See Page 7

November 11

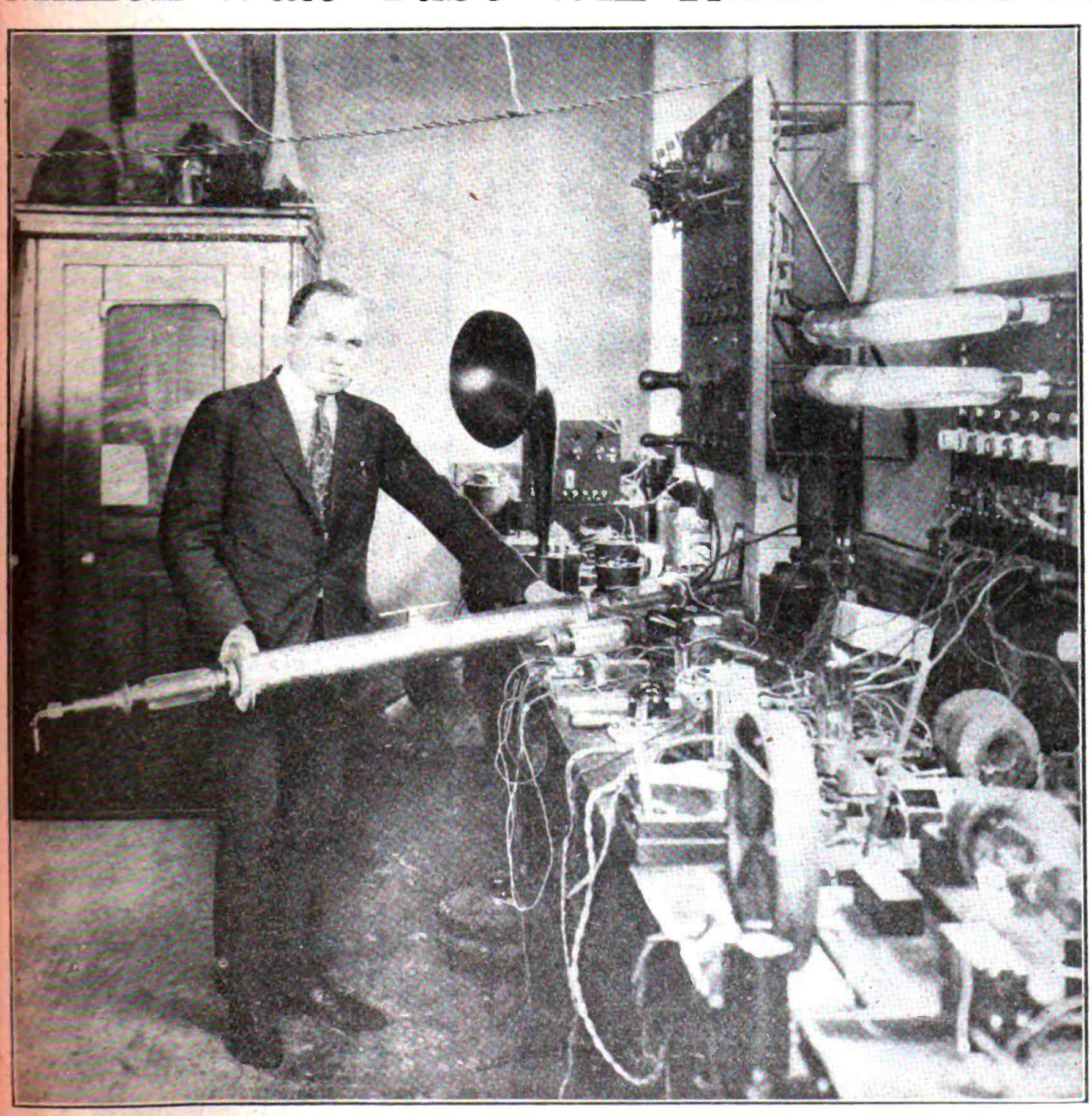
15c. a Copy. $6.00 a Year
52 Numbers

RADIO WORLD

(Trade Mark)

ILLUSTRATED. WEEKLY

Million-Watt Tube Will Radio Voice Across Atlantic



A MILLION-WATT vacuum tube, the most powerful in the world, has just been developed by J. H. Payne, Jr., at the research laboratories of the General Electric Company, Schenectady, New York. Although still in a stage of development, it promises to result in a supertube that will handle unusually large amounts of current.

Its type is the Magnetron class. Its weight is sixty pounds, and it can supply energy equivalent to that required to light 40,000 25-watt incandescent lamps, the current necessary to illuminate 1,500 homes. The tungsten filament, if drawn into a filament of the size used in the home, would supply 175,000 lamps.

The output of this tube is, approximately, forty amperes at a pressure of 250,000 volts. This is about 1,000 kilowatts. The tube serves to act as a rectifier in changing alternating current to direct current. It is also adapted, in an inverted sense, to change direct to alternating current of any frequency, or to convert low-frequency alternating current to high-frequency alternating current.

This new tube is fifty times as powerful as the recent tube invented by Dr. Irving Langmuir, or five times as powerful as the Alexanderson alternator.

(See page 3 for "close-up" and detailed story of this remarkable device.)

(C. International News Reel)

HOW TO BUILD A 100-METER CONCERT SET—Page 4

Radio Smiles

By Arthur G. Shirt

HAVE you read it? The book which tells you how to make a receiving set with a range of 3500 meters out of grandfather's top hat and an old phonograph record?

* * *

Where are the novelty banks made in the shape of a radio receiver with a knob that really turns and a tiny bulb that lights up every time you drop in a nickel?

* * *

Even in this second winter of the radio craze, there are people who think of laundry starch when the name Armstrong is mentioned.

* * *

If every youngster hasn't a home-made radio set constructed by his own hands and at the absurd cost of $3.64, it's no fault of the magazine articles on the subject.

* * *

Try our "Tinpantone," the new radio diversifier. Each and every unrelated sound magnified and distorted to ten times its original volume! Can be heard for blocks! Splendid opportunity for weary 'phone owners to drive away undesirable visitors! You can't appreciate a good horn until you hear this one!

* * *

Have you written your radio book yet?

* * *

News head: "De Wolf Hopper broadcasts to thousands that he cannot see." That's nothing. The Sears Roebuck Company has a greater broadcasting radius than any radio station in the country, and daily *takes money* from thousands it will *never* see!

* * *

Have you heard of the guy who dwells so morbidly on the cost per minute of operating the set when he has company, that his visitors force him to shut the outfit down and talk about it for a while?

* * *

Already one-half of the world is plugged in on what the other half is saying.

* * *

If people listen-in this winter as they did last, the next generation of flappers is doomed to flat ears and the safe opening wrist twist.

* * *

It's coming! A book entitled, "What Every Ardent Suitor Should Know About Radio."

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

VOLUME TWO

RADIO WORLD

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

A Weekly Journal, Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Telephone: Bryant 4796.

Vol. II, No. 7. Whole No. 33 | November 11, 1922 | 15c. per copy, $6.00 a year

"Close-up" of the Most Important Radio Development of the Hour

By John Kent

(Further description of the illustration on the front cover of this issue of Radio World.)

WHILE radio may be used for short distances, in place of telegraph lines, its real force lies, rather, in long-distance work, side by side with the cables. However, a most important development has taken place. It is the completion of a 1000-kilowatt supertube, the work of J. H. Payne, Jr. Mr. Payne created this tube in the research laboratories of the General Electric Company, Schenectady, New York, employing discoveries made by Dr. Irving Langmuir and Dr. A. W. Hull.

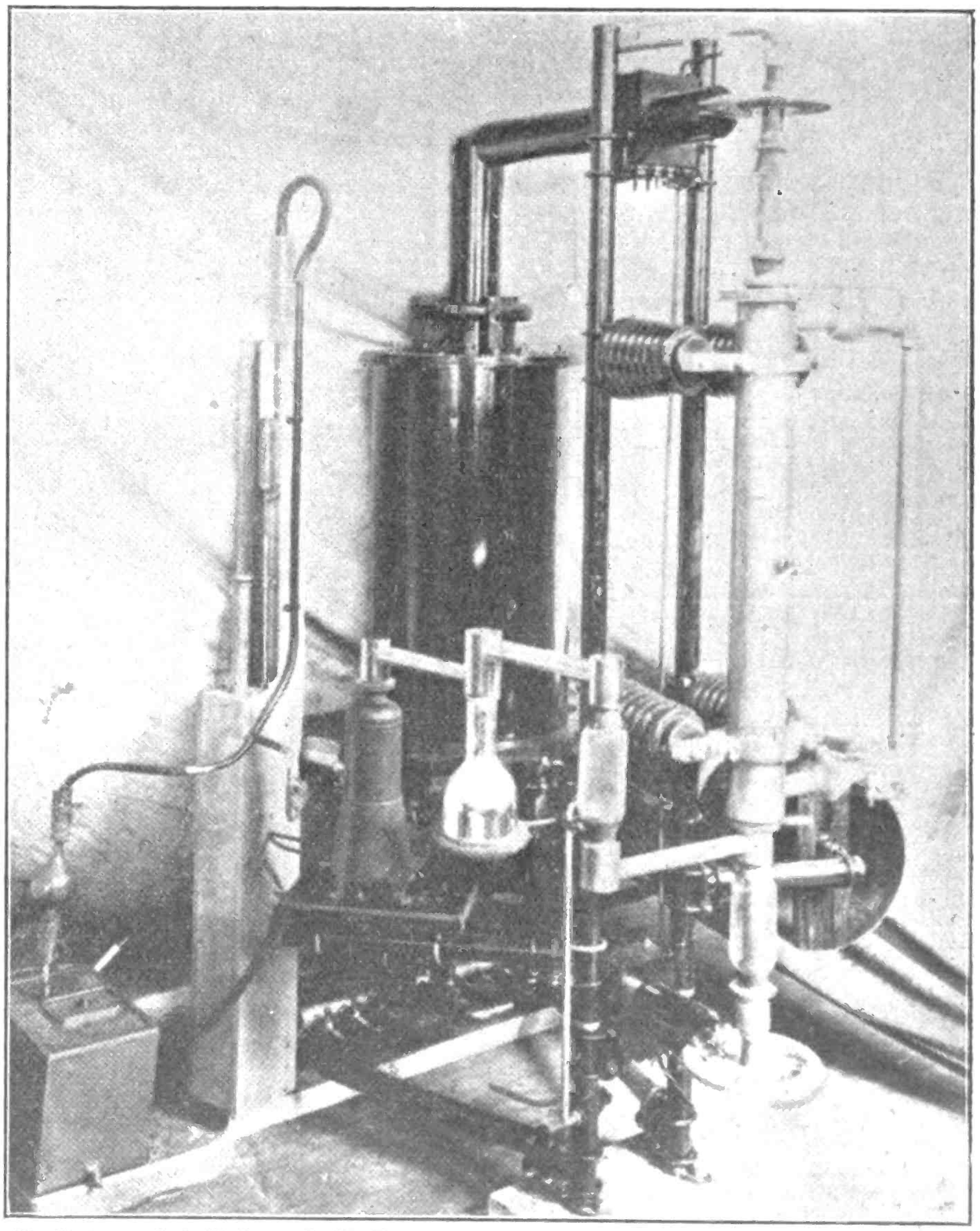
It is not intended or adapted for use on lighting circuits. Engineers had found that the major problem of tube development for radio has been solved insofar as the size tubes is concerned. They had demonstrated that almost any size tube could be made for radio work and operated successfully. But there was an undeveloped field for tubes in general engineering, especially where high-frequency generators or high-voltage rectifiers might be required.

Attention was directed to the development of superpower tubes for use in the generation and transmission of high voltage, direct current, and other engineering work.

The supertube has an output of 40 amperes at 250,000 volts—about 1000 kilowatts, or 1,000,000 watts. Dr. Langmuir, in describing the tube, says:

"This tube consists essentially of a water-cooled cylindrical anode thirty inches in diameter. In the axis of the anode is a tungsten filament four-tenths of an inch in diameter and twenty-two inches long. This filament is excited by a current of eighteen hundred amperes at ten thousand cycles, the filament excitation requiring about

Another line of development is, therefore in progress: the production of tubes of high efficiency as well as tubes of larger output. The progress in this direction is more difficult and is apt to be slower than in the direction which, thus far, seemed more important. These developments will come gradually, for the practical construction of powerful tubes giving thoroughly satisfactory operation requires considerable development. It would be boasting, however, to predict the limitation of the ultimate use of the vacuum tubes in the power field.



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

Close-up of the million-watt vacuum tube, fifty times more powerful than any now in use,

How to Build a 100-Meter Concert Receiving Set

By Frederick J. Rumford, E. E., R. E.

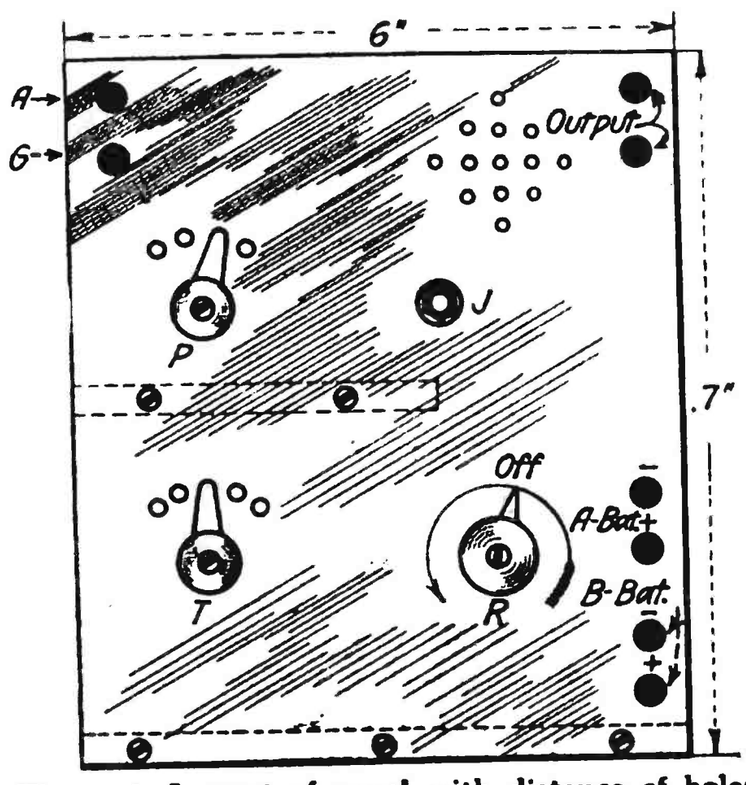


Figure 1—Layout of panel with distance of holes to be drilled; also the position of the binding posts, knobs, contact points and rheostat. Suggested by Frederick J. Rumford. Drawn by S. Newman.

IN the near future many broadcasting stations in the United States will transmit on a wave length of 100 meters, more or less, because this range gives a radiophone station a larger band of wave lengths to operate over and will reduce interference from other stations. For instance, KDKA has broadcast concerts which have been received quite often by the writer at his home in Roxbury, Massachusetts.

I advise any radio fan who is interested to build himself one of these little receivers and have it hooked up so that the throwing of a switch will connect it with the antenna and ground circuits.

If your concert-receiver is unable to tune in 400 meters and over use this little set. It gives very good results on 100 meters.

Below are listed the necessary parts, and their respective cost, for the making of this set:

1	panel formica, or bakelite, 6"x 7"x¼"	$1.26
1	base 6"x6"x½"	.25
1	vacuum-tube socket	.75
1	rheostat	1.25
1	jack	.75
1	plug	1.00
1	five-contact switch assembly complete	1.00
1	six-contact switch assembly complete	1.10
1	vacuum-tube bracket for socket	.25
8	binding posts	.80
1	set of screws, wire and accessories	.50
¼	pound No. 22 D. C. C., magnet wire	.30
1	cardboard, or bakelite, tube, 3½" diam., 2" depth	.35
	Total	$9.56

First, all the marking of holes on the panel must be completed. The panel is now ready to mount the switch-assembly rheostat, the jack and the binding post. After this is done, we are ready to make the coil which will consist of a primary and tickler winding. The tube is first given several coats of shellac and left to dry. After drying, the primary winding is started about ¼ of an inch from the end of the tube. There are 18 turns in this winding, with taps at the 9th, 11th and 13th turns. On the 18th, or final turn, there is a ½-inch space.

Next, wind the tickler coil, which

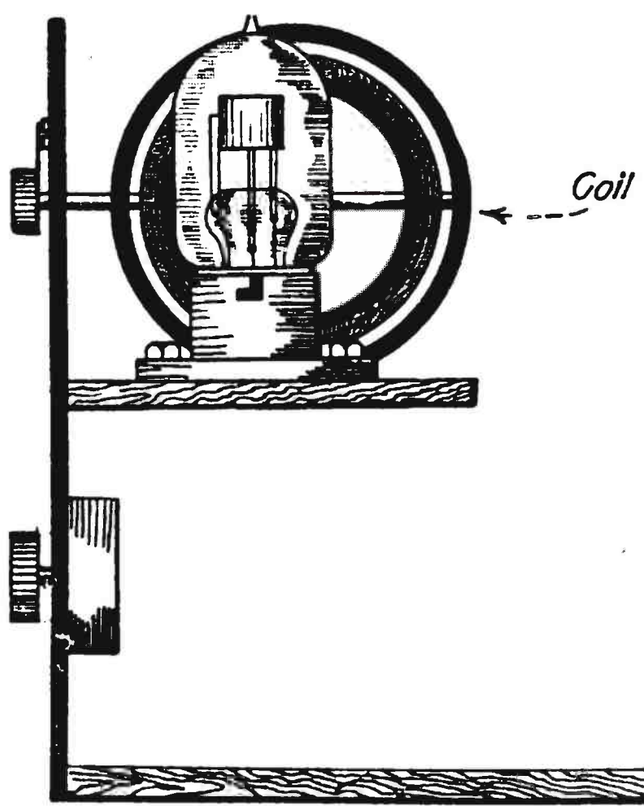


Figure 2—Rear of the panel, indicating how the instruments should be mounted. Suggested by Frederick J. Rumford. Drawn by S. Newman.

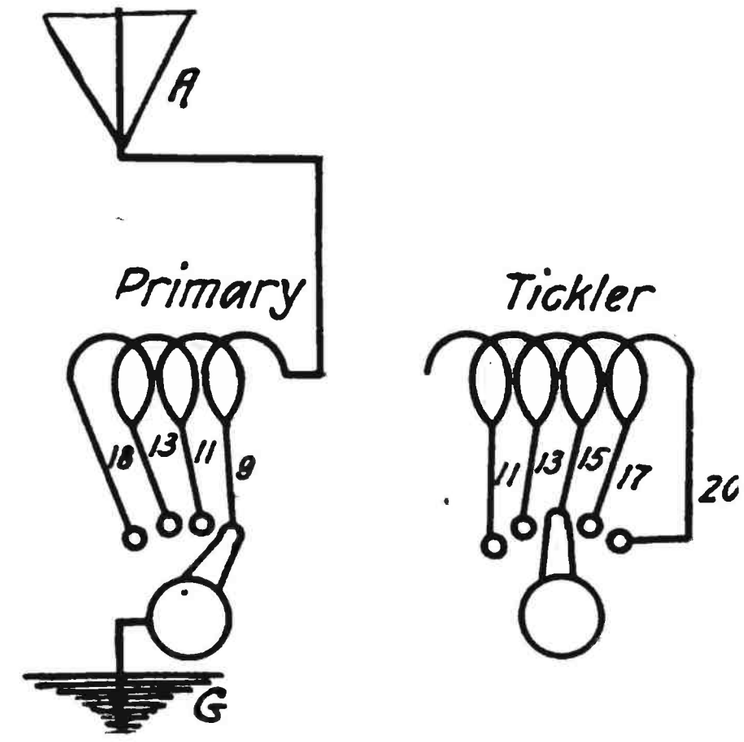


Figure 4—Wiring and connections of the taps of the primary and tickler coil. These make the set regenerative. Suggested by Frederick J. Rumford. Drawn by S. Newman.

has 20 turns of the same size of wire as used on the primary. This is tapped as follows: At the 11th, 13th, 15th, 17th and 20th. After the winding has been completed, the coil should be given two coats of insulating compound.

