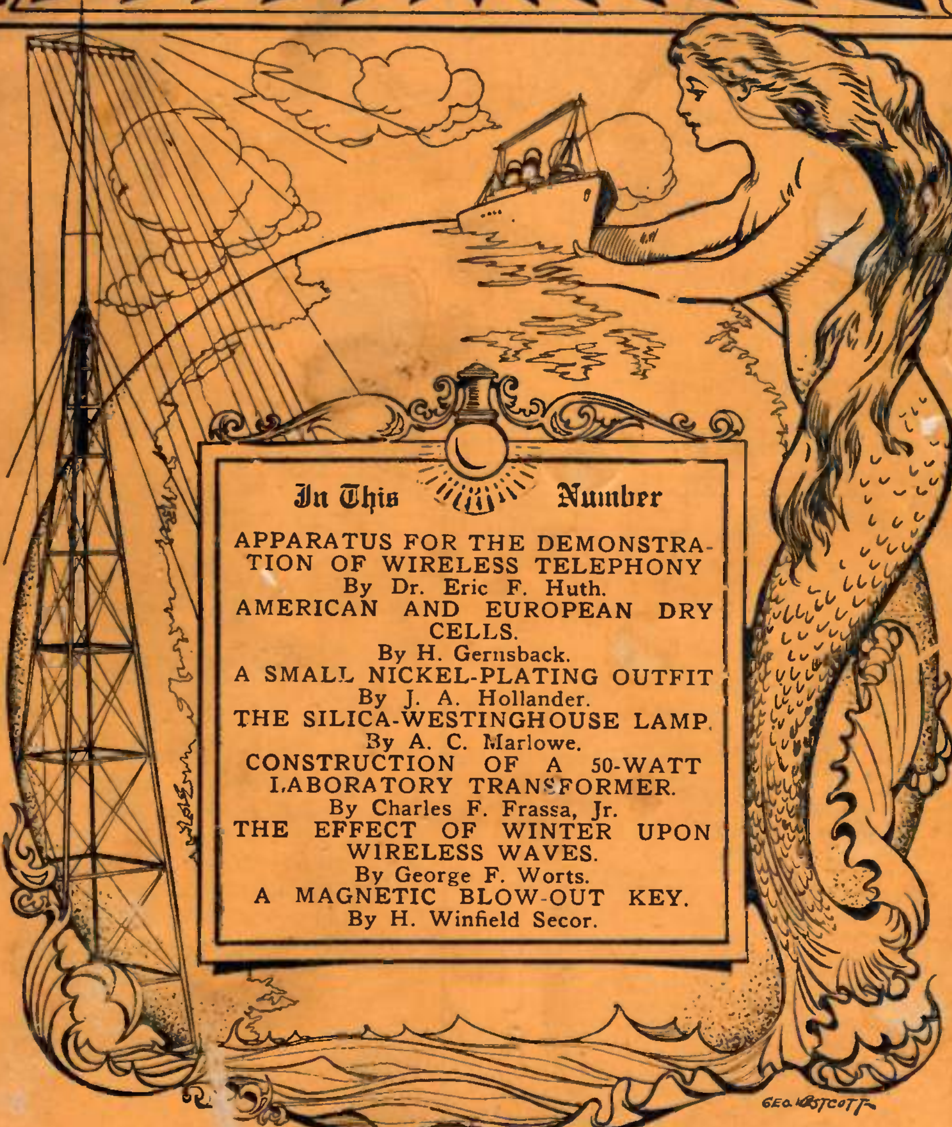
PRICE 10 CENTS

JANUARY 1911

Vol. III

No. 0

MODERN ELECTRICS



In This Number

THE SPIRIT OF WIRELESS

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

When writing, please mention "Modern Electrics."

Modern Electrics

VOL. III. JANUARY, 1911. No. 10

Apparatus for the Demonstration of Wireless Telephony

By Dr. Erich F. Huth
(Berlin)

THE interest concentrated upon wireless telegraphy owing to its application to the transmission of news has

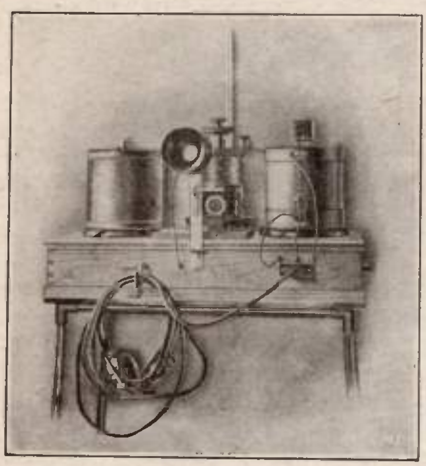


FIG. 1

been materially increased by the possibility of wireless telephony. In order to demonstrate this branch and to facilitate the study of the subject, the apparatus described herein has been brought out. By its aid it is possible to transmit music as well as the human voice over a distance of 50 meters (165 feet). By the

