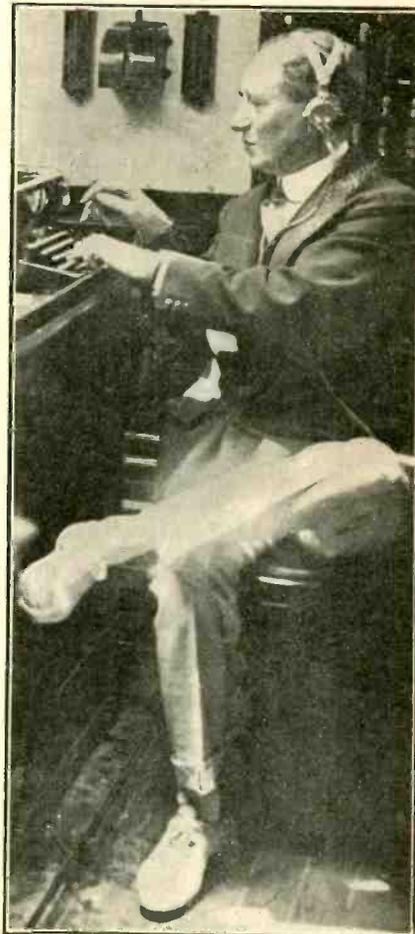
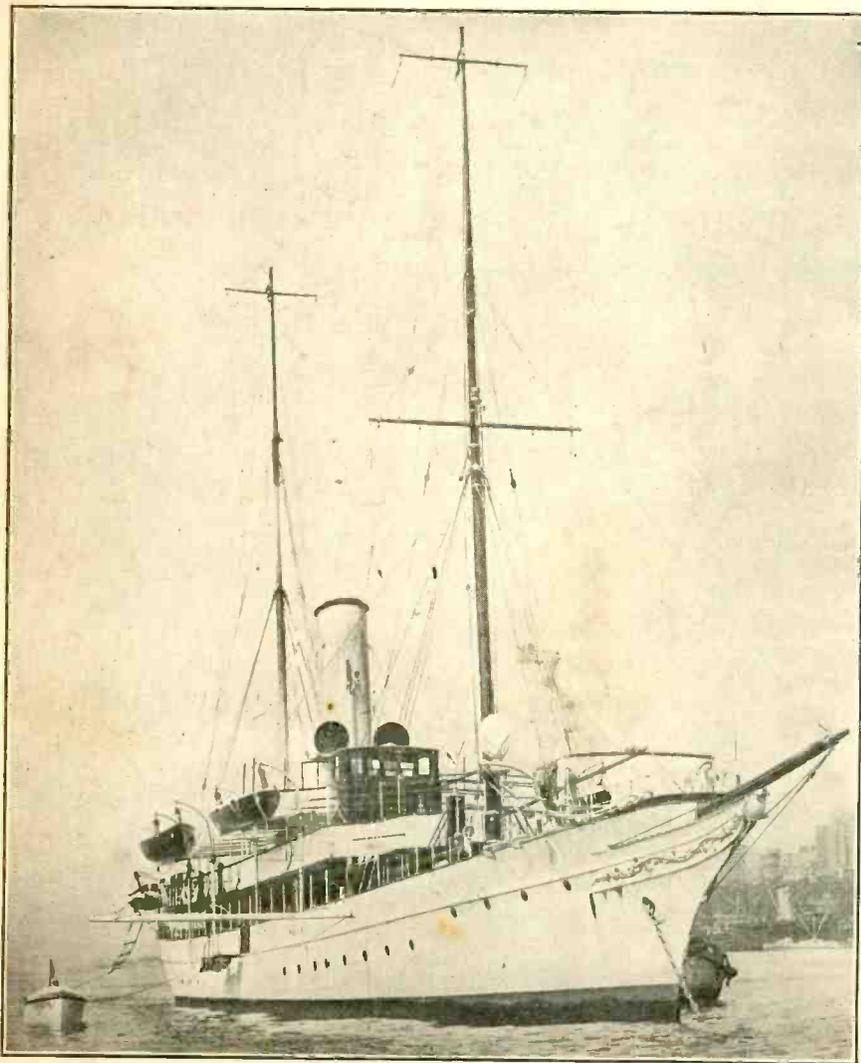


# RADIO WORLD

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

I L L U S T R A T E D

## Marconi Thrills America with New Radio Feat



Marconi in the radio office of his yacht "Electra," aboard which he arrived in New York a few days ago. The yacht is shown at left.

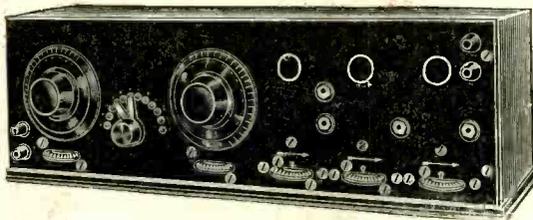
(C. A. & P. Photos.) (SEE PAGE 12)

Important to Fans! "How to Use a Condenser"

# PROGRESS SURROUNDS RADIO TO-DAY

PROFITS

S  
U  
C  
C  
E  
S  
S



F  
A  
I  
T  
H

ACHIEVEMENT

## Progress Is Co-operation!

You Have An Opportunity to  
Become a Co-operator in the

## NORRIS RADIO CORPORATION

which, since 1913, under the name of the Norris Electric Specialties Co., has produced standard electrical equipment and radio apparatus. We are now expanding in radio to enable us to produce standard equipment, and our special radio patents (one of which appears in our advertisement on page 27 of this issue). We number among our customers the following:

U. S. Government  
Western Electric  
General Electric  
Westinghouse  
New York Telephone & Telegraph  
American Telephone & Telegraph  
Chicago Edison  
Sao Paulo Tramway Light & Power Co., Brazil  
Kellogg Switchboard & Supply Co.  
Domestic Heating & Lighting Co., Galesburg, Ill.  
Third Avenue Railway Co.  
Northwestern Electric Equipment Co.  
U. S. Navy

Interborough Rapid Transit Co.  
Brooklyn Rapid Transit Co.  
New York Edison Co.  
Pennsylvania Railroad  
New York Central  
Western Union  
Postal Telegraph  
Radio Supply Co., of California  
W. C. Teas Co., Chattanooga, Tenn.  
Reliance Electric Co., Norfolk, Va.  
Electric Appliance Co., Chicago  
Commercial Electric Supply Co., St. Louis

To NORRIS RADIO CORPORATION,  
126 LIBERTY STREET,  
NEW YORK CITY, N. Y.

I would appreciate information on Norris Co-operative plans.

Name .....

Address .....

City ..... State .....

Occupation .....

For a limited period, we offer investors participation in our plans for expansion.

Radio enthusiasts who know radio as it is and will be, communicate with our secretary.

# RADIO WORLD

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

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

Vol. 1, No. 14

July 1, 1922

15c. per copy, \$6.00 a year

## General Pershing Honors Inventor of Undersea Radio



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

In honor of his services to military and naval science, General Pershing and his staff recently visited Dr. J. Harris Rogers, inventor of underground and undersea radio, at his laboratory at Hyattsville, Maryland. From left to right: Dr. J. Harris Rogers, Miss Cornelia Clark, Dr. J. Clarence Owens (standing), General Pershing, Colonel Major, General Pershing's aide.

## Army Shares Arlington Station

THROUGH the cooperation of the Naval Communications Service, the Radio Section of the Signal Corps has acquired the use of part of the big Arlington Station for its chief sending station at Washington, D. C. Two sets will be used by the Army exclusively; one tube set with 10 k.w., in the antenna and another with 20 k.w., in the antenna. The latter, used on about 3,000 water-waves, should carry as far west as Omaha. To-day, the Signal Corps is using a two k.w., transmitting set at Arlington for regular traffic on 2650 meters, controlled from the radio headquarters in the Munitions Building.

The government has saved at least

\$50,000 by combining the Naval and Army sending stations at Arlington, as the Signal Corps station planned for the Washington Barracks would have cost practically that much when the permanent installation was completed. Now the temporary station at the Barracks has

**Radio will be man's greatest help within a very few years.—  
Prof. J. A. Fleming, of London.**

been abandoned, and the permanent construction saved.

The Navy will still continue to operate from its station at Arlington, using its own sets as previously, but has arranged to lend the Army radio section its big 100 k.w., spark set when necessary, as well as its arc set. Another combination has made possible the operation of the Navy 1 k.w., tube-set at Arlington by either the Naval Air Station at Anacostia or the Army Bolling Field for the transmission of messages to planes or short distances up to 250 miles. These stations will also conduct considerable meteorological work with the 1 k.w. set at Arlington.

# Novel Unit-Detector and Amplifier

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

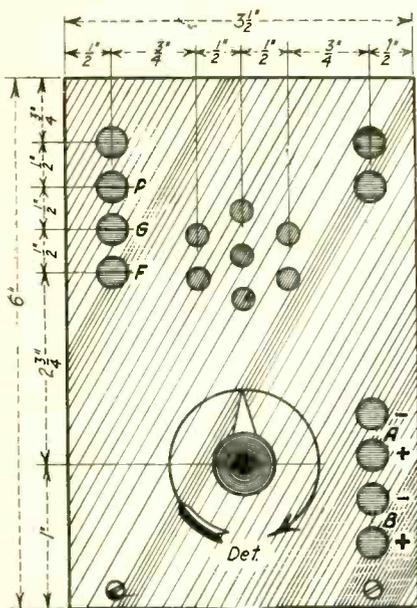


Figure 1—Front view of the detector unit-panel with necessary dimensions. Suggested by F. J. Rumford. Drawn by S. Newman.

I PROPOSE to describe in this article, as non-technically as possible, the building of unit detector and amplifier panel, which may be made up at cost of less than \$40. This outfit has proven to be very efficient in operation. The result should be a high-class instrument, both in appearance and ability to serve its purpose.

As will be noted, this outfit may be made up just as a detector panel. Or, either as a one- or two-stage amplifier it may be used later in conjunction with the detector panel. Its cost is nominal. As will be noted also, the wiring is very simple and is accessible

at all times for any internal changes of hook-up or for the changing of a vacuum tube or amplifying transformer. The writer knows the builder of one of these units who has mounted each individual unit in a cabinet of its own, the cabinet having a hinged cabinet for access to its inner parts.

For years I have been experimenting with all kinds of radio and electrical instruments, and used many and varied

kinds of hook-ups. At the present time I am looking for an amplifier which I may consider perfection.

So far I have found this one to be as near perfect as any in my experience. And I am certain that any instrument I describe will work as I claim, provided the directions are faithfully followed.

Figure 1 shows the front view of the detector unit-panel with its necessary dimensions. Figure 2 shows the front view of a two-amplifier panel-unit, which also shows the position of jacks and rheostats with respective dimensions. Figure 3 shows the end view of the amplifier unit showing the method of mounting the jack, and amplifying transformer, and the vacuum-tube sockets; it also shows the proper dimensions. I have omitted showing an end view of the detector unit-panel, as in all respects it is like the amplifier unit-panel with but one difference: it has no amplifying transformer mounted on its base, but, in place of the transformer, it has a grid leak and grid condenser, combined, mounted. Figure 4 shows the method of hooking up the detector unit-panel and the amplifier unit-panel internally and externally, particular attention being paid to the method of hooking in the detector panel, as the vacuum tube used in this instance is radiotron UV-200, which carries a plate voltage at the highest of 22½ volts and the amplifier panel tubes, which, in this instance, are two

(Continued on next page)

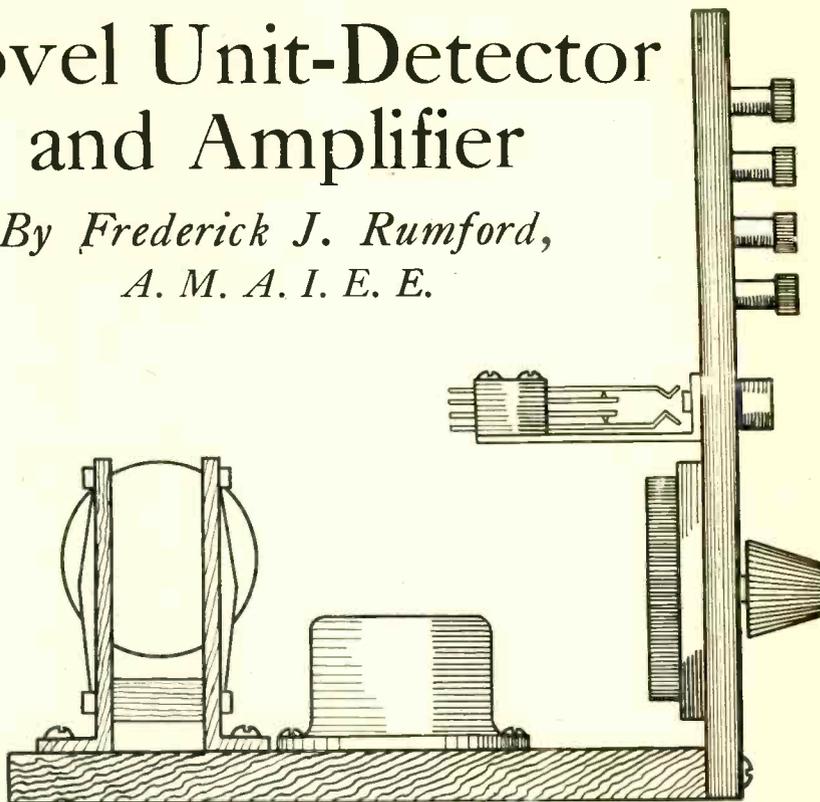


Figure 3—End view of the amplifier unit showing the method of mounting the transformer, jacks and sockets. Suggested by F. J. Rumford. Drawn by S. Newman.

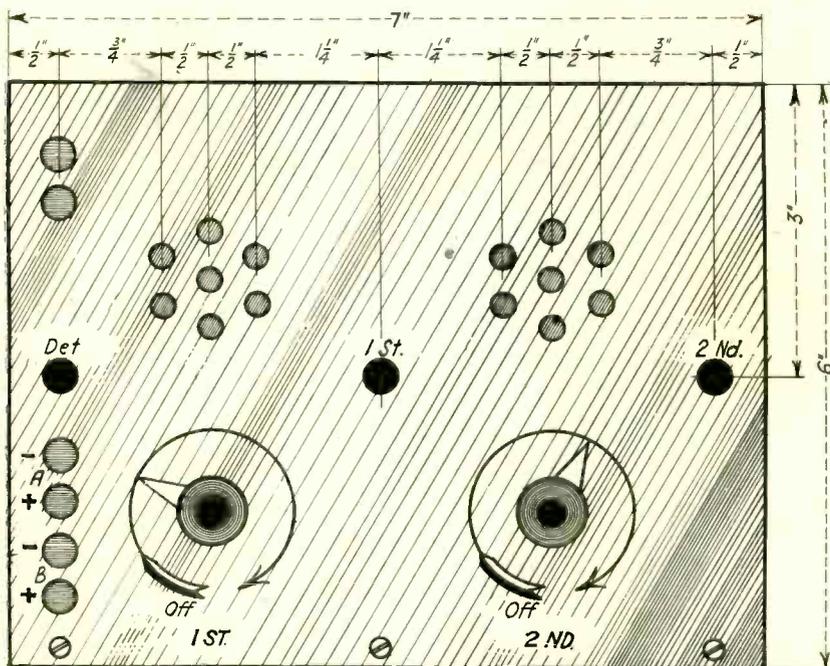


Figure 2—Front view of a two-stage amplifier panel-unit with dimensions. Suggested by F. J. Rumford. Drawn by S. Newman.

(Continued from preceding page)  
radiotron tubes, UV-201, which have a plate voltage at the highest of 45 volts.

Under no circumstances must 45 volts be applied to the detector tube as it would not function properly. The detector and the two-amplifier tubes have each a filament voltage of from 4 to 6 volts.

Following is listed the various articles, with their respective prices, for the detector:

1 formica panel 6x3½x¼ in.	\$ .63
1 Fada rheostat.....	1.00
10 binding posts.....	① .10 1.00
1 vacuum-tube socket.....	.75
1 base 5x3½x¾ in.....	.10
1 grid condenser and grid leak accessories.....	1.20
1 Radiotron UV-200 vacuum-tube detector.....	5.00
<b>Total .....</b>	<b>\$9.68</b>

This cost includes the vacuum tube. No doubt you are aware that in buying a detector panel-tube, at a cost of at least \$8 to \$10, the vacuum tube is omitted. It is purchased separately. Compared with the above figures, it should encourage every reader to build himself at least the detector unit, even if he does not desire to build the amplifier unit at the present.

In the following the necessary parts and their respective costs for the amplifier unit-panel are listed:

1 formica panel 7x6x½ in....	\$1.26
2 Fada rheostats.....@ 1.00	2.00
2 Frost two-circuit jacks.....@ .90	1.80
1 open circuit Frost jack.....	.75
6 binding posts.....@ .10	.60
2 vacuum tube sockets.....@ .75	1.50
2 Clapp-Eastham amplifying transformers.....@ 4.00	8.00
1 Frost plug.....	1.00
1 base 7x5x¾ in.....	.25
Accessories.....	.30
2 Radiotron UV-201 vacuum tubes.....@ 6.50	13.00
<b>Total .....</b>	<b>\$30.46</b>

The total cost, therefore, for the detector control-unit panel and the amplifier unit-control panel is \$40.14, which includes the three vacuum tubes.

For the actual construction: First, both panels must be marked up and drilled. I have not specified the size of holes or drills to be used, as in many cases the builder requires parts of larger or smaller shafts or screws, so the size is left to the builder's own judgment. After the drilling has been finished, the panels should now be rubbed with No. 0 sand paper and fine or light machine oil, which will give the panels a nice finish. In many instances, the panel when purchased is finished. If such is the case, leave well enough alone. Next, the binding posts, rheostats, and other necessary impediments should be mounted, and the panels should be mounted on their respective bases by means of two wood screws.

After the panels have been mounted, as shown in Figure 3, the vacuum-tube sockets should be mounted upon their

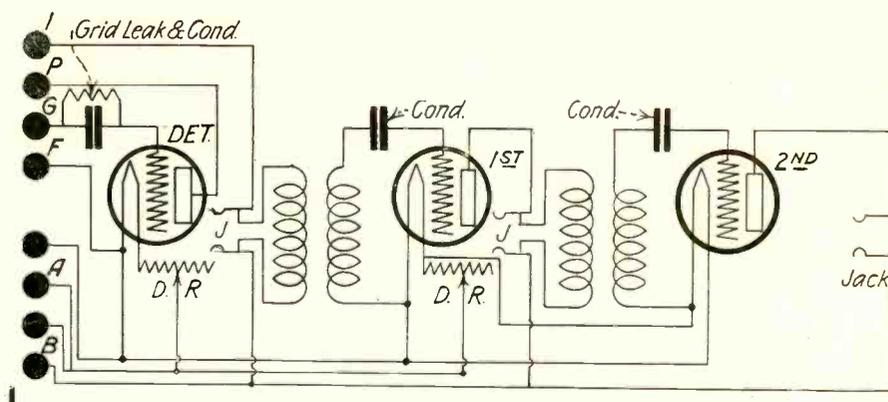


Figure 4—Schematic diagram of the hook-up is shown. Suggested by F. J. Rumford. Drawn by S. Newman.

bases; but, of course, on the amplifier unit the simplifying transformers are mounted on the base, as also shown in Figure 3; and on the detector unit, the grid leak and the grid condenser must be mounted on the base. Just a word of advice: It is well to shellac the bases before mounting the panel.

