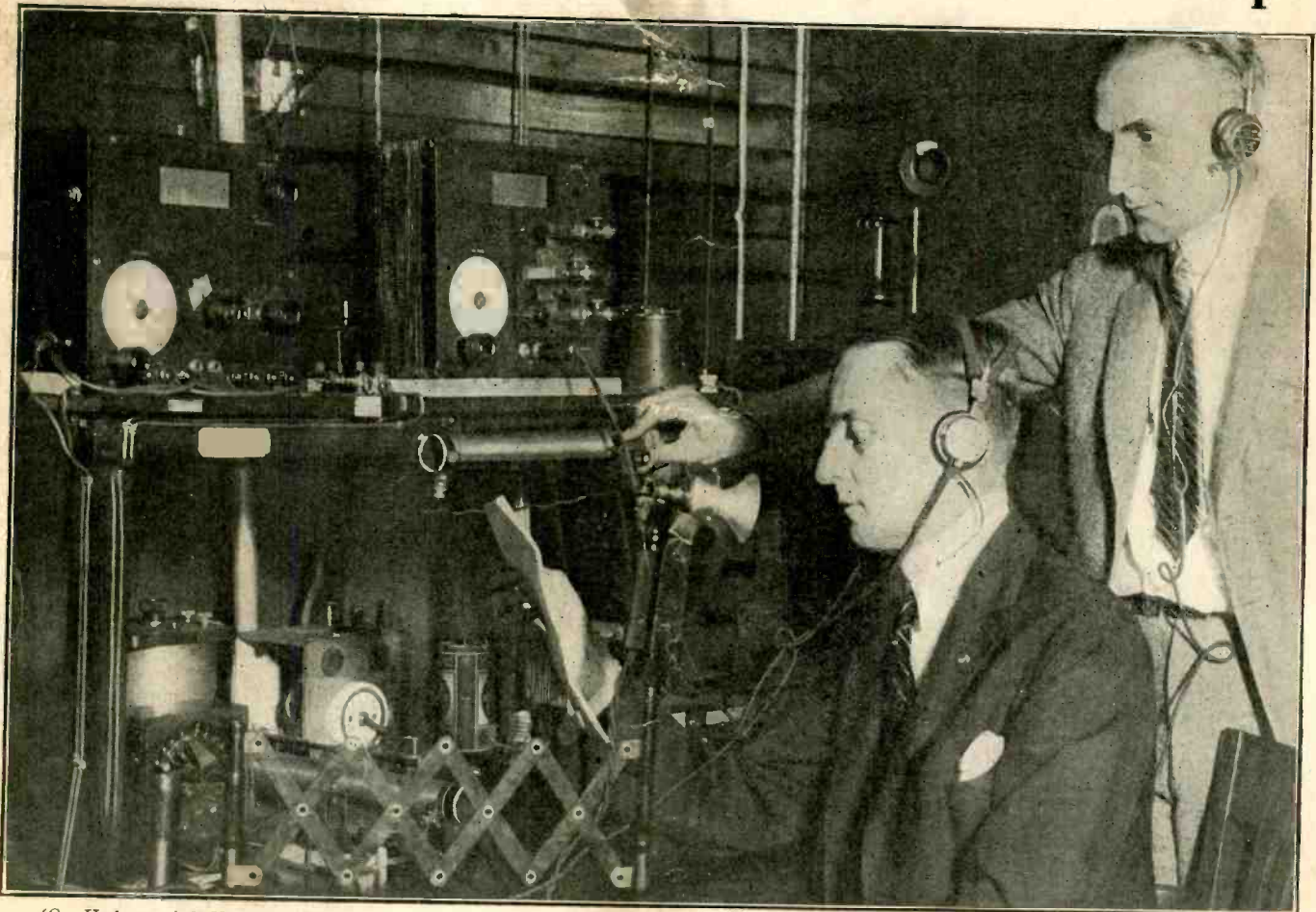


RADIO WORLD

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

I L L U S T R A T E D

If You Need Skilled Workers—Hook Up!



(C. Underwood & Underwood.)

The latest method of securing skilled workers was put in operation by Dr. Rogers, of the Veterans' Bureau, Washington, D. C., when he broadcast a list of vacancies for former service men. The list of positions open had been sent to the Bureau by a number of industrial firms. Dr. Rogers, in turn, sent it over the country. The broadcasting resulted in a large number of men being put to work who otherwise might have remained idle.

My 20-Kilowatt Tube, By Irving Langmuir See Page 9

SPECIAL INTRODUCTORY

BARGAIN

DICTOGRAPH HEADSET \$9.00

3000 ohms \$12 value

DEALERS WRITE

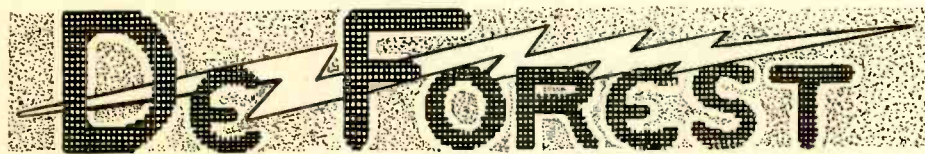
**CENTRAL-KANSAS
RADIO WHOLESALE CO.**

LYONS, KANSAS

**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"

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.

If you did not get copies of Radio World No. 1 to No. 16 send us \$2.20 or 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.

The Radio "Colyum"

THE first contrib to this colyum advises us that, in the Middle West, the latest thing is the "radio cake-eater." This bird, we are informed, cuts into a concert program with a description of his entertaining qualities and wants to know if he can escort any good-looking young lady home.

Second contrib writes that he has heard of an amplified trombone for broadcasting purposes. "Sallright so long as the beginners don't get hold of 'em."

We presume that the lucky office seekers, this fall, who intend to utilize radio when campaigning will not forget the primary coil.

A girl out in old Kokomo,
Once had a deaf mute for a beau
They couldn't hold hands
As true love demands
Until both understood radio

M. J. J., drops in with his tidbit to "The News," New York: If they call a man who operates an aeroplane an aviator, and one who navigates a steamer a navigator, then whyneil isn't a radio man a radiator?

"Knowlton had drifted to the South Sea Islands to get away from the world," says a fiction writer. Not so. Radio would have found him out eventually.

First Radio-Engineering Student—My atmospheric reputation is pretty good, this week

Second Radio-Engineering Student—Your reputation was always atmospheric.

Old Bill Shakespeare may have had radio in mind when he wrote: "Friends, Romans, Countrymen! Lend me your ears."

Atlantic City note: "The bathing suits here are so loud they drown out the static."

Marconi admits he has not yet heard from Mars. Probably another case of "no foreign entanglements desired," says *The American*, New York.

During the past few years men have been very fussy about their cellars. The slogan, to-day, is: "Look to your roof!"

McJones of New Jersey didn't intend to shock the family when he called them "damned" and "undammed" waves.

The "Three-Step" and the "Anti-frequency Coupler" are the latest radio dances.

Our Own Broadcasting Station
 OUCH for week beginning July 31, 1922
 7:01—Bed-linen Tales, by Hop Sing, managing director of our laundry.
 7:32—Very Sentimental Ballads (No 2) "How to Keep a Family Flivver on Twenty Dollars Per."
 7:51—"Don'ts for Jailers," by Sing Sing 4-11-44.
 8:11—"The Soup Eaters Chorus," by Childs Restaurant Corporation. N. B.—This number (defies static).
 8:31—My Latest Sherlock Ohms Story: "Spirits, Spirits Everywhere; But Not a Drop to Drink," by Conan Doyle.
 8:43—Recipes I Have Never Tried: "How to Keep Pickled Onions from Turning Sour," by Kit Chenstove.
 9:00—Foolish Question No 899,472: "Why Does a Grid Leak?"
 9:11—How to Keep Congress from Getting on Your Nerves.
 9:28—Debate: "The Hip Subsidy Bill" Old John Barleycorn vs.: The Anti-Saloon League.
 9:46—Instructions for Eat-a-Prune-a-Day Week.
 9:55—Correct time from Patagonia.
 10:00—GOOD NIGHT!

—ROBERT MACKAY.

RADIO WORLD

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Static Interference Reduced by Antenna

By John Kent

THE thousands of amateur radio-fans, a majority of whom are realizing for the first time what an interference static is to the reception of the various programs broadcast, will be interested in knowing what means the large commercial companies, such as the Radio Corporation of America, are taking to offset this atmospheric disturbance.

Perhaps the chief means used by the Radio Corporation is in the type of aerial. This is known as the "wave" antenna, which in addition to reducing static interference, has greatly increased the efficiency of transatlantic wireless telegraphy.

An explanation of this antenna is best gained by a description of its use at the chief receiving-station of the Radio Corporation, located at Riverhead, Long Island. This station receives from all European stations which are using wave lengths ranging around 15,000 meters in length; or, in other words, electromagnetic waves each, approximately, nine miles long.

In order to fulfill all of the requirements of the theory covering the operation of the new antenna, it is necessary to have a receiving aerial one full wave-length long—in other words, a receiving aerial nine miles in length. This is exactly what has been installed at Riverhead. The aerial is nine miles long, and is supported on poles thirty feet above the ground, one end being grounded through a non-inductive resistance, and the other through a variable inductance. With this wire, the Riverhead station is daily receiving five different European stations simultaneously without interference.

To illustrate the operation of the "wave" antenna, an engineer of the Radio Corporation of America has drawn the following analogy:

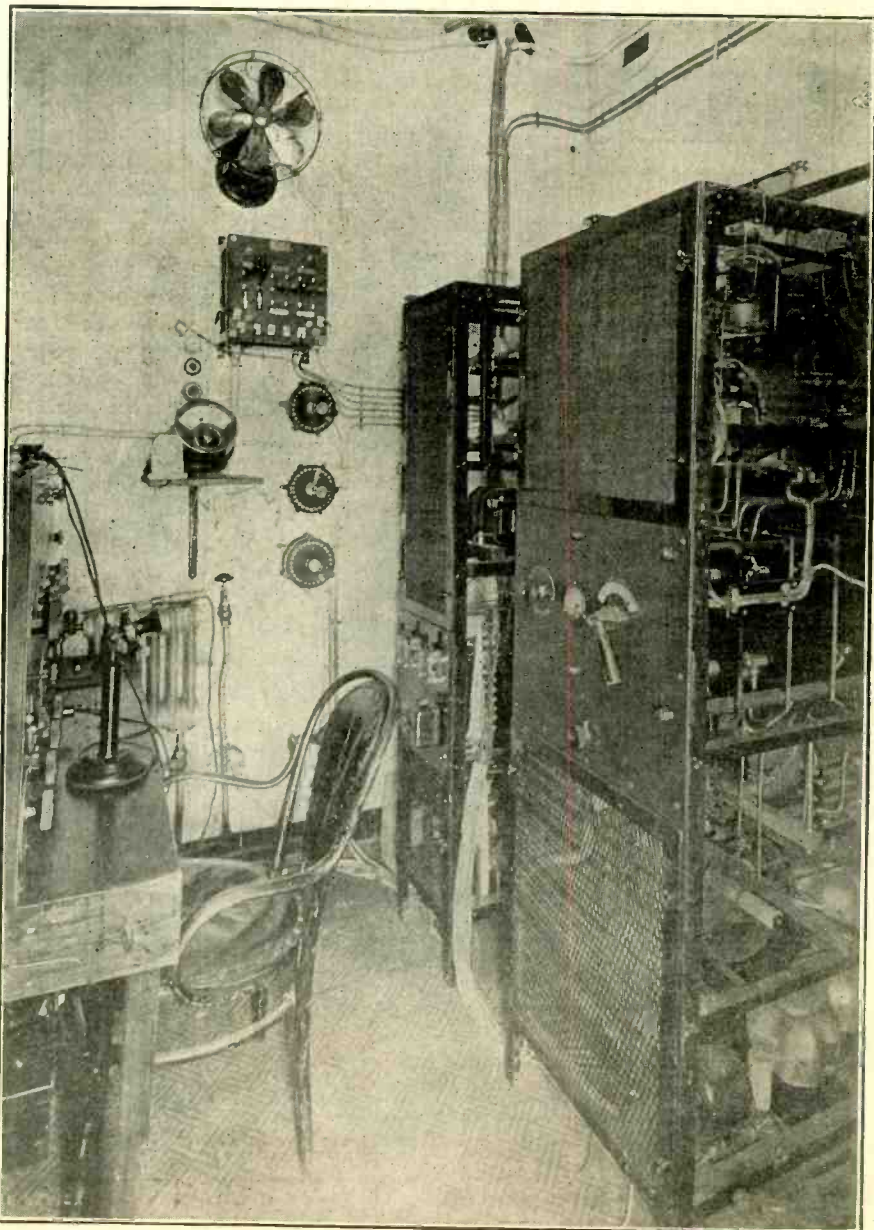
If we look on the new antenna as a large lake and the wind as the static, we can get an idea how it works. Suppose the wind is blowing across the lake, from east to west. At the eastern end there will be few or no ripples; but as we get to the western end, the ripples will

gradually increase in size to full waves. If the shore at the western end is a gentle slope of sandy gravel, the waves will be dissipated and will not be reflected.

If, on the other hand, the shore of the lake is precipitous and rocky,

the waves will be reflected and will disturb the eastern end of the lake. Now this antenna, having a non-inductive resistance at its non-receiving end, corresponds to a sandy shore, because it absorbs the static and does not reflect it.

Radio Room of an Ocean Liner



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

With this equipment the "America" telephones from midocean.

The Vacuum Tube as a Transmitter

By Charles H. Plath

WITH the adoption of C W (continuous wave), we were able to work far better than with the old-time spark gap. There are many radio amateurs who operated prior to the radiotelephone, and who seem disturbed if an article is published condemning the damped-wave type of spark gap. Among amateurs this device is better known as the "stone crusher"; because, when in operation, it destroys the harmony of the concerts being broadcast. It must be understood that this type spark-gap, better known as the damped-wave spark, takes in most frequencies, and with the adoption of C W, considerable interference will be eliminated.

The damped wave is created by an oscillating body, the oscillations of

a continuous wave. Continuous waves vary in amplitude, in radiotelephony. One important fact regarding C W, or undamped waves, is to keep the current constant. It is also necessary to furnish just the same amount of energy during each oscillation as is lost in that oscillation. An undamped wave is very pure and has none of the characteristics of a broad wave. It carries more energy in a given amount of time than damped waves.

There are a number of ways to generate damped and undamped waves. We will endeavor to mention the methods of the undamped type. One of these methods is the use of the Alexanderson high-frequency generator, or alternator. This alternator is capable of generating alternating currents of radio frequency. The energy lost in each oscillation is supplied direct by the generator. Another is by the Golschmidt machine. There is another method: by means of the arc. Arc transmitters are less costly than alternators, and there is no difficulty in controlling the wave lengths, as this is determined by the inductance and capacity values in the circuit.

The fourth method of generating the undamped wave is by means of the famous vacuum tube. To-day the tube generator is becoming the best method for the so-called undamped-wave generator. There is no doubt among scientists that the tube will replace the alternator for long-distance transmission at less expense.

In using a vacuum tube as a transmitter we must utilize the three-electrode vacuum tube, specially built to carry high potentials on the plate. For amateur use the 5-watt tube is used. Other tubes range in value up to 250-watts input. Using C W means that the wave bands must not be so wide, because it is possible, with this type transmission, to tune very close. The three-electrode vacuum-tube oscillator circuits have found wide application not only in undamped wave-receiving but in radio transmitting.

By studying the schematic diagrams furnished herewith, it will be seen that it is possible to use a single vacuum-tube for detection in transmitting or for generating local oscillations. A simple circuit is shown. The circuit may be designed so as to require no adjustment for coupling, for a fairly

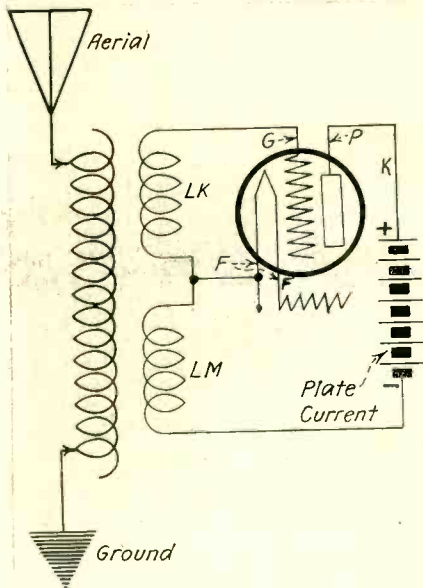


Figure 1—A simple circuit essentially similar to Figure 2. This circuit may be so designed as to require no coupling adjustment for a fairly long range of wave lengths. Suggested by Charles H. Plath. Drawn by S. Newman & Co.

which are gradually fading out. This gradual fading out of an oscillation means that the current of the oscillation gradually decreases its value. An undamped wave is originated by an oscillating body, whose oscillations always retain their maximum value. Thus, in an undamped radio-set, the oscillations—and, also, the wave generated by the oscillation—is continuous so long as the power is applied.

This means that there are no wave trains in undamped waves as there are in damped waves. An undamped wave is, also, a continuous wave; but a continuous wave is not necessarily an undamped wave. Any unbroken wave is

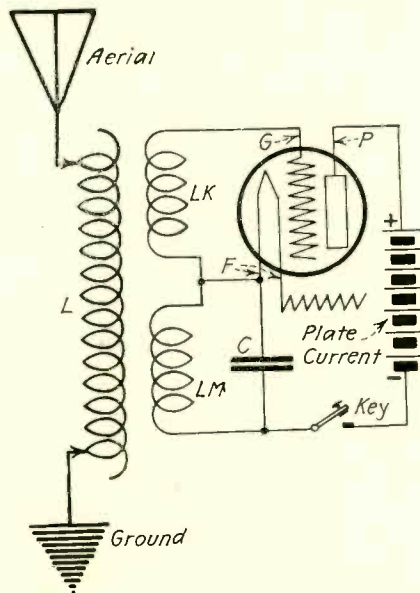


Figure 2—Showing the same circuit as that of Figure 1 with the key inserted in the plate circuit, making it possible to transmit continuous waves. Suggested by Charles H. Plath. Drawn by S. Newman & Co.

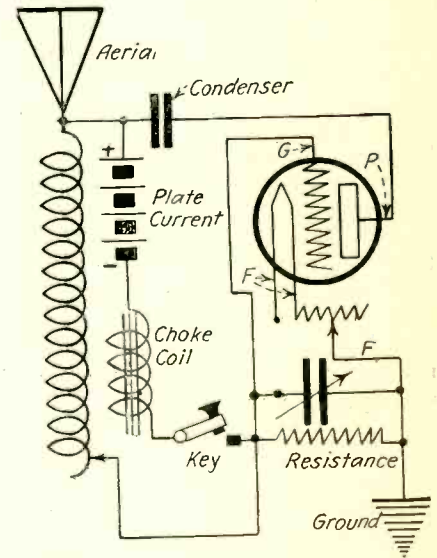


Figure 3—The circuit shown in this sketch is an application of the electrostatically coupled circuit. Suggested by Charles H. Plath. Drawn by S. Newman & Co.

large range of wave lengths. The only adjustment necessary is tuning the antenna circuit so that it will have a natural wave-length equal to the wave-length to be transmitted.