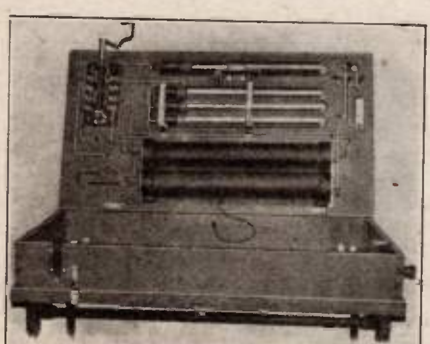


FIG. 2

use of a longer and higher aerial line, this distance can be considerably increased.

The apparatus is made of two different types. The simple form consists of two stations, one of which can transmit, the other receive; between these stations, therefore, speech in one direction only is possible. The more complete equipment allows of speech in both directions. It consists therefore of two stations each of which is arranged for transmitting as well as receiving.

The transmitting set consists of a generator for continuous electric oscillations, transmitter coil and microphone. The receiving set consists of a receiving coil, detector and double head-piece telephone receiver.

The appearance of the set for working in both directions is shown in Figs. 1 and 2. The transmitter and receiver

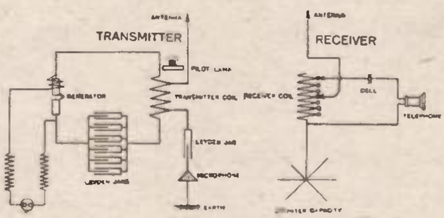


FIG. 3

are both mounted on a case of polished ash about 55 by 30 cm., and 10 cm. high. Inside this case are fixed the Leyden jars, the choking coils and the automatic main switch.

The case carrying the apparatus is mounted in the same way as the set for working in one direction, viz., on an iron frame, about 90 cm. high with casters.

In both of these sets the cases are attached to the frames by screws and can be removed easily. The main parts of the set, viz., generator microphone, antenna, etc., can also be taken off and used separately; different experiments can therefore be made with a single apparatus. It is simple to demonstrate the principles of wireless news transmission as also Tesla's and any other experiments depending upon the use of electrical oscillations of high frequency.

If required, the apparatus can be arranged for wireless telegraphy, and in connection with a Morse telegraph instrument written messages can be obtained.

The diagrams Fig. 3 show the connections used in the sets working in one direction only, or in both directions.

The connections in the set for working in both directions at the same time are shown in Fig. 4. By closing the plug connection, continuous current at 220 volts flows through a choking coil to the arc generator, in parallel to which is an oscillation circuit consisting of a self-induction (transmitter coil) and a capacity (Leyden jars). From the transmitter coil, which is connected at the upper part with the antenna, a branch connection is made through a Leyden jar and a microphone to earth, the coupling between the generator circuit and the antenna is therefore direct. By reversing a switch (automatic) which in Fig. 4 is shown turned to "Transmitting," the receiving circuit is put in. It consists of the receiving coil, the thermodetector (cell) and a double head-telephone; all three instruments are connected in series. Part of the receiving coil is connected to the antenna; the coupling is therefore direct in this case also.

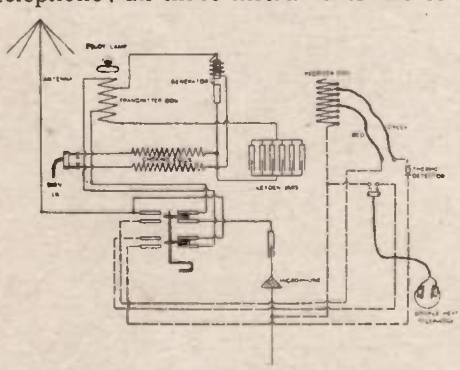


FIG. 4

Transmitter.

The choking coils are wound with enameled wire; these are fixed inside the case, on which the separate instruments are mounted.

The generator (British Patent 15,891 '09) is constructed on a new method for producing continuous electric oscillations. The generator as shown in Fig. 1 is worked by an arc. The arc burns between two carbon electrodes of special form.

In Figs. 5 and 6 different forms of electrodes are depicted. In both cases the electrodes consists of tubes, the ends of which are conical. In Fig. 5 the upper electrode projects into the lower. The arc is started at the place where the electrodes are nearest to each other, and is driven outwards by the heated air. It is then lengthened, owing to the conical form of the electrodes and finally broken.