The entire outfit is now ready for wiring on the detector unit:

A wire is run from the negative of the A battery binding post to one of the binding posts marked F on the vacuum-tube socket. Another wire is run from the positive of the A battery to the arm of the rheostat; another wire connects from the remaining post of the rheostat to the other post, marked F, on the vacuum-tube socket; another wire runs to the binding post on the panel, marked F, to the wire just connected with the remaining post, marked F, on the vacuum-tube socket. There is a wire connecting with the post on the vacuum-tube socket, marked G, to one of the posts on the grid leak or grid condenser. Another wire connects with the remaining post of the grid leak to the binding post, marked G, upon the panel. Another wire is connected with the post on the vacuum-tube socket marked P, which, in turn, connects with the post, marked P, on the panel. Another wire which connects with the post, marked I, to the post, marked I, on the other side of the panel, and there is a remaining wire which connects with the binding post marked positive, of the B battery, to the post, marked 2, on the panel.

I will now follow with the internal wiring of the amplifier unit. A wire connects with the binding post, marked negative, of the A battery and runs across the lower section of the panel with two intersecting wires connecting off either and running to each side of the filament vacuum-tube socket. From this wire, which has already been connected, there is a wire running and connecting to one of the secondary binding-posts of the amplifier transformer on each. The other side of the remaining binding post—of the second of the transformer—connects each to

the post, marked G, on the vacuum-tube socket. A wire connects from the positive binding post of the A battery, which, in turn, connects to each of the arms of the rheostat. The remaining binding posts on both the remaining rheostats connect to the posts, marked F, on the vacuum-tube sockets. From the binding posts, marked 1, on the upper left-hand corner of the panel, a wire connects to the top blade of the jack; from the binding post, marked 2, on the upper left-hand corner of the panel, a wire connects to the lower blade of the jack; from the two inner blades of the jack wires connect respectively to the both posts of the primary of the amplifier transformer.

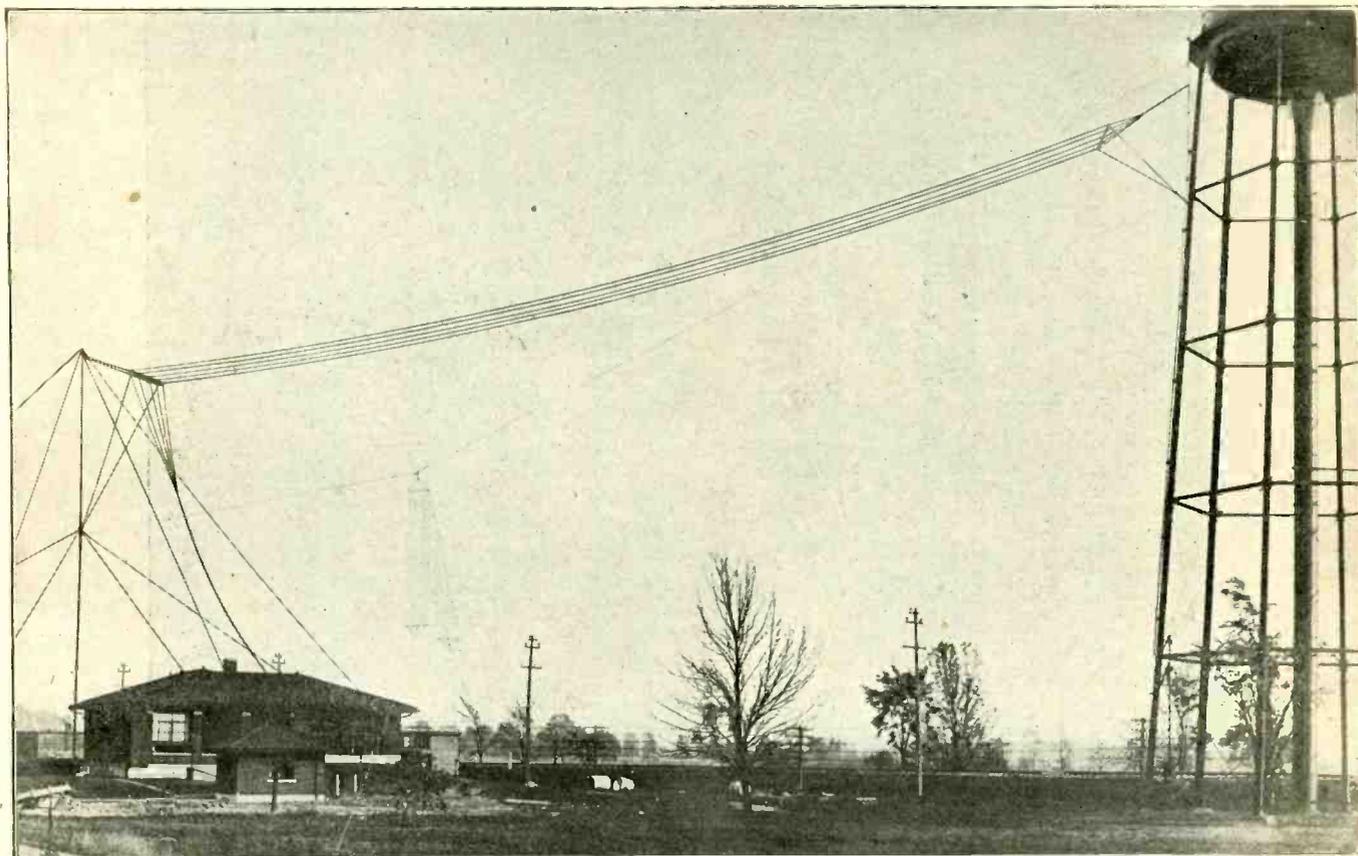
There are also wires that run from the positive of the B battery binding-posts across and connect respectively to the lower blades of the two remaining jacks. From the first amplifier vacuum-tube socket and the post, marked P, a wire connects to the upper blade of the second jack. The two inner blades connect with the primary of the second amplifier transformer; from the blade of the second amplifier tube to the upper blade of the remaining jack, a wire is also run. The wires must be bent and built to position, using rigid wiring of No. 18 enameled wire. There is a jumper wire that runs from the negative of the B battery to the positive of the A battery on the detector panel unit.

The above wiring is not as complicated as it may seem at first sight. It is all clearly shown in the diagrams. It is understood, also, that the receiving set should be correctly connected in with the aerial and ground.

Procedure: Light the filament of the vacuum tube by switching on the rheostat. The plug is then inserted in the first jack. The rheostat of the vacuum-tube detector is then manipulated until the point of oscillation is reached, which may be detected by a pronounced hissing heard in the phones. The hissing should be reduced to a minimum. Now, the plug is inserted in the third jack, for louder signals using the same procedure.

# Henry Ford's Up-to-Date Station

*By Edward J. Beck*



The Ford radio station, WWI, at Dearborn, Michigan. This station operates on a wave length of 500 meters. The antennae are a large inverted L and two smaller aeri-als. This makes long-wave reception possible with the large aerial. With the smaller ones, interference from neighboring stations can be practically eliminated.

**F**OR two years, Henry Ford has maintained a series of radio stations to transmit communications between his plants. Long before the general public was aware of the practicability of the wireless telephone the famous manufacturer had experimented with radio. The results were so satisfactory that five stations were established, four of which are still in operation. The plant at River Rouge, Detroit, where tractors are made and heavy castings for Ford cars, has been discontinued.

The Ford radio stations are located at Dearborn, Michigan, KDEN; Springfield, Ohio, WNA; Flat Rock, Michigan, WFD; and Northville, Michigan, KDEP. The Dearborn station is also licensed for broadcasting under the designation WWI, and as an experimental station under the name 8XD. The latter license entitles the Dearborn unit to send out messages over a wide series of wave lengths.

At Springfield, Ohio, are located the subheadquarters of the Ford railroad—the Detroit, Toledo & Iron- ton. During the first month this radio station was operated, in 1920, 4,000 messages

were transmitted between Springfield and Dearborn, the capital of the Ford industrial dominions.

Radio has come out as winner in an efficiency competition with the telegraph and the long-distance telephone. In the early days, wireless telephoning was the method used. Experience indicated that executives were inclined to be long-winded when they talked. So it was decided that messages should be sent in code in order to save time.

"By using code we are able to send thirty words a minute," said C. R. Voorhees, in charge of the radio department. "When an executive writes out his messages he is more concise and we are able to handle a much larger volume than is possible when he talks direct. As it is, our Springfield and Dearborn units are busy from seven forty-five in the morning until five fifteen at night."

In March, Michigan was visited with a sleet storm that almost completely interrupted telephone service for a week. The Ford plant at Northville, a small town thirty miles from Detroit, could not be reached by telephone. But no inconvenience was caused by this fact

because uninterrupted communication was maintained by wireless.

One of Mr. Ford's most cherished plans is to develop small water-power projects in rural communities to give employment to dwellers in small towns and stop the drift of population toward the cities. He is constantly adding to his holdings water-power sites on which plants may be located to manufacture the smaller parts of his cars and tractors. The two plants, at Flat Rock and Northville, are examples of such developments. As such plants are made ready, it is the intention to link them with Ford headquarters at Dearborn and Highland Park by radio.

At the Northville plant, one of the office employees functions as radio operator in addition to his other duties. The Dearborn radio unit employs four operators.

The Ford railroad, the D. T. & I., extends from Detroit to Southern Ohio. Messages are now sent from points on the Ohio River to Springfield over wires, thence by air to Dearborn, where they are again made to travel over wires into the telegraph room of the Highland Park plant. In

# How Wave Lengths Travel

By Fred. Chas. Ehlert

**S**OUND waves, water waves, and radio waves travel at greatly different or varying rates per second. However, it is known that sound waves travel 1,100 feet a second, or 330 meters. Radio waves travel at the same speed as light—186,000 miles a second, or 300,000,000 meters.

But what are radio waves? Every one is familiar with water waves. The first thing we notice about a wave is its height and, of course, waves depend on the wind to create the height they are able to attain. The stronger the wind the greater the height. The correct way to measure the height of a wave is to secure the distance from the surface of the water to the crest—if such a thing is possible.

The amount of energy transmitted by water waves depends on the height of the ripple crests. This is also true of all other kinds of waves; therefore, the principle may be applied to radio waves. A better term for such measurement is called the "amplitude of the wave." The amplitude of the wave is the displacement between the trough (bottom) and the crest (top). Thus

we may say that the energy in wave motion depends on the amplitude. In order to have a wave, it is evident that there must be some material to carry the wave.

The element in which the wave travels is called the medium; the medium that carries water waves is water.

## Battery Needs Every Care

**T**HE storage battery cannot be disregarded for any length of time without suffering a reaction. The necessity of replenishing the individual cells with distilled water more frequently than usual during the summer months, is due to the fact that evaporation of the water is much more rapid, obviously the effect of the hot weather. Fans who operate their sets the year round, will now find it necessary to add distilled water about once a week instead of every two or three weeks.

**There is nothing in the world that can rob radio of its popularity with the people. It is here to stay.**  
—Marconi.

Sound, therefore, is carried by waves in the air. Radio waves are carried by ether. If we watched the water waves we would soon notice that, besides the height, the waves have length also. There is, naturally, a certain distance from one wave to another. The distance is measured from the highest crest of one wave to the highest crest of the next wave. The distance is the length of the wave. A wave length is the distance from any part of one wave to the corresponding part of the next wave. It is the motion caused by these waves, as they move, or spread, that carries sound. A radio wave, reduced to its simplest meaning, is a vibration through space. A tuning fork is one of the best illustrations of vibration. The sound produced is caused by the speed, or frequency, of vibration—500 a second will produce a low hum; but the vibrations, if increased in frequency, will become so "high" that the human ear cannot hear them. In such a state, they will have gone out of the range of audio frequency, and become what we call sound waves or radio frequency.

(Continued from preceding page)

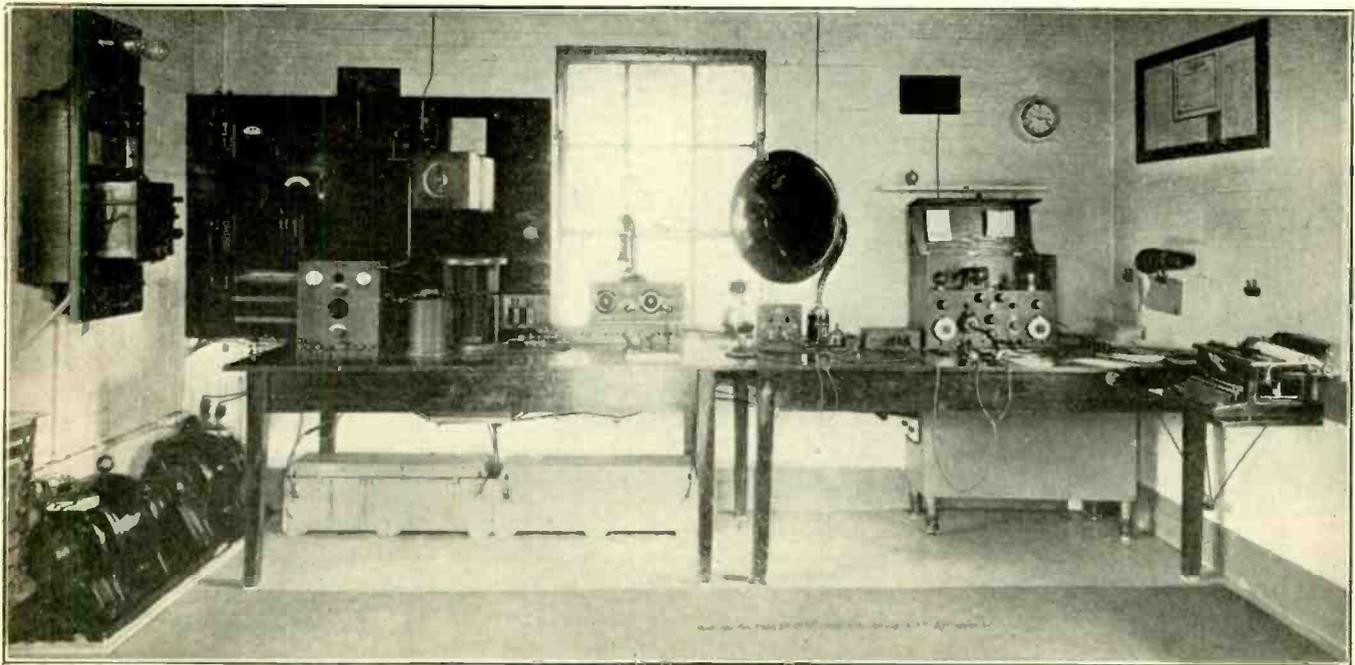
this way, an operator presses his key at a telegraph office in Southern Ohio, another operator in Highland Park gets the message with an ordinary telegraph instrument after it has traveled through an aerial gap of 200 miles.

Mr. Voorhees says that the number

of errors is no greater than those that formerly occurred in wiring. Telegraph bills have been largely reduced and quicker communication assured. When there is much interference from river and lake boats, or static, the operators verify messages by repeating; but, ordinarily, this has not

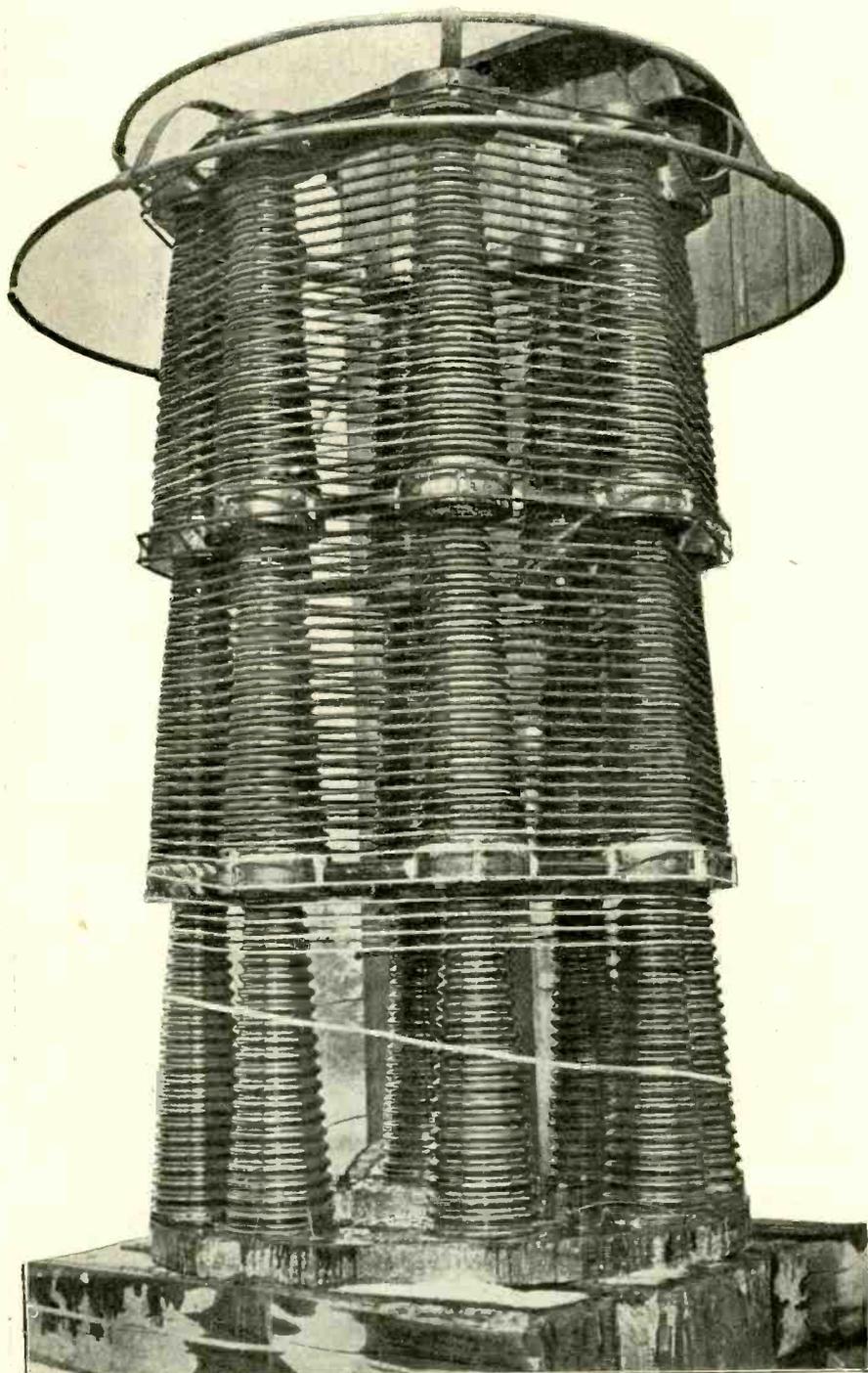
been found to be absolutely necessary.

The Dearborn station uses a wave length of 500-520; the Springfield station, 465. The broadcasting privilege has rarely been taken advantage of. One of the few times was when Edsel Ford announced that there would be a cut in tractors.



Interior view of Henry Ford's radio station, showing the equipment whereby thousands of messages are received and transmitted weekly. To the right of the room is the receiving gear. On the left is the transmitting set.