The method of placing the key in the grid circuit has a tendency to stop the oscillations flowing, but does not stop the electronic flow from filament to plate. It merely disconnects and insulates the grid which, then, accumulates a negative charge. When the key is closed to start the oscillations the charge must leak off first and a certain lag takes place in the building up of the oscillations to their final value. This is objectionable, as it introduces harmonics in the radiated

Curious Calls of the Ether

By Carl Hawes Butman

WASHINGTON, D. C.—Assigning radio calls is something of a trick. With the constant increase of stations, it promises to become an art. In this country, we have but three initial-letter calls for about 5,000 official and commercial stations, which makes the designation of appropriate calls almost impossible. Having only the letters N, K and W to start a word with, even champion wordmakers who spell thousands of words out of trade names, would be stumped in the position of chief radio inspector of the Department of Commerce.

In some instances he has done pretty well. All calls starting with N are Naval, which is very appropriate, and the Army calls commence with W, which is somewhat significant as referring to the War Department. The rest of the W calls, he heedlessly assigned to the Eastern part of the United States, leaving K for the West Coast. The definite geographical call WVA (W. VA.,) went to a city in Alaska; while to a Naval station at Savannah, Georgia, he gave the letters NEV (NEV.,) which, perchance, would have suited a station in Carson City far better.

Tips For the Radio Fan

TO reduce the howls and noises coming through your telephones, a good method is to sheath the cabinet inside and ground it. This is accomplished by using sheet metal such as tin foil, copper, aluminum, or tin. Simply make it fast close against the inside of the front panel. All necessary drilling in panel can be done through sheathing, also. When sheathing has been finished, ground any side, or end, of metal sheet used to the ground post. This will eliminate all body capacity effects and reduce some of the noises. A piece of metal secured between the tubes and properly grounded will benefit the set considerably.

Your Lightning Switch

YOUR lightning switch, on being installed, should be placed in series with aerial and ground outside your window. For this purpose, No. 4 wire is best. When closing your station for the night, always see that the lightning switch is thrown in such a position that the aerial is well grounded. This will prevent its being affected by electrical storms.

When the inspector got down to specific stations, however, he did far better; what could be more suitable than the call assigned to the Detroit Police Department, KOP—unmistakable! In view of the recent revelations by Adolph Busch, some of the Shipping Board's calls are quite appropriate. The craft known as the "West Gotomska" carries the significant call WET, while the "Rio Grande" answers to the calls of KEG. The "Chamblee" has the same signal, but spells it KEGG; while the "West Hartland" makes it plural, KEGS. Speaking liquorishly, Great Britain got a gem of a call in the anti-prohibition signal, GIN; and, also, since she has V with several other letters, uses the call VOP—significant of a very fine brand in the old days. Russia, with the letter R, of course has RUM and RYE ships. Another vessel of the Shipping Board has a startling title when it comes to radio prefixes, KORK, which some experts insist belongs to Ireland.

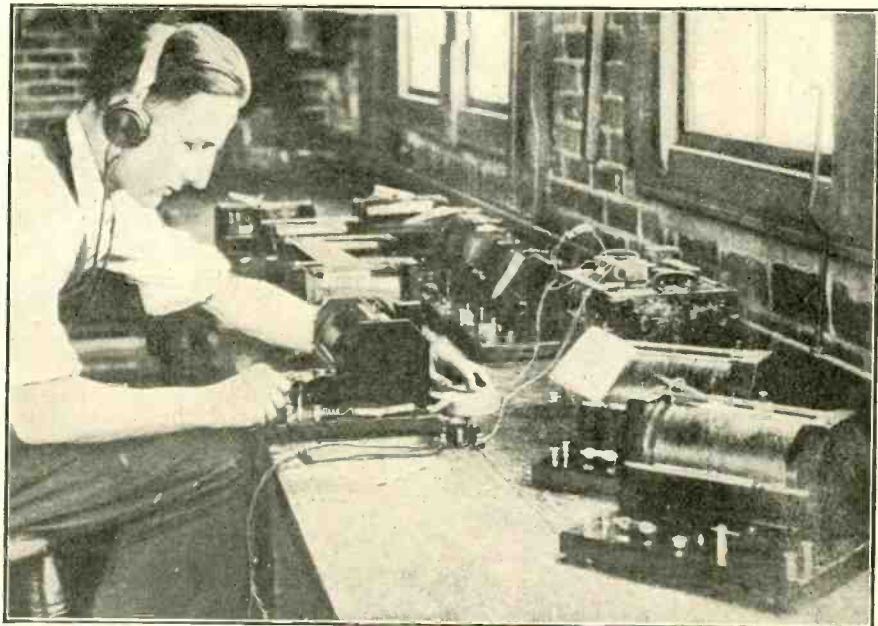
The chief call-assigner of Great Britain, with the letters B and G, and Y, had a lot more chance to display his versatility in issuing signals. Among unusual British calls are BVD, GOP, and YAP—more

suitable for America, it would seem. YES falls to Great Britain; but OUI happens to be Danish instead of French, showing that other radio inspectors may have no humor.

One Southern Pacific passenger ship bears the title of a famous southern fraternity, KKK, and an Italian contemporary goes it one better with the well-known call, IWW. Japan has one appropriate signal—JAP. A French radio station carries the designation FUN; and a British submarine, the "Polly-Anna," the title GLAD. Another English sub bears the name of GABY, formerly of France. FAN aptly denotes one French operator, and an unfortunate Madagascan station got FLU.

Some American naval vessels have calls which spell the names of their sweethearts, NAN and NEL, while another ship has the sentimental call KISS. Radio broadcasters have a perfect right to kick when assigned such calls as WEAK and WEEP, yet two suffer under those titles notwithstanding good service, showing the failings of the radio inspector who made another mistake when he gave the significant call, WEAR, to a newspaper instead of to a clothing manufacturer.

Raised Funds Making Sets



(C. Underwood & Underwood.)

The latest college endowment fund drive was successfully carried out by Tufts College, Massachusetts. Three students in the engineering school made amateur radio receiving-sets, which were sold, and yielded a substantial profit to the "Jumbo Bond Campaign." These sets have a listening radius of 25 miles and a wave length range up to 1,800 meters. Myron S. Allen, Class of '23, is shown testing one of the sets.

My 20-Kilowatt Tube and Its Uses

By Irving Langmuir,

Research Laboratory, General Electric Company

THE three-electrode vacuum tube, which first appeared as the De Forest audion, is now universally used not only for the receiving of radio messages, but is coming into more widespread use in connection with the transmission of such messages. The original De Forest audion did not have a particularly high vacuum, and, because of the ionization of the residual gas, could not be operated at more than 30 or 40 volts, or at more than a few milliamperes of current.

Several years ago, in connection with a study of the Edison effect in incandescent lamps, I noted that, in lamps with a very good vacuum, the Edison effect was nearly absent. In other words, although there was a difference of 110 volts between the two ends of the filament, very little electron current flowed across the vacuum space between. In the presence of a little gas, however, such big currents were obtained that the currents might lead to the formation of an arc, with resulting destruction of the lamp.

At that time it was not at all understood why these currents should become smaller as the vacuum was improved, and a great many scientists believed that if a perfect vacuum could be made no current at all would flow across it. Although the Edison effect in well-made lamps thus caused no difficulty in their manufacture, for it practically did not exist, yet it was a point of very great scientific interest to learn why these currents were so small in a good vacuum.

It was in connection with these studies that we discovered a "space charge effect." We then understood that in a high vacuum the electrons got in each other's way, so that the electrons that had already left the filament repelled, because of their negative charge, the electrons which followed and tended to drive them back into the hot filament which emitted them. In the presence of gas this effect did not exist, because the gas formed both positive and negative ions, and the accumulation of the slowly moving positive ions in the space neutralized the effect of the negative electrons.

As the result of these studies it gradually became clear how it would be possible to construct vacuum tubes which would operate at high voltages and at high currents. One of the early applications



DR. IRVING LANGMUIR

In his right hand Dr. Langmuir is holding his new 20-kilowatt radio tube—the tube that may mean telephoning across the Atlantic Ocean. It is a tiny thing compared with the device in his left hand—a 201 radiotron, so commonly used by amateurs. The gigantic alternators generating a 200-kilowatt current may be superseded by this simple little invention.

of this new knowledge was made by Dr. W. D. Coolidge, who utilized this in the development of the Coolidge X-ray tube, an X-ray tube which has gradually displaced practically all of the older, so-called gas tubes.

Another application was found in the kenotron and pliotron. The kenotron is a vacuum tube rectifier, having two electrodes like the Fleming valve but capable of operating up to voltages of several thousand volts and with currents comparable with an ampere or more. Tubes of this kind have found application for smoke precipitation, for various electrical testing devices, and in connection with the regulation of the electric generators used for the radio transmitting outfits on aeroplanes during the war. The development of the kenotron into a thoroughly practical device for these purposes is largely the result of the work of Dr. Saul Dushman.

The pliotron bears about the same relation to the De Forest audion that the kenotron does to the Fleming valve. It is a device which contains three electrodes, namely, a filament, grid, and plate, like the audion, but it is capable of being

operated at high voltages and currents, so that considerable amounts of power may be controlled. Tubes of this sort are now finding widespread application for transmitting radio messages, particularly for radio telephony. The ordinary radio telephone outfit, used for broadcasting, generates from $\frac{1}{2}$ to 5 kilowatts of high frequency power, which is used to feed the antenna.

The design and construction of tubes of this type has been carried out principally by Mr. W. C. White.

It has long been realized that, following out the principles made use of in the smaller tubes, it would ultimately be possible to construct tubes of larger power. There have been many difficulties to overcome, however. After years of work by Mr. W. C. White and Mr. H. J. Nolte, they have succeeded in designing and perfecting pliotrons which are capable of generating about 20 kw. of high frequency current. In principle, these tubes resemble the smaller tubes which are now usually called radiotrons, in that they also have three electrodes. These large tubes are used in circuits much like those used by amateurs when they cause the tube to generate oscillations. In the construction, however, there are many differences.

The 20-kilowatt tube has a very large rugged filament, many times the diameter and length of the ordinary radiotron. The grid is in cylindrical form and surrounds the filament, and the plate is a metallic cylinder about $1\frac{1}{2}$ inches in diameter and 8 inches long, which is sealed directly to a glass tube through which pass the leads carrying current to the filament and grid.

Thus the plate, instead of being inside of the tube, as in ordinary radiotrons, forms a part of the outside wall of the tube. In order to dissipate the relatively large amount of energy liberated at the plate, the plate is water cooled, which is rendered particularly easy by the fact that part of its surface forms a part of the wall of the tube.

These 20-kilowatt tubes are ordinarily operated with about 20,000 volts d. c., which is obtained from ordinary 60-cycle alternating current by rectification, using two or more kenotrons, together with large condensers for smoothing out the rectified alternating current.

A bank of ten tubes of this kind



Broadcasting has given many an experienced orator, or singer, a new experience in stage fright.

—Chuck Ward in "The Globe," New York.

The Wave Length

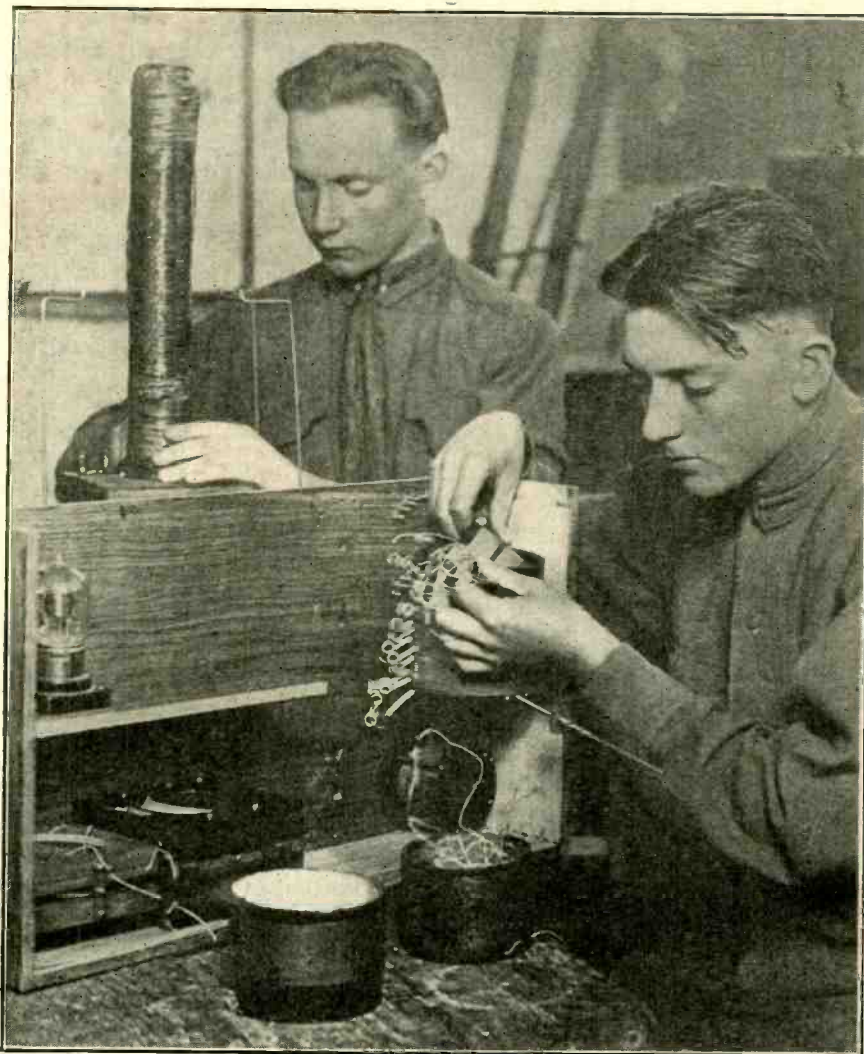
THE wave length is a term used to denote the length of the electromagnetic wave that is traveling through space from the transmitting station. A wave length of 360 meters means that this wave is of that length from crest to crest. It is quite possible with transmitting apparatus to produce waves of any desired length by varying the amount of capacity and inductance in the transmitting circuits. Theoretically, the length of the wave has nothing to do with the distance over which it will travel. The distance is governed by the amount of power used at the transmitting station. In practice, however, it is generally found that greater distance can be covered with longer waves than with shorter waves, using the same amount of power. For reception purposes, a single wire aerial 100 feet long will be far better for you than the 300-foot wire for short wave purposes.

operated in parallel is capable of generating 200-kilowatt of power, which is about all that is required for most transoceanic radio communication. It is probable that outfits of this kind will displace the larger and more expensive alternators, the most successful type of which has been the Alexanderson alternator.

The 20-kilowatt tube merely marks one stage in the development of still larger tubes. It will undoubtedly be possible, when the need arises and when the necessary development work has been completed, to construct tubes of many hundreds, or even thousands, of kilowatts. Such devices will probably be used not merely for radio purposes, but may ultimately play an important part in such problems as the electrification of railroads and the transmission of power to long distance by means of direct current.

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

Eager School Boys Assemble Sets



(C. Keystone View Co., N. Y.)

There are many vocational schools in the United States today where the construction of various parts of radio sets is an important element of the curriculum. There is a keen rivalry among students to see which will turn out the most efficient set.

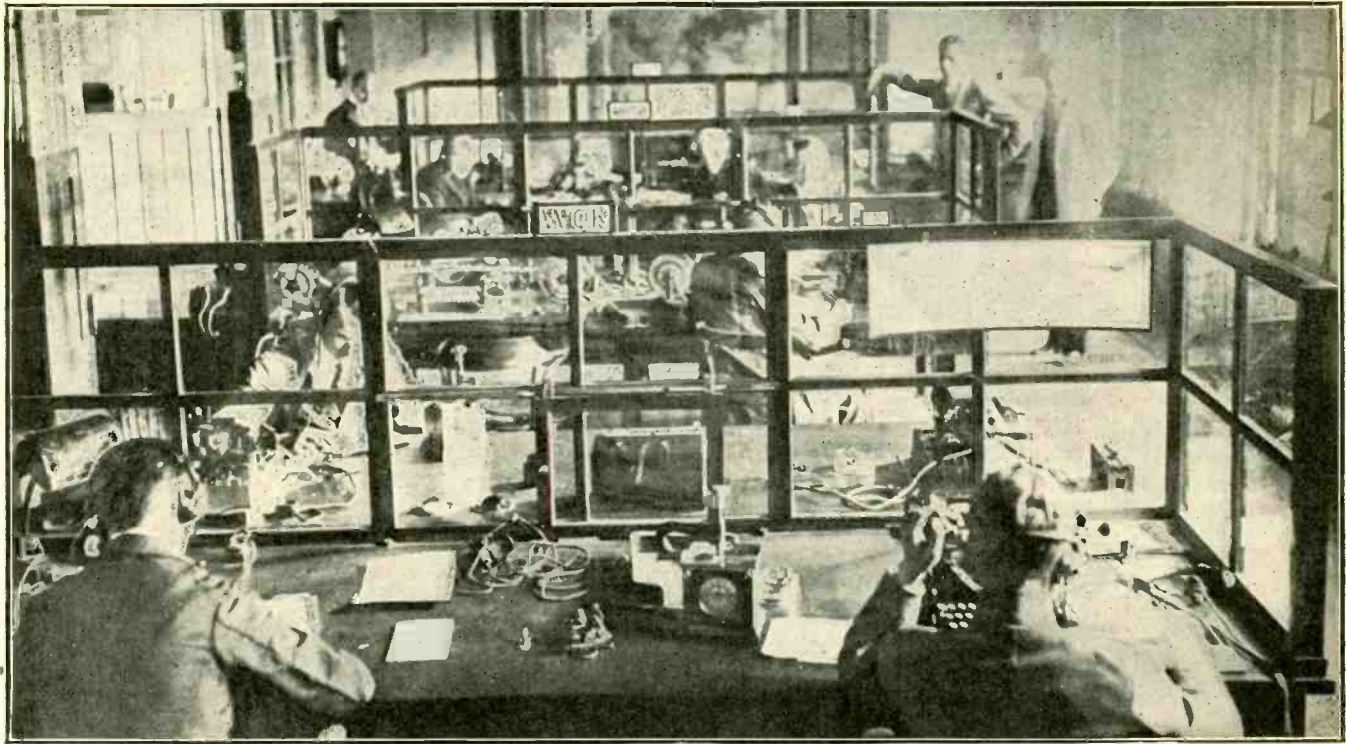
Their Landlord Permits Aerials!



(C. International.)

The result is a happy family and a host of highly pleased friends—all listening to a concert by radio. As Marconi says: Radio will keep the home intact.

Transatlantic Radio Station in Berlin



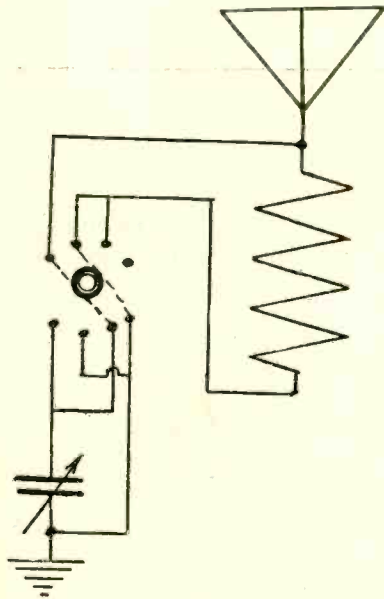
(C. Underwood & Underwood, N. Y.).