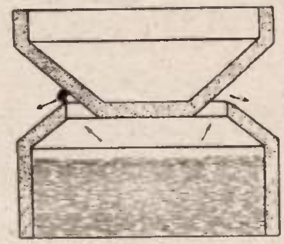


FIG. 5

The advantage of this system is, that undamped electric oscillations of great constancy can be obtained without using special blow-out arrangements, or magnetic blow-outs. By using methylated spirits or any other quickly evaporating liquid, which surrounds the lower electrode and increases the blowing out of the arc by its evaporation, the intensity of the oscillations can be increased.

In order to secure an even consumption of the electrodes, which is very important for a constant generation of oscillations, the arc rotates electromagnetically. For this purpose the arc is in a magnetic field, of which the lines of force are at right angles to the direction of the arc. The magnetic field is generated by a coil which forms the upper part of the generator.

Besides this, through the rotation of the arc, the breaking influence caused by the shape of the electrodes is increased, as on account of centrifugal force, the arc has a tendency to curve outwards.

The generator is started automatically. The coil, which generates the field for the rotation of the arc serves, at the same time, as a striking coil. It is connected in series with the arc electrodes. When no current is passing through the generator, the electrodes are in contact; when current is applied, the upper electrode, which is composed mostly of magnetic material, is drawn into the coil and the arc is produced. By turning the knob at the top of the electrode any length of arc required can be obtained.

By the striking arrangement, the operation of the generator is greatly facilitated. If the arc be extinguished, which may happen when too much energy is taken off or when the power of the primary current is too small, it is indicated by a "Knocking" of the ignition electrode. The electrode drops down, the circuit is again completed, the electrode is drawn into the coil again and so on. The generator thus automatically indicates a mistake in its working.

A knob which is fixed to the upper part of the electrode makes it possible to start the generator by hand. The upper part, consisting of striking coil and electrode, is fixed to the lower part by a bayonet-joint. By turning the upper part through 120 degrees it can be lifted from the lower part in the simplest way, in order to adjust the inner parts of the generator, to put in new electrodes or to fill up with methylated spirits.

The lower part consists of a cast iron basin which carries the other electrode in its centre. A mica window in the front

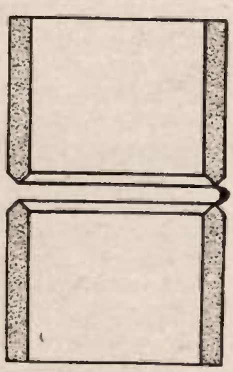


FIG. 6

makes it possible to control the arc with the generator closed.

Opposite the window is a valve serving to regulate the pressure. The weight of the complete generator is about 3.5 kilos.

The self-induction exciting coil consists of stranded copper wire, the single wires of which are carefully insulated from each other. It is wound on a "Presspan" cylinder and afterwards soaked with a non-hygroscopic varnish.

A few turns of copper wire, which are in series with a glow lamp, are coupled inductively with the transmitter coil. As soon as oscillations are generated, which also flow through the transmitter coil, the lamp begins to glow. This serves not only as a detector of the oscillations but also as an indicator of their intensity. The Leyden jars have a collective capacity of 3,000 cm and are 6 in number. The microphone is of the strong current type. It can be moved vertically and easily changed.

Receiver.

The receiving coil consists of wire strand which is finely subdivided and wound on a "Presspan" cylinder. At every ten turns a connection is taken out and led to a plug, of which there are 13. By means of 2 plug sockets the necessary tunings can be effected. The leads to these sockets are placed side by side in ebonite inlet tubes. The wire covered with green, connects the coil with the antenna, the red covered wire, with the thermodetector and the double head-telephone.

The thermodetector which is mounted on the receiving coil, is constructed in the form of a two-polar plug. It is adjustable and can be interchanged. It is not sensitive to shaking and practically independent of changes in temperature.

The telephones are of high resistance. The diaphragm and the connecting clip are adjustable.

Antenna.

The antenna consists of an umbrella-shaped nickel plated frame which can easily be closed and opened. When closed it is 133 cm high, when opened it is 240 cm high with a diameter of 165 cm. The antenna is insulated from the iron frame of the station by a porcelain grooved insulator.

From the Pamphlet of the Dr. Erich F. Huth Co., Berlin

THE SACRAMENTO WIRELESS AND SIGNAL CLUB.