# Gigantic Tuning Coil Hurls Radio Waves Across Atlantic



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

In recent issues of RADIO WORLD several of the large transmitting stations are described, including those at Nauen, Germany, and Sayville, Long Island. Another important American station was used exclusively during the World War by officials of the United States Navy Department. This station is situated at New Brunswick, New Jersey, and is now operated by the Radio Corporation of America. It has always been a problem to control several hundred kilowatts of power at frequencies of about 20,000 cycles per second by breaking it up into dots and dashes per minute or more. To radiate the large amounts of power required to bridge trans-oceanic stretches a large and lofty radiating system, or aerial, is required at the New Brunswick station. A row of 400-foot masts, stretching some 6,000 feet, from the station support the "multiple tuned" aerial system. In order that the proper and most efficient amount of power may be used to advantage a tuning system must be employed. In the photograph it may be seen clearly what is termed "a large tuning coil." It was built by the General Electric Company for the New Brunswick station. It is used in transmitting electrical waves across the Atlantic. It is in position outside of the radio station. Particular attention should be given the massive insulators, through which every ounce of power is sent to the aerial system.

## Marconi Can Now Send Radio to a Chosen Point

**S**ENATOR GUGLIELMO MARCONI, the radio wizard, came to New York, a few days ago.

He arrived on his yacht, "Electra," perhaps the most perfectly equipped radio vessel afloat.

Mr. Marconi's first important engagement in New York was a lecture before a thousand radio and electrical engineers at the United Engineering Societies Building.

He startled those present—and the world as well—with tests of a new device that guides radio in a chosen direction!

He produced a "baby wireless set" and sent signals about twenty feet, demonstrating how a beacon of waves may be hurled at a station specially intended to receive it.

This illustrates one of his most recent experiments. It is an important new step in radio. Mr. Marconi and his engineers are still working on it.

With this same midjet apparatus he pointed out a vast undeveloped field—the field of the short wave.

Marconi believes that the short-wave field is capable of as high development as the field employing hundreds of thousands of meters.

Marconi began his wireless experiments with the short wave. Now he returns to it for new fields to conquer.

The short-wave field has been neglected both in America and in Europe, he claims.

With waves of about  $3\frac{1}{2}$  meters, Marconi has hurled a shaft nearly a hundred miles in a desired direction.

To accomplish this, he uses a reflector apparatus, and the wave is caught at the receiving end on a horizontal metal standard.

When the semi-circular reflector, a skeletonized device covered with wires and resembling a dish cut in half, is turned with its open side toward the receiving stations, the signals are heard loud and clear. When the open part is turned away the signals become inaudible.

Popularly, it throws a radio wave somewhat in the same manner in which a mirror throws a ray of light.

Radio waves have been thrown, in this manner, from London to Birmingham, a distance of 99 miles. The results have been highly satisfactory.

It is a system of concentration with reflectors which will greatly enhance the value of air apparatus.

It makes impulses rebound.

It is a big step forward in radio. What the world will unfold in this new science is beyond the comprehension of man.

Marconi said to the thousand engineers: "America leads the world in radio."

### Radiolets

"Are your new neighbors modern people?"  
"Modern? Say, they sent in last night to borrow our radio set."—"Buffalo Express."

\* \* \*

"Senator, do you keep your ear to the ground?"

"Not now. I got a radio outfit."—"The Journal," Kansas City.

# The Use of the Vacuum-Tube Detector

**T**HERE seems to be considerable dissatisfaction among certain amateurs who have sets equipped with the crystal detector with the distance and range that it affords. Those who wish to receive from a wider range, may do so by using what is called the vacuum-tube detector. This detector will not be so expensive as some amateurs think; but for the increased range that may be had, it is well worth the difference between the crystal and the tube detector. For short distance, the crystal detector will work well; but for reliable work under exacting conditions, the crystal detector is limited to about 20 miles range.

Some crystal users frequently wonder if a loud speaker may be used in conjunction with the crystal detector, but it is entirely out of the question for such a machine to function. Possibly a large aerial is erected in conjunction with a crystal detector, in

*By Geo. W. May, R.E.*

range of your set, you may do so by simply adding a one-step amplifier to this circuit. The following apparatus will be needed if you care to change your detector to this vacuum-tube outfit:

One tube socket. One detector tube. One filament rheostat. One grid condenser and leak. One 22½-volt variable B battery. One six-volt A battery.

A word to battery buyers: Be certain to purchase a good battery and, also, a good-sized ampere-hour battery, as the higher the ampere-hour battery capacity, the less it will have to be placed on charge. Nothing is more discouraging than to have the battery start to run down, particularly when you are entertaining some new radio enthusiasts.

Accompanying this article is a schematic diagram of tube hook-up, better known as a straight hook-up. Inductance L1 is the primary winding of the coupler, L2 is the secondary winding of the coupler. The variable condenser, which is in shunt to the secondary, has a capacity of .0005 mfd., and its function is for tuning the secondary circuit. The grid leak and condenser may be had at any radio store. The 22½-volt battery is connected in the plate circuit, as shown, as well as the telephone receivers.

One side of the filament of the tube is connected to the wire running from the telephones to the variable condenser. Be sure that the 6-volt storage

battery is connected in right. Before making necessary connections, be sure that the battery leads are correct.

If the leads from the 22½-volt battery are crossed with the filament, or A battery leads, you may be surprised to learn the filament of the detector tube has burned out. This will mean that another tube will have to be purchased. As the price is \$5 it is well worth the tube to be certain that the connections are right before lighting

The rheostat in series with the tube which controls the filament lighting of the tube, is also shown. In case this is turned to high, the tube will also burn out. These precautions will have to be undertaken; but outside of this, there is not much more to worry about. Generally the socket for the tube is marked P, for plate; G, for grid; F minus, for filament; and F plus, for filament. These two F marks are to

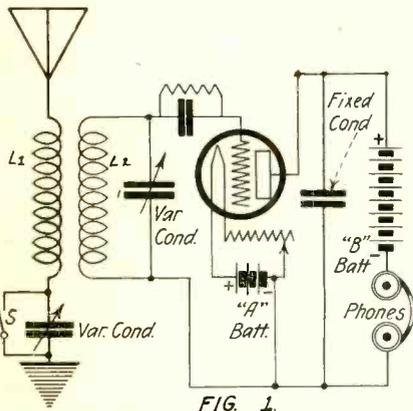


FIG. 1—Schematic diagram of what is known as a straight hook-up. The various elements are shown in the circuit. Suggested by George W. May. Drawn by S. Newman.

order to hear the broadcasting; but within a short distance, the crystal detector is used. Hence, sooner or later, the vacuum-tube detector is brought into play regardless of what other equipment may be needed. One thing must not be forgotten: when a tube outfit is used additional steps of amplification can be used.

The cost of a tube outfit would not exceed a little over \$30. This would include all necessary storage batteries. Dry batteries are not recommended, as their life for this work is very short. In the long run, it would be far cheaper to purchase a good storage battery, even if it did cost a few dollars more, than to hesitate and purchase dry cells at various occasions.

If you have some equipment on hand you may remodel your set in a few hours, and it will be possible for you to have a vacuum-tube set. Furthermore, any time you care to increase the

## Before You Invest Study Radio

**T**HE patent situation is an element which should have the investor's attention. Of course, most of the older and more stable manufacturers naturally have their various products thoroughly covered by all the patent protection which the government affords. Most of these responsible designers and manufacturers have been too busy to undertake the prosecution of infringements, but the day of reckoning will come, and those opportunists who are trying, carelessly or unscrupulously, to capitalize the public demand for radio, will be obliged to answer for their violations of government-granted rights on existing inventions.

Let the investor, before placing a dollar in radio, study it thoroughly. Let him find out whether the man he backs is a reputable business man or an unscrupulous operator. Let him judge, not the isolated hand-made set, but the first outfit made in quantity by standardized machinery.

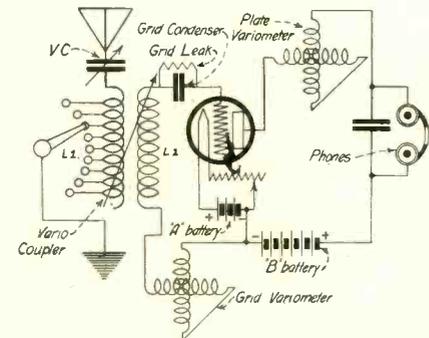


Figure 2—Schematic diagram of the so-called regenerative receiver. This is the variometer type. In the above hook-up it is easy to discern where the variometers are placed in the grid and plate circuits, respectively. Suggested by George W. May. Drawn by S. Newman.

be connected to the 6-volt battery. Be sure to connect them to the proper polarity and with the rheostat. In working with this set, you will learn by experience that when lighting the tube it will start to hiss. The most sensitive spot is just below the point where the tube starts to hiss. Once again you are cautioned not to turn the filament too high as this will probably burn out the tube. By keeping the filament at its proper brilliancy, the tube's life will be lengthened. By using the tube you will soon find the value it offers.

After your set is completed and working at its best, you will find you can still increase the signal strength by inserting a variometer in series with the plate and grid circuit, as shown in the diagram. Study carefully the schematic diagram of No. 2 and see just where the variometers are placed. The hook-up is the same as above with the only exception of the plate and grid variometers.

# Congress to Clear Aerial Traffic

*By Carl Hawes Butman*

WASHINGTON.—The mystic symbols "S-3694" and "HR-11964" designate government papers which bear directly on the future development of radio in this country. These papers are exactly alike and comprise the proposed radio legislation introduced in Congress. The first bill was introduced by Senator Kellogg, of Minnesota, on June 8, and was referred to the Senate Interstate Commerce Committee, while the House bill, prepared and introduced by Congressman White, of Maine, was presented on June 9 and was turned over to the Committee on Merchant Marine and Fisheries. Mr. White is now more sanguine about the early consideration of his bill by this committee, as the Ship Subsidy Bill was reported out recently, clearing up one of this committee's big problems.

At the Department of Commerce, radio officials are waiting the enactment of legislation so that they can clear the aerial traffic, so to speak, especially along the route of the 360-meter wave on which all 348 broadcasting stations are now operating. With the passage of the bill—and there seems little doubt that it will pass, as there are virtually no opponents to it, a conference in Washington of all radio inspectors will

be called to meet with the new radio advisory committee of twelve authorized in the bill to aid Secretary Hoover in enforcing the legislation.

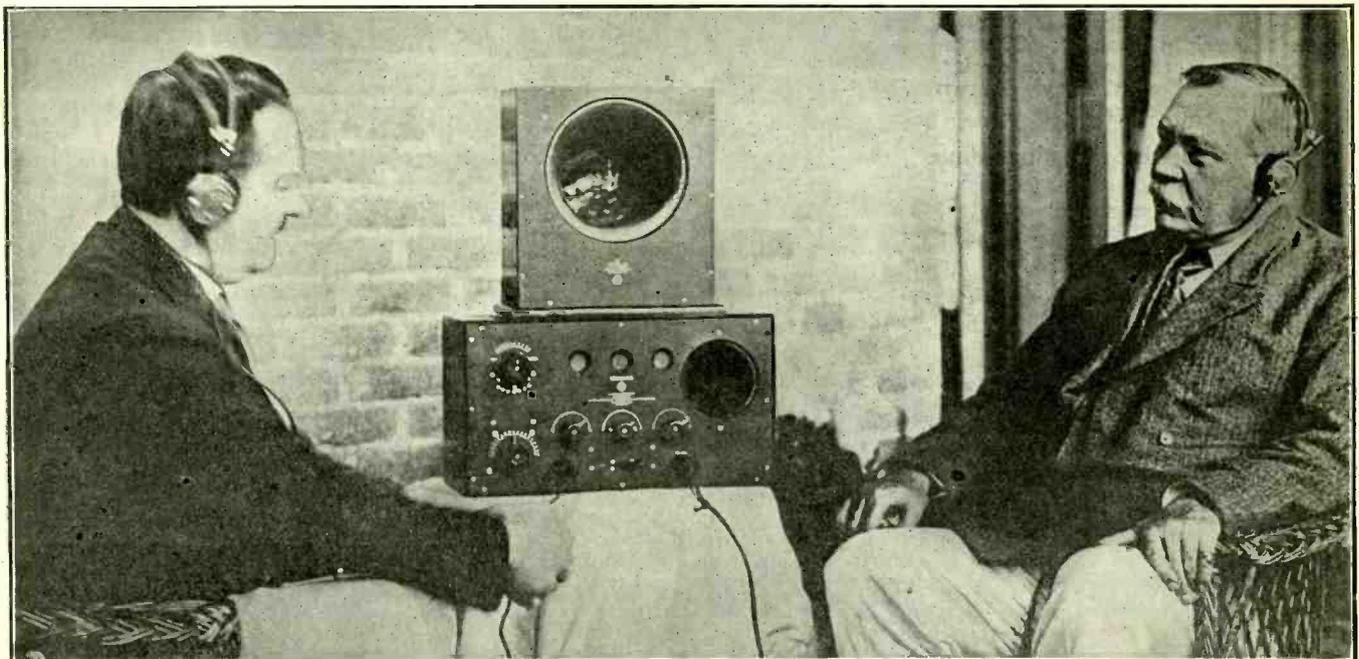
To date, no one will hazard a guess as to the personnel of the committee, although it is thought that the six governmental representatives will include a number of the officials who have already cooperated with the department in its recent conference on radio-wave distribution and the necessary legislation. The following men were conspicuous in that work and may serve again: Dr. S. W. Stratton, Bureau of Standards; Major-General George O. Squier, United States Signal Corps; J. C. Edgerton, United States Post Office; W. A. Wheeler, Department of Agriculture; D. B. Carson,

It is even more difficult to predict the members to be selected from civil life, as there are many interests to be represented by only six men. The manufacturers of radio apparatus must be included, as well as transoceanic operators, broadcasters, amateurs, radio engineers, commercial operators, and probably educational institutions and news agencies, which makes eight interests. This shows the difficulty which may be encountered in making a fair distribution, although one man

may be found who can represent two of the classes vitally interested in radio.

One of the first problems to be encountered by the department will be the assignment of new wave lengths so that interference will be decreased, and then the problem of whether to zone the country or classify the stations will come up. If waves are assigned by zones, it is pointed out, local interference will become greater; whereas, if wave lengths are distributed to different classes of operators—as, for example, one wave to newspapers and one to entertainment—the air would be jammed again with various news stories on one wave length and music and song on another. Naturally there are not enough waves between 285 and 485 meters to give every operator of the 348 broadcasters a specific length—so it would appear that a plan of combined classification and zoning would have to be tried out and regulated further by specific hours for operation. It is thought, however, that by using the system of classification detailed by the full radio committee recently, and a zoning system with, perhaps, the maintenance of local time schedules in cities where there are several broadcasting stations, much can be accomplished to clear the air.

## Conan Doyle, Famous Author and Spiritist, to Study Radio Here



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

Sir Arthur Conan Doyle (at right) and F. D. Walker, vice-president of the John Firth & Company Radio Corporation, New York, listening to a concert by radio at the Ambassador Hotel, Atlantic City, N. J. Sir Arthur became an interested student of the radio when Mr. Walker, a radio expert, took a set apart and explained its workings. The spiritist and author will learn all he can about radio while he is in America. He thinks it will aid him in his psychic investigations.

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

I WANT you to know what radio did for me," said a pretty matron, a very particular friend of mine, when I met her coming to town from her country place near New London. "You know, my husband is radio 'bug.' At least that is what the boys call him. Well, the other night he had to stay in New York, and left me with mother and the children—and, I almost forgot, the radio set. Of course, I stayed awake for hours wondering if burglars would break in. Finally, I did hear strange noises. It seemed as if someone was in the kitchen. I knew that if I yelled, I would be laughed at if my fears were groundless; so I just slipped on a wrapper and tiptoed downstairs to the living room. I had seen Jack tune in a dozen times, so I sneaked over to the set and turned that little knob. Luckily there was a steamer somewhere on the sound sending out signals, and I caught them. You should have heard that noise! Yes, the kitchen door slammed. And I did hear footsteps on the gravel walk outside. Mother came down, and we made an investigation. All they got away with was a silver serving-tray. I call the receiving set my watch dog."

Another friend, one with a family of six, four of them girls still under twenty, tells me that they are keen for radio and are engaged in building their own set. They have a big bungalow near Lake George. Adjoining them is a colony of boys; and the four girls are vying with them in making a set that will pick up every broadcasting station within a reasonable radius. And these girls are learning all about the new science, too. I know them; and I know that what they set out to do they stick to until the job is finished. I am invited to spend a week-end with them, and I will tell you how the rivalry progresses.

Anent the above, school authorities in all parts of the country report a remarkable interest in radio, not only among the young men but among young women as well.

Y. M. C. A. radio schools report several young women in their classes. Have you heard of Eleanor Gould, of Minneapolis? She is one of the many girls in this country who have taken up radio. She is just eleven, but she is making her own crystal set. When she finishes, she says, she is going to make a vacuum set. Miss Eleanor wound the coils, mounted the parts in an oak cabinet, and even strung the aerial from the roof of her home. I simply mention this is an example of what girl fans throughout the country are doing.

I deeply appreciate the letters that women readers of RADIO WORLD send me. Indeed, I did not know that our weekly has so many women readers. One writes: "We all thought that radio was a terrible mystery when my husband, a traveling man bought a set. We looked in wonderment whenever he tuned in, and wondered what it was all about when he talked in radio terms. But the most disappointing thing was what we were to do when he was 'on the road.' Well, I was determined that we should not be without our entertainment. I followed your dictionary, learned the terms, studied the set—and I'm proud to say—yes, mighty proud!—that I can operate as well as friend husband. I'm taking up code now. Every night our home (She lives up near Lake Hopatcong.) is crowded with neighbors. They all want sets now."

I was looking over the publications at a newsstand at the Grand Central Station, the other day. A smartly dressed woman came up and asked the attentive clerk for a copy of the latest radio publication. I was not at all displeased when he handed her last week's issue of RADIO WORLD. "I see this is a weekly," said the woman. "I'm glad of that. My boy, who is at a boys' school in Massachusetts, says he can scarcely wait for the monthly radio publications to come out, and I know he'll be delighted to learn that he can get a radio paper every week. I imagine he will want to subscribe for it." And she walked away, looking as if she were a she-Columbus who had discovered something new for the family hope-

Miss Hope Hampton, First National film star, who is not only an ardent radio fan, but also a member of a radio association and a practical worker. She was photographed taking a crystal set a part in order to mount it on a vulcanite panel. This is not an easy undertaking for an amateur, and it shows what the clever radio woman will attempt to-day.



(C. International)

ful. It looks, from where I write, as if another new name were to be added to a certain subscription list.

A drive through Westchester County, last Sunday, disclosed the fact that there has been a very decided and noticeable increase in the number of aerials in that region. A casual glance at the roof tops in the trip from Larchmont to Portchester, enabled the counters to spy sixty-seven aerials along the roads made by the tourists. Can you possibly imagine how this number will be increased to during the coming twelve months?

I was in the office of an eminent lawyer the other day, and was told that the big legal light was in conference and could not be seen just at the moment. Over the mahogany and glass partitions came the sound of a well-known voice and the following one-sided dialogue was distinctly heard: "All right dear. I'll try and have the stuff shipped to-day or to-morrow so that we can have it installed before Sunday. Tell George that I'll try and get the amplifier he wants. . . . Certainly: I'll get the best of everything so that he will start right. . . . Good by, dear." All of which indicated that the important legal conference had more to do with the interesting subject of radio.