Receiving and transmitting room of the New Transatlantic Radio Central, recently opened in Berlin, Germany. It is one of the largest stations in the world, and is completely equipped for sending messages to America.

Importance of the Capacity Switch

THE desire to place all the controlling elements of a cabinet radio receiving-set on the outside of the panel, has brought into general use the capacity switch for the primary-tuning circuit.

A capacity switch consists of two metal blades—long, narrow, and thin—rotating around a center rod which



Hook-up of standard rotating capacity-switch. Dotted lines show position of blades when condenser is placed around (in parallel with) primary of variocomplex or other tuning device.

By E. L. Bragdon

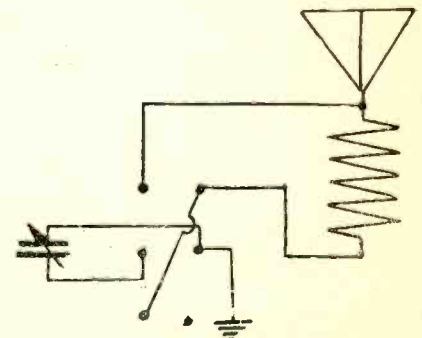
carries the insulating knob or handle. The purpose of the capacity switch is to insert a variable condenser into the primary-tuning circuit for either one or two reasons: to place the condenser in series to decrease the effective wave-length of the aerial-circuit; or, to place the condenser in parallel to increase the effective wave length of the aerial circuit.

The amateur living in the country, where open space is not at a premium, erects an aerial of 200 feet or more in length. He is quite correct in his belief that a long aerial will produce signals of greater strength, but he fails to consider that radiophone broadcasting, in which he is most interested, is sent on a wave of 360 meters whereas his excellent aerial has a fundamental wave length of 365 meters or even more.

When this happens, the only possible move is to insert some capacity in series with the aerial. The aerial itself is like a huge condenser with the earth as the other conductor and the air between as the insulator, or dielectric. This, by placing a condenser in series with the aerial, produces an effect similar to two condensers in series. As most radio amateurs know, this condition, reduces the total capacity of the circuit.

But the opposite state of affairs is encountered, nowadays, even more frequently. The amateur finds that his aerial, plus the amount of wire on his tuning coil, is not sufficient to give him the requisite wave-length which would permit him to pick up a broadcasting station sending on 1450 meters. In this case, his easiest solution is some capacity in parallel with the aerial circuit. Wave length is the product of capacity and inductance. The latter is fixed by the tuning coil; but the former may be varied within certain limits.

Condensers hooked-up in series give the effect of a large condenser equal to the sum of both. Unfortunately for all, it is not possible to connect a condenser in parallel with the aerial.



Hook-up to use when capacity is inserted by means of simple double-pole, double-throw knife switch.

(Continued from preceding page)

wave. This objection may be obviated by shunting the key contacts by a resistance of several megohms to provide a leakage path for the charge from grid to filament while the key is open. This circuit will not operate satisfactorily with a low-power tube and large antenna. It may be entirely inoperative with an antenna having too large a radiation for the tube to use.

In order to overcome the tendency of the circuit—to refuse to oscillate when used with a low-power tube—a circuit using an intermediate oscillatory circuit is shown. It has been used successfully. Considering the antenna circuit as non-existent, the vacuum-tube oscillator is very satisfactory in this circuit. For results in the plate to grid coupling, strong undamped waves are set up in the plate oscillatory circuit—L-M-C.

The oscillating current in the circuit, L-M-C, may be many times the D-C plate current. If now the antenna circuit is tuned to the circuit, L-M-C, and coupled to it, as shown in the accompanying diagram, the current in the plate-oscillatory circuit will induce undamped oscillations in the antenna circuit; and these oscillations, due to the large resonance current in circuit L-M-C, will be of sufficiently great amplitude to operate the circuit despite the radiation of energy from the antenna.

It may be advisable to describe the circuit, or the method of adjustment of this kind, in order to radiate at desired wave lengths. The antenna circuit is first opened, or its coupling so reduced that it will be appreciably energized by the vacuum-tube circuit and may be considered as absent. The key is closed, and the vacuum-tube circuit is adjusted for maximum-oscillation generation. This is done simply by adjusting the grid-to-plate coupling until maximum reading is obtained when using an ammeter in the plate circuit. The antenna circuit is there fairly loosely coupled to the plate oscillatory circuit, and is tuned to that circuit by varying the inductance and capacitance. The final step, then, is to obtain the coupling between the antenna and plate-oscillating circuit from which maximum energy will be transformed from the latter to the former. Be careful of too close a coupling, as this will give you a double-humped resonance curve in the antenna circuit.

This may be checked up for any value of coupling by varying the wave length of the antenna circuit.

First 17 Numbers of Radio World

If you did not get copies of Radio World No. 1 to No. 17 send us \$2.50 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.

—Advt.

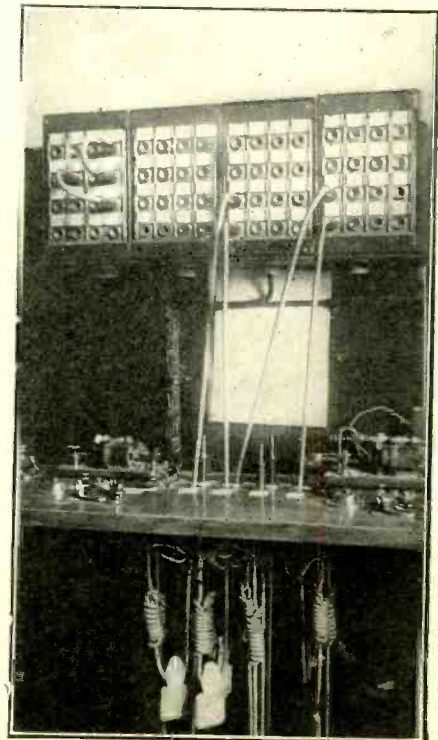
Machine to Speed Transmitting



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

How It Works

Sending radio messages by hand is almost a thing of the past. Today in most every naval radio station an automatic transmitting-machine is installed. This enables the sender to operate the keyboard similar to that of a typewriter. This machine functions like a punching machine, perforating holes for the letters punched. The machines are used for speed, accuracy and economy. The operator, after punching, examines the perforated tape to see if he has punched a wrong letter. If so the mistake may be quickly corrected. Machines of this type are called "Kleinschmidts," and are used in all transAtlantic radio stations. With them operators can send about 45 words a minute. The smaller photograph shows the main radio-switchboard of the radio central located at the Arlington Station, Arlington, Virginia. Each of the holes, or sockets, represent a distant station. By inserting the plug into the proper hole, or socket, a signal is transmitted. This method of transmission is called remote control. It is used by the Navy Department in all of its main stations.



The Radio Primer

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

The Beginner's Catechism

By Edward Linwood

CAN electric-light current (direct) cause more interference than alternating?

The electric-light currents cause interference in a receiving set only when the aerial is running parallel to the electric-light wires, or when the generators are very close to the receiving set. In case of alternating current, the interference takes the form of a continuous hum, corresponding to the 60-cycle note of the current. In case of direct current, the interference is somewhat more irregular and is caused by commutator ripples.

* * *

How may this interference be prevented?

This interference may be eliminated if the aerials are run at right angles to the electric-light wires.

* * *

What is lightning arrester?

A lightning arrester consists of a very small air-gap between two pieces of metal inclosed in a vacuum.

* * *

Must a wire lead from the ground to the arrester?

It is absolutely imperative that you have a wire from one side of the arrester to the ground connection. It must be a good ground-connection. The aerial will be attached to the other side of the arrester.

* * *

How far should a lead-in be from the side of the house?

It is best to keep the wire at least five inches from the side of the house. This can be done by bracket insulators.

* * *

Which is preferable—a lightning switch or an arrester?

A lightning arrester is preferable to a switch as it functions automatically and eliminates the personal element. With a lightning switch you might forget to throw the switch over to the ground connection; whereas, with the arrester, such an operation is unnecessary and, consequently, you are protected all the time.

* * *

During a lightning storm, wouldn't the lightning follow the wire leading in

as well as the wire leading to the arrester which may be secured outside of the house?

Lightning has the peculiar property of taking the shortest path toward the ground. It prefers to jump across a very small air-gap inside of a lightning arrester than pass through the turns of a tuning coil to ground. Do not have any fear regarding this, as the device will thoroughly protect the house and it meets all requirements of the fire underwriters.

* * *

What are call letters and what do they represent?

All radio transmitters have call letters. Just as motor-cars have licensed numbers on plates, so do radio stations; only, instead of numbers, radio transmitters have letters. When one station wishes to call another, it simply does so by means of the call letters of the desired station.

* * *

Who assigns these call letters. Is there a book giving a list of them?

The United States government assigns the call letters at the time the station receives its license. A list of all licensed stations may be secured by writing to the Superintendent of Documents, Washington, D. C. Enclose fifteen cents and request a copy of "Amateur Radio Stations of the United States" and "Commercial and Government Radio Stations of the United States."

* * *

Why are the grid condenser and leak combined?

Principally for the sake of compactness and because they lend themselves to such a combination.

Radio World's Revised Radio Dictionary

By Fred. Chas. Ehlert

Ground—In radio the ground connection is the other side of the wave distributing system. Its main function is with the antenna or aerial and acts as a large condenser that is between the aerial and ground.

Impedance—The term applied to the resistance offered by a coil of wire to a current flowing through it. This is due to the counter EMF, or the total opposition of a circuit to a varying current, which, in turn, due to its ohmic resistance and the reactance of the circuit.

Inductance—Plays a very important part in radio circuits. The unit of inductance is the "Henry." It may be defined as the property of an electrical circuit which opposes a change of current in a given time. It is the transfer of an electrified body to a non-electrified body of close proximity, but without actual contact.

Insulator—A material through which electricity will not pass.

Induction Coil—An instrument for producing high voltages from low-voltage currents.

Interrupter—An instrument for breaking up a direct current into a series of impulses, thus producing a current for radio use called an intermittent current.

Ionization—The breaking up of molecules into atoms. The gas or air employed becomes ionized or conductive.

Kilowatt—A unit used in measuring large amounts of electricity. Meaning 1,000 watts.

Loop Aerial—A small frame usually from three to six feet in size wound with a number of turns of wire. It is used indoors, eliminating the outdoor aerial and ground connections.

Loud speaker—Any device used for reproducing signals, or speech, loud enough to be heard without the use of telephone receivers.

Low-frequency current—A current from 60 to 500 cycles.

Megohm—One million ohms.

Magnetic field—The entire space from which a magnet extends its magnetic influence.

Microfarad—One millionth part of a farad and the unit of capacity.

Milliampere—One thousandth part of one ampere.

Microphone—A sound magnifier. A device for converting sounds into electrical equivalents in a given circuit.

Broadcasting Has Come to Stay

By Guglielmo Marconi

I THINK that broadcasting has come to stay. In thousands of homes, in this country, there are radiotelephone receivers and thousands of intelligent people, young and old, men and women, well able to use them, even able to make the apparatus and, in many cases, contributing or striving to contribute valuable information concerning the problem still unsolved. I think I am safe in saying that since radio has already done so much for the safety of life at sea, for commerce, and for commercial and military communications, it is also destined to bring new and unforeseen opportunities in health and recreation into the lives of millions of homes.

Startling Demand for Radio Instruction in New Jersey

IN New Jersey the demand for radio instruction has been so strong that the Department of Public Instruction has taken charge of the work and expects to have courses in radio in every school where shop work or manual training is a part of the curriculum. Several years ago, according to The Times, New York, radio sets were made in the manual arts department in the schools of this State, but the boys' interest could not be sustained so long as the dot and dash system of signals only was available. Now the opportunity of hearing the actual voices, words, songs and music of the best kind has taken this project out of the more experimental stage and made practically every boy anxious to build and own a wireless set for his own use.

Every effort has been made in schools throughout New Jersey to give boys a chance to design and build radio sets. The shop teachers have made a special study of radio construction, and boys have been given an opportunity to make various types of wireless sets. Schools have installed large radio sets. Montclair, N. J., has erected over its high school an aerial that equals in size and construction those seen at broadcasting stations. A receiving set has been installed in the physics department, and at the last meeting of the Board of Education money was voted for the purchase of a sending set. Many of the high-school boys are licensed radio operators. In the manual arts department of the grammar schools at Montclair more than 600 wireless sets have been made.

A report from Jersey City states that 665 radio sets have been built by upper-grade boys, while in the Hoboken High and Junior High school during this year 350 wireless sets have been made.

A great deal of attention has been given to the study of wireless in the public schools of East Orange. In the elementary schools 750 crystal sets have been constructed by boys taking shop work. The high-school boys have made 327 crystal receiving sets, 29 tube outfits with one and two stages of amplification, and one sending set is nearly completed.

Navy Radio Ship En Route to Alaska

GOLD STAR," radio repair ship of the United States Navy, steamed out of Nanaimo en route to Kodiak, Alaska, on July 11, where she will supply and repair the Navy's ten radio stations during the summer. This unique ship, captained by Commander John B. Earle, is named for the mothers of the men lost in the service during the World War. Equipped with all manner of radio apparatus, spare parts, and supplies, she carries a crew of expert repair and equipment men, capable of erecting a complete station or repairing a transmitting tube. "Gold Star" is a 7,420-ton ship, carrying a complement of 300 officers and men.

To-day the Navy is operating the following traffic stations in Alaska: St. George, St. Paul, Dutch Harbor, Kodiak, Seward, Cordova, Juneau, and Ketchikan, and two compass stations at Cape Hinchinbrook and Soapstone Point, which form a chain of communications in Alaska and adjacent waters with transPacific stations, besides serving as a relief in the event of a break in the Pacific cable. As the stations are all difficult to reach, except between April and October, and few commercial vessels reach them, the Navy has put "Gold Star" into service to supply the men stationed there with food, clothing, and relief.

Last-Minute Radio News!

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

IT has been decided that the transmitter of New York City's new broadcasting station will be installed on the top floor of the Municipal Building, there being a room there that calls for practically no alterations. Band concerts will be broadcast to the various city parks, where receiving sets with loudspeakers, will be placed so that a single concert may be heard in various parts of the city. When noted persons are received by the city, the ceremonies will be broadcast. All official city news will be sent out in this way. Every police station and fire house will be equipped with receiving sets so that the forces that protect the citizenry may be marshaled and directed with lightninglike speed.

Candidates for Congress will be permitted to broadcast their political speeches by radio for two weeks prior to election if plans of the American Radio Association with national headquarters at Washington materialize.

The opening address of Herbert R. Hoover, Secretary of Commerce, at the first convention of the National Radio Chamber of Commerce, at Washington, D. C., showed that he is very much in sympathy with radio but would like to see Congress take a little more action in its work regarding broadcasting regulations and other matters.

Forest fires raging in the State of Washington were quickly checked, during the past week, by airplanes equipped with radio.

Figures just announced indicate that in New York State, during the month of May, 1922, 1717 new radio corporations were organized.

A new airplane passenger-service is to be put in operation between Lisbon and Buenos Aires. The planes will carry fifty passengers. They will be guided by radio.

The Radio Electric Company, of Pittsburgh, has been assigned call letters WHAF for its broadcasting station. Scheduled programs will begin about September 1. This broadcasting station will be under the direction of Parker R. Wiggin, chief engineer of The Radio Electric Company.

The opening of new Signal Corps radio stations at Fort Benning, Georgia, and Fort Totten, New York, bring the total stations to 53, and with the cooperation of the Naval Station at Boston, one more point is reached. A new station planned for Fort Sill, Oklahoma, will hook the Eighth Corps Area into the Army Radio Net, which will then embrace practically the whole country.

The Independent Radio Corporation, \$100,000, has been incorporated at Wilmington, Delaware. Directors: Hartin E. Smith and M. D. Jukes. Artemas Smith, Wilmington, Del., is the agent.

The copper market is very brisk. The price has advanced practically 1/8 cent a pound. The demand is for August and September. Financial writers attribute this rise to radio manufacturing.

To China goes the honor of installing the longest commercial radiotelephone circuit in the world. Radio telephone sets have been installed at Peking and Tientsin, covering a gap of ninety miles.

Steamers of the Detroit and Cleveland Navigation Company, plying between Buffalo and Detroit, have been equipped with both receiving and transmitting sets.

Radio Choir to Kill Jazz



(C. Kadel & Herbert News Service.)

A California radio choir that hopes to annihilate jazz by broadcasting music that is based on old melodic principles.

Navy Plans Radio-Equipped Airships

By Washington R. Service

WASHINGTON, D. C.—The largest airships in the world, now building for the United States Navy, one at Lakehurst, New Jersey, and the other at Friederichshafen, Germany, will have the latest and best radio-equipment capable of development. Anticipating their completion, their home port is being fitted up for their arrival with a high-powered radio station.

A new type of radio-transmitting antenna without towers has just been installed at the Naval airship base at Lakehurst, which is Naval Radio Station NEL. In an effort to keep the big landing field clear for the two giant rigids, ZR 1 and ZR 3, to eliminate high towers and aerials, the radio engineers of the Navy designed a long low aerial. It is nearly 800 feet long and fully 120 feet wide, forming a sort of gridiron, mounted on poles only 60 feet in height instead of between 150 and 200 feet. Technically it is a multiple-tuned antenna with several ground leads. By erecting the aerial

along one side of the field, a clear open space is left for maneuvering the ships.

Recent transmission tests with the new aerial have carried messages on 900 meters to Newport, Rhode Island, and Norfolk, Virginia, distances approximating 200 to 250 miles, which indicates excellent daytime service. Daytime communication with the big airships when they are cruising within about 300 miles of the station is promised. At present, a vacuum transmitting set with 1 kilowatt in the antenna, is used, and the experts believe that on clear nights in winter communication may be carried on with aircraft or ships fully 2,000 miles out on the Atlantic. This will insure the picking up of the German-built ZR 3, on her maiden trip to her home port, before she is a third of the way over. When the R-38 made her initial trans-Atlantic cruise, she was not heard from until within about 600 miles of New York.

The new aerial was designed and

built by the Naval Aircraft Radio Laboratory at Anacosta, and installed at Lakehurst by radio men from the Philadelphia Navy Yard.

In addition to the new radio transmitting set, Lakehurst will have a radio-compass station which will enable the dirigibles to determine their positions in the air within a radius of two hundred miles, and locate the field when returning from a cruise in darkness or in dense fogs. Radio equipment for the big rigid ships has not been designed; but it is understood that, as plenty of room will be available for engine-driven generators producing great transmitting power, a very long range set can be installed. It is anticipated that both radiotelegraph and radiotelephone communication may be carried on up to 300 and 100 miles

United States Army plans for new radio sets for the semi-rigid airships call for central power-stations which would include generators geared to gasoline engines, after the fashion in which a magneto is driven, but never before attempted. The French tried out belt-driven electrical generators, but with little success. However, representatives of the Air Service Engineering Department, at McCook Field, expect to develop a central power-plant that will give sufficient power for putting half a kilowatt in the antenna and, also, power for lighting, heat, and electrical control work.