After the coils have dried, they should be mounted at the back of the panel by means of two machine screws with nuts, fastened firmly at the back, holding the coil-form firm and rigid. The taps are then connected to their respective posts.

The set is now ready to be wired. Careful attention should be paid to the wiring diagrams, figures 3 and 4. Regarding the two binding posts marked

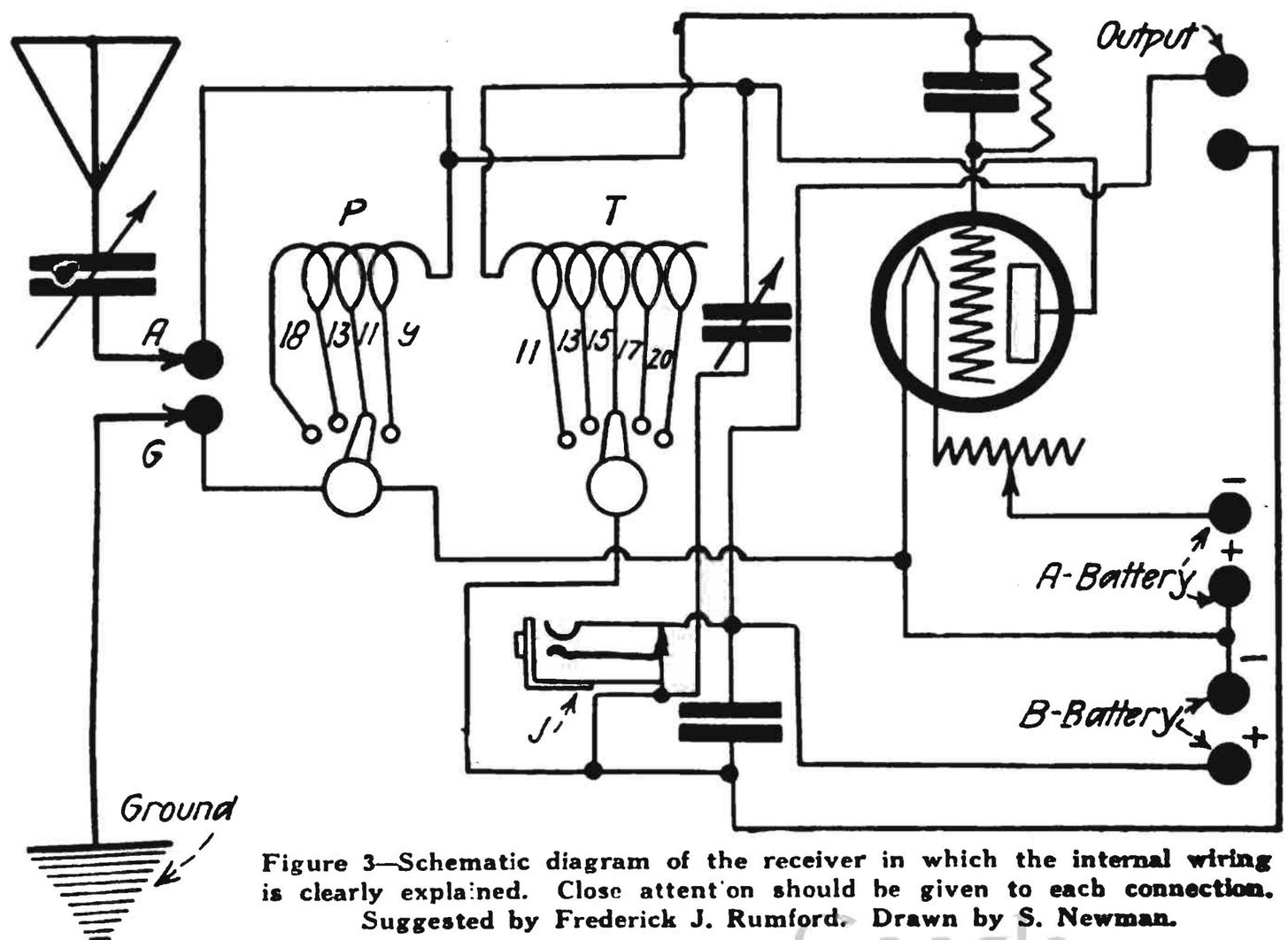


Figure 3—Schematic diagram of the receiver in which the internal wiring is clearly explained. Close attention should be given to each connection. Suggested by Frederick J. Rumford. Drawn by S. Newman.

United States May Be Divided Into Radio Zones

By Carl H. Butman

WASHINGTON, D. C.—The radio public is beginning to demand not only good entertainment and high-class transmission, but a greater range of reception. In other words, the listener-in wants to reach farther afield. His horizon is extending. He wants to hear the distant stations outside his city and state. The Department of Commerce radio officials, therefore, are making a survey of each radio district to see if there isn't some way by which this can be arranged.

One radio enthusiast says that, while he is appreciative of all his local stations, he sometimes wants "to go visiting by radio"—listen to some of the big stations outside the local field—just as he frequently likes to listen to the conversation of others than his immediate family whenever guests are present.

It's the same in radio broadcasting, he says.

In an effort to aid in seeking a solution of this new problem the Department of Commerce has written letters to its nine radio district-inspectors, stating that information reaching the department indicates that, throughout the country, a sentiment for silent local radio broadcasting periods is developing so that the listeners-in can hear the distant stations, which is often impossible when local stations are broadcasting. In some sections of the country steps for such an arrangement have already been taken. On the Pacific Coast, for example, what is known as the Pacific plan of time division has been amended so that, from 8 to 10 o'clock each evening, amateurs are silent, thus permitting the broadcasters to have a clear field.

At 10 o'clock the amateurs have a period, during which they may communicate without interruption. In other sections the local broadcasters remain silent for one evening a week, or for a few hours one or two evenings a week, so that those having sets capable of long-distance reception may pick up some of the powerful broadcasters outside their district. The department points out that there is a great fascination in listening to distant stations, and it is the opinion of the Radio Section that this wish of the radio public will meet with the cooperation of most of the broadcasting stations when it is understood. Broadcasters and local enthusiasts should advise local inspectors as to what they think of the plan or take it up with the department directly.

It may be found desirable to divide the United States into zones somewhat as it is divided into time zones, the stations in a particular zone having silent nights or periods of two hours each. It might be arranged so that the broadcasters in the Eastern Time Zone would not transmit on Monday night; those in the Central Zone keeping quiet on Tuesday; Mountain Section, Wednesday, and the Pacific Coast on Thursday; all sending on the other nights. The department inspectors have been requested to bring this suggestion to the attention of owners of broadcasting stations in their districts and explain it to broadcasting and listening-in organizations. Reports from inspectors will indicate the desire on the part of the public and the attitude of the broadcasters, who must arrange the matter, as the department's plan is only a suggestion.

Radio fans who complain of interference must not forget, officials point out, that the execution of such a plan will not enable them to get long-distance stations unless they have good sets and know how to tune in properly. The scheme is expected to receive the endorsement of the public and broadcasters alike, but it can only be successfully carried out with the close cooperation of every one. The reports of inspectors are awaited in Washington with interest.

(*Continued from preceding page*)

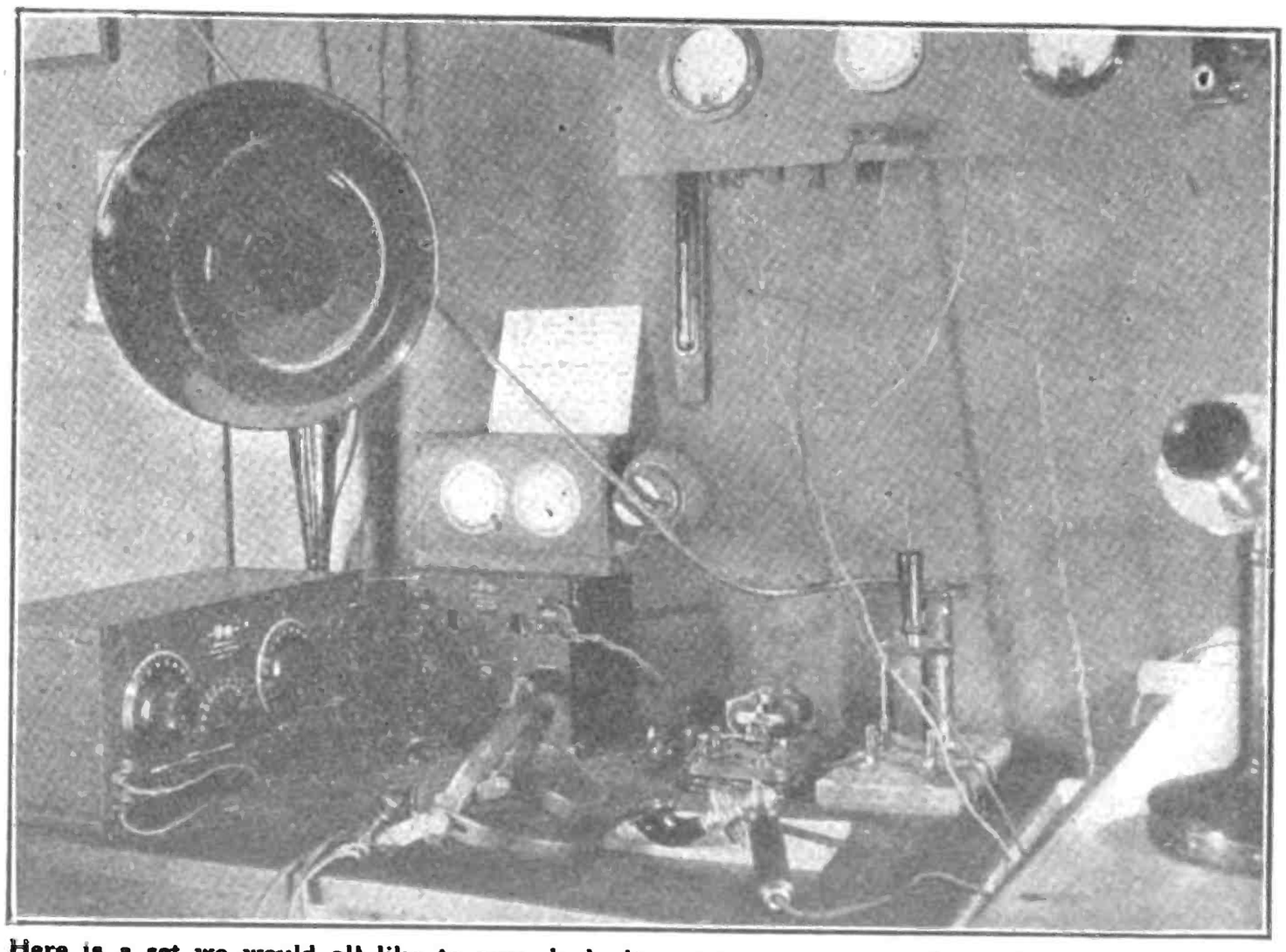
"Output," which really connect with the points of the jack: The reason for one of these sets should desire to hook-up an amplifier with this unit, it can be easily made by connecting jumper wires from these posts to the posts provided from them on the amplifier unit.

The variable condensers used in this set are of a small value in capacity, and the grid condenser is, also, of a very small capacity. The grid leak is one-half megohm.

The vacuum tube used is a radiotron U-V 200. The B battery is of 22 volts and the storage battery, 6 volts, 60 ampere hour.

This Is Radio Station 8 BVZ

Send Radio World a Photograph of Yours



Here is a set we would all like to own—look it over, amateurs, with a view to copying its especially neat and compact arrangement. The batteries are in a locker under the table and hidden from sight. The call letters of this station are 8 BVZ. Its owner is Nicholai H. Hiller, Jr., Carbondale, Pennsylvania. Mr. Hiller has a few other complete outfits spread out over the valley, but this is his outfit de luxe. If yours can match it, send a photograph to RADIO WORLD for publication.

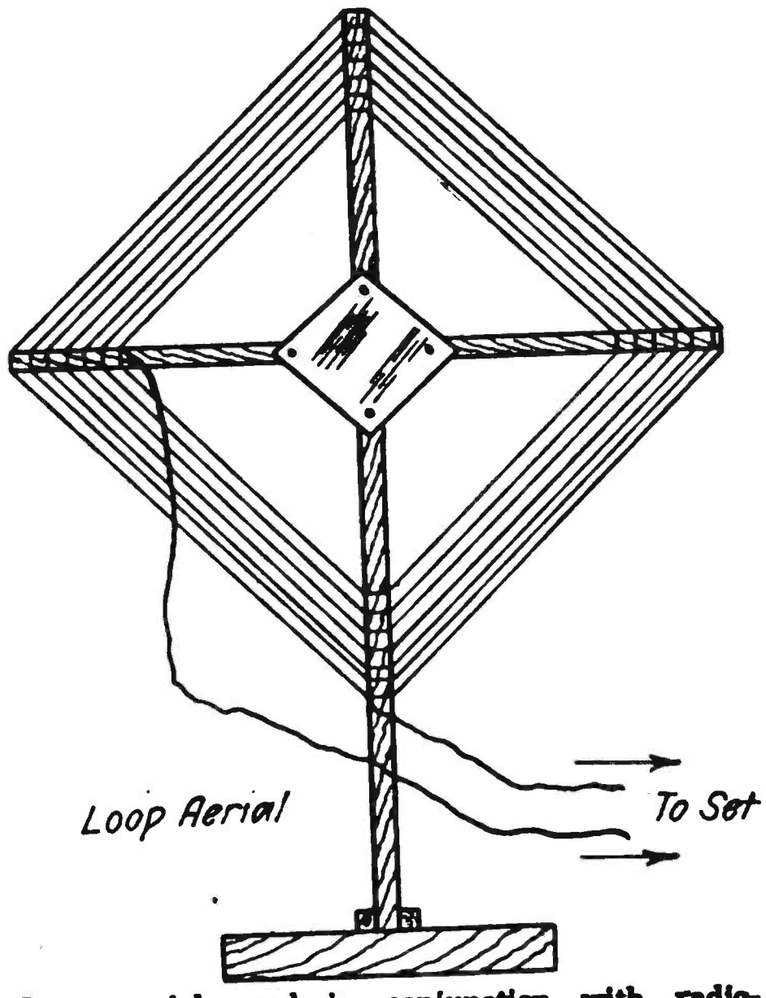
Wide Field for Experimenting With Aerials

Construction of Antenna Involves Many Details Which, if Properly Attended to, Will Increase Efficiency of Receiving Set

By Donald Van Wyck

FOR the radioist interested in experimenting, there is an interesting field that may be easily tapped—experimenting with aerials of various types. Although RADIO WORLD has made clear the working of aerials, I will endeavor to cover another phase of the subject. Radio enthusiasts who live in apartment houses, in many cases, find it inconvenient to stretch an outdoor aerial. Where circumstances prevent this, there are only a few schemes whereby broadcast programs may be picked up. A loop antenna, an indoor aerial, or an aerial plug which fits into the electric-light socket, and permits the use of the lighting socket as a means of absorbing the radio impulses, may be substituted for the outdoor wires; but in no case will the signal strength be as loud as with an outdoor antenna. One thing that the amateur must remember: crystal detectors will not function satisfactorily with the indoor loop, as they are not amplifying detectors—but sensitive mineral detectors which will pick up and rectify if the outdoor antenna is used. They will function all right, but the range of the broadcasting station must be five or ten miles. For distance with the indoor loop aerial, vacuum tubes must be used with two stages of amplification, for good results.

A convenient way of installing a simple indoor antenna is to extend a length of No. 20 single cotton-covered copper wire around the room or down the hallway. If it is run along the moulding, any effect which may detract from the appearance of the room may be prevented. We must look for the *ground*. This can be had by connecting the *ground* connection from the receiving set to the cold-water pipes or to the radiator. This wire can be run along the baseboard, or a crack in the floor, making the wire unnoticeable. When making the connections to the cold-water pipes, or radiator, make sure to file, or clean, the spots where you intend to make the connection. This will give you a good electrical connection when finished.



Loop aerial used in conjunction with radio-frequency or superregenerative receiving sets. Good results have been accomplished with such an aerial. It has well-marked directional properties. It also has the advantage of eliminating interference. The loop aerial is used exclusively throughout the United States Naval Radio Compass stations for locating positions of ships.

The loop antenna requires a sensitive set of instruments such as a radio-frequency or a super-regenerative set for its successful operation; as the loop aerial is a poor absorber of radio energy, due to the fact that closed circuits have a tendency to hold energy instead of absorbing or radiating the signal. The loop aerial gives the greatest volume of signals when pointed toward the source of the incoming wave, and thus has a directional effect. Of course, the small-sized loop is what makes the signals weak; but there is a great chance to try some experimenting with one.

There are various ways of connecting the aerial, or loop, to the set, depending on the type of set used. However, the general method is to connect one end of the loop to the antenna terminal of the set and the other to the binding post of the set marked "Ground." When the loop aerial is employed, no actual ground connection is necessary.

The construction of a loop is shown clearly in the accompanying sketch. The simplicity is at once apparent. Two light pieces of wood are made up in the form of an X about 4 or 5 feet in height. Across the ends of these pieces, smaller pieces are screwed. These pieces need not be over 6 inches long and should be notched to take the wires and hold them in place. The number of wires needed must be determined by experiment; but, as a starter, try about 8 or 10 turns. For the wire, almost anything will do. No. 18 ordinary bell wire will do. If the builder wishes, he may use No. 22 or No. 24 cotton-covered wire. The fact that the wire is insulated will not make the slightest difference. Simply start the wire wherever convenient and wind the form full, keeping the wires spaced evenly.

The completed loop may be mounted in such a way that it revolves easily, so that the radio operator may get the loudest signals and, at the same time, cut out a large amount of interference.

Another method of eliminating the outdoor antenna is the use of the condenser plug which enables the radio fan to use the house-lighting wires as the antenna without the trouble of installation. In some apartments, the plugs work very well; but success depends upon local conditions, particularly th manner in which the wires are strung. If the wires are shielded by metal ceilings or conduits, signals will not be as loud as if the wiring is open. If the building is surrounded by steel structures, the results will not be so pleasing.

Experiments seem to indicate that the plugs work best on the second and third floors, especially in frame or brick buildings. A regenerative set with two stages of amplification works well with the plug and will pick up broadcasting easily.

The antenna plug is a condenser, or a number of condensers, encased, which serve to prevent the live-wire line from surging through the set. The function of the plug is to afford a coupling similar to a condenser in a circuit, allowing the high-frequency radio currents picked up by the house wiring to flow through the receiver.

National Radio Week Executive Committee Ready for Action

Subsidiary Working Committees Will Be Appointed This Week

MAJOR J. Andrew White, chairman of the Executive Committee in charge of preparations for National Radio Week, to be observed from December 23 to 30 (inclusive) has appointed the following to complete the personnel of five members suggested at the meeting reported in RADIO WORLD, No. 32, dated November 4:

H. Gernsback, Kendall Banning, Lawrence A. Nixon, Arthur H. Halloran, and Roland Burke Hennessey. Arthur H. Lynch is treasurer.

This committee, with Major White as chairman, held a very important meeting on November 3 at Major White's offices, 326 Broadway, New York City, full details of which will be published next week.

Committees to take charge of the music and broadcasting programs, the publicity, the special meetings of dealers and manufacturers will be formed.

Enthusiasm prevails everywhere and National Radio Week promises to be the one big event of the year. RADIO WORLD has received many messages of praise, not only for suggesting the idea, but for passing it on to the radio field at large in order that all may take an equal interest.

Among the newspaper comment is the following from "The Globe," New York. It shows the spirit of one of the big, progressive newspapers of the Metropolis:

A brilliant idea has been conceived by R. B. Hennessy, editor of the RADIO WORLD, a weekly radio publication. Mr. Hennessy makes the suggestion that a National Radio Week be held from December 23 to 30, inclusive, during which time short talks appertaining to the season are to be personally delivered by high government officials and broadcasted from all broadcasting stations. The idea is an excellent one both from the viewpoint of the country itself and from that of the radio industry.

It is Mr. Hennessy's intention to weld the country together for one whole week through the agency of radio. Political talks, speeches on art and literature, entertainment in lighter vein for those who care not for the heavier subjects, and religious and scientific addresses by leaders in their respective fields.

