's discovery further: By



(C. Kadel & Herbert News Service). Mrs. August Belmont, formerly Eleanor Robson, actress, who served with the Red Cross in the French, British and American Lines' Hospitals, gave a talk by radio on the "Work of the American Red Cross." Mrs. Belmont is a member of the Central and Executive Committees and is considered one of the most brilliant speakers in America.

means of it composite bodies are reduced to their elements. Flint becomes fine powder. Pain is alleviated. It is even asserted that gold can be made.

The "Daily Express," London, says that a Brighton corporation is using one of Mrs. Dickinson's radioactive cylinders with complete success to clear hot water pipes in their baths of incrustations. Mrs. Dickinson, who is a member of the Royal Institution, when asked how she made her discovery, is quoted as saying:

"I was experimenting with oils for the purpose of making perfume and scented soaps. I noticed on a paper at the top of the water, some small crystal whose presence I could not understand. I took them to chemists in London, and on their suggestion, I fused them, using an ordinary Bunsen burner. There was an alarming and unexpected explosion, which happily did no damage. When it was over I found this fine white crystal like a diamond, and also a particle or vegetable, which I have since found to be the scarab.

"It puzzled me altogether when I examined it under the microscope because of the rays it was emitting and I placed it in a bottle. When this bottle is laid in the sunlight the scarab throws off through the air and through the glass minute crystals which I use."

Mrs. Dickinson says the scarab has moved since she placed it in the bottle eight years ago. She says it is not an insect, and she believes it to be vegetable life. "Perhaps," she added, "it is the source of all life."

Verily, the wonders of radio have only begun.

Did you hear Helen Westley broadcast the work of the Theatre Guild? It was a clear, distinct piece of work. Miss Westley "radios" well. And her story was most interesting.

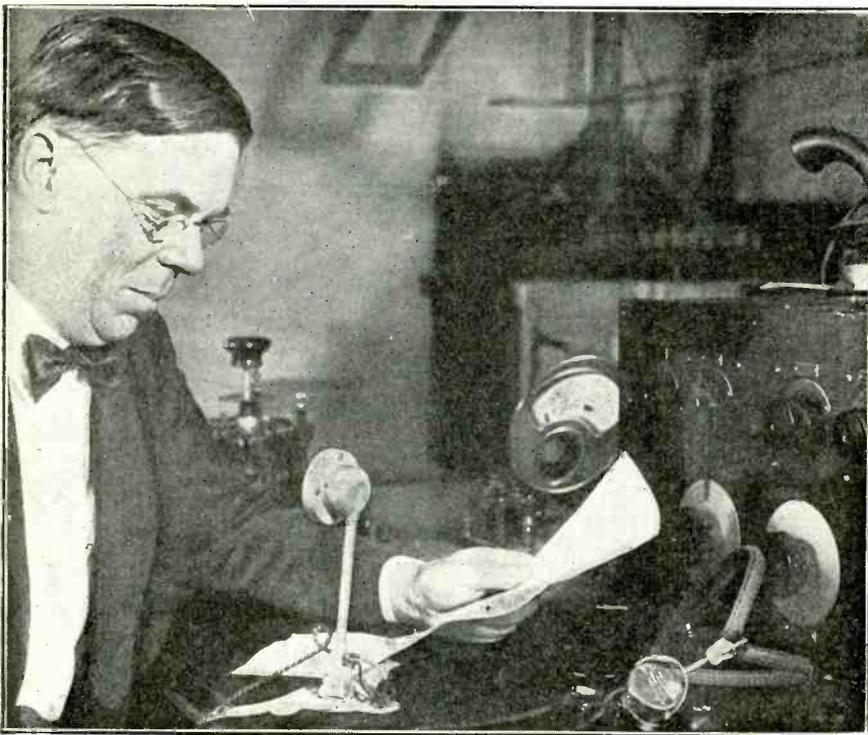
I liked, also, "What Paris Is Wearing at the Races." It not only gave us the latest styles, but a lot of French atmosphere as well. These fashion talks, by radio, are most interesting to us women. I know many with receiving sets who tune in on this particular bit of broadcasting whenever it is announced.

Well, I am off to the woods for a month. I've just finished packing up my set. We are to have a bungalow near Lake Hopatcong. I'll have some interesting radio matters to divulge from there.



(C. Kadel & Herbert News Service). The scope of radiophone is becoming so broad that each day reveals new possibilities for its use. An interesting instance of this is revealed in connection with entertainments for the blind. Realizing this, the New York Association for the Blind installed a very fine radio receiving-set with two stages of amplification and loudspeaker at its headquarters, known as "The Light-house." The blind girls there are so enthused over it that it is not uncommon to see them walk up to the set and carefully examine it with their fingers endeavoring to learn just what makes it "take music from the air." The photograph shows a group of totally blind girls listening to a radio concert.

# Makes Radio Fans of Farmers



(C. Underwood & Underwood, N. Y.)  
The man in the photograph is pleased—pleased because he is doing the farmers of the United States an invaluable service. He is W. A. Wheeler, in charge of the radio service of the Department of Agriculture. He is in charge of the nation-wide radio agricultural service, which is broadcasting weather, crop and market reports to every radio receiving set in the United States.

## Idaho Joins Broadcasting States

**A**MONG twelve broadcasting stations licensed by the Department of Commerce, during the past week, two are in Idaho, one of the five States which had no broadcasting station. They are operated by an electric shop in Moscow and a firm in Lewiston. Wyoming will soon be in the broadcasting field, it is reported, and then there will be but three States without radio stations—Mississippi, Kentucky, and Delaware.

Los Angeles appears to be pretty near the saturation point so far as radio broadcasting is concerned. With twenty-nine stations in its vicinity contributing to the aerial barrage of news, music, and entertainment, time schedules and wave assignments will be necessary soon.

The newly licensed stations include:  
KFAR—O. K. Olsen, Hollywood, Calif.

KFBA—Ramey & Bryant, Lewiston, Idaho.

WHAG—University of Cincinnati, Ohio.

WHAH—J. T. Griffin, Joplin, Missouri.  
WHAI—Radio Equipment & Mfg. Co., Davenport, Iowa.

WHAJ—Bluefield Daily Telegraph, West Virginia.

WHAK—Roberts Hardware Co., Clarksburg, W. Va.

WHAL—Phillips, Jeffrey and Derby, Lansing, Mich.

KFAN—Electric Shop, Moscow, Idaho.  
KFAP—Standard Publishing Co., Butte, Mont.

KFAX—City of San Jose, Calif.

WHAM—School of Music, Rochester University, New York.

(Applied)—Galveston Tribune, Texas.

## Newspaper Broadcasters of the United States

Daily News Printing Co., Canton, O.  
Detroit News, Michigan.  
Examiner Printing Co., San Francisco.  
Fort Worth Record, Texas.  
Sacramento Bee, California.  
New Orleans Item, Louisiana.  
Los Angeles Times, California.  
Seattle Post Intelligencer, Washington.  
Minnesota Tribune Co., Minneapolis.  
Oregonian Publishing Co., Portland.  
Palladium Printing Co., Richmond, Ind.  
Post Despatch, St. Louis, Mo.  
Register and Tribune, Des Moines, Ia.  
Ridgewood Times, New York.  
Rochester Times Union, New York.  
Atlanta Journal, Georgia.  
Atlanta Constitution, Georgia.  
Herald Publishing Co., Modesto, California.  
Los Angeles Examiner, California.  
Modesto Evening News, California.  
Spokane Chronicle, Washington.  
Times Picayune, New Orleans, La.  
The Desert News, Salt Lake City, Utah.  
Republican Publishing Co., Hamilton, Ohio.  
Detroit Free Press, Michigan.  
Newburgh News Print. & Pub. Co., N. Y.  
Times Despatch Pub. Co., Richmond, Va.  
Tribune Pub. Co., Oakland, Calif.