An organization of amateurs in Sacramento held their annual election of officers in their club room on December 7th. The following officers were elected: President, E. Rackliff; Vice-President, W. Archbold; Secretary, L. Huber; Treasurer, P. Pratt; Chief Operator, E. Miller; Assistant Chief Operator, J. Murray; Sentinel, F. Strader. Address, 1025 7th St.

American and European Dry Cells

By H. Gernsback.

THERE are few electrical products to-day about which there is known so little as the common dry cells. With this I mean that although the general

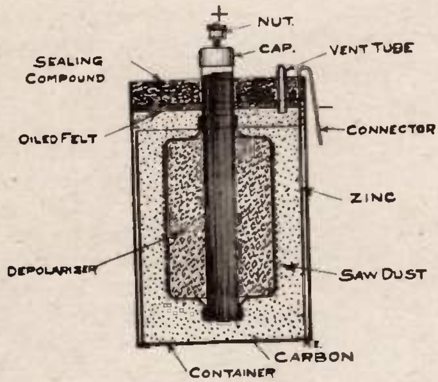


FIG. 1

make-up is well known, the formula with which certain efficient dry cells are made up, is usually jealously guarded by most manufacturers.

There are two distinct make-ups of the modern dry cell. The first, the European one (the first dry cell constructed originated in France), the second the American one. The European cell is outlined in Fig. 1. The container is usually of black glass. A zinc cylinder well amalgamated, is placed close to the wall of the glass container. The negative element is usually a carbon rod capped with a brass cap and binding post. Around this carbon rod is pressed the depolarizing mass, usually a mixture of black oxide of manganese 98 per cent. pure and some carbon powder, or more often graphite. To keep the mass in place a piece of white cheese cloth, muslin or linen is wrapped around it and kept in place by means of string wrapped tightly around and secured at the carbon itself. A layer of sawdust or cardboard about ¼ inch thick is then placed on the bottom of the container and the completed carbon element is placed upon it, exactly in the center, equidistant from the zinc cylinder. The intervening space between the carbon and the zinc elements is then filled in with moist sawdust, which has previously been soaked with the exciting electrolyte, usually a mixture of sal-ammoniac with chloride of zinc and water. The moist sawdust is packed tightly in place, by means of circular ring-shaped rammers. On top of this sawdust a circular piece of oiled felt is usually placed, to keep the salts from "creeping" to the terminals of the cells. A vent is then placed through the felt as shown; this serves to let the gases escape.

On top of the felt, the usual battery sealing wax is placed, closing the cell hermetically, except for the small vent. The usual appearance of such a cell is shown in Fig. 2.

The American cell differs radically from the European one, except for the fundamental principles Fig. 3.

A zinc cylinder is lined in the inside with blotting paper, or absorbent cardboard as shown. Sometimes instead of the above materials, plaster of paris is used. The exciting electrolyte is then poured into the lined shell and allowed to soak into the lining for from fifteen to twenty minutes. The liquid is then poured out and the shell with the moist lining placed upside down, to allow the surplus electrolyte to drain off. After this the space between the carbon rod

FIG. 2

and the lining is tightly packed with the depolarizer, consisting usually of black oxide of manganese and carbon powder. The depolarizer is moistened with electrolyte before ramming it into the cell.

On top of the depolarizer a thin film of dry sand is placed, and on top of this the hot sealing compound is poured. This finishes the cell.

It does not take much observation to reveal the fact that the American dry cell, seems simplicity itself, while the European one seems very complicated.

Size for size, and weight for weight, however, the European cell has from 30 to 50 per cent. more capacity (although using a smaller quantity of depolarizer). It also has greater recuperative powers.

The obvious question then arises: Why are not American cells made on the European plan?

The answer is varifold.

To begin with, when dry cells were first introduced in the United States, they brought a relatively high price, from 50 cents to $1.00 a piece. Most of them were made in the same manner, as they are made to-day, except for the ingredients. This mode of construction was evolved because the high cost of labor did not permit the European construction, which latter is a rather tedious one.

But at that time, about 18 years ago, if the European method had been adopted universally by the American makers, good profits could have been made, as the price per cell was quite high.

Unfortunately, however, price-cutting and underselling became the rule in the dry battery business in this country, and all efforts since to introduce a sane dry cell were futile, as the public has grown to buy dry cells from 10 cents apiece up to 35 cents and refuses to pay more, never realizing that a cell built on correct principles, that could be sold from 40 to 50 cents will outlast three to four of the *best* present American cells.

To-day some cells can be bought as low as 7 cents apiece in large quantities, and if one contemplates how much material goes into a cell measuring 2½ inches x 6 inches, it may be realized how much efficiency can be expected from such a cell.

