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RADIO WORLD

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ILLUSTRATED WEEKLY

Selective Receiving Apparatus Used on the S. S. Resolute

(C. Kadel and Herbert)

The Telefunkun receiver shown in this illustration is a type of selective receiving apparatus widely used on board ships. It is very flexible in operation and has a reliable range of from 300 to 20,000 meters, covering practically every wave length used in commercial work. C. B. Smith, the operator, is seen tuning in. The inductances are mounted with a view to saving space in the coupling arrangement. The taps, instead of being varied with switch points and arms, are plugged in. This manner of working, while not as flexible as the former method, is undoubtedly more efficient, since it allows better contact. Not a great deal of tuning, that is, not much jumping around, is done on shipboard. If an operator is listening on 600, he stays on that wave for some time, while the fine tuning can easily be accomplished by means of the condensers, shown in the photograph below the inductances. Most ships, when intercommunicating, use crystal detectors, instead of the tubes. If amplification is desired it is accomplished by a separate amplifying unit which can be plugged in, but which in ordinary ship-to-ship reception is not used. While, of course, most of the naval ships are using tubes throughout, for both reception and amplification, the regular commercial operator prefers the crystal for regular communication, because it is clearer for short distances, and in general is less trouble. A description is given inside.

VOLUME TWO OF

RADIO WORLD

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Most Up-to-Date Radio Room on S. S. "Resolute"

By Harold Day

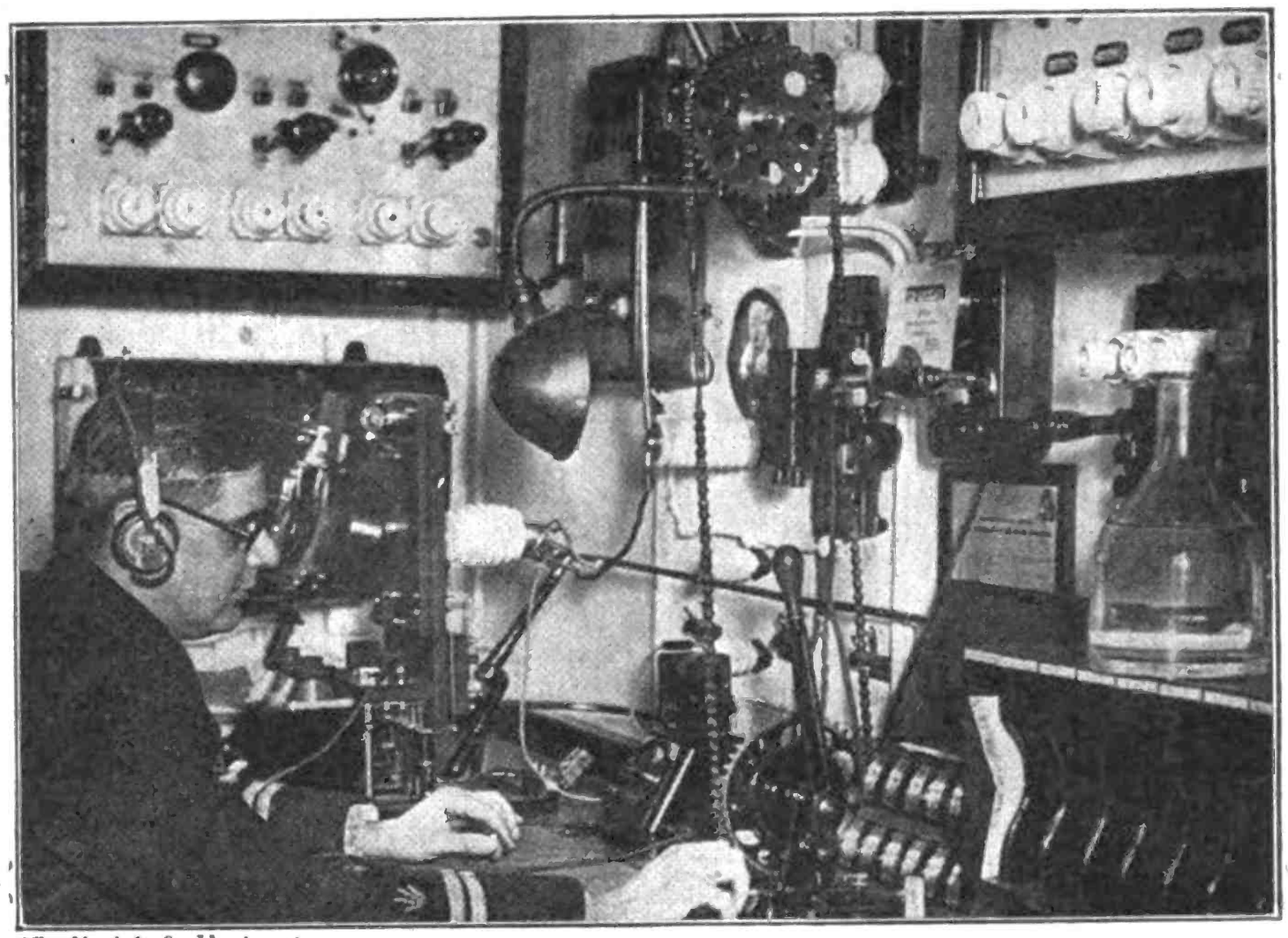
IN this elaborate radio room of S. S. Resolute, mentioned on the front page of this issue, Chief Operator Nelson J. Kearny is seen operating the spark set. The antenna is switched from receiving to transmission by means of a change-over switch, controlled from the operating table by means of chains. This allows the switch proper to be kept out of the way on the roof of the operating room.

There are two switch-boards, one controlling the large set, which is supplied with current from the ship's generating set, and the other by the auxiliary set, worked from the storage batteries. This is necessary on all ships, as the law compels ship stations to embody an auxiliary set in their equipment, to be used in case of trouble with the ship current, which normally supplies the larger set.

Directly under the larger switch-board, on the right, will be seen the telephone, by means of which the captain, or the man in charge of the bridge, can speak directly to the operator. Although the average ship now embodies a telephone exchange, similar to that in a large hotel, the telephone seen on the wall is directly connected so that there will be no delay in communication with the operator.

It will be noticed that the receiver takes up only about one-quarter of the space generally used, the most space being allotted to the transmitting apparatus. As mentioned on the front page of this issue, this receiving apparatus, being compact, and at the same time very flexible as to wave-length, takes up little room.

Many people have heard it said that the radio room is really the "heart of the ship," but they do not understand how true this is. Without the radio room on board the captain would be put entirely at a disadvantage. He would not be able to keep in touch with the ships in the vast body of ocean surrounding him, he would not receive the weather forecast or the position of various wrecks, which are a menace to all vessels. Taken all in all, he has become so accustomed to relying on radio that when the set is out of commission, be it only a short space of time, he generally is a very worried man.



(C. Kadel & Herbert)
The interior of the S. S. Resolute's radio room. The extreme neatness and compactness of this apparatus are in direct contrast to the old time ship stations. The operator has plenty of room.

Take for instance the ship that is nearing land in a dense fog. Before radio came into use, there of course were not so many large vessels navigating the seas at the one time. Now, the vessels get their bearings any time of the day and night by means of the stations located around the large harbors, which, by means of "direction finders" can tell the captain his exact position, within two minutes after the signals have been heard by the land direction finder station.

It therefore places a great deal of responsibility both on the radio operator and the apparatus he is handling. For that reason, on all the big trans-oceanic liners, they have several expert operators, all of whom know how to take care of all the apparatus.

You can see that radio is, then, as important to the captain of a ship as it is to the passengers. Many do not know that the little newspaper published on board a modern liner gets its information from the land stations that supply the service to the ships. Many people, especially those who have traveled over the seas numerous times, have become so accustomed to reading the bulletins and newspaper that they would be lost without them.

Consider, also, the fact that serious accidents may happen aboard ship, which need the immediate attention of a medical man or surgeon. The captain gets in touch with a ship in the vicinity, tells the symptoms, or accident, and the doctor in attendance, though he be miles away, diagnoses the illness, or advises treatment.

Radio Golf at 3,576 Miles an Hour

By Arthur S. Gordon

FOR those amateurs who try to get the most out of their receivers this new radio game will provide a means of keeping track of their achievements. It is said to have originated in Cuba, but it has taken a firm hold in the United States wherever it has been introduced. New England seems to have heard of it first, and a "DX nite owl" in Needham, Massachusetts, asserts that at present he is the champion radio golfer of the United States. His record for six hours and twenty minutes of play is 22,672 miles, or an average score of 3,576 miles per hour. To date this is the high score-card of all radio golfers, but it is not an unbeatable one.

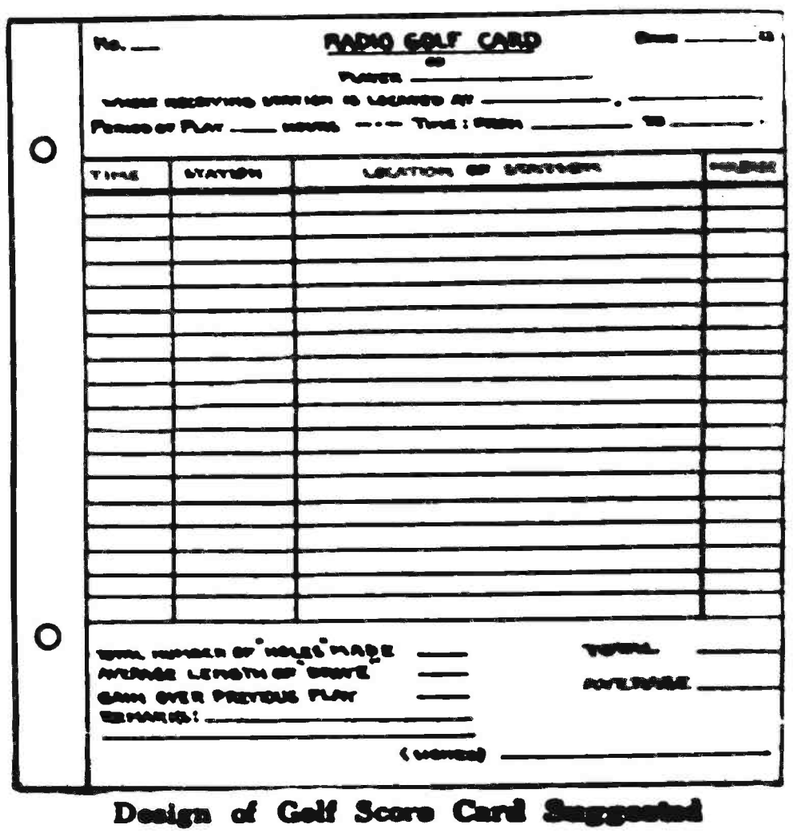
To play the game the radio amateur needs no equipment other than his usual receiving apparatus, with the possible addition of a pad, a pencil, and a watch. He starts at a certain hour, tunes in on a station and stays there just long enough to hear the announcer give the call letters and location of the broadcaster. This is the radio golfer's first hole. He jots the call letters, location, time of reception, etc., on the pad, leaving a vacant column at the extreme right to be filled in later. With the first "hole" made he tees off for the second, and so on until the hour or hours of play are over.

Then he counts up the number of different stations brought in. No broadcasting station may be listed twice. With a map the radio golfer then proceeds to figure out how far away from the home "green" his various "shots" landed.

In each case the mileage is entered in the right-hand column and added up to a grand total. In this way the course of the radio golfer is laid out over a broad section of the country, and in all directions of the compass.

The idea is to tune in and identify as many different stations as possible during a limited period of play. It is important that a station be identified by its own announcer before the golfer drives off for the next. It is also desirable that the stations be as distant as possible, for DX work is the factor which runs up the score. In this respect the play of radio golfers will differ. Some will prefer to bring in local stations in rapid succession, while others will reach out for the more difficult "drives" in an attempt to make distance all at once. Some may even develop a highly original technique.

An hour or so of play will convince the radio amateur that radio golf is a fascinating game with all kinds of amusing and interesting possibilities. Situations will come up calling for quick decisions, demanding the exercise of discretion. Suppose, for example, that you are tuning for a



Design of Golf Score Card Suggested

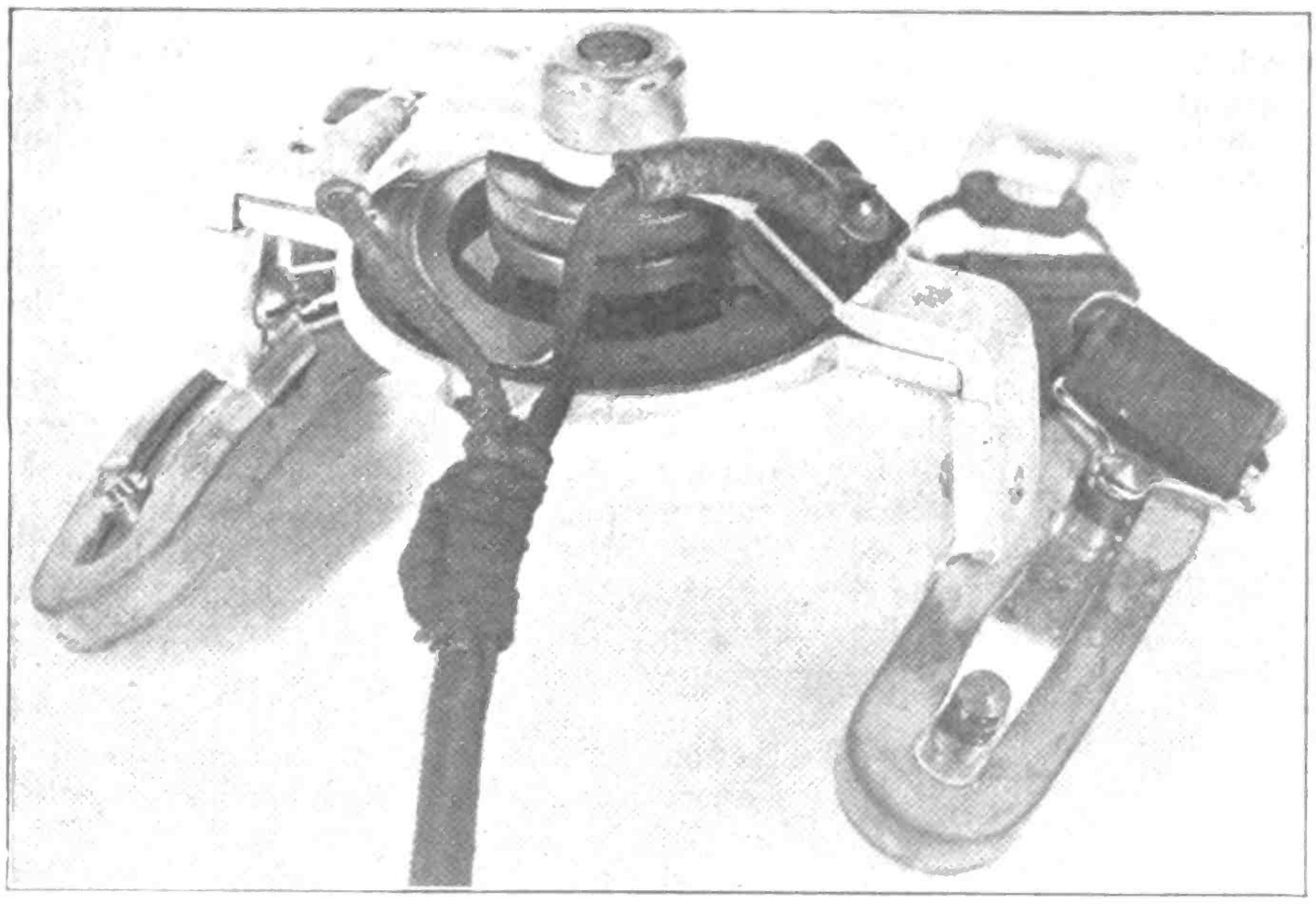
station which refuses to come in very clearly. Because of this difficulty you have a suspicion that it is a distant outfit, therefore you hang on for the call letters. At the end of a long selection, one that might have been entertaining but for the fact that you were interested in something else just then, you wait anxiously for the call letters. Instead of giving them, as it should do, this particular station begins another selection, as many stations do at the present time, which promises to be as long as the preceding one.

What to do? Hang on, or tune in for somebody else? Either procedure might be fatal to the final score. Most radio amateurs know how difficult it is to identify a half-missing station, and all of us have experienced a freaky and mysterious "shut-down." These possibilities are only a few of the points which make radio golf more interesting than it otherwise would be.

The rules of the game are simple. Each player must agree to be fair and honorable in keeping his own score. A large map should be used—the one published in RADIO WORLD for May 20 is suited exactly—and the distances taken off carefully with a ruler or pair of dividers. Two hours is the official time limit, but if an amateur wishes to extend the period of play he may do so at his own risk.

The DX amateur who "plays golf" may now reduce his achievements to an hourly average in miles, which may be compared at a glance to the average of any other amateur. Play golf until you make what you please to call your "high score" card. Then submit it to the editor of RADIO WORLD for possible publication. Watch the DX columns for the golf cards of other amateurs, and fill one out for yourself as soon as you can.

New Anti-Noise Transmitter



New type of transmitter developed for use in airplanes and other places where there is a great amount of external noise. The transmitter fits over the operator's head, being held in place by cotton webbing, with rubber side pieces to press it firmly against the cheeks of the person wearing it without causing any annoyance. The transmitter proper is then against the lips of the operator.

Twenty-seven Stations May Be Abandoned for Good of Service

By Carl H. Butman

WASHINGTON, D. C. — The abandonment or transfer of twenty-seven minor naval radio and compass stations has recently been recommended by the Special Naval Board on Shore Stations, headed by Rear-Admiral Hugh Rodman, and the recommendation forwarded to Congress by Secretary Denby with his approval. Disposal of these useless radio shore stations should make for naval sea efficiency. Communication experts of the navy believe that when they are closed commercial interests which they now serve will immediately establish new public stations equipped with modern apparatus, and that this will guarantee better service to the public and not interfere with broadcasting. Already the old Miami station is leased to a commercial company, which plans complete new equipment. Most of the old stations were unnecessary from a marine point of view, and the navy could not afford to continue their operation. Many of the radio transmitting stations recommended for the scrap heap were equipped with old spark sets, which interfered with telephonic broadcasting. Some of them had been maintained at a cost ten times the return since the war because no local public radio service facilities were available at the time.

All the high-powered naval radio stations, such as Arlington, Annapolis, Porto Rico, Canal Zone, Honolulu, Guam, and certain ones in Alaska, will be retained, as well as the semi-high-powered stations in the navy yards at the twelve important naval bases, and a number of minor stations now in use. Today there are 65 traffic stations and 33 compass stations in operation, requiring a personnel of 70 officers and 1,257 men. The elimination of 27 would leave 71 active stations, sufficient to meet the navy's needs ashore.

The board recommends that 8 radio stations on the Great Lakes and those at Buffalo and Cleveland be abandoned or turned over to the army for operation. Nine, located at Baltimore, Mobile, Miami and St. Petersburg, Grand Isle, Louisiana; Port Arthur, Seattle, Navassa Isle, West Indies, and Managua, Nicaragua, will probably be discontinued and abandoned. Radio compass stations at Detour Pass, White Fish Point, and Grand Morais, Michigan, are recommended for transfer to another government department or abandoned. The sites of two old and unused radio stations at Siasconsett and South Wellfleet, Massachusetts, are also recommended for disposal. Some of them might be operated by the navy if commercial and shipping interests would meet the cost of maintenance.