The Star Telegram, Fort Worth, Tex.  
Bakersfield Californian, California.  
Daily States Pub. Co., New Orleans.  
Pasadena Star News Pub. Co., California.  
Herald Pub. Co., Klamath Falls, Wash.  
Kansas City Star, Missouri.  
Quincy Whig Journal, Illinois.  
Quincy Herald, Illinois.  
Tampa Daily Times, Florida.  
The Tribune Inc., Great Falls, Mont.  
Arizona Daily Star, Tucson, Ariz.  
Florida Times Union, Jacksonville.  
Hartford Courant, Connecticut.  
Muskogee Daily Phoenix, Oklahoma.  
Telegram Pub. Co., Salt Lake City, Utah.  
Fresno Evening Herald, California.  
Bellingham Publishing Co., Washington.  
Star Bulletin, Honolulu, T. H.  
Baltimore American and News, Md.  
Dallas Morning News, Texas.  
Daily Drivers Journal, Chicago, Ill.  
Daily Argus-Leader, Sioux Falls, S. D.  
Houston Chronicle, Texas.  
St. Cloud Times, Minn.  
Glendale Daily News, California.  
Miami Daily Metropolis, Florida.  
Southern American, Ft. Smith, Ark.  
South Bend Tribune, Indiana.

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Radio brings it  
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R-3 Magnavox Radio with 14-inch horn, is ideal for use in homes, offices, etc.

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set is complete  
without the  
**MAGNAVOX**  
Radio

To secure maximum power input for your Magnavox Radio, add Magnavox Power Amplifier Model C (2 or 3-stage) designed especially for power tubes.

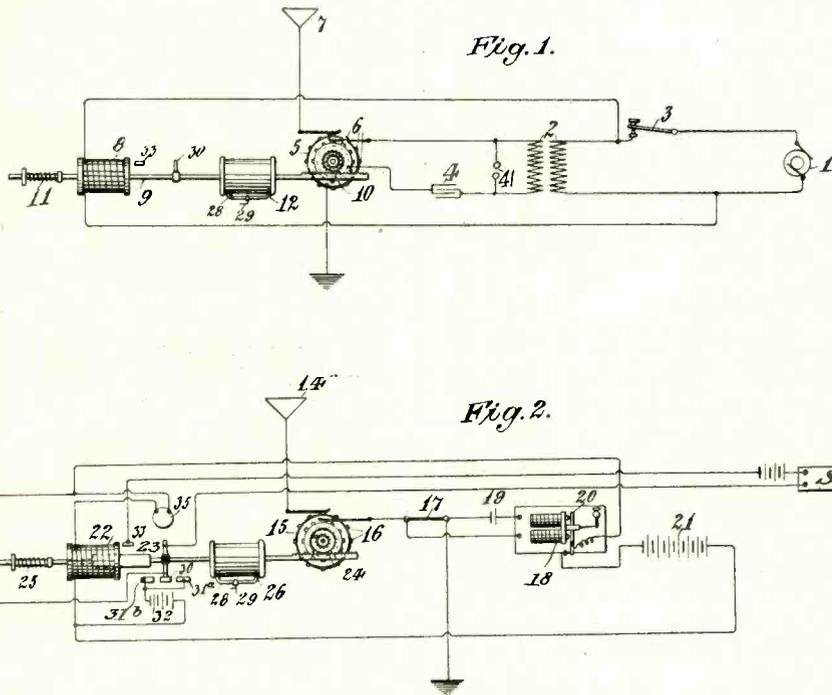
Any radio dealer will demonstrate, or write us for descriptive booklet and name of nearest dealer.

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Oakland, California  
N.Y. Office: 370 Seventh Ave.



# Radio Patents

## RECENTLY ISSUED



Schematic diagram illustrating the circuits of the invention of John Hays Hammond, Jr., to perfect conversation, without interference, between two stations, regardless of the number of stations on the same wave-length.

### To Prevent Interference of Messages on Same Wave-length

No. 1,420,257. Patented June 20, 1922.  
 Patentee: John Hays Hammond, Jr., Gloucester, Mass.

IN transmitting wireless messages interferences of different messages often occur when two independent operators send their messages by chance in the same wave length. When this occurs the message being received becomes unintelligible as the two messages become mixed together. The object of this invention is to provide means whereby a message may be sent in impulses

of different predetermined wave length succeeding each other in a predetermined order.

The receiving instrument in Mr. Hammond's invention, is arranged so that it is rendered responsive successively to the different wave lengths in the same predetermined order. In this way a message which passes between the operators is composed of elements constantly changing in wave length. Hence it becomes impossible for an operator of another instrument to interfere unless he is sending with the same system of wave lengths and order of succession.

With this system two operators may converse as in a code without interruption or interference.

### Electrostatic Condenser to Prevent Rotor Accidents

No. 1,420,485. Patented, June 20, 1922.  
 Patentee: George F. Johnson, Springfield, Ill.

IT is a matter of common knowledge that the storage capacity of an electrostatic condenser is due, among other things, to the quality of the dielectric, that is, the specific character of the dielectric, to the extent of the space separating the adjacent plates, so that it will have a greater storage capacity the closer plates are together; and by varying the space separating the two armatures at any point, the storage capacity is increased and decreased, and the variation in capacity in a condenser in use in a wireless telegraph circuit renders the condenser unreliable in establishing and maintaining a reliable adjustment.

The capacity of a condenser depends on the exposed area of the two plates, or armatures, with respect to each other; by decreasing the exposed area, the storage capacity is decreased. It follows

from this that if you vary the exposed area of one plate, or armature, with respect to the other plate, or armature; or if you vary the distance between the two adjacent armatures, you change the capacity and, therefore, the adjustment. It is convenient to join two series of thin metal plates and to interleave one series of plates with respect to the other. It is common to do this by fixing one series of plates in stationary position and pivoting another series of plates, so that one series of semicircular plates interleave with another series of semicircular plates; each arrangement, one fixed and the other movable, is called an armature. The movable set is on an arbor adapted to be rotated by a handle or button on the exposed exterior. It is possible to adjust the storage capacity of a condenser by varying the extent of exposure of the surface of one armature with respect to that of the other, and it is very important to cause the movable armature to move so true and accurate that one plate never makes contact with the other and, in moving to expose more or less surface, to move without making

contact or irregular variations of distance between the adjacent surfaces of the two separate armatures."

"In my improved condenser," says Mr. Johnson, "one armature, or stator, is firmly fixed in position and the other armature, or rotor, is moved so true and accurate that there is no variation in parallelism between the interleaved plates.

The invention provides improved

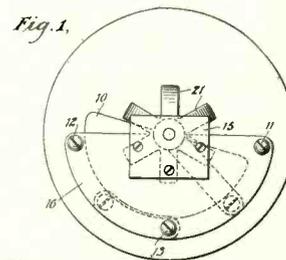
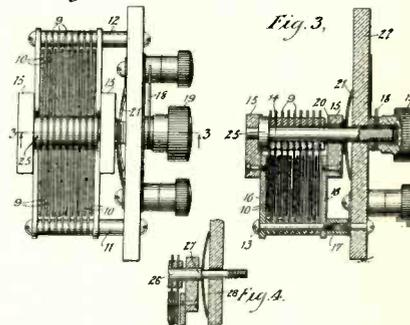


Fig. 2.



Schematic diagrams of the Johnson electrostatic condenser which, when rotated, may prevent short circuits. The invention provides improved means to protect the movable rotor from accident, against any adjustment.

means for maintaining the movable or rotor, member of the condenser against accidental movement after adjustment. It also provides a condenser with a star or other shaped spring exerting frictional or elastic contact to hold the plates of the movable member, or rotor, of the condenser accurately and permanently centered with reference to the plates of the stationary member.

### Radio Would Have Saved Atlantic City Express

RADIO would have saved the Atlantic City express.

"There is no excuse for the terrible loss of human life in that most recent of railroad disasters.

"Science has come to the aid of transportation. It is here, ready to serve whenever called upon, and to fail to accept its helping hand, is as close to actual criminality as any responsible official should care to approach."