Just to show that woman knows something about the technical as well as the amusement angles of radio, let me cite the case of a New York matron whose husband is a well-known electrical engineer, and is, in fact, the inventor of more than one important electrical device. This woman submitted to her husband's firm, a number of drawings showing certain improvements in a radio receiving-set. She sent them in under an assumed name. The matter was taken up by the husband and other members of the firm's technical staff, and it was decided that there was something worth while in the proposition. A letter was written to the name and address given, an appointment made for later in the week, and, at the proper hour, the wife walked in upon her astonished husband and his associates and declared she was ready to talk business. As the question of sex had nothing to do with the value of her invention, terms were quickly made. Now both husband and wife are anxiously awaiting the outcome of the little woman's skill and initiative. It is said, by the way, that the wife has refused a large sum of money for all her rights in the patent—this, on the advice of the husband.

## Limited Commercial Broadcasting Stations Licensed, June 10-16

- KDZW—Claude W. Gerdes, San Francisco.
- KDZX—Glad Tidings Tabernacle, San Francisco.
- WFAF—Henry C. Spratley, Poughkeepsie, N. Y.
- WFAC—Superior Radio Co., Superior Michigan.
- WFAD—Watson, Weldon Motor Supply Co., Salina, Kansas.

- WAAF—Chicago Daily Drivers' Journal, Chicago, Ill.
- WFAK—Domestic Electric Co., Brentwood, Mo.
- WFAH—Electric Supply Co., Port Arthur, Texas.
- WCAH—Entrokin Electric Co., Columbus, Ohio.
- WFAJ—Hi Grade Wireless Inst. Co., Asheville, N. C.

- KWZZ—Kinney Bros. & Sipprell, Everett, Washington.
- WFAE—Radio Engineering Laboratories, Waterford, N. Y.
- WFAP—Brown's Business College, Peoria, Ill.
- WFAT—Daily Argus-Leader, Sioux Falls, South Dakota.
- WFAR—Hall & Stubbs, Sanford, Maine.

# Latest Radio News of the Week Photographs

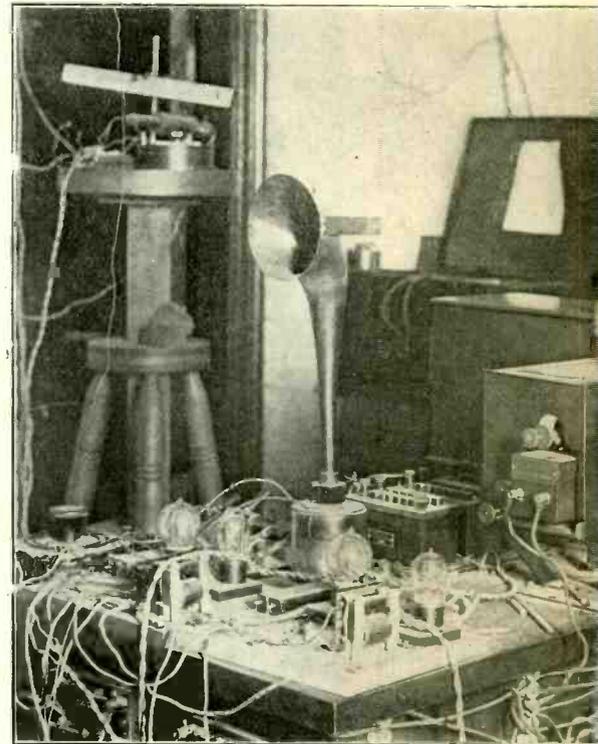
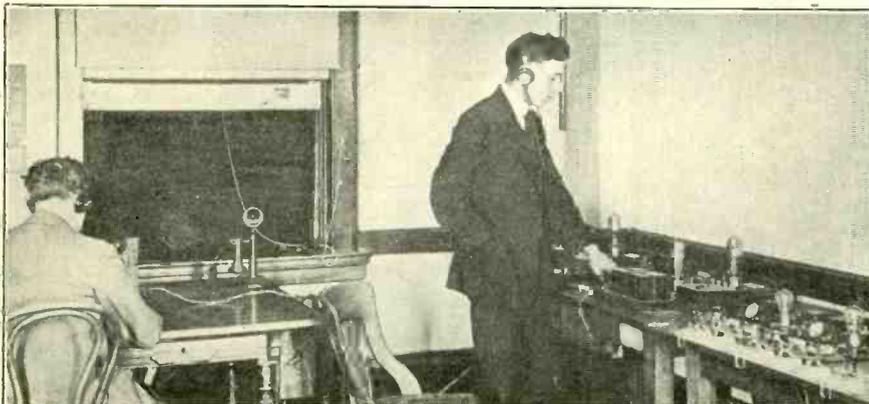


(Above) The young radio fans are busy on the roofs of the tall apartment houses of New York City. These high buildings make excellent foundations for aerials, for they are generally clear of interference. You who live in the country have trees and telegraph poles for your antennae; but the city fan has an equal chance to listen in with the clear plateau of an apartment-house roof for his base.

(C. International.)

(Right) Now you may take a peek into the transmitting room of the broadcasting station of WGY, the General Electric Company's station at Schenectady, New York, one of the most powerful in America. Mlle. Ladd, harpist of the Opera Comique, Paris, is sending a solo over the ether. At the microphone is Kolin Hager, studio manager. Standing behind Mlle. Ladd is Robert Weidaw, assistant to Mr. Hager.

(C. Underwood & Underwood.)



(Above) One of the most interesting new radio devices is shown in this photograph. It is called the oscillograph—a machine that either photographs currents produced in radio research work or permits the operator to watch them in action. It utilizes two distortionless amplifying tubes and two power-tubes.

(C. Kadel & Herbert News Service.)

(Left) They check up all the radio programs sent out from a big broadcasting station; that is, in an operating room adjoining the transmitting room a close "check" is kept on all broadcast matter. By means of the apparatus on the table at the right, the electric currents set up in the microphone are amplified before being transmitted by wire to the broadcasting plant. The utmost care must be taken, for transmitting is an important undertaking. The photograph was taken at WGY, where everything is up to the moment.

(C. Underwood & Underwood.)



# ews and Novelties ek Told in graphs



(Right) At a recent radio show in Greater New York the Army and Navy boys vied with one another teaching the fair sex the mysteries of radio. They are all pretty keen radio experts—these young men in Uncle Sam's service. Of course, the Army uses different apparatus from the Navy. It may be difficult for a young lady to choose between the two, but, as a usual thing, young ladies are very diplomatic when it comes to a choice in anything pertaining to the service.  
(C. Underwood & Underwood.)



(Below) The radiophone is a wonderful thing, but what about the audience? Marie Prevost, moving-picture actress, and her director, Hobart Henley, are listening in while Harry D. Brown, electrical engineer, is explaining "how she works." It was the first time Miss Prevost had ever listened in.  
(C. Kadel & Herbert News Service.)



(Above) The latest type of Marconi direction finder—an aerial of two loops at right angles to each other—which determines the direction of messages from shore stations and ascertains the exact location of a ship in a fog. The instrument is one of the new wonders in radio.

(C. Ewing Galloway, N. Y.)



# Answers to Readers

**I**S a tuning coil 6 inches long and 4 inches wide, wound with No. 24 cotton-covered wire with taps taken off, better than a two-slide tuning coil, 8 inches long by 4 inches wide?—Harry Walton, Omaha, Neb.

A two-slide tuner is the best as it gives better selectivity.

\* \* \*

In RADIO WORLD, No. 10, June 3, under the heading, "Cost of a Single Circuit Receiver," the author makes several statements which I would like to see answered more fully.—J. Davis, Brooklyn, N. Y.

No doubt the author of the article, Howell W. Miller, 565 West 139th Street, New York City, will be pleased to reply.

\* \* \*

What system of wiring makes a circuit, a regenerative circuit, or hook-up? What is the number of the patent (Armstrong) that we read so much about? What is the part, or type of a circuit the Armstrong patent covers?—R. C. May, Dorchester, Mass.

In brief, regeneration is a circuit employing a vacuum tube detector whereby the currents are fed back through the tube by means of coupling inserted in the plate circuit to the grid circuit, thus causing a large degree of amplification to take place without the aid of additional amplifiers. The Armstrong patent is No. 1,113,149. In regard to Mr. Edwin H. Armstrong's patent, we would suggest that you discuss this matter with Mr. Armstrong, Columbia University, New York City.

\* \* \*

How many plates should be used in a series condenser with aerial?—Arthur Stokes, Omaha, Neb.

Use 43 plates. A smaller condenser will cut down the wave length too much and reduce the signal strength.

\* \* \*

I am making a set according to the enclosed diagram. What do you think of it?—G. L., Jackson City, Mich.

The circuit is all right, but be careful when wiring.

\* \* \*

I have a vactophone, made for deaf people. Can I use this for radio?—Paul Jones, Phoenix, Ariz.

No.

\* \* \*

Which will make a crystal set have a longer wave length and make it more efficient—a loose coupler or a vario-coupler with two variometers?—John Thompson, Richmond, Va.

A loose coupler is the most efficient tuning device for crystal reception.

\* \* \*

Will copper wire that has turned black from the weather give the same results as when new. Kindly let me know if the

enclosed hook-up for a lightning arrester is correct.—Arthur Chase, Binghamton, N. Y.

The black is nothing but an oxide of copper and will not affect results. Your hook-up is correct.

\* \* \*

Will a two-, three- or four-wire aerial increase the range of a receiving set, consisting of regenerative, a receiver and a two-stage amplifier?—Edward Lebak, New Haven, Conn.

Not so much for receiving as for transmitting. One wire should be sufficient for receiving purposes.

\* \* \*

I made the set described by G. W. May in RADIO WORLD, No. 11, dated June 10. I heard WJZ the first night. When I took the variable condenser out of the aerial circuit, I got excellent reception from WJZ and 2XB. Why don't I hear more stations? My aerial is 65 feet long, with two wires, inverted L type.—Robert G. Frank, New York City.

The variable condenser cuts down the wave length. Evidently, when the condenser was eliminated, you happened to be right on WJZ wave length. We suggest that you add one or two steps-of amplification to your set, if possible, as this will give you wider range. Also see if you can erect one wire aerial about 100 feet long.

\* \* \*

Regarding the circuit of Mr. Casmay's, described in RADIO WORLD, No. 8, dated May 20. What does the tickler consist of and how is it adjusted in relation to the secondary? Are the 600 meter coils loading coils?—W. R. Leslie, E. E., Highland Park, Mich.

The tickler consists of three quarters of the amount of inductance as that used in the secondary winding. It is adjusted by a rotor upon which this winding is wound, the rotor, in turn, being placed inside the tubing that holds the secondary winding. The 600-meter coils are not loading coils—merely coils which would enable 600 meters to be heard. Either circuit can be used.

\* \* \*

How many plates are required in order to get the following capacities for variable condensers: .0005, .001, .002, and .003 mfd.—George E. Hoyt, Bridgeport, Conn.

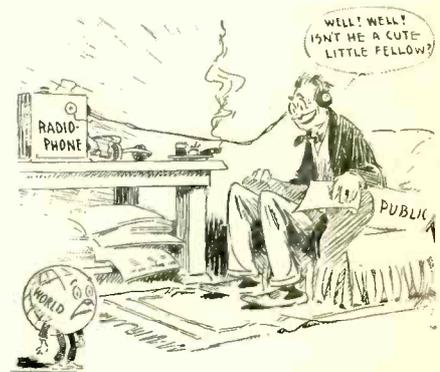
See RADIO WORLD, No. 10, dated June 3, entitled "How to Compute the Condenser," by E. L. Bragdon.

\* \* \*

Can slate be used successfully for panels? How does it compare with other dielectrics?—Joseph B. Lombardo, Phillipsburg, N. J.

Slate, electrically, is a very poor dielectric and nonconductor. It was used in past years as a panel for transmitters, but we have never heard of it being used for receivers. At present, nothing is superior to bakelite or hard rubber.

## It Is Getting Smaller Every Day!



By Brown, Chicago "Daily News"

## Only One Amateur in 100 Transmits

**D**O you think that the "radio fan" is a new arrival? The fan himself can tell you otherwise—although it is only within the past few months that he has become so amazingly numerous. In 1920, there were about 10,500 licensed amateurs in the country; last year there were 13,560. Amateur radio stations that receive only are not included in the licensed list; of the latter it has been estimated that there are 600,000 to 1,000,000 now in existence, while a year ago there were not over 60,000. The pre-war peak was in 1916 when the number of licensed stations was slightly over 5,600. During the war there was a large drop in the number because all but official stations were prohibited. In 1904 the money invested in the production of radio telegraph instruments was only \$114,050, and, in 1919, the amount had risen to \$7,600,698.—"The Evening Mail," New York.

## The Kindly Ether

I always thought that ether was  
A sort of paralyzing stuff,  
That made the patient never mind  
When surgeons got too rough.

And now I learn from radio  
THE ether's not that kind,  
But mystery in the air around  
Like thoughts within a mind.

You cannot see, nor sense it,  
Nor catch it in your glue.  
It laughs at all the cameras,  
And yet—it talks to you.

Odd things this radio has done;  
Aladdin's lamp, it's beaten,  
Some day, perhaps, ether will bring  
A meal in to be eaten.  
—"Mac," in "The Evening Mail," New York.

## Controls 51 Stations

**T**HE Signal Corps radio message center in the Munitions Building, Washington, D. C., now controls 51 separate radio stations throughout the country, connecting every corps area and numbers of small stations with army headquarters. During the past few weeks, stations at Camp Custer, Michigan; Miller Field, Staten Island, New York; Scott Field, Illinois; Rockwell Field, California; Camp Lewis, Washington, and Arlington, Virginia, have been added to the net of the Signal Corps.

## SELLS MORE RADIO WORLDS THAN ANY OTHER 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

# Hook-ups

By Albert P. Taylor

PROBABLY, by now, Bellevue Hospital, New York, has a receiving set. The officials planned to instal one. We can't help thinking what a difference radio reception would make to patients in any hospital. Instead of those old tired-out records, to have original music coming into the wards would be a good tonic—not necessarily bitter, either. Patients might have to listen to Dr. Copeland once in a while; but don't doctors prescribe counter-irritants?

\* \* \*

It seems radio is being used by the police in several states to help in capturing criminals. Now, if we were an upper-story crook, we'd transmit to the party with the valuable gems, informing them of our interest, and ask 'em please to bring the stuff down to the first floor. In that way it would be a cinch to get the goods. They couldn't locate us through a phone booth and ———. We hadn't calculated on their stopping en

route to bring along one of those six-shooting heirlooms. There're a lot of new uses for radio just the same.

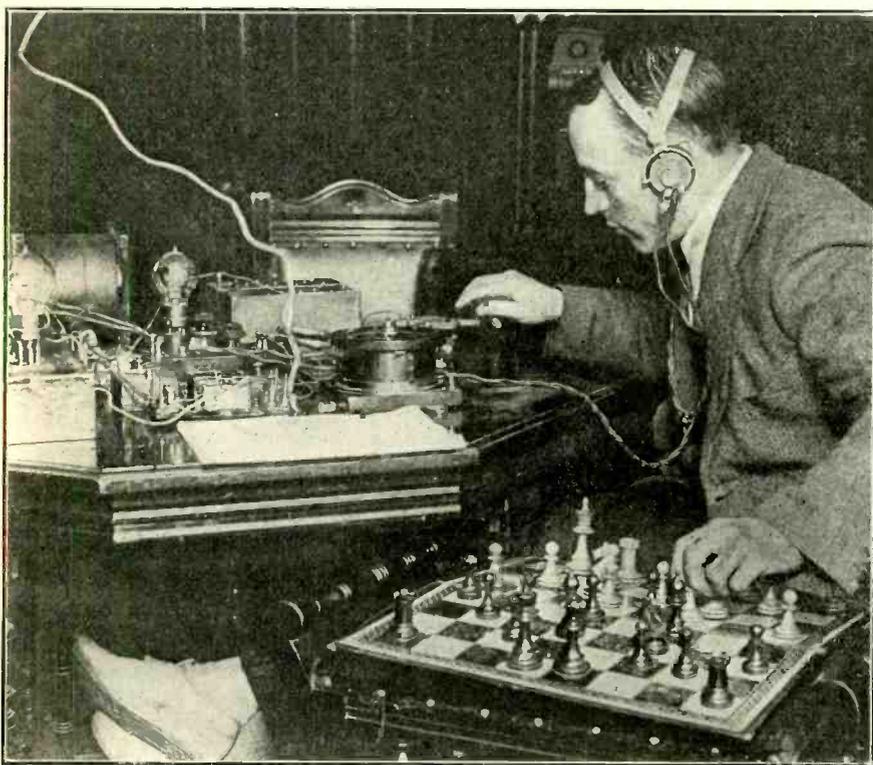
\* \* \*

Let's shake with Alexander Graham Bell! That telephone of his can bring you out of a comfortable bed to find the operator called the wrong number. Of course, we need it to gossip with the family down the street once or twice a day. With radio, we can listen in when it suits us, and shut 'em off when it tires us without causing hard feelings. Just at present, you can't transmit to all the folks you know, even with code; but a few friends probably are initiated.

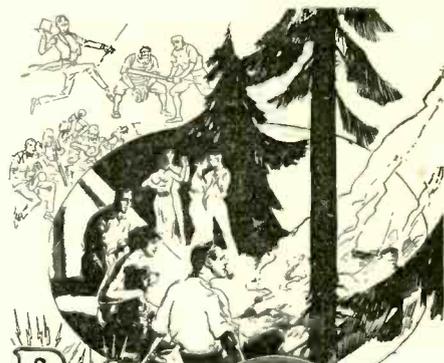
\* \* \*

There's a drug store in Cincinnati which carries a fine window-display of radio equipment. No doubt they have a complete assortment of amplifier sundaes, d.-c. frappes and cool drinks that are real transformers. There should be brisk trade with a loud speaker near a soda fountain.

## One End of London-Paris Chess



(C. Kadel & Herbert News Service.) Chess, the most scientific game in the world, has been played by radio on several occasions—once while one player was at sea and the other in Chicago. Here is a photograph of Frank Walsh, a young inventor, in his home in London, England, playing chess with his brother in Paris—each move of the chessmen being made by radio. Mr. Walsh claims that the excitement is made more tense by the distance that intervenes—that waiting for his brother to radio a move, while he studies his own board, adds a peculiar zest to the match. Chess is a game calling for the greatest skill and patience—but, Mr. Walsh says, radio does not take away from its most important elements in the slightest.



Radio brings it  
MAGNAVOX tells it

The Summer Camp is made complete by the

MAGNAVOX RADIO—

WHAT wonder that camping parties, clubs, summer schools, hotels and country homes everywhere are enthusiastically taking up Magnavox Radio to solve the inevitable problem—adequate amusement for every member or guest.

It is Magnavox Radio, the reproducer supreme, which makes the receiving set wholly useful and enjoyable.

With the Magnavox Radio you hear every wireless program at its best.



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

No Wireless receiving set is complete without the MAGNAVOX Radio

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

The Magnavox Co.  
Oakland, California  
N.Y. Office: 370 Seventh Ave.



# Radiograms

Latest Important News of Radio from the World Over, Told in Short Wave-Lengths

**S**UMMER Programs Must Not Be Overlooked by the managers of broadcasting stations. Radio is appealing strongly to the vacationist, and many people have taken their sets to the country. The camper, the sea-shore devotee, and he who can remain away from his office for a week or a month, no doubt will be greatly interested in the news of the day—particularly baseball scores. He will want the broadcasting station to substitute for his newspaper. He will want to be entertained—but, first of all, he will want news; but, if too much news is broadcast, the city man will object because he cannot be torn away from his evening paper. Why not broadcast more news during the day? The vacationist has plenty of leisure during the day—the city man has not!