The Army Air Service plans to use the new Signal Corps set 135, combining radiophone and telegraph circuits good for distances up to 75 miles and 200 miles respectively. The range will be greater than is planned for the big Martin bombers, however, as better facilities for erecting aerials are available on airships than on planes. One method considered is to install the antenna within the envelope; another is to suspend it below the ship, drawing it up upon landing; while a third contemplates hanging the wires of the aerial along the sides and over the top of the ship. Experiments will determine which of these methods is the most efficient.

Naval radio experts are loath to reveal their definite plans for the radio equipment of the ZR ships; but, it is said, they may parallel the Army's ideas although their ships will be about twice the size of the largest semi-rigids now planned, giving them more latitude and more room for equipment.

Mother's Clothesline Their Aerial



(C. Kadel & Herbert News Service.)

After many weeks of patient toil little Daniel Callahan (seated) completed this double-circuit regenerative-receiver, every snitch of what you see in the photograph being either made or assembled by him. He then proceeded to erect an aerial on the roof; but, sad to say, a cold-hearted landlord who had forgotten his own boyhood days made Daniel take it down. But Danny fooled him with a bright idea. His mother's clothesline, suspended across the backyard, has a wire run through its center. This he successfully utilized as an aerial. When photographed he was telling his friend, Joseph Early, all about it.

Radio World's Hall of Fame



(Courtesy General Electric Company.)

Dr. IRVING LANGMUIR

Assistant Director, Research Laboratory, General Electric Co.

One of the younger geniuses in radio inventiveness. Educated in the public schools of Brooklyn, New York. Graduate of Columbia University School of Mines. Took a post-graduate course at University of Gottingen, Germany. Entered research laboratory of the General Electric Company, Schenectady, New York in 1909. Inventor of the nitrogen, or gas-filled, incandescent lamp; of the pilotron and kenotron—devices that are highly advantageous in radio and which are fundamental discoveries leading to the perfection of the Coolidge X-ray tube. Dr. Langmuir was presented with the Hughes medal in 1918, an award by the Royal Society of London, for his "Researches in Molecular Physics," and has twice been honored in being awarded the William H. Nichols Medal for "Arrangements of Electrons in Atoms and Molecules." He is now perfecting a twenty-kilowatt tube to take the place of gigantic plants.

Radiograms

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

ABOUT 350 active broadcasting stations are in operation throughout the United States. It is estimated also that the number of receiving sets will run up to the million mark. There is now about one station to every 3,000 sets and to every 10,000 square miles of population.

Radio is one "sport" that is not disturbing the churches. Many pastors throughout the country continue to report that it is doing more than any other modern agency to bring the church into the home.

Election returns at Portland, Maine, were broadcast recently with unusual success.

Mr. Charles D. Isaacson, of New York, recently sponsored a radio concert for the inmates of The Hospital for Insane, at Center Islip, New York, the largest institution of its kind in the country. The programme was the opera, "Cavalleria Rusticana." Nearly 3,000 inmates of the institution gathered in the auditorium, and a gigantic loud-speaker, built especially for the occasion, was installed. The music was heard with marvelous clearness and tonal quality. It came over the ether, fifty miles from WJZ, Newark, New Jersey.

It is said that no quieter or more attentive audience ever listened to an opera. Delight and astonishment illumined the faces of the inmates. Ninety per cent. of them had never heard of the existence of radio. Mr. Isaacson believes that he has demonstrated that music by radio will help the sick, the afflicted, and, particularly, the insane.

The summer home of the Church of the Heavenly Rest, Copake, New York, has been equipped with radio for use in its community work as well as for direct work in church affairs.

There is nothing difficult about learning code. It is just a matter of steady application and practise to acquire speed. The United States Navy cooperates with the amateurs of the

country to this extent: the naval stations actually send out code matter at a slow rate of speed daily for practice purposes. For instance: the Brooklyn Navy Yard, NAH, sends out code practice for amateurs every night. This begins immediately after NAH has completed its nightly program of news for ships. It sometimes starts at 9 o'clock; sometimes not until after 10. The start depends entirely on the amount of news matter to be sent out.

Several of the big London department stores have established radio departments and are selling receiving sets as low as \$10. Aerials are springing up on the roofs like mushrooms, and each day sees a legion of additions to the broadcasting which has so thoroughly captured the popular fancy. Direct contact with Arlington and other American stations is easily established.

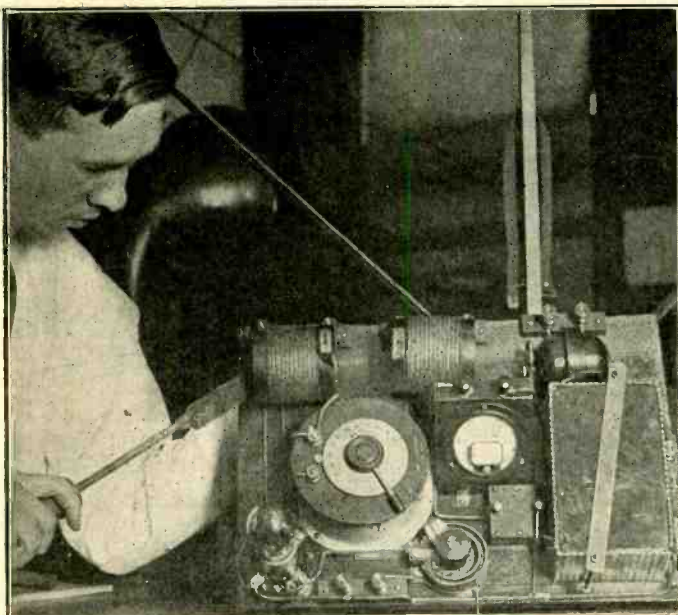
The "Spoken Journal" has been "issued" in Paris. The editor, Maurice Privat, gathers his staff about him on a stage and, one by one, the members speak their "news or editorials." And, lo, radio takes their words to the waiting world.

Overseas Wireless Company of Germany has attained a new record. In one day, a total of 50,000 words were exchanged by radio at the stations of this company at Nauen and Eilvese. Two years ago, the entire business of this company amounted to only 100,000 words a month.

"The ordinary radio receiving-set involves about as much fire hazard as a white-enamel bathtub," according to W. S. Boyd, chairman of the electrical committee of the American Radio Association.

"Who knows?" says "The World," New York, "Their use as amplifiers in conjunction with the (Alexanderson) alternators may mean transatlantic telephone service before the snow flies." "The World" is referring to the 20-kilowatt tubes recently invented by Dr. Irving Langmuir of the General Electric Company.

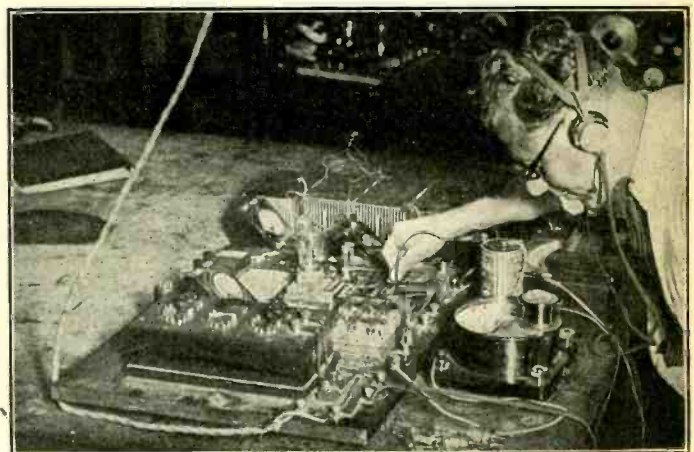
New Low-Power Transmitter



(C. Kadel & Herbert News Service.)

The above is a photograph of a low-power, 56-meter transmitter. Note the very small coils used. It is a very interesting set—a set that is intended for broadcasting on very short wave-lengths. It is a fact that no equipment has hitherto been devised for such a purpose, but busy minds are experimenting day and night to perfect new devices in radio. It is a fact, too, that what seemed a necessity six months ago has been replaced by newer, better, and more practical material.

Testing Tubes by Ammeters



(C. Kadel & Herbert News Service.)

Here is Samuel C. Miller, of the City College Radio Laboratory, whose keen knowledge of radio aided by his invention, the "Miller Bridge," enables him to keep tabs on all the radio vacuum-tube manufacturers in order to see if their output comes up to specifications. By means of his device, any defect in a tube may be detected. The "Miller Bridge," shown in the foreground, is a very sensitive ammeter which can measure currents as low as one-hundredth-millionth part of an ampere. It is used, also, to measure grid currents. The vacuum tube is one of the most vital parts of radio equipment. Without it, the new science practically would be helpless. A number of articles on this interesting little wonder have appeared in Radio World; but the subject is one that will always furnish food for clever pens. The vacuum tube is radio efficiency in the highest form of its potentiality.

Radio and the Woman

By
Crystal D. Tector

I HAVE been hard at it since we opened our bungalow here at Lake Hopatcong. Like all men, Friend Husband, wanted to get the cooking stove in order first of all; but I told him that he would go good and hungry if he didn't help me get the set in order before we even unpacked our bags. Well, he fussed and fumed—I wish you could have seen him! Said I wanted to starve him out, and all that sort of thing, so I did take pity on him and let him gnaw at a ham handwiche before I told him to get busy with what was first in my mind.

* * *

Not that Friend Husband isn't a good radioman. He knows a lot about it and can operate a set with the best of them; but I was a "bug" long before he ever thought there was anything in what he used to dub a "silly lot of nothing." I told him that there were people who thought Thomas A. Edison crazy when he announced the phonograph, forty-five years ago. F. H. would look at me and scowl and mutter something about "you women"; but I took it all cheerfully and now I have the laugh on him.

* * *

Well, we got the set in order, set up our aerials—strung from a peak of the roof to a tree—found a nice damp place for a ground, and, after dinner—I simply had to capitulate after all that—we listened in. It was wonderful how easily we picked up Newark. It was a splendid program. One song came over so clearly that it quite aroused our neighbors; and before we were aware of it, we had quite a goodly sized audience.

* * *

Even the county sheriff, who happened to be in the neighborhood, wafted in. He told me that he had been attracted by the "queer noise," as he called it, a quarter of a mile away. Said, too, that he had heard a lot about radio, but this was the first time he had ever "seen one workin'." He stayed so long that, I think, he must have neglected his constabulary duties. When I had him listen in for the time tick from Washington—telling him that he could then learn if his watch was correct—he was filled with more genuine surprise than I have seen since F. H. discovered that I am writing for RADIO WORLD.

* * *

The sheriff is a daily visitor. I am giving him special instructions in how to build a set. He is all enthusiasm. To-night, as I write this, he is to bring over his wife and family for an introduction to the mysteries and wonders of radio.

* * *

My mail has been particularly large this week. May I quote from a few of the letters?

Mrs. J. L. K., of East Orange, N. J., says: "What we need most—we who hear the programs every night—is more about advanced domestic science. That is what the up-to-date woman with a home is most interested in."

Miss Daisy L., Oklahoma City, Okla., writes: "I danced to radioed music the other night. My partner had the nerve to say to me: 'You dance much better since they put in ether music.' The nerve! I felt like answering him thus: 'If that is so, why don't you take it!' (I think that one is good enough for Mr. Mackay's colyum.)"

Miss H. Y. O., Dallas, Texas: "The other night we picked up a broadcasting station in Cleveland, O. We all felt that it was something worth recording as ours is only an amateur set. Anyhow it was a wonderful thrill."

Mrs. R. T. E., Evanstown, Ill.: "We are the happiest family you ever saw since my brother perfected his radio set. We can hardly wait for night to come; and, the dinner over, sit about the loud speaker and listen—listen! Our ambition is to pick up some ship at sea."

* * *

Some day, I intend to write a book based on the many wonderful

Delights Radio Fans with Songs



(C. Underwood & Underwood.)

An exclusive photograph of Mrs. Laura Kincheloe, wife of the Congressman from Kentucky, singing in a Washington radio broadcasting-station to thousands of radio fans who nightly listen in to aerial doings. Mrs. Kincheloe is well known as a whistler of great merit, and is a prime favorite in the congressional set because of her entertaining qualities.

letters that I receive from enthusiastic radiowomen. Their missives are all so human and so full of heart interest. Do not fail to write me whenever you can. And if I can help you by a personal answer, I will gladly do so.

* * *

I took a long motor trip over the beautiful Jersey countryside yesterday. I was looking for aerials, however, rather than at scenery. And I was agreeably surprised to see the number strung from the roofs of pretty hospitable homes. New Jersey, you know, is sort of a home for radio fans. It is truly wonderful how radio is booming in the schools—and among the girls as well as the boys.

Don't Miss the Next Issue of
RADIO WORLD

(No. 19, Dated August 5)

It Will Contain

The Armstrong Superregenerator

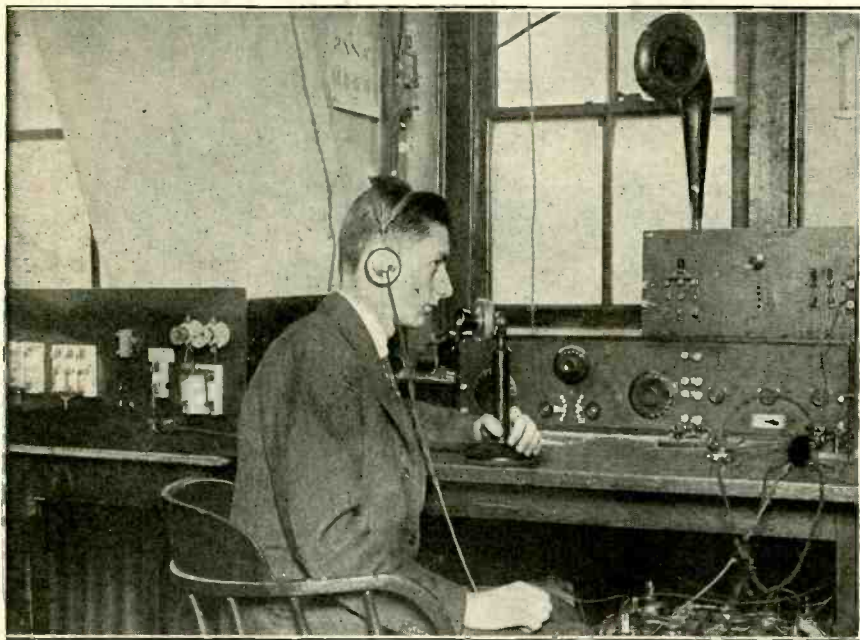
(Fully Explained)

By JOHN KENT

With Two Large, Complete Schematic Diagrams

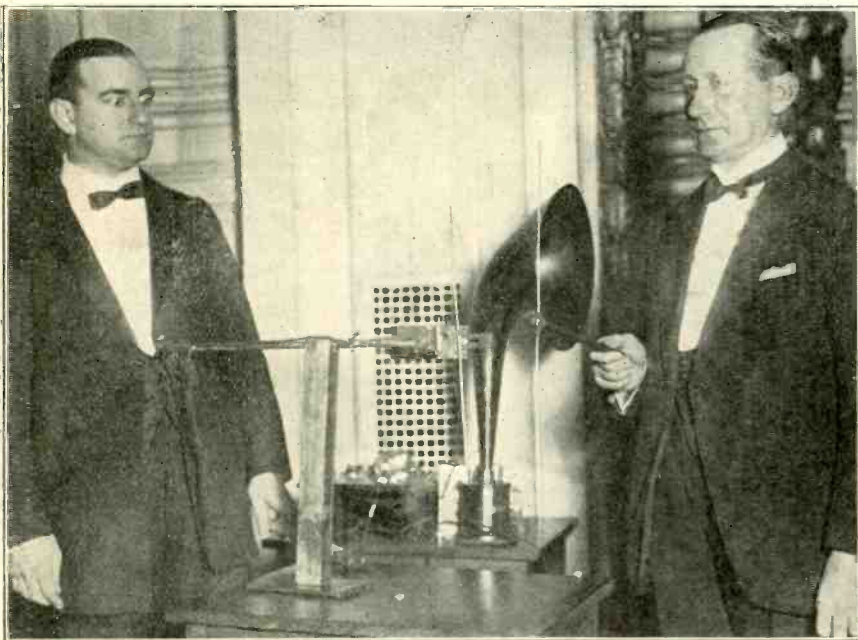


Radio Shows Remarkable Progress at the



(C. Kadel & Herbert News Service.)

The above photograph shows a section of the radio room of the College of the City of New York. This station, better known in the radio field as 2XNA, has been heard by more radio fans than any other amateur radio station in the country. Richard Carlisle is shown talking by radiophone to 3EIJ, who is located in Virginia. The receiving equipment, at the right of Mr. Carlisle, was built by one of the students. It is a regenerative set carrying three steps of amplification. To the left is a home-made charging-unit, which keeps the batteries in trim so that communication is possible any minute of the day. The room is also equipped with a powerful transmitter.



(C. Kadel & Herbert News Service.)

At the left of the above photograph is Dr. Alfred N. Goldsmith, professor of engineering of the College of the City of New York. At the right, Senator Marconi is explaining his directional radio waves. Dr. Goldsmith, himself an inventor of eminence, has done heroic work in advancing the interest in radio among the student body at the big college of the world's greatest metropolis. Dr. Goldsmith was one of the first men to realize that radio will be one of the great commercial elements of the future, and to this end he advised young men to prepare for it. He has enthused and guided them, and the student body at the C. C. N. Y. look to him to keep them abreast of the steady advance in the new science. In his own laboratory Dr. Goldsmith has performed some remarkable experiments, and he has even picked up messages broadcast from Nauen, Germany, which any radioman may be proud to have to his credit.

THE College of the City of New York now boasts one of the most progressive radio clubs of any institution of learning in America. Its call is 2XNA. The club has managed to establish a healthy modicum of brotherly love among its members, and the result is a large number of interested radiomen who will do much to elevate and advance the new science.

2XNA is under the supervision of a licensed operator capable of handling twenty words a minute. The club maintains an efficient radio station. Code is taught and the atmospheric reputation of the student is carefully developed.

The College of the City of New York also maintains a laboratory for the use of students in radio engineering. Dr. Alfred N. Goldsmith, inventor and radio expert, is the head of this class. The engineering students conduct an evening class for the benefit of beginners. The set installed consists of three 50-watt tubes, making a total of 1,500 watts. Several hundred miles have been reached successfully. Under normal weather conditions, a thousand miles may be reached.

In order to measure up to its progressiveness the club has outlined a fall program of improvements. Some of the more important items are as follows:

A loud speaker is to be installed in the Concourse to advertise current college-activities and announce the world series.

Cabinet Member Radios

(Right) Postmaster-General Work, who stopped his busy program at Washington so this photograph might be taken, is one of the busiest radio fans in the United States. Mr. Work uses radio as a means of speeding up his department. It is remarkable what the United States Post-office can find to broadcast. It has a continuous program to be sent out, and it must be sent with accuracy and dispatch. It will not



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

be long, it is reported, before capital will be equipped with r:

he College of the City of New York

Due to the success of the recent radio-chess match, arrangements are to be made to play other institutions.