Commenting on the recommendations made the report of the committee states in part:

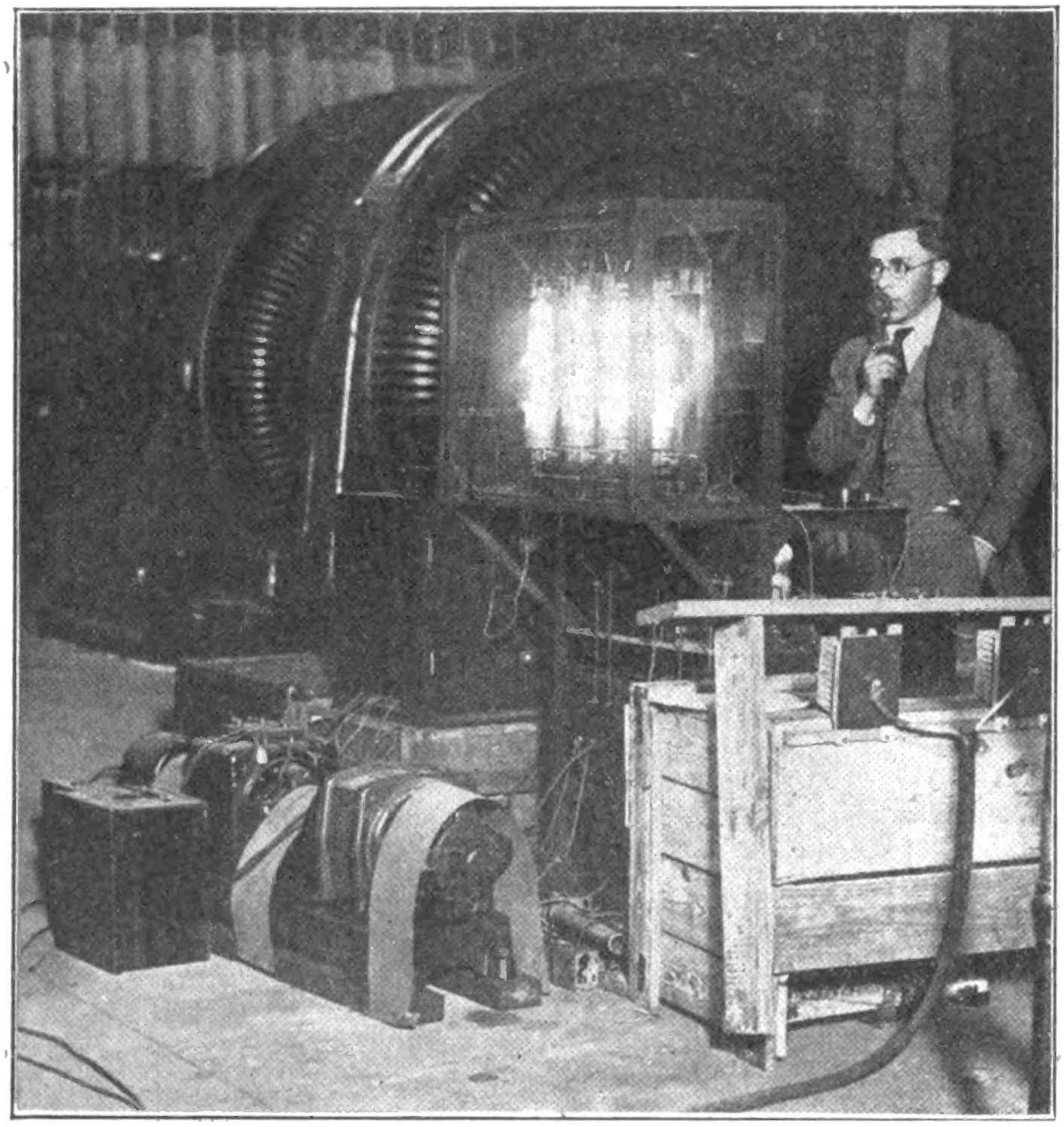
"Radio communication is of paramount importance to the fleet. The maintenance of a complete trans-ocean and coastwise system of radio communication by the Navy Department is necessary for the efficient management and operation of the fleets of the United States in peace and war. The control of various independent operations can, through it, be more closely associated and made to conform with the general plan of action. Efficient radio service provides the means to obtain and disseminate information, and gives a nation that most important of all war assets—the power to strike hard with its fighting force. In time of peace efficient radio service is also essential to commerce. Superiority in this service by the navy is a factor of the same order of importance as superiority in number or types or in the trained officiency of ships. The Naval Radio System is an integral part of the navy. It must be maintained and operated during peace in such a way as to be of the greatest value in time of national emergency."

Listening in Through Apartment House Walls

(C. Kadel & Herbert)

The latest method of letting your sweetheart "listen in." This enthusiastic fan, by running a hose through the court to the adjoining apartments, lets his fiancee listen in while comfortably enjoying the privacy of her boudoir. He uses a large hose, similar to that in a vacuum cleaner, one end being inserted in the loud speaker of his set, the other in the loud speaker in the next apartment.

"Wired Wireless" Insures Secrecy in Sending Radio Messages



(C. Underwood & Underwood)

The small generators in the lower left-hand side of photograph supply the necessary plate current.

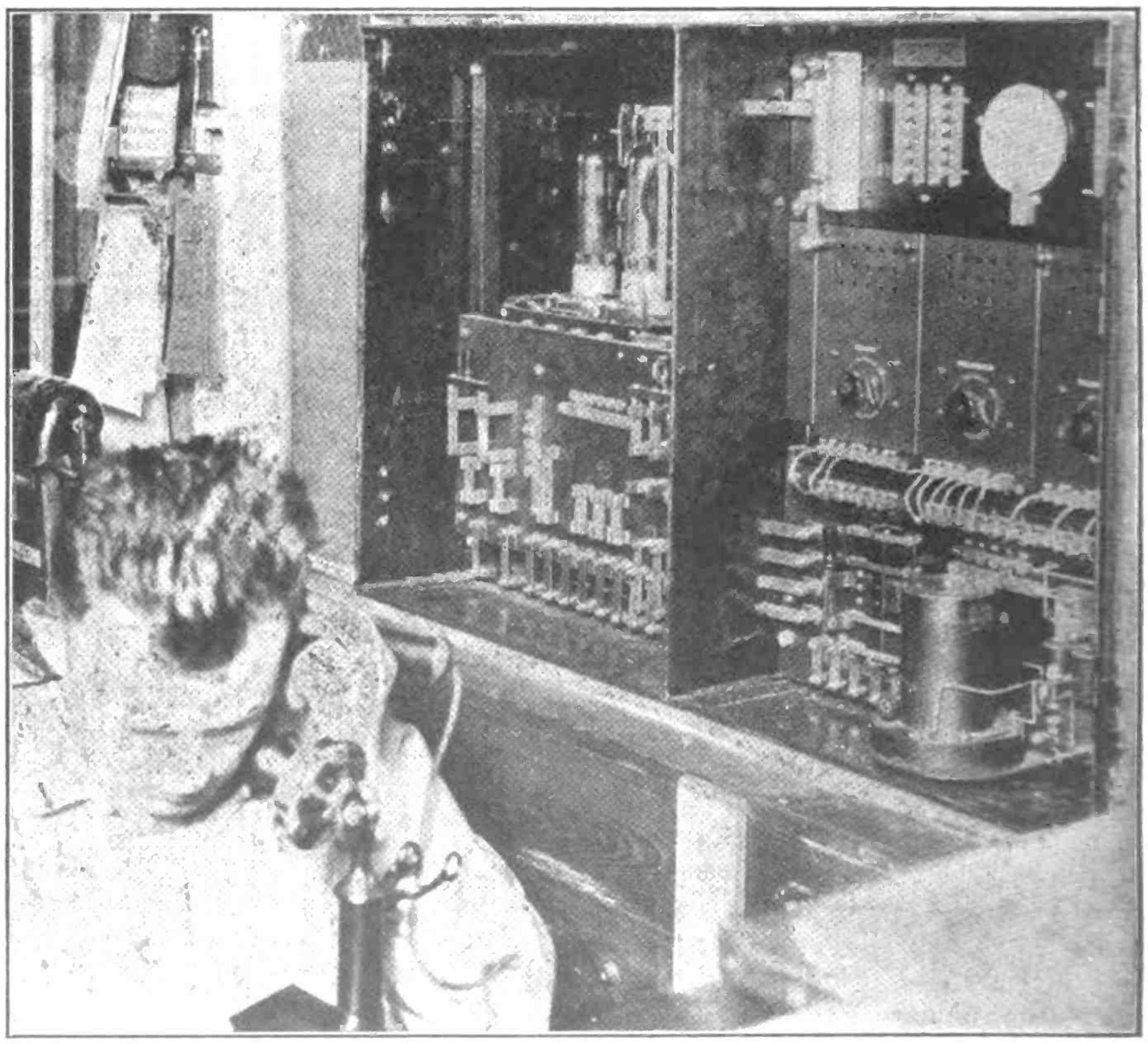
THE latest improvements in the radio field have mystified a few and have caused others to raise their eyebrows and exclaim, "Well, I never!" This is probably the first published photograph showing the invention of Major General George O. Squire, the head of the signal corps of the United States Army. Major Squire calls his invention "wired wireless," because it does not depend on ether waves for the transmission of the modulated waves. Transmission may be accomplished by using any wires, high tension or telegraph lines, for the propagation of the signals. In the first actual demonstration of his invention, Major Squire used the apparatus shown in the picture, and the high-tension lines that radiate from the sub-station of the Potomac Electric Power Company, in Georgetown, and his message was received at the Bureau of Standards Building, over five miles distant.

This new system of transmitting speech has countless advantages over the present method, most of which is its absolute directional effect. A message started over a certain line will follow only the direction of that line, and will be heard only by people having apparatus and using that line for the purpose. Of course, this increases the secrecy of all messages transmitted by the new system. Every word spoken into a microphone at the present time, using the radio apparatus now in vogue, radiates in circles, and is audible to anyone who has a receiving apparatus at any point of the compass.

Major Squire has been experimenting with the new method for many months, and has finally got it to a point of perfection. The photograph shows the battery of tubes that were used, as well as the motor generators used to generate the high current to supply the plate. The necessary condensers are seen resting on the wooden table, under which are located the various controls needed in handling the high currents used.

In order that the high tension, which is a very dangerous thing to experiment with if you don't understand it, may not back up and injure either the operator or the lis-

(*Continued on page 7*)



(C. Photo News)

Transmitter proper with cover off. The apparatus is automatically shut off, when the cover is shut down. This is done to remove any liability of danger to human life.

Secretary of War Weeks Deplores Action in Harbord Case

THE War Department has issued an official statement on the amendment to the army bill adopted by the House of Representatives for the purpose of depriving General Harbord, president of the Radio Corporation of America, of retired pay. In this statement Secretary Weeks says officially:

"It is most regrettable from the standpoint of the War Department and the public service that the House of Representatives adopted an amendment to the Army Bill which, in effect, takes from General Harbord, until recently Deputy Chief of Staff, his retired pay because he has become president of the Radio Corporation of America. The reason given for this action is that he has been employed by the Company for the purpose of obtaining more business from the Government than the Company could otherwise hope to secure. This is an insult to General Harbord and to the Government itself.

"For nearly forty years General Harbord has been faithfully and efficiently serving the Government and, regardless of what position he may occupy in civil life, the best interests of his government will be his chief concern. Any inference to the contrary reflects on the person making it. As a matter of fact, the government's business with the Radio Corporation is inconsequential. At the present time there is no contract, and, generally speaking, purchases of radio equipment, which are of small moment in total amount, are made from the manufacturers. But there is a much broader question involved in the action taken by the House.

"General Harbord, the son of a western farmer, enlisted in the army. Starting his military career as a private, at the beginning of the World War, at the age of fifty, he held the rank of major. While his rank was not high, he had already impressed himself upon the War Department and his associates in the army to such a degree that he was made Chief of Staff of the American Expeditionary Forces. He went from that position to the command of the Second Division, one of the most conspicuous fighting divisions in the army. He commanded this division during the Marne-Vesle campaign. Things were not going satisfactorily in the service of supply and he was transferred, greatly to his regret, to the head of that service, a position of enormous responsibility and of the greatest importance to the army. He so reorganized and conducted that service that he brought to himself not only the plaudits of his associates in the army, but attracted the attention of men of importance in civilian life who were temporarily serving the government in Europe; in fact, so extraordinary were his services and organizing ability that they have occasioned continual commendation from civilians since the War, and it was because of this capacity that he was called to the presidency of the Radio Corporation, as the most competent available man for that particular service in the United States.

"The development of the radio is of vast public importance and there is, therefore, a public reason why he should accept and fill his present position, retaining his place on the retired list of the army so that he will be available for service in an emergency. If a British officer, French officer, or an officer of any other nation had performed for his government the service rendered by General Harbord, instead of having this stigma attached to him, that is, the inference that he is dishonest—not to mention taking away his retired pay—he would have been given honors of very important character and certainly in the case of Great Britain, a large honorarium as well. I do not believe the people of this country wish its great defenders treated in such a shameful way, and I should think General Harbord would feel that a country that would tamely submit to such treatment of one of its officers was hardly worth serving. He will certainly feel a sense of injustice which time can never efface."

Secretary Weeks, according to the New York "Times," was recently advised by the Radio Corporation that service to the government would be suspended if the legislation goes through.

(*Continued from preceding page*)

tener, there are necessary many banks of similar condenser and protective devices. High tension, when out of control, has been known to jump many feet of intervening space seeking a ground, and therefore it is absolutely necessary that all possible care be taken with experiments. In order to insure this the lines were all looked over carefully, to make sure that no one associated with the experiment be hurt.

The second photograph shows the cabinet containing the apparatus. It will be noticed at once that this bears no similarity in appearance to the present transmitting apparatus used for radiotelephony. Particular notice is called to the fact that all the controlling switches have fuses, and the entire cabinet is protected with a metal cover which automatically shuts off all the apparatus the moment the cover is let down. This absolutely prevents any disastrous results from the apparatus being left in operation when the operator is not present.

These experiments have been carried on with utmost secrecy, and with the idea in mind of relieving the congestion, which is at present so noticeable in the air. When they are finally perfected, it is expected that the present system of broadcasting will be abandoned, in favor of the more efficient one. This, however, is but a supposition on the part of the writer, and only time will tell.

To realize the congestion in the ether, it is only necessary to listen in some evening, and realize how many hundred radiophone and telegraph stations are operating at once, each one supreme in its own particular district. Of course, this causes a great deal of interference, which is particularly annoying when more than one station is operating on one wave at the same time in very nearly the same district.

Radio Exhibit in Kansas City

ELEVEN jobbers contributed to the success of the radio show held in Kansas City from January 18 to 20. Eight thousand people attended the show, 300 of whom were children. Two local stations broadcasted from the exhibition room. Crystal, tube, and bulb sets were shown. The show was held in the ballroom of the Hotel Muehlebach.

Various Filament Resistances and How to Make Them

By Marius Thouvais
Secretary of Radio Club of Cologne

AMONG the various accessories required by the experimenter to build his receiving set—one that he can turn out easily—is the filament rheostat. Quite suitable rheostats are on sale for several dollars, but an excellent pattern may be made at home much more cheaply that will be equal to the best of the ready-made apparatus now on the market. From the various known models I shall first describe the simpler one, which I will call the standard type. It is an easy matter to build it as it requires but a few feet of resistance wire, a spindle, a knob, some nuts, a bit of brass, and a little cardboard. To make this rheostat first get a convenient length of resistance wire. About five feet will do, according to its gauge. No. 25 S.-W.-G. is a suitable size, but other gauges will suit as well, provided the total resistance is about six ohms. This is a good average value, usually adopted to control from one to three bulbs. The former, on which the wire is to be wound, is simple to make. With a pair of compasses first lay out two concentric circles on a piece of stout cardboard. The larger circle must be 3 inches in diameter, while the smaller one is but 1½ inches. Next, a little to one side, on the same sheet, lay out two further circles, the outer circumference having a diameter of 2¾ inches and the inner one 1¾ inches. Make another set of two concentric circles of the latter dimensions. Now cut out the three pieces with a pair of scissors according to Figures 1 and 2. Take the larger piece (1) and glue one of the smaller ones (2) to each side, and give the whole a coat of shellac. When finished it resembles a horseshoe. When quite dry the wire may be wound upon it. This winding must be made tightly and very evenly, taking care to space each turn regularly. The wire is next fastened at both ends (Figure 4). Any regular switch may be used, but as it is intended to hook up the "horseshoe" on the back of a panel a bushing for the spindle will be found useful, though not indispensable. A rod is now fitted in front of the panel; a knob and its pointer is screwed on the spindle, and the sliding blade is secured at the other end of the threaded rod. (See Figures 4 and 5.) The "off" point is obtained when the slider leaves the wire.

This very common form of rheostat is all that is needed with most hard tubes. But in order to get the best results, particularly with certain kinds of "soft" audions used as detectors, it sometimes is required to have a very critical regulation of the filament potential, so a vernier adjustment is really useful. A good method of adding a vernier control to a regular rheostat is shown in Figure 6, where a second ebonite knob is fitted below the main handle. The spindle of this second knob holds another blade that slides over a single loop of resisting wire, this small arrangement being put in series with the main resistance. This service is all right when there is plenty of room on the panel; but that is not always the case. In most cases the space is very limited. When this is so it is best to take a hollow spindle for the main resistance. A light, threaded rod passes through the main spindle—a small knob at one end, a sliding blade at the other—making contact over the loop of resistance wire, as shown in Figures 7 and 8.

Other very convenient and rather newer patterns may now be described. Like the first three, they are simple to make, and their cost is only a matter of a few cents. All of the four or five types I will describe give an extremely fine adjustment throughout their range, entirely doing away with the necessity of a further vernier. The pattern which is shown in Figures 10 and 11 requires a sort of drum (Figure 9), which may be made either of hard wood turned on the lathe or with any molded insulating material. A convenient size for this drum is 2 inches in diameter and 1 inch in length. This, when completed, must be generously brushed with shellac varnish before winding.

Starting from a point of the drum wind the wire regularly and very tightly in spiral over the circumference, spacing the turns regularly. A second coat of thick varnish may be given after winding so as to strengthen the whole and firmly hold the wire down in its place, for it would be likely to sag under the rubbing of the blade if it were not strongly fastened to the former. Three holes are next bored, as shown in Figure 9, the central one to pass through the spindle; the other two to fit the drum behind the panel by means of two small screws. The sliding blade must be about 2 inches in length. It is bent, as shown in Figure 11, and fitted, as usual, at the end of the spindle between two nuts. At the beginning of the spiral, behind the maximum resistance point, the rubbing blade finds an "off" position when leaving the wire. At the other end of the spiral the resistance is *nil*, yet the variation of resistance is very regular, and as slow as desired throughout the range covered. With this kind of rheostat a bushing for the spindle is really useful to improve the sliding of the blade over the wire, which must be, of course, as smooth as possible. On the other hand, a dial is no longer of use here, and the standard ebonite knob, without pointer, is all that is necessary.