Of course the present dry cells are turned out by machine to-day, the packing being done entirely by machinery, consequently the labor per cell is but a mere fraction. When one considers that at the present the United States alone turn out over 200,000,000 dry cells annually, one may find in that figure another answer why the European plan is not in vogue, as it would not be an easy matter to turn out the latter with machinery.

Let us now see in what respects the American dry cell lacks in efficiency and why.

The function of the depolarizer is to furnish a surplus of oxygen, necessary to keep up the combustion in the dry cell, the same as the human lungs can not keep up their function without oxygen.

As the oxygen is consumed in the depolarizer, the latter becomes harder, the pores close. Finally with all the oxygen gone, the depolarizer ceases to breathe, as it were, and its function is destroyed.

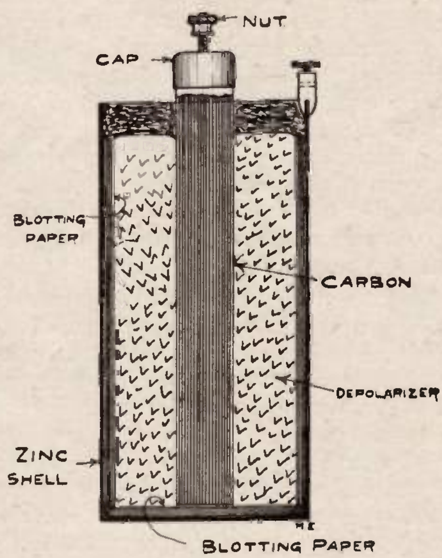


FIG. 3

Furthermore, in order to carry the charged electrons from the carbon to the zinc element, the electrolyte must well permeate the entire mass of the depolariser, else there cannot be any action between the two elements.

Now then, as seen before, after the depolarizer has given off its surplus oxygen, its pores close (especially at the outside surface, nearest to the zinc) and the electrolyte can no longer circulate in the pores of the depolarizer, consequently the dry cell dies two deaths, one asphyxiation, the other thirst, as it were.

If we study the construction of the European dry cell it will be seen that the makers have attempted to overcome the above mentioned obstacles. In the first place they use a comparatively large amount of electrolyte, preventing the cell from drying prematurely.

The next important point is the vent. This not alone assists the gases to escape—an important point in a dry cell—but also allows oxygen to enter, which passing into the depolarizer, assist to lengthen the life of the dry cells by quite a few ampere hours. It also adds greatly to the recuperative powers of the cell.

The most important mission of the vent, however, is that it actually keeps the cell well moist. This statement probably comes as a surprise to many.

It is remembered that the electrolyte contains not a small quantity of chloride of zinc. Now this salt is exceedingly hygroscopic, which may be seen by placing a small quantity in an open dish. The dry salt will in a short time liquify, as chloride of zinc, having a powerful affinity with water, draws the moisture from the air in a very short time.

It will be understood now why the vent helps to keep the cell moist as the chloride of zinc used as part of the electrolyte, constantly keeps on drawing moisture from the air, even after the cell has long played out.

Turning now to the American cell we are immediately struck with the wrong design. To begin with the quantity of absorbed electrolyte is very small, and if, as happens most of the time, the thin zinc shell is eaten up in a small spot, the little electrolyte that was in the cell in the beginning oozes out, due to the internal gas pressure in the cell and immediately begins to die a quick death.

During the time that the zinc shell is intact, the harmful hydrogen and other gases cannot escape, and they naturally do not assist to lengthen the life of the cell. The worst part, however, is that as soon as the zinc is consumed but little, the powerful pressure of the imprisoned gases burst the shell at the weakest point, which latter, if there had been a vent, would have lasted quite a while longer.

As will be seen the construction is faulty throughout.

The worst part of the entire thing, however, is that after the average dry cell is not fit for work any more, one-quarter of the depolarizer (that part next to the carbon electrode) is still in good condition, but cannot perform further work, because the layer next to the zinc has become as hard as a stone, from lack of electrolyte and the damaging effect of the gases. Consequently the average cell is thrown away as useless, although if properly constructed it could furnish from 20 to 30 per cent. more of the entire capacity. That the foregoing is true may be easily proved by dismanteling a worn out dry cell and cutting away the hardened depolarizer till the softer core (about ¼ to ½ inches away from the carbon), is reached. If this element is now placed in an old zinc shell with its old lining and fresh electrolyte is used, the battery will deliver from 20 to 30 per cent. of the former capacity of the cell.

It has been my opinion that the capacity of the present dry cell could be greatly increased by making it twice its present length, and by decreasing its diameter to one half the present diameter. This would naturally