The passageway between the radio and physics towers will be fitted out completely as a code practice room. It is expected that a class of a hundred will be enrolled, each student being on the job two or three hours a week. A definite schedule will be adopted, club members being the instructors. A chart of code speed will be kept from month to month.

An Armstrong superregenerative receiver will be installed.

Expert members are to do night-operating duty. Schedules to be made with DX stations.

A new transmitter will be constructed using four 50-watt tubes with a plate potential of 1,000 volts.

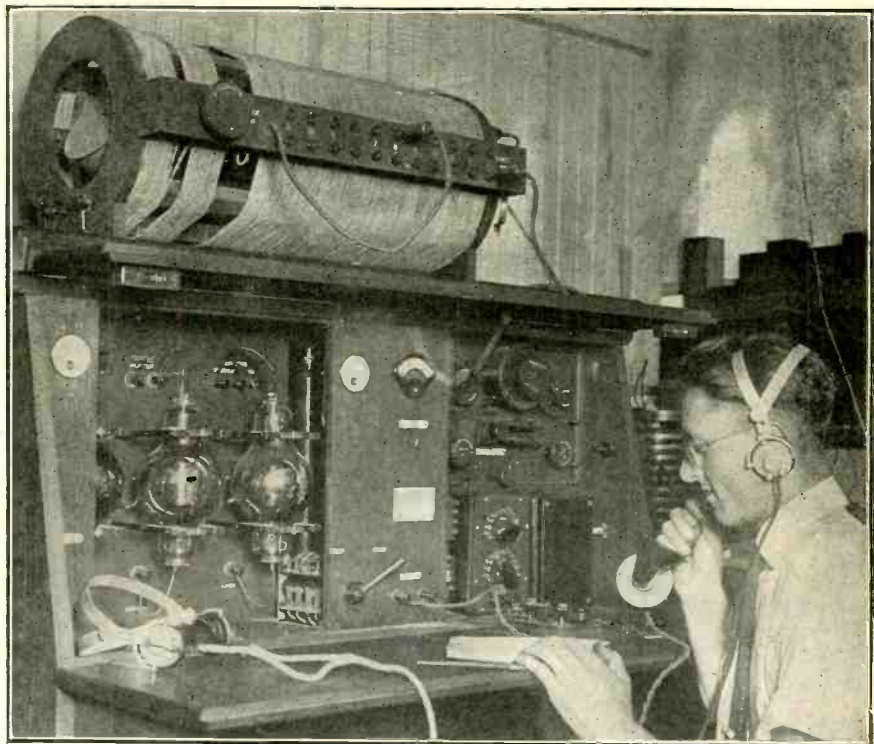
Only members of the operating committee on schedule may operate the transmitter. These men must do at least twenty words a minute.

There will be a radio lecture every week. If a speaker of prominence cannot be secured for each week the club will assign topics of varying technicality to the more expert members, who will talk on whatever subject with which they are most familiar. The subjects will alternate between elementary and advanced matters, so that both inexperienced members and veterans may be benefited.

The club room will be artistically decorated in harmony with its purpose.

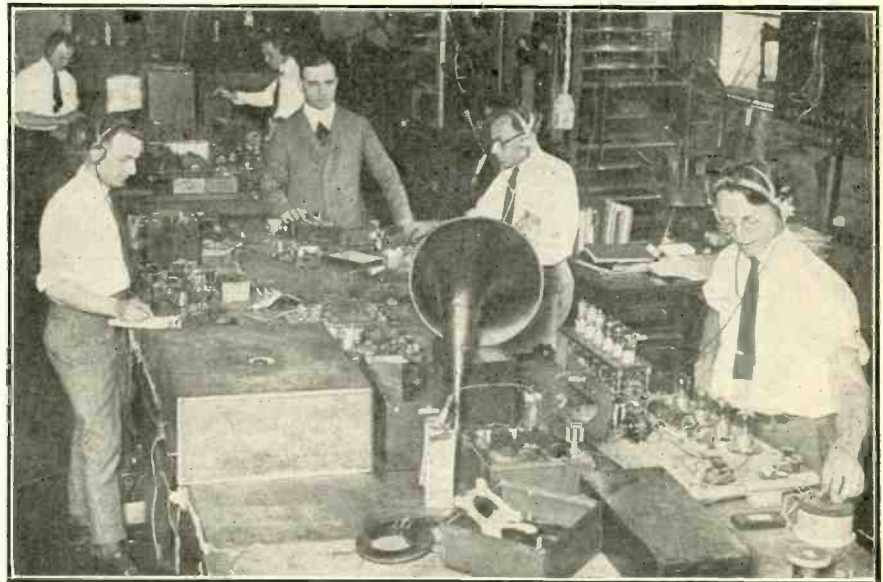
The members go up to the club rooms on schedule; they will continue to sign the roll on leaving. The great bell will be rung by wireles time every day.

Last year's radio term proved unusually successful for the C. C. N. Y. The membership was more than double. The copying speed was noticeably advanced. All of the radio activities were operated by a thorough system.



(C. Kadel & Herbert News Service.)

This illustration shows the large radio-tube transmitter located in the College of the City of New York. It is claimed that this is the largest tube-set ever installed for amateur operation. Its capacity takes in three tubes of 50 watts each, totaling 1,500 watts, or one and one-half kw. Abraham Ringel is photographed talking to a steamer several hundred miles out at sea. The transmitter is enclosed in a cabinet, permitting any serious adjustment to be made at the shortest possible notice. The large coil on top of the cabinet is a tuning inductance. It is used for tuning various wave lengths. To the right in the cabinet is the receiving equipment.



(C. Kadel & Herbert News Service.)

Every amateur who owns a radio set does some experimenting during his leisure hours and finds some improvement that may be made in his set. This enables him to grasp some of the principles of radio communication. Yet there are some experiments which would tend to show that some principles of the art are lacking, due either to some technical equation being too deep for him to understand or for some reason of circuit. The College of the City of New York maintains a laboratory where experiments are made in all such interesting technical matters. In this photograph Dr. Alfred N. Goldsmith is shown conducting a class in research engineering, experimenting with various circuits. The laboratory is well equipped, as may be seen. At the testing-table engineers are testing out vacuum tubes for the proper functioning of the circuits. This laboratory carries every known instrument that the research engineer requires.



every Government department in the nation's radio transmitting and receiving sets.

Answers to Readers

Can a loading coil be used to increase the wave length of a loose coupler or vario-coupler?—Robert Devita, Los Angeles.

A loading coil can be used, but you must load up the secondary as well as the primary. If a tuned-plate circuit is used that also must be loaded in proportion to the primary load.

* * *

In making up a spider-web coil, how many turns are required for primary, secondary, and tickler?—Thomas Malon, Syracuse, N. Y.

The primary requires about 35 turns, secondary about 50, and the tickler about 50. In employing these coils use a primary series condenser of about .001 mfd. capacity, and a secondary condenser capacity of .0005 mfd., capacity.

* * *

In using crystal detectors, which is our best: Galena or carborundum, using the carborundum with an applied external voltage?—Ernest Metler, Brooklyn, N. Y.

Galena is usually the most sensitive crystal, although carborundum is more dependable for short-distance work. It also retains its adjustment.

* * *

I would like to purchase a receiving set on the installment plan. Do you know of any concern selling on this plan?—Peter McIntosh, Rome, N. Y.

RADIO WORLD does not know of any firm selling sets on the installment plan.

* * *

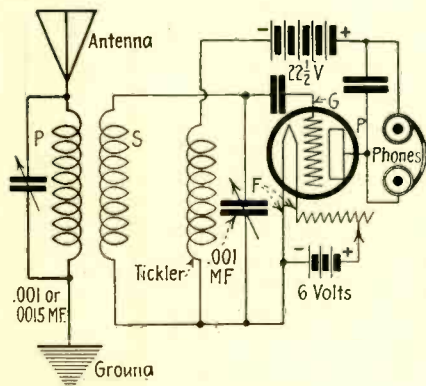
I am making a variometer set, using two variometers, one for the grid and one for plate circuit. Can I make a variometer that will tune up beyond the broadcasting stations—say, about 1,500 meters?—Paul Shaefer, Chattanooga, Tenn.

A variometer of this size is not practical, as it is too cumbersome to operate. Make a honeycomb-coil set. Then you can reach almost any wave desired by simply changing coils.

* * *

In using a tickler-coil circuit consisting of a coupler with movable tickler, using vacuum tube and condensers, what would be a good hook-up to work from?—Joseph Sercak, Marion, Ohio.

The accompanying schematic diagram gives you full wiring data for the circuit. Wire accordingly. This is the Armstrong



regenerative circuit. Excellent results should be obtained when completed.

* * *

I have read several interesting articles on radio frequency by George W. May, R. E., in Radio World. Could you advise me who manufactures these; or, were they specially designed by Mr. May?—John Wiley, Richmond, Va.

Anyone wishing to experiment with radio frequency according to Mr. May's ideas should write to him in care of this office. We will forward the letters.

New Radio-Equipped Lightship



(C. Kadel & Herbert News Service.)

Blows and seas off Hatteras will have to be record ones to displace the new lightship stationed off Diamond Shoals. She is the newest and largest vessel in the United States Lighthouse Service. No. 105, as the ship is listed, was built to replace No. 72, which was sunk by a German submarine on August 6, 1918. The vessel is red in color and bears the name "Diamond" in large white letters on each side. She shows a flashing light at the foremost head, the illumination being acetylene gas controlled by an electric flasher operating the gas burners and giving it a characteristic flash distinguishing it from other lights on the neighboring coast. The vessel is 147 feet long, has a displacement of 825 tons, and can be driven by a compound-engine with an indicated horsepower of 400. She is equipped with three distinct fog signals, a steam chime whistle, a submarine bell, and an automatic fog-signal. No. 105 is the latest lightship to be equipped with the radio signal.

The Truth About Electric Lamp-Socket Aerials

By Harold R. Hart

CONSIDERABLE interest has been created by several lamp-socket aerials that appeared recently. However, there is much confusion in the minds of many amateurs over this type aerial.

Its existence must be credited to Maj.-Gen. George O. Squier, of the United States Signal Corps. The ordinary aerial and the lamp-socket aerial act as two separate aerials. It must be remembered, when using a lamp socket as an aerial, that one must apply 110 volts to the terminals of the socket. This means that there are 110 volts at the terminals. Until broadcasting stations see fit to transmit their programs over these electric-light power lines, this lamp-socket invention, which acts as an aerial, will have no direct application to amateur reception; but using electric-light wires as an aerial, for radio reception, it is possible to secure results.

The elimination of the outside aerial is now possible, and the amateurs who have the lighting power in their homes may hear the daily program of the various broadcasting stations by attaching a plug to any lamp socket.

But certain care must be maintained in order to protect the set from mishap. One factor is necessary: a good plug. The plug must be perfect electrically; that is, perfect in such a manner that it will stand up under high voltages without heating or breaking down; and in order that any person may handle it without producing a short circuit, the plug should be well protected. An ordinary separable attachment plug is used, one with two blades connecting the separate halves of the plug. Only one wire is run from the plug, the other binding-screw is left undisturbed. This single-conductor wire should be long enough to reach from a handy electric-light socket to the table on which the instrument is placed.

Between the lighting wires and the apparatus we must insert a condenser either of the oil or air type. This is very essential for two reasons: first, in order to keep the current from your instruments; second, to effectively reduce the wave length of the lighting wires, which are exceptionally long, so that it is possible to carry on the

(Continued on next page)

Chief, also, of Army Radio Fans



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

General John J. Pershing, U. S. A., is head of the great army of fans in the United States Army, as well as ranking officer of that branch of the service. Radio is to play a big part in future army affairs, and General Pershing, who is keenly aware of this, watches every little change in the improvements that are being made daily in all branches of radio. He believes in its usefulness as a powerful army accessory.

(Continued from preceding page) shorter wave-lengths from the broadcasting stations.

In order to assure constant service and freedom from buzzing from the alternating-current circuit, the plates, and dielectric in the condenser should be so compressed and held together that it is impossible for them to expand, or enlarge, when placed under an alternating current. No set should ever be used on this system without the aid of condensers in the aerial, or ground circuit, the aerial circuit being preferred. Another help to the amateur will be to insert, just prior to the antenna connection on his set, in series, a one-half ampere fuse, which will protect and benefit the set considerably. One may wonder how this set would work if the condenser were even placed in the ground circuit; but in such a case the whole antenna would then work on the principle of a loop aerial.

In case an externally connected condenser is used, the circuit should be run from the fuse to the condenser and from the condenser to the antenna

binding-post of the receiving set. In some cases where the condensers are built right in the set, the connection from the set is run directly to the antenna binding-post.

Screw the attachment plug into the electric-light circuit and tune as usual. These plugs have proved quite successful and in a majority of cases, will work as successfully as the regular type of aerial—sometimes even better. In order to get satisfactory results, the particular line from which you wish to operate your set.

When using your set, if no signals are heard, simply reverse the bottom half of the plug. Amateurs endeavoring to use a lighting system as their aerial, should never hook-up direct to the lighting system without employing a means of safety, such as a condenser. Where no condenser is used, the fuses will be blown and the house left without light. Precaution should also be taken so that no body contacts are made with the power lines and the ground at the same time. Plugs purchased should be bought adjustable.

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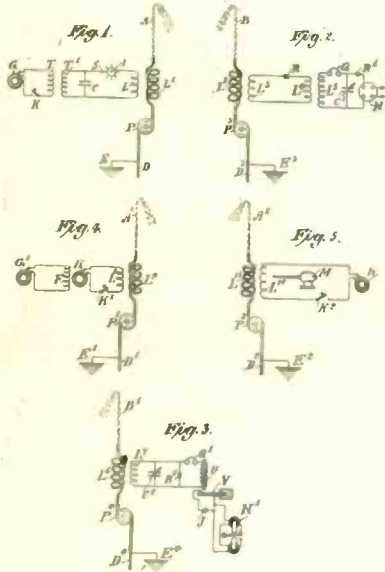
Radio Patents

RECENTLY ISSUED

Electric-Wave Transmission With a Fluid Antenna

No. 1,420,254. Patented June 20, 1922.
Patentee; John Hays Hammond, Jr., Gloucester, Mass.

MR. HAMMOND intends that this invention will employ liquid, or gaseous, elements to replace the usual solid type of antenna used for transmitting and receiving in radiotelegraphy and radiotelephony. It relates more particularly to a method for utilizing such



Schematic design of the Hammond invention to replace the ordinary antenna with liquid or gaseous elements.

liquid and gaseous antennae in a practical way. The idea of using a liquid, or gaseous, antenna with the ordinary method of tuning by means of wave frequencies in radiotelegraphy is not new; but it is obvious that in any kind of a wind, and also owing to other causes, the capacity of either a liquid, or a gaseous, antenna would be continually changing; and as the frequency of the waves emitted from an antenna depends on the product of its inductance and capacity, it follows that, by the ordinary method of tuning, resonance between transmitting and receiving antennae would be impossible."

Mr. Hammond also hopes to make possible tuning by wave-group frequency, so that changes in the wave length of the waves emitted and received will not affect the selectivity between station.

* * *

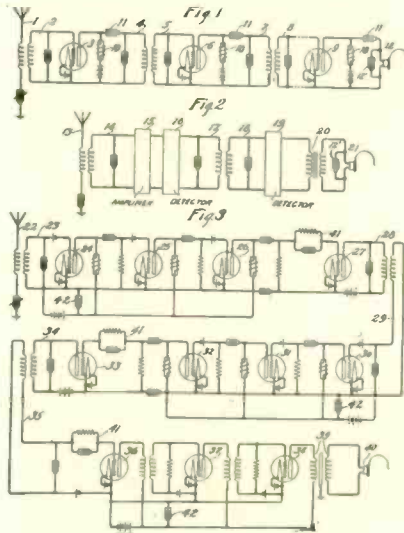
Radio Receiver Employing Multiple Detection

No. 1,420,055. Patented June 20, 1922.
Patentee: Harold W. Nichols, Maplewood, N. J.

THE primary object of Mr. Nichols's invention is to provide a means whereby a current of low intensity will not be affected by a strong interfering wave of frequency. Another object is

to provide means for eliminating interference due to a current of large amplitude colliding with a current which a person may wish to receive.

In this system, advantage is taken of the fact that, because of the curved characteristic of most detectors includ-



Schematic design of the Nichols invention to prevent high frequency from interfering with low intensity.

ing the vacuum tube type, if a speech or other signal-modulator carrier-current is impressed on its input circuit, there will be present in the output circuit the signal modulated first even harmonic of the carrier frequency; and by tuning the output circuit of the detector and the coupled input circuit of the next detector to his first even considerable harmonic selectivity will be obtained.

When a receiving station adapted to co-operative with a low-power, or "weak" transmitting, station receives energy from a high-power, or "strong" transmitting, station interference results, the measure of which is determined by the intensity of the signal current received from the "strong" station relative to that from the "weak" station and to some extent upon the relative frequencies of the waves radiated from the two transmitting stations.

Therefore, when two such stations employ frequencies which are close together on a percentage basis, i. e., the ratio of the frequency of the interfering to selected waves is large or that of the difference frequency relatively to that of the desired waves is small, selection at the receiving station of the signal currents radiated from the "weak" transmitting station is extremely difficult with the arrangements heretofore devised.

* * *

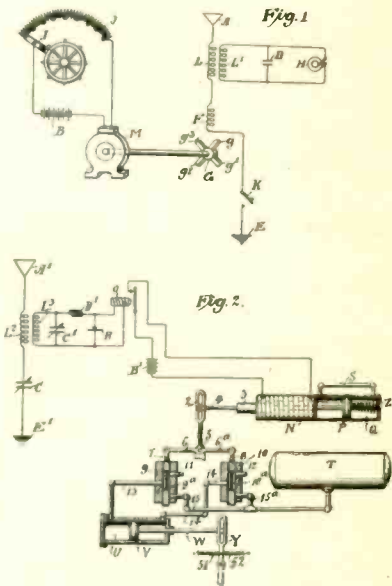
A System of Distant Control

No. 1,420,256. Patented June 20, 1922.
Patentee: John Hays Hammond, Jr., Gloucester, Mass.

THIS invention relates to systems for the control of mechanisms at a distance by means of radiant energy, and relates more particularly to sys-

tems in which radiant energy transmitted from a distant station actuates electrical receiving apparatus, which causes the operation of mechanisms worked by fluids under pressure.

"I have discovered that when a series of wave impulses is sent out from a transmitting station," says Mr. Hammond, "the position of a plunger, or movable core in an electromagnet, at a receiving station, can be controlled by the frequency of the impulses. When no impulses are received by the electromagnet, the plunger is not attracted, and when impulses are received, the attraction of the electromagnet for the plunger will depend upon the frequency of the impulses; the greater the frequency, the greater the attraction. The frequency of the impulses sent out from the transmitting station can be controlled in various ways, for instance, by sending out a continuous train of waves and then varying the amplitude of the waves by changing the inductance or the capacity of the antenna circuit at



Schematic design of the Hammond invention to control mechanism at a distance by means of radio.

any frequency desired. The electric waves may also be sent out in groups, and the group frequency varied."

In any of these ways the attraction of the electromagnet for its plunger may be varied, and hence the position of the plunger can be controlled, and any mechanism attached to the plunger can likewise be controlled.