The dates selected come at the season of Christmas, an opportune time for a venture of this nature. The wholesome advantages of life in this country and particularly at this time could not be brought to the attention of the nation in a better way than through the chain of broadcasting radio stations now available.

MAJOR J. ANDREW WHITE
Chairman of the Executive Committee of National Radio Week.

Of course, there is another thought behind the movement. That thought is based on the desire of dealers for a radio Christmas. The contention is made, and rightly, too, that with the decrease in cost of good radio equipment no gift carries with it such lasting benefit and general good-will as a radio set. By calling to the attention of the public the vast amount of information and entertainment that can be drawn from the air at any hour of the day, a National Radio Week would not only revive trade in radio equipment, but would most certainly add to the enjoyment of millions of Americans.

No less important is the following letter of commendation from William M. Calder, United States Senator from New York. Senator Calder writes:

United States Senate,
Washington, D. C.

Editor RADIO WORLD:—

I have had the pleasure on several occasions during the present campaign of speaking over the radio, and I fully appreciate its practical value in very many directions. The whole world is coming to appreciate its unlimited possibilities.

I heartily endorse your plan for the celebration of a National Radio Week, and shall be glad to do anything possible to make that celebration a success.

Very truly yours,
WILLIAM M. CALDER.

National Radio Week is to be an important event. The executive committee is seeking suggestions to make it a huge success. All radio fans and amateurs are invited to cooperate.

Radio Development in Cuba

Amateurs Enthusiastic Over Establishment of New High-Power Broadcasting Station in Havana

OWING to the lack of adequate broadcasting facilities, radio development in Cuba has not kept pace with the progress of radio transmission in the United States, says Assistant Trade Commissioner Livengood, Havana, in a report to the Department of Commerce but recently a high-power sending center has been established in the capital and the market for small receiving sets is expected to widen rapidly. This station has not yet made arrangements to supply broadcasting service, but it will do so soon. The apparatus of the company operating this station, which has a capacity of 500 watts, is an exact duplicate of that used by the New York Telephone and Telegraph Company in its Walker Street station. Test messages from the new Havana station have been heard as far away as Princeton, New Jersey.

As in all tropical countries, Cuban enthusiasts have met with difficulty because of "static" disturbances. In spite of all obstacles, however, a considerable number of Cuban amateurs have been experimenting in receiving and transmission. In order to receive from United States stations, apparatus of the more expensive kind is necessary. With such sets, messages have been received from Memphis, Detroit, Pittsburgh, Jacksonville, Wichita, Kansas City, and Schenectady. Messages from Atlanta have been most successfully received in Havana.

Havana dealers are well equipped to supply radio apparatus in anticipation of broadcasting from the new Havana station. Interest in radio matters is thoroughly active, and when United States facilities are available, merchants believe that Cuba will offer a promising market.

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.

Be a Booster for National Radio Week!

Single-Tube Superregenerative Receiver

By C. White, Associate A. I. E. E.

THE interest taken by amateurs in the development of the superregenerative circuit indicates that there is a preference for the more scientific receiver, although its actual construction does entail many difficulties in wiring. Up to the present time, many designs of this famous circuit have employed either two or three tubes, but the objection to such sets has mainly arisen from the necessary complexities of the general connections. Some radio fans tried to build a multitube superregenerator, but failed because they attempted to crowd the apparatus into too small a space. This is a common fault with most amateur construction, and the poor results are commonly indicated by all sorts of howling, audio-oscillations, and extremely sensitive tuning-adjustment without the desired amount of selectivity. Frequently, such troubles are caused by improper shielding or a lack of shielding of the component parts or groups of parts; or, perhaps, poor condensers and loose connections. So, no matter what type of modern circuit the novice is considering, it is paramount that he pay very careful attention to minor details of construction, which often determine the actual efficiency of the outfit.

The demand for a circuit employing the superregenerative principle with a single tube has been apparent from the start. This demand has been due to two chief facts; first, the two- and three-tube outfits have been very bulky and by no means easy to carry around, especially since a storage battery of very large capacity is needed to supply the filament currents. Second, although the results obtained have been truly remarkable, the cost, both initial and maintenance, has been far in excess of that which the average amateur is so disposed to pay. Hence many have been at work trying to perfect a single-tube outfit that possesses most of the points of advantage of the larger types and still retains the outward and inward simplicity in design, and, also, is immune from excessive costs. Since it is rather hard to definitely connect scientific perfection and financial economy, we frequently must compromise between the two and make some slight sacrifices in favor of one or the other. The single-tube superregenerative receiver does not have the flexibility of control and the extremely fine selectivity, although in size and cost it is really in the class with the average regenerative-set employing variometers and a double-tuning circuit. It is quite simple and it is possible to make up a receiver that is very good for traveling and demonstrating purposes by employing a WD-11 tube which requires only a 22½-volt B battery and an ordinary No. 6 type dry-cell to light the filament. Personally, I have seen a lecturer's radio set made on this principle which measured only one foot in each dimension. Except for a loop aerial and a loud speaker this recevier was very complete and ready to work in a moment's notice.

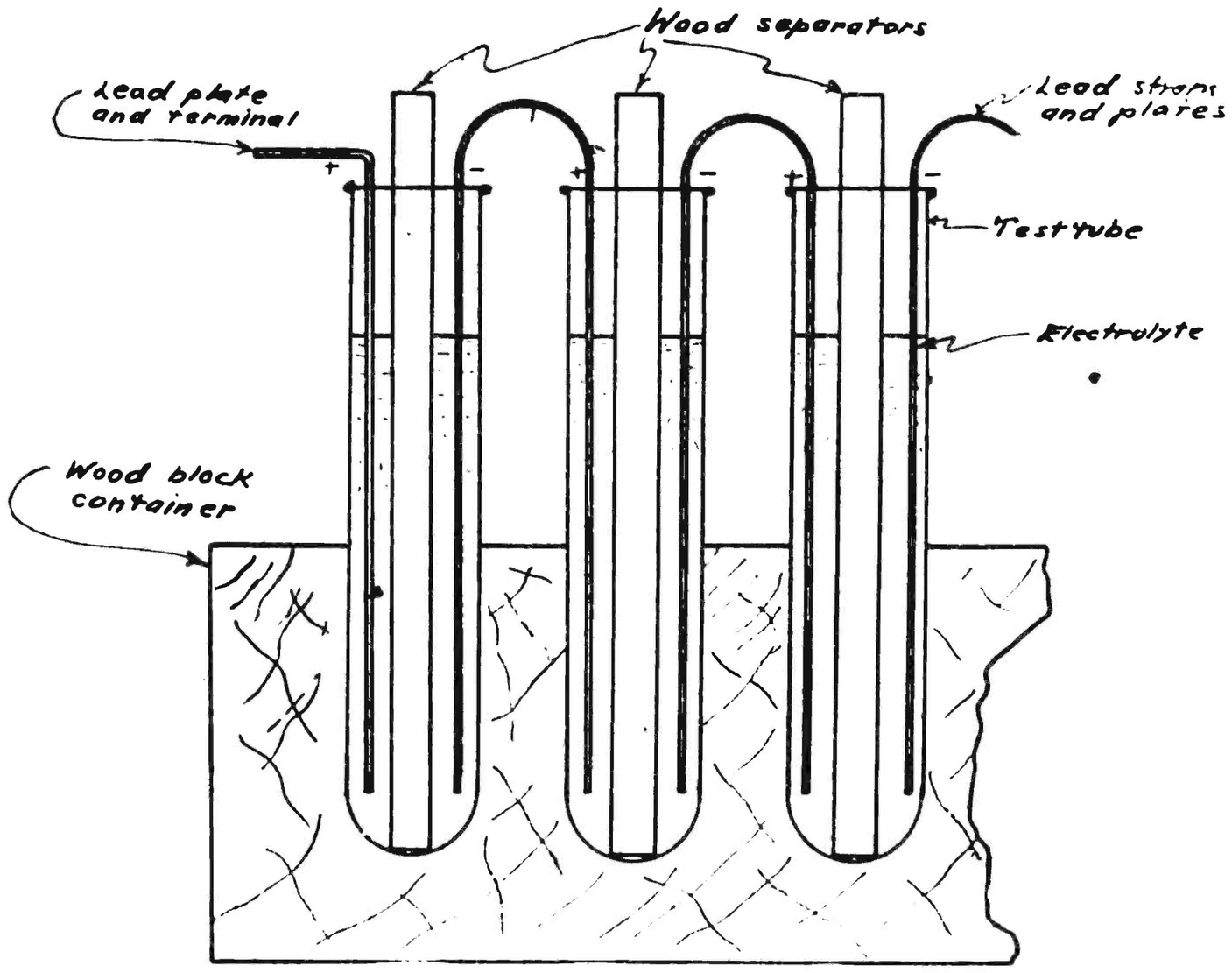


Figure 2—Schematic design of a plate potential battery for a single-tube superregenerative receiver. Drawn by C. White.

In Figure 1 is shown the general wiring connections. A vario-coupler with the stator as primary and the rotor as tickler coil was used. But if the amateur so desires, he may change the general tuning-circuit by using a vario-coupler with two rotors; the stator for the primary of the antennae-ground circuit, one rotor for the secondary, and the other for the regenerative tickler coil. While a double-circuit arrangement adds a certain amount of scientific refinement, I do not think it is advisable to incorporate such an expensive item as a double rotor vario-coupler in a single-tube set, especially since, with a loop aerial, it is quite easy to obtain good selectivity and a minimum of interference.

As illustrated, a 43-plate variable condenser is placed across the terminals of the stator and thus provides a method of sharp tuning. The regenerative coils consist of two honeycomb

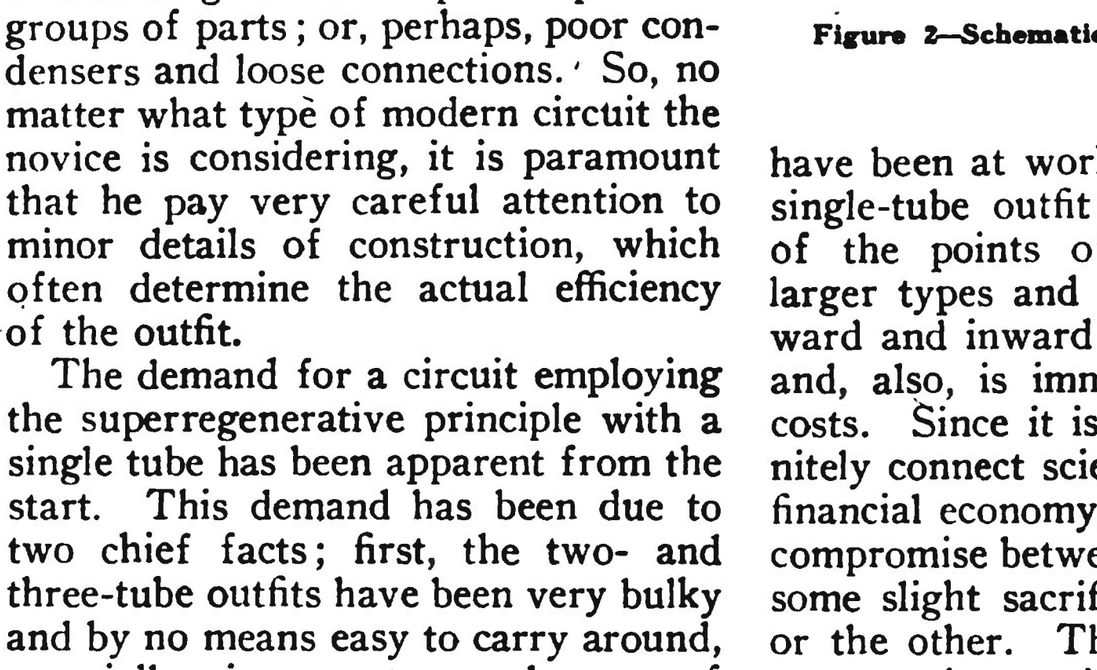


Figure 1—General wiring connections of the single-tube superregenerative set. If the amateur wishes he may change the general tuning-circuit by using a vario-coupler with two rotors; the stator for the primary of the antennae-ground circuit, one rotor for the regenerative tickler coil. Suggested by C. White. Drawn by S. Newman.

Why it Is Necessary to "Tune In"

By Arthur G. Shirt

WHAT are you doing when you juggle with the slider on your tuning coil, or twirl the dials on your variable inductance?

"Why," you answer, "I'm tuning in."

But there you stop. Why it is necessary to "tune in" perhaps never occurred to you. Therefore, an explanation couched in language everyone may understand, may not be amiss.

To begin with—the aerial. If no other explanation will quite cover the idea, the aerial is erected outside or inside, as the case may be, for the purpose of catching messages, music, speeches, and press reports, just as a rain barrel is given its place to catch rain water. Falling rain represents some energy, even if it is not generally utilized, and so does the entertainment which comes down through your aerial to your receiving set. It is of an entirely different kind, however, and peculiar to itself.

The sort of energy that we hope to capture when we string our antennae is what is known as "wave energy," so called because we can more readily conceive of it when it is compared to ocean waves. Every transmitting set in the country sends out wave energy; but to avoid interference of the worst kind, the radioists send out waves of *different lengths*. Waves have length—and they are not spoken of as being so many feet long, or so many yards, but so many *meters*. Thus amateurs send on a wave length of 200 meters and less, broadcasting stations from 285 to 485, and government stations on 800 meters.

Whatever type of aerial you may put up, it will possess a neat little wave length all its own. It may be from 75 to over 200 meters, and may be determined beforehand by working out a well-known formula. If you had just a detector and a pair of phones attached to the end of your aerial, you would be limited to the reception of only those wave lengths which were the same as the natural wave-length of the aerial. Poor chance of ever getting anything with an arrangement like that. It is apparent that you must have some means of raising or lowering the wave length of the aerial so that your receiver will respond to a wide range of stations.

This is done by means of a tuner. The tuner, as most of us know, is a coil of wire connected to the aerial and the ground, and forming the primary circuit of a receiving hook-up. All tuners —with the exception of block coils, such as honeycomb and spider—have some means whereby the number of turns of wire which are included in the circuit may be controlled. Either a slider or a dial will accomplish this; and by manipulating these devices you put your set in resonance—to use a word which means exactly the same as tuning—with as many different wave-lengths as the size of your coil will allow.

Hereafter, when you set out to tell anyone who is not familiar with radio why you are tuning in, say: "To place my set in resonance with the set which is sending out the music I want to get." Then they will understand, and, at the same time, give you credit for knowing what you are doing and why.

"Radio will make this a bigger, better world."—Hoover.

(*Continued from preceding page*)

coils, D-L 1250 and a D-L 1500, mounted so that they can be turned axially with respect to each other, thus varying the mutual coupling in order to definitely control the amplitude of the locally generated oscillations. It is highly recommended that a good make of mica condensers be used with these coils. If it is not possible to obtain .002 microfarads capacity in a single condenser, then such a capacity can be made up of two .001 microfarad condensers connected in parallel.

Although, as I have previously said, it is quite possible to make such an outfit extremely compact and portable by using a dry-cell type of vacuum tube with a low B-battery potential, still if the receiver is not to be moved about often, I would advise that a hard tube with a high-plate voltage be employed instead of the soft tube. With this set, a UV-202 tube with 200 volts, or thereabouts, on the plate will give far better volume and results in general than a UV-200 or UV-201. Naturally the average amateur will object to this on the ground that it is next to impossible to get a cheap reliable source of high potential that will stand the current drain of a power tube; but such is far from the actual fact. Small storage-cells for plate potential batteries can not only be purchased at an extremely reasonable price, but can be made up by the amateur from $10 to $15 for a 150-cell battery (that is about 300 volts).

The general method is to obtain as many 1-inch by 7-inch test-tubes as there are cells, then cut from a 1/16th-inch lead sheet, strips about ½ inch by 18 inches in length for the plates. For the separators, a small stick of white wood may be placed between the two plates in each cell. Any type of device that will hold the cells rigidly in place, will suffice as a container for the whole battery; but as illustrated in Figure 2, it can be made up of ordinary wooden beams, bored just deep enough to make a firm resting place for the butt of the tube. This type of wooden base, or container, should be painted with at least two coats of black asphaltum paint in order to allay the eating action of the acid electrolyte. It is cheaper and safer to buy from some battery-service station, the electrolyte (dilute sulphuric acid) already mixed, then to endeavor to dilute concentrated sulphuric acid, which operation, if not properly done, will result in serious bodily harm to the mixer.

The potential of the terminal of the battery is determined by the initial potential of the first charge. Such a battery may first be charged and then recharged by either dividing the same into groups of three cells and connecting such groups in parallel with a 6-volt D-C supply; or by dividing into groups of 55 cells, if a 110-volt D-C supply is available; or 110 cells for a 220-volt D-C system. The majority of amateurs will resort to the first method, using the same apparatus that they use to charge the 6-volt A battery. After charging has been accomplished, all the cells may then be connected in series for the regular B battery work.

I strongly recommend this type of receiver with a hard tube employing a high-plate potential. Under such conditions of operation, it is perfectly possible to receive from local stations using a loud speaker with a single vacuum-tube. For those who want the greatest possible results for the minimum amount of money invested, there is, possibly, no better style of vacuum-tube outfit to rival the superregenerative receiver employing one bulb. But the amateur who wishes an ultrafine receiver of the supertype, would do well to use a two- or three-tube outfit. The single-tube set is not as good, scientifically, as the multiple-tube regenerator. This is quite evident since we must sacrifice quite a bit of flexibility of control when we endeavor to make one tube play a dual role. Again I must say to anyone attempting to build any high-grade receiving apparatus that shielding must be perfectly accomplished if satisfactory results in sharp tuning are desired.

The Radio Primer

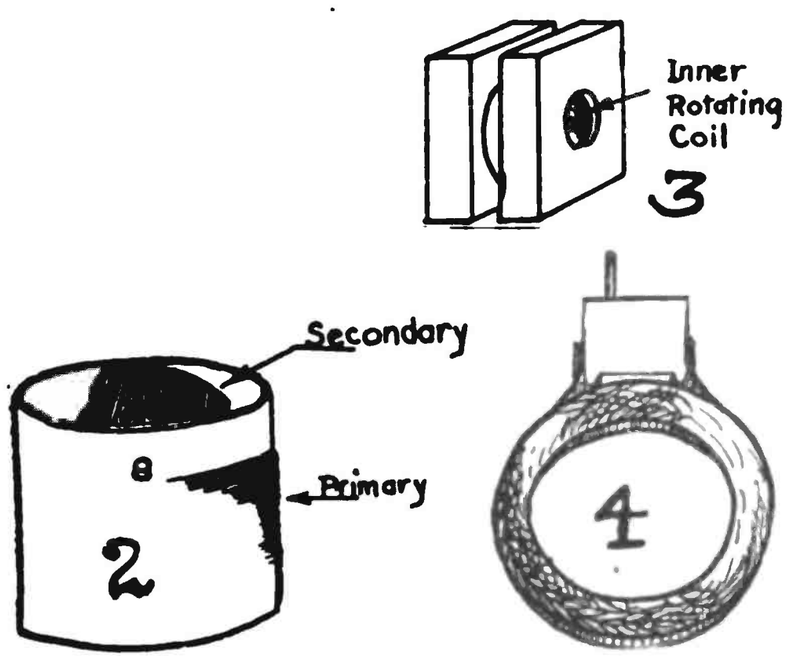
For Thousands of Beginners Who Are Coming into Radio Circles

Weekly A B C of Radio Facts and Principles Fully and Tersely Explained

By Lynn Brooks

What is a vacuum tube?

THE vacuum tube is a glass bulb shaped very much like the bulb of an incandescent lamp and of similar size. It contains three elements: grid, filament, and plate. It is called a vacuum tube because the air within it has been reduced to the lowest possible percentage.



In most of the present-day radio receivers, an instrument known as inductance, is employed to enable the fan, or novice, to operate his receiver on the different wave lengths. 2 is the variocoupler with its primary and secondary windings. 3 is the variometer used so much for the regenerative effect for amplification. 4 the honeycomb coil explained on this page. These instruments are important as they are mostly dealt with by the radioman.

What is the plate?