Another new form of continuously variable resistance is shown in Figure 12. A springy resistance wire is coiled into a spiral around a brass spindle—a threaded rod, at the end of which it is fastened between a set of nuts as usual. The construction of this latter pattern is still more simple than the others previously described. Its working is easy to understand. When the wire is entirely unwound the resistance is maximum, as the current is compelled to flow throughout its length. But as soon as we turn the knob to the right the wire winds itself around the threaded rod, shorting to the conductive body of the spindle, slowly and continuously lowering the resistance till zero is reached. The coil is entirely wound tightly around its spindle. This rheostat, which is certainly the simplest of all, is, perhaps, among the best. It has the advantage of taking very little space on a panel, and therefore will appeal to many experimenters. But its main and, doubtless, only disadvantage is that it has no "off" position, necessitating a separate switch. Fortunately there is a possibility of doing away with that annoying switch, but the mounting then becomes a little more intricate.

Figure 13 shows how to get the very desirable "off" point. Here, as it may be seen, the contact is not taken directly from the spindle. This brass rod is passed through an ebonite, or waxed, cardboard tube, which insulates it from further tubing—a brass tube—which becomes the "shorting" contact. This is what provides the switching arrangement so greatly desired.

This is how it works: When turning the knob to the left the spiral unwinds regularly, and soon after reaching the maximum resistance the wire swerves from the brass tube, breaking the circuit. Another class of filament

(*Continued on page* 10)

Constructural Drawings of Filament Resistances

See opposite page

Working plans for the various filament control resistances as described in the accompanying article. These drawings should suggest to the constructive amateur something to do in the way of making up his own apparatus. He will find most of the parts necessary for the construction of these novel rheostats in his "scrap box." Figures 12 and 13 do not take up much space on the panel, and will probably save the amateur the expense of buying larger panels to accommodate his apparatus.

Fig 1

Fig 2

Fig 3

Fig 3A

Fig 4
Scale ½ size

Fig 5
The Standard rheostat

Scale full size

Fig 12
The simplest rheostat yet very useful

Fig 13
The same rheostat as Fig 12 but with shielding arrangement

Fig 13A

Filament resistances
by Marius Thouvais

Fig 6
Scale half size
A simple vernier arrangement

Fig 7
Scale ⅔ size
A good combination for the vernier

Fig 8

Fig 9

Fig 10
A Rheostat that gives a very fine adjustment throughout its range

Fig 11
Scale full size

Fig 14

Fig 15

Fig 16

16A

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 meant by the term hetrodyne as related to radio?

This is a method of receiving undamped (C. W.) oscillations by making them interact with other locally produced, sustained oscillations. They are generally of slightly different frequency and greater amplitude, causing a beat note between the two circuits, due to the slightly different frequency in each circuit. This makes the undamped oscillations audible, but is not much used owing to the commoner and easier method of regeneration.

* * *

What is the function of the tickler coil in a feed-back circuit?

A tickler coil, through its ability to transfer part of the energy of the oscillating current in the plate circuit set up by the incoming oscillations back into the grid circuit, produces oscillations of a beat frequency, and also amplification, making undamped (C. W.) signals audible.

* * *

What are the advantages of an oscillating circuit over a straight detector circuit?

1. Owing to the fact that regeneration is possible with an oscillating circuit a greater response may be had from the detector, due to self-amplification.
2. It makes undamped (C. W.) signals audible.
3. Sharper tuning is made possible.

* * *

What is the quickest way of telling the exact condition of your storage battery (charged or uncharged)?

By the use of a hydrometer.

* * *

What is a hydrometer?

A hydrometer consists of a glass tube containing a graduated scale with markings from 1.000 to 1.300. These markings are generally made on paper and inserted inside of the tube, which is small at the top and larger at the bottom, as shown in sketch. The larger part generally contains lead shot or some other heavy substance, which will cause it to remain upright in a solution. This smaller tube is generally placed in a larger tube having a sealed bottom, with a rubber tube projecting. At the top there is a syringe, which causes the solution to be tested to be drawn up in the larger tube, floating the smaller one.

What is the advantage of a hydrometer?

It allows a quick and accurate test of the condition of the cell through the agency of the specific gravity of the battery solution, which is higher when the cell is charged than when discharged.

* * *

What is meant by specific gravity of a cell?

By this we mean the weight of a volume of the electrolyte as compared to the weight of an equal amount of pure distilled water, taken as a standard. A hydrometer will therefore show in the graduations how much heavier the electrolyte is than water.

* * *

What are three indications of a fully charged cell?

Gassing (extensive bubbling) of the cell if the current charging the cell is small. Specific gravity as shown by a hydrometer as being 1.220 or greater. Voltage of 2.1 or higher as shown by a voltmeter.

* * *

Is a gassing cell a reliable indicator of a charged cell?

A gassing cell is not always a reliable indicator of a fully charged cell on account of the fact that chemical impurities sometimes get into the electrolyte, causing gas to rise when the cell is not fully charged. This does not always happen, but it is always best to check your cell through either the use of a voltmeter or a hydrometer in order to more accurately learn the condition of the charge.

* * *

What main factor determines the capacity of a cell?

The number of square feet of positive plate surface (active) and the number of positive plates used in the cell. In general practice we allow from 6 to 8 amperes for each square foot of positive plate surface.

* * *

Why is it necessary to add water to a battery?

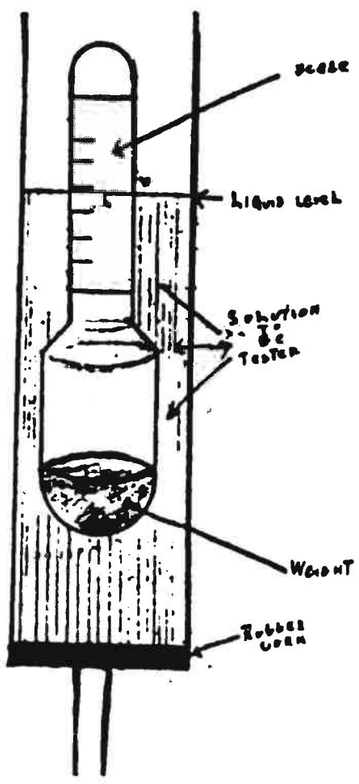
Because of evaporation it is necessary to add water to keep the strength of the electrolyte constant. The acid does not evaporate, therefore it is not necessary to add any. It is a good plan to empty the entire solution occasionally, and to clean the jars with pure, distilled water before putting back clean electrolyte.

(*Continued from page 9*)

regulator is based on quite a different principle. There is no longer a resistance wire in its construction. The variation of resistance is obtained through a screw-conductive material, the pressure of which may easily be varied, applied, or removed—quickly or slowly and progressively—by means of a milling screw.

Figure 14 shows how such a resistance may be made simply with a pile of carbon discs, while Figure 15 shows a rather more elaborate type, which embodies two piles of discs. In both patterns a large brass washer is put on either side of the carbon filler in order to make a positive contact. The pressure on the resisting material is continuously variable through the screw and its knob.

Finally, there is a model which, although very similar to the preceding ones, embodies a somewhat different resisting material. Its resistance is made of powder—graphite powder or loose carbon grains—enclosed in a small cylindrical box. The only disadvantage of this last type is that the powder tends to "keep crowded" when once compressed. To overcome this inconvenience a coil spring is put in the box in order to crumble the mass when the pressure is removed.



Simple Sketch of a Hydrometer

THOUSANDS of radio beginners have come into the radio field since summer. They will find "The Radio Primer," published weekly in RADIO WORLD, a regular source of instruction and aid. For this reason, RADIO WORLD will republish, from time to time, some of the valuable primer articles that appeared in its early issues. These articles, by experts, contain a vast amount of radio information that cannot be duplicated. Every beginner will find them necessary to the building of sets and cooperative with the new material being printed weekly.

Radio Development Is Rapid in Germany

By John Kent

WHILE the activities of England, France and Holland in the field of radio have been concentrated since the war on the establishment of communications with their dominions and colonies, Germany, deprived of all overseas possessions, has been building up within her own borders a system of radiotelegraph and radiotelephone stations that is second to none in the world, says W. T. Daugherty, assistant trade commissioner, in a report to the Department of Commerce. The loss to Germany of her ocean cable system, built up at great cost during the fifteen years preceding the war, made her dependent on neighboring countries for all her international communication, except the portion that she could handle by radio. The logical result has been the increased use of high-power radio stations for overseas communications, especially to the United States.

At present the central office of the Gosellschaft fur drahtlose Telegraphie, located in the Oranienburgerstrasse, Berlin, controls the two great transmitting stations. Nauen and Eilvese, and the two receiving stations, Gelton and Hagen. Both the transmitting stations work on schedule, Nauen with New York, Moscow, Madrid, Rome and Bucharest; and Eilvese with Rome and Madrid. Both have transatlantic press schedules as well.

Extensive changes are now in progress at Nauen, says Mr. Daugherty, designed to increase its power and the flexibility of its operating plant. Separate antennas are being constructed for the American, the Asian, and African, and the two European circuits; and a special arrangement is planned for the new Buenos Aires circuit which is to be opened to public correspondence within the next few months. The corresponding station at Monte Grande, near Buenos Aires, is to be maintained and operated by a combination of French, English, German and American radio companies.

The German Post Office station at Koenigswusterhausen, near Berlin, transmits to London, Budapest, Sofia and Saraijevo, and its receiving station at Zehlendorf makes up the return circuit. Norddeich, a coastal station used for hydrographic reports, shipping news and weather reports, completes this group which is known as the Main Stations Group (Hauptfunkstellen). Although communication is maintained with the foreign cities mentioned, the Main Stations Group operates principally within Germany.

The feeder stations of this system, or "leading stations" (Leitfunkstellen) operate an interior service as subsidiaries of Koenigswusterhausen. The stations located at Dortmund, Breslau, Duesseldorf, Frankfort-on-the-Main, Hamburg, Hanover, Koenigsberg in Prussia and Munich are each equipped with two sending and two receiving installations. Dortmund operates a special service to Rotterdam as well.

"Simple stations" (Funkstellen) supplementing the feeder stations and equipped each with a single sending and receiving set, are located at Bremen, Darmstadt, Elbing, Friedrichshafen, Constance, Stettin, Nuernberg and Mainheim.

Ship-to-shore stations are sixteen in number and were excepted from the system taken over by the Post Office Department in 1919.

The distribution of the wireless news broadcast from the interior transmitting stations is effected by 75 receiving stations which have no transmitting sets. Similarly equipped stations receive weather reports in nine of the principal cities.

Public wireless telephony was inaugurated in Germany on September 1, 1922, the Post Office Department and the Express Service (Eildienst G.m.b.H.) uniting to establish the service. Subscriptions, open to the public, are based on the extent of the service rendered, and the only additional cost is the installation charge.

The apparatus used may be employed by either telegraphic or telephonic reception, vacuum tubes being supplied. In accordance with the distance from the broadcasting station, amplification in varying stages is provided.

Koenigswusterhausen is the broadcasting station and subscribers to the service are now located in 176 cities and towns. The material furnished so far has been confined to economic news.

Listening in on Europe

(C. Keystone View)

Officers of the American Radio Relay League are here seen listening to signals from European amateurs who are permitted to transmit with high power through special privilege accorded them by their respective governments. At the right of the photograph is seen Hiram Percy Maxim, president of the A. R. R. L. Seated next to him is F. H. Schnell, traffic manager, and on the table is Kenneth B. Warner, secretary of the league.

White Radio Bill Recognizes Privileged Status of Amateurs

By Washington R. Service

WASHINGTON, D. C.—Proponents of the White Radio Bill, unanimously reported out by the House Committee last week without amendment, hope for its early passage.

The bill requires licenses for all transmitting stations other than governmental stations, and all except governmenal operators. It directs the Secretary of Commerce to classify licensed stations and make rules and regulations for the prevention of interference. The President will assign wave-lengths to government stations. But when government stations, other than vessels at sea, are transmitting commercial messages they are subject to the regulations for commercial stations and traffic.

Other features of the bill give the President enlarged authority over all radio stations in time of war, forbid aliens from owning radio stations in this country, restrain the transfer of licenses, limit their duration and provide for revocation of licenses. The issuance of licenses rests with the discretion of the Secretary of Commerce.

Congressman White's pending bill recognizes the privileged status accorded to amateurs by the radio act of 1912. It strikes from existing law the words "200 meters," and provides that "the wave-lengths for amateurs shall not be less than 150 meters nor more than 275 meters." This change was desired by the amateurs, and has the approval of the conference and of the committee. The amateur is the only user of radio to whom a definite assignment of wave-length is made in the law itself. Other wave-lengths are allocated by the Secretary of Commerce. The committee appreciates the value of the service which the amateur is rendering in the development of the art and in the training of skillful operators, and feels justified in continuing special recognition.

The Electrons Work in Radio

By B. R. Cummings

Radio Engineer, General Electric Company

IN technical and semi-technical publications reference is more and more frequently made to the electron, and it is the writer's object to point out some of its most unusual characteristics with the hope that those who take interest in the many developments of science will find an incentive to investigate further this fascinating branch of the electrical art.

The electron is defined as the unit charge of negative electricity. It plays a most important part in the composition of all matter.

Those of us who have studied chemistry, even in its most elementary form, know that all materials are composed of atoms, the atom being defined as the smallest particle of any material which retains the characteristics of the material; so that there are atoms of iron, of copper, of oxygen, and of all the elements.

For many years it was believed that the atom was indivisible, and that it itself was the smallest possible subdivision of matter. More recently it has been discovered, however, that the atom is composed of units, the number of which depend upon the material of the atom.

It has been shown that all atoms consist of a nucleus, which is called the proton, which is in reality a positive charge of electricity. Surrounding this nucleus are electrons, the number and arrangement of which depend upon the material of the atom. The structure of the atom is frequently referred to as a constellation, and may be pictured as resembling our solar system, the positive nucleus representing the sun, and the electrons surrounding it the planets.

The arrangement of electrons about the positive nucleus has been the subject of much investigation, and, while there are differences of opinion as to their specific number and exact arrangement, it is commonly agreed that one series of atoms, representing a number of materials, has from one to eight electrons surrounding the nucleus in what is referred to as the first shell, all of the electrons lying on the surface of a sphere. The atoms of the next series of elements have, in addition to the first shell of electrons, a second shell, which includes from one to eight electrons, also lying on the surface of a concentric sphere. Another series includes a third shell and still another a fourth shell, so that the number of electrons associated with the positive nucleus varies from one in the hydrogen atom to as many as a hundred or more in the atom of the heaviest metals.

It is contended by some scientists that the electrons have definite orbits about the positive nucleus, which still further brings the modern conception of the ultimate form of matter into a system similar to our solar system.

Quite recently it has been shown that the positive nucleus itself is very probably complex and may consist of a combination of two or more units. The probable formation of this structure, however, is as yet unknown.

From the foregoing it is apparent that all matter consists, in the ultimate analysis, of the same thing; that is, of positive and negative electricity, and that different materials, as we know them, have their varying characteristics, due to differences in the arrangement and number of electrons in their atomic structure.

In any material there is practically an infinite number of atoms, associated with which there is a still greater number of electrons. These atoms are in constant motion except when the material is at a temperature corresponding to absolute zero, and while in such motion they collide with each other continuously. Such collisions result in electrons being freed from many of the atoms, so that all materials include a number of so-called free-electrons, which are moving back and forth in the material at extremely high speeds. These are the carriers of electricity in any material; in fact, they themselves are electricity. Materials which we know as good conductors of electricity, such as copper, have a comparatively great number of free-electrons. Those materials which we know as insulators, such as glass and porcelain, have a very small number. When an electric current flows there is a progression of the free-electrons through the material making up the circuit.

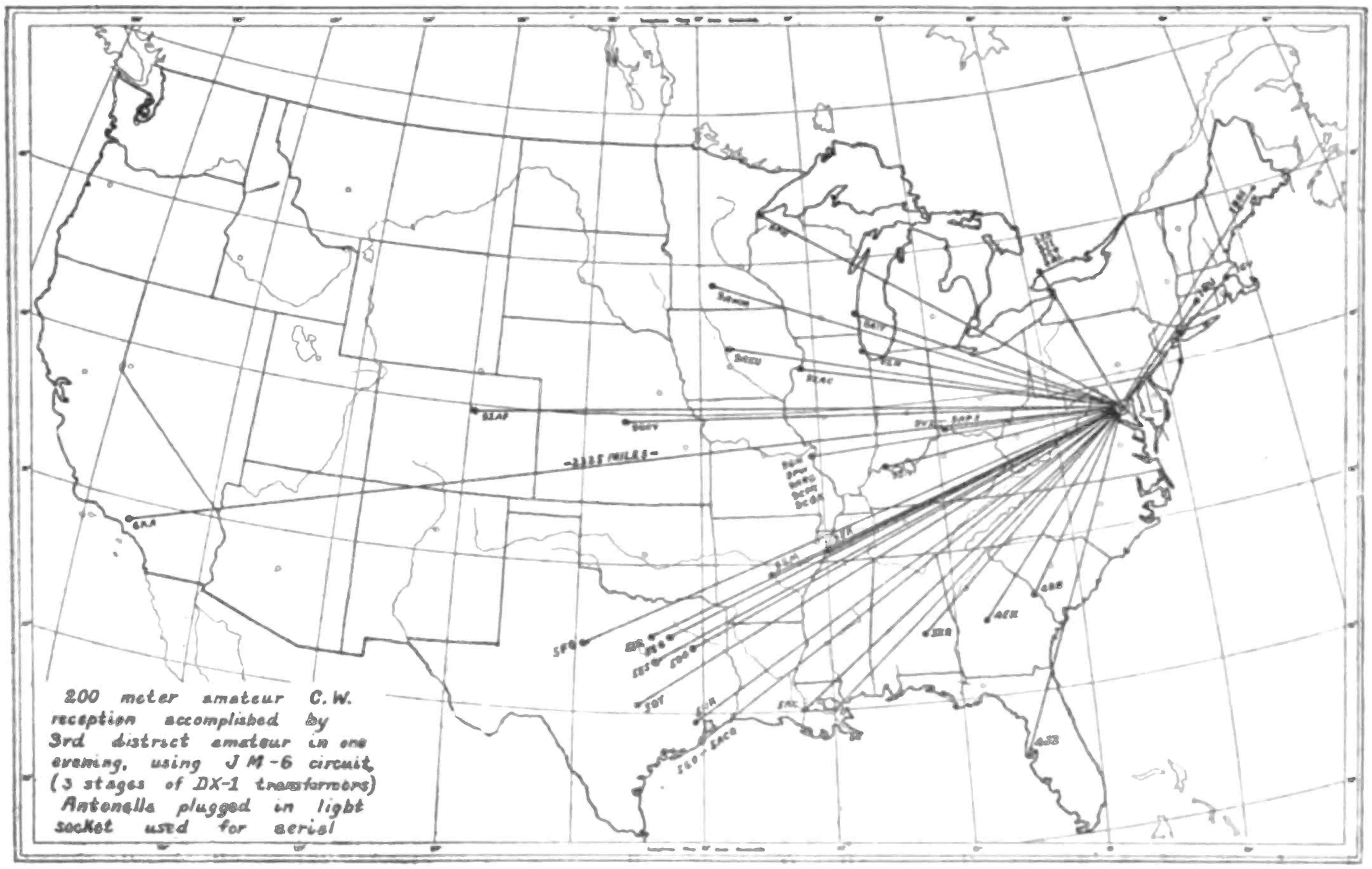
If the temperature of the material is increased the speed of the electrons is increased until, if the temperature is made sufficiently high, as in the filament of a receiving vacuum tube, the electrons break through the surface of the material into the surrounding space.