* * *

Old Schooner a Radio Station

THE Country Club of Sturgeon Bay, Wisconsin, has put an odd radio station in operation. The club, in constructing a new pier for its grounds made use of the hull of an old lumber schooner, the "Mary Ellen Cook." This craft formerly sailed between Chicago and Marinette and it carried building material for the homes of many old-time Chicagoans.

The hull was rebuilt and painted white, but many of the parts that distinguish the old craft were left intact. The hull was sunk at the site of the pier and will be used for dock purposes only. Between the original masts of the schooner an aerial will be stretched and below will be installed one of the best radio outfits. Club members will be privileged to sit on the old deck and listen to the broadcasting.

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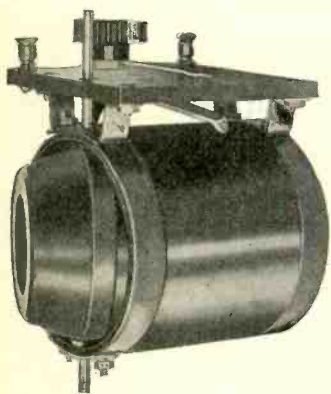
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Broadcast Bill's Radio-lays

By William E. Douglass

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

SISTER'S come to visit us and spend a week or two, to help my wife put up some fruit, an' then when that is through, she's goin' to do some sewin' fer my wife an' fer herself, so they can get themselves dolled up fer Harvest Home, the twelfth. In evenin's when they're sewin', after Willie's gone to bed, I get my wireless set hooked up an' harness on my head, er sometimes when it's good an' loud I put it on the horn so wife an' sis can hear the price of hogs an' wheat an' corn. Last week sis



"Everything wuz lovely by the time that sis come down"

met a feller an' he cum around to court, I entertained him better, heaps, than openin' up a quart. When he wuz sittin' in the parlor waitin' Wednesday night, young Bill got started talkin' an' he queered the party right. "What's them," he sez to sis's beau an' opened up his hand an' showed him something white that we all thought at first wuz sand. "They're beans," said sis's beau an' Willie turnin' to his maw, sez, "See, he knows 'em, maw, you said he didn't know beans at aw'." I tried to change th' subject an' start talkin' 'bout the crops, but all the time I notices sis's beau wuz mad as hops. So, I turned on the wireless an' we heard some vaudevil, but fer a time I'll tell you everything wuz pretty still. Then one of them comedians pulled off a funny joke that seemed to tickle sis's beau, well gosh, I thought he'd choke. Well, everything wuz lovely by the time that sis cum down, I hope that he'll ferget the beans on th' way into town.

The "Radio Fixer" Here

THE radio aerial repairman is here. Not to be outdone by those reaping the shekels in this golden age of radio, the line-man has merged a new job with his former remote occupation of repairing clothes lines in backyards, says "The Sun," New York. For a small sum he repairs your radio aerial which may have downed during a storm. "In some blocks I make more money fixing aerials than repairing washlines," he said. "The work is simple compared to climbing lines poles, and much safer. And you don't have to know a lot about science to fix the wires."

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.

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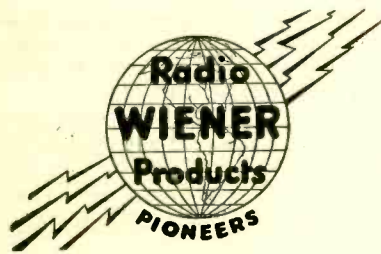
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To many anxious inquirers **RADIO WORLD** has no free list. One copy is sent as a voucher to each advertiser or advertising agent represented in current issues. All other copies are paid for on subscription or through the news trade.

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

Marconi Will Experiment with American Material

WHEN Senatore Guglielmo Marconi sailed from New York on his radio-equipped yacht, "Elettra," he took with him much American wireless material to be used largely in telephony. Among this material were some of the new electron tubes, called radiotrons in this country, which have been developed at the General Electric Company by Dr. Irving Langmuir for use in both wireless telegraphy and telephony. The new tubes are of 20 kilowatts. One-kilowatt tubes have been used by Marconi on the "Elettra," and the four-kilowatt tubes in some of his experiments on land. Senatore Marconi also took a wireless telephone set and amplifier, to be used for the reception of broadcast programs.

While he was in this country, Marconi gathered the opinions of American radio engineers as to how he could further his experiments with short-wave telephony, and that will be the first scientific problem he will undertake when he arrives in Europe. Some of his men are now out on the vessel, "Pharos," conducting experiments on short-wave telephony, and it is probable that Senatore Marconi will join them. He has already talked about ninety-nine miles over land by use of his short-wave system.

Governmental Committee Submits Schedules

THE recently organized interdepartmental committee has advised Secretary Hoover regarding the priority of government material to be broadcast and has submitted schedules of operation.

The committee recognizes that radio must be used primarily for types of service that cannot be as satisfactorily conducted by other means of communication, and, therefore, radio broadcasting should not be used in general where wire telegraphy, or telephony, or printed publication would be as satisfactory. The scope of the Committee's activities may be extended in an advisory capacity to the Secretary of Commerce in matters of government radio-regulation and considering all radio questions of interdepartmental interest.

Eight existing governmental stations designated as primary stations for the transmission of daily news and information include Naval stations at Arlington and Great Lakes, Post Office stations at Washington, Omaha, North Platte, Rock Springs, Elko, and Reno. The material sent out may be rebroadcasted by other stations licensed as "limited commercial."

Radio in Apartments

So keen is the desire of the engineers of the various manufacturing companies to simplify the operation of the receiving sets, that it is quite likely that many of the apartment houses now building in New York City will have both aerial and current source installed, making it necessary merely to press a button or turn a switch to get the concerts. Even phonograph operation will seem hard compared to this.

RADIO WORLD

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

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FRED S. CLARK, Manager, 1493 Broadway, New York.

ASSOCIATE EDITORS:

Robert Mackay Fred. Chas. Ehlert

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Entered as second-class matter, March 28, 1923, 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.

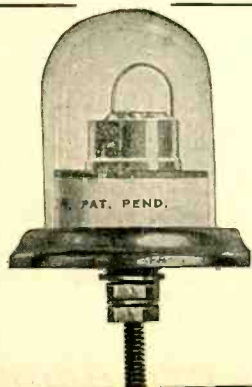
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NO product of electrical manufacturers has ever taken the world so by storm as has the radiotelephone receiving-set, according to a statement made by the Electrical Division of the United States Department of Commerce. All over the globe broadcasting stations are daily disseminating news, music and commercial information to many thousands of radio enthusiasts.

Outside of a few countries where existing political conditions have imposed restrictions, the use of radio is being taken up universally. The development has been most rapid in this country. In Europe, South America, Australasia, and, to some extent, in Africa and Asia, broadcasting stations are being installed, with a resultant increasing demand for receiving sets.

Notwithstanding an enormously increased manufacturing capacity, makers of radio equipment are still behind on their domestic orders, and this, naturally, has limited their interest in export trade. Nevertheless, the total value of wireless equipment shipped abroad during the first five months of this year is more than 60 per cent. of the total for the calendar year, 1921, and the inquiries from abroad have increased considerably. As productive capacity here catches up with the domestic demand, a strong export trade may be expected.

Due to the volume and the variety of the home demand, American manufacturers have developed simple, compact, efficient, reliable, and economically priced receiving sets, which should take well abroad. As an indication of the interest shown by foreign buyers, one manufacturer reported a few days ago that, as a result of circulars recently sent to a number of London electrical importers, he had already received two inquiries by cable.

As an interesting feature of the sales abroad, for several months there has been a considerable call for receiving sets from our neighbors on the north and south—Canada, Cuba, Mexico and Central America—where radio "fans" found that tube sets would permit them to readily listen in on some of the important American broadcasting service.

No Interest in Stocks Until Quotations Were Broadcast

TORONTO, Canada.—Simons, Agnew & Co., Toronto, members of the Standard Stock Exchange of this city are now regularly broadcasting the Canadian mining-share market to their correspondents throughout Ontario, at intervals of one hour. The plan, it is said, is productive of a large increase in business on the Toronto Board. While activity at the hundreds of Ontario mines this year has been more marked than ever before, the public appeared to take no interest in the stocks of the

various companies until the broadcasting of quotations was inaugurated. From a volume of a few thousand shares a day on the local exchange, two weeks ago, transactions have rapidly increased until half-a-million share days are now the regular order. A remarkable feature of the innovation is that it has brought a vast amount of business to the exchange from the mining regions, most camps now being equipped with at least one receiving set. Many of the mines are located hundreds of miles from Toronto and at isolated points long distances from railroads and telegraph offices.

Cleveland's Next Show

THE success of radio expositions held in New York, Chicago, Detroit and other large cities have proved to the manufacturer, distributor, and dealer in radio equipment the benefits to be derived by exhibiting and demonstrating their products, and educating the public in the rapid strides this industry is making. Cleveland is the next large center to fall in line—a huge display is being organized to be held in the Cleveland Public Hall, August 26 to September 4, inclusive.

Prizes will be awarded to students in both grade and high schools for the best homemade radio-receiving sets displayed. The technical schools of Cleveland will be represented, and there will be feature exhibits and demonstrations which will give the public a liberal education in radio and its branches. No rental charge is being made for the display space and firms wishing to exhibit are being allotted their space in the order in which applications are received.

Pittsburgh's Radio Day

THE Radio Engineering Society of Pittsburgh held its monthly meeting last week at Hotel Henry, Pittsburgh. Dr. Omar T. Cruikshank, president, and a large number of members were present. The discussion centered about the coming big radio event known as "Pittsburgh's Radio Day." This event will be held in West View Park, August 24th. The attendance will not be limited to club members. All radio enthusiasts are invited. There will be a large number of radio demonstrations and exhibitions of radio apparatus. Various radio novelties will be donated and everybody will be given a chance to take home a radio-set by winning some of the prize athletic and aquatic events. A radio dance will be a special feature.

Radio Dealers' Directory

Realizing the great need of a reliable directory of radio dealers throughout the country, Sydel's Radio Directory and Service, 555A Schenck Avenue, Brooklyn, New York, is now offering such a list to the radio trade. It is arranged in card-catalogue form and is annotated to indicate exact class, as "Exclusive," etc.

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

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.)

Dickinson Electric & Mfg. Co., 114 South Race St., Urbana, Ill. Mr. H. C. Dickinson writes: "We are incorporating for \$100,000 and are manufacturing a first-class line of parts and sets, including wooden and moulded variometers and variocouplers, radio and audio-frequency transformers, variable and fixed condensers, standard binding posts, short and long wave, one and three-circuit regenerative receiving-sets, one and two-stage amplifiers, and other miscellaneous parts."

Gearhart's Pharmacy, Hopkington, Iowa. Radio sets and supplies. N. A. Gearhart, manager.

Driscoll Mfg. Co., Brooklyn, to deal in auto accessories and radio products, \$50,000; J. F. Driscoll, L. M. Baer, A. Levy. (Attorneys, Goodman & Werner, 51 Chambers St., N. Y.)

Racony Corp., Manhattan, deal in radio appliances, \$20,000; N. Roznikoff, F. Lewin, A. L. Hecht. (Attorneys, S. Rubin, 120 Broadway, N. Y.)

Hennessy Radio Publications Corp., Manhattan, \$100,000; R. B. and M. B. Hennessy, F. S. Clark. (Attorney, A. Dreyer, 1482 Broadway, N. Y.)

Wiener Wireless Specialty Co., Newark, wireless enterprise, \$100,000; Nettie J. Wiener, Louis Lefkowitz, Louis Wiener, Newark, N. J.

Standard Wireless Corporation, Hempstead, Nassau County, \$10,000; H. Lindquit, A. H. Buck, F. D. Burroughs. (Attorneys, Edwards & George, Freeport, Long Island, N. Y.)

Mortimer Radio Corp., Manhattan, \$50,000; M. L. Newman, L. Levy, A. Birnbaum. (Attorneys, Price Bros., 261 Broadway, N. Y.)

United Electrical Supply Co., Newark, \$125,000; Isadore Siegel, William Gross, Henry Siegel, Newark, N. J.

Williams Battery Co., deal in batteries, electrical machinery, \$3,000,000; A. H. Williams, T. J. Town, J. H. Phillips, Philadelphia, Pa. (Attorney, Capital Trust Co. of Delaware.)

Orpheum Radio Stores, Manhattan, \$100,000; D. B. Beckett, H. A. Irmiler. (Attorney, R. J. Reilly, 41 Park Row, N. Y.)

Redoradpark Corporation of America, to manufacture phonographs, \$500,000, Wilmington, Del. (Attorney, Colonial Charter Co.)

Wright Radio Corporation, Manhattan, \$10,000; T. M. Smith, C. W. Irwin, J. A. Delany. (Attorney, G. P. Breckenridge, 7 Dey St., N. Y.)

Getting in the Home

Another interesting feature of the rise of radio as reflected in the programs broadcast, is the large number of stations which now carry regular programs designed for women at home and those interested in matters domestic as well as material of interest to small children, such as Bedtime Stories and Animal Tales. What more promising sign of the permanent arrival of radio as a feature in our national life could be found than this widespread movement of "start them in young?"

New Radio Firms! Send Radio World Your Name and Address

HOMCHARGE YOUR BATTERY for A Nickel

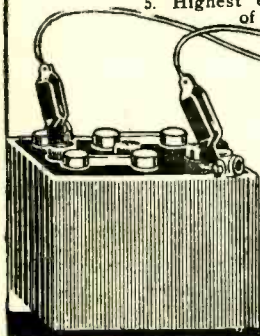
No mess, trouble, dirt—no moving of batteries—loss of time—no effort on your part—no technical or professional knowledge needed.

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 Chief Feature of County Fair

RADIO will be the principal attraction at the Steele County Fair, Owatonna, Minnesota. A radio school, even, will be established. L. F. Klima, of the board of directors of the fair, has issued the following in regard to the radio exhibit:

The directors of the Steele County Fair saw in radio a wonderful opportunity to entertain and educate the patrons of their fair.

It is fortunate that there is located here in Owatonna, a large company of broad-gauged men who are manufacturing complete radio-receiving and broadcasting sets and parts.

No county fair could afford to pay what it would cost to put on a radio show such as will be put on at this year's fair.

It was through the public spirit of these men that this great educational feature of the 1922 fair will be made possible.

The Fonce Radio company is the name of this new company who has made arrangements with the fair board to furnish all the radio apparatus for the radio building on the fair grounds.

The plans are to reduce the number of side shows on the pike, to reduce the number of kewpie-doll stands and to devote a larger part of the fair to education.

There will be a large building or tent in the center of the grounds which will house this free radio school and show.

There will be lecturers on hand to tell anyone how to build his own radio set.

There will be a hundred or more seats with a head receiving set at each one.

The patrons of the fair can go into this building any time, sit down and rest and while resting can "listen in" to anything that is being received.

There will be a bulletin board outside so that you can see what is being received and where it is coming from.

This entire radio show and school is free to anyone. There will be no collections taken up and there will be nothing to sell.

Fifty-Six Dailies Broadcast News

THE report of the recent meeting of the New York Associated Dailies at Kaaterskill, N. Y., that it was almost the unanimous sentiment "that radio has not as yet reached a point at which it is of advantage, and that most newspapers are going too far in devoting extensive space to it," is challenged by many.

The basis of such opinion is hard for radio experts to understand, as there are operating, to-day, fifty-six broadcasting stations owned by newspapers, three of which are in New York State.

No one can estimate the number of papers running radio departments correctly; but it is safe to say that, practically, two out of every three large dailies are doing so, and in some cities all papers carry considerable radio news, subscribing to several general and technical services.

That it pays, is obvious by a glance at the advertisements, and an appreciation of the keenness of the competition, in such cities as Detroit, Atlanta, Salt Lake, and New Orleans, where, practically, all dailies vie with each other for both news space and broadcasting excellence.

To date, none of the fifty-six broadcasting dailies has cancelled its license, and new papers are taking out licenses at the rate of about two a week.

In Washington, D. C., all five daily papers use radio news services, giving a column or more of space; and one newspaper is cooperating with a local broadcasting station.

All Live Things Produce Electricity

TO know whether an egg is alive (impregnated) or not, send a strong (electric) shock through it; if it produces an electric response it is alive, writes Professor R. S. Harris in the "Scientific Monthly." Not only has Waller used the electric response as a sign of life, he has also made it a quantitative measure of the degree of vitality. He selected a number of seeds of Phaseolus from one to five years old and tested one of each age for the production of electric current. The responses in fractions of a volt were for five years, respectively—0.0170; 0.0052; 0.0043; 0.0036 and 0.0014—a very remarkable demonstration of the statistical aspect of livingness. The older the seed the less the response; it is what one would have supposed, but it could not be taken for granted. These seeds were dry, they were to all intents and purposes dead; they were lying in a pill-box doing nothing vital, but they were not dead, they were in latent life; they could germinate and they could produce electric current.

NOVO "B" BATTERIES FOR RADIO

22½-45 & 105 VOLTS

NOISELESS DEPENDABLE GUARANTEED

ASK YOUR DEALER

NOVO MANUFACTURING CO.
 424-438 W. 33RD ST.
 NEW YORK

531 SO. DEARBORN ST. CHICAGO.

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.	



HERE THEY ARE!

EBY

BINDING POSTS

See them at your dealers.



Corporal

Ensign "H"

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

BUY "RITE"

- Kloster Rheostats\$1.00
- U. V. 200 Detectors.....\$4.50
- U. V. 201 Amplifiers.....\$5.90
- 4-Inch Electrode Dial.....\$1.25
- Radiocite Tested Crystals—
- "Rite" Detector Unit.....\$5.50
- "Rite" Amplifier Unit.....\$11.95
- Ducons (No aerial).....\$1.50

Postage Paid.

Wholesale and Retail.
Dealers—Write for Discounts.

Specialty Service Co.

Corner 4th Avenue and Pacific Street
BROOKLYN, N. Y.

KNOCKED-DOWN VARIABLE CONDENSER
MONEY-SAVING PRICES

An accurately made, fully efficient instrument that cannot get out of order or adjustment. Fully guaranteed. Extra heavy aluminum plates. Condensate end pieces. All other parts heavily nickel-plated. Knob and pointer included. Furnished assembled or knocked-down at the following low prices. Easily assembled by anyone following instructions furnished. Save money—order from us. Folder upon request.



No. of Plates	M.F.D. Capacity	Assembled	Knocked-down
3	.00007	\$1.75	\$1.50
11	.00025	\$2.50	\$2.00
21	.0005	\$3.25	\$2.50
43	.001	\$3.90	\$2.90

Lott's Better Radio Condenser Co.
473 ORANGE STREET NEWARK, N. J.

Radio World, 52 issues, \$6.00.

Radio Development in South Africa

VARIOUS wireless-telegraph schemes are now occupying the attention of the Government of the Union of South Africa. Trade Commissioner Stevenson has informed the United States Department of Commerce, that the British Imperial Government has a scheme of connecting Great Britain and South Africa by a series of short range stations via Cairo and Nairobi, which will involve the expenditure on the part of the Union Government for its station of approximately £180,000. Under this scheme the range of the South African station is to be between 2,000 and 2,500 miles.