The plate may be either a wire mesh, a flat plate of nickel, or, as in some tubes, it may take a cylindrical form completely enclosing the other two elements.

* * *

What is the grid?

The grid is usually made of some fine wire mesh. It is a network of fine wire of tungsten, tantalum, or nickel, or a perforated plate of one of the same metals. One end of the grid is connected to the tuning coil and the other end is left free.

* * *

What is the filament?

The filament usually is made of finely drawn tungsten wire coiled in a spiral similar to the filament in the ordinary house-light. The filament is heated to incandescence by a 6-volt storage battery. The battery must not be over 6 volts.

* * *

What is a honeycomb coil?

In order to obtain the required amount of wire for long wave-lengths it was found necessary to have large, or long, coils of bulky construction. Although at first thought it would seem preferable to wind the coils in more than one layer, radio engineers know that if this were done the final result would not be what it should be due to what is known as distributed capacity.

* * *

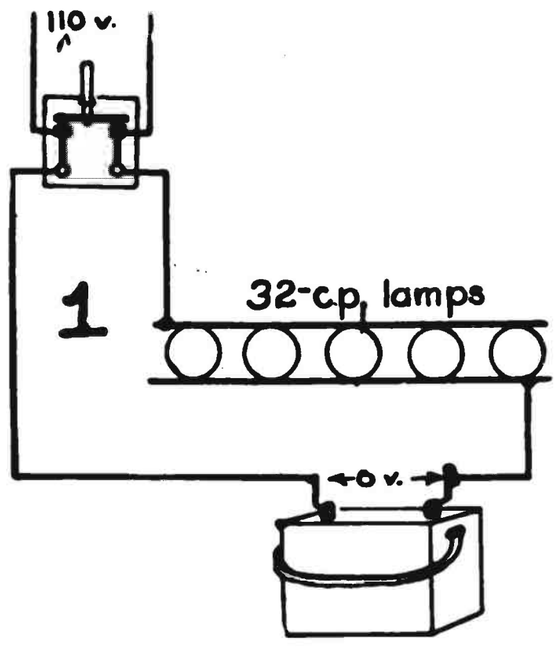
What is distributed capacity?

When the wires form a miniature condenser and these condensers are in their right places, they do not belong in a tuning coil—particularly when they are widely spread. So they are called "distributed capacity." If the capacity were concentrated, the objection would no longer hold; but this is not so.

* * *

From what does the coil derive its name?

From the peculiar appearance of the finished coil. In winding inductances, none of the wires are ever parallel. They cross each other and always at right angles.



1 is a simple sketch showing the wiring diagram in connecting up a storage battery to the house current, when 110 volts direct current is available.

What is a variometer?

An instrument which serves to vary the inductance and the wave-length value of any circuit in which it may be used. It consists of a set of fixed windings and a set of movable windings, the latter being rotated on twin axes in the usual construction. When both sets of coils carry the current, or flow in the same direction, the variometer has the maximum inductance value or wave length. When coils are turned around so that the current flow in both sets is in opposite directions, the coils are said to be "bucking" one another. Then the inductance and wave length value are at a minimum.

Radio Hints

Useful Facts for the Beginner Who Wants to Know

FILAMENT rheostats are designed with a zero point which acts as a switch between the tube and the storage battery, but it sometimes happens that, in the hurry to close the station for the night, the rheostats are not turned off completely. This permits the storage battery in the circuit to discharge all night long through the resistance. To prevent this many fans have installed a separate switch, which, through practice, they accustom themselves to turn off before the rheostat is turned back to zero.

* * *

The increase in the use of the dry-cell tube is particularly noticeable. Up to a short time ago it was difficult to obtain these tubes, but the supply is now meeting the demand. For compact sets to be carried about in an automobile, or even in a pack on the back, dry-cell vacuum tubes are unusually well adapted.

* * *

All connections about a radio circuit must be soldered, but soldered correctly. There are some general hints that may be given, but judgment and experience are essential. The soldering copper must be clean and the tip well coated with solder. If the tip of the soldering copper is not bright it should be filed clean. It is then heated, care being taken that the tip is not in the soldering flux or paste, and the copper tip coated with solder. The wires are cleaned where the soldering is to be done, using fine sandpaper, then a small amount of soldering flux or paste is applied at the joint and the wires to be soldered are tinned or coated with solder before the wires are joined.

* * *

After the wires are tinned they are soldered together, using just enough solder to make the joint solid. The joint should not be jarred while the solder is still soft; to do so weakens the joint and gives the solder a dull appearance. A good soldered joint will be smooth and bright. All excess soldering flux or paste should be cleaned off. Gasoline or alcohol will assist in cleaning off the paste. This last point is sometimes overlooked, and the excess flux often causes the copper wires to corrode.

De Forest Competitor Will Make "Movies" Talk

Device Invented by C. A. Hoxie, of the General Electric Company, Will Also Increase Scope of Broadcasting Entertainments

By B. S. Beach

AN ingenious apparatus for recording sounds on a photographic film to such an extent that the sound may afterward be reproduced in ordinary telephones or loud-speakers has been developed in the general engineering laboratory of the General Electric Company, and brings immeasurably nearer the day of the practical talking-movie.

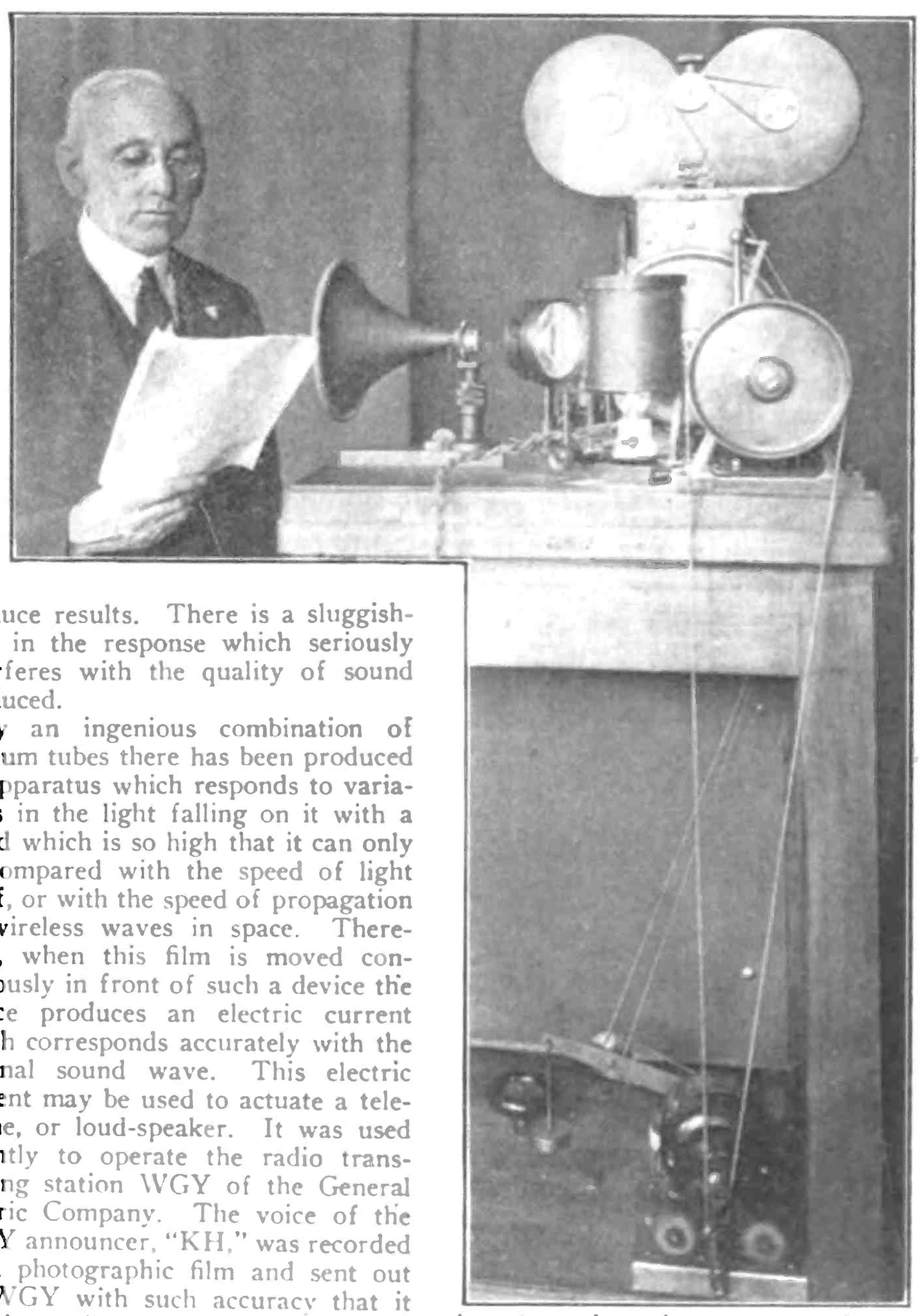
It also means a boon to radio broadcasting studios. From a central studio —say, in New York City—the world's greatest artists may sing or speak before this machine which produces the film. Copies of this film may then be made and sent to other stations and reproduced with clearness.

It is claimed that it makes possible the talking-movie, for on a film of normal width can be the picture of the voice of the actor as well as the photographic record of his action, both voice and action absolutely synchronized because they are part of the same film.

C. A. Hoxie is credited with the invention of the device. It is called the Pallo-Photo-Phone. The record is made by causing the sound waves to produce vibrations on an exceedingly minute and very delicate mirror. A beam of light reflected by this mirror strikes a photographic film, which is kept in continuous motion. The film, when developed, shows a band of white with delicate markings on the edges, which correspond to the sound which has been reproduced. On account of the exceedingly small size of the mirror and its low inertia it is possible, by this means, to produce a sound record which includes the very delicate "overtones" which give quality to speech and musical sounds. This has not been so successfully accomplished by any other method of recording sound waves.

The reproduction of the sound from the film is accomplished by moving the film in front of an exceedingly delicate electrical device, which produces an electromotive force which varies with the amount of light which falls upon it. In the past attempts have been made to produce these results by means of selenium cells; but a selenium cell, the inventor claims, though it responds to the changes in the amount of light which it receives, does not respond with sufficient promptness to produce results. There is a sluggishness in the response which seriously interferes with the quality of sound produced.

By an ingenious combination of vacuum tubes there has been produced an apparatus which responds to variations in the light falling on it with a speed which is so high that it can only be compared with the speed of light itself, or with the speed of propagation of wireless waves in space. Therefore, when this film is moved continuously in front of such a device the device produces an electric current which corresponds accurately with the original sound wave. This electric current may be used to actuate a telephone, or loud-speaker. It was used recently to operate the radio transmitting station WGY of the General Electric Company. The voice of the WGY announcer, "KH," was recorded on a photographic film and sent out by WGY with such accuracy that it was impossible to distinguish it from his voice as ordinarily directly transmitted from the station.



Apparatus to be used to convert sound waves into vibrations and then recorded on a moving-picture film. When the film is developed it shows a band of white with delicate markings

Radiofacts to Remember—Signals

Signals which come in weaker than the critical point of the detector make no impression on the detector and, therefore, are lost entirely. No matter how many steps of audio-frequency amplification may be piled up after the detector, the signals which have failed to actuate the detector will not be heard. With radio-frequency amplication, there is, virtually, no critical point and even the weakest signal is built up to the desired degree before it is passed on to the detector, there to be rectified to audio-frequency currents which, if desired, may be passed on through one or more stages of audio-frequency amplification in order to build up the signal strength. This is done when great amplification is needed by the operator.

Odd Ways of Identifying Stations

By Washington R. Service

BROADCASTING stations are coming to be known by the voices of their announcers, their slogans, and the stunts they perform in order to identify their stations, as well as by the cryptic call letters assigned by the Department of Commerce.

There is little romance or euphony in the letters WSB, but listeners-in are very familiar with the big gong which rings "Bong! Bong! Bong!" to announce the Atlanta "Journal." The unmistakable southern accent of the broadcaster announcing the "Voice of the South" is also an indication that WSB is sending.

As the radio enthusiasts well know, there are a number of other stations using identifying phrases and sounds. For example, the "Courier-Journal" and "Times," WHAS, Louisville, Kentucky, plays a few bars of "My Old Kentucky Home." WDAJ, the Atlanta and West Point railroad station, at College Park, Georgia, has uniquely established its identity by blowing four blasts of a locomotive whistle. When you hear this in your receivers you may be certain that WDAJ is broadcasting. The Naval Station at Anacostia, D. C., NOF, is known by the deep bass voice of the announcer.

It is not only in the Southland that these slogans and phrases have become popular. In the West, for instance, is the Palmer School of Chiropractic, Davenport, Iowa. "This is WOC," the announcer states; "out where the West begins." Another station identifies itself with: "Out where the corn grows tall." The voice of the spokesman at WOH, the Hatfield Electric Company, Indianapolis, might confuse one at first. He has a southern accent similar to that of WSB in Atlanta. The pronunciation of the simple word "and" like "a-yand" would hardly seem to locate a station, but ask any one who has heard "Mister," KDKA, Pittsburgh. They will admit that the drawled "a-yand" is a most positive identification.

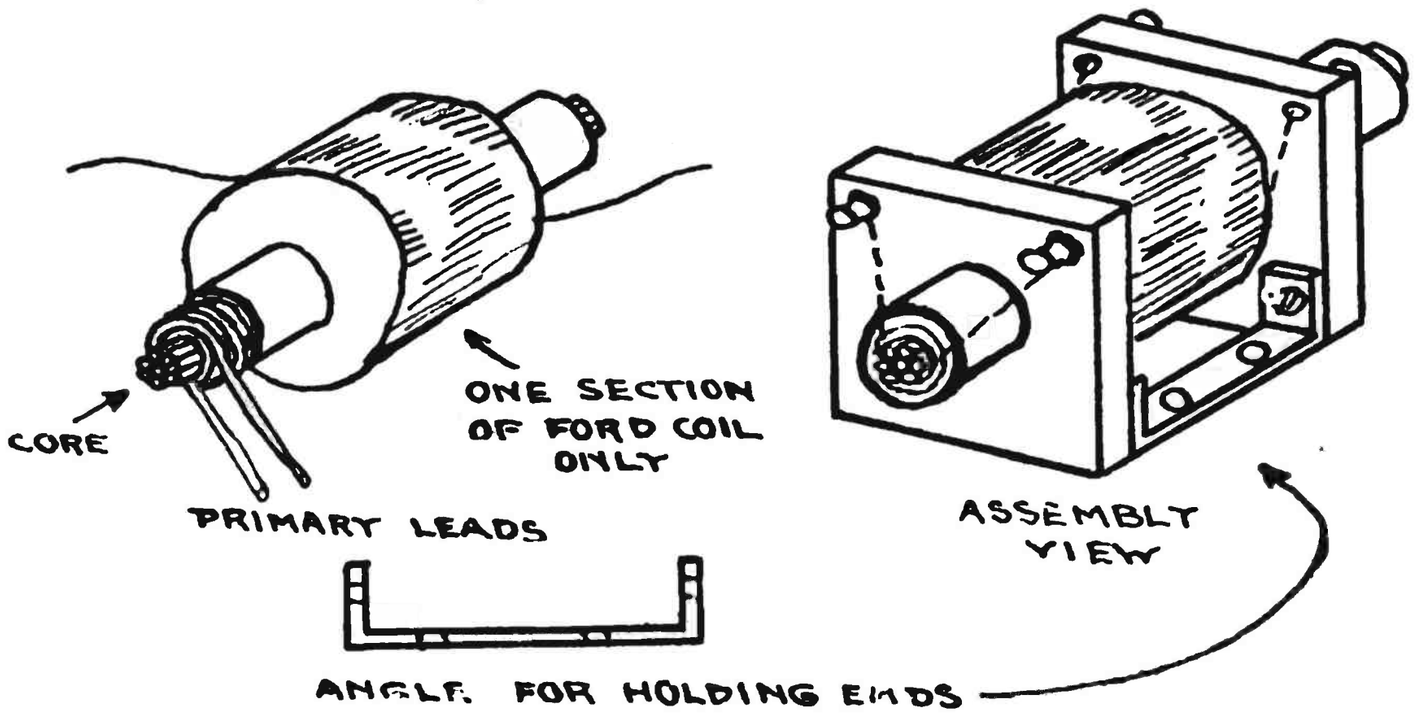
The voices of the evening story-tellers are well known by the small radioites. Some of the broadcasters sound a signal on the telegraph key, giving their call or some single letter indicative of their station besides the customary announcing of the letters.

Methods of announcing the time also serve to establish who is at the transmitter. Those who hear the Louisville "Courier-Journal" say they like the method of telling the time, as the hour approaches, with a simple statement, "Ten o'clock," when the minute hand reaches twelve, better than the standard tick-system of the Naval broadcasting stations.

When the Detroit "News" signs off the exact time is given. This is a benefit to those who have not set their timepieces for the night. Probably the custom will grow rapidly, and familiarity with the voices of broadcasters all over the country, as well as the mottoes and slogans of stations, will extend the acquaintance of listeners-in with the voices of the air.

Utilizing Ford Spark-Coils for Audio-Frequency Transformers

By Ortherus Gordon



Illustrations to guide the amateur in making transformers of Ford spark-coils.

WHEN the time comes to supplement your detector bulb with amplifiers, you will need in addition to the bulbs, sockets, filament rheostats, and two audio-frequency transformers. Any amateur who wishes to avoid paying the price of these transformers may make them himself provided he can get hold of two old Ford spark-coils. Most cities have automobile wrecking companies. Such concerns always have some of these coils on hand at a very low price.

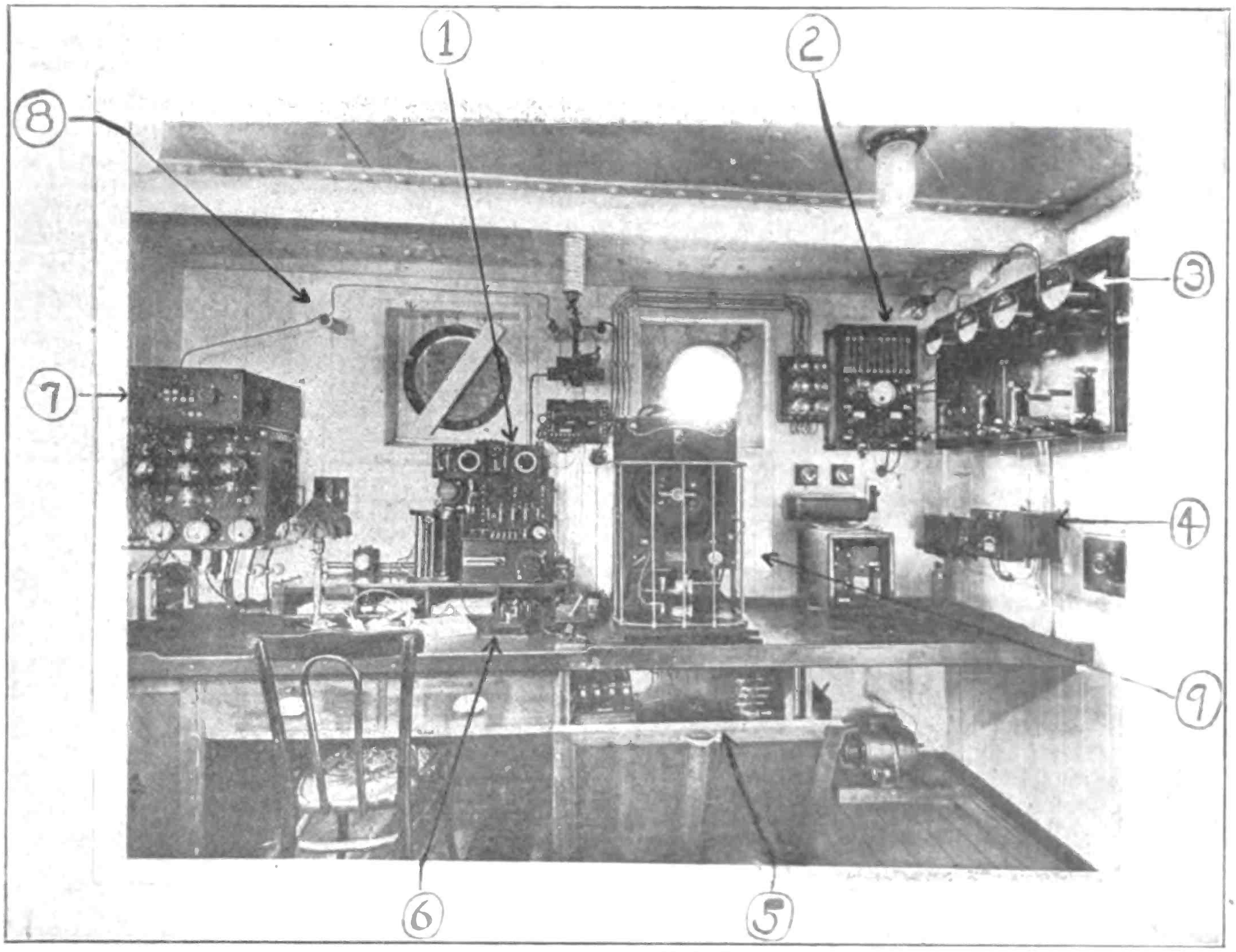
With a little care and discretion, the amateur can pull the coil apart so that he has the primary, the secondary, and the make-and-break device in separate pieces. This done, throw the vibrator into your spare-parts looker and proceed to construct the transformer with what is left. Leave the primary and the core just as they are, but remove one section of the secondary. Ford-coil secondaries are made in two sections. Place the remaining section in the center of the primary, bring the thin wires out free and block the ends with wooden partitions. Then you will have something similar to the design shown in the accompanying illustration.