The name of the man who uttered the foregoing pregnant sentences is omitted because he is a high official of one of the leading radio equipment manufacturers in America and does not wish to become embroiled in a controversy. If there comes to the reader of the statement a sufficiently energized desire to verify it, the name of this official will be given, in confidence, and he may be consulted on the subject. He went on to declare himself most emphatically on the subject, after the writer of this had suggested that radio would have saved that train and any other that was in danger from a similar cause.

"Every railroad train in America should have its radio equipment," he continued, "especially those that carry passengers. It is criminal to omit it. Its value has been proved by the lives it has saved at sea. Eugene Shade Bisbee in *The Globe*, New York.

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11	.00025	\$2.50	\$2.00
21	.0005	\$3.25	\$2.50
43	.001	\$3.90	\$2.90

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30 OGDEN ST.  
Newark New Jersey

**RADIO WORLD**

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Advertising rates on request.

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**IMPORTANT NOTICE:**

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

**Talks Radio, Not Politics**

THE Charleston S. C. Mail tells of a novel political campaign being conducted by R. B. Howell, Republican national committeeman from Nebraska, a candidate for Congress. The novelty is this: Mr. Howell's speeches contain nothing about politics and nothing about the speaker himself. The topic is radio.

He talks about the use of the radio on the farm and in the isolated home, and the farmers, their wives and their sons and their daughters are flocking to hear him. He interests his audience, and they do not stop to ask if he is progressive or reactionary, or what not. They know he is a live man who is up-to-date, because he talks about the most up-to-date thing in the world to-day. Then, charmed with the new message, so different from anything which they have heard before, with their imagination given free play, his auditors go home and there is no end to what they may picture to themselves, as to what good will result from having in the Senate of the United States one who is so competent, and one who, they think no doubt, will in some way use his power to help them in every way.

\* \* \*

**Electricians Must Know Radio**

ELECTRICIANS, if they are to come in contact with radio, should make a study of radio. Of course, to merely install a lightning switch or arrester requires no research; but to put a radio set into perfect operation is not so simple.

Electricians fail to grasp the fact that radio is not a simple mechanical problem like wiring a house yet so they do not study it except by observation or by blind experimenting. Yet some electricians will advise beginners and due to their profession are heard with confidence.

It would be well for electricians to stick to straight electrical work until they know something about radio from study. Then let them go to it for all it's worth.

**-A L-O-U-D S-P-E-A-K-E-R**

In a jiffy so all can hear by using the "PHONE-ADAPTOR," fits Edison, Victor, Sonora, Columbia and Pathe phonographs. Threaded to fit the leading makes of headphones. Specify make of phonograph and headphones you have. Satisfaction guaranteed or money promptly refunded. Seat postpaid anywhere. Nickel finish \$1.00; Gold finish \$1.35. **SEND FOR YOURS NOW.** Dealers write for literature and attractive discounts.

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1493 Broadway New York City

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## New Hoover Committee to Regulate U. S. Broadcasting

AT the request of Herbert Hoover, Secretary of Commerce, each of the ten Government Departments has appointed representatives to an Interdepartment Advisory Committee on Governmental Radio Broadcasting. There are in addition representatives of the Office of the Chief Coordinator (Bureau of the Budget), and the United States Shipping Board. The membership of the committee is as follows:

Agriculture—W. A. Wheeler, Radio Development section.

Commerce—Dr. S. W. Stratton, director, Bureau of Standards.

Interior—O. P. Hood, chief mechanical engineer, Bureau of Mines.

Justice—S. Ely, chief clerk.

Labor—A. E. Cook, office of the Secretary.

Navy—Commander D. C. Bingham, Naval Communication Service.

Post Office—J. C. Edgerton, Air Mail Division.

State—W. S. Rogers, International Communications Conference.

Treasury—L. J. Heath, Public Health Service.

War—Major General G. O. Squier, Chief Signal Officer.

Chief Coordinator—Captain H. P. Perrill, asst. coordinator, Bureau of the Budget. United States Shipping Board Emergency Fleet, corporation—F. P. Guthrie, head of radio division, Operating Department.

The chairman of the committee is Dr. S. W. Stratton; secretary, Dr. J. H. Dellinger, chief of the Radio Laboratory, Bureau of Standards, Department of Commerce.

In accordance with recommendations of the committee, an experimental system of government broadcasting by "primary" broadcast stations has been established, utilizing only previously existing government stations and equipment. The "primary" stations are stations which broadcast official government news by continuous-wave (code) telegraphy for the purpose of furnishing this information to local broadcast stations for rebroadcasting, by radiophone. The eight stations thus far included send out daily bulletins of government news, mostly agricultural market data. They are: Arlington, Va., (Navy, 5950 meters); Great Lakes, Ill., (Navy, 4900 meters); Washington, D. C., (Post Office, 1980 meters); Omaha, Nebr., (Post Office, 2500 meters); North Platte, Nebr., (Post Office, 4000 meters); Rock Springs, Wyo., (Post Office 3000 meters); Elko, Nev., (Post Office, 3000 meters); Reno, Nev., (Post Office, 3200 meters).

The committee has made a preliminary classification of the kinds of material

which the several departments may have to broadcast by the primary stations, viz:—market prices and data, weather and hydrographic news, standard radio-signals—such as wave length and time signals—executive announcements, statistics, and educational material. One of the functions of the committee is to advise regarding priority of the types of Government material to be broadcast and regarding schedule of operation.

The committee has recognized the principle that radio must be used primarily for types of service that can not be as satisfactorily given by other means of communication, and that, therefore, radio broadcasting should not be used in general where wire telegraphy or telephony, or printed publication, would be as satisfactory. It is possible that the scope of the committee's activities may be extended beyond the subject of broadcasting, and that the committee will act in an advisory capacity to the Secretary of Commerce in matters of government radio regulation, and, further, will consider all radio questions of interdepartmental interest.

## Trade Notes

### New Eby Binding Post



THE H. H. Eby Manufacturing Company, 605 Arch Street, Philadelphia, has added another design to its line of metal binding posts. This new style is the same in all respects as the type this firm is now marketing, with the exception that, instead of having a tapped base to take a standard machine screw, it has a solid threaded stem. It is made in three sizes, and is known to the trade by the code words SERGEANT "SS," BUDDY, and MIDGET; the first  $\frac{1}{2}$  inch in diameter with  $\frac{1}{8}$  x 10-32-inch stem, the second  $\frac{3}{8}$  inch in diameter with  $\frac{1}{8}$  x 6-32-inch stem, and the latter 5-16 inch in diameter with  $\frac{1}{8}$  x 4-36-inch stem. This design permits the posts to be mounted more quickly, by simply screwing a hexagon nut on the stem. The company advises that it is now in production on all the sizes mentioned.

### Chicago's Next Big Radio Event

THE fastest radio operators in America, if not in the world, together with the world's greatest experts in the radio development and construction field, are to attend the International Radio Congress, Chicago, August 6, 7 and 8, held in connection with the Pageant of Progress at Municipal Pier.

Major J. O. Mauborgne, signal officer of the Sixth Army Corps Area, located at Chicago, and associate with Major General George O. Squier, chief signal officer of the United States Army, is president of the congress. He will preside at the main sessions, of which there will be five. The details of arrangement are in the hands of a committee of Chicago radio men, headed by Commissioner George E. Carlson,

department of electricity of the City of Chicago, and head of the Chicago Municipal Radio station, as chairman.

One of the features of the congress will be a "radio marathon" for a diamond medal, to be held Sunday morning, August 6, and participated in by the fastest receiving operators that can be assembled. The rules of the contest as outlined by the officials of the congress, and by Lawrence R. Schmitt, United States Inspector for the Ninth Radio District, who will supervise the event, including the following:

The diamond medal, valued at several hundred dollars, is donated by Commissioner Carlson, and applications for entry should be directed to him at Room 614, City Hall, Chicago. Applicants must give their names, addresses, business connection, age, and previous records. The contest will be an elimination affair.