\* \* \*

**Bobbins for telephone receivers**, when used in radio, are wound with No. 40 single-silk, or enameled, wire. This wire is about the thickness of a human hair and requires very careful manipulation.

\* \* \*

**England is to be divided into eight broadcasting areas** with one transmitting station for each area.

**Washing hung on roofs to dry is a greater interference than static** and much harder to eliminate. When you see the week's wash and the antennae in a seemingly unseparable tangle, you may realize the truth of this.

\* \* \*

**New Jersey has decided on a competition**, in its various schools, in the construction of radiophone sets. Thus far, over 4,000 complete sets—some of them of a more complicated nature—have been built. The authorities claim that boys are learning more, through wireless, about electricity, batteries, the telephone, and ether, than they could assimilate through text books.

\* \* \*

**The Radio Amateur Bureau of the Third Naval District**, located at South and Whitehall Streets, New York City, is now broadcasting its radio information immediately after the 9 p.m. press broadcast is completed. The station operates this amateur broadcast on a spark wave of 1,832 meters.

\* \* \*

**Michigan is to use radio in the rum-running war** along its borders. One radio station has been established on the Upper Peninsula, at the State police sta-

tion, at Negaunee; another at Gaylord; a third in or near Grand Rapids; a fourth in or near Detroit; another in the Thumb district, comprising probably half a dozen sending and receiving stations to assist the state police and local officers in apprehending violators by broadcasting news about rum running. The central station will be at Lansing.

\* \* \*

**A wire should be used to "jump" the meter**, so that the ground connection will be continuous. In most gas installations in the older houses an insulating coupling is placed between the piping and the gas meter. This renders the gas pipe useless for grounding purposes in connection with the radiophone receiver.

\* \* \*

**Radiotelephony is still an unknown science in Belgium.** Only recently, King Albert listened to his first aerial conversation—a message from the Eiffel Tower, Paris. There is not a single broadcasting station in Belgium. The few scientific persons who have built receiving equipment depend entirely upon Paris, and Schevevingen, Holland, for their entertainment. Such is the unique picture of aerial communication conditions in the little kingdom as pictured by L. Van Dyck, chief of the production branch of the Bell Telephone Manufacturing Company, at Antwerp, who has come to the United States to study methods at the Western Electric Company's factory, Chicago. "Belgium," Mr. Van Dyck declares, "has acquired the habit of looking to the United States for all suggestions in electrical matters. Once the radiophone has proved its feasibility as a commercial enterprise here, Belgium undoubtedly will take steps to adopt it."

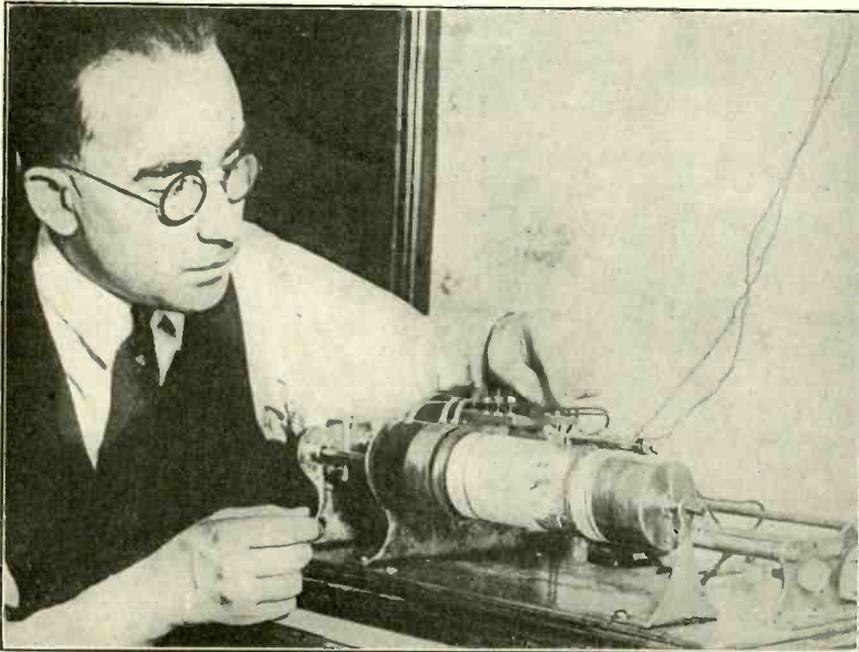
\* \* \*

**An unusual measure of international tribute** has been paid to the engineering forces of the Western Electric Company. Coincident with the election of Frank B. Jewett, vice-president in charge of the company's engineering and manufacturing departments, to the presidency of the American Institute of Electrical Engineers, word has been received from the other side of the Atlantic of the selection of Frank Gill, European Chief Engineer of the International Western Electric Company, to head the institution of Electrical Engineers in Great Britain.

\* \* \*

**The radiophone and spinal anesthesia, two recent inventions**—one electrical, the other surgical—enabled a girl in the Samaritan Hospital, Philadelphia, to undergo two serious operations, last week, and remain smiling throughout. The spinal anesthesia numbed the girl's body from her shoulders down. The radiophone transmitted to her the songs of McCormack, and the piano wizardry of Paderewski and other musicians. The experiment was conducted by Dr. John Howard Frick in an effort to alleviate the mental torture which his patient, a naturally nervous person, would have had to endure under the knife. During the first operation, for appendicitis, the girl remained oblivious of the surgeons. The radio receiver strapped over her ears, her only comment was that she could "hear perfectly" the strains of music coming through space. The second operation was for the removal of gall stones. Throughout it, the patient entertained the nurses with laughing comment on the "good execution" of the musician who was transmitting Chopin for her. She even offered occasional criticisms.

## This Machine Radios Pictures



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

John Leichman, of Ogden, Utah, demonstrating his machine for the transmission of photographs by wire. The original photograph is placed on a drum on the machine and a sheet of white paper is placed on a similar drum at the receiving station. The impression is made by the sensitiveness of the vibrations. The face of a person photographed may be seen on Mr. Leichman's machine.

**Mr. Garrick Defended**

**E**DITOR. Radio World:—Well, Well! Looks as if Friend Garrick started something in Radio World, dated April 22. Maybe you are right, 2-tt; but you know he just said, "Westinghouse," so I took it for granted that he meant the "RC."

Now, as for you, Mr. Hoeveler, your letter makes me smile. You admit that you don't know anything about radio, but you have the nerve to write such a letter. I would suggest that you read 2-tt's letter and study radio a little more before calling a commercial operator narrow minded.

Do you suppose that a ship or land station is going to change their wavelength, or the amateurs change their 200-meter wave allowed them by the Government, just to please the "music listeners?" That statement of yours is pure foolishness. Very true, thousands of people enjoy the broadcast music, but is that any excuse for a dozen "would-be" broadcasting stations springing up every day? Why not have one good one in each State operating on a wave that won't be interfered with by telegraph signals? The amateurs get more complaints from these "parlor hams" about interference than they do from the big commercial stations handling hundreds of important messages every day.

I think you are one of those "birds," who, every time they hear a ship handling traffic with a coast station—probably relating to a ship in distress—say, "There goes another one of those amateurs with his 'da dit da.'" Did you know that there are times when thousands of lives on a ship at sea depend on those da dit das?

You also say, "If Mr. Garrick is such a clever radioman." Let me tell you one thing: If he holds a commercial operator's license, he IS a clever radioman.

Learn radio before saying that a real radioman has a cramped intellect.

My very best regards to Mr. Garrick, 2-tt, and all the "BRASS POUNDERS."—D. B. Fancher, Radio Station 1-BVB, Westerly, R. I.

**Big Business Ahead**

It has been stated in these columns before that radio has not as yet "struck its stride," says "The Evening Mail," New York. Several million American homes will have to be equipped before radio will have reached the zenith of its phenomenal growth. It will take many years for that.

The writer recently returned from a trip to the northern part of the State and he was surprised at the small number of radio aerials he saw on the roofs of houses. Not one house in a hundred had an aerial on it. Interest in the radio was running high, and a great deal of apparatus was being sold by the dealers, but the great mass of the people had not yet reached the buying mood. That condition is general throughout the entire country.

**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.

CHICAGO RADIO SHOW, Coliseum, Chicago, Ill., October 14 to 22. U. J. Hermann, managing director, 549 McCormick Building.

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

FIRST INTERNATIONAL RADIO EXPOSITION, Grand Central Palace, New York City, George Brokaw Compton, secretary. Date not set.

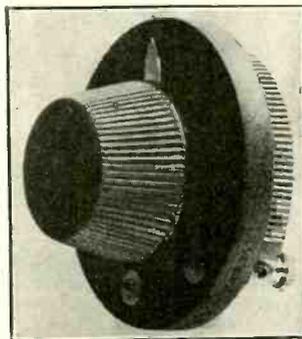
"RADIO DAY," Pittsburgh, Westview Park, August 24. Under auspices of Radio Engineering Society. C. E. Urban, secretary.

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

Established 1860

Tel. Barclay 8676

**CHAMPLIN FILAMENT RHEOSTAT**



List  
\$1.00

Resistance  
5.24 Ohms

Immediate Delivery  
JOBBERS AND WHOLESALERS  
Wire for Discounts

**Champlin Mfg. Co.**

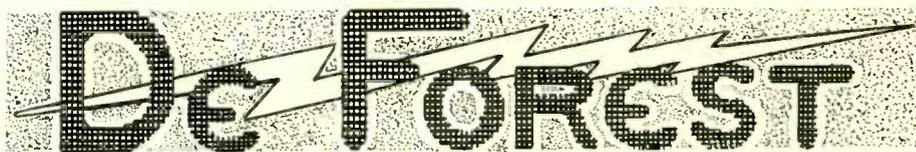
90 WEST BROADWAY, NEW YORK CITY

**DE FOREST RADIO PARTS**  
**For Those Who Build Their Own**

The same care should be taken when purchasing Radio Parts as when buying a complete Receiving Set. De Forest Radiophone Parts are unequalled in quality of materials, workmanship and correctness of design. Insist upon De Forest when purchasing the following instruments:



- Rheostats
- Coil Mountings
- Switches
- Duo-lateral Coils
- Grid Leaks
- Tube Receptacles
- Condensers
- Crystal Detectors
- Amplifying Transformers



*"Famous For Dependability"*

**BACK NUMBERS AND NEW RADIO WORLD READERS!**

The publisher has reserved a limited supply of the first thirteen issues of RADIO WORLD for the benefit of new readers who want to become subscribers and have their files complete from the first issue. The first twelve copies will be mailed postpaid on receipt of \$1.50; or better still, subscribe now for six months (\$3.00), or twelve months (\$6.00 for 52 issues) and have your subscription start with No. 1. Radio World Co., 1493 Broadway, New York City.

# Radio Merchandising

## New Firms and Corporations

Notices in this department are considered as purely interesting trade news and published without compensation to us. We welcome trade news of this nature. All notices having an advertising angle are referred to our Advertising Department, and are placed under Classified Advertising at 5 cents a word, or as Display Advertising at \$5 an inch.

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

Radio Co., Manhattan; \$5,000; J. Oldak, M. Davis, R. I. Livingston. (Attorneys, Livingston & Livingston, 299 Broadway, New York.)

DeKady Radio Equipment Company. Manufacture electrical supplies. \$9,000. Harry B. Doyle, Mt. Vernon, N. Y.; Victor C. Kitchen, Great Neck, N. Y.; S. E. Darby, Jr., New York City. (United States Corporation Co.)

Natural Voice Radio Horn Corp., Manhattan; \$20,000; E. M. and E. A. Leet. (Attorney, W. V. Burke, 375 Fulton St., Brooklyn, N. Y.)

Beverly-Green Corp., Manhattan, radio outfits, 100 shares common stock, no par value; F. Raab, F. Demovitch, G. Schonberger. (Attorneys, Joseph, Demov & Feinstein, 277 Broadway, New York.)

Brownie Radiophone Co., John F. Dwiggins, manager, 81 Orchestra Place, Detroit, Mich.

Fairbanks Radio Corp., Brooklyn; \$10,000; S. and M. and J. Siegmund. (Attorney, S. Douglas, 922 Broadway, Brooklyn, N. Y.)

Norris Radio Corporation. Manufacture and sale of radio equipment. 300,000. C. Henry, P. D. Benson, A. E. Claffey. New York City (Colonial Charter Co.)

Radio Land Corp., Delaware; 10,000 shares preferred stock, \$10 each; 10,000 common, Class A, \$10 each; 30,000 common, Class B, no par value; rep., M. W. Waide, 127 West 53d st.

Paramount Radio Parts and Die Corp., 174 North St., New York, N. Y.

Northern Radio Supply Co., Manhattan; realty, \$10,000; E. A. London. (I. Weissberger & Leichter, 93 Nassau St., New York.)

Franklin Radio Corp., Philadelphia; manufacture wireless telephone; \$250,000. (U. S. Corporation Co.)

Bestophone Radio Corp., Manhattan; \$10,000; A. A. Lenick, I. Merzger, G. N. Sherman. (Attorneys, Perlman & Levitt, 15 Park Row.)

Millard Radio Corp.; apparatus; \$1,250,000; Theodore L. Ernst, S. E. Freeland, Samuel Baras, New York. (American Guaranty and Trust Co.)

Flash Radio Equipment Co., Manhattan; \$100,000; J. F. Siegel, O. C. Bryant. (Attorney, H. C. Harris, 291 Broadway.)

Simon Radio Corp., Delaware, to Rayphone, Manhattan.

British American Radio Corp., apparatus, \$2,500,000; Jacob H. Roberts, Edward B. Jordan, Jr., George H. Matthews, Hempstead, N. Y. (Phillip L. Garrett, Wilmington, Del.)

Midwest Radio Corp., Wilmington, apparatus, \$500,000. (American Guaranty Trust Co.)

Mohawk Radio Mfg. Co., Manhattan, engineering and contracting, \$200,000; J. P. Aylward, F. Weinberg, H. J. Heght. (Attorney, J. J. Heght, 126 Liberty St., N. Y.)

Thresher Radio Corp., Brooklyn, \$100,000; A. A. Thresher, J. D. Smith. (Attorney, W. F. Smith, 39 Cortlandt street, New York, N. Y.)

Radio Clearstone Corp., 2072 Valentine avenue, New York City (Bronx), \$20,000; H. Meisinger, H. D. Danehy, F. Metz. (Attorney, B. J. Levy, 45 West 118th street, New York.)

North American Radio and Supply Corp., Wilmington, Del., airplane and radio supplies, \$100,000.

International Engineering and Radio Corp. of America, Wilmington, Del., equipment, \$100,000. (Colonial Charter Co.)

Tesh Radio Co., J. Fred, Tesh, manager, High Joint. N. C.

## A Simple Variocoupler

A VARIOCOUPLER is an essential part of every radio set used for the reception of continuous wave transmission and in particular the broadcasting of telephone. It is the first step of transformation of the radio frequency, and in order that the reception may be brought into resonance, the instrument must be tuned to the proper frequency.

The Selector variocoupler differs from those now on the market in the feature that the selective tuning is all self-contained within the variocoupler itself. This is accomplished by the addition of the Selector, which is a selective contact switch, so inserted into the variocoupler that its control in this position is in the same alignment with the rotating means of the rotor section of the variocoupler, so that the aerial ground and rotor, or secondary control, are located in one spot on the surface of the panel of the set. This feature, from a mechanical point of view, is a great space saver and tends to a more harmonious and symmetrical design of the radio receiving set, a feature which every manufacturer today is striving to accomplish. From this point of view alone it is one of the most radical steps that have been accomplished.

Now from the point of view of discussion as to how it will benefit the amateur who builds his own set, we believe that this feature is most paramount. Every amateur who purchases a variocoupler is confronted with the very serious problem of its installation. That it necessitates the assembly of the two selective switches and the contact points which are now found on every set and their assembly and installation alone requires considerable skill. After these switches and points are assembled it then becomes necessary to exercise considerable skill and ingenuity, and the installation of the leads from the taps to the points as installed on the surface of the front of the set and in the assembly of the instrument represents about 40 per cent. of the wiring. It is a very troublesome job and in ninety cases out of a hundred it is never done satisfactorily.

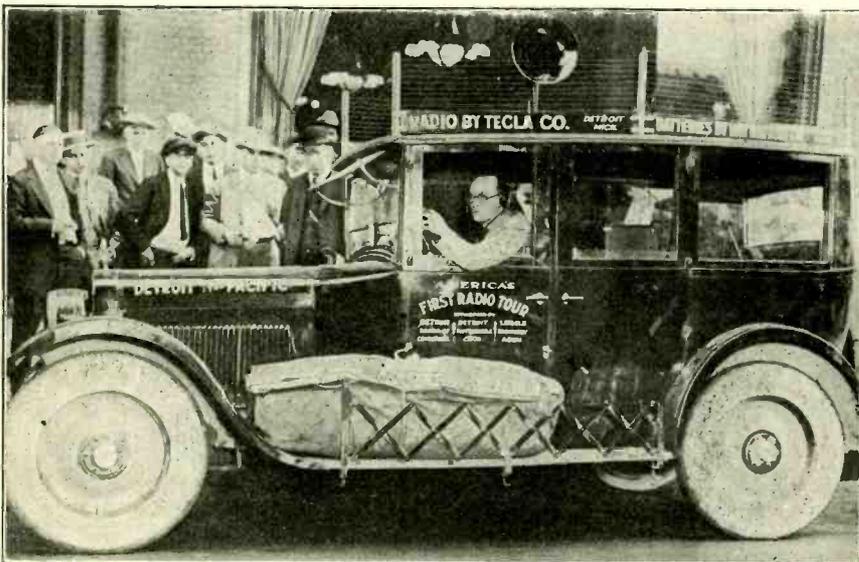
## Work on New York City's Radio to Begin

ROVER A. WHALEN, Commissioner of the Department of Plants and Structure, has announced that actual work on the New York City broadcasting station, to be erected on the roof of the Municipal Building, will be commenced almost immediately.

The Board of Estimate has voted the sum of \$50,000 for this purpose, and Mayor Hylan, who proposed the idea, has complimented the members on their generosity. Plans and specifications are now being prepared and bids for the steel tower to support the aerials will be advertised in a few days. Only one steel tower will be used. The antenna will be attached to it and to the tower of the Municipal Building.

New York City, metropolis of the Western Hemisphere, is, therefore, the first city to erect its own broadcasting station. This is a bit of radio enterprise which, no doubt, will be an inspiration to other municipalities throughout the country. With New York City supporting its own broadcasting station, the entire country will be benefited, for the ether waves will carry the programs to many distant points.

## "He Shall Have Music, Indeed"



(C. Pacific and Atlantic Photos.)

Are you radio touring this summer? They say it's simply grand! The latest thing out! So here we see Wallace Blood, of Chicago, his sedan car all "dolled up" with radio harness ready for a trip to the Pacific Coast, which, Mr. Blood says, is the first radio tour on record. The photograph shows the radio sedan, with Mr. Blood's hands on the wheel and the phone clamped to his ears, starting out from Chicago, ready to pick up the ether waves as he goes.