Put two binding posts on one end and fasten the primary leads to them. The secondary leads may be taken and made fast to binding posts on the other end. A brass piece bent in staple shape, as shown, will serve to hold together the wooden ends and, at the same time, provide a means of screwing the finished transformer down to the table or baseboard. The whole makes a satisfactory audio-frequency transformer.

The Rheostat's Work

IN radio a rheostat connects the storage A-battery with the filaments of the vacuum tube. The rheostat is the valve which permits the operator to increase the electric current going from the storage A-battery to the filament. Rheostats are heat regulators. Heat drives off the electrons from the filament to the plate. When the tube shows a dull red glow the temperature is about 1800 degrees, and electrons are then beginning to be cast off. When the filament is white hot the temperature is 2050 degrees. As each degree of heat is increased from about 1800 degrees a tremendous increased proportion of electrons is cast off.

Elaborate Radio Equipment of the New Italian Liner "Julius Caesar"



(Both photographs C. Kadel & Herbert)

THE "Julius Caesar," the newest of fast ocean liners flying the flag of Italy, has one of the most modern radio sets on any passenger ship. Her transmitting and receiving equipment makes it possible for her to keep in communication with either continent when crossing the Atlantic. The photograph at the top shows the interior of the radio room. The numerals designate the various pieces of apparatus as follows: 1—The receiving gear. 2—Charging panel to keep the batteries charged in accordance with the laws of radio. 3—The main switchboard with its layout of meters. 4—The starting box by which the main motor-generator is set in motion to operate the main transmitting set. 5—The noise-proof cabin where the motor-generator is placed. 6—The main telegraph-key to operate the transmitter. 7—Continuous-wave (C-W) transmitter. 8—The wall; sometimes called the "deck insulators." 9—The wave changer which makes it possible to work on various wave-lengths. These cover all the important parts of the station. The illustration at the left shows Joseph Garosi, first radio operator, sending a radiogram in mid-ocean.

It is of utmost importance to employ all this equipment. When it becomes necessary to work long-distance (DX work) in order to clear the ship's daily traffic of messages, the continuous wave (C-W) transmitter is "cut in" the circuit and used. Not only does this transmitter enable the operator to cover a long range, but, at the same time—due to the wave being continuous—eliminates much of the interference that is found in undamped transmitters. Another feature of the C-W transmitter is this: It functions best when employing the higher wave-lengths. Usually 600 meters are used, but there are times when the transmitter is shifted to operate on a 2400-meter wave-length.

Radiograms

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

RADIO was utilized successfully by a ship's surgeon on the high seas to secure advice for a passenger suffering from heart trouble. Henry W. Kibbe, an official of the Cadillac Motor Company, recently went to Argentine on the Lamport & Holt liner, "Van Dyck," for his health. He was suddenly stricken with rheumatism of the heart. On the return trip he was under the constant attention of two nurses and the ship's surgeon, Dr. A. R. Jenkins, who daily used the ship's radio in consultation with the best heart specialists in the United States in order to safeguard Kibbe's life. The patient was taken to Flower Hospital after the "Van Dyck" docked in New York City.

* * *

So many requests for assistance in solving radio problems have reached the Central Technical School, Toronto, Canada, that a special night-class has been started for instruction in building, operation and general care of radio receiving sets. There is a complete receiving-set in one of the electrical rooms and considerable research work is being done. Two hundred students have a good all-round knowledge of practical radio and are able to construct parts, in addition to efficiently handling receiving apparatus.

* * *

Legislation is about to be enacted in Chili, putting radio on a basis similar to its control in the United States, with broadcasting stations maintained by private enterprise.

* * *

A committee of radio experts in France, which have been conducting research with telegraphy on moving trains on the Paris-Orleans line, reports that its efforts have met with success. A small portable apparatus was used, and long-distance signals were clearly received while the train was moving at high speed. During their experiments members of the committee set up apparatus at some of the stations on the tour and invited farmers and others to listen-in.

* * *

The American Radio Relay League operating department will conduct the third series of transatlantic tests with the cooperation of the English, French and Dutch amateurs in December this year. While no definite dates for the final tests have been decided upon, pending suggestions from England, France and Holland, the probable dates are December 12 to 31, inclusive. During the first ten days of the tests American and Canadian amateurs will transmit signals for reception in England, France and Holland. The best American transmitters, as determined by reception reports from the European amateurs, will be selected to broadcast the result of the reception of signals transmitted by English and French amateurs during the last ten days of the tests, the same as MUU and WII did last year. Transmitting will be from 7 p. m. of one day to 1 a. m., the following day, during the first ten days; "listening-in" will be from 8 p. m. of one day to 2 a. m., the following day, in the second ten-day period.

Weather forecasts sent out by the National Meteorological Office, France, for the benefit of agriculturists, are received on radio sets installed at parish schools or gendarmerie stations, at a cost of 200 francs. Weather warnings are given locally by sounding a bell.

* * *

A series of New England Radio Nights to take place during the fall and winter months, is the latest announcement in the broadcasting programme of the Amrad station. It is planned to devote specified meetings at periodic intervals to certain organizations who will be responsible for the programme during the time allotted.

* * *

Over two hundred Rochester, New York, radio fans have formed the Rochester Radio Telegraph Club, the object being to study the continental Morse code used in the transmission of radio signals. Headquarters have been established at 36 South Avenue. David Ryan, former navy radio instructor, stationed at Pelham Bay, New York, during the World War, will be the instructor.

* * *

The United States is now divided into eight radio districts with a radio inspector under the Department of Commerce in charge of each district. Radio inspectors have offices in Boston, New York, Baltimore, Savannah, New Orleans, Detroit, Chicago and San Francisco. The Department of Commerce has licensed about 20,300 stations, and of this number 3,575 are ship and commercial land stations, 11 trans-ocean, 560 special land stations such as colleges and experimental stations, 565 broadcasting stations and 15,780 amateur stations.

* * *

Montclair, New Jersey, has installed in its high school an aerial equal in size to some of the broadcasting stations. The receiving set is in the physics department and many of the pupils are licensed operators.

* * *

A radio station at Madras, India, will probably be converted into highspeed automatic plant for operation inland and also to Rangoon.

* * *

Over 18,000 ex-service men and women are receiving instruction in radio in the Knights of Columbus schools, New Haven, Connecticut, in special radio classes organized by the K. of C., and through the Knights' correspondence school. The latest figures compiled show that those taking courses in auto-mechanics under the same auspices approximate 35,000; but the proportionate increase in the popularity of the study gives radio a large increase over figures of 1921.

* * *

T. R. McElroy, of Boston, who won the receiving contest in Boston recently, broke his own record with a speed of fifty-eight words per minute, with five errors.

* * *

Portugal has awakened to radio! Consul General Hollis, Lisbon, reports to the Department of Commerce that by a recent bill the Portuguese government is authorized to contract with the Marconi Wireless Telegraph Co., Ltd., for a system of radiotelegraph and radiotelephone stations in Lisbon, the Azores, Madeira, Cape Verde, Angola and Mozambique. The bill provides that this authority must be exercised within three months from the date of approval so that all installations may be complete within four years. The Marconi Company must bind itself to organize a Portuguese radiotelegraph and telephone company, the board of directors of which shall be composed of seven members, five of whom shall be Portuguese citizens. At least two-thirds of the capital of the new company is to be reserved for subscription in Portugal. If this portion of the stock is not subscribed, the unsubscribed portion may be taken up by the government or by any other interest.

* * *

Over 2,000 hours of operating time, conservatively estimated to be worth $150,000, has been saved to navigation interests in the Great Lakes in a single season by radio advice as to weather conditions.

* * *

All ships sailing from American harbors, and carrying fifty persons or over, are required by law to maintain and operate a radio set capable of covering at least 100 miles.

* * *

The broadcasting station of Spokane, Washington, has decided to suspend operations two nights a week so that owners of sets there may hear concerts from outside points

Two Wizards of Electricity Meet

(C. International News Reel)

Thomas A. Edison and Dr. Charles P. Steinmetz, chief consulting engineer of the General Electric Company. Dr. Steinmetz is showing Mr. Edison a piece of wood which, but a few moments before, he had gouged from a limb of a tree with his new artificial lightning-making machine.

Radio and the Woman

By Crystal D. Tector

SINCE the last number of RADIO WORLD went to its readers, I have been besieged with telephone calls in regard to National Radio Week. It is too early for letters, but I expect that by the time I sit down to indite my next "copy" for this department, I will have heard from a great many of you—and I shall try to answer you all as cheerfully as I know you will write me. In fact, I have taken Friend Husband's advice, and engaged a secretary. She will open and sort my mail, and I shall dictate to her, as speedily as possible, answers to all letters that come to me, so there will be no delay. I will gladly help you to perfect any arrangements you have in mind to make The Week a huge success.

* * *

We—and when I use that muchly abused pronoun—I mean a partnership with all radioists who have the best interest of National Radio Week at heart; well, we want this very important event to extend as far as possible—even into every town in the United States. It does seem to me that it should be made a week of social functions—radio dances and dinners and parties—and even radio teas. I can imagine nothing more attractive than a beautiful reception room, flowers and greens everywhere, pretty girls as hostesses, and a receiving set hidden somewhere "exhaling" the most wonderful dance music with songs and recitations in between.

* * *

Teas are very much in vogue, here in the East. In fact, they have become one of the most popular forms of social pastime. The men seem to like them—and although they usually begin about four o'clock in the afternoon they frequently run far into the night. Recently a very charming friend of mine, who is noted for her social affairs, invited me to one of her teas. It was very gay, but she seemed to think that something new would have to be created in order to keep up the interest in such affairs.

* * *

I suggested to her that she give another tea and let me bring my radio set. Well, she knew as much about radio as a kitten, and when I asked her if there was an antenna on the roof, she replied that she didn't know because she "sent all her washing to a laundry!" However, that part of it has been overcome. She lives right in the heart of the most thickly populated section of New York City and pays a rent that would stagger some of us. So, her landlord found no objection when the matter of erecting an aerial on his roof was finally explained to him. She became so anxious that she wanted to give the radio tea within two weeks. The most attractive cards had been prepared and were all ready to be mailed, when I prevailed on her to postpone her event until National Radio Week. She demurred—wanted to be first in the field and all that sort of thing; but when I told her how gay and festive and full of wonder that week would be, she gladly capitulated, and put it off.

* * *

She has asked me to be "hostess of honor." The event will take place on Tuesday afternoon, December 26. The invitations have been designed by a clever artist. The design is a pretty girl sitting before a receiving set and over the invisible ether comes a voice, represented by tiny waves, which is asking, "Will you come to my radio tea?" In one corner are the hostess' name and address, and the date. It is all attractive and neat, and very much in keeping with both radio and what the society reporters are pleased to call "A swell affair." Being a generous person, she has told me that I may go to any cost—and she will foot the bill—if I need anything to improve my set. "Get two sets, my dear, if you need them," was her *naive* remark!

* * *

Friend Husband says that I will wear myself to a frazzle with all I have to do to make her affair a success. He always throws cold water on things I undertake—at first—but he always comes around when I succeed; and I generally do. And I am going to see that this affair does not slip up in any way.

* * *

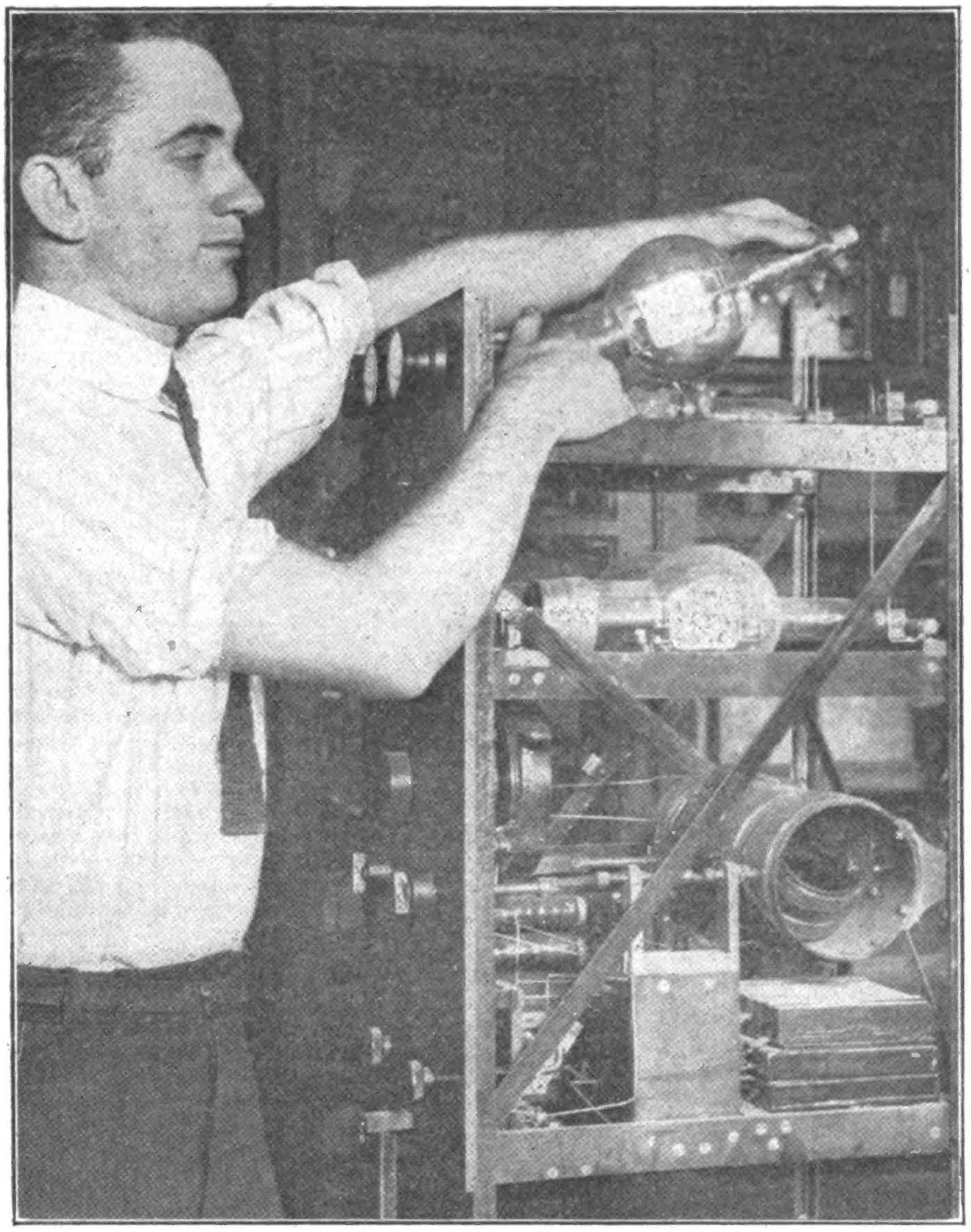
I was mentioning the many telephone calls I have had regarding National Radio Week. I did not mind answering one of them—even if one—a man, at that—called one chilly night at one a. m., and—Friend Husband answered the call! He didn't say anything—just looked! My late 'phone caller wanted to know if I could suggest his name for a position as publicity disseminator. Don't blame the man. He is just a good example of the American spirit. He thought he saw a chance to make some money, and he wanted to be "Johnny on the spot." That man will succeed.

Boy Scouts Will Listen to Radio at Any Time

(C. International News Reel)

Remarkable photograph of a troop of Boy Scouts listening in while a broadcast story is coming over the ether. It is claimed that no other form of entertainment so deeply interests and holds the attention of boys.

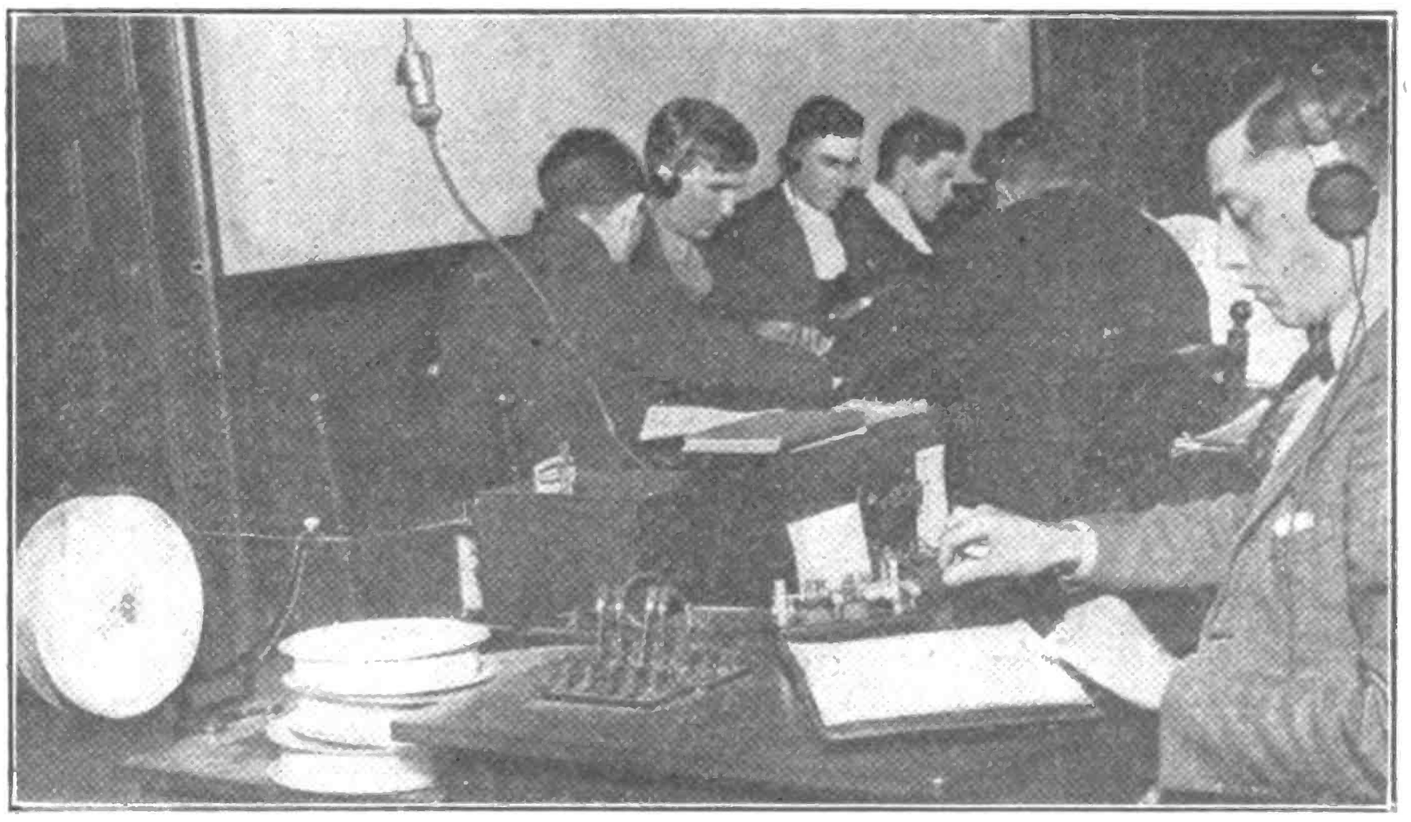
Latest News-Ph
Week i



(C. Kadel & Herbert)