### Pignolet Radio Voltmeter

The amateur user of regenerative and amplifying radio receiver sets, finds it indispensable to have some means to tell when the filament current is adjusted so as to get the best reproduction, as well as the longest life, from his tubes. In addition, there is need for testing A and B batteries, circuits, coils, condensers, etc., especially if trouble develops and the set does not work well.

These tests have usually required several instruments, such as ammeters in order to measure the filament current, low-reading voltmeters for the A batteries and high reading voltmeters for the B batteries. The Pignolet two-range voltmeter has been designed specially for testing of receiving sets, and will make all tests at a considerable saving.

The instrument is of the movable coil, permanent magnet, dead-beat type, and is complete with corrector for zero errors. The base of the portable meter is of polished wood  $4\frac{1}{4}$  inches in diameter. The scale is 3 inches long, with widely spaced divisions permitting close readings on both ranges.

The low range reads from 0-7½ volts in fifth-volt scale divisions, easily readable in tenths as the divisions are wide and half divisions can be accurately estimated even by an inexperienced user.

The high range of the meter is from 0 to 150 volts, and is designed specially for testing and detecting weak B batteries that would interfere with the operation of the set, testing plate voltages, circuits, coils, condensers, etc.

The Pignolet instrument is furnished, also, in switchboard models for mounting on panels; but the portable type is recommended, as with it the connections for the various tests are more easily made.

## New Firms and Corporations

### New \$21,000,000 Corporation

Among the charters recently filed in Dover, Delaware, is that of the National Radio Consolidation, New York, for the purpose of manufacturing radio equipment. The capital stock of this new corporation is \$21,000,000. The United States Corporation Company, is the holding Company.

Electric Merchandise Service Corp., purchasing agents, \$75,000; Philadelphia, Pa. (Attorney, Corporation Guarantee and Trust Company.)

Monarch Appliance and Radio Corp., Manhattan, \$10,000; A. J. Kollin, L. Goldberg.

Electra Radio Corp., Buffalo, makes wireless instruments, \$50,000; H. L. Jauch, W. M. Taylor, F. J. Maloney. (Attorneys, Dirnberger & Moore, Buffalo.)

Radio Supply Company. H. A. Daake, Hornell, N. Y.

The Radio Shop, Batesville, Ark. Mr. W. H. Walkup, of this company, writes: "We have been amateurs for four years, and lately started to manufacture and sell radio supplies. Business is extra good."

Ayer & Bullard, radio sets and supplies, Dexter, Maine.

# Last-Minute Radio News! U. S. Radio Compass Station

*Important Items Tuned in by Radio World Reporters  
Just Before Going to Press*

Richard E. Enright, police commissioner of New York City, now in London, cables that fingerprints and photographs of crooks will be sent by radio from one part of the world to another in the near future.

The Scandinavian-American liner, "Hellig Olav," and the Norwegian-American steamer, "Bergensford," arrived in New York half an hour apart. During their eleven days at sea, neither steamer was more than 75 miles from the other. During the journey passengers on both vessels freely conversed by radio.

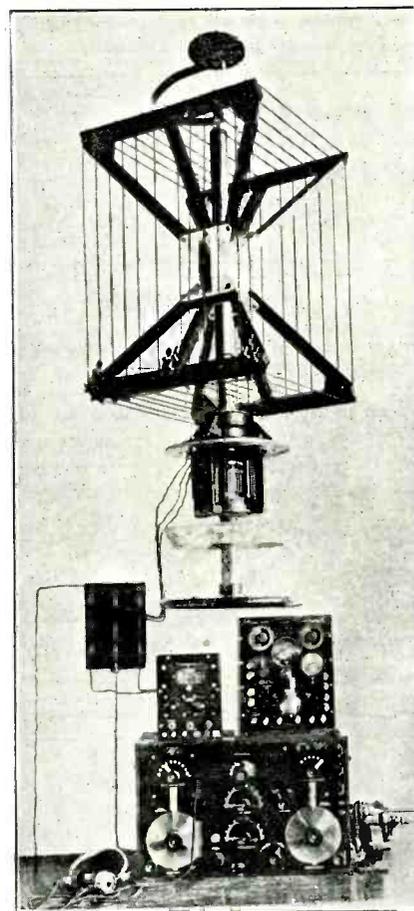
Robert F. Gowen, of Ossining, New York, radio expert, has returned from China. He reports that the use of the radiotelephone is rapidly spreading over that country. "Its use is largely commercial," says Mr. Gowen.

William M. McWilliams, of Morristown, Ohio, is conducting his political campaign entirely by radio.

The New York City Broadcasting Station, says Grover D. Whalen, commissioner of Plant and Structures, will be in operation before the first of September.

Reports from New Orleans indicate a growing interest in radio all over the South. Applications for broadcasting licenses were sent to Washington from a dozen quarters, during the past week.

The Consolidated Radio Corporation, to manufacture radio apparatus, has been incorporated at Dover, Delaware, for \$1,000,000. Attorney, The Delaware Registration Trust Co.



## Business Outlook Is Steadily Improving

FAILURES and failure liabilities continue to ebb, the latter more quickly than the former, and comparisons with a year ago, says "Bradstreets," though still unfavorable, tend to improve as the months advance and the unmistakable improvement in underlying conditions becomes more manifest. June failures in number were the smallest recorded in any month since last September, while liabilities were the lightest of any month since October, 1920. Failures and liabilities for the second quarter of this year also make an especially favorable contrast with the totals for the first three months of this year.

The totals for the half year ending with June 30, however, constitute new high records in Bradstreet's history of failures. Evidences of continuance of strain in business are found in the high proportion of assets to liabilities reported in the first half year, which have been exceeded only twice in a period of forty-three years. The preponderance of failures at the South is still a matter of note, but the proportion of liabilities in the Middle Atlantic States is slightly in excess of that at the South.

There were 1,656 failures in June, a decrease of 6.7 per cent. from the total for May and of 40 per cent. from the peak point of January this year, but 19 per cent. in excess of June a year ago. Liabilities for June were \$38,412,782, a decrease of 20 per cent. from May, and of 30 per cent. from June a year ago, while only slightly more than one-third those of the peak month of January. Failures and liabilities in June were about four times the number and value of those of the low-water month of June, 1919.

The improvement noted in the past three months is shown by the fact that failures, which totaled 5,385 in the second quarter, were 24 per cent. below those of the first quarter, 13 per cent. below those of the fourth quarter of 1921, and 12 per cent. below the total

in the first quarter of 1915, although 30 per cent. more numerous than in the second quarter of 1921, and the fourth largest quarterly total ever recorded. Liabilities for the second quarter, \$159,706,654, were 31 per cent. less than the peak liabilities in the first quarter of this year and 3 per cent. less than in the second quarter of 1921.



(C. Kadel & Herbert News Service.)

The use of the radio compass has revolutionized navigation, especially as it pertains to handling ships in dense fog and warning the navigators of dangerous waters. Many of these stations have been erected along our coast lines. The range of these compass stations is over 200 miles. Some of these radio stations are situated at isolated points, but are giving valuable assistance to vessels of the world. The upper photograph shows the Navy radio compass used in stations to warn vessels of dangerous waters and to direct boats in fog. The lower photograph shows the Naval radio compass station at Cape Hinchinbrook, Alaska. This is a typical view of the exterior of a naval radio compass station and indicates the desolate locations in which it has been found necessary to establish these stations to protect vessels in dangerous waters.

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RADIO PUBLICATION**

Times Building, New York City, June 9, 1922.

RADIO WORLD, 1493 Broadway, New York City.

It may interest you to know that of all the radio publications handled on our  
stand in the Times Building, more copies of RADIO WORLD are sold by us each  
month than of any other radio publication.

Yours truly,

(Signed) David J. Farley, Times Bldg., Newsstand.

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and Canadian Postage.