The possibility of utilizing radio telephony in remote parts of South Africa, and the sections otherwise difficult of access, has been engaging the attention of the post-office authorities. Two suitable Marconi sets were purchased in England, and various trials and tests made in Swaziland and other remote parts of South Africa, as well as between Cape Town and Touws River, in the Cape Province, a distant of 160 miles, by the local representative of the Marconi Company. While these trials proved very satisfactory, so far as the range and efficiency of operation under favorable atmospheric conditions were concerned, the post-office authorities express some doubt as to the commercial practicability of the method, particularly in a sparsely settled country like South Africa, where the amount of traffic between the outlying districts would not be sufficient to guarantee the cost of the installations. A source of power is also necessary, and if, as would normally be the case in an outlying district, a gasoline engine and generator would supply the necessary power, the running costs would be considerable as compared with communication by land lines.

In view of the great development of the wireless telephone in the United States, particularly by amateurs, considerable publicity has been given to the subject in South Africa. A radio society was recently formed in Cape Town.

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.

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

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. . . \$3.00
 - 650 Radio Supply Jobbers in the U. S. . . 5.00
 - 4,500 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.

PATENT

Your Radio Ideas.
Call or Write
FREE ADVICE



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.

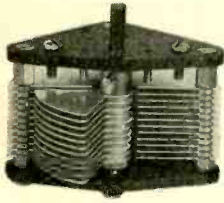
CINCINNATI, OHIO

My Wireless

WHAT brings the sunshine to my room,
Chasing far the shades of gloom
And makes the day pass all too soon—
My Wireless!
I hear the news from far-off shore
Of busy mart—the base-ball score

And list to songs I sung of yore
By Wireless!
With song and story I'm beguiled,
And go to sleep like a happy child
To dream an Angel passed and smiled
On Me and Wireless!

Radio Broadcasting News.



PIONEER "WONDER BRAND" VARIABLE CONDENSERS

23 Plate, .0005 Tested, \$1.00

FRENCH BRUNET HEADSETS



New York Mail Certificate of Excellence.
Price, \$8.00

Either of the above two articles sent upon receipt of price.
Money refunded within 10 days if not satisfactory.

Interesting Discounts to Dealers

PIONEER RADIO PRODUCTS CO.

329 EAST 29th STREET

NEW YORK CITY

THERE IS MONEY IN THE AIR

"RADIO CURRENCY" IS AN ELECTRICAL COMMUNICATION THAT IS CASHING IN DIVIDENDS.

RADIO AS A NEW INDUSTRY GIVES PLENTY OF SPACE FOR MAKING WEALTH. Its popularity is sweeping the country and is spreading throughout the World like wildfire.

NORRIS RADIO CORPORATION, ESTABLISHED SINCE 1913 AS THE NORRIS ELECTRIC SPECIALTIES CO., having among its customers U. S. Government, Western Electric, General Electric, Penna. R. R., New York Central, Interborough, B. R. T., Radio Supply Co. of Calif., is a medium by which you can plant your seed for unlimited possibilities.

RADIO, THE EIGHTH WONDER OF THE AGE, BECKONS TO YOU, like the telephone, telegraph, automobile, motion picture and phonograph industries did years back. Norris Radio Corporation is expanding. Together with its patents, one of which appears on page 30, the corporation is coming out with a new type of radio set which is a sensation.

TAKE IMMEDIATE ADVANTAGE OF THIS OPPORTUNITY
FOR ANY INFORMATION WRITE OUR SECRETARY

NORRIS RADIO CORPORATION

126 Liberty Street, New York

WRITE PLAINLY

To NORRIS RADIO CORPORATION,
126 Liberty Street, New York City, N. Y.
I would appreciate information on Norris Co-operative plans, also copy of "Out of the Air."
Name
Address
City State
Occupation

The company's shares are being offered at \$15.00 per unit, consisting of one share 8% Preferred and one share of Common, \$10.00 par value on each. Rapid advance in price on the units is predicted.

Radio Trade Directory

National CARD CATALOG of
Radio Dealers, Distributors,
Jobbers, Indicating Class as
Exclusive, Wholesale, etc.

Compiled from Information Secured from
Chambers of Commerce, Manufacturers, etc.

Circular and Sample Cards upon Request.

SYDELL'S RADIO DIRECTORY
AND SERVICE

555A Schenck Avenue Brooklyn, N. Y.

Coming Events

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

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

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

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

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

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

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

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

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

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

COIN MONEY MAKING RADIO SETS AND PARTS

RAD-I-CO COIL WINDING LATHE,
Complete, Delivered, \$5.00

SPECIFICATIONS:

This is a real manufacturing machine for quantity and quality production of variometers, variocouplers and any coil or wire winding proposition used in radio.

It has a 7-in. swing, 20-in. between centers with adjustable tail stock. Two tube and rotor chucks adjustable to any size from 1 in. to 7 in. inclusive. Automatic wire spool holder and feeder (insuring tight even windings). It will accommodate tubes, rotors or stators up to 7 in. diameter and up to 20 in. long.

Furnished for hand or power drive.
Strong, accurate and rigidly built of all malleable and wrought iron. Highly enameled finish. Practical for manufacture as well as amateur. Guaranteed to satisfy, shipped on trial, terms cash with order.

RAD-I-CO DIAL AND KNOB MOULDING MACHINE, Complete, Delivered, \$5.00

SPECIFICATIONS

This machine will completely make, graduate and number 20 dials and knobs per hour from Radio dielectric compound like Bakelite at a total cost of less than 15c per dial and knob. Furnished for either 3/16" or 1/4" shafts, 50 or 100 degree graduations. In 2 1/2, 3, 3 1/2 and 4 inch sizes like Tuska style with large tapered knob. A quantity of dielectric compound furnished with each mould gratis.

RAD-I-CO DIELECTRIC COMPOUND
ENOUGH FOR 6 DIALS AND KNOBS,
\$1.00 PER PACKAGE

RAD-I-CO VACUUM TUBE SOCKET
MOULDS (Base or Panel Mounting),
Complete, Delivered, \$5.00

(Rad-I-Co Moulded Sockets Cost Less Than 15c Each)

RAD-I-CO VARIOMETER AND VARIOCOUPLER ROTOR OR STATOR
MOULDS, Complete, Delivered, \$5.00 Each
(REMLER OR TUSKA TYPE)

All items guaranteed to satisfy, immediate deliveries, full instructions, terms cash with order.

RADIO INSTRUMENT CO.
YORK, PA.

(exclusive makers of Rad-I-Co
Patents Pending Products)

A Weather Man Explains "Static"

(From an Interview with Eric R. Müller, Meteorologist, United States Weather Bureau, Madison, Wisconsin.)

THE average man is unaware that there is such a thing as atmospheric electricity, except when it thunders. The work of the radio operator is interfered with continually by sounds of snapping, crackling and grinding in his head-phones. These signal the arrival of stray waves from more or less distant thunderstorms.

The generation of electricity in thunderstorms has been explained by G. C. Simpson of the Weather Bureau of India. He found by experiment that when drops of water fall through a vertical blast of air that the breaking of the drops into spray is accompanied by the production of positive and negative electricity, and that the drops are left with a positive charge.

A strong upward current of air is one of the most conspicuous features of the thunderstorm. It is always evident in the turbulent cauliflower-shaped heads of the cumulus cloud from which thunderstorms grow. Besides, strong upward currents are necessary for the formation of hail, which so often accompanies thunderstorms, since the freezing raindrops and growing hail must be carried repeatedly to the cold that is found only at high altitudes. In the turmoil of a thunderstorm raindrops may be forced through the cycle of union, division, of coalescence and disruption many times, with the formation at each disruption of a correspondingly increased electrical charge.

Hence, one started, the electricity of a thunderstorm grows to a considerable maximum. If this theory is correct, and it seems well founded, it must follow that the one essential to the formation of the giant cumulus cloud, namely, the rapid uprush of moist air, is also the one essential to the generation of the electricity of thunderstorms. This is the reason that lightning seldom occurs except in connection with a cumulous cloud. It is simply because the electrifying process of splashing is vigorously active in this cloud and nearly absent in all others.

The use of a coil antenna will enable any radio receiving outfit to locate approaching thunderstorms and to forecast their time of arrival quite accurately when within twenty or thirty miles. The coil antenna gives the strongest effect for waves approaching in the plane of the coil, least along the axis of the coil. The vertical coil must be arranged to turn through a semi-circular horizontal arc. In experiments at Hampton Roads, Virginia, the average wave length on which the best results were obtained was 900 meters. The average intensity of static or thunderstorm days exceeded the average static on no thunderstorm days by 36 per cent., but the difference was much greater as the storm approached.

An
Important Radio Subject
Treated by an Expert
Using Radio Frequency to
Extend Range

By GEORGE W. MAY, R. E.

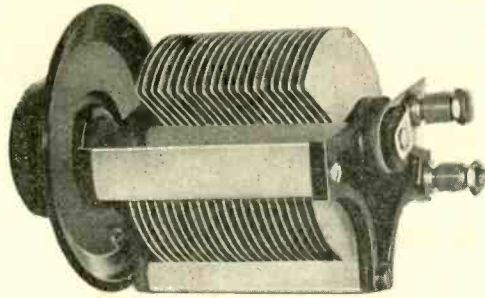
In the Next Issue of

RADIO WORLD

Saturday, August 5, 1922

The Bayley Variable Condenser

THOROUGHLY INSULATED



3-inch Dial and Knob for 1/4 shaft with recessed White Enameled Degrees on black ground75c

\$4.50

Packed in Strong Box.
Complete with Full
Instructions.

Money Back Guarantee

If returned in same condition as when received within 10 days.

The Bayley Variable Condenser is of good and pleasing design and high class workmanship. Steel Spindle with long bearing insures true running without any side lash. The 43 plates are spaced close, giving the finest tuning qualities. PLATES ARE ASSEMBLED AS A SOLID INTEGRAL PART OF THE WHOLE, BY THE DIE CAST PROCESS. IMPOSSIBLE FOR ANY PLATES TO LOOSEN IN SERVICE. Binding Post drilled with screw and lash nut also with soldering point attached. May be hooked-up three ways.

A metal spring under dial for ground wire to cut out body static from condenser. A 3-inch Dial and Knob with recessed white enameled degrees on black ground. Also a diagram label to place on board, showing where to drill holes for spindle and screws, insuring perfect registration with condenser, without measuring or marring the board.

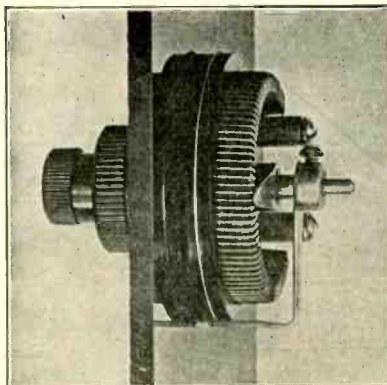
To Jobbers and Dealers We Offer a Splendid Proposition.

Write for Particulars.

BAYLEY CONDENSER CO.
105-109 VANDERVEER ST. BROOKLYN, N. Y.

Improved Vernier Rheostat

An absolute necessity in the new Armstrong
Regenerative and in Radio Frequency
Amplification



VERNIER

With Dial \$2.00

Without Dial \$1.50

REGULAR

With Dial \$1.50

Without Dial \$1.00

We are the only manufacturers
selling a regular rheostat with dial
for \$1.50.

MAXIMUM DISCOUNT TO DEALERS

THE TECO RADIO CO.

P. O. Box 3362, Boston, Mass.

Factory: 165 High St., Waltham, Mass.

Rocky Mountain Crystals

BETTER THAN GALENA
 The most sensitive mineral rectifier known. Can also be used with one or more stages of amplification.
 Mounted, 35c.; Unmounted, 20c.; Postpaid
 Manufacturers, Jobbers, Dealers, Clubs,
 Apply for Special Trade Prices
Rocky Mountain Radio Products, Inc.
 9 CHURCH ST., NEW YORK, N. Y.

"Vox Humana"

The Receiver with the Living Voice
 Write for Free Catalog.
 Good territory open for live distributors.
The Radio Guild, Inc.
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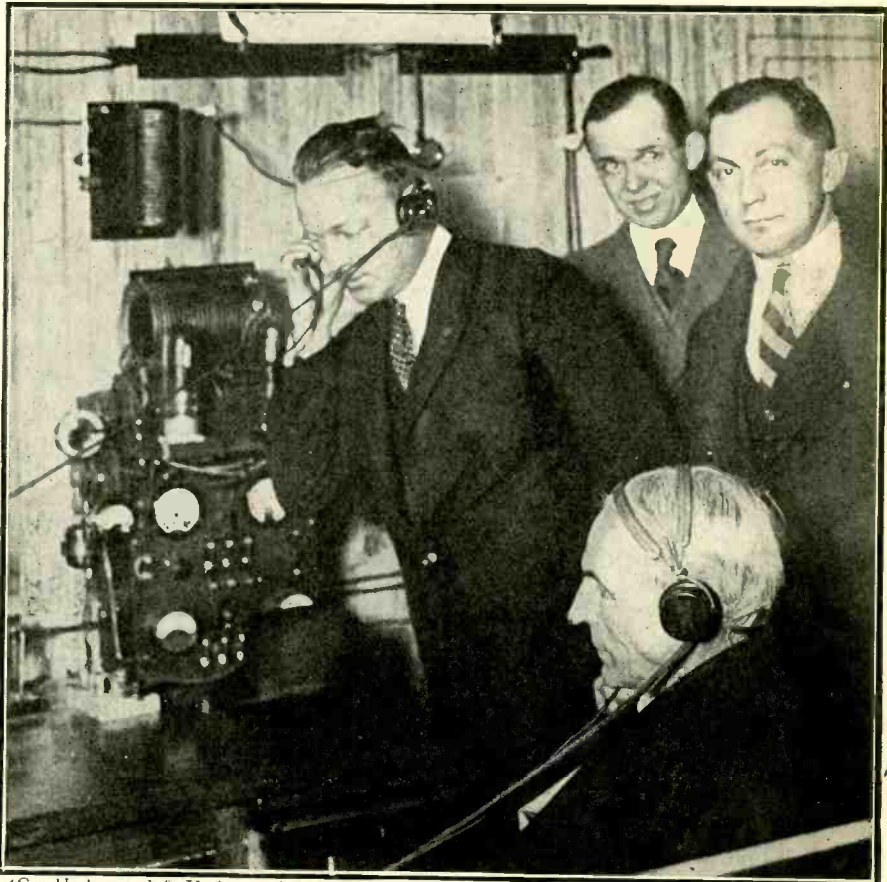
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Henry Ford Says it's "Fine"



(C. Underwood & Underwood.)

Henry Ford—here he is in the right-hand lower corner with head-phones on—has become one of the most ardent radio fans. He seldom misses a chance to listen in. "Fine!" he said after he had heard some information he was seeking come to him from the ether.

75,000 to 100,000 New York City Apartments Equipped With Radio

ALMOST every apartment house on the East Side (New York) as well as the West Side has one or several radio antennae stretching from a chimney to a water tank, or from pole to pole erected at the ends of the roof, while many just drop an insulated wire out of the window, keeping it free from the brick or stone surface of the building, says *The Times*, New York.

While the many wires seem to tell the story of radio installation in the majority of apartments in Manhattan, they only serve as the introduction to a most interesting tale of the advance of radio.

The great difficulty radio has experienced in entering the New York apartments has been in finding a way to satisfy the landlords who objected to the erection of wires on the roofs of the buildings.

Thus necessity to please the apartment owners has brought into use several indoor antenna systems in the form of loop antennae, and in many cases merely a single wire extended around the room or down the hallway, even concealed behind the molding. Another new and popular indoor antenna system is the use of a little plug which, when placed in the electric light socket, permits the use of the house lighting system as a means of absorbing the radio waves.

The improvements which have been made in radio amplification during the past few years, and the use of the indoor antenna, have made possible the pleasure of enjoying radio concerts in city apartments equal to the entertainment radio has afforded in the homes where the landlord "had nothing to say."

Radio has grown so rapidly during the past year that it is impossible to determine the exact number of apartments in New York City equipped with radio receiving sets; however, a fair estimate for the present day would be 75,000 to 100,000.

Plans being made for apartment houses to be built within the next few years provide radio equipment for each apartment. There will be a central receiving station connected with the apartment and in charge of an experienced radio operator, quite similar to the switchboard operators in the apartment hotels.

Radio Will Help Music

THE radio broadcasting station can be the biggest asset that the music publishers can have if they will learn to take best advantage of it. They should send copies of new songs to the broadcasting stations, gratis, with the request that they be turned over to a good musician to be played for the benefit of the radiophone audiences. If the music strikes the popular fancy, the radio "listeners in" will be first to purchase it. Anything that makes a hit with the radio audience is a long way on the road to success. As a matter of fact, members of the Music Chamber of Commerce should consider it a great opportunity to have their wares brought to the attention of the public in this effective manner. When they get this service for nothing they do not appreciate it. If they had to pay for it, they would all clamor for it.—*The Evening Mail Radio Review.*

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

New System for Learning Code

HERE has been developed a novel system for memorizing the various combinations of dots and dashes which make up code. It is the product of a Scotch radio engineer by the name of F. MacBeth, who spent considerable time while in the Orient working it out in detail. It is based upon the well known lines of memory words, or mnemonics says "The Tribune," New York.

The novelty of the system lies in the fact that he has worked out six letters as the basic combination of all the others, and when combining them to form the other letters, they actually make a word which is easy to remember.

The letters B and D will amply illustrate this system. For instance, the letters N, E and I are three of the basic combinations. In making B he takes the letters N and I, which together equal the dots and dashes of B. The memory word in this case is nib. Similarly in the case of the letter D. The two combinations in this case are N and E. For the purposes of memorizing, N and E are combined with D and form the memory word ned. This system is followed throughout.

This novel system undoubtedly offers a short path for the novice to tread in memorizing the dots and dashes of the code for each letter. It does not give him the necessary speed to read what the wireless telegraph stations are saying. That comes alone with constant practice.

About Receivers

WHAT seems to confuse the radio enthusiast is the kind of receiver he should buy. To-day there are two types of sets on the market commonly known as the crystal set and the set that employs the vacuum tube. Both of these receivers will respond to spark and telephone signals, but with the better class of receivers made to-day, tuning is so sharp that the undesired spark stations may be eliminated. The present market has quite a number of crystal receivers, which are simple to adjust. These sets will bring in the music only for short distance, as this receiver is of the non-regenerative type. The tube, or regenerative-type receiver, is one which employs the vacuum tube and tends to bring in the signals much louder having the advantage of employing one or two stages of amplification with the marked advantage of employing a loud speaker.

How the Current Flows

THE current which flows through a telephone receiver is a direct, pulsating current, corresponding to the group pulsations of audio-frequency. It isn't, in actuality, strictly direct current, but a uni-directional current of a pulsating character. The vacuum tube, as a rectifier, does not rectify absolutely 100 per cent. and consequently there is an alternating current flow in the plate circuit back to the grid circuit, and the bridging condenser assists the flow of this current, which aids in amplifying.

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.