# Radio Captains of Industry

No. 3—JOSEPH D. R. FREED

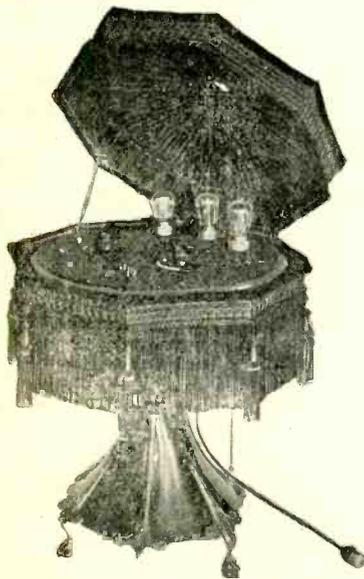
President, Freed-Eisemann Radio Corporation



(C. Kadel & Herbert News Service.)

What is claimed to be one of the most radical advances in radio is this miniature detector tube, which, requiring no batteries whatever to operate, is designed to replace the costly vacuum tubes used in radio outfits. Joseph D. R. Freed, president of the Freed-Eisemann Radio Corporation, is the inventor. He claims that, after years of careful laboratory research work, he has finally perfected a tube that will cost the radio fan very little money, yet will function perfectly. Mr. Freed was photographed holding a large vacuum tube, in general use, in one hand and the new miniature tube in the other. Note the difference in size.

## The Radio Phonolier



THE Radio Phonolier combines, in one compact unit, a lamp, and a complete radio-telephone, tuner, detector, two-stage amplifier and loud speaker.

Due to our scientifically designed "All-

Wave" coupler, the Radio Phonolier has a range of from 150 to 3,000 meters, no extra loading coils or other apparatus being necessary to hear the higher-powered broadcasting stations.

The Radio Phonolier is built of solid copper, and finished in bronze, silver or gold, with lamp shades of refined and subdued combinations to match or contrast with interior decorations.

The base of the lamp is the loud speaker, and contains an inner horn that increases the clearness and volume of tone amazingly.

The Radio Phonolier is all that the discerning artistic temperament can desire for reading or efficient broadcast reception, and is being produced for refined individuals who take pride in beautiful home surroundings, and who, at the same time, wish to enjoy the entertainments being broadcast by the many stations.

## Trade Notes

A NOTICEABLE increase in the number of incorporations in New York State, reported by the Secretary of State's Department as an indication of a new confidence in the future of business, resulted in 1,683 companies, with a capitalization of \$60,379,139, taking out charters in May. In the first five months of 1922 there have been 952 more incorporations than in the similar period in 1921.

Of the companies embarking in business last month, 264 with a capitalization of \$13,776,000 are distributed over 43 counties outside of Greater New York. Radio supply companies continue to occupy a prominent place in the ranks of new ventures.

THE RECENT DEVELOPMENT and popularity of radio has afforded many manufacturers a new field for sales. One of these is the Post Electric Co., 30 East Forty-second street, New York City, manufacturers of the "Post Electric Pen." Professionals and amateurs alike have found this "pen" just the thing for soldering connections heretofore hard to get at with the ordinary large soldering-iron. The "Post Electric Pen" may be attached to any electric-light socket. It attains maximum heat in 45 seconds and makes the soldering of connections and loose parts as easy as writing with a pen.

## Radio Booms Metal Trades

W. L. Chandler, President of the National Association of Purchasing Agents, in an interview, says that the metal trades have followed in the wake of the radio boom and show a great increase in orders during the past two months. A great demand has developed for strip and ribbon metals which are used extensively in the manufacture of radio equipment.

## 1,717 Radio Companies in New York

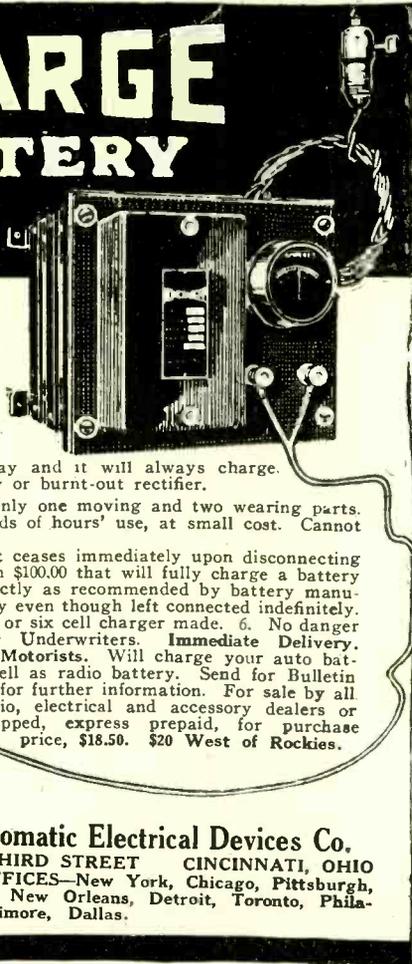
New York State records show that 1717 radio companies were incorporated in the month of March, 1922. A summary issued by Secretary of State John J. Lyons, shows that an aggregate total capital of \$58,411,250 is represented.

## Will All New Firms Join This List?

- G. F. Johnson, 625 Black Ave., Springfield, Ill.
- DX Radio Co., Summit, Ill.
- Ideal Apparatus Co., 1901 E. Louisiana St., Evansville, Ind.
- Alamo Sales Corp., Indianapolis, Ind.
- Indianapolis Radio Supply Co., 3023 Boulevard Place, Indianapolis, Ind.
- Radio Service Organization, Logansport, Ind.
- The Radio Shop, Union City, Ind.
- Burgess Elec. Co., Duluth, Minn.
- Chas. A. Anderson & Co., 430 2nd Ave., S., Minneapolis, Minn.
- Findley Electric Co., Minneapolis, Minn.
- Radio Equipment & Mfg. Co., Minneapolis, Minn.
- Sterling Elec. Co., Minneapolis, Minn.
- Berggren Electric Co., 436 Gilfillan Bldg., St. Paul, Minn.
- Pioneer Electric Co., St. Paul, Minn.
- Central Radio Co., Independence, Mo.
- Central Radio Co., Inc., 575 Grand Ave., Kansas City, Mo.
- McCreary Radio Supply Co., 4th and Delaware Sts., Kansas City, Mo.
- Western Radio Co., 6 W. 14th St., Kansas City, Mo.
- Benwood Specialty Co., 13th & Olive Sts., St. Louis, Mo.

- Linze Electrical Supply Co., 1127 Olive St., St. Louis, Mo.
- Missouri Radio Supply Co., 4623 Maryland Ave., St. Louis, Mo.
- H. & M. Radio Equipment Co., Akron, O.
- Athens Radio Co., Athens, O.
- Electric Motor & Eng. Co., Canton, O.
- Wireless Mfg. Co., Canton, O.
- Radioelectric Shop, Cleveland, O.
- Reliable Radio Parts Co., 11419 Durant Ave., Cleveland
- The Amolecco Co., Cincinnati, O.
- Ano Radio Mfg. Co., 218 W. 12th St., Cincinnati.
- Cino Radio Mfg. Co., 218 W. 12th St., Cincinnati.
- Craig & Loughborough, Norwood, Cincinnati.
- Mid-West Radio Co., 3423 Dury Ave., Cincinnati.
- Milnor Elec. Co., 129 Government Sq., Cincinnati.
- Precision Equipment Co., Peeble Corner, Cincinnati.
- Reuter Elec. Co., Cincinnati.
- Electrical Specialty Co., 48-50 S. Front St., Columbus, O.
- L. J. Lease, Delaware, O.
- Wm. Hall Elec. Co., Dayton, O.
- American Radio Sales & Service Co., Mansfield, O.
- B. S. Sprague Elec. Co., Marietta, O.
- Dewey Sporting Goods Co., Milwaukee, Wis.
- Meter Electrical Construction Co., Oshkosh, Wis.
- D. & F. Kusel Co., Watertown, Wis.
- Western States:
- Reynolds Radio Co., Inc., 613 19th St., Denver, Colo.
- Winner Radio Corp., 1710 Glenarm Pl., Denver, Colo.
- Henry Francis Parks, Butte, Mont.
- Northwestern Radio Mfg. Co., 1556 E. Taylor St., Portland, Ore.
- Stubbs Elec. Co., 6th at Oak St., Portland, Ore.
- The Bon Marche, 2nd Ave., Pike and Union Sts., Seattle, Wash.
- Northwestern Radio & Elec. Co., 418 Union St., Seattle, Wash.
- Northwest Radio Service Co., 1637 Westlake Ave., Seattle, Wash.
- Williamson, Elec. Co., Seattle, Wash.
- The Radiomart Co., 1236 American Ave., Long Beach, Calif.
- Brode Elec. Co., Los Angeles.
- Manual Arts Radio & Elec. Shop, 4154 S. Vermont Ave., Los Angeles.
- Southern California Elec. Co., Los Angeles.
- Standard Radio Co., 1048 S. Olive St., Los Angeles.
- Western Radio Elec. Co., 550 S. Flower St., Los Angeles.
- The Wireless Shop, 1262 West 2nd St., Los Angeles.
- Radio Dept., Y. M. C. A., Los Angeles.
- Montebello Radio Shop, Montebello, Calif.
- Warner & Linden, 22nd and Telegraph Ave., Oakland, Calif.
- Altadena Radio Laboratory, 32 W. Colorado St., Pasadena, Calif.
- J. J. Dunn, Pasadena, Calif.
- David Radio Supply Co., R. A. Box 388, Reedley, Calif.
- Hobrecht's, 1014 6th St., Sacramento, Calif.
- Harry A. Snyder, 337 F St., San Bernardino, Calif.
- Southern Electrical Supply Co., San Diego, Calif.
- Herrold Laboratories, 467 S. 1st St., San Jose, Calif.
- The Radio Shop, San Jose, Calif.
- Atlantic-Pacific Radio Supply Co., 638 Mission St., San Francisco.
- California Elec. Supply Co., 643 Mission St., San Francisco.

# HOMCHARGE YOUR BATTERY for A Nickel



No muss, trouble, dirt—no moving of batteries—loss of time—no effort on your part—no technical or professional knowledge needed. **THE HOMCHARGER** successfully meets all charging conditions, and is the only rectifier combining the following essential Homcharging features:

1. Self-polarizing. Connect battery either way and it will always charge. No danger of reverse charging, ruined battery or burnt-out rectifier.
2. No delicate bulbs to break or burn out. Only one moving and two wearing parts. These are replaceable as a unit, after thousands of hours' use, at small cost. Cannot be injured by rough handling.
3. Operation stops and consumption of current ceases immediately upon disconnecting battery.
4. The only charger costing less than \$100.00 that will fully charge a battery over night. Gives battery a taper charge—exactly as recommended by battery manufacturers. Guaranteed not to harm your battery even though left connected indefinitely.
5. Highest efficiency of any three or six cell charger made.
6. No danger of fire. Approved by Underwriters. **Immediate Delivery.**

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.

**The Automatic Electrical Devices Co.**  
135 WEST THIRD STREET CINCINNATI, OHIO  
BRANCH OFFICES—New York, Chicago, Pittsburgh, Los Angeles, New Orleans, Detroit, Toronto, Philadelphia, Baltimore, Dallas.

## Radio and Wire Phones Not Alike

AFTER considerable study the telephone engineers have come to the conclusion that radio and wire telephony have entirely different fields and functions which do not conflict, says "The Radio Digest."

The natural characteristics of radio and wire transmission are fundamentally different. One of these systems performed a duty for which the other is unsuited, and each is supplementing the other to the end that all important needs for communication are being provided for as rapidly as they arise.

The use of wires is necessary for handling the large amounts of traffic on land, which must be done with certainty and minimum of cost. We can plainly see where radio will render a service of the greatest value for communication over wide stretches of water, with moving conveyances generally, for a host of maritime and military purposes and for the broadcasting of information. It would appear that these fields mentioned are the ones in which the radiophone will be of greater importance.

It has often been said that, had the course of scientific development been reversed so that radio transmission preceded transmission by wire, the discovery that wires can be used to guide the ether waves would be considered one of the marvels of science. By their use, the otherwise uncontrolled ether waves are caused to follow predetermined pathways, flashing thousands of messages, whether up through the intricate structure of a thirty story office building, or out across the plains, under rivers and over mountains, to the far side of the continent, there to be received by him—and him alone—for whom it was intended.

## Ode to a Bulb

I T'S far from a thing of beauty, I know,  
But for wonder it hasn't a mate—  
I'm speaking now of that little glass tube

With filament, grid and plate!  
They cost like the devil, but still we buy;  
We'll have them whatever the rate,  
For you can't do much sans the little  
glass tube

With filament, grid and plate!  
It puzzles us all as to just how it works,  
But knowledge will come if we wait,  
And some day, perhaps, we'll know all  
about

The filament, grid and plate!  
You'll put your galena in a box,  
And for money your folks you'll bait  
Till they "come through" with sufficient  
jack

For a filament, grid and plate!  
And when you have a tube in your set  
You'll turn down date after date,  
For your only love, my lad, will be  
A filament, grid and plate!

### EPILOGUE

Of all the things that we don't like,  
Our most particular hate  
Is to burn out one of those doggone tubes  
With filament, grid and plate!

—Detroit News.

## Charles E. Hayes Co.

Wholesale Distributors of

# Radio and Electrical Supplies

32-34 TAYLOR STREET  
SPRINGFIELD      ::      ::      MASS.  
Telephone: River 3515

## KEYSTONE VARIABLE CONDENSERS

21 Plate  
\$3.55

43 Plate  
\$4.50

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

Agents and Jobbers write for information

**KEYSTONE MOTOR COMPANY**  
OAKS, MONTG. CO., PA.

## No Free List

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

RADIO WORLD, 1493 Broadway, N. Y.

# EVERYTHING IN RADIO

To the Dealer  
From Parts to Complete Sets

**Immediate Deliveries  
Priced Right**

Write for Our Proposition

**The Wolbrack Co., Inc.**

1778 Broadway New York City

## RADIO WILL MAKE YOU MONEY

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

### ALL CAPITAL STOCK—

No preferred shares or bonds  
Price Advancing Rapidly

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

**G. BOISSONNAULT CO.**

26 Cortlandt Street, New York

## NOW EASY TO GET EXPERT RESULTS IN RADIO ~



YOU can now get one real authority on radio subjects—how to enjoy the daily programs in your own home;—what kind of aerial to put up—how to operate your set to best advantage—the correct way to comply with underwriters' rules—every phase of radio, technically correct in everyday language. This one authority is the Lefax Radio Handbook, compiled by the heads of the United States Radio Laboratory with all the unlimited resources of the Government at their command. It's written in language so easy to understand that anyone, with Lefax help, can get expert radio results.

Lefax (Leaf facts) is pocket size, indexed, and loose-leaf. It never grows old. All the new events, the latest developments, are reported as fast as they happen on new pages, sent FREE to every owner up to July 31st, 1923. Only by using Lefax Handbook and Lefax Service can you have a radio library, complete in one handy volume—that is perpetually up-to-date. Get your copy at once for a full year of Lefax Service free. Order your copy from your radio dealer or send \$3.50 direct to

LEFAX, Inc., 157-D South Ninth St., Philadelphia, Pa.

**Lefax**  
LOOSE-LEAF FACTS  
**RADIO HANDBOOK**

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

## Sherlock Holmes Has a Rival

WILLIAM J. BURNS, chief of the Department of Justice Bureau of Investigation, told a story recently in which radio took the part of Sherlock Holmes, says "Radio." A dapper young man appeared before the sales manager of a radio-manufacturing plant, and explained that he wanted to purchase a fine receiving set for a local high-school. He was greeted cordially and the best of the house's set was demonstrated. Ordering an expensive set, he managed, somehow, to secure delivery without payment, and then disappeared. The set also vanished from the place it had been shipped to originally, much to the chagrin of the manufacturers, who decided to advertise their loss through radio itself, being able to give a very accurate description of the young man.

Chapter two opens in an apartment where a genial and fine-appearing young man, with a scar on his cheek, is entertaining his friends with a new receiving test. Suddenly the instrument begins to tell of the manufacturer's loss and give a detailed description of the thief—unmistakably the host! The consternation of the guests may be imagined. The next morning a very worried mother paid for the instrument which her son had wanted so badly, whereupon the manufacturer dropped the matter.

## Wave Length Conserva- tion

The wave-length problem is growing more serious daily. The supply of available commercial wave lengths is being rapidly depleted, says *The Mail*, New York. Unless something is done, the development of commercial radio will be seriously hampered. In this connection, it is interesting to note that the nations of the world have decided on a sane policy of cooperation rather than an insane policy of competition. Last year Germany, France, England and the United States planned to erect trans-oceanic stations in Argentina. All preparations were made. Four stations were to be erected to do the work of one, and four precious wave lengths were going to be wiped off the list. American engineers and officials suggested a conference. The representatives of the other nations agreed, and the matter was discussed about the conference table. It was finally decided to build one international station in Argentina in place of four independent stations. Thus three wave lengths were saved, to say nothing of much human effort and several millions of dollars capital.

## Fatigue Measured with Vacuum Tube

A German scientist, Professor Hoerber of Kiel, is using the vacuum tube to "listen in" on the operations of the human body, says the *Mentor Magazine*.

With the aid of the versatile bulb that made the radiophone possible, he is able to measure human fatigue. Every vital function, the movement of a muscle or a nerve, results in the generation of an infinitesimal current of electricity. This is detected and amplified until a whole class of students can hear the noise produced in a telephone by the movement of a frog's leg. As the muscle becomes fatigued the current, produced gradually, becomes weaker and the sound fades away.

Subscribe direct or through your news dealer. \$6.00 a year, \$3.00 six months, \$1.50 three months. Radio World, 1493 Broadway, N. Y. C.

## Radio Set Complete

Enjoy Daily Concerts, Weather Crop and Sporting News

**Complete Outfit \$12.75**  
Including 2,000-ohm Phones  
Immediate Shipment.

Can be installed in 30 minutes  
by any one.

Full instructions with each set.  
Send check or money order to

**F. L. MARVIN & CO.**

298 Woolworth Bldg. New York  
Selling Agents Wanted.

## 86,960 NAMES

Increase your sales by using names and addresses of firms and individuals interested in everything in Radio.

310 Radio Manufacturers in the U. S. . . . .	\$8.00
650 Radio Supply Jobbers in the U. S. . . . .	5.00
6,500 Retail Radio Dealers in the U. S. . . . .	35.00
5,000 Amateur and other owners radio apparatus . . . . .	10.00
25,000 Amateur and other owners radio apparatus . . . . .	40.00
50,000 Amateur and other owners radio apparatus . . . . .	75.00
Amateur Radio Directory of the U. S. Complete list of Amateur stations with names and addresses of operators or owners. Prepaid for \$3.00	
Names and addresses are guaranteed 98% correct will refund postage on all mail returned as undeliverable if less than 98%. Remit with order.	

### SUBSCRIPTION AGENCY

1021 Carrington St. Janesville, Wis.

## Special! Special!

21 plate Var. Condensers—  
regular price, \$3.55, now...\$2.80  
43 plate, regular price, \$4.50—  
Now...\$3.75

Highest grade Panels cut to your measure, 3/16 thick, .02 per sq. inch, 1/8 thick, .01 1/4 per sq. inch.

### POTTSTOWN RADIO SUPPLY COMPANY

228 High St. Pottstown, Pa.

## "GET THIS"

We have accumulated a surplus of Dials which we have to sell immediately, and to dispose of them quickly we will sell them at

**3 for \$1.00**

The specifications are: 3 1/2" diameter, highly polished finish, graduations 1 to 100 in half circle marked in white enamel, knurled knob with set screw for 1/4" shaft. Very neatly designed. At this price quick action is necessary. A few hygrade Rheostats with metal dial attached, \$1.00 each.