**Fifteen Naval Radio Shore-  
Stations on Great Lakes**

THREE new radio-compass stations,  
in Michigan, have been completed  
by the United States Navy Department.  
They are at Grand Marais, Whitefish  
Point, and Point Detour, where they will  
serve the ships that pass back and forth  
through Sault St. Marie, from Lake  
Superior to Lake Huron—a dangerous  
passage, marked by many wrecks caused  
chiefly by fogs.

With the three compass-stations in  
operation, it should be a simple matter  
for all mariners to secure frequent and  
exact compass bearings and avoid adding  
to the "grave yard" of the Great Lakes.

A Naval subchaser on a recent cruise  
into Lake Superior, made a test run for  
the calibration of the stations at Grand  
Marais and Whitefish Point, which work  
together off the northwestern entrance  
of the strait, and reported the job com-  
pleted and the stations ready for work  
as soon as the personnel is assembled.

Naval radio stations guard all the  
ships on the Great Lakes.

It is virtually impossible for mariners  
equipped with wireless to get lost in the  
Lakes, to-day. The completion of the  
three stations finishes a chain of fifteen  
Naval shore-stations from Duluth to  
Buffalo. A ship may now keep in con-  
stant touch with its home port provided  
its headquarters is fitted with radio.  
Both owners and operators, it is said,  
are rapidly coming to install radio on  
their ships, several companies having  
their entire fleets and home stations so  
equipped, many of them through the pur-  
chase of surplus Naval radio-equipment.

The use of the Naval radio stations at  
Alpena, Buffalo, Chicago, Cleveland,  
Detroit, Duluth, Eagle Harbor, Great  
Lakes, Mackinac Island, Manistique, Mil-  
waukee, and Whitefish Point, for relay  
purposes, saves delayed and expensive  
communication when contact with the  
owner or operating office is necessary.  
Soon every ship on the Great Lakes will  
be equipped with radio just as all transat-  
lantic steamers are equipped for safety  
and convenience.

Subscribe for RADIO WORLD. \$6.00 a  
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9 CHURCH ST., NEW YORK, N. Y.

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EVERY NOTE  
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The Forerunner of KDKA

ALMOST any radio amateur who owned a set capable of good range reception, prior to 1921, is familiar with the history of station SXX of Wilkensburg, Pennsylvania, operated by Frank Conrad. These amateurs know of the phonograph concerts broadcast by Mr. Conrad during a period of a year and which were heard as far West as the Catalina Islands. They may recall hearing his request for records one night and may have sent him one, for there were 500 records received in answer to his plea. This was early in 1920, before the radio broadcasting craze had swept the country and was, possibly, the first indication that radio broadcasting had some wonderful possibilities as a medium of entertainment.

SXX has not been very active the past two years; for KDKA, of the Westinghouse Electric & Manufacturing Company, at East Pittsburgh, has taken its place as the broadcaster of Pittsburgh and environs. But even so, little SXX was the forerunner of powerful KDKA and actually was the indirect means of bringing the attention of H. P. Davis, vice-president of the Westinghouse Company, to the radio phone as a means of popular entertainment and instruction.

Many radio amateurs who know Frank Conrad as a broadcaster of ability may not know that he is assistant chief engineer of the Westinghouse Company and besides being the inventor of a great deal of radio apparatus including a combined receiving and transmitting set for the United States Signal Corps which was used in France during the World War and a short wave meter, is one of the most prolific electrical inventors of the present day.

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

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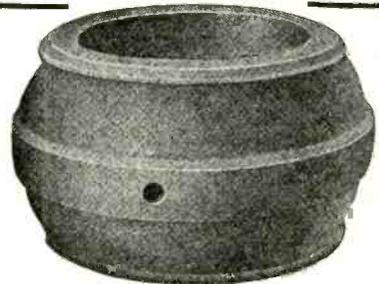
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DL—100.. 1.71 each	DL—750.. 2.59 each
DL—150.. 1.76 each	DL—1000.. 2.86 each
DL—200.. 1.82 each	DL—1250.. 3.30 each
DL—250.. 1.87 each	DL—1500.. 3.85 each

### IDEAL VARIABLE CONDENSERS

43 Plate.....	\$4.75 each
23 Plate.....	3.75 each
11 Plate.....	3.00 each

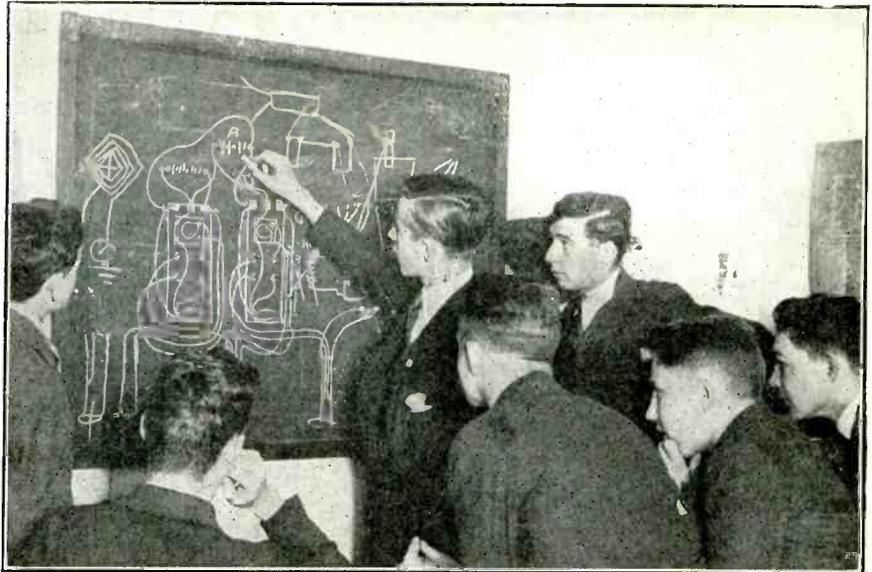
- Viking Vario Coupler.....\$5.00
- Viking Vernier Condensers.....\$1.50
- Zeta Radio Frequency Transformers.....\$6.00
- Genuine 2-Fil Audiotron Tubes.....\$6.00
- Adapters (for above).....\$1.50
- Metal Dials 3/4" diam. 1/4" shaft.....90c.
- Moulded Phone Condensers, .002 mfd..75c.

Dealers will find it worth their while to write for attractive discounts on these articles and others we carry in stock

### Viking Radio Company

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(C. Paul Thompson, N. Y.)

In a big radio-supply house in New York City, the clerks and salesmen formed a radio class. The proprietor gave them fine assistance with a new blackboard and other accessories. The young men went at their studies with a will—and, as a result, the firm's sales increased.

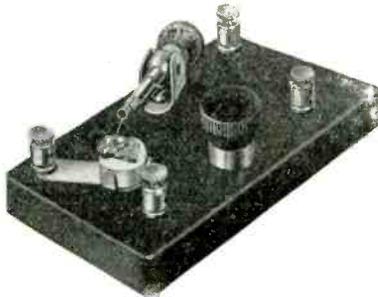
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PRICE

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IMMEDIATE SHIPMENT

MAIL ORDERS GIVEN PROMPT ATTENTION

## ARJAY RADIO PRODUCTS

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NEW YORK CITY

### "Scare" Advertising

EVERY one agrees that radio receivers used in connection with outside aerials should be properly protected from lightning, although the hazard is small, since the aerial is no more dangerous than the eaves-trough or the drain-spout.

Some manufacturers of lightning arresters would have the public believe radio receivers are especially susceptible to lightning discharges. Their advertising copy indicates designs to scare radio enthusiasts into purchasing arresters. Great flashes are shown, with burning houses and other intimidating pictures. One would think that the thunder god has a special grudge against radio receivers, and that he is sure to single them out and smash them all unless they are protected with lightning arresters.

This sort of advertising has a very bad effect upon radio in general. Few laymen realize that there is no increased danger from lightning, and upon seeing an advertisement of this nature become unduly excited. Some, indeed, may refrain from buying apparatus because of their fright.