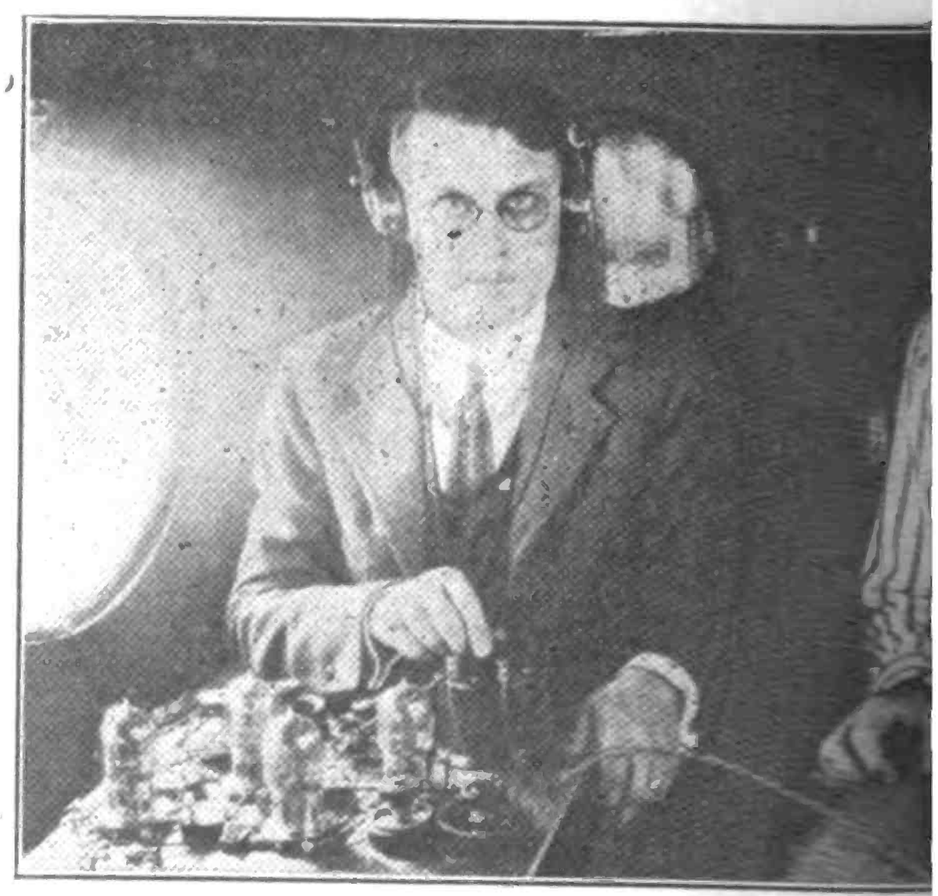
(Above) The 1-kw. (C.-W.) telegraph transmitter shown in this photograph is used in Professor J. N. Morecroft's radio laboratories at Columbia University, New York City. Its output is as powerful as that of the leading broadcasting stations. Charles J. McCarthy is seen replacing one of the big vacuum-tubes.

(C. International News Reel)



(C. Kadel & Herbert)

(Above) A Y. M. C. A. class in high-speed code receiving. To become proficient in this phase of receiving requires considerable study and patience. The photograph shows J. L. Hornung, instructor of the class, giving some of the students under him an hour of hard work. Mr. Hornung is using a vibroplex high-speed key, used only by expert operators for transmitting signals. It is known as a "time-saver" when fast transmitting has to be done. These keys are used in all large radio-stations in the United States. It takes the average student abou[illegible]r to learn code, although some have perfected themselves in six months.



(C. Central News Photo Service)

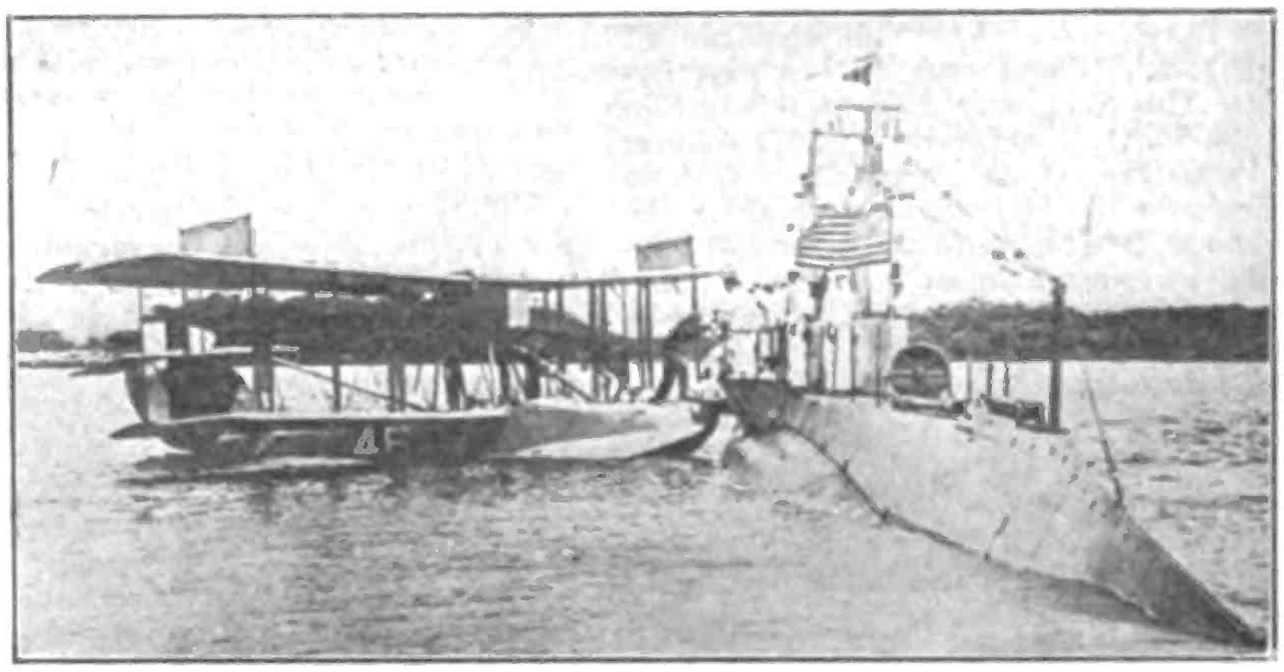
(Above) The interior of the after cabin of the flying bo Miami, Florida; Cuba, and the West Indies. The photograph in a small space, but the completeness of it has rendered mos "boat." Note the big loop aerial and the receiving set. Tes withstanding the noise made by the propellers of the flyin is distinctly heard.

...otos of a Busy Radio

(Right) When the Prince of Wales recently sent a radio message to the Boy Scouts of Great Britain, the event was regarded as something of unusual radio importance in his country. The prince has become a radio fan and has induced his royal father to install a set in St. James Palace. The photograph shows a company of Scouts listening to the message.

(C. Central News, Ltd., London)

(Left) Thomas A. Edison, on his first visit in twenty-five years to the General Electric Company's plant at Schenectady, New York, was introduced to some of the most recently developed tubes used in connection with radio broadcasting and reception. Mr. Edison is shown in the photograph with the new Langmuir 20-kilowatt vacuum tube which successfully hurled a radio message across the Atlantic, at the left is George F. Morrison, vice-president of the General Electric Company, in charge of the Edisor lamp works at Harrison, New Jersey. In the center is Dr. Irving Langmuir, radio research engineer, of the General Electric Company, who invented the 20-kilowatt tube.



(C. Kadel & Herbert)

(Above) The first passenger in the world to be transferred to a submarine from an airplane was Secretary of the Navy Edwin L. Denby. The submarine was summoned to its position by a radio message from the airplane.

...'Buckeye, operating between ...ows a lot of radio apparatus ...fficient service on the popular ...perators are in charge. Not- ...oat, reception—even music—

(Right) Alan Edwards, formerly a radio engineer, is now singing and acting his way to fame in "The Gingham Girl," one of New Yorks successful musical comedies. He is the proud possessor of one of the smallest radio sets in the world. It has a two-bulb regenerator honeycomb-coil, a detecter, a two-stage amplifier, and can be tuned to 2,500 meters. It is built into a soap box which is covered with leather—the finished article closely resembling a camera. At a recent radio show in New York, this set won first prize. Between the acts of every performance, Mr. Edwards entertains the other members of the company with concert music and other broadcast numbers. By leaving the door of his dressing room open, the broadcast program wafts through the "back of the stage" area. Mr. Edwards, as one may surmise, built his prize set. He has also built similar sets for Richard E. Enright, Commissioner of Police, New York City; Miss Pearl White, the moving picture star; Miss Nora Bayes, singer of popular songs; and others. He is a young man of many talents and a staunch believer in radio.

(C. Central News Photo Service)

Latest Radio Patents

R. A. Heising Has New Device to Detect Radio Signals

No. 1,432,622. Patented: October 17, 1922. Patentee: Raymond A. Heising, East Orange, N. J.

IT has been customary, prior to my invention," says Mr. Heising, in his patent papers, "to provide, for heating the cathode a direct current source such as a battery or direct current generator. The external circuit connections to the cathode have been generally made to one side of the filament. As a result, all parts of the filament have not been of the same potential with respect to the anode or the grid, the difference between extreme ends being equal to the voltage impressed upon the filament. Where a source of direct current is employed, this voltage, or difference of potential, is constant and,

Fig 1.

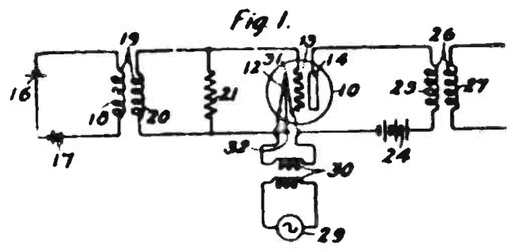


Fig. 2.

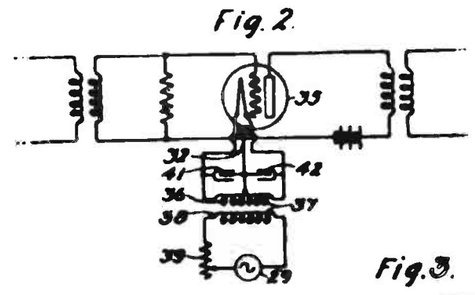


Fig. 3.

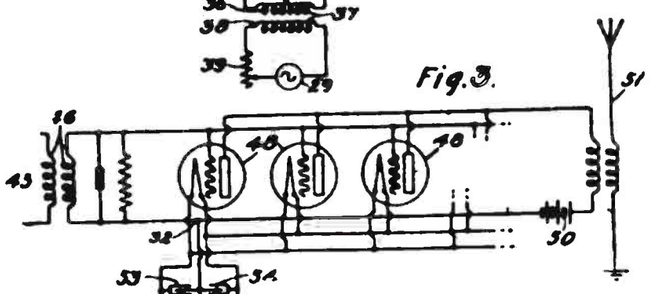


Fig. 4.

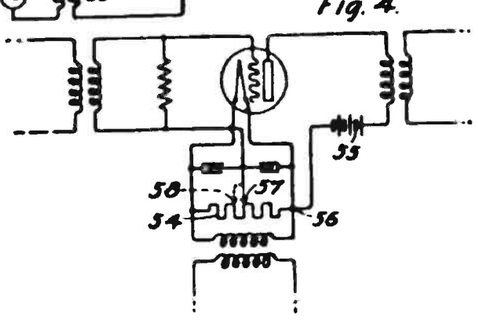


Figure 1 represents an embodiment of this invention shown in connection with an electron discharge device. Figure 2 is a modification of Figure 1. Figure 3 shows how this invention may be applied simultaneously to a plurality of electron discharge devices. Figure 4 illustrates how a non-inductive resistance may be employed to obtain the desired average potential of the filament with respect to the grid and cathode.

therefore, will not produce variations in the operation of the device. It is, however, more convenient, in some cases, to employ an alternating current for heating the filament, this being particularly true when a large number of such tubes are operated simultaneously, requiring a considerable amount of power for the heating of the filament. Upon the substitution of such an alternating current heating-source for the filament, the variations of potential difference between the grid and filament or the plate and filament, which are thereby introduced may seriously affect the efficient operation of the device."

The object of Mr. Heising's invention is to provide an improved circuit connection for electron discharge devices, whereby alternating current may be employed for heating the filament. Current for heating the fil[illegible]nt is obtained directly from an alter[illegible]rrent generator or from the second[illegible]nsformer, and the connections from anode and grid to the cathode are made to some point in the filament circuit which has a potential equal to the average potential of the filament which in general, is that of the middle point of the filament. When the connections are made in this way, the average voltage or difference of potential at any instant between different portions of the cathode and the grid, and the anode, due to the heating current, will be zero.

* * *

Requires One Pair of Electrodes

No. 1,431,393. Patented, October 10, 1922. Patentee: Alphonsus L. Golden, Alameda, Calif.

THIS is an oscillator for the production of high-frequency oscillating currents for radio. The inventor claims that it is simple, compact, and easily

Fig. 1

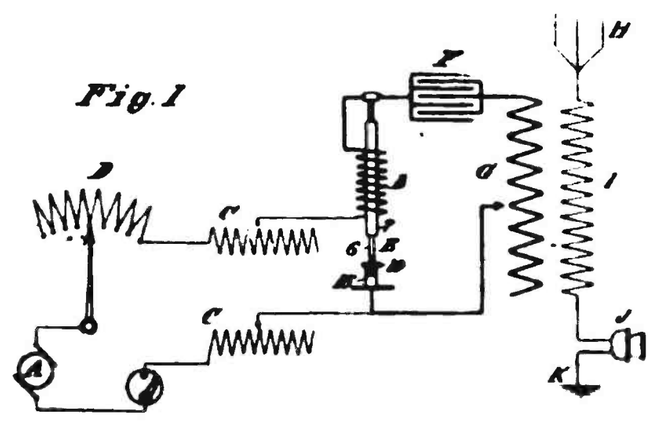


Fig. 2

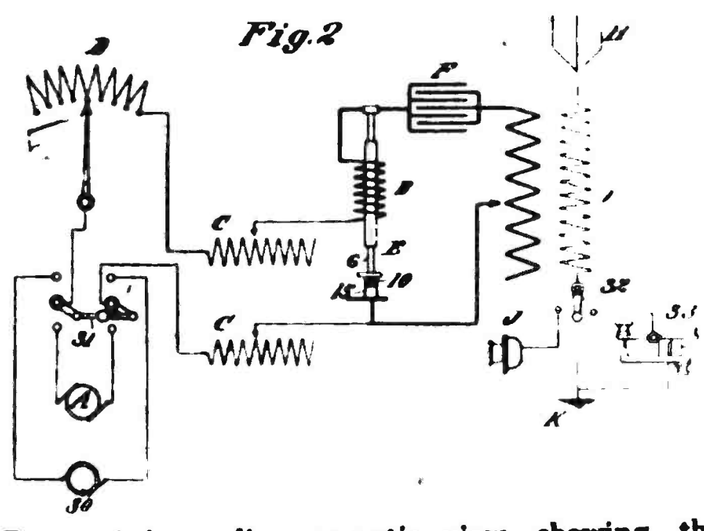


Figure 1 is a diagrammatic view showing the different apparatus employed in the wireless telephone system. Figure 2 is a diagrammatic view showing a wireless system capable of employing either direct or alternating current and adapted to be used either as a wireless telephone or telegraph.

operated and adjusted. It requires only a pair of electrodes to produce the same amount of smooth, uniform high-frequency oscillations heretofore produced by oscillators with several pairs of electrodes.

* * *

Receiver for Radio-telegraphy

No. 1,429,572. Patented, September 19, 1922. Patentee: Henri Jean Joseph Marie de Reginauld de Bellescize, Toulon, France.

HENRI JEAN JOSEPH MARIE DE REGINAULD DE BELLESCIZE, a French inventor, has received letters patent for a circuit receiver—an ordinary receiver mounting, which comprises a closed circuit conductively connected by means of a self induction with the self induction of a second closed circuit, to the terminals of which the detector and indicator are connected. The primary may be with a closed antennae, for example a frame, or an intermediate

Fig. 1

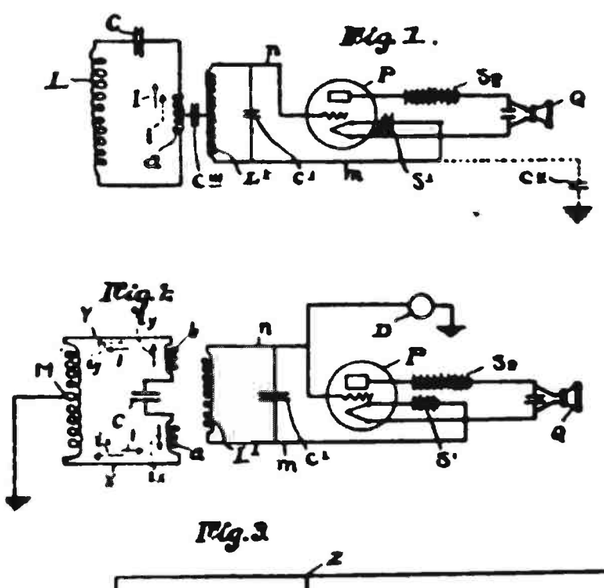
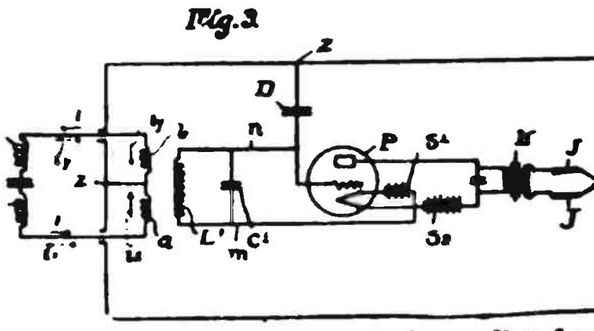


Fig. 2



Three schematic diagrams of the radiotelegraphy receiver of M. de Bellescize.

circuit actuated by other circuits not shown.

This invention, it is claimed, will be useful in the construction of radiotelegraphic receivers comprising a self-inductor and a capacity forming an oscillating circuit in connection with an indicator cidcuit. A method consisting of balancing the external electrostatic actions on all of the elements of the receiving apparatus, so that these actions may be distributed symmetrically with a respect to the capacity is an important element.

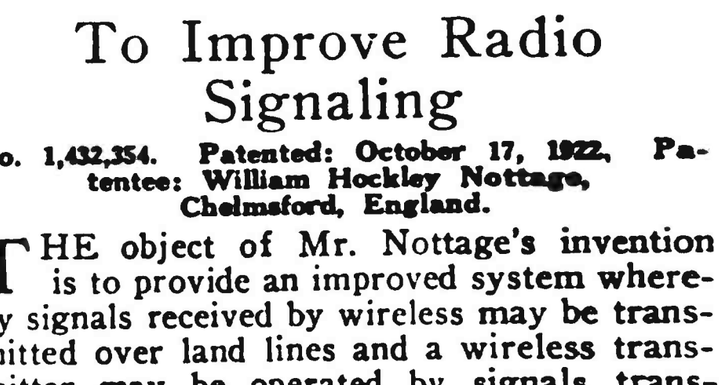
* * *

To Improve Radio Signaling

No. 1,432,354. Patented: October 17, 1922. Patentee: William Hockley Nottage, Chelmsford, England.

THE object of Mr. Nottage's invention is to provide an improved system whereby signals received by wireless may be transmitted over land lines and a wireless transmitter may be operated by signals transmitted over land lines.