The characteristics of the electron are extremely interesting. These are not assumed, but have been established by the most painstaking research. The electron is so small that we can never hope to see it directly, for it is much smaller than the shortest wave-length of light, and therefore is incapable of reflecting light. Its diameter, when expressed as a fraction of an inch, is so small as to be meaningless; but some conception of its size can be had from the following:

If a drop of water, which consists of hydrogen and oxygen atoms, and therefore includes a great number of electrons, were magnified to the size of the earth, and all of the electrons associated with it magnified in the same proportion, even then each electron would appear only as large as a grain of sand.

The third characteristic of electrons is the velocity of its travel. Those of us who use vacuum tubes in our receiving equipments know that electrons are given off at the filament, travel across the intervening space between the filament and the plate, and finally enter the plate and then travel through the conductors of the circuit. The current in the vacuum tube is composed of electrons. It is referred to as the electron current, or, to differentiate it from currents flowing in conductors, which are also electron currents, it is more specifically referred to as a thermionic current. When electrons leave the filament of a vacuum tube and start their travel toward the plate they are moving at a speed of approximately 50,000 miles a second.

Accomplished on Indoor Aerial



Map showing the various stations and distances heard by Herbert Hoover, Jr., son of the Secretary of Commerce, in one evening, using the house lighting wires as an antenna, with three steps of radio-frequency. This will give some of the DX boys something to browse over for more than an hour, and maybe give them an idea for charting stations.

THIS map shows the remarkable receiving record of an amateur in Washington, which will give the sceptics something to "think about." All of the stations heard were operated by amateurs, and according to the law an amateur is limited to low power. He is, therefore, to be commended because he uses just what he can, and sees that he uses it as efficiently as it is humanly possible. This is testified to by the fact that he has covered such remarkable distances. Many amateurs, who have good apparatus and plenty of resources at command, pay no attention to getting their station "up to tick," and are fully content to talk to the man five or ten miles away. A little time spent in carefully hooking up and readjusting their sets would really enable them to accomplish wonders.

To give an idea of the efficiency of the apparatus that must have been used by this Washington amateur, consider the fact that the stations recorded on the map were all heard on a set using three stages of radio-frequency amplification, and the electric light wires as an antenna, through the agency of a plug, sold for that purpose.

By reference to the map it is easy to see that good reception was accomplished from all sections, north, south and west. There was no distance to cover to the east toward the Atlantic Ocean. You will note that most of the reception was really accomplished over distances above three hundred miles.

In these days, radio amateurs seem to be paying all their attention to improving their receiving apparatus, and you do not hear much talk of the transmission end of the game. But you can sit back secure in the fact that for every improvement made in receiving equipment, someone is improving his transmitter. It is due to the untiring interest and efforts of the American amateurs that radio has reached the marvelous efficiency it has at the present day. Many a radio hero sits up night after night, working and thinking of the many ways in which he can improve his apparatus, and then putting his plans into action. When he does, there is generally something doing in the air besides a lot of noise, and nine times out of ten he will hang up another distance record.

C. Kadel & Herbert.

This shows the interior of one of the largest stations in the United States, that at Chatham, Massachusetts, which is one of the chain of stations that keep in constant communication with ships at sea, to furnish them daily news, as well as with the foreign stations. It is also the terminus of the land wire linking Boston with other cities.

Radiograms

THE Netherland government has completed the new powerful receiving and transmitting wireless telegraph station erected at Kootwyk for communication between Holland and her East Indian colonies. This station has been clearly heard in Java, a distance of 7,500 miles, and also in America. It is equipped with German apparatus and is said to have the same capacity as the Long Island station.

* * *

Patients in St. Luke's Hospital, on Morningside Heights in New York City, are no longer cut off from the outside world while they are ill or convalescing. A new radio service has been installed in the hospital's four large wards, the children's receiving ward and in some of the private rooms, and about one hundred patients are daily enabled to listen in on varied programs of grand opera, popular songs, band concerts, selections by famous orchestras and recitations. On Sundays organ music and the services of St. Thomas' Protestant Episcopal Church, of New York City, are provided. Each patient is permitted to listen for from twenty minutes to half an hour, when the radio receiver is passed to some one else.

St. Luke's receives its program from Station WEAF, American Telephone and Telegraph Company; Station WOR, of L. Bamberger & Co., Newark, and Station WJZ, of the Westinghouse Electric Company, Newark.

* * *

Homesick fowls, attending the annual National Poultry Show, which ran last week at Madison Square Garden in New York City, were able to communicate by radio with relatives and friends at home. The awards in the show were broadcast every evening and prize winning fowls were permitted to send messages back to the farm. An effort was made to broadcast the general hubbub made by the thousands of fowls temporarily inhabiting the Garden.

* * *

That radio communication may be of great value in mine rescue work has been shown by experiments recently conducted by the Bureau of Mines, working with Westinghouse engineers, at Bruceton, Pennsylvania. Signals were distinctly heard through 50 feet of coal strata, audibility falling off rapidly as distance was increased. With a receiving instrument 100 feet underground signals from a station 18 miles distant were distinctly heard, but an iron pipe, containing electric light wires, which extended therefrom through the mine, assisted greatly in the reception. The transmitter used sent out continuous waves of 200 to 300-meter wave length. The best results were obtained from vertical antennae, horizontal ones giving practically no reception. A loop of a single turn was used with fair results. The strata at the experimental mine lie almost horizontal; the mine is a comparatively dry mine, but the overburden is damp. Further experiments are to be made along this line.

* * *

Owners of vessels equipped with wireless apparatus, companies operating and controlling the apparatus, and radio inspectors are advised to see that all ship stations are properly licensed as required by Section 2 of the Act of August 13, 1912, in that the correct ownership of the vessel and the ownership of the station are shown in the license. When a vessel changes ownership the old ship station license should be surrendered, notwithstanding the fact that the period for which the station was licensed may not have expired, and a new license procured showing the new ownership and any other changes in the data required in the license. It has been reported to the bureau that a number of vessels, especially vessels sold by the U. S. Shipping Board to private owners, are violating the law in this respect.

* * *

Radio impulses from a radio receiving set may be transmitted through the air for a considerable distance from the machine and then be picked up and carried by an ungrounded wire. This interesting discovery has been made by Robert Hilliard, the hydraulic engineer in charge of the tank equipment used in "Better Times," at the Hippodrome in New York City.

A New Amplifying Receiver

By Frederic J. Rumford, A.I.E.E.

THE latest invention in amplifying receivers is the work of an X-ray expert, Dr. Frances Le Roy Satterlee, of Flushing, L. I. This invention was called to the attention of Major-General George O. Squier, chief officer of the Signal Corps of the United States Army by the inventor. General Squier, after several hours of study and experiment has given it the name of "inductive amplifying receiver."

A test made of this new receiver by army experts at Ford Wood has brought out the following facts. On receiving the radio broadcasting of WJZ, which is about twelve miles away, using this for a test station, the experts obtained an audibility of 400 against 200, the latter obtained with the usual duo-lateral coils. On working out this test, the army experts say they were particularly impressed by the comparative ease of manipulation and tuning, and also the freedom from all distortion.

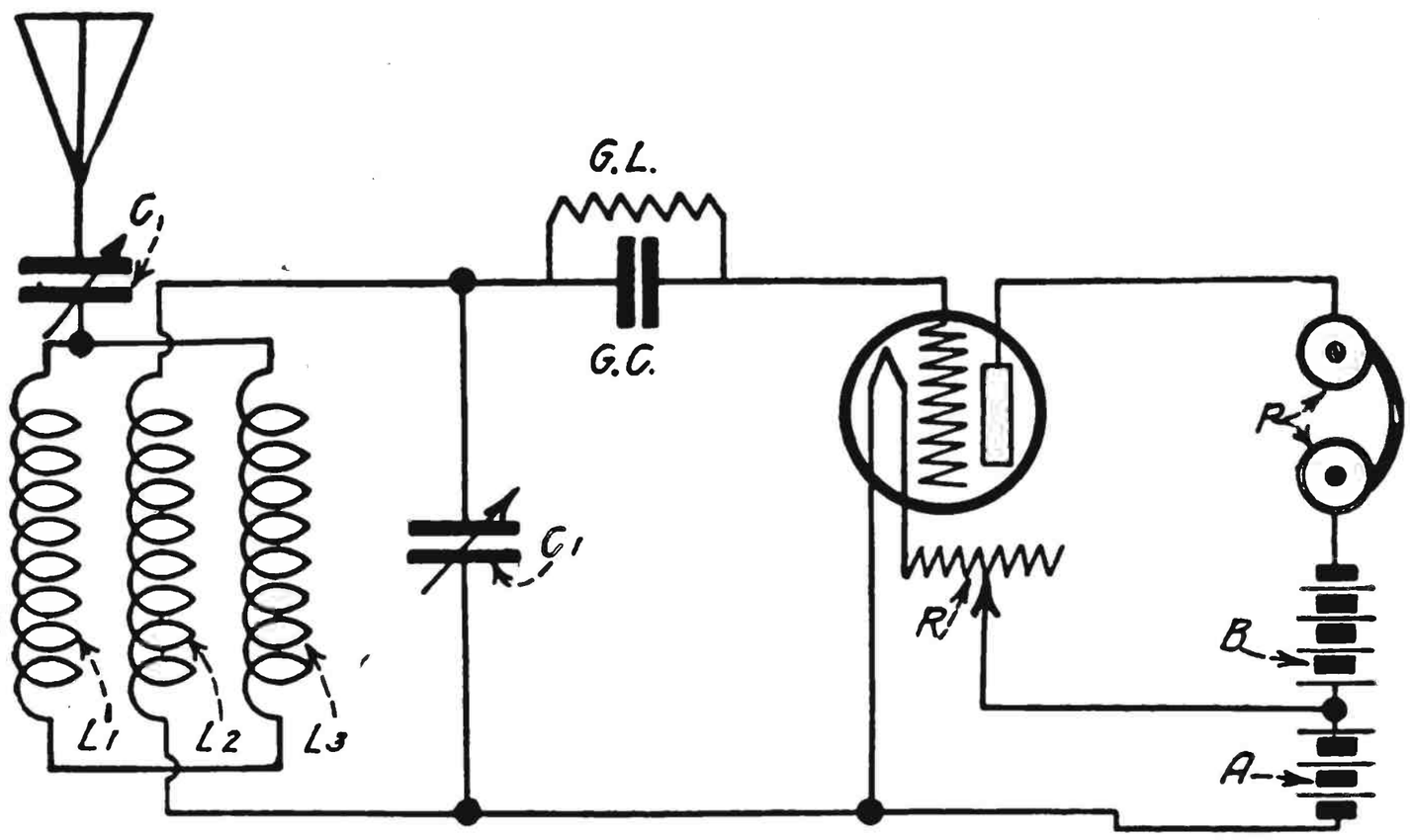
Tuning is done roughly by the manipulation of the two variable condensers C and C1; tuning for finer reception by changing the positions of these coils L, L1 and L2.

These coils are unusual, being wound in the form of flat spiral with litz wire. They are also said to have less distributed capacity than the usual honeycomb and duo-lateral coils, and lower high frequency resistance.

The notable features of this receiver are:

1. Signals which are equal if not better than those received on an Armstrong plain regenerative type.
2. Absolutely no chances of oscillation which will decrease any interference with near-by receiving stations.
3. Very close and sharp tuning.
4. Very low cost of construction.

The coils L, L1 and L2 are similar in appearance to small phonograph records, disc type. L and L2 are pivoted and move like the leaves of a book, while L1 moves in slide fashion in and out between them. The other part of this circuit resembles an ordinary non-regenerative receiver.



Dr. F. Le Roy Satterlee's New Amplifying Circuit.

Radio and the Woman

By Crystal D. Tector

I HAVE just received a letter from a young woman, all the way up in the North Canadian Woods, and this is what she says: "We are snowed in pretty nearly seven to fourteen weeks of the year, and as daddy is a trapper I seldom get a chance to have any fun, except the weekly trip of the Padre, or probably some belated trapper, who will stop in for a few nights to get 'thawed out.' You can see what it means to me, having lived most all my life in a large seminary, in Montreal. Last year daddy let me stay with one of the girls in Montreal, and the winter before I had a party of girls up here; but they all left early, because of the intense cold and hardships. Now that daddy has let me have a radio set, I don't have much trouble enjoying myself when the long nights come. I enjoy your articles, when I get the magazine, which is about every three months, because of the delayed mail, and I generally get all the issues at once."

This girl is very lucky. Can you imagine anything finer than those piney woods in the summer, and a beautiful cabin decked with furs, a radio set and a RADIO WORLD during the winter?

* * *

ALONG with everything else, I have received a notice through Friend Husband that I can take an examination to become a radio inspector. Imagine that! I will be kept busy, and F. H. will be kept hungry, if I accept his challenge—which I shan't.

* * *

DO you notice that most of the popular musical comedies have a "radio" song or number? No wonder radio is so popular with the Tired Business Man. Friend Husband and I went to a widely advertised musical comedy the other evening, and one of the hits of the show was a number on radio. F. H. remarked that the prima donna's voice was wonderful, but I think that that little chorus dancer was much more interesting.

* * *

A VERY dear friend of mine received a letter from her son, away in a military school, who told her that he had "helped install the radio set." He seemed to be as proud of that as of the high percentages in his studies, and the fact that he stood second in the class.

FRIEND HUSBAND came in the other night wearing a face as long as anything. "Humph! I don't think much of Mr. ———'s views," he said. After a while, not getting any reply from me—because I know that if I show any curiosity when he is angry he will take it out on me for being "curious"—he brightened up and remarked: "Say, if that fellow would only read the White Bill he wouldn't need to argue so foolishly. Anybody with a grain of sense can understand it if he reads it." So long as it was only about the legal points I let it go, for when F. H. talks legalities he simply bewilders me, and I believe that "silence is golden."

At such times he becomes a silver tongued orator and is likely to rave on all night.

* * *

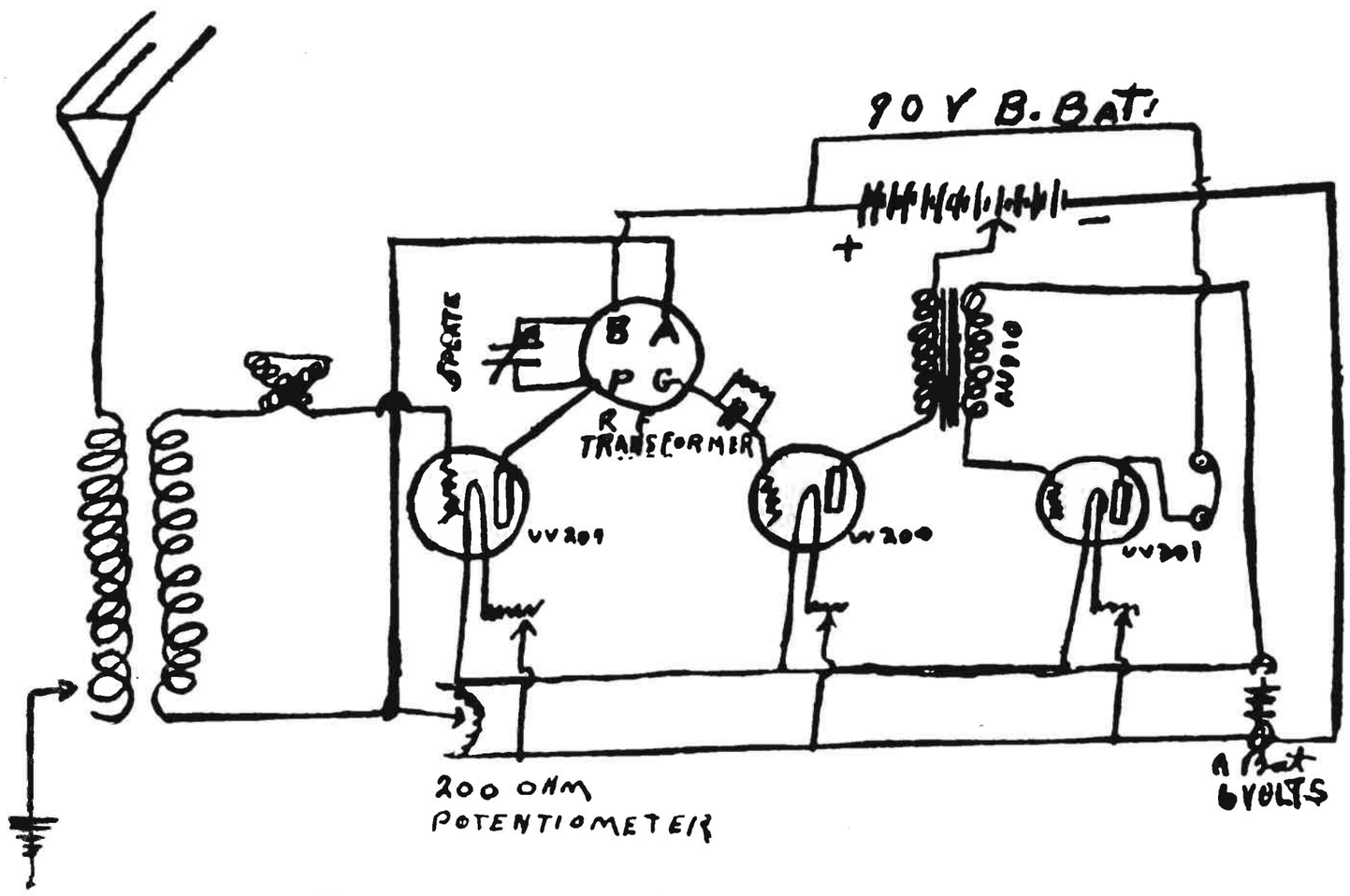
IT is interesting to listen in on some of the daily conversation in the cars and streets today. Most everyone is adapting the radio terms to their daily conversation. Just the other day, while on a shopping tour in New York, I overheard this conversation between a pert flapper and her escort: "Well, talk about interference, when that OW starts to broadcast, everyone else has to pipe down. She started at the beginning of the dinner and, honestly, she drowned us all out." "Oh, don't I know it. Say, she is worse than WEAF when she starts. You can't even hear across the table when she opens up her transmitter. Somebody ought to tell her to decrease her decrement—her wave is too broad." "Well, Sheba, guess I'll duck. So long for a while. My boss is a bear for opening the program on time, and I have a terrible stack of accounts to enter." "So long, OM. C.U.L." I looked in surprise, but all the rest of the folks around didn't seem to even notice the new language that was being used.

* * *

FRIEND husband gave me quite a surprise last evening when he broke the news that he intended taking a license. "What kind, auto, druggist, or marriage?" I asked. "Why, stupid, a radio license, of course. What do you think of that?" Well, all I can say, is that I see where F. H. has been bitten BAD by that insect named "Radio." He will probably never recover, but as it isn't fatal to anything except the wallet, "I don't care."