Lightning arrester manufacturers are hurting the very business that is giving them a livelihood. Their seeming attempt to coerce readers into buying arresters hurts the sale of all radio apparatus. It is well to develop a wholesome respect for lightning, but there is no reason to lash this into a chronic fear.—"The Evening Mail Radio Review."

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



## The Famous "Grewol" Radio Detector Complete

as illustrated costs you only \$2.00. Used the country over by thousands of Radioists. Always set and ready, fully protected from dust and dirt, gives the best results.

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NEWARK, NEW JERSEY

## Radio Tanks for Army and Marine Corps

RADIO-controlled tanks is the latest step in government radio work for the Army and, probably, for the Marine Corps. To date, no definite plan has been evolved by radio engineering experts; but after the Navy successfully operated the "Iowa" by radio control, the leading scientists of the Army believe radio-controlled tanks are a certainty.

One out of every eight or ten Army tanks has a radio transmitting and receiving set, enabling this leading, or control, tank to keep in close touch with headquarters constantly and to communicate by signals with its fellows in battle. Such efficient liaison is a tremendous step in military science, as the tanks could also serve as message centers for infantry troops, as well as spot artillery fire, and keep headquarters posted as to the position of the advance lines. That all Army tanks and the Marine Corp will be equipped with radio communicating outfits, is believed possible before January 1, 1923. At the recent maneuvers at Gettysburg, the Marines used some Army tanks, one of which was a "master tank" equipped with radio.

While the method of the radio-control of the battleship "Iowa," by the "Ohio," last summer during the bombing maneuvers, has been carefully guarded, and the details of radio-controlled automobiles never revealed, it is understood that Army radio experts have all the necessary principles well in hand and that the first radio-controlled tank will be christened before many months have passed; then American forces, will have one of the most efficient military weapons—one that needs no personnel. During the World War, the tanks used did not even have radio communication, but signaled visually, or reported by messengers or runners.

strongly and are then workable to the limit of the station's night range.

There are several places at sea where intervening mountains prevent the reception of signals from stations at the other side. The Peak of Teneriffe acts as an effective "blanket" between the Teneriffe station and vessels approaching from the north. At Vigo, in Spain, a wireless station was moved to overcome a similar difficulty. Vessels sailing from Cape Town to Durban cross an ocean stretch where the Cape Town signals are unheard.

On the other hand, there are certain extraordinarily sensitive areas in which signals can be read with unusual clearness.

It is expected that wireless broadcasting on short wave-lengths will provide interesting data in regard to "dead" or "screened" spots in England, as it has done in America.—Special to *The World*, New York.



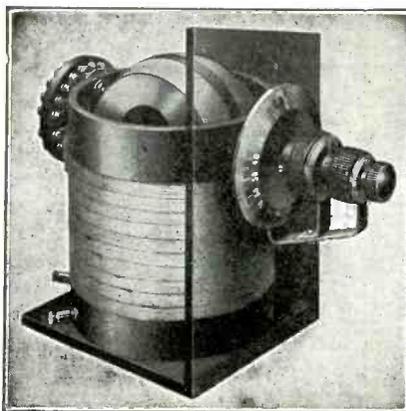
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 --is what your Genuine Chinese Good Luck ring brought me," says F. M. ... Hundreds tell us our ring brought success in love, business and financially. Ours is the genuine and original ring, stamped inside with the Chinese characters "彩好" (Cǎi Hǎo). Believed by Ancients to bring Good Luck, Health, Happiness, Prosperity. Solid Sterling Silver. Price, Postpaid, Cash with order \$1.50, or C. O. D. \$1.50. THE ZANZIBAR CO. Dept. 288 109 West 42d St. New York City

### VARIO TUNER

Especially wound for long Distance Radiofone Reception Supersensitive Circuit "Circuit Finished with Each Order" Price, \$5.00 Elizabethtown Radio Equipment Co. Elizabethtown, Pa.

Subscribe for RADIO WORLD. \$6.00 a year, \$3.00 six months, \$1.50 three months.

### An Epoch-Making Advance in Vario-Couplers



Selector Vario Coupler—3 units in one. Pat. Pending. Oct. No. 970 Show your customers this new development. It is an instrument of great accuracy and is the product of an organization whose engineers have had long experience in Radio Research.

## The New Norris "Selector"

Every dealer should sell this new Norris "Selector" Vario-Coupler because it is an instrument each "Fan" will want. It combines in one compact unit, an efficient and accurately designed vario-coupler and the necessary tuning switches. It is actually three instruments in one as separate controls are provided for both the coupling and each of the two primary switches.

The "Selector" works easily and gives a very fine adjustment on each of the three controls.

Radio Fans can easily install this new Vario-Coupler on their sets with a great saving of panel space. Radio Jobbers and Dealers—

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**Norris Radio Corporation**  
 126 Liberty Street, New York City

## Dead Spots in Radio's Silent Zones

THE perfect reception of wireless signals, and especially of telephoning, depends mainly on the power of the transmitter and the sensitiveness and active tuning of the receiver. These are known factors, but there are others which are largely mysterious, even to experts. There are places where difficulty is experienced in receiving wireless signals, and others where their reception appears almost impossible from certain directions."

So writes a radio correspondent of the Daily News, London, dealing with certain localities where wireless signals cannot be picked up. He goes on:

Some localities are known as "dead" spots, though for this there is no explanation, while others are said to be "screened" by iron, or other ore, in neighboring hills.

One of the best known "dead" spots is in the Red Sea, about one day's steaming from Aden. Ships passing through this region can read no signals from the Aden station; but on leaving it, messages are suddenly picked up again at full strength. From a certain position in the Mediterranean, vessels cannot get their signals to Port Said; whereas, messages from vessels and stations much further away, but at different angles, are read perfectly.

About 1,500 miles out from New York, on the way to Rio de Janeiro, signals from Washington cease to be heard for about 48 hours, after which they come in again

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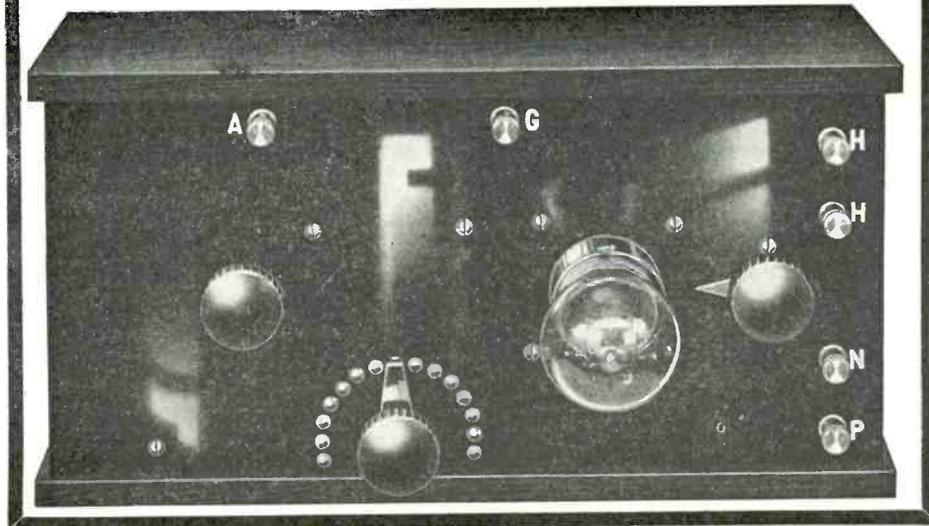
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"Simplicity Senior" No. 1 (without tube, phones or batteries)

**SIMPLICITY RADIOPHONE MANUFACTURING CO.**  
 CINCINNATI, OHIO





### Shipping Board Resents Cornering Tubes

WASHINGTON, D. C.—Better radio-service at sea is assured through the decision of the Radio Corporation of America to sell vacuum receiving tubes to ship stations, according to F. P. Guthrie, head of the Radio Division of the Shipping Board. Privately owned ships, as well as government operated vessels, may now be equipped with the latest types of radio-receiving tubes, even though the ships are in direct competition with the Radio Corporation of America, which controls the patents and production of the tubes.

Following an urgent request from the Shipping Board that all American vessels be permitted to purchase the very best and latest radio equipment in the interests of the safety of life and property at sea, the representatives of the corporation have agreed that a special receiving tube, for ships only, will be produced to sell for ten dollars each. The tubes, which can also be used for amplifying and transmitting, will be a big improvement over the crystal detectors and spark transmitting sets now in use.

Heretofore the Radio Corporation has refused to sell its tubes except to amateurs and for experimental use. The sale of tubes to commercial companies competing with their transmitting and receiving stations was refused until the Shipping Board officials appealed in the interest of ship stations. At first the corporation insisted on the payment of an excessive royalty running to about \$400 per ship, except for Government use, but finally acquiesced to the humanitarian plea of the Shipping board, and drew up a special contract for sea radio stations, forbidding the use of the tubes ashore.

The new sea tube is said to be better than the tubes sold for \$7.50

### All Were Amateurs Once

EDITOR, Radio World:—In the June 17th, issue of RADIO WORLD, I notice a letter from a Mr. James H. Hoeveler answering another letter from a Mr. Ralph S. Garrick. I am sorry that I did not see Mr. Garrick's letter, but whatever he said, I agree with him.

Mr. Hoeveler is trespassing on sacred ground when he calls himself a "ham." He seems to forget that the old-time amateur was here first and that it was mainly through him that present-day wonders in the radio field were made possible. All of the "big boys" in radio, to-day, were formerly amateurs. Senatore Marconi, in a recent speech, via radiophone, boasted—and really feels proud—that he was an amateur; in fact, he insists on being called one now. Bearing in mind the fact that amateurs are limited to a certain amount of power, it sure was some feather in our cap when over twenty-five of our stations were recently copied in Scotland. We will concede that we are a minority so far as numbers go; but so far as gray matter in connection with radio is concerned—"no comparison at all!"—George A. Schaefer, No. 8AUL.

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Has a Complete List of all the Amateurs, Special Amateurs, and Broadcasting Stations of the entire Nine Districts of the United States.

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Radio World, \$6.00 a year, in advance. 52 numbers.

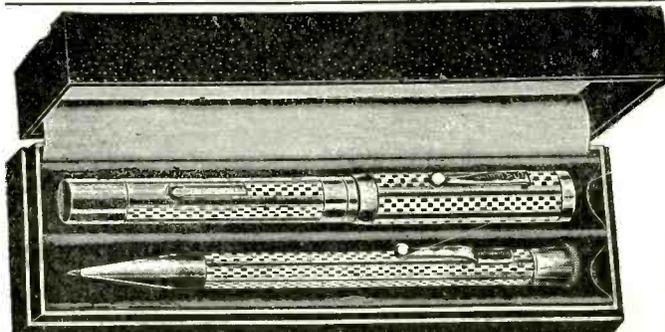
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Many of your customers will want the first sixteen issues of Radio World. Your wholesaler may have a few copies on hand. Inquire. If you cannot get back numbers write us and we will try to supply you so that your customers will have a complete file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

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

Radio World, 1493 Broadway, New York City.

Latest broadcasting map, 15c. That is, a complete broadcasting map appeared in RADIO WORLD, No. 8, dated May 20. Mailed on receipt of 15c. Radio World Company, 1493 Broadway, New York City.



### Special Offer TO Radio World READERS

RUSH your name and address and we will tell you HOW you can get this handsome 14k. Gold Filled Fountain Pen and Pencil Set.

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REMEMBER, with our plan it WON'T cost you a cent. The set comes to you in an elaborate push box. Fill out the coupon herewith and mail at once for our FREE PLAN.

Publisher's Promotion Bureau, 120 Patchen Avenue, Brooklyn, N. Y.  
Gentlemen: Without any obligation on my part, please send me particulars of the above offer.

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

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

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

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

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

**High Grade Antenna Wire.** Best quality 7 strand No. 22, tinned copper, non-corrosive antenna wire. Only 1c. per foot. The Kehler Radio Laboratories, Dept. W., Abilene, Kans.

**My Regenerative Receiver** and two-step amplifier for sale. Set was made to order. Workmanship and performance unsurpassed. Price, without batteries or tubes, \$75.00. First check takes it. Receiver guaranteed. C. H. Glick, 5 Sheridan Square, New York City.

**CHOICE CRYSTALS FOR YOUR RADIO SETS** The Bay City Assay Office, 209 West Holly, Bellingham, Wash., offers Argental Galena Crystals, in pairs, at 25c., 35c., and 50c. Sizes suited to capacity of your receiving set. Every piece has sensitive spots and fully guaranteed.

**ATTENTION RADIO DEALERS AND AMATEURS** Why pay \$0.75 or \$1.00 for HEAD PHONE CORDS? Send us 40c. in coin and we will send you a finely braided complete HEAD PHONE CORD, Postpaid. All orders filled in turn. New England Braiding Co., Calendar St., Providence, R. I.

**BUILD YOUR OWN** Electrolytic Storage Battery Charger. Plates and Complete Instructions, \$1.00. Descriptive Circular Free. PEERLESS ELECTRICAL PARTS CO., 105 Harris Street, Rochester, N. Y.

**VARIOMETER SET** with dry cell tube and controls. Walnut cabinet, 6 x 14, \$45.00. G. H. Miller, 1672 9th Ave., Huntington, W. Va.

**OVERSTOCKED.** Must raise money. Therefore the following bargains: Clapp-Eastham H-R Tuners, \$30.50, with detector tube, \$35.00. Westinghouse R-C sets, with detector two-step, \$115.50, with three tubes, \$122.50. Grebe CR-5, \$74.00, with detector tube, \$78.00. Dollar 3" Dials with knob, 75c. 12c. Composition Top Binding Posts, 9c. each. \$1.00 per dozen. Send money order or certified check. Write for list of other bargains. John R. Koch Co., Charleston, W. Va., Radio Dealers since 1918.

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**FOR SALE**—Detector Control Panel, N A A Receiving Transformer, and many other things. Write for list. RAY KLUTZ, 907 Thorne St., North Manchester, Indiana.

**LONESOME CLUB**—HUNDREDS SINGLE; CONGENIAL people; all walks of life, want to correspond. Particulars, photos, etc., Free. Hon. Ralph Hyde, 225, San Francisco, California.

**Honey Comb Coil Receiving Set,** which includes an Audiotron detector tube, phones, B Battery, "Super-Antenna," etc., for \$35.00. Send stamp. Albert Micolites, 34 Colton St., Worcester, Mass.

**VARIABLE CONDENSERS**—Assemble your own Variable Condenser. Parts for 43 plate, \$2.35; 23 plate, \$1.70; 21 plate, \$1.60; 11 plate, \$1.40. Standard capacity. All parts high grade material. Cash with order. CALDBECK TOOL & MFG. CO., 208 East Walnut St., Des Moines, Iowa.

**DEALERS**—Get our proposition on complete receiving sets, parts and Batteries. MAIN RADIO COMPANY, Cleveland.

**TESTED** Galena crystals, 25c.; Phone Condensers, .001 MFD, 17c.; Grid Leak and Grid Condensers, .0005 MFD, 25c. BUSCH-MURPHY, 105 Mason St., Rochester, N. Y.

**ARMSTRONG SUPER-REGENERATIVE CIRCUITS.** Wonderful results in R.F. amplification from only two tubes, instead of six or eight. These circuits will not work unless you know constants and all apparatus used. Complete tested diagrams containing all hitherto unpublished constants and full instructions for fifty cents. R. I. Co., Red Bank, N. J.

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## AMATEURS

Our 130-page 8x10 illustrated catalog now ready. Contains over 25 pages radio data and hook-ups, also complete descriptions and prices of over 600 items. An excellent handbook. Price 50c. postpaid, including free membership in our discount club. Gibson & Collins, 515 Evergreen Ave., Brooklyn, N. Y.

**A young man**—college graduate preferred—intensely interested both in RADIO and ADVERTISING is wanted as assistant to the advertising manager of a leading radio publication. Every opportunity to thoroughly learn the business. For the first 90 days his salary will be \$15 a week. Within a year or two, if he is teachable, he should be earning \$5,000 a year. This is a life position and a great opportunity to the right man, no previous experience necessary. Write fully regarding yourself. Address Publisher, 30 5th Ave., New Rochelle, N. Y. Your work would be in New York City.

**BARGAIN**—New \$32.00 Three Circuit, Short Wave Regenerative Tuner, no cabinet, \$22.50. LAURANCE GENACK, 132 Firglade Avenue, Springfield, Mass.

## What the Highly Sensitized Receiver Will Do

THE transatlantic sending and reception, accomplished in 1901, by Marconi, demonstrated that the radio waves tend to follow the earth's surface, or else that they can take a direct course through water and earth; for, of course, there is a big curve between the coast of Ireland and the coast of Newfoundland. So, after that demonstration, says "The Literary Digest," New York, the skeptical were more or less silent; and it did not call for much imagination to conceive that the entire world must ultimately be the field of a powerful transmitting radiation. What was called for was a sufficiently powerful transmitter, or a sufficiently sensitive receiver—one or the other. At first attention centered chiefly on powerful transmission; but latterly—and particularly since the success of the amateur transatlantic test last December—it is coming to be more fully recognized that almost any transmitter will answer if we can sufficiently sensitize the receiving apparatus.

The new era began when Dr. De Forest put a grid into the electron tube. The audion or triode thus produced constitutes the most sensitive energy-trap ever devised. To compare it with the original Marconi coherer, or even with the improved crystal detector, is to compare things of quite different orders. According to Bureau of Standards estimates, an ordinary crystal detector requires for its operation a current of about 50 microamperes. An exceptionally sensitive crystal can handle a current of 10 microamperes; comparing in sensitiveness with the electro tube in the simplest detector circuit. But with a specially good detector tube, or an ordinary tube connected in a simple Armstrong regenerative circuit, one microampere of current suffices; and for an oscillating tube operating in a good circuit under satisfactory conditions, a current of the one-hundredth of a microampere.

Otherwise stated, the De Forest audion operating under good conditions in an

Armstrong circuit for regenerative amplification, is 5,000 times more sensitive than an ordinary crystal, and 1,000 times more sensitive than the best crystal.

And now comes Armstrong with his super-regenerative circuit, which is said to make a receiving set of two electron tubes a thousand times more sensitive than the superheterodyne receiver of eight or ten tubes devised by the same inventor, and used by Paul Godley in the famous transatlantic tests. To compute the amount of current necessary to actuate such an apparatus, would be to deal in infinitesimal quantities of energy, more or less comparable to the energy of starlight.

And all this has direct bearing on radio ambitions. The new work gives pretty full assurance that a sensitive receiver alone can solve the problem of world-wide communication.

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

Our supply of back numbers of RADIO WORLD (Nos. 1 to 16) is limited. We will take orders for the first sixteen issues until the supply is exhausted. If you want these numbers, or want your subscription to start with any special number, let us know.

RADIO WORLD CO., 1493 Broadway, New York City

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## Amateurs May Make Own Sets Despite Patents

SO many readers are puzzled by their rights to construct their own sets without coming into contact with the numerous awe-inspiring patents they read and hear about, that a word on the subject might not come amiss, says "The Globe," New York.

There is no reason, either in law or ethics, why a person should not make any type of set or part and utilize any hook-up he pleases as long as the set is destined for his own use and is not offered for sale.

When it comes to making apparatus for sale there are few patented parts which it is within the power of amateur to make, owing to his limited manufacturing resources. However, the safest course in respect to these parts is to purchase them for inclusion in the set to be sold, as in the case of design patents on coil, etc., or to sell the set without, as in the case of tubes.

The crystal set is covered by no patent, to our knowledge, save certain design patents on a few parts, which may be made in a different style by the amateur without infringing on the patent or bought if he so desires. Quite a number of experienced radio amateurs are making their pin money by constructing crystal sets for beginners, and there can be no objection to this practise—so long as the set is honestly made and sold on a conservative representation.

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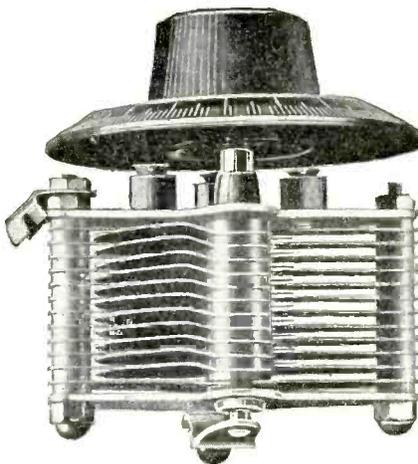
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## New Radio Society

The National Cooperative Radio Society has been organized at New Orleans, Louisiana. The object of the society is to effect a national community of interest among parties now interested, or may hereafter become interested, in radio. It proposes to build its own broadcasting stations Max N. Kohler, 214 Saratoga St., New Orleans, La., is the secretary-treasurer.

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**LET THE WORLD TALK TO YOU!**

For perfect results in receiving nothing can beat the **PAN AUDIO** Type 102. Here is a real Vacuum Tube Receiving Set for the Radio Enthusiast who knows what he wants at the right price.

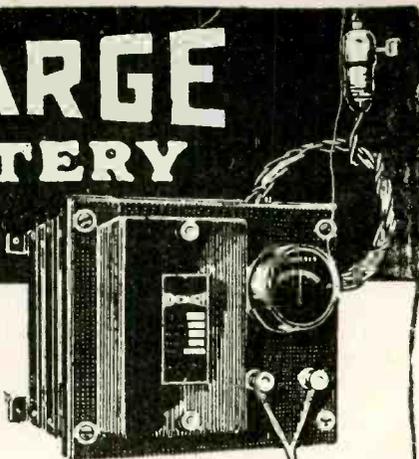
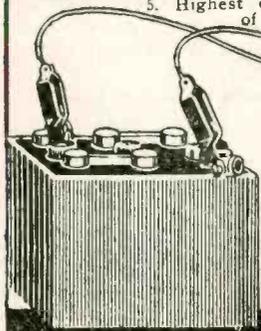
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Ask your dealer to show you the **PAN AUDIO** to-day or write us for descriptive matter and details.  
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- Attention Motorists. Will charge your auto battery as well as radio battery. Send for Bulletin No. 58 for further information. For sale by all radio, electrical and accessory dealers or shipped, express prepaid, for purchase price, \$18.50. \$20 West of Rockies.



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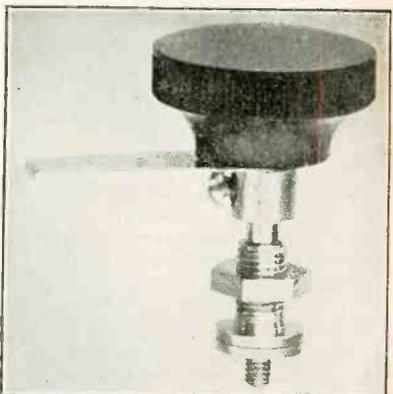
### HARD VULCANIZED RUBBER POLISHED KNOB

Hand Buffed—Nickel Parts  
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### COMPOSITION KNOB

Tapered and Highly Polished  
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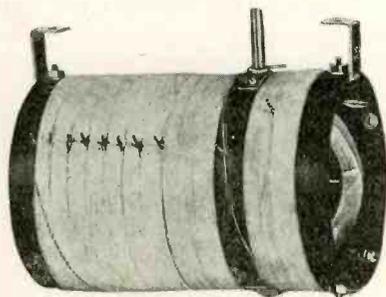
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