A Wheatstone bridge is used, the each of two adjacent arms of which are formed of



In the above diagram A, B, C, D is a bridge, two arms, A and B, including the secondary windings A′ and B′ of two similar transformers, the windings preferably being of high inductance. R and R′ are resistances included in Arms A and B for purposes of balancing. In the other arms C and D are two impedances, such as condensers C′ and D′, one or both being variable; they may conveniently be air condensers of the kind used in radio telegraph receivers.

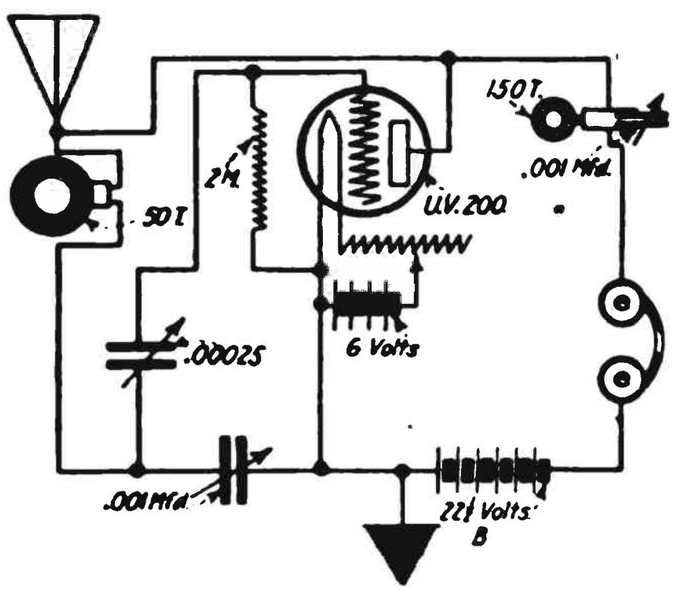
one winding of a transformer, such, for instance, as those used in land-line telephony for connecting the receiver to the line. To two opposite junctions of the bridge are connected the wireless receiver and to the other two junctions are connected the wireless transmitter. The land line is connected to the other winding of the transformer of one arm.

Testing Out Mr. Miller's Hook-up

EDITOR, RADIO WORLD—In response to your request regarding the results obtained from the single duo-lateral coil set shown in RADIO WORLD, No. 30, dated October 21, I take the liberty to send you the following report:

I found it necessary to make the following changes in the hook-up, which, I judge, will be obvious to you, and am giving my diagram to illustrate them.

I changed the position of the grid leak, as, in the position shown in your diagram, it acted as a high resistance conductor for



Schematic diagram, showing changes made in Mr. Miller's hook-up by Frederic W. Proctor.

the B battery current, which, flowing into the grid as it naturally would, paralyzed the circuit.

I also placed a tuned circuit in the plate lead to the telephones. I hope that these changes may be of interest to you. The results obtained on an ordinary antenna and ground were good.

This is not a modification of the "Colpitt's" transmitting circuit.—Frederic W. Proctor, The Ambassador, New York City, N. Y.

* * *

DITOR, RADIO WORLD—In RADIO WORLD, No. 30, dated October 21, I noticed the hook-up of a simple one-tube radio receiver. Credit for originating this hook-up was given Mr. Miller of Dallas, Texas. While experimenting with this circuit, I have found a number of ways to improve it, with the result that I now have a receiver that, though extremely simple, is remarkably efficient. I thought that possibly you and your readers might like to know of this little set; for I have obtained unusual results with it.

The objection to the circuit, as you published it, is that it is too critical, necessitating an extremely careful adjustment of the condenser. To overcome this, I tried a vernier condenser. This was better. However, when two stations were coming in at practically the same point, I could not hear very plainly; so I discarded the vernier, and instead of a honeycomb coil I used an inductance constructed as follows: 90 turns of 26 D. C. C., wire wound on a 3-inch tube, 5 inches long. These windings occupy about 2½ inches of the tube. Leaving a space of about 1 inch on the tube I wound 2 turns more, skipped ¼ inch and wound 3 turns more. These last 5 turns form the stator of a miniature variometer, the rotor of which has 6 turns of wire on a 2½-inch tube 1 inch long.

This variable inductance enables me to make very critical adjustments with little effort, so that I can now tune in or out any station within my receiving range. I have found that a .0005 variable condenser is best; also that a grid condenser of .0005 mfd. capacity gives louder signals than one of .00025 mfd. capacity. No grid leak is necessary.

Now for the best part of this tale. Instead of using an ordinary 6-volt vacuum tube, with its expensive and bulky storage battery, I am using a Westinghouse WD-11 "Peanut" tube, and the results are more than satisfactory. Using this receiver, which fits in a cabinet approximately 9 inches square (both B and A batteries go in this cabinet, too), I have heard the following stations: KDKA, Pittsburgh; the "Detroit News," Detroit; KSD, St. Louis; WOC, Davenport, Iowa.

The cost of this receiver is less than $20.00.—E. C. Taulbee, 2426 Homan avenue, Waco, Texas.

* * *

EDITOR, RADIO WORLD—I have been using the circuit published in RADIO WORLD, No. 30, dated October 21, page 19, for about a year. It is a dandy! I heard Los Angeles, California, twice on one tube only. My aerial is 100 feet long and 30 feet high. I am using a variometer in place of the D-L 50-coil and a variable grid-leak with variable grdi-condenser. A plate variometer with a 3,000-ohm choke coil in plate circuit increases the signal strength. I am using a 201 tube and a 60-volt B battery.—William F. Kaiser, M.D., 484 East 23rd street, N., Portland, Oregon.

Advertising Rates, Display, $5.00 per inch, $150.00 per page

Radio Merchandising

Classified Quick-Action Advertising, 5 cents per word

Telephone Bryant 4796

Let "Radio World" Test Your Goods

MANY buyers of radio goods have been "STUNG." At some time they bought something that was not right or would not work.

Inexperienced manufacturers have rushed into the manufacture of radio goods in the past eight months while the public in its eagerness to buy has been willing to take almost anything. Buyers are now twice shy and cautious. They want to KNOW the goods are right before parting with their money.

Our seventy thousand radio buyers who read RADIO WORLD each week, have faith in it. They know that RADIO WORLD does no merchandising, has nothing to sell, that its opinions cannot be bought. Therefore, RADIO WORLD'S endorsement means something.

Manufacturers, send a sample of your goods to our Technical Editor, Fred Charles Ehlert, 9006 Pleasant Street, Queens, Long Island, N. Y. It will be carefully tested and returned. If your goods satisfy our experts, RADIO WORLD S endorsement will bo published in our merchandise department without charge or obligation of any kind on your part. When the radio purchaser sees a published test in RADIO WORLD' with the seal accompanying this editorial attached, he will know that the product stands for perfection and has the guarantee of RADIO WORLD.

22 Exhibitors Already for American Radio Exposition

TWENTY-TWO representative manufacturers have already contracted for space in the American Radio Exposition to be held at Grand Central Palace, New York. City, December 21 to 31 inclusive.

These firms are the following:

Western Electric Company, Inc., New York City.

Radio Corporation of America, New York City.

C. Brandes, Inc., New York City.

National Carbon Company, Long Island City, New York.

Novo Battery Company, New York City.

Sleeper Radio Company, New York City.

General Insulate Company, Brooklyn, New York.

Sound Wave Corporation, Brooklyn, New York.

Pacent Electric Company, New York City.

Stromberg - Carlson Manufacturing Company, Rochester, New York.

Holtzer-Cabot Company, Boston.

National Airphone Corporation, New York City.

Clapp-Eastham Company, Cambridge, Massachusetts.

Hutchison Radio Company, New York City.

Henry Hyman & Company, New York City.

DeForest Radio Tel. & Tel. Co., Jersey City, New Jersey.

Dubilier Condenser Co., Inc., New York City.

In addition to the twenty-two contracts mentioned, nineteen more of the principal manufacturers have made reservations for space.

Heard at the Radio Counter

A Conversation Between Customer and Radio Clerk

(Part IV)

I AM seeking information regarding my aerial and would like to know if you can help out a good fan."

"Shoot! I'll tell you anything regarding aerials if within my power, Mr. Customer."

"Well, I own my house and have erected an inverted L about seventy-five feet long, directional north by east, fifteen feet high from the top of a fifteen-foot pole—which is at the front of the house—to another fifteen-foot pole erected on the house in the rear of mine. Now, when I use this aerial, I can only get the broadcasting station from a certain direction and, sometimes, find it hard to tune. Signals are also of a weak nature. The receiver is O. K."

"May I ask what your roof is made of?"

"The roof is of tin—on both houses."

"Well, I'll explain your trouble regarding weak signals. When your aerial is in operation, one may say that the earth, or ground, is your roof due to the fact that the tin roof is grounded. It acts, in this case, as a ground. Try and get your aerial so it lays in a position over the actual ground. Point your aerial towards the station you wish to hear. Take off the lead-in at the nearest end of this wire. Use about seventy-five feet and try out your set. I am sure this will aid you in every respect."

"Thank you for this advice and, by the way, give me three small electrose insulators."

"Right! Here they are—and success to the remodeling of your antenna."

"Good-bye."

(To be continued)

Stable Firms Will Aid Radio

A SHORT time ago, one of the leading manufacturers of automotive equipment appeared on the radio horizon with a new line of well-designed and exceptionally well constructed apparatus. Every part of the equipment exhibited the thought and care of an established manufacturer of precision mechanisms, says "The Globe," New York.

Within the last few days a second manufacturer whose name is synonymous with old-fashioned conservatism appeared in a small way as a maker of refined radio parts. This firm, like the first, had appreciated the business that awaited them in the radio industry, but unlike a large proportion of manufacturers that have sprung up over night, these old time concerns were satisfied to wait until they had perfected a line of goods that they knew were right.

Still a third company, long affiliated with things electrical, is reported to be deeply interested in the invention of a scientific worker in the east. This invention, if found to do all that its discoverer claims for it, will go far toward relieving the intense patent situation that has been the bogeyman of radio manufacturers and dealers.

New Firms and Corporations

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

American Lamp-o-Phone Corp., Manhattan, make phonographs, $50,000; H. H. Stevens, M. H. Elvidge, F. Riera. (Attorney, L. J. Feinstein, 47 West 34th St., New York.)

Ipco Electrical Sales Co., Manhattan, electrical contracting, $10,000; H. E. Kreindler, F. Padwe. (Attorney, L. Perkin, 261 Broadway, New York.)

Sta-Brite Electric Corp., Manhattan, $10,000; same as preceding.

Associated Radio Manufacturing, New York, $760,000. (U. S. Corporation Co.)

Capital Increases

The Bakelite Corporation, New York, has increased its capital stock from $3,100,000 to $5,100,000.

Radio Real Estate Corp. of America, Manhattan, $2,000,000; S. B. Howard, G. V. Reilly, H. C. Hand. (Attorney, S. Ryan, Albany, N. Y.)

Jaworsky Electrical Co., Buffalo, supply business, $25,000; L. A. Jaworsky, M. Polcyn, J. Mayer, Jr. (Attorney, A. B. Borkowsit, Buffalo, N. Y.)

Change of Name

The Philadelphia Radiophone Company has changed its name to Durham & Co., Inc.

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.

SECOND NATIONAL RADIO EXPOSITION, direction International Trade Exposition Co., Chicago, January 13 to 20, inclusive, 1923, George A. King, director of publicity, 417 South Dearborn Street, Chicago, Ill.

PERMANENT RADIO FAIR FOR BUYERS, Hotel Imperial, New York City. Open from September, 1922, to May, 1923.

AMERICAN RADIO EXPOSITION, Grand Central Palace, New York City, December 21 to 31. Colwell & Korbell, Fisk Building, New York City, directors of publicity.

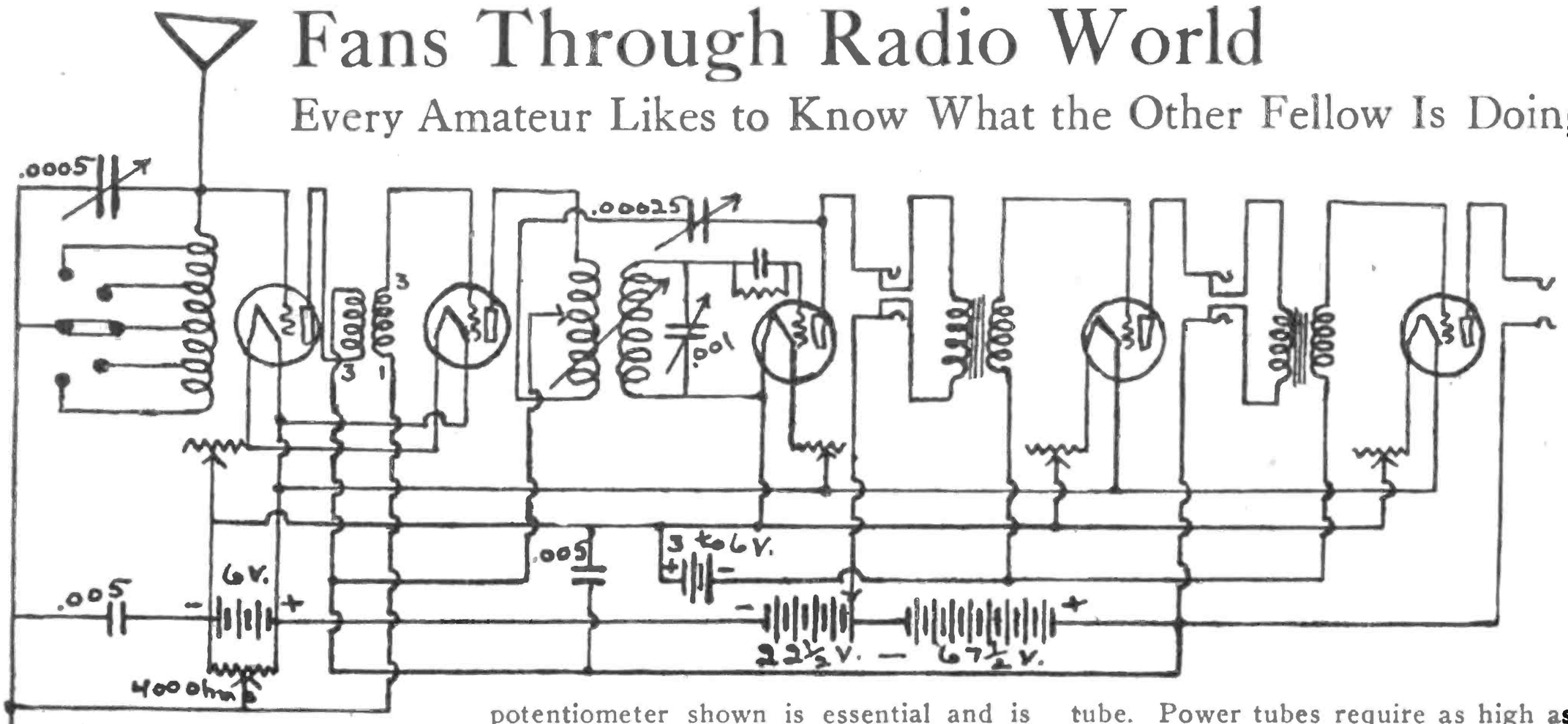
INTERNATIONAL RADIO SHOW, Madison Square Garden, New York City, November 20 to 25, inclusive. E. C. Buchignani, director of publicity.

SOUTHEASTERN RADIO EXPOSITION, Auditorium Armory, Atlanta, Georgia, December 4 to 9, inclusive. Co-operative Radio Sales Assn., 295 Peachtree St.

SECOND DISTRICT RADIO CONVENTION, Hotel Pennsylvania, New York City, March 1, 2, and 3, 1923.

Share Your Radio Knowledge with Your Brother Fans Through Radio World

Every Amateur Likes to Know What the Other Fellow Is Doing



Schematic design of Mr. Lovegren's circuit which he offers to readers of Radio World and which has given him satisfactory results.

IN response to RADIO WORLD'S request for any interesting constructive work in radio that might have been perfected by its readers, Mr. F. W. Lovegren, Box 649, Virginia, Minnesota, sends the accompanying circuit which he has been using for some weeks and which, he declares, is hard to equal. "This hook-up," writes Mr. Lovegren, "is not original, but is the Radio Corporation of America circuit with changes."

This circuit, he further declares, is very desirable for the following reasons:

1.—It gets all the stations.
2.—It is extremely selective.
3.—It diminishes static considerably.
4.—It does not radiate.

"For day time receiving," writes Mr. Lovegren, "I have heard WJAP, WWJ, WLAG, WBAH, WOC, CJCG and several others loud enough to be audible half a block from the Magnavox. Using *no* antenna but simply the usual ground connection, I have heard WSB, WHB, WOR, WDAP, KYW, and others too numerous to mention, loud enough, without exaggerating, to be audible a block away. I need not mention what it will do using the regular aerial."

Description of the circuit is as follows:

The antenna inductance consists of 100 turns of No. 20 or No. 22 wound on a 3½ inch tube, tapped at every 10 turns. The condenser may be either used in shunt, as illustrated, or may be in series with the antenna. No condenser is necessary across primary of the vario-coupler, the tuning being done by the secondary condenser and the coupling. Regeneration in this circuit is accomplished by an .00025 mfd., variable condenser which is inserted between the plate of the detector and primary of coupler.

This is an excellent means of controlling regeneration. It will be found that little will be required in this circuit. The detector is not critical in adjustment, therefore no vernier rheostat for the filament or potentiometer, for fine control of plate voltage, are necessary. The potentiometer shown is essential and is used to obtain the proper negative potential on the grids of the radio frequency amplifier tubes. This should have a resistance of 400 ohms for fine control although 200 ohms will function quite satisfactorily. The bias battery shown **is not absolutely necessary, but maximum amplification will be had only with its use. The proper value will be found by experimenting. From 3 to 6 volts will be required for the UV-201 amplifier** tube. Power tubes require as high as 10 volts.

For broadcast reception, a brief summary of tuning this circuit is as follows: For a 150 foot aerial, use 50 or 60 turns on antenna inductance with condenser at about 10 on the dial. Set coupling at maximum; use 50 turns on primary; set secondary condenser between 35 and 45 and the feed-back condenser about midway. The rest of the tuning is easy.