My Idea of a Radio Set

By Henry N. Fullerton, M. D.



New hook-up for radio-frequency amplification.

BEGINNING with a regenerative circuit using only a detector, I made hook-up using one, two, three, and four stages of audio-frequency amplification.

Not being wholly satisfied with the results obtained, although I was getting as successful results as others with the same hook-ups, I then began experimenting with the non-regenerative class of circuits making use of radio-frequency. Beginning with one stage of radio-frequency and a detector, I have used one, two and three stages of radio-frequency amplification ahead of the detector, and, also, one and two stages of audio-frequency in combination with one, two, and three stages of radio-frequency amplification.

With the radio-frequency type of receiver, I have had some remarkable results, receiving stations at a distance of 2,200 miles loud and clear. I have received concerts from Chicago, Davenport, Iowa, and other distant places.

Taking all phases into consideration, I think that a nonregenerative receiving hook-up using one stage of radio-frequency detector and one stage of radio-frequency is about the ideal radio outfit. With this hook-up signals are received of sufficient volume up to 1,000 miles and there is the advantage of getting practically no interference from tubes or other parts.

In the set that I have been using, I utilize a vario-coupler and variometer, believing that the basket type of weave adds to the efficiency of the apparatus. For the radio-frequency transformer, I use an Earla. For the audio-frequency transformer, a U-V 712.

I enclose a diagram of the hook-up. I have received concerts and other broadcast programs from about sixty different stations, ranging from 300 to 2,200 miles.

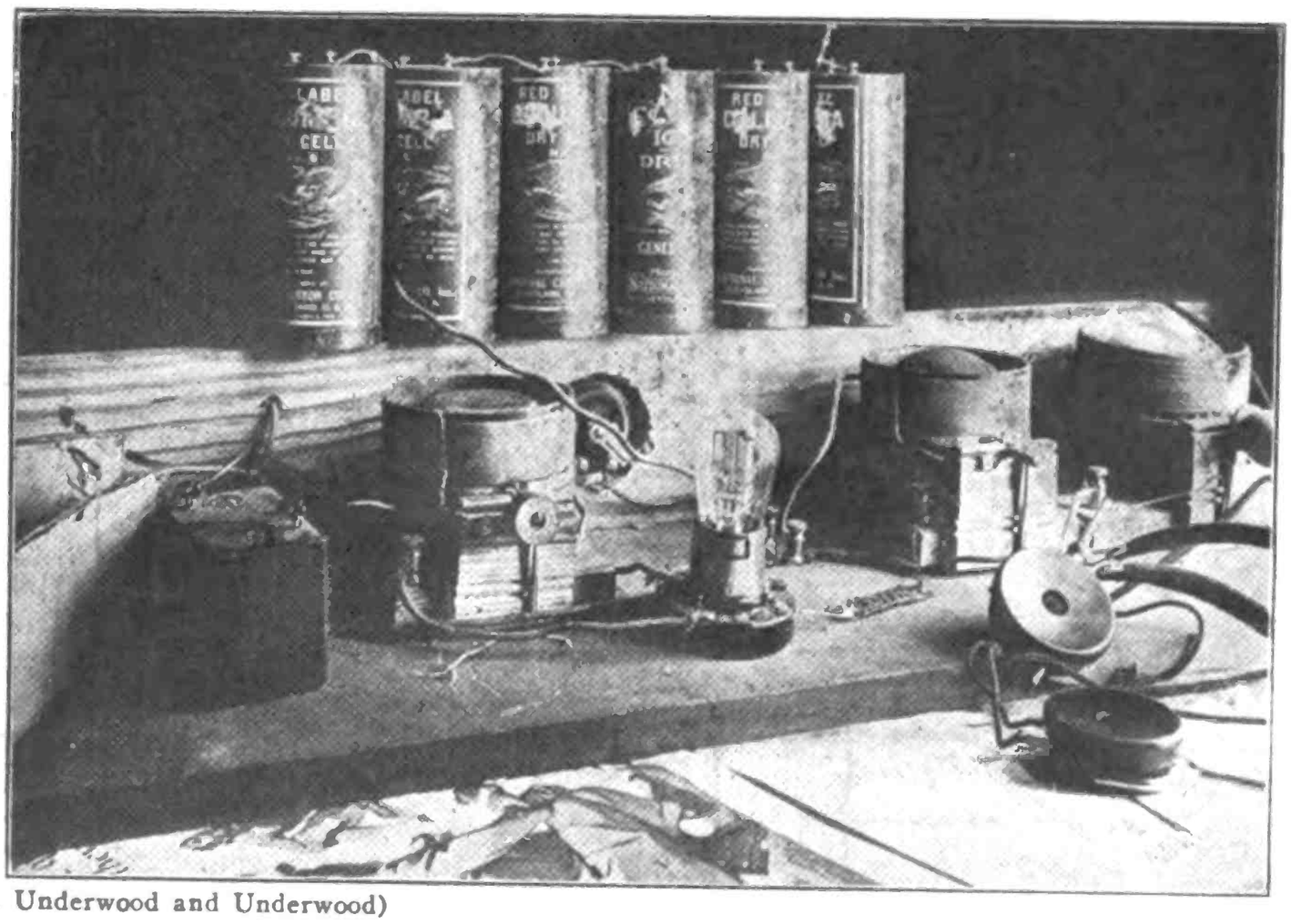
Radio P of th

(C. Kadel and Herbert)

An interesting radio experiment which may be made by anyone possessing a radio receiving set. Several turns of insulated or bare wire are wrapped around the body, which is used as an antenna for receiving signals.

(C. Keystone View Company)

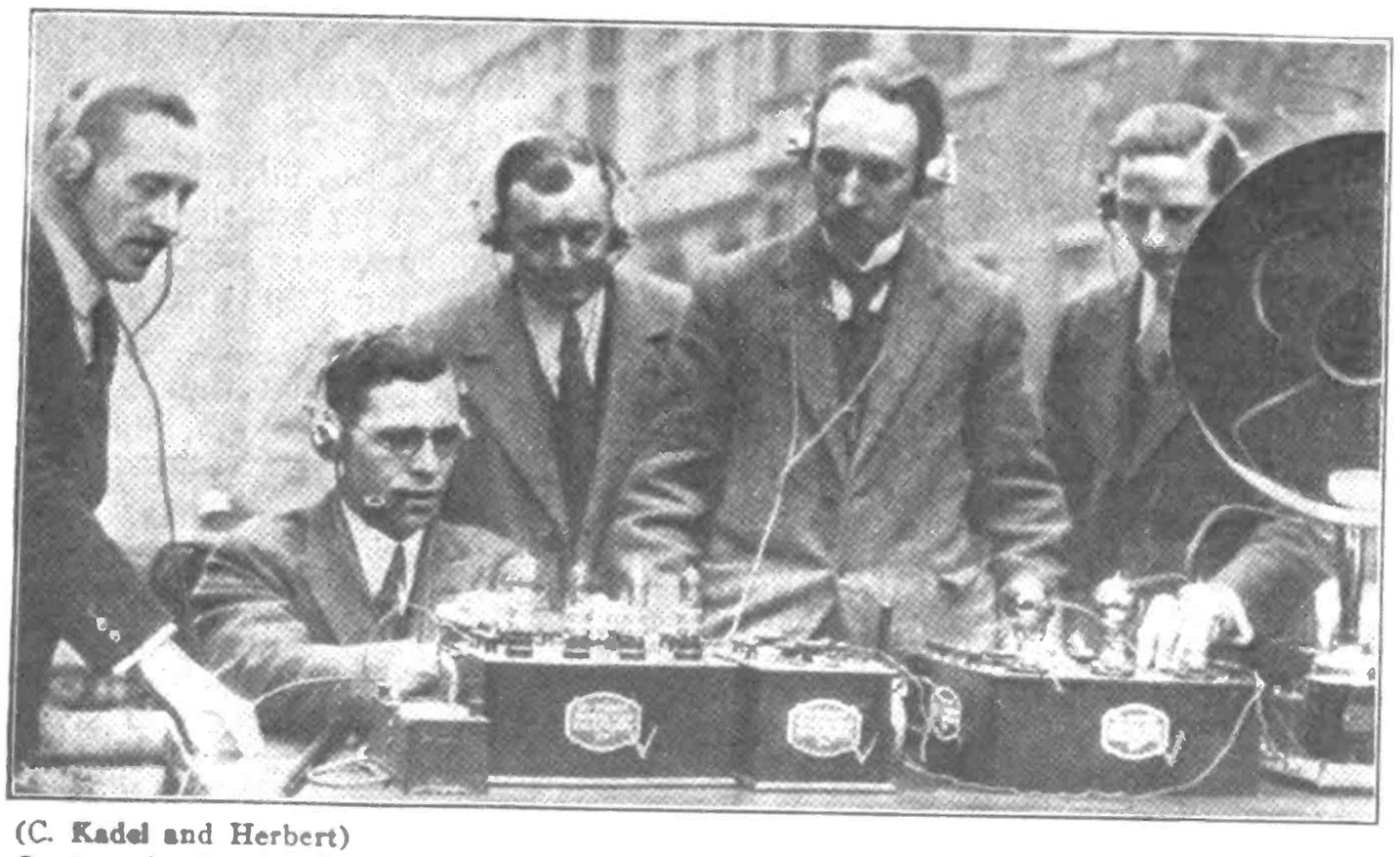
Exclusive photograph of Joseph S. Freylinghuysen, Jr., young amateur has constructed all the apparatus, and



(C. Underwood and Underwood)

A simple home-made receiving set that is within reach of any radio fan. It was built by George Stahlman of Nashville, Tennessee, and is capable of receiving concerts from New York, Detroit, Fort Worth, Atlanta, and numerous other distant broadcasting stations. The set, as the photograph shows, is made from odd pieces of wood and cardboard tubing which Mr. Stahlman found lying around the shop. It isn't built for beauty, but for service, and it works.

Captions by Patrick Nichols



(C. Kadel and Herbert)

On top of a London bus a practical demonstration was given showing that radio could be received in a mov[illegible]vehicle. Your notice is called to the fact that both radio frequency and a two-tube po[illegible]r was used. Of course, the apparatus as shown takes up more room than is ex[illegible]as a hurried last-minute idea, and was carried out very successfully.

A single-tube radio set which Dr. R. S. Piper, a Chicago surgeon, has devised and patented. This set works on a door-bell battery and B battery with very high sensitivity and selectivity and is used either with head phones or horn, which ever way desired at the time. It can also be used with a storage battery.

(C. Kadel and Herbert)

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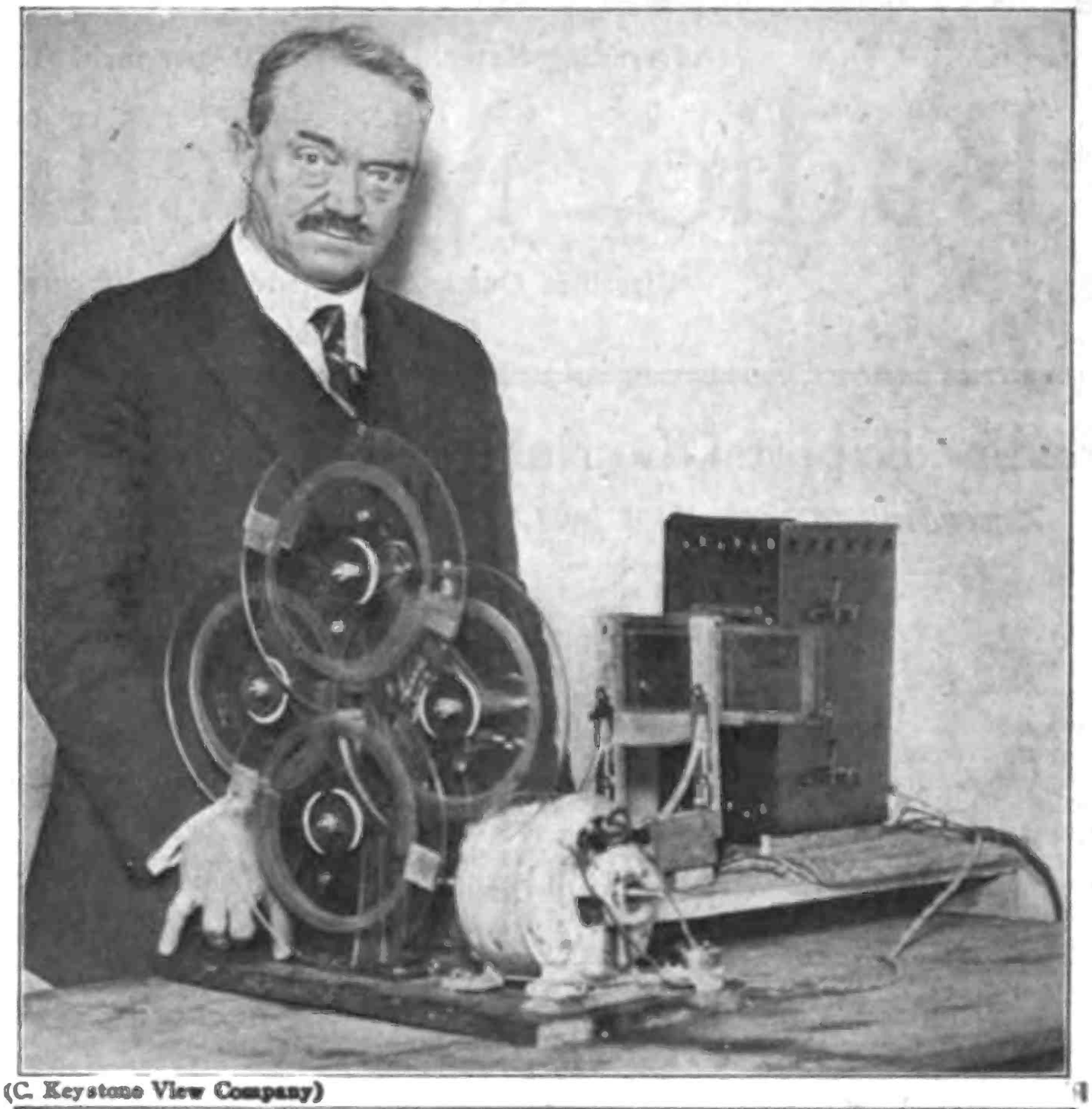
tographs Week

C. Francis Jenkins, who is the inventor of this apparatus for transmission of moving pictures via radio. Mr. Jenkins predicts that within the next few years his invention is going to be as popular as the "movies."



(C. Keystone View Company)

Jersey Senator, testing the radio set made by himself. The ly have become ardent radio fans through his experiments.

Modern stenographers and office girls lunch to the tune of radio instead of going out for their noon walk. The photograph shows how an enterprising employer has installed a radio set in his employees' rest room, for the purpose of entertaining them while they are eating their luncheons.

(C. Kadel and Herbert)

Photos)
has become popular in St. Paul, hundreds of mothers have helpful in keeping their children quiet and amused.

Louis Bamberger, well known merchant of Newark, New Jersey, who sailed on the S.S. Homeric Saturday, has installed a powerful radio receiving outfit in his stateroom, by means of which he will keep in continuous contact with his office through radio station WOR.

Radio Exports During November, 1922

According to Statement by Department of Commerce

Countries	7181 Radio and wireless apparatus *Pounds*	*Dollars*	7182 Telegraph apparatus *Pounds*	*Dollars*	7184 Telephone apparatus including telephone switchboards *Pounds*	*Dollars*
Belgium	92	891	...	...	201	809
Denmark	...	...	...	...	160	1,361
France	217	1,018	...	...	134	738
Germany	1,700	875	...	...	...	...
Iceland and Faroe Islands	20	88	...	...	...	...
Netherlands	992	1,361	...	...	276	1,188
Norway	24	54	...	...	...	...
Spain	81	93	...	...	110	284
Sweden	201	274	...	...	29	122
England	2,203	6,606	1,687	1,509	71,924	100,501
Canada—Maritime Provinces	419	1,542	7,094	1,484	622	672
Quebec and Ontario	23,214	39,834	10,646	9,474	35,715	47,384
Prairie Provinces	8,690	16,273	92	91	1,782	3,859
Brit. Col. & Yukon	384	627	137	603	737	1,372
Costa Rica	2	32	...	...	...	...
Guatemala	...	...	...	...	26	59
Honduras	...	...	...	...	5,607	4,076
Nigaragua	24	25	...	...	1,492	4,007
Panama	23	125	...	...	136	129
Salvador	...	...	...	...	123	384
Mexico	76,670	12,998	3,692	2,683	7,432	3,352
Miquelon and St. Pierre Is	...	...	...	...	117	123
Newfoundland and Labrador	...	...	3,555	5,048	1,537	2,477
Bermuda	...	...	...	...	1,011	1,051
Jamaica	...	...	...	...	898	401
Trinidad and Tobago	...	...	...	...	700	466
Other Brit. West Indies	80	325	...	...	35	18
Cuba	11,199	24,586	261	585	17,127	23,008
Dominican Republic	51	48	...	...	221	1,184
Haiti	...	...	...	...	3	6
Virgin Islands of U. S.	...	...	...	...	635	373
Argentina	18,158	71,874	8	15	2,605	12,561
Brazil	753	4,199	546	6,000	7,912	30,140
Chile	788	1,951	...	...	746	1,462
Colombia	...	...	...	...	9,115	8,686
Ecuador	...	...	...	...	587	1,114
Peru	...	...	40	400	2,157	2,973
Uruguay	2,166	12,208	...	...	...	...
Venezuela	...	...	...	...	739	1,341
British India	15	34	...	...	...	...
Straits Settlements	43	81	...	...	...	...
China	86	165	...	...	1,458	1,543
Hongkong	24	130	...	...	60	128
Japan	1,385	6,703	82	342	15,198	37,533
Philippine Islands	3,065	3,476	...	...	...	...
Australia	2,214	5,404	11	204	7,338	19,000
British Oceania	50	45	...	...	...	...
New Zealand	4,886	9,011	11	177	3,788	2,260
British South Africa	40	224	...	...	51	70
Egypt	...	...	...	...	18	121
Total	159,958	223,180	27,862	34,615	200,562	318,336

SHIPMENTS FROM THE UNITED STATES TO NON-CONTIGUOUS TERRITORIES

Non-contiguous territories	*Telephones Dollars*
Alaska	1,000
Hawaii	1,100
Porto Rico	55

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.)

Goodnow-Gardner Electrical Corporation, care of Good, Kimbrought & Hutchinson, Boulder, Colo.

John Barstow, Barstow's Radio Shop, Selwitz Block, 10 Pearl street, South Manchester, Conn.

Clarence L. Carey, Haisley Bldg., Lake Wales, Fla.

Torrington Electric Company, Orpheum Bldg., Wichita, Kan.

Case, Manhattan, electrical business, $20,000; N. L. Case, C. G. A. Weiss. (Attorney, J. M. Detzen, 61 Broadway, New York.)

Premo Electric Corp., Manhattan, $10,000; L. M. Fox, M. L. Gilman. (Attorney, B. Lewinson, 119 Nassau street, New York.)

Vesey Electric Sales Corp., Manhattan, selling electric fixtures, $25,000; M. Gerst, L. Bailey. (Attorney, N. Bolet, 55 Vesey street, New York.)