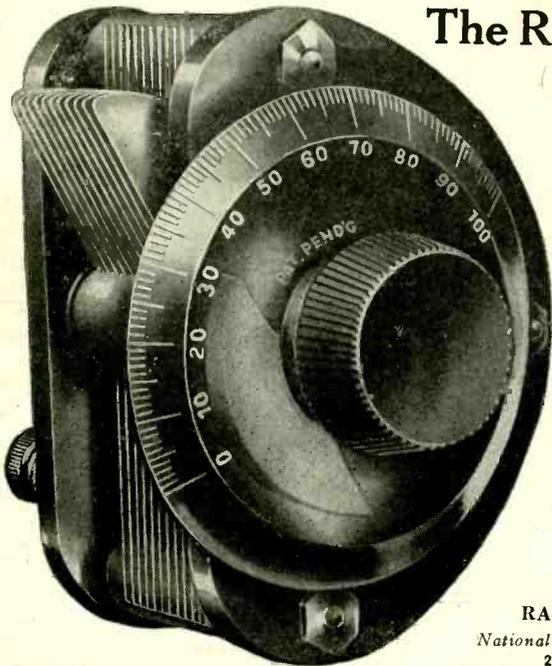
**NATIONAL RADIO CO.**  
Shelton, Conn.

## QUESTIONS and ANSWERS

Ask RADIO WORLD any questions about Radio. Subscribers are answered in next week's issue. New wonders of the marvelous wireless illustrated and fully described in each weekly issue. All newsstands at 15c a copy. Subscriptions, 3 months, \$1.50; six months, \$3.00; one year (52 numbers), delivered to your home, \$6.00. RADIO WORLD, Room 326, 1493 Broadway, N. Y. C.

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.

**"A Set Is No Better Than Its VARIABLE CONDENSER"**  
**The RADIO STORES**



**VARIABLE CONDENSER**

**"A Step Forward! Unequaled!"**

- Concealed Counter Weight Under Dial.
- Brass Studs Through Aluminum Plates and Die Cast.
- Shaft Held in True Center Through Brass Bushings.
- Binding Posts Mounted on Separate Metal Straps.
- In No Instance Is Insulating Material Tapped—Brass Inserts Throughout.
- Precision Workmanship—Best Engineering Design.
- 23 Plate. .0005 mfd. \$4.25 List  
Max. to min. capacity, ratio 12 to 1
- 43 Plate. .001 mfd. \$4.75 List  
Max. to min. capacity, ratio 22 to 1

Complete with Knob, Dial and Counter weight. Each packed in individual carton.

**IMMEDIATE SHIPMENTS**  
**RADIO STORES CORPORATION**

National Distributors and Manufacturers  
 218-222 WEST 34th STREET  
 NEW YORK CITY

Exact Size

Type VC-1

Dept. W.

**THE ONLY UP-TO-DATE**



**AND CALL BOOK**

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

**ALSO**

How to Build Regenerative Set, Detector, and Two-Stage Amplifier, and How to Shield It.

How to Calibrate Your Receiving Set without the use of a Wavemeter.

**PRICE, \$1.00 PER COPY**

(DO NOT SEND STAMPS)

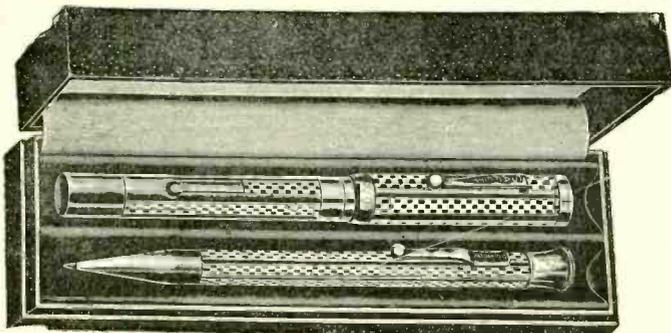
Department W.

Order from Your Dealer—If Your Dealer Hasn't Them, Send Direct.

**DEALERS WRITE FOR PROPOSITION!**

**RADIO DIRECTORY AND PUBLISHING CO.**

45 VESEY STREET, NEW YORK CITY, N. Y.



**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.

**Absolutely Free**

REMEMBER, with our plan it WON'T cost you a cent. The set comes to you in an elaborate plush 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.

Name .....

Street ..... City .....

**RADIO WORLD**

TELEPHONE, BRYANT 4796  
 PUBLISHED EVERY WEDNESDAY (Dated SATURDAY OF SAMB WEEK)  
 FROM PUBLICATION OFFICE,  
 1493 BROADWAY, NEW YORK, N. Y.  
 BY RADIO WORLD COMPANY

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

**ASSOCIATE EDITORS:**

Robert Mackay Fred. Chas. Ehlert

**SUBSCRIPTION RATES**

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

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

Advertising rates on request.

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

**IMPORTANT NOTICE:**

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

**Radio Relay Tryout**

THE Radio Section of the Signal Corps intends to try out an automatic relay at Chicago, controlled from Washington, thus enabling the Capital station to control traffic through Chicago West, probably as far as Omaha. If the circuit works well, it is also planned to instal a similar relay at Omaha and to operate to the Far West from Washington by means of the 20-k.w. set at Arlington, Virginia. Omaha will be advised when the messages are to be relayed through their station and will stand by, letting Washington work through the relay to Salt Lake City or even farther west.

Last month the Radio Section of the Signal Corps handled 5,232 official messages numbering 175,672 words, and equaling a saving of approximately \$2,718 over what the cost would have been by commercial lines.

**—NACO—**

**Radio Receiving Sets**  
**\$20.00**

Scientifically built to insure dependable service under exacting conditions with which radio communication has to meet. For clear hearing and pleasing tone use a Naco set.

**Naco Radio Accessories**

Telephones, Knock-Down Sets, Condensers, Coils, Detectors, etc.

**STATE MANAGERS WANTED**

National Motor Accessories Corp.,  
 47 Vesey Street, New York City

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



This is the K-S crystal receiving set you hear them all talking about. This is not a cheap set, the best that skill and engineering can produce.

List with Phones  
\$18 Each

Without Phones  
\$11.75

Attractive Discounts  
Offered to Dealers.

**CANADIAN-PACIFIC  
RADIO CORP.**

708 Canadian Pacific Building  
342 Madison Avenue  
NEW YORK CITY  
Telephone: Murray Hill 2185

**AT LAST—ROOF  
AERIAL ELIMINATED**

No Lightning Switch.  
No Lightning Arresters.  
No Outside Grounding.  
No Danger from Lightning.  
Both Windows can be Opened or Closed.

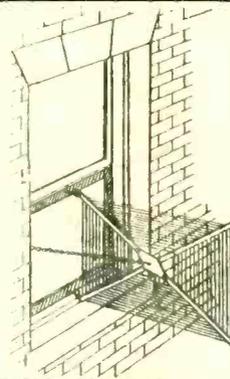
Fits Any Window  
up to 48" Wide.

LIST PRICE

**\$10**

Dealers

Write for Discounts.



**ANNOUNCING  
STANRAD ADAPTER**  
for the RACB-Meyers-tube. Enables the Amateur to use the above tube in the standard socket. Price \$1.25 P.P.  
Orders filled in order received.  
**STANRAD PRODUCTS CO.**  
West Winfield, N. Y.

**—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. Sent postpaid anywhere. Nickel finish \$1.00; Gold finish \$1.35. SEND FOR YOURS NOW. Dealers write for literature and attractive discounts.  
**Harry D. Cromer, Room 919**  
30 Church Street New York City

**'PRECISION'**  
GRID LEAKS and MOUNTINGS  
Resistance Ranges from  
.05 megohms to 5. megohms.  
Accuracy Guaranteed.  
Grid Leaks ..... 75c  
Mountings ..... 50c  
**RADIOPHONE EQUIPMENT CO.**  
47 New Street Newark, N. J.

**Another Radio Pioneer**  
**H**ARRY PHILLIPS DAVIS, vice-president of the Westinghouse Company, entered his office one morning in September, 1920, with an idea. The idea had come to him while reading the advertisement in his evening paper. In a corner of a full page ad, he came across the words, "Mr. Conrad will send out phonograph records this evening." This advertisement was in the interest of the store's amateur radio department and was explaining to local radio amateurs that Mr. Frank Conrad, who had operated his station intermittently since the war, would send out by radio phonograph records on a certain evening. The Conrad station was very well known to amateurs all over the country, for it was one of the few amateur stations licensed to operate during the war. This special operating was in the interests of government research work which the Westinghouse Company was doing and also to test some apparatus.  
Dr. Davis could not forget his idea. He was struck with the fact that the radiophone fundamentally did not lend itself only to private communication but that it had a universal field of usefulness and that through it, one could communicate with hundreds, thousands or millions; all could listen who had the suitable "ear," for if a certain class of people were interested enough to listen to music from a few phonograph records, there was a possibility of increasing this small audience of radio listeners to an enormous number by sending out entertainments, current events, etc., in a regular and interesting manner.

**ATTENTION  
Radio Manufacturers!**  
Manufacturers' outlet for New York and vicinity. Large experienced sales organization. Let us be your eastern representative.  
**PIONEER RADIO PRODUCTS CO.**  
329 East 29th Street New York City

**Radio Needs  
Trained Men**  
Radio is sweeping the country like wild fire. Thousands of dollars are being spent for expensive outfits. RADIO EXPERTS are needed everywhere to keep this equipment in order and to sell and install new outfits.  
**Be a Radio Expert**  
I will train you quickly and easily in your spare time, to become a RADIO EXPERT so you can install, construct, repair and sell Radio equipment. I am a Graduate Electrical Engineer and from actual experience I will give you exactly what you must know to make the really big money in radio.  
**FREE** My Consultation Service to you is FREE. This outside help which I gladly give you is, in itself, worth more than the small cost of the Complete Course.  
**START NOW**  
Don't let others beat you to the big money. Start now and within a few weeks' time I will train you at home, at an amazingly low cost, to become a RADIO EXPERT. Write for "Radio Facts" sent free without obligation.  
**A. G. MOHAUPT, Electrical Engineer**  
American Electrical Association  
4515 N. Winchester Ave., Chicago  
**WRITE TODAY**

**SELECTOR—VARIO—COUPLER**

**Three units  
in one.**  
**Self-contained.**  
**Minimum  
static  
Disturbance.**

**Space Saver.**  
**Neat,  
Compact  
and  
Efficient.**  
**Send for  
Circular.**

**NORRIS RADIO CORPORATION**  
Dept. 46 126 LIBERTY STREET, NEW YORK CITY

**The HI-GEE RADIO CONCERT RECEIVER**  
Price, \$29.50

The above Instrument comes to you completely assembled, ready to wire; all parts mounted on genuine Formica Panel, set in quartered oak cabinet with hinged cover. Panel is properly shielded so that no "body effects" are experienced with this instrument.  
This is truly a HI-GEE quality instrument consisting of two variometers, one vario-coupler, socket and rheostat. (Rheostat not shown in above cut).  
**IMMEDIATE SHIPMENTS. PREPAID.**  
Our catalogue is ready for distribution—send for your copy NOW.  
**HI-GEE RADIO MFG. CO.**  
Marion, Illinois

**DEALERS**

Have you our price list?  
Drop us a line  
Everything for radio

**RADIO ACCESSORIES CO.**  
220 West 42nd Street New York

Write us for full information concerning

**Radiobat B**

The Revolutionary Battery For  
Wireless Telephony.  
Multiple Storage Battery Corp.  
350 Madison Avenue New York

HERE THEY ARE!



**EBY**

BINDING  
POSTS

See them at your dealers.



Corporal

Ensign "H"

**H. H. EBY MFG. CO., PHILA., PA.**

**MAKE MONEY AT HOME**

You can earn from \$1 to \$2 an hour in your spare time writing show cards. Quickly and easily learned by our new, simple "Instructograph" method. No canvassing or soliciting; we teach you how, guarantee you steady work at home no matter where you live, and pay you cash each week.

Full particulars and Booklet free.

**American Show Card School**

41 Ryrie Building

Toronto, Can.

**PHANTOM ANTENNA**

Reduces static, eliminates lightning arrester and unsightly outside aerial. Ideal for apartments and city users who cannot erect aerial.

Fine oak cabinet and nickel fittings with green silk cord and plug ready to attach to nearest lamp socket. Price postpaid \$5.00. Dealers and jobbers wanted.

**A. C. PENFIELD**

Conneautville, Pa.

**Radio Apparatus**

Immediate Shipment from Stock

- Frost Head Phones, 3,000-ohm..... \$8.00
- Frost Head Phones, 2,000-ohm..... 5.00
- Dictograph Head Phones, 3,000-ohm..... 12.00
- Estru Lattice Type Variometers..... 5.00
- Estru Lattice Type Vario Couplers..... 4.50

These are small compact instruments of the lattice type with no unnecessary frame work. Maximum efficiency, sharp tuning. Ideal for portable sets and for those who build their own because of easy accessibility.

- 3" Bakelite Dials with knobs..... \$ .75
- 43-Plate Variable Condensers..... 4.00
- 23-Plate Variable Condensers..... 3.75

These condensers are of the very highest quality. Fully guaranteed.

Mason Revolving Sets 2 stage amp..... \$110.00

Mail orders promptly filled.

Dealers write for our proposition

Complete Radio Equipment

**Northern Radio Supply Corp.**

542 West Washington Street

MAIN 2230-2231

CHICAGO, ILL.

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

Broadcast Bill's Radio-lays

By William E. Douglass

(Copyright, 1922, Westinghouse Electric & Manufacturing Co.)

THERE ain't no month the whole year 'round I like as well as June; when spring with all its rain is past an' summer comin' soon. The trees and fields all dressed in green, the whole world seems to smile; most everyone likes June I guess, leastwise it's just my style. One reason why this world seems bright, it ain't just cause its Spring, it's cause that chap the other day sold me this wireless thing. He handed me some happiness all done up like a present, a shiny little package that is makin' my life pleasant. Now folks 'round here say listening is the only thing I do I like to know what's goin' on, an' all the stuff that's new; so now, when dinner's over I kin lay around an' hear what's doin' in this land of ours, in places far an' near. A lyin' in my hammock there so calm an' peaceful-like I hear the



"It's radio, of course!"

latest baseball scores or 'bout the miners' strike, how Carpy knocked out Lewis, gosh that must a been a peach, I'm mighty doggone glad I wasn't there within his reach. They told us 'bout a woman whose husband liked baseball, it seems that he neglected her which pleased her not at all, an' so she up an' leaves him—she's a "baseball widow" now. Next think I know on this here farm there's goin' to be a row; my better half is thinkin' now of gettin' a divorce—to all her friends I s'pose she'll say, "It's radio, of course." The people here in Brussels Sprouts don't know the war is over, the only thing they think about is sowin' oats and clover; an' when I try to tell em, that they're awful out of date, they turn their noses up an' say, I'm addled in the pate. Now folks I'll leave it up to you, don't happiness come first? An' I ain't happy 'less I hear what's new; it's like a thirst that some has got for homemade hootch, for me it's information that keeps my spirits in a state of sorter mild elation.

Do you know that the radiophone business has increased 60,000 per cent within a year? The demand which called it into existence is as tremendous as it has been sudden.—"The Radio Digest."

**52 Weeks for \$6.00**  
Complete Your File of **RADIO WORLD**  
Copies of Radio World No. 1

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

**"SPAGHETTI"**  
VARNISHED TUBING  
"EVERYTHING IN INSULATION"  
VARNISHES, COMPOUNDS, PAPERS, ETC.  
**MITCHELL-RAND MFG. CO.**  
24 VESEY ST., NEW YORK, N. Y.

**IT WILL PAY YOU**

to investigate the superior quality, design and practicability of the products of the

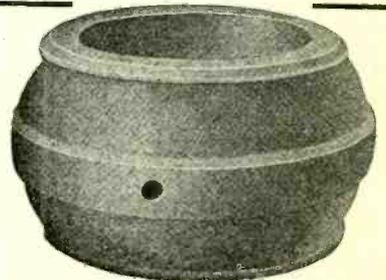
**Medford Radio Engineering Co.**  
312 MAIN STREET MEDFORD, MASS.  
Manufacturers of Complete Sets, both Crystal and Audion — Rheostats — Variometers — Vario-couplers — Condensers — Loud Speakers.  
Quantity Discounts to Dealers

**RADIO SUPPLIES—**  
**RADIO SUPPLIES**

We carry a full line of Radio Goods  
**Dictograph Head Sets, Vario Couplers, Everett Head Sets, Variometers, Transformers, 1700 Meter Loose Couplers, Dials and Knobs.**

Send 50c for 20 Blue Print Hook-Ups

Radio Sets Made to Order  
**SUNBEAM ELECTRIC CO.**  
71 3rd Ave., New York City



**ROTORS**

- highly polished ..... \$ .50
- wound with stems..... 1.00
- Variocouplers, complete.. 3.00
- Variometers, complete... 3.00
- Well made, high class goods

**E. U. MACK, Mfr.,**  
FLORENCE, S. C.

**NEWSDEALERS**  
**ATTENTION!**

Many of your customers will want the first thirteen 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.

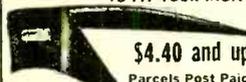
Radio World, 1493 Broadway,  
New York City.

**ELECTRICAL SPECIALTIES**

Auto—Electric and Magnet Wires  
Dealers write for magnetic wire price lists on 1- 1/2 and 1/4-lb. spools

**RICHMOND ELECTRIC CO.**  
181 McDougal Street Brooklyn, N. Y.

**CUSTOM TAILOR MADE TO FIT YOUR INDIVIDUAL CAR**

 **\$4.40 and up**  
Parcels Post Paid  
Made in our custom shops after your order is received. We ship ordinarily in 2 or 3 days. Perfect fit guaranteed when correct name, year and model of car is given. You can easily apply it yourself. We furnish instructions and all necessary tacks, welts and fasteners. Our Catalog No. 10 with samples is free for the asking.  
**LIBERTY TOP & TIRE CO., Dept. R2, Cincinnati, O.**

**VARIOMETERS UNWIRED**

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

**SAMPLE SET, \$1.10**

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

**2200-Ohm Head Phones**

\$8 per pair list

Bring in Music Loud and Clear!

**VARIABLE CONDENSERS**

43-Plate, .001 mfd., list.....\$4.00  
23-Plate, .0005 mfd., list.....\$3.25

Dealers write us for prices

**RADIO DEPARTMENT**

**Signal Systems Service Co.**

1 East 42nd Street, New York City

**The Great Radio Query**

Here is the great question mark of the industry: Will it be possible to develop sending sets or transmitting sets that can be carried by the individual? This is asked by J. Hannaford Elton, in "The Illustrated World." Radio experts believe it will: that is, they believe that small sending sets of limited range, yet possessed of power enough to throw messages to the nearest transmitting station for relay to destination, will be perfected within the next year.

Whether the final development—the dream and goal of the radio industry—will ever be reached is at present problematical. That dream is simply this: that a type of multiple-transmitter be developed which will permit messages thrown by individual sets to be caught by the central transmitting stations and multiplied in power a thousandfold and hurled forth to travel around the world, if necessary. And the dream is that it shall be done automatically. This does not mean relayed, but simply increased in power so that the original message will be sent from the powerful transmitting station simultaneously with the broadcasting of the message from the individual set. When this stage is reached, wireless telephony, or "radio," as popular usage now has it, will know no limitation.