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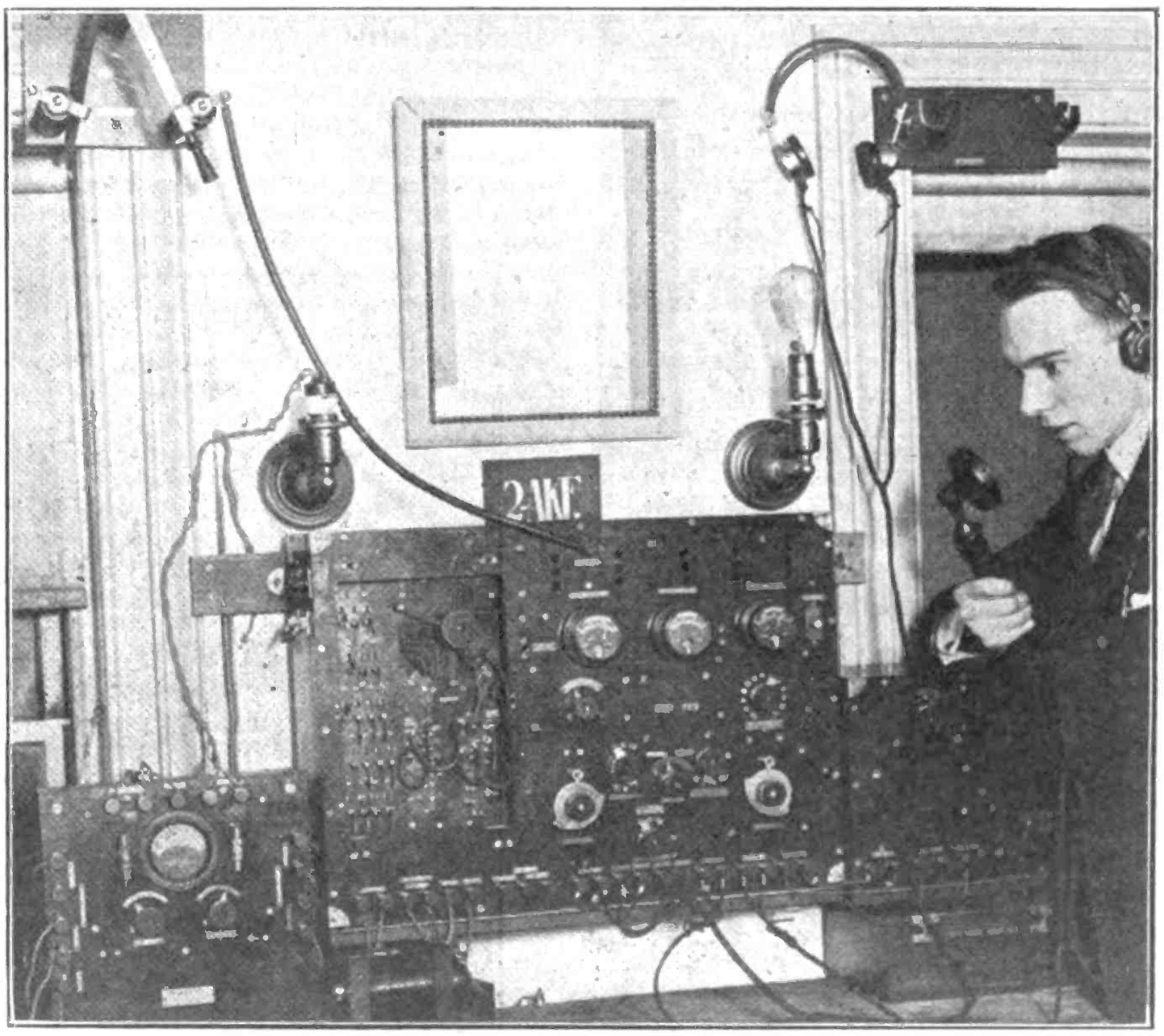

(C) Kadel & Herbert

Here is a photograph of Sterling G. Sears and a United States submarine-chaser radio-set, valued at $2,100 which he purchased for $175. This is one of the finest receiving and sending sets made. Recently, the Navy called for sealed bids on this set and Mr. Sears's bid of $175 was accepted. On the extreme left may be seen the power-panel for generator-control filament and plate supply. Next to this is the transmitting unit. Note the multiple-switch tuning section for antennae adjustment and the vernier helix. In the same cabinet with the transmitting unit is the receiving unit which covers a wave-length range from 150 to 600 meters and, also, two stages of audio-frequency amplification. In the cabinet on the extreme right are three additional stages of amplification.

Broadcasting Still Grows

Fifteen New Stations Bring Total Up to 565

SOME pessimists predicted that broadcasting would begin to drop off in this, the second, year of radio; but to-day there are 565 stations using the 360-meter wave and 15 Class-B stations operating on the new 400-meter wave, assigned to the larger stations giving high-class programs. There is no indication that this means of disseminating educations, news, music and many other forms of entertainment will cease; on the other hand, it seems to be growing, and continues to be one of the most popular American pastimes. With broadcasting as general as it is, stations now operating in every state, the popularity of radio, with the listeners-in, at least, is assured, and initiated neophytes join the numberless throng daily.

Last week fourteen new stations took up broadcasting on 360-meter in as many states. One—the Atlanta "Constitution"—joins the elite class of B stations on the 400-meter wave.

Supplemental List of Limited Commercial or Broadcasting Stations on 360 Meters.

WQAP—American Radio Co., Lincoln, Neb., 500 watts.

WDAG—Apollo Theatre, Belvidere, Ill., 20 watts.

WQAA—Horace A. Beale, Jr., Parkesburg, Pa., 500 watts.

KFBS—Chronicle News & Gas & Electric Supply Co., Trinidad, Colo., 150 watts.

KFCH—Electric Service Station, Billings, Mont., 10 watts.

WOAD—Friday Battery & Electric Co., Sigourney, Iowa, 50 watts.

WNAM—Ideal Apparatus Co., Evansville, Ind., 500 watts.

WGAK—Macon Electric Co., Macon, Ga., 50 watts.

WOAC—Maus Radio Co., Lima, O., 100 watts.

KYG—Radio Service Bureau, Inc., Portland, Ore., 100 watts.

WNAR—C. C. Rhodes, Butler, Mo., 200 watts.

WNAN—Syracuse Radio Telephone Co., Syracuse, N. Y., 250 watts.

WOAB—Valley Radio, Grand Forks, N. D.

WWAX—Worman Bros., Laredo, Texas, 100 watts.

Limited Commercial Class-B Station, 400 Meters.

WGM—Atlanta "Constitution," Atlanta, Ga., 500 watts.

List of Radio Stations Published

AN index to commercial and government radio stations of the United States nas just been issued by the Department of Commerce, and is available to the public for fifteen cents at the office of the Superintendent of Documents at the Government Printing Office, Washington, D. C. It gives complete lists of all commercial and government stations, both on land and sea, licensed up to June 30, 1922, including the broadcasting stations. The list of amateur stations is still on press, but will soon be available for distribution by the Superintendent of Documents at about 25 cents a copy.

College Courses in Radio

A HOME course in radio is being given by the extension department of the University of California. The course has been prepared in a style that can be easily understood by the average broadcasting fan. This is not the first home study radio course, however. Last year the University of Wisconsin—one of the first educational institutions to popularize radio—prepared an excellent popular treatise on radio which they distributed at nominal cost to residents of the state.

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That Armstrong Circuit

So much interest has been displayed in the special article, "TESTED INVENTION OF MAJOR ARMSTRONG AMPLIFIES SET 100,000 TIMES," by John Kent, that appeared in RADIO WORLD No. 12, dated June 24, 1922, the publisher decided to put aside a number of copies for those who were not able to get this issue when published. Copies will be sent, postpaid, on receipt of 15c. or send in your subscription, $6.00, for one year (52 issues), $3.00 six months, or $1.50 three months, and subscription will be started with the issue containing the article about Major Armstrong's Amplifier.—RADIO WORLD, 1493 Broadway New York.

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

Radio Talks by Naval Officials

THROUGH the co-operation of the Naval Communication Service and the American Marine Association radio talks will be broadcasted by representatives of the Navy Department in Washington from November 8 to 11.

A large radio receiving-set and loud-speaker was installed at the Grand Central Palace, New York, by the naval radio experts, and the talks broadcast from Washington are available Wednesday, Thursday, Friday and Saturday evenings of this week for those attending the American Marine Association Show. The broadcasting will be done from NAA, Arlington, over the new radiophone set at 2050 meters.

The speakers selected include Admiral Coontz, chief of operations; Rear-Admiral Robison, engineering; Rear-Admiral Washington, navigation; Rear-Admiral Moffett, aeronautics; Captain McNamee and Captain Overstreet. It is understood that each of the speakers will talk on subjects under his direction in the Navy Department in connection with sea transportation.

The United States Naval Band, well known to those who pick up NOF, will play several selections each evening during the latter part of the exposition week.

At this, the second American Marine Exposition, the Department of Commerce has radio exhibits in connection with the work in the Light-House Service, the Bureau of Standards and the Radio Section, an inspector being detailed to explain the work of the department to those interested. Exhibits are also planned by the Navy and Shipping Board.

Radio As You Ride

ABOUT the first thing the radio novice learns is that to operate his receiving set he requires a long antenna suspended high in air and a "ground" connection to establish an electrical circuit through the surface of the earth, says Henry Smith Williams, in "The American," New York.

The establishment of this antenna system is much the most difficult part of the work of installing a radio receiver. So it is rather hard to get away from the idea that it is an essential part of the radio mechanism. Yet in reality it is quite feasible to do away with this cumbersome apparatus altogether, provided certain other conditions are met. These alternative conditions involve merely the making of a receiving apparatus that is more sensitive than the one with which the novice usually starts.

In a word, it is necessary to have an electron tube (triode) amplifier, preferably more than one of them.

With one or more such tubes installed before the "detector" tube we obtain what is called radio-frequency amplification. Messages that would otherwise be too faint for recognition are amplified to the stage of audibility, and radio messages of ordinary intensity may be received on a small loop aerial, no cumbersome antenna being required.

Almost any coil of wire will serve for such a loop aerial. Five-inch coils have been used, but ordinarily it is expedient to use a loop of about two or three feet in diameter. No "ground" connection is required. The apparatus is self-sufficient.

The convenience of such an apparatus, which can be installed on a card table in your drawing room or office, with no bother about wires up on the roof or water pipe "ground" connections, is obvious. Moreover, you may adjust the entire apparatus on your automobile if you wish and "listen in" as you ride anywhere within a hundred miles or so of the broadcasting station.

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

At Your Service!

There appeared in RADIO WORLD, dated April 1, 15, and 29, the following articles.

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 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 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 I. Rumford.

Each copy sent on receipt of 15c. per copy, or the three issues for 45c.; or better still, send your subscription beginning with any one of these issues and we will send this paper to you and you will then have a complete and constant reference. Address 1493 Broadway, New York.

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Governmental Communication Experts to Meet

AT the request of the Department of State each governmental department interested in radio communication has appointed a representative to serve on an inter-departmental committee for the consideration of problems of international electrical communication. At a meeting, soon to be called in Washington, the several members of the United States Committee will study the problems to be considered at the International Conference to be held in Paris.

The membership of the committee follows:

Post Office, Paul Henderson, Second Assistant Postmaster-General.

War Department, Major-General George O. Squier, Chief Signal Officer of the Army.

Department of Commerce, P. E. D. Nagle, Communications Expert of Signal Corps, U. S. A.

Navy Department, Rear-Admiral H. J. Ziegemeier, Director of Naval Communications. In his absence Rear-Admiral Joseph Strauss will be available for this service.

United States Shipping Board, F. P. Guthrie, in charge of Radio Service.

The State Department representative has not been designated.

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Great Range Covered with Amateur Waves

NOT long after radio communication passed from an experimental to a practical stage, and numbers of stations began to spring up, both on land and on sea, says "The Globe," New York. It became necessary to enact certain laws placing definite restrictions on transmitting stations, in order to prevent as much as possible, the interference that would naturally follow. The most important step in this direction was the assignment of wave lengths and power input. To many amateurs, the radio laws of the United States seem rather drastic, but really they are the most lenient of any country in the world.

Under the present law, the maximum amateur wave length is placed at 200 meters, although special amateur licenses are sometimes issued to permit the use of a wave length of 375 meters. Waves of a length of 200 meters are comparatively short, but with well-designed apparatus and skilful manipulation remarkable results can be obtained.

The power input allowed an amateur is one kilowatt, or 1,000 watts. Amateurs within five miles of a government or naval station are limited to 500 watts, or one-half kilowatt, power input. One kilowatt of power is not so very small when efficiently used, as this is the power used by the largest broadcasting stations.

It may be interesting to note the ranges of wave length allotted to stations other than amateur. Ship stations have a general calling wave length of 600 meters, though at other times they can use 300 or 450 meters. The distress call, or S O S, is always sent on 600 meters. Coastal stations for communication with ships generally send on 300 or 600 meter waves. Government stations utilize wave lengths between 600 and 1,600 meters.

The large coastal stations used for transoceanic communication are assigned wave lengths suitable for their most efficient operation, but these wave lengths must be below 600 or above 1,600 meters. They generally range from 3,000 to 20,000 meters.

Phonograph and Radio in Partnership

WHENEVER anything new comes into being the good, old conservatives who hold down the earth begin to see the end of existence and of all existing things. When the phonograph first came into existence and showed some signs of lasting and developing into permanence some of the calamity howlers were sure that the record artists were writing their own death sentence as far as concerts were concerned.

When the motion pictures came into existence, some of the same brood were for immediately turning all legitimate theaters into hospitals and morgues.

With the advent of the radio everything was doomed to extinction according to these deathly conservatives.

It seems to me, says Charles D. Isaacson, in "The Mail," New York, that so far as the radio and phonograph are concerned they are in partnership with each other and that as time goes on the two will become such firm allies that they might even grow romantically inclined and marry.

Don't always blame the broadcasting stations. It is usually the fault of your own apparatus.—"The World."

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Are you familiar with all the radio symbols used in the various hook-ups published in Radio World? If not, secure a copy of Radio World No. 26, dated Sept. 23. In this issue was a complete table of all important symbols used in radio construction and testing. Send 15 cents for a copy, or $6.00 per year, and have subscription start with that issue. RADIO WORLD, 1493 Broadway, New York City, N. Y.

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BROADCASTING MAP of the United States appeared in RADIO WORLD No. 8. Sent on receipt of 15c coin or stamps, or start your subscription from that number ($6.00 for 52 issues). RADIO WORLD, 1493 Broadway, New York.

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Broadcast Bill's Radiolays

By William E. Douglass

FOUR years ago Ol' Kaiser Bill got scared an' yelled, "Enough," because he said the enemy wuz treatin' him too rough. An' so in Brussels Sprouts each year we aim to celebrate November the eleventh as a most important date. It seems like it's been forty years instead of only four since we wuz in the Argonne wishin' we could end the war. In June of nineteen eighteen I wuz down along the Marne so blue an' doggone homesick that I didn't give a darn what happened. Then the orders came fer us to go up front an' bein' sorter reckless that's the time I pulled the stunt o' swimmin' in some Heinies an' I got It made the home-folks here in town all mighty proud of me—that's why the Armistice Parade is run by Private Bill. I've run it now fer four years an' I guess I always will. As long as I've been doin' it things never have gone blooey. Sometimes I think I'm smart enough to be a second Lieuie. Now take fer instance this year, my scheme worked out purty nice, it didn't cost me very much but it was worth the price. I had my radio hooked up in the reviewing stand an' then "picked up" a station where a Military Band played patriotic music. I left Min to watch the set; the celebration this year wuz the best one we've had yet. I had the Brussels Sprouts police head up the big parade. Yep, both of them right in the front, no need to be afraid of traffic interferin' when we're marching down the street. I tell you in their uniforms our cops look pretty neat. Then come the Golden Cornet Band, they made a lot of noise an' marchin' right behind them wuz the Hook an' Ladder Boys; an' then some flivvers all dolled up in red an' white an' blue—Chuck Walker had to butt in here just 'cause his car wuz new. An' then I an' my buddies finished up the grand procession. Our luck wuz breakin' mighty good to make a fine impression, fer just as we got up to where my wireless set wuz playin' we heard Star Spangled Banner an' it goes without my sayin', I had the boys halt on the spot an' yelled, "Comp'ny attention!" Believe me this here Radio's a wonderful invention.

How to Make a Decremeter

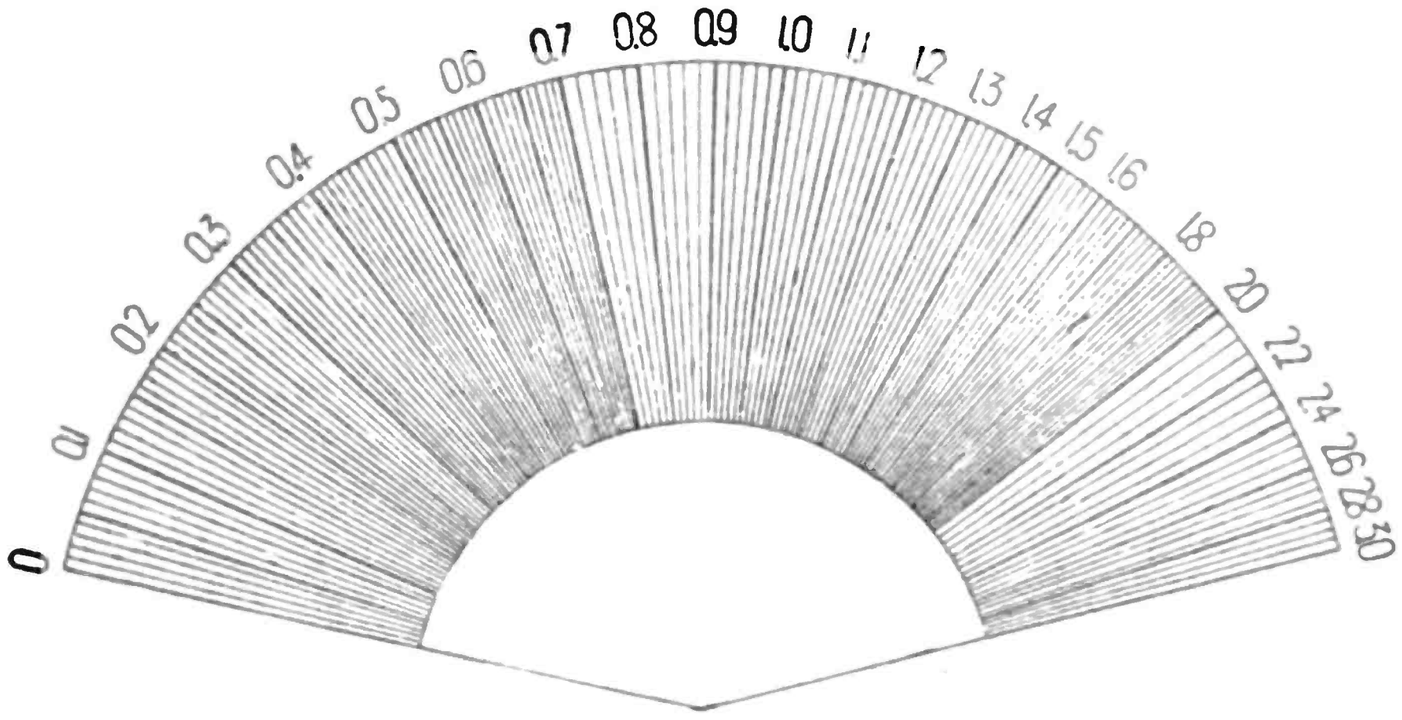

Figure 1—This diagram may be cut out and used as a decremeter.

IN RADIO WORLD, No. 32, dated November 44, there was published, complete, an article of first value to radioists entitled, "Wave Meter for Amateur Operators," describing how to construct the device which enables one to adjust his set tnd comply with the law. This article was prepared by the United States Bureau of Standards experts. Frequently it is necessary to employ a decremeter with a wave meter.

It is possible to make a decremeter out of a wave meter by placing a suitable scale on the variable condenser. For a wave meter having a condenser with semi-circular plates or any condenser such that the graph of its capacity against its setting is a straight line, the capacity being very small at zero setting, it can be shown that the decrement scale to be used is one in which the graduations vary as the logarithm of the angle of rotation. Such a scale, designed for a semi-circular plate condenser, is shown in Figure 1. This scale may be copied, or cut, from this issue of RADIO WORLD and trimmed to fit the dimensions of the condenser dial with which it is to be used. It may be made stationary with a moving pointer traveling over it, or it may be mounted on a dial rotating under a fixed pointer. At the setting corresponding to maximum capacity the scale reading should be be zero. Since the scales of most condensers read counter-clockwise, this arrangement usually places the decrement scale in the unused space opposite the capacity scale.

A measurement of decrement is made by first observing the current squared at resonance, then reading the decrement scale at the settings on either side of resonance where the current squared has one-half its value at resonance. The scale is so constructed that the difference between these two readings is equal to the decrement of the transmitting circuit plus the decrement of the wave meter itself. It is then necessary to subtract the wave meter decrement from the total just obtained. The decrement of the wave meter is determined as follows: the wave meter is coupled and tuned to a source of unmodulated continuous waves. The sum is measured as just described. Since the waves are continuous, the decrement of the waves is zero and the result obtained is the decrement of the wave meter alone.

From determinations of the decrement of the wave meter made at different points on the scale, the calibration curve of decrement plotted against condenser setting is obtained. The conditions necessary to permit the use of this scale in the manner described are as follows:

1. The condenser must have semi-circular plates. Condensers with plates of a different pattern will have different decrement scales just as they have different capacity calibrations.

2. It must be remembered that only when resonance is indicated by a current-square meter is the deflection to be reduced to one-half its maximum value in detuning to either side of resonance. If a milliammeter is used, the reading must be reduced not to one-half its maximum value, but to the maximum value divided by the square root of 2 or to 0.71 of the maximum value.

3. The generator must have an output sufficiently large that the coupling employed may be loose enough to prevent any considerable reaction of the wave meter on the generator.

4. Neither the generator nor its coupling with the wave meter must be changed during the measurement of decrement.