Unit Radio Corp., Manhattan, supplies, $10,000; B. Katz, M. Julien, A. Zweekly. (Attorney, A. F. Karman, 116 Nassau street, New York.)

J. C. Harding & Co., Wilmington, Del., electrical contracting, $20,000. (American Guaranty and Trust Co.)

Promethesus Electric Corp., Manhattan, $66,400; H. L. Herrick, F. D. Hagan, J. Van Harder. (Attorneys, Davis, Symmes & Schreiber, 55 Liberty street, New York City.)

Excello Construction and Electric Co., Manhattan, $5,000; E. J. Dwyer, L. P. Wilkinson. (Attorney, P. A. Schmitt, 119 West 42d street, New York City.)

Stuyvesant Electric Co., Manhattan, has increased capital stock from $10,000 to $50,000.

Cosmo Electric Construction Company, Manhattan, $150,000; P. Aigeldinger, J. Spitzer, C. H. Pond. (Attorney, T. F. McMahon, 1400 Broadway, New York City.)

Construction Materials Corp., Manhattan, electricians, $10,000; E. C. and A. M. Sargeant, W. Porter. (Attorney, E. P. Feely, 42 Broadway, New York City.)

Radio Stocks

Curb Market of the week ending January 20. Quotations from New York Times of January 22:

Sales		High	Low	Last	
7,300	Dublier Cond. and Radio	5⅞	5	5⅞	+⅛
300	Prima Radio Co.	.88	.87	.88	—.02
12,300	Radio Co.	3⅜	3⅜	3⅜	..
13,500	Radio Co. pf.	3⅝	3 1-16	3⅜	+1-16

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.

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

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

FIRST UNIVERSAL EXPOSITION OF INVENTIONS AND PATENTS, Grand Central Palace, New York City, February 17 to 24, inclusive, 1923.

SOUTH JERSEY'S FIRST RADIO-ELECTRICAL SHOW, Third Regiment Armory, Camden, N. J., February 5 to 10, inclusive.

Western Electric Company Post Gives Theatre Party

THE Broadhurst Theatre in New York City was bought out for the night of January 23 by the Western Electric Company Post of the American Legion. The performance for the evening was "Whispering Wires."

Answers to Readers

GIVE me any information you have on the use of the W-D 11 *as a radio-frequency amplifier. I have inquired in several places, but no one seems to have any definite information. Are they inferior or superior to the 6-volt tubes for this purpose?—A. T. Bales,* 501 *Merchants Exchange, St. Louis.*

These tubes cannot be used successfully as radio-frequency amplifiers. The best tubes for this purpose are the ones you mention in your letter or the V-T 2, Western Electric.

* * *

Give me the hook-up embodying the following apparatus: 2 *variometers,* 1 *vario-coupler,* 1 43*-plate condenser variable,* 1 23*-plate variable,* 1 *detector and* 1 *amplifier. —George Leaderer,* 336 *Bryant Ave., Syracuse.*

See reply to Mr. Anorthy, and hook-up on this page. You will wire up only the one step, omitting the double-circuit jack in the circuit of the second tube.

* * *

1. *Can* 3 *Radiotron U-V* 202 *tubes be used in the place of the U-V* 201 *tubes in the Armstrong Superregenerative published in* RADIO WORLD, *No.* 19, *dated August* 5?

2. *What plate voltage should I use on these tubes?*

3. *Will it be necessary to use different rheostats and transformers if these tubes are used?*

4. *What other changes will be necessary in this hook-up in order to use these tubes? I wish to use them on a transmitter later.—V. A. Gilbert,* 332 *Riverside Ave., Spokane.*

1 and 2. While these tubes may be used in the circuit you mention, it is not advisable as they are not meant for that purpose. Higher plate-voltages will be required for operation. It is best to use either the 201 or the Western Electric V-T 2. These tubes may be used also in a small, low-power transmitter.

3. It will not be necessary to change any of the transformers, but we think it advisable to use a rheostat that will stand a slightly higher current without any danger of burning out.

4. No other changes are necessary.

* * *

Can you give me the address of Dr. H. V. Hillman and Dr. Clarke F. Fletcher, published in RADIO WORLD, *No.* 42, *dated January* 13, *in connection with their method of locating disease by radio?—F. A. Chapman, Box* 526, *Wellsburg, West Virginia.*

We refer you to the photographers who furnished the illustration, Kadel and Herbert, 153 East 42d street, New York City. They will give you the information, with which we were not supplied.

* * *

Publish a regenerative hook-up using the following apparatus: Vario-coupler, 23*-plate condenser, W-D* 11 *tube, batteries, and phones.—Jack Brown, Wenatchee, Washington.*

If you will consult RADIO WORLD No. 39, dated December 23, page 19, "With the DX Nite Owls," you will find a hook-up such as you want.

* * *

I have a regenerative set, but, owing to the fact that I am located about three blocks from the central power house of the B. R. T., I am bothered with a terriffic humming in my receivers. I also have the telephone company almost a half a block away. How can I remedy this, as I can't do any work at all except on very local stations.—Joseph Adams, Ridgewood, New York.

If you will refer to the answer given R. V. Andrews, Perryville, Ohio., under "Answers to Readers" in RADIO WORLD for January 20, you will find two ways of eliminating the hum. In the first, a primary of a 1-inch induction coil should prove efficient. In the second, you will have to wind two coils of 40 turns each on a cardboard core, and arrange the sliders as shown, with preferably a fixed condenser shunting them.

* * *

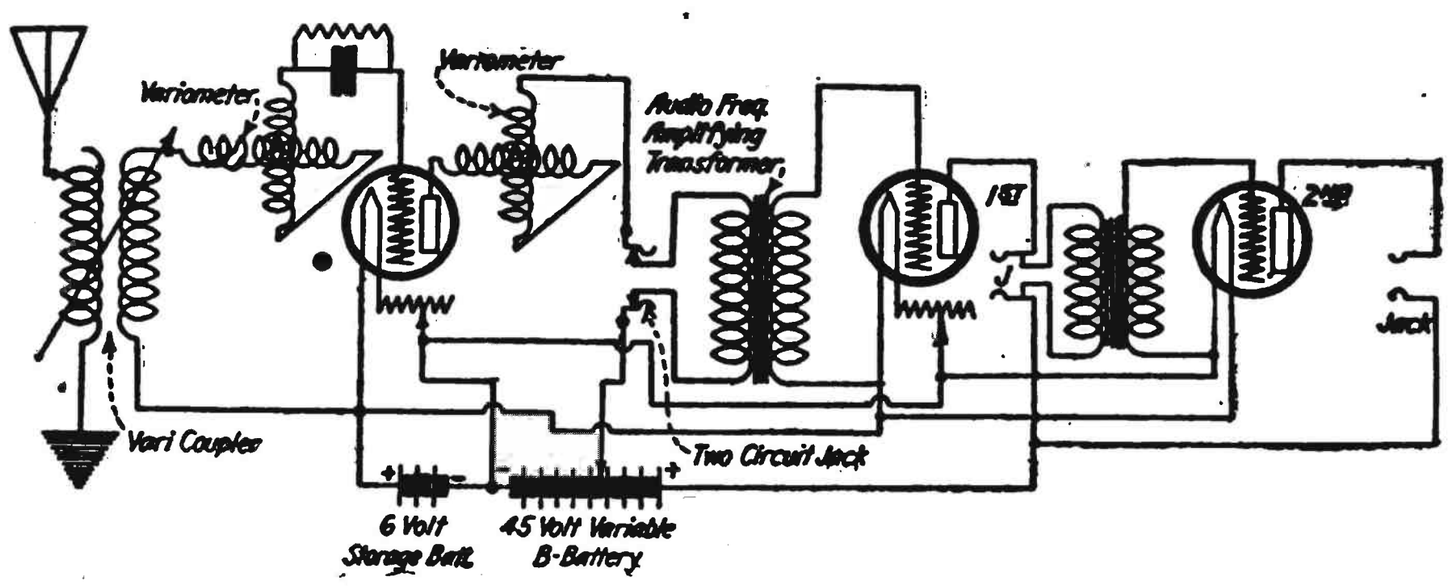
Is the Flewelling circuit practical? Is it superior to the three-unit variometer vario-coupler regenerative set?—Morris Dorsey, 604 *Woodward Ave., Atlanta, Georgia.*

This is a very practical circuit. It is not ethical for us to criticize one circuit in favor of another. Excellent results may be obtained with either, depending upon the way in which the apparatus is handled. Know your circuit and how to work it and you will get excellent results. This applies to a crystal circuit as well as to an Armstrong Superregenerative.

* * *

Give me the hook-up necessary for the panel published by Cranby Meyers in RADIO WORLD, *No.* 42, *dated January* 13.—*J. L. Anorthy, Waynesburg, Pennsylvania.*

Hook-up you desire is published herewith. The parts necessary are 2 variometers, 1 vario-coupler, 3 tubes, 3 rheostats, 3 jacks, 3 sockets, 1 grid lead and condenser, 2 amplifying transformers, panel 7 by 18, cabinet, 60-volt B battery with 22½-volt tap (1 22½-volt battery and 1 45-volt will suffice; hook them in series, and tap off for the 22½-volt), a battery, dials, and bus-bar wires.



Regenerative circuit published in response to query by Mr. Anorthy. The apparatus used is all specified in the hook-up.

* * *

Can I use De Forest coils (D-L 50 *and* 75) *in the DX receiver described in* RADIO WORLD, *No.* 43, *dated January* 20, *by Ortherus Gordon? How can I shield this panel effectively?—John F. Neary,* 5745 *Mosholu Ave., Riverdale, New York City.*

Yes, you may use these coils. The best way of shielding your panel is to paste either heavy tinfoil or light-gauge copper-foil on the back of the panel with shellac, taking care to leave space surrounding your fastening screws sufficient to clear all the apparatus.

I am using the Armstrong Superregenerator built according to the specifications in RADIO WORLD *of September* 16. *I have a* 160*-foot outdoor antenna, and everything called for in the article, but I do not get sufficient volume in the received signals. What is my trouble?—Jack Mason, Reading, Pennsylvania.*

This circuit is rather critical, and calls for careful tuning-in. As you seem, by your letter, to be getting quite a distance we fail to understand how the volume can be so low. Most of the regenerative tuning is done with the condenser C1 and the rotor of your coupler. Try using this set on a loop, as that is what it was originally designed for. Remarkable results have been accomplished with this circuit on a loop when properly tuned.

* * *

How can I increase the strength of my received signals? I am using the De Forest D. T. 600 *crystal set, and wish to cover greater distances.—M. Seibert, Clifton, New Jersey.*

You can increase the signal strength by putting one or two stages of audio-frequency amplification on. A suitable diagram appeared in RADIO WORLD for September 2 under "Answers to Readers," in response to an inquiry by H. S. Houston.

* * *

1. *Can a W-D* 11 *tube be used in the reflex circuit described by C. White, on page* 11 *of* RADIO WORLD, *dated January* 20?

2. *How high should the B battery voltage be?*

3. *What kind of transformer is used?*

4. *What kind of potentiometer is used?—John H. Newton,* 482 *North Sixth Street, Newark, New Jersey.*

1. No, the W-D 11 tube will not function properly in this circuit. It is better to use the regular hard tube such as the U. V. 201.

2. The voltage on the B battery should be 60 volts variable.

3. The transformer is the regular audio-frequency transformer used in regular audio-frequency amplification. One of fairly high ratio is preferable.

The regular 200-400 ohm potentiometer can be used. We suggest the Bradliometer, which is a carbon unit potentiometer, and gives finer adjustment.

* * *

I am building a crystal set, using: 1 *vario-coupler,* 1 *condenser, crystal detector, and I should like to know which would be best to use:* 1 43*-plate condenser, or* 2 23*-plate condensers.—V. R. Langdown,* 18 *Chestnut Street, Princeton, New Jersey.*

You do not mention where you wish to use the condensers. We advise you to use the 2 23-plate condensers, putting one across the secondary or rotor, and the other in the primary, with a series-parallel switch, so that it will be possible either to shunt it across the primary, thus increasing the wave length of your set, or to put it in series, allowing you to cut down your wave length.

* * *

Can the W-D 11 *be used in the Reflex Circuit, described by C. White in* RADIO WORLD, *dated January* 20.—*Charles Maloney,* 36 *Preston Street, Hartford, Connecticut.*

Not successfully. This tube is primarily a detector, and is not very useful in circuits such as this, although it can be used. We advise the U. V. 201.

With the DX Nite Owls

A Six Months' Fan Sends His

From O. E. Martin, 836 Railway Exchange Building, Kansas City, Missouri

I HAVE been a "radiophan" only six months, and don't claim to know very much about radio in general, or any part of it in particular; but I feel called upon to take issue with Mike Podhorn, of Wood River, Illinois, after reading his rather sarcastic comments in RADIO WORLD No. 42, dated January 13, on the receiving record of Arthur Lindstrom, of Baraboo, Wisconsin, in RADIO WORLD No. 37, dated December 9, 1922. Mr. Podhorn states he has quite an expensive set, has been in the game three years and has never heard music from a western station. This does not, to say the least, speak very well of his ability to operate his set unless there is something radically wrong with its construction. I do not think there is anything so unusual about Mr. Lindstrom's record in hearing from coast to coast and border to border with a set having one step of amplification. I am giving my record, made January 15, which covers practically every point of the compass from Kansas City, the greatest distance being KHJ, Los Angeles, about 1,800 miles. I am using only one tube, no amplification of any kind. Most of the stations heard were while WDAF, the Kansas City "Star," were on the air, which makes me proud of my record, as the "Star" is considered a hard station to tune out when so close to it as I am.

*KDKA, Pittsburgh; WGM, Atlanta; *KSD, St. Louis; *KFAF, Denver; WLAJ, Waco; *WWJ, Detroit; *WAAN, Cedar Rapids; *WAAK, Milwaukee; WAJN, Topeka; *WOC, Davenport; WBAP, Fort Worth; KHJ, Los Angeles; *WLW, Cincinnati; WBAD, Minneapolis; also the Fort Worth "Record," but I did not get their call letters.

I am using a Reinartz tuner, which I constructed myself. The entire set with all accessories from antenna to ground did not cost over $35. If Mr. Podhorn wants a copy of it, he will find it on page 23 of the same issue in which his letter appeared.

I have experimented with several different kinds of equipment and many different hook-ups, with varying success, and several complete failures, and from my experience I favor the Reinartz over all others.

*Indicates station heard through WDAF.

* * *

A List of 13

From Willis E. Gilbett, Jr., Box 1277, Alliance, Nebraska

THIS is a list of the stations I heard on the night of January 16: WAAK, WHAN, WHB, WFAA, WLW, WCH, WBAP, WSD, KUO, KZN, KSD, KDGU, KHJ.

* * *

Working at Odd Times

From Ernest A. Dibble, Rockaway, New Jersey

I HAVE a Paragon special and Paragon type DA 2-amplifier, with an antenna about 140 feet long and 35 feet at the highest end. It is a single-wire, and it crosses the canal. I have another antenna, also a single-wire, about 75 feet long and 18 feet from the ground. This I often use as a counterpoise and also a ground on the city water pipe. During the past month I have worked my outfit only at odd times. I have received the following list of stations on a detector tube, and many of them I am able to work in on the vocal loud-speaker, so that they may be heard plainly in different parts of the house. I have worked WOC in especially well on the loud-speaker:

THE Editor of RADIO WORLD will be pleased to receive sketches of hook-ups from the "DX Nite Owls" who send in records with a view of publishing them.

Send hook-ups of your sets, drawn neatly in black ink, provided they contain something unusual. Send, also, the names of the various makes of apparatus you are using.

Make your letters brief and informative. Write on one side of the paper only.

The letters and hook-ups will be published in the earliest possible numbers of RADIO WORLD.

KFC, KOP, KSD, KYW, WAAM, WAAS, WBAM, WBAN, WBAP, WBAY, WBS, WBT, WBZ, WCAE, WCM, WCN, WCX, WDAC, WDAF, WDAJ, WDAP, WDA2, WDAW, WEAF, WEAM, WEAS, WFAJ, WFAK, WGAM, WGAS, WGI, WGM, WGR, WGY, WHA, WHAB, WHAK, WHAM, WHAS, WHAZ, WHB, WHK, WIAC, WIAM, WIAO, WIAZ, WIP, WJAN, WJAX, WJZ, WKB, WKAC, WKAY, WLAD, WLAC, WLAG, WLAH, WLAK, WLAP, WLAW, WLB, WLK, WLW, WMAC, WMAF, WMAJ, WMAK, WMAM, WMA2, WMAS, WNAC, WNAN, WNO, WOC, WOH, WOO, WOR, WOS, WPI, WRAU, WRL, WRW, WSB, WSL, WWJ, WWL, WWX, WWZ, NOF, WAA2, 2XI, 2XJ, 2XAI, 3XW, WLAL.

* * *

In 15 Minutes

From C. A. Lynch, 4124 Bellevue Avenue, Detroit, Michigan

I HAVE been reading RADIO WORLD with much enjoyment since last April. With Frank S. Meyers' hook-ups (No. 3), illustrated in RADIO WORLD, No. 42, dated January 13, I picked up WFAA, Dallas; Kansas City Star, and KDKA, Pittsburgh, all in about fifteen minutes. My set contains a home-made vario-coupler, one 43-plate condenser, one W-D 11 tube and the electric light socket for the antenna.

* * *

Does Not Use Amplifiers

From L. D. Minnick, Box 36, Lovilia, Iowa

HERE are some of the stations I have heard with my home-made set, which cost less than $10. I do not use amplifiers: KYW, CJCB, WOI, KDKA, KSD, WGM, WHB, WYF, WDAP, WMAD, WHAJ, WAQ, WIAK, KFAF, WEAF, WBAP, WFAA, CJCK, WHAF, WLW, WNAZ, WWJ, WCX, WHAZ, KHJ, WGL, WLAG, WMAF. All come in well. At times I can remove the head set and hear the music.

* * *

A Record from Indianapolis

From Cecil Partner, 624 Lafayette Avenue, Lebanon, Indiana

AS a devoted radio fan and reader of RADIO WORLD I send you my record. My set consists of a detector and two-step audio, and two-step radio-frequency amplifiers. I have the latter for experimental use only. I have heard all stations on the detector and audio-frequency amplifiers.

The farthest distances are: WMAT, Duluth; WBZ, Springfield, Massachusetts; PWX, Havana; WOAI, San Antonio; KLZ, Denver; KHJ, Los Angeles. The total is ten, which vary in distance from 30 to 2,000 miles.

I have just erected two new antennas. One is a four-wire, 75 feet long and 30 feet high. The other is a one-wire, 125 feet long and about 25 feet high. The two tune practically the same, but I get a little better signal strength on the one-wire.

I should like to hear from any one wishing to purchase a complete set.

* * *

A Three Nights' Record

From Clarence Gladstone, 10 Phillip Street, Asheville, North Carolina

I HAVE a one W-D 11 tube set with no amplification, with which I have heard the following stations in three nights distinctly: WGY, Schenectady; WOR, Newark; WHAM, Rochester; WCX, Detroit; WAAK, Milwaukee; WIP, Philadelphia; WOC, Davenport; WEAF, New York; WCM, Memphis; WWJ and WCX, Detroit; KDKA and WCAE, Pittsburgh; KSD, St. Louis; PWX, Havana; WHB and WDAF, Kansas City; WWI, Dearborn; WDAP, WMAQ and KYW, Chicago; WBAP, Fort Worth; WGM, Atlanta; CFCA, Toronto; WJAX, Cleveland, and WLW, Cincinnati.

I think RADIO WORLD is the best radio magazine on the market, and shall continue to buy it as long as you publish it.

* * *

A New York City Record

From Marcel Silz, New York City

AFTER reading the records of many fans I have decided to send my list in:

WDAF and WHB, Kansas City; WSB and WGM, Atlanta; WOH and WLK, Indianapolis; WCAE and KDKA, Pittsburgh; WDAP, WMAQ and KYW, Chicago; WIP, WOO, WFI and WPJ, Philadelphia; WHK and WJAX, Cleveland; WWJ, Detroit; WWI, Dearborn; WBAP, Fort Worth; WHAS, Louisville; WMAB, Oklahoma City; WOC, Davenport; KSD, St. Louis; WLAL, Warren; WLW, Cincinnati; WDAJ, College Park; WGY, Schenectady; WGI, Medford Hillside; WBL, Springfield; WHAM, Rochester; WMAK, Lockport; WNAC, Boston; WMAT, Duluth; WMAF, South Dartmouth; WBT, Charlotte, and 15 nearby stations. Once I tuned in 17 stations.

* * *

Did Not Keep Tuning

From E. L. Laudell, Bethany, Illinois

I READ the RADIO WORLD every week, and have been keeping up with the DX night owls for some time. I listened to CFCA, "Daily Star," Toronto, some time ago from 5:30 until 6:15, when they signed off. There are about seven high-powered stations working at this time in my neighborhood, but these did not interfere with CFCA. I did not have to keep tuning to hold them. Among the stations I have heard in the last two weeks are: CJCG, WGY, WWJ, WAAP, WCAS, WCX, WDAF, WEAY, KFAD, CJCG, WHAS, WHB, WJZ, KHJ.

* * *

2,200 Miles from Winston-Salem

From Edward Felts, Box 358, Winston-Salem, North Carolina

RECEIVED KFAP, Butte, Montana, with detector and 1 step. I find a 23-plate condenser across the aerial and ground helps tuning. I use a three-wire aerial; fifty feet high and fifty feet long. I have the longest record heard of in Winston-Salem—over 2,200 miles. Among the stations I have heard are: PWX, Havana; KSD, St. Louis; WHD, Kansas City; WFAA, the "News," Dallas; WGY, Schenectady; KDKA, WLK, WHK, WDAE, WJAX, WHAM, WCAE, WEAO, and 49 others.

(*Continued on page* 26)

Spaghetti Tubing and How It's Made

UP to about ten years ago the common practice of insulating short terminal and connecting wires was by the use of cotton sleeving, or braided tubing, then also known as stockinet; after the apparatus was finished, this sleeving was given a sufficient number of coats of varnish to produce a smooth surface. Where such connections were subjected to moisture or oil, as in motors, dynamos and transformers, the dielectric strength of the varnish gradually weakened and finally broke down; and where high temperatures also prevailed the disintegrating process was so rapid that the insulation afforded only temporary protection.

Some one, possibly preferring a shorter name to "M-R Impregnated Varnished Tubing," says the New York "Mail," and aided by the resemblances of the material itself, dubbed it "macaroni" and the name stuck until the smaller sizes became popular. Since then "spaghetti" has been the designating shop term.

During the war the United States government tested several makes of "spaghetti" and many thousands of feet were used in radio and other work by the various bureaus of our own government, as well as those of foreign countries.

When manufacturers of electrical apparatus took up the production of radio sets they naturally used "spaghetti" on leads of exposed wiring, primarily as a protection against "shorts," although the "dressed up" appearance thus attained was at once recognized as an aid to selling. The three styles of "spaghetti" now on the market may be briefly described as follows:

Base of cotton sleeving impregnated through and through with varnish and baked, then given from eight to ten additional coats, each coat being baked and rubbed down. This is the genuine "macaroni" in the larger diameters and "spaghetti" in the smaller sizes. The wall around the sleeving is thus built up of nearly a dozen layers of varnish, is homogeneous and of tremendously high insulating value. As the final coat is rubbed down the finish is smooth but not brilliant. Dielectric value approximately 7,000 volts. Characteristics already described.

Here the cotton tubing is treated with a dressing or filler, instead of varnish, dried and then dipped five or six times in varnish, each coat being baked dry before the succeeding one is applied. This method produces a tube with a high gloss that is moisture proof, oil resisting and, when properly made, will withstand breakdown tests up to an average of 5,000 volts.

And it is difficult to determine quality by either price or appearance, as some of the most highly polished are built up entirely of collodion, cellulose, or other guncotton compound, to which castor oil is added to retard hardening, and as they contain absolutely no varnish whatever they soon become hard, brittle and crack; then, too, they are highly inflammable.

White or colored cambric cloth is cut in narrow bias strips, rolled lengthwise to form a tube 36 inches long, and covered with an insulating compound resembling (but containing no) rubber. To produce yellow tubing, amber colored compound is used over white cloth, whereas both cloth and compound are of the same color when other shades are made.

In every case the coating is transparent, flexible and will give excellent electrical protection up to 1,000 volts in ordinary apparatus where it does not come in contact with water or oils.

This form of "spaghetti" is ideal for radio instruments inasmuch as it offers insulating protection with a factor of safety many times in excess of that required; its low cost permits of its liberal use and where more than one color is employed to trace out different circuits the result is an improvement in appearance of the home made set.

The Dead End Effect Explained

END loss in radio inductance coils is of great importance to all amateurs who construct their own sets, says the New York "Globe." It is also a thing that should be guarded against when purchasing a set already completed.

This loss is one which may be so great as completely to prevent reception of signals on a certain wave length. The effect is seldom considered in home-made sets, and at times even manufacturers do not guard against its troublesome effects.

All inductance coils possess more or less distributed capacity, depending upon the dimension of the coil, its insulating properties, and the nature of the supporting form. Capacity is far greater in a coil having more than one layer of wire than in a coil which has but a single layer.

If only a portion of the wire on the coil is used the remainder will have a certain fundamental frequency or wave length due to the inductance of the unusued portion and the capacity of the coil as a whole.

If the value of the unusued part of the coil has a wave length approximately equal to the wave length at which reception is desired, a great portion of the receiving currents will be absorbed by the unused circuit.

As an experiment connect a small, variable condenser across the terminals of the coil. Vary the condenser and note that at a certain point, if the values of the coil and condensers are the proper ones, the signals will disappear. Now, if the coupling between the test coil and the receiver is very weak these effects will not be noticed. If it is very close—which is a condition when only a part of the winding of a coil is in use—the effects will be more apparent.

Japan Speaks to New York

THE New York "Times" radio station has copied a twenty-two-word message direct from station JAA, near Tokio, thought to be the first time a complete message from Japan has been recorded in New York. It is difficult to tune in the Japanese station from the eastern coast of the United States, because of interference created by the powerful French station, UFT, on the outskirts of Paris, operating on practically the same wave length, 14,600 meters. One morning last week, at 2:07 o'clock, the French transmitter was standing by, as were stations on the Atlantic coast of this country, giving the Japanese dots and dashes opportunity to register in New York with great clearness.

Ordinarily it requires several hours to get a message from Tokio to New York, for it must be sent to Honolulu, then relayed to San Francisco, where it is put on the land telegraph lines and sent across the continent. It takes at least three weeks for a letter to travel from Japan to New York. Radio spans the 9,000 miles across the Pacific and the United States in a fraction of a second.

Don't—

DROP your bulbs more than once a day. You may dent the glass or, possibly, shake some of the ions off the filament.

Run your aerial across more high-tension lines than you have to. It may not kill you, but you'll never look the same in a wooden overcoat as you do in a Morris chair.

Burn your bulbs up too high. It looks pretty but it puts an awful drain on the battery.

Listen to a beginner's advice—go to someone who knows more about it than yourself.

Try to receive without tuning. Coué never could make a car run by auto-suggestion, and you can't tune in Detroit by just thinking about it.

Try to drive talks into your panel. Machine screws look neater, and there isn't so much chance of denting the panel with the hammer.

Expect the battery to last forever. A man's life is limited to years, a battery's to months. The life of each depends on care.

Make your tubes "blue." You know how it feels to be blue but you don't understand how you make the tube feel. It doesn't work well after a few blue spells. Cut down your B current.

When ——

By Allen Donne

YOU can tune in on any station you want, without being interfered with——

You can fix your own tubes, as easily as you fix the inner tube on a car——

You can walk into a radio store and come out with just what you went in for, and nothing more——

You can get someone to explain the action of your favorite circuit in a way that you can understand——

Someone who has been in radio a month more than you have doesn't try to show you up as a numbskull——

The CQ hound on the next block understands that you don't have to hear him sign 66 times in order to understand him——

YELL "EUREKA" 'cause you've found PARADISE!

Quick Work by a Radio Druggist

A PHYSICIAN in Bayonne, New Jersey, attending a patient suffering from influenza a few days ago, ordered a prescription by radiophone. The druggist, A. C. Nuber, Jr., happened to be at his set, and the prescription was filled and delivered in ten minutes.

A Radio Type Machine

A NEW type-setting machine with an attachment for receiving wireless copy directly is claimed by a French inventor. According to his statement, the machine is so simple that it can be handled be a child.

How Broadcasting Is Done

FOR those who have given little thought to what takes place at a broadcasting station while they are being entertained and instructed, C. W. Horn, superintendent of Radio Operations of the Westinghouse Electric Company, recently addressed a radio audience from Station KDKA on the subject of broadcasting stations and the conditions confronting those who have their operation in charge. Mr. Horn said in part:

"A broadcasting station consists of certain apparatus so constructed and arranged that it will pick up sound waves, transfer them into electrical energy, amplify them, and then by means of radio transmitters radiate them through the ether.

"The first thing to consider is the transmitter itself, which makes possible the radiation of energy. This transmitter makes use of the well known vacuum tubes which are operated at very high pressure in the Westinghouse Stations at about 2,000 volts. A set of these tubes, known as oscillators, are so connected and arranged in a special circuit that they generate what is called high frequency electricity. The electricity which lights your home travels in waves at the rate of about sixty per second, whereas in this high frequency electricity there may be a million or more waves each second. This high frequency current is transferred to the antenna and radiated through space, acting as the carrier wave for the music or speech which you pick up on your radio receivers. To these oscillators are coupled a number of tubes called modulators, whose function it is to control the radiated energy in such a manner as to reproduce faithfully and without distortion the spoken word or music it is desired to transmit.

"Now let us look at the microphone in the studio. This is an instrument which is designed to pick up sound waves and convert this mechanical energy into electrical energy. Most of you are familiar with this instrument either from actual experience or from having seen photographs of them, but you may be surprised to learn that they are practically the same as the transmitter on your ordinary telephones, with the exception of certain refinements found necessary for radio work. After this energy has been transformed into electrical current it is intensified by means of amplifiers until it has reached sufficient strength to properly control the large modulator tubes on the transmitting set previously described. When it is realized how many times this energy must be transformed from one form to another, it is remarkable that the quality and strength can be maintained without appreciable loss.

"Each tone or note in music consists of a fundamental beat or frequency of vibration, and a number of harmonics or partial vibrations. These harmonics contain different percentages of the total energy in any note. The distribution of the energy among the harmonics governs the quality of the tone and also make it possible to distinguish one instrument from another. It will, therefore, be seen that it is quite necessary to pick up all the harmonics possible in their true proportion, or the quality of the tone will be destroyed. To do this properly has required considerable study and experimenting. In the first place the studio or room in which the broadcasting is done must be thoroughly protected to prevent the reflection or reverberation of sound energy. This is usually accomplished by lining the walls, ceiling and floor with heavy drapery, and sometimes felt is used. In the new broadcasting studio of Station KDKA at East Pittsburgh, we have gone to considerable pains to secure this freedom from reflection. In this new studio, which was just recently opened, the walls, ceiling and floors have been covered with felt, over which with the exception of the floor, has been spread a sheet of muslin. Over this is hung in heavy folds a covering made of monk cloth. The floor has a covering of thick carpet over the felt. Special effort has been made also to exclude external noises and when one enters this room he is immediately conscious of the intense stillness which prevails.

"In this studio when a musical instrument is sounded the sound waves travel directly to the pick-up, or microphone and are not distorted as they would be if they were reflected from different objects or places about the room.

"There is a kind of broadcasting which the average listener knows very little about, but which he nevertheless enjoys probably to a greater extent than the broadcasting performed in a studio, and that is when the material is picked up from a distant point, such as a theater, opera house, football game, etc. To accomplish this successfully is rather difficult because it is not possible to rebuild the halls or theaters in which the performances take place, and for that reason we must accommodate ourselves as best we can to the conditions existing. One of the greatest drawbacks in this kind of broadcasting is that the microphone picks up echoes, especially in large halls and in churches. Opera is especially hard to pick up, inasmuch as the singing is varied, and takes place at different points on the stage. At Chicago our Station KYW has ten microphones scattered about the auditorium where the Chicago Civic Opera Company renders its selections. An expert sits in the audience with a small switchboard in his lap and cuts in the proper microphone for whatever type of performance is being offered at that instant. He uses a different microphone for a solo than he does when the orchestra is playing, and he must make the change instantly at the beginning of each selection. Needless to say this man knows all the operas by heart."

Attention! Fans and Amateurs!

Have you built your own receiver?
Are you experimenting with any particular hook-up?
Are you improving your set?
Are you doing any interesting constructive work in radio?
Why not share this knowledge with your thousands of brother fans who read RADIO WORLD every week?

We want pictures of receiving sets with descriptions of how you overcame some difficulty, or of any additional part or unit that you have added to obtain better results. These are the things that, probably, the other fellow is looking for. Send in your information; pictures or whatever you have done to improve the art. Remember the beginner is looking for them.

We intend to print in this paper, each week, pictured information and description of value to radio amateurs. If you have found a newer or better way of doing anything, don't keep the secret but tell it to your thousands of brother fans.

Send in a photograph of your set with or without accompanying diagrams and measurement. State whether you figure in the picture yourself, or not, and without any expense whatsoever to you we will make an engraving and publish it. Be sure to write your name and address plainly on photograph.

Send in your picture at once, or if you have not made a set or done anything else in making radio material, tell the boy next door all about this offer.

Address Technical Editor
RADIO WORLD, 1493 Broadway, New York City, N. Y.

No Free List

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

Did You Know That—

THE first Transatlantic signals were "put over" by Marconi on the night of December 11 in 1901, that the sending station was Poldhu in Cornwall, while the receiving station was at St. John's, Newfoundland?

The first radio stunt of any importance in this country was staged by the New York "Herald," when the international boat races between the Shamrock and the Columbia in September and October of 1899 were reported by wireless for that newspaper?

The first "scoop" of this kind, however, occurred in England a year earlier (1898), when the Dublin Daily Express of London had the events of the Kingstown Regatta reported by wireless for publication in its columns?

The first Marconi station in the world was constructed at the Needles, Alum Bay, Isle of Wight in 1897?

The first paid Marconigram—as a radiogram was then called—was radiated from that station in June of 1908? The message was over the signature of Lord Kelvin, and was addressed to his friend, Sir George Stokes?

The first amateur to sit back and really be satisfied with the results he is getting has not yet come forward for recognition?

The first American battleships to be fitted with radio were the New York and the Massachusetts (1899) and at that time signals were exchanged at distances up to 36 miles?

The first visit of the wireless wizard to America was on the occasion of the international races in 1899 and that Marconi has been here eighty-four times since?

The first ocean newspaper appeared on board the S.S. St. Paul in 1899 and was called the "Transatlantic Times"?

The first time a wiseacre refused to predict a limit to the progress of radio was just a short year ago?

The first concert is not always the best?

O. G.

Gossip by Radio

CHARLES REED JONES, formerly managing editor of Photoplay Journal and Filmplay, who has assumed direction of the "Stage and Screen" periods of the WHN radiophone station at Ridgewood, Long Island, promises to give his audience real gossip that could be obtained from no other source. Mr. Jones has recently returned to New York City from Hollywood, where he has spent some time.

Mr. Jones intends to carry forward the policy of his predecessor, R. C. Reed, in introducing stars of the stage and screen to his radio audiences. Rex Ingram, director and producer of "The Four Horsemen," is one of the leading lights of filmdom who will be heard from WHN shortly.

Local QRM

THE true psychology of one phase of radio was expressed the other day when one amateur said to another: "Horace, ya poor fish, why don't you show some originality and try out a new circuit on that outfit of yours just like the other fellows?"

MR. TOM TUTTLE says that there aren't many points of similarity between a violin and a radio, but he knows this: that if he were put in a room with one hundred radio receiving sets bringing in a concert from a near-by station, he could pick out his own. He says his is the only one that would bring in the announcements and then go dead for the duration of the concerts.

SOMETHING had happened to make the toothless centenarian happy. Old, worn and wife-ridden, he had few comforts, but radio was numbered among them and he used it to the fullest advantage.

One evening, when a woman lecturer was talking about household affairs, he asked her in his century-old babble please to keep quiet. She obeyed him not. Then the worn old gentleman experienced the thrill of his long life. He stretched forth his withered hand and pulled the plug. The voice stopped instantly.

He experimented for awhile, and then realized that he had just done what he had tried unsuccessfully to do all the long years. A grin spread over his face.

Now he spends all his time letting a woman lecturer get a good start and then shutting her up just like that. He says he expects to enjoy his second hundred years more than he did his first.

England Hears WGY on Loop Aerial

SINCE December 24 many letters have been received by WGY from English radio fans, who report successful reception of the General Electric Company station. Probably the most remarkable reception was that of Captain Round, of the British Marconi Company, who, on December 24, received WGY on a two-foot loop aerial, and Arthur Brooke, of Liverpool, who, on the same evening, picked up the Schenectady station on a forty-foot indoor aerial. Among those who reported reception were: A. Shaw, Colne Lanes; R. T. Hatton Evans, Penarth, South Wales; W. G. Boothroyd, Southport; J. W. F. Cardell, Cornwall; J Ashworth, Bolton, Lancashire; T. B. Trott, Plymouth, and Thomas E. Henshelwood, Inverness, Scotland.

The Englishman who picks up an American radio station must be a real enthusiast because most folks across the Atlantic are in bed by the time the American stations are getting into the air. London is five hours later than New York, so a London fan who picks up WGY at the beginning of its program—7:45 p. m.—is listening at 12:45 a. m., his time.

The Mountain Comes to Mahomet

THERE is one angle of radio broadcasting that should be supported by every thinking citizen of the country, says the New York "Globe." Whatever we may think of the usual jazz programmes which are used as a means of entertainment, we are bound to approve the type of radio broadcasting which brings the Sunday church services into the homes of those who are too feeble to attend church in person.

Every Sunday morning there are thousands of people who never go outside their own doors, but who, nevertheless, are in attendance at one of the big churches throughout the country. Perhaps the church is only next door or possibly many hundred miles away, yet the music from its organ and the voice of its pastor penetrate into the homes of people who are unable for some reason or other to attend the church services in person.

It is a modern version of the old story of Mahomet and the mountain. If there are people who cannot go to church then the church must go to them.

The value of church broadcasting was emphasized first when the Rev. Ernest Stires of St. Thomas' Episcopal Church in New York City preached his entire sermon by radio, so that many who could not get to church could have the word of God brought into the home. Encouraged by this attempt, greater power was used thereafter to make it possible to cover the bulk of the shut-ins who are scattered throughout the United States. Reports then came that sets were being constructed for shut-ins, invalids, hospital patients, and others who were denied the privilege of getting outdoors.

Orphanages, homes for old people, and even jails were fitted out with radio receiving sets. In the South it is rumored that a fund is under way to provide sets for 1,000 churches where it has been impossible to get a preacher regularly. Many a small church has fallen off through lack of a regular pastor. Radio is not expected to change all this, but it is hoped to make the country church a civic, educational and cultural centre.

That Armstrong Circu

So much interest has been displayed in t special article, "TESTED INVENTION MAJOR ARMSTRONG AMPLIFIES SET 100 TIMES," by John Kent, that appeared in RAI WORLD No. 13, dated June 24, 1922, the publi decided to put aside a number of copies for th who were not able to get this issue when p lished. Copies will be sent, postpaid, on rece of 15c., or send in your subscription, $6.00 for year (52 issues), $3.00 six months, or $1.50 th months, and subscription will be started w the issue containing the article about Ma Armstrong's Amplifier.—RADIO WORLD, Broadway.

(*Continued from page* 20)

With a Home-Made Set

From Joe McCormack, 1018 Peachtree Street, Gadsden, Ala.

I HAVE received the following stations in less than three months on a single-detector, no amplification, using a honeycomb coil, with tickler feed-back, two .001-variable condensers, (one in primary and the other in secondary) and change-over switch in series. This set is home made. Anyone having a set of this type, please write. I will be pleased to give further information. Here are some of the stations received: WJZ, WWJ, WLW, WMH, WOH, WSB, WAAX, WAAG, WCX, WEAT, WDM, WOK, WKN, WDAF, WWI, WHB, WWZ, WGAQ, WBU, WIAB, WAAP, WEAY, WGM, WHAS, WHAA, WSY, WGY, WHAL, WHAO, WDAJ, WEAK, WOC, WAAC, WEAU, WGAN, WDAE, WOS, WIAG, WOR, WAAW, WAAB, WOI, WFO, WLAB, WCK, WRR, WBAO, WEAF, WBAP, WOO, WMAD, WLK, WOAI, WGF, WFAA, WDAP, WLAG, WMAK, WIP, WCAH, WBL, WGR, WMC, WEAS, PWX, WHK, WBAZ, WHAM, WDAL, WJAK, WAIO, WBAK, WJD, WAAH, WCAU, WJAX, KYW, KDNA, KSD, KFAF, KHJ, KOF, WQAA, WNAV, WOAF WFI, WJAJ, WDAV, CFCA, WJAH, WMAF, NOP, WBAV, WJAN, WHAZ, WFAT, WPA, WKAL, WHAH, WNAC, WOAV, 2XD, 9ARU, 4FC, 2XD, 9AJ, 5XA, 2XI, 9DYN, 1XB, 9KP. All of these are radiophone stations. The hook-up is on a separate page.

* * *

Results from Bulb Set Nearby

From L. S. Musser, Anderson, Indiana.

I JUST read in Mr. Keating's letter in RADIO WORLD, dated January 20, about the remarkable results he is getting on his crystal set. It seems that he is very much concerned about being told that his results are due to bulb sets near where he has his set.

I have experimented with the crystal set for the past year and have made one that gives the same results. I have tested this in the country four miles from a bulb set and find that I get better results there than I do in town.

My set is 3 inches wide, 7 inches and 2 inches deep. I use a double coil primary and secondary, a 10-point wave length control switch, a crystal detector, a phone condenser and four binding posts, all mounted on a hard rubber panel. I do not use any amplification. I can use two and three sets of phones on this outfit. I get the following stations regularly and very clearly:

WGY, Schenectady; KDKA, Pittsburgh; WWJ and WCX, Detroit; KYW and WAAF, Chicago; WSB and GYM, Atlanta; WHB and WDKF, Kansas City; WOC, Davenport; WSY, Birmingham; WOH and WLK, Indianapolis.

Other stations I have heard are WKAF, Wichita Falls; WFAA, Dallas; KSD, St. Louis; WKY, Oklahoma; WLAG, Minneapolis; WLW, Cincinnati; WCR, Buffalo; WWZ, New York; WOR, Newark; WBAP, Fort Worth; WBAX, WilkesBarre, Pa.; WWX, Washington.

My aerial is 2 wires, 50 feet long, 25 feet high. To get results one must have a good coil, good aerial, the best crystal and good phones.

I know that a crystal set does not have to depend on a nearby bulb set for results. All connection in the aerial and set should be soldered.

* * *

135 Stations Heard

From Edward Coffman, Quincy, Ohio

HERE is a list of DX stations received by me in the last 2 or 3 months which I think will compare favorably with that of B. L. McBride of Winchester, Tennessee, whose record was given in RADIO WORLD of January 6. I use a single detector bulb with a tuning coil (single winding, not secondary) 3,000-ohm Manhattan headset and a single wire aerial, 92 feet long and 25 feet high.

KHJ, KWH, KFI, Los Angeles; KUO, San Francisco; WNAC, Boston; WEAF, NYC, WJZ and WOR, Newark; CJCG, Winnipeg; CFCA, Toronto; WHAB, Galveston; WKAL, Orange; PWX, Havana; WKAQ, San Juan.

The total number of stations heard to date is 135.

Ocean Forecast Messages

The following arrangements have been made for issuing warnings of cyclonic disturbances off the coast of Queensland from December to April: By arrangement with the Commonwealth Meteorological Bureau warning of a cyclonic disturbance is dispatched by urgent telegram (Sundays included) to the radio stations and post offices of the ports in the area likely to be affected. Radio stations will broadcast such warnings to all vessels, and, in special cases, the meteorologist will indicate when his next report will issue.

At 4:30 p. m. (local time) daily, except Sundays, radio stations will broadcast an "Ocean Forecast Message," giving the state of the weather, direction and force of the wind, and state of the sea at 3 p. m. along the Queensland coast, followed by a forecast of probable conditions during the ensuing 24 hours. On Saturdays the forecast of probable conditions will be for the ensuing 48 hours.

Heard at the Radio Counter

A Conversation Between Customer and Radio Clerk

Part XIII

"WELL, sir, what can I do for you?"

"I have just recently become interested in radio, and I am thinking of purchasing a radio set. Could you advise me as to just what to do?"

"As you say that you have never operated, I advise that you get an inexpensive crystal set to begin with. If you were to buy a more expensive one to begin with you might have a lot of annoyance by not knowing how to operate it. Not getting the proper results, you would become disgusted with it before you had learnt its advantages."

"That is what I was told, but I have also been told that small sets of this type are inefficient, and therefore troublesome."

"Well, as the advantage of crystal sets lie in their simplicity of manipulation, you can learn more by operating one to begin with, and then after you know something about apparatus, by reference to different text books and magazines, you will naturally want to increase your receiving range, and will buy a tube receiver."

"That is very explicit. Have you any of the crystal sets you mention?"

"Surely, here are five different models, and while the principle on all of them is the same, they differ in workmanship, and the more expensive has of course the best apparatus. I would advise you to buy only the best, because it always gives the best results."

"Is this all that I will need?"

"No, you will need an aerial. We have some antenna sets already made up in boxes. You will attach the wires and insulators. Then you will need a pair of phones, and the same principle applies to these instruments as to the set. The best will naturally give the best results. You will find all the phone sets in the glass cabinet right below."

"Well, if you think that is all I need, I will leave the selection to you, since I don't know one from the other. Will you wrap them up and deliver them to my address? Here is my card."

"Certainly. Just one minute and I will

"Setting You Right"

IN RADIO WORLD, dated January 13, page 23, we published a hook-up of the Reinartz circuit, in answer to an inquiry by C. W. Stewart. An error was made in connecting up the first rheostat.

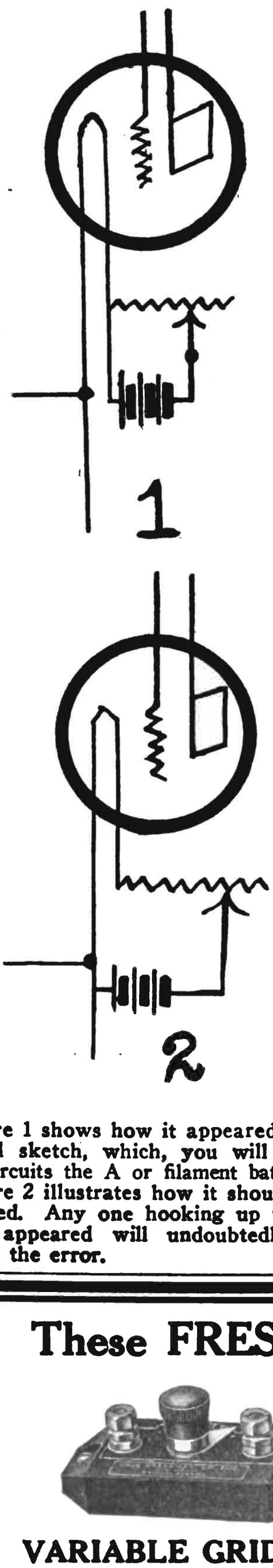


Figure 1 shows how it appeared in the original sketch, which, you will notice, short-circuits the A or filament battery.

Figure 2 illustrates how it should have appeared. Any one hooking up this set as it appeared will undoubtedly have noticed the error.

No Free List

To many anxious inquirers: RADI WORLD has no free list. One copy sent as a voucher to each advertiser advertising agent represented in curre issues. All other copies are paid for subscription or through the news trad

A Set That's a Little Different

EDITOR, RADIO WORLD: Frank S. Myers, in RADIO WORLD, No. 42, dated January 13, requests that the fans tell something about the parts of their sets. Also C. White, consulting engineer, has an article entitled "To the Radio Amateur with Little Money to Spend."

This is an answer to both.

My set is a three-circuit regenerative, single tube, vario-coupler and two variometers. These coils are wound on tubes made of blue plasterboard and glue. The wire is of three different sizes, as I used scraps of what I had on hand.

The leads from the rotors come out through copper tubes. This tubing is from the cooling system of an automobile. The knobs are spools from a "Tinker Toy" set. The dials are "Little Wonder" records. The switch blades are made from the case of an old alarm clock. The points on both inductance switches are brass-head tacks, and on the other switches are copper rivets.

I have two variable condensers. One is made from a patent-medicine sign. It has two sets of leaves that intersect with a sliding motion, operated through the panel by a rod from the ever useful "Tinker Toy." The other is of the same type, but is made from old negative plates covered with tinfoil. There is no body capacity to these. Both have a vernier made of sheet iron and tinfoil.

The by-pass condenser is of mica and foil between two pieces of hard rubber—part of a broken photograph tray. The grid condenser is of waxed paper and foil from a Ford coil. The variable grid leak is of hard rubber from the photograph tray. It consists of a switch lever with hole drilled in end, with short piece of pencil lead inserted. This lever makes its own pencil mark. The rubber base should be sandpapered so it will hold the lead. The leak is connected to a three-point switch, which connects it with the coupler in the usual place, or with the filament or plate. Another switch—four-point—varies the voltage from the B battery. The detector tube is only five inches behind the coupler, and the B battery is on a shelf on the panel, so all these connections are short. Still another switch connects the negative side of the B battery to either the negative or positive side of the A battery.

By connecting the leak to the filament and the B battery minus to plus on A battery, reducing the B voltage, and burning filament very hot, distant stations are brought in with great increase in volume. I got hold of a 12-volt storage battery that had been thrown away, from which I got sufficient plates to make three fairly good cells. It has had no attention, except a little rainwater, in nearly two years. It is charged from a 220-volt D-C line, through 190 ohms resistance. I often use the set while the battery is charging.

My vernier rheostat is wood—one of those little hoops, 5 inches in diameter, which women use for fancy work.

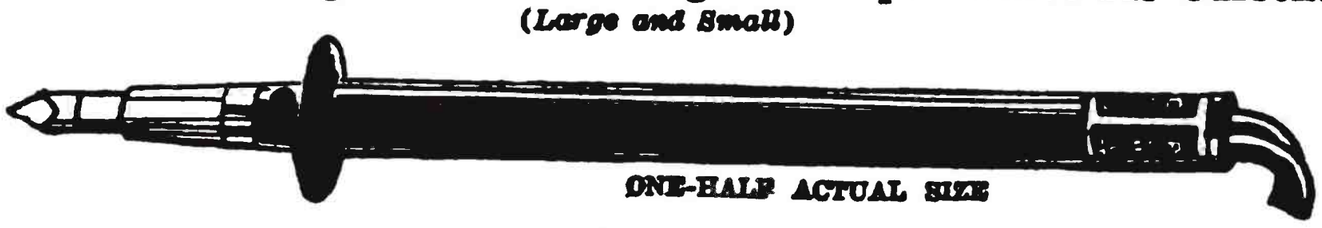
A single German silver or other resistance wire is wound on the outer circumference. The total resistance is about ¼ ohms. It gives a fine adjustment.

The panel is part of the footboard from an old bedstead. It is very large, as I need room to try out different circuits. It is covered with foil on inside and grounded. My aerial is one wire, 130 feet long and about 38 feet high. I frequently use a small loop in plate circuit.

With this set I get about all that is worth hearing east of the Rockies—from the call of the North to PWX; from Denver to Boston. I have never heard from the Pacific Coast, but I never listen in after 11 p. m., Central Time. I once heard some phonograph records from Boise, Idaho.

If I get a station at all I get it with good volume. I have never tried to see how many stations I could get in one night, nor have I kept count of total number received; but it is not less than eighty.

I am claiming no records. I give all credit to our splendid broadcasting stations. I wish I could find words to express my appreciation of them. This may be of help to some beginner with limited means, and who lives where it is hard to get supplies.—F. Onderdonk, Calera, Alabama.



Another Voice for Mr. Lindstrom

EDITOR, RADIO WORLD: I have been in the radio game since Coherer days, or about 1908-1909. As a rule I don't mix in these novice discussions, but happened to notice, in RADIO WORLD, No. 42, dated January 13, the challenge given Arthur Lindstrom, of Baraboo, Wisconsin, by Mike Podhorn, of Wood River, Illinois. I don't

(*Continued on next page*)

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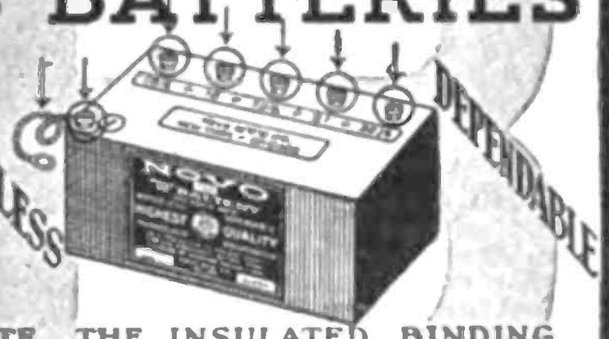
NOVO "B" BATTERIES



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¶ This is fiction but Mr. Le Queux is a member of the Institute of Radio Engineers and therefore well fitted to write this engrossing radio adventure.

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RADIO WORLD

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(*Continued from preceding page*)

see why Mr. Lindstrom's record should be questioned. I live about 35 miles from Baraboo. And even listeners with single-circuit receiver and detector are only getting phone stations on both coasts and from the Texas stations to Winnipeg and Regina.

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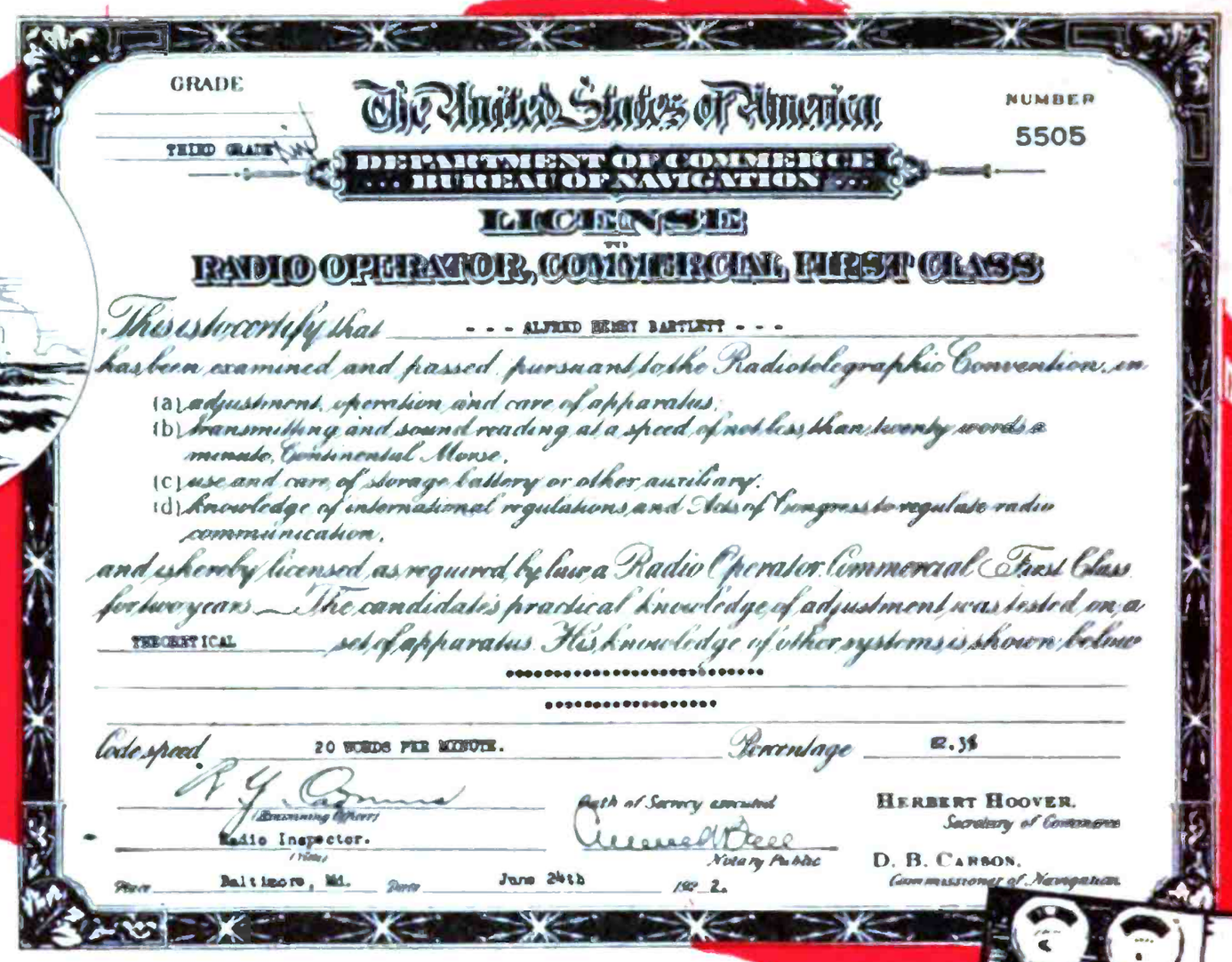

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