Helps for You

Technical Articles That Appeared in Radio World Since Its First Issue

- APRIL 1.
A 500-Mile Radiophone Employing a 5-Watt Tube, by Frank A. Hahnel.
"Tell Me, Please, How Will This Set Receive?" by E. L. Bragdon.
Short Cuts in Receiver-Circuit Design, by O. C. Roos.
Making a Short-Wave Regenerator, by Fred. Chas. Ehlert.
- APRIL 8.
Do You Know Your Receiving Equipment, by James D. Gordon.
Why a Crystal Is Called a Rectifier, by Walter Emmett.
Is Radiotelephony Dependable? by O. C. Roos.
Mounting Crystals in Your Detector, by E. L. Bragdon.
Storage Batteries for Radio, by Fred. Chas. Ehlert.
- APRIL 15.
First Principles of Electricity as Applied to Radio, by John P. Miles.
Your Storage Battery, by E. L. Bragdon.
What Makes Radio Possible, by Edward Linwood.
Ground Connection as Vital as Antenna, by Fred. Chas. Ehlert.
- APRIL 22.
Solving the Puzzle of the Honeycomb, by Fred. Chas. Ehlert.
More About Your Storage Battery, by E. L. Bragdon.
Vacuum Tubes as Applied to Receivers, by Walter J. Howell.
How to Build the Loose Coupler and the Variometer, by Frederick J. Rumford.
The Best Aerial for a Receiving Station, by Edward Linwood.
- APRIL 29.
Valuable Pointers on Aerial Construction, by Edward Linwood.
What is Meant by Tuning, by E. L. Bragdon.
Radio-Frequency Amplification and Regeneration, by Frank Armstrong.
Honey-Comb Coils and Condensers, by Edward Linwood.
Charging the Storage Battery, by E. L. Bragdon.
How to Construct the Variocoupler, by Frederick J. Rumford.
- MAY 6.
The Advantages of Radio Frequency, by Harold S. Potter.
How to Construct, Protect and Operate a Storage Battery, by George W. May.
The Beginner's Catechism, by Edward Linwood.
Tuning and What Is Meant by It, by Fred. Chas. Ehlert.
New Frequency Amplifier Brings Faintest Waves in Strong, by G. W. May.
- MAY 13.
My Practical V. T. Detector and Two Stage Amplifier, by Frederick J. Rumford.
The Principles of Radiotelegraphy, by Walter J. Howell.
The Reason for the Loop Aerial, by George W. May.
Tuning and What Is Meant By It, by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.
- MAY 20.
The Design of an Amateur Receiving Set, by C. White.
The B Battery and the Plate Current, by George W. May.
Radio Terms at a Glance, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Fire Undewriters' Rules, by Fred. Chas. Ehlert.
- MAY 27.
The Beginner's Catechism, by Edward Linwood.
How to Make Your Own Condenser, by George W. May.
Tuning as Applied to Telegraphy, by Walter J. Howell.
Why the Condenser Doesn't Condense, by E. L. Bragdon.
Making Signals Louder with Two-Stage Amplifier, by George W. May.
- JUNE 3.
The Cost of a Single-Circuit Receiver, by Howell W. Miller.
The Beginner's Catechism, by Edward Linwood.
How to Compute and Build a Fixed Condenser, by E. L. Bragdon.
Design for an Amateur's Receiving Set, by C. White.
Simple Method of Recharging a Storage Battery, by John Grayson.
- JUNE 10.
Radio Receiver for Short Waves, by George W. May.
How to Filter Atmospheric Conditions, by C. White.
- The Messenger Boys of Broadcasting, by E. L. Bragdon.
Are You a Member of the N. O. D. C.? by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.
How to Construct One- and Two-Slide Tuning Coils, by George W. May.
- JUNE 17.
The Vacuum Bulb's Start in Life, by C. White.
How to Select the Right Set, by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.
Test of Inductance Coils, by Fred. Chas. Ehlert.
Short Waves from a Simple Receiver, by Stanley Bryant.
- JUNE 24.
How to Make Your Radio Cabinets, by W. S. Standiford.
How the Crystal Detector Is Used to the Best Advantage, by C. J. Williams.
How to Construct a Long-Wave Regenerative Receiver, by George W. May.
Tested Invention of Major Armstrong Amplifies Set 100,000 Times, by John Kent.
Repairing Cracks in Hard-Rubber Storage Battery Jars, by W. S. Standiford.
The Beginner's Catechism, by Edward Linwood.
- JULY 1.
Novel Unit-Detector and Amplifier, by Frederick J. Rumford.
Why You Must Use a Condenser, by C. J. Williams.
How Wave Lengths Travel, by Fred. Chas. Ehlert.
Radio World's Revised Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Use of the Vacuum Tube Detector, by George W. May.
- JULY 8.
Radio's Place in the Phenomena of Nature, by E. L. Bragdon.
The Function of the Loose Coupler, by Charles H. Plath.
Armstrong's Superregenerative Amplifier Fully Explained, by John Kent.
Operating a Transatlantic Station, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Reducing Strays and Statics, by Fred. Chas. Ehlert.
- JULY 15.
Assembling a Detector and Two-Stage Amplifier, by H. S. Stanford.
Combined Radio and Audio Frequency Amplification, by C. White.
The Beginner's Catechism, by Edward Linwood.
Locating Your Aerial, by Harold Day.
Facts for Beginners, by Fred. Chas. Ehlert.
- JULY 22.
When Your "Movies" Come by Radio, by Stanley Bryant.
Underlying Principles of the Vacuum Tube, by George W. May.
Practical V-T Detector Panel, by Frederick J. Rumford.
Revised Radio Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Importance of Aerials to Radiation, by C. White.

Any single copy of Radio World, beginning with No. 1, mailed on receipt of 15 cents postpaid. Any seven issues for \$1.00. The full 17 numbers sent for \$2.50. Or send \$3.00 for 3 months (26 numbers) or \$6.00 for 1 year (52 numbers) and have your subscription start from No. 1. Radio World, 1493 Broadway, New York City, N. Y.

Don't Worry About Static

STATIC makes radio reception prohibitive only during thunderstorms; at certain other times it may be almost imperceptible if the receiving set be of the proper type for hot weather reception and capably manipulated. Dealers find that some of the public still look askance at radio as an attractor of lightning; this fallacy has been so thoroughly exploded that any fears predicated on it are more a matter of superstition than of reason.

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.)

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

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

CRYSTAL DETECTOR SET, from aerial to phones, complete. Big bargain. Send for circular. Salkey Radio Co., 2378 Eighth Ave., New York City.

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

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

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

EXPERIENCED RADIO SALESMAN wants to represent Radio Parts and Outfit manufacturers for the island of Cuba. Exclusive Territory. S. Cabello, 21 St. Nicolas St., Havana, Cuba.

ANTENNA WIRE, 7 strand 22 tinned, \$0.90 per 100 ft.; Tested Galena, \$0.20; mounted, \$0.30; 23 plate condensers, \$3.00; Nickel plated contact points with nuts, \$0.30 doz.; Crystal detectors, panel mounting, \$0.60; Manhattan Head phones, complete, \$6.00. Postage prepaid to second zone. Write for prices on parts not listed. Columbia Radio Co., P. O. Box 1720, Washington, D. C.

Radio Flash Outspeeds Editorial Pen

IN a small town in the Middle West, there are two weekly newspapers, both of which publish on Friday. There is considerable rivalry between them, and the editors are continually at penpoints with each other. Recently, one of the papers ran a "lead" stating that its news was more newsy than its opponents. Immediately, the second editor began working on a plan to outdo his rival, and hit upon the following!

VENTRILOQUISM taught almost anyone at home. Small cost. Send 2c. stamp today for particulars and proof. Geo. W. Smith, Room M-642, 125 N. Jefferson Ave., Peoria, Ill.

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.

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RADIO MANUAL—Everything the beginner should know. How to build and operate an inexpensive receiving set. Sixty-four pages, thirty illustrations. Twenty cents. Post paid. **RAYDIO PUBLISHING COMPANY, CAXTON BUILDING, CLEVELAND, OHIO.**

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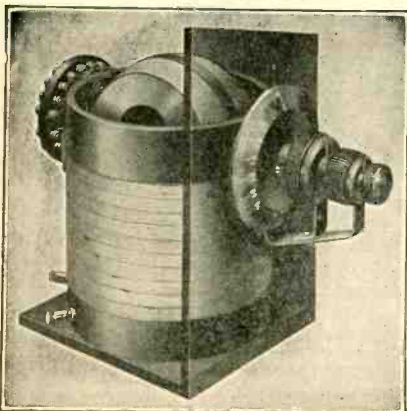
SALESMEN—To call on Radio Dealers. Splendid opportunity. Liberal commission. Write **EDW. J. GOETZ CO.**, Distributors, Cambridge Bldg., Cincinnati, Ohio.

THAT ARMSTRONG AMPLIFIER Illustrations and reading matter about the much-discussed amplifier devised by Major Edwin H. Armstrong appeared in three issues of RADIO WORLD—June 24, July 8, 15 and 22. These copies will be sent on receipt of 15 cents each, or the 4 copies for 60 cents. Or, better still, subscribe and have your subscription start with RADIO WORLD of June 24 and get all these issues. **RADIO WORLD**, 1493 Broadway, New York City.

FIRST 17 NUMBERS OF RADIO WORLD from April 1 to date will be mailed, postpaid, on receipt of \$2.50. Or send us \$3.00 for 6 months (26 numbers) or \$6.00 for year (52 numbers), and we will start subscription with first issue. **RADIO WORLD**, 1493 Broadway, New York City.

He wrote a friend in a nearby city, who had a radio receiving-set installed in his office, and astounded his native town, as well as his rival editor, by printing the last-minute news, even before the big-city papers came to town. Finally, his method was discovered. He had his friend buy the late papers in the big city, read the important last-minute news into his radio sending apparatus, which broadcast the items so that the editor, with his radio receiving-set could hear the radiophone messages and write copy simultaneously!

An Epoch-Making Advance in Vario-Couplers



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

The New Norris "Selector"

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

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

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

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126 Liberty Street, New York City

PATENTS

Protect your invention today. Write for 1922 Illustrated Book Free. Radio, Electrical, Chemical and Mechanical experts. Over 30 years' experience. A. M. Wilson, Inc., 310-18 Victor Building, Washington, D. C. (Successors to business established 1891 by A. M. Wilson.)

CORONA, Sr. Receiver in cabinet, Eighteen Dollars. Frank Einsel, Struthers, Ohio.

BARGAINS IN USED APPARATUS—Ame Amplifier Unit, new, \$10.00. Two Slider type couplers, \$4.75 each. Saco Clad amplifying transformer, \$3.85. Remler control panel, \$7.00. Large navy type coupler, \$9.00. Audion control panel for tubular detector, \$9.00, cost \$30.00. Lee Brothers Company, Champaign, Ill.

VACUUM TUBE DETECTOR SETS. Completely assembled and wired without tube, phones or batteries, \$15.00. Guaranteed. Demonstrated. R. Lukates, 910 East 216th St., New York City.

REGENERATIVE SET less tubes, batteries, phones. Consists 2 variometers, variocoupler, variable condenser, rheostat. Sell \$30.00. Ibelli, 312 Adams St., Brooklyn.

MOULDED DIALS, 50 cents each. Unbreakable, high grade. No junk. Lee Brothers Company, Champaign, Ill.

YOU CAN GET the first 17 numbers of RADIO WORLD for 15 cents a copy, or \$2.50 for the whole batch to date. Or subscribe and start subscription with first issue. **RADIO WORLD**, 1493 Broadway, New York City.

SEND 60 cents for four issues of RADIO WORLD containing articles and illustrations about Major Armstrong's remarkable amplifier. Or subscribe, and subscription will be started with first number containing Armstrong material.

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A New Radio Feat

AT a prize fight, held in Madison Square Garden, New York, recently, there were several men at work in the cellar of the main floor, during the fight. These men were very anxious to learn the outcome of the fistic battle. One of the men bethought himself of a friend, who, he knew, had a radio receiving-set, and he remembered that the fight was being broadcast from Newark.

So he telephoned his friend, who rigged up his set with a loud-speaking set near the mouthpiece of a telephone connected to the cellar of the Garden. The workmen, at the receiver of the telephone in the cellar, were able to learn the details of the fight above, within a few feet of the telephone. The complete circuit was as follows: the fight returns were sent from the Garden to Newark by land phone, broadcasted by radio from Newark, and returned to the cellar of the Garden by phone again!

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

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DL-25.. \$1.54 each	DL-300.. \$1.93 each
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DL-250.. 1.87 each	DL-1500.. 3.85 each

IDEAL VARIABLE CONDENSERS

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

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

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

Viking Radio Company

26 Cortlandt St. New York City
 453 Washington St. Boston, Mass.

All But Two States Now Broadcast

THE States of Kentucky and Mississippi went on the Department of Commerce's Broadcasting Map, last week, when stations in Louisville and Corinth were licensed. There are but two States, Delaware and Wyoming, left without broadcasting stations, every other State of the Union having one or more.

Eleven limited commercial stations licensed during week ending July 15, bring the total broadcasters to 406. Of the new stations, Nevada, District of Columbia, California, New Jersey, Georgia, Illinois, Kansas, Montana, and Wisconsin, besides Mississippi and Kentucky, opened one station each. The new stations are as follows:

- WHAO—F. A. Hill, Savannah, Ga.
- WHAP—Dewey L. Otto, Decatur, Ill.
- WHAN—Southwestern Radio Co., Wichita, Kansas.
- KFBB—F. A. Buttery & Co., Havre, Mont.
- WHAS—Courier Journal and Louisville Times, Louisville, Ky.
- WIAA—Waupaca Civic & Commerce Assn., Waupaca, Wis.
- WHAQ—Semmes Motor Co., Washington, D. C.

3000 OHM SETS, \$4.50

2000 OHM SETS, \$4.00
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 Plus 20c for Postage and Insurance
 Satisfaction Guaranteed or Money Back.



We will mail phones the day your order arrives. Every pair tested, matched, and guaranteed as sensitive as \$8 to \$10 phones. We have no agents or dealers. By ordering direct you save dealer's profits—circular free.

TOWER MFG. CO.
 11 STATION ST., BROOKLINE, MASS.

KFBD—Clarence V. Welch, Hanford, California.

WHAR—Paramount Radio & Elec. Co., Atlantic City, N. J.

KFAS—Reno Motor Supply Co., Reno, Nevada.

WHAU—Corinth Radio Supply Co., Corinth, Miss.

The call of the Galveston Tribune, assigned last week, is WIAC.

Wants to Buy Radio Sets Outright

Winston-Salem, N. C.
 July 15, 1922.

Radio World,
 1493 Broadway,
 New York, N. Y.

We are very anxious to buy outright the best and most complete radio sets that can be used for advertising purposes. We know little about the game and will appreciate it very much if you will give us all the suggestions possible. Our plan is to buy these machines outright for which we are going to pay spot cash, re-sell same or put them out on a retail basis.

GENE FOCHT.

Old Bill Shakespeare seems to have been somewhat of a radio bug himself, for he hooked up "The Tempest" to an Ariel—Roy K. Moulton, in "The Evening Mail," New York.

RADIO STORES CORP.

If your dealer cannot supply you, send us his name and \$9.00. We will ship you an "ALL-WAVE" Coupler by return mail, post paid.



\$9.00 List

INCLUDING 6 HOOK-UPS

WE ARE DISTRIBUTORS FOR

The "ALL-WAVE" COUPLER

150 TO 3,000 METERS

Guaranteed Wave Length

A combination vario-coupler, and loading coil. Incorporates a superior process of combination flat and bank winding on one compact unit. Permits building the most compact receiver at a low price, as it eliminates Variometers, Vario - Couplers and Loading Coils.

222 West 34th St. New York City

Variable Condensers

Compact, Interchangeable, Highly Finished,
 All Sizes, 3 Plate, \$2.00; 43 Plate, \$4.00.
 Templet for Mounting

Standard Wireless Corp.

HEMPSTEAD, N. Y.

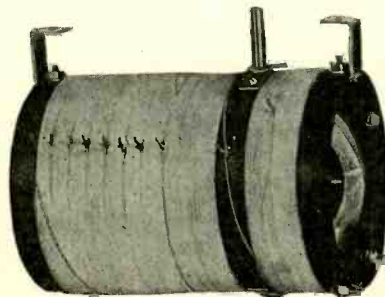
Manufacturers of Tools, Dies, Precision Instruments

LIST PRICE

\$9.00

Guaranteed Wave Length

150 to 3000 Meters



Patent Pending

Six efficient Hook-ups sent upon receipt of 10c. stamps or FREE with each ALL WAVE COUPLER.

The New

"ALL WAVE"

COMBINATION FLAT AND BANK WOUND

Coupler

Entirely Eliminates the use of

All Variometers, Variocouplers and Loading Coils

Permits the building of the most compact and efficient receiver at a considerably lower cost.

We guarantee the "ALL WAVE" Coupler (with a money back guarantee) to give maximum results for long or short wave long distance selective reception.

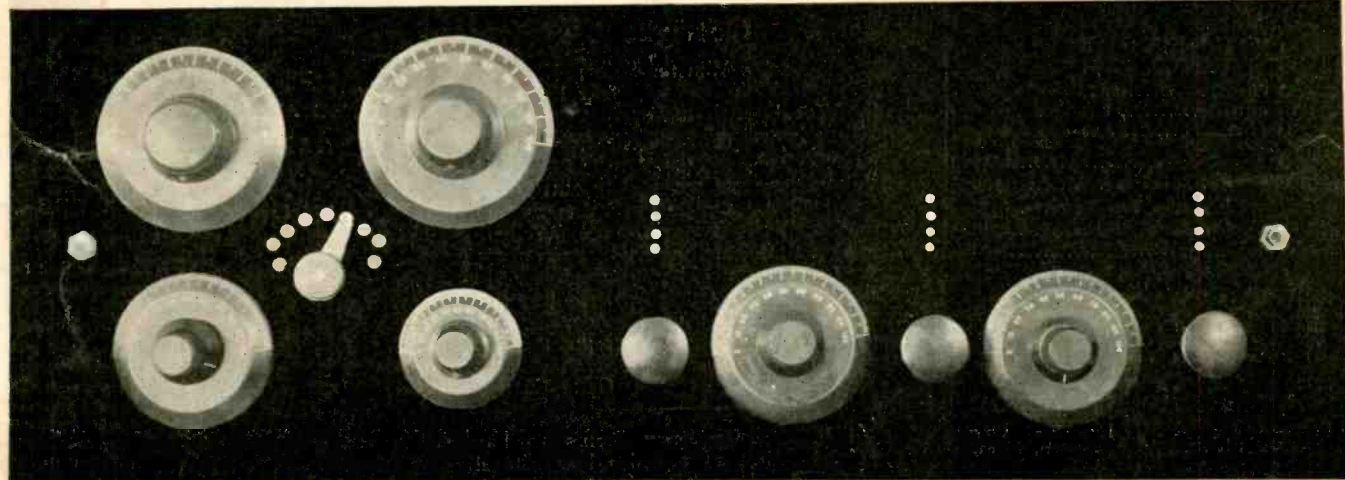
If your dealer cannot supply you, send us his name and your order; we will supply you direct or through him.

Manufactured by

Capitol Phonolier Corporation

54 to 60 Lafayette Street
 NEW YORK, N. Y.

THE NEW ARMSTRONG



Front view of the second set constructed. This receiver employs three tubes and gives very high amplification.

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