**A Prediction for March 4, 1924**

The inaugural address of the next President will undoubtedly be heard by the people of the country by radiophone. The Borough of Queens, New York City, is considering the installation of a municipal station. On every hand there are signs to show that the broadcasting of the future will be conducted as a governmental function, or at least as a governmentally regulated monopoly.

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

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

**A REAL VARIABLE**

THE HAYNES VARIABLE CONDENSER was designed before it was built. IT DOES NOT LEAK. DEALERS—Here is a condenser worth twice its price, yet there is plenty in it for you. Write for particulars. We can make delivery.

**The Haynes Radio Shop**

629 Lexington Avenue New York City

**GUARANTEED RADIO SETS & ACCESSORIES**

**NORTHERN RADIO SUPPLY CO., Inc.**

14-16 Church Street, New York

Mail orders promptly attended to

**RADIO CABINETS**

Manufactured

in any Style, Size or Quantity

**A. E. CHERNACK & CO., Inc.**

314 East 75th Street NEW YORK

Phone Rhineland 2747

 **SPECIAL OFFER TO DEALERS**  
3 and 4 Inch Dials  
Fixed and Variable Condensers  
Klossner Vernier Rheostats  
ALL RADIO EQUIPMENT  
**NEW YORK RADIOPHONE CO.**  
32 UNION SQ. - NEW YORK CITY

**Radio World, 52 issues, \$6.00.**

Subscribe for Radio World, \$6.00 a year, \$3.00 six months, \$1.50 three months.

**CASTINGS**  
**BRASS, BRONZE, ALUMINUM**

**Our Motto**  
**"SERVICE"**

**THE ANCHOR BRASS & ALUMINUM CO.**

Ninth and Freeman Sts.

**CINCINNATI, OHIO**

# RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

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

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

Exchange jolly interesting letters through our Club! Stamp appreciated. Betty Lee, 4254 Broadway, New York City.

Mailing Lists—Canadian radio operators' addresses \$4 per 1,000. Atelier Trade Service, London, Ontario.

For Sale—Regenerative Receiver, Tubes, Batteries, Detector Two Step with Phones. Sell cheap. E. Schuessler, 2209 Wheeler St., Cincinnati, Ohio.

**RADIO CABINETS**—With all good tone chambers, with or without phonograph combination. Any quantity in stock sizes or in order. Columbia Mantel Co., 175 Powers Street, Brooklyn, N. Y. Tel. Stagg 2726.

Radio Memory Course, in 20 minutes. Lengthy study unnecessary. Learn Code, Alphabet and numerals in practically one reading. Send 25 cents. Mervyn Sales Co., 850 Penobscot Bldg., Detroit, Mich.

**AGENTS WANTED** in every city and town to sell standard radio apparatus. Attractive discounts given. If interested, write at once, stating age and radio experience. Wilmington Electrical Specialty Co., Inc., 912 Orange Street, Wilmington, Delaware.

### DEALERS and JOBBERS

Write for our attractive proposition. Shipments and satisfaction—not disappointments. Service unexcelled. Complete line. G. S. NYCUM, Manufacturer NYCUM Radio Supplies, 507 Penwood Ave., Wilkesburg, Pa.

### TYPE R-3 MAGNAVOX TYPE R-2

We can make immediate delivery on a limited supply of Type R-3 Magnavox, \$45.00, 14" Horn, and Type R-2, 18" Horn, \$85.00. Dealers and agents, discount 10% on 1, 15% on 2 or more. C. O. D. or cash with order. **THE KEHLER RADIO LABORATORIES**, Abilene, Kansas, Dept. W.

### RADIO DEALERS AND AMATEURS

DON'T BUY until you have investigated our line of Radio Instruments BECAUSE radio apparatus requires scientific knowledge and mechanical skill in the design and manufacture. Our experts have embodied these in our Special Broadcasting Receiving Sets. Audio, Radio-Frequency and Power Amplifiers, Loud Speakers and complete line of parts manufactured by us. **LEE RADIO CORPORATION, HADDONFIELD, NEW JERSEY.**

### First 12 Numbers of Radio World

If you did not get copies of Radio World No. 1 to No. 12 send us \$1.50 and we will send you this paper for one year, (\$6.00 for 52 issues) and start it with our first issue, which will be mailed you as soon as possible after receipt of order.

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.

**VENTRILOQUISM** taught almost anyone at home. Small cost. Send 2c. stamp today for particulars and proof. Geo. W. Smith, Room M, 125 N. Jefferson, Peoria, Illinois.

Enclose Self-addressed Envelope and receive free bulletin of various designs from which you may build your own Receiver from our blueprints. The blueprints show full constructional details, wiring diagram, bill of material and necessary data, and we guarantee the performance of the model. Price of blueprints varies as to subject desired. Ask for bulletin No. 349. Experimenters' Information Service, 220 West 42nd St., New York City.

### GOOD TERRITORY STILL OPEN FOR LIVE DEALERS TO HANDLE OUR COMPLETE LINE OF RADIO INSTRUMENTS

Special Broadcasting Receiving Sets, Crystal and Audion, Radio, Audio Frequency and Power Amplifiers, Loud Speakers and complete line of parts. Complete details on request. **LEE RADIO CORPORATION, HADDONFIELD, NEW JERSEY.**

### \$1.00 COMBINATIONS—BY MAIL, \$1.05

No. 1—100 ft. No. 14 antenna wire; 20 ft. No. 14 insulated ground wire, 1 ground clamp (solid copper); 1 single pole double throw lightning switch. No. 2—1 8 by 3½ inch insulated tube, wound with enameled wire; 2 slides and 2 brass rods to fit; 4 nickelplated brass binding posts. No. 3—2 60c. switch-levers (1½ inch); 20 contact points with nuts; 4 stops, 4 binding posts, 1 detector stand (unmounted). No. 4—1 set of 4 radio tubes, 8 inches long by 3-3/8—4-4/8 dia.; one spool No. 24 cotton covered wire, 375 feet; one wood rotor. Enclose Money Order or Checks, but no stamps. **Brilliantone Radio Products, 874 Columbus Ave., at 103rd St., New York.**

**BARGAIN**—Portable Radio Receivers, with phones and aerial, \$18. Seikel Ream Laboratories, Dover, Ohio.

New Westinghouse Senior, complete, regular \$75.00 at \$60.00; less antenna, \$50.00. Murdock phones, new, \$4.25. Write for other specials. D. G. Fox 20 Fernwood Ave., Haverhill, Mass.

**Regenerative Receiver**, \$35. Iglar, 255 Hull Street, Brooklyn, N. Y.

**Men, Over 17, Wanted**—Steady work. Commence \$135 month. Government Railway Mail Clerks. Common education. List positions free. Write today. Franklin Institute, Dept. G-151, Rochester, N. Y.

**Brownie Vest Pocket Set**, complete with phone. At your dealers or by mail, \$5.00. Brownie Radiophone Co., 81 Orchestra Place, Detroit.

### VARIABLE CONDENSERS

**Knocked Down Form**, absolutely **GUARANTEED**, 43 Plate, \$2.50; 21 Plate, \$1.80; 11 Plate, \$1.50. Same capacity as any standard condenser. 20% more efficient. Inquiries Solicited. Immediate Delivery, **POSTPAID**. Send cash with order. **ELBEE RADIO LABORATORIES**, 1716 N. Wells Street, Chicago, Ill.

**RADIO FANS!** Send for our catalogue of Electrical, Radio and Mechanical books. Includes radio outfits and amplifying transformers. Prices reasonable. A. C. Urie & Co., 333 W. Manhattan Boulevard, Toledo, Ohio.

**RADIO CRYSTAL RECEIVING SETS** (without receivers), \$2.65. Why pay more? Send Money Order to C. S. Mattoon, 365 Potomac Avenue, Buffalo, N. Y.

**SALESMEN WANTED**—Resident. In various localities. Standard, basic radio parts to Jobbers and Dealers. Splendid opportunity for men able to show past selling record and references. The R. C. Mills, 30 E. 23rd Street, New York City.

**WANTED AGENTS**—Be our representative in your town for the Olive Unipolar Phone. Big commission. Guaranteed article that sells fast. Write or wire for details. Meridian Radio Company, 430 Jefferson East, Detroit, Mich.

**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.

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

### 52 Weeks for \$6.00

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

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

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.

## Steering Ships by Microphone

WHILE the World War was in progress, the location of enemy ships by measuring the distance of his batteries by means of sound was carried to a high degree of perfection. Recently successful experiments

have been made to apply this principle to steering ships in dense fogs and off dangerous coasts. According to a German publication, "Zeitschrift des Vereins Deutschen Ingenieure," this is accomplished as follows:

### SUBSCRIPTION BLANK

## RADIO WORLD

RADIO WORLD CO.,

1493 Broadway, New York City.

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

### SUBSCRIPTION RATES:

Single Copy .....\$ .15  
 Three Months .....1.50  
 Six Months .....3.00  
 One Year (52 Issues) ..... 6.00  
 Add \$1.00 a Year for Foreign and Canadian Postage.

"The ship inquires its position by wireless from the coast station. The latter thereupon requires it to make a sound signal which is received by a series of microphones distributed along the coast. These microphones are connected by wire with some sort of indicator apparatus, such as an oscillograph. It is possible to cover a stretch of coast from 20 to 30 miles long in this manner. The sound signals are magnified to the required degree and the oscillograph records the time intervals between the signals from the various microphones, so that they can be read instantly even when only a hundred to the second apart. Distinct signals from three microphones suffice to indicate the location of the ship. In a recent test a point 4½ miles distant from the Kiel Canal was measured with a precision within 100 feet."

## Radio Inventor Honored

THE use of buried antennae as a substitute for aerials supported by high towers, was discovered by Dr. J. Harris Rogers, who was recently honored by a visit from General Pershing, as photographed on page three of RADIO WORLD this week. Dr. Rogers also invented the method of communicating by radio with a submerged submarine.

### Your Opportunity To Profit

because of the Tremendous Wave of Radio Enthusiasm now Sweeping over the World, is at hand.

"Sparks," a publication devoted to the outlook for the

### Acme Battery and Radio Corporation

an established, growing concern, clearly outlines the Profit Possibilities of the company's shares.

Send for "Sparks" at Once. There is no charge.

**Industrial Expansion Service**  
No. 1674 Broadway New York

### Radio Sermons for Churches Without Pastors

IN Louisiana the initiative is being taken in applying in a way that may become universal radio. This is the broadcasting of sermons from a church, to be received by congregations of numerous small churches at a distance. The church that is about to start this is the First Baptist Church at Shreveport. Science and Invention, New York, says:

"The station will have a normal radius of 1,500 miles, but under favorable conditions may be picked up from coast to coast, and by ships at sea. It will use a 200-watt set, sending on a 360-meter wave-length.

"Sermons, lectures, choir and congregational singing, organ recitals, chime concerts, and a daily news service will be among the features available to those having receiving sets. The auditorium, the largest in the city, will be used as a civic center, and the world's most noted singers and lecturers will be heard here. Their programs and lectures will be broadcasted.

"Several hundred small churches throughout the Southwest, most of which have no pastor, are installing receiving outfits, and their congregations will worship with the congregation of the Shreveport congregation."

### Standard Tests for Receiving Sets

THE Bureau of Standards and the Electric Testing Laboratories of New York have approved, in outline, a standard method of testing complete radio-telephone receiving sets. The method is said to be for immediate use in testing sets manufactured for receiving radio telephone broadcasting, but details have not yet been made public. Improvements on the method used in testing the equipment submitted by the National Retail Drygoods Association will be subject to the approval of the Bureau of Standards, the Bureau cooperating with the Electric Testing Laboratories in establishing these methods as standard procedure.

### Radio Club Notes

THE secretaries of the following radio organizations have filed the names of their clubs with RADIO WORLD. All other clubs are invited to send in their names and addresses, and the name of the officer to whom membership application should be made:

The Boys' Radio Club of Alameda. Organized June 10, 1922. Barton Cuyler secretary, 2527 Central Avenue, Alameda, California.

If you were not able to get the first twelve issues of RADIO WORLD, your newsdealer can probably get the copies through his wholesaler, or copies will be mailed from this office direct, at 15 cents per copy. RADIO WORLD CO., 1493 Broadway, New York, N. Y.

### Real Radio Values in Complete Sets and Parts

BILT RITE Variometers.....\$3.50  
BILT RITE Variocouplers.....\$3.50  
3-inch Dial for above.....\$1.00

### Atlas Variable Condensers

43 Plate Variable Condenser.....\$3.50  
23 Plate Variable Condenser.....\$3.50  
3 Plate Variable Condenser.....\$1.50  
Phone Condenser (Fixed).....20c.  
Grid Leak Condenser (Fixed).....20c.

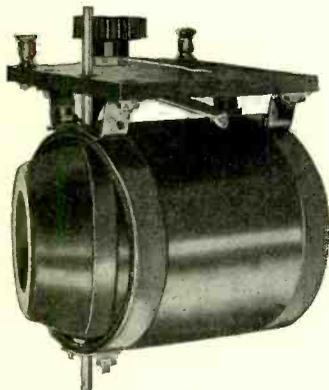
We have a complete line of sets and parts in stock for immediate shipment.

### L. W. Shollenberger Co.

602 NORTH SECOND STREET  
POTTSVILLE, PENNA.



Radio Products of Dependability Are Always Good Sellers—Try Them



ILLUSTRATING OUR "Every-Wire-Contact" Coupler

LIST PRICE \$7.50

Write for descriptive circular and dealers' prices.

MORELAND SALES CORP.  
30 OGDEN ST.

Newark New Jersey

This Summer The BIG Thing will be RADIO!

At seashore or in the mountains, your vacation will not be complete without Radio. Therefore subscribe for

**RADIO WORLD**

and keep up to the minute.

\$1.50 for 3 months

to your summer address.

**RADIO WORLD**

1493 Broadway New York



### PRESCO

Sectional UNIVERSAL Radio Outfits

Licensed under Armstrong U. S. Patent No. 1,113,149

The Set Consists of Three Units:

Tuner and Detector Unit.....\$50.00  
Two-Step Amplifier Unit.....\$35.00  
Unit for holding "A" Battery 9.50  
Top and Bottom, which when added to the three other units, make a complete section all in one, Each, \$5; both 10.00  
Complete Set, Total.....\$104.50

Ask your dealer; if he cannot supply you, write us, Dept. 878.



### NOVO

"B" BATTERIES FOR RADIO OUTFITS  
Noiseless—Dependable—Guaranteed  
All standard sizes 22½ to 105 volts.

For Sale by Leading Dealers

**NOVO MFG. CO.**  
NEW YORK—424-438 W. 33rd St.  
CHICAGO—531 So. Dearborn St.



A Message to the Trade Only  
**GET IN ON THIS!!!!**

### VARIABLE CONDENSERS

21 and 43 Plate

### MOULDED SOCKETS MOULDED SWITCH LEVERS

The Finest You Have Ever Handled

Our Liberal Discounts Mean Large Profits For You.

COMMUNICATE AT ONCE

### WIENER WIRELESS SPECIALTY COMPANY

(Manufacturers)

21 ACADEMY STREET

NEWARK NEW JERSEY

Get our Price List covering complete line.

# \$15.00

**PREPAID**

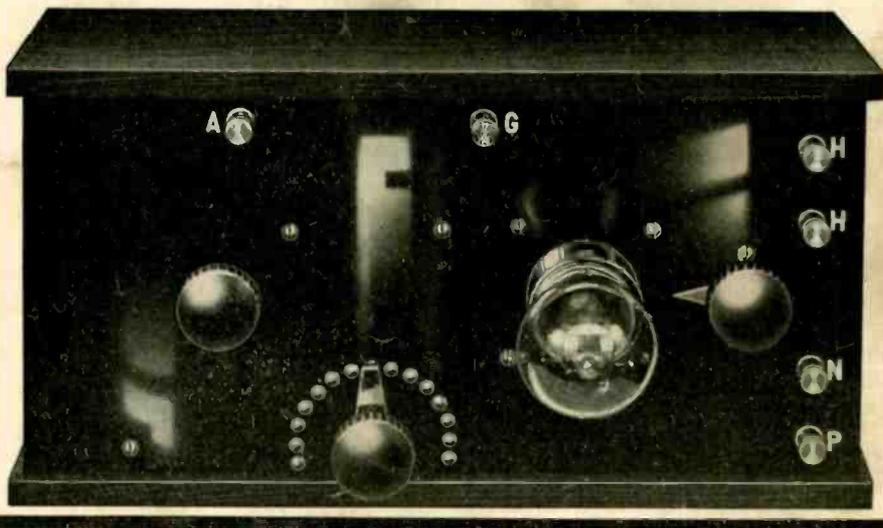
Completely assembled and wired, including

VARIABLE CONDENSER, TUNING COIL, RHEOSTAT, SOCKET, FORMICA PANEL, OAK CABINET, MISSION AND NICKEL FINISHED

## VACUUM TUBE DETECTOR SET

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

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



MAKE IT YOUR BUSINESS TO USE

## RADIO-DUCT

(Patent Pending)

NOTHING IN THIS WORLD CAN TAKE ITS PLACE, BECAUSE IT IS A CONDUCTOR DESIGNED FOR RADIO WORK AND NOTHING ELSE

**NO AERIAL—NO LOOP  
NO LAMP SOCKET ATTACHMENT  
ONLY RADIO-DUCT AND A GROUND CONNECTION**

SOLD IN 10-FOOT ROLLS AT \$1.00 PER ROLL  
NO STAMPS—NO CHECKS  
DISCOUNT TO THE TRADE IN QUANTITIES

**COLUMBIA ELECTRIC MOTOR COMPANY**  
1414 ADAMS STREET HOBOKEN, N. J.

## COMMUNICATE AT ONCE

BOOK YOUR ORDERS NOW

**Scientifically Designed Bakelite Variometer and Variocoupler Combined Complete with Mounting**

Entirely New Type—Our Patent Is Pending

Price Only \$7.50—Discounts in Quantities  
WIRE — WRITE — CALL

**PAUL G. WEILLER, 320 Market Street, Newark, N. J.**

## DEALERS

Have you our price list?

Drop us a line

Everything for radio

**RADIO  
ACCESSORIES CO.**

220 West 42nd Street, New York

## VACUUM TUBE REPAIRING

Prompt Deliveries

**Marconi Moorhead  
Electron Relay**

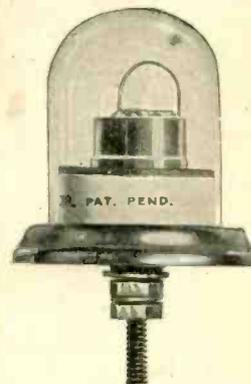
(Amplifiers and Detectors)

**\$3.50**

**George H. Porell Co., Inc.**  
364A Somerville Ave. Somerville, Mass.

## Does Summer Static Bother You?

IT WON'T WITH THIS  
RADIO DETECTOR



(Actual Size)

**PRICE \$2.00**

In using the GREWOL you don't have to find the spot.

**THIS DETECTOR IS  
ALWAYS SET AND READY**

GUARANTEED ONE YEAR  
IF YOUR DEALER DOES NOT  
HANDLE THE GREWOL SEND  
US \$2.00 AND WE WILL MAIL  
ONE TO YOU.

WRITE FOR OUR TRADE  
PROPOSITION

**RANDEL WIRELESS CO.**  
9 Central Ave. Newark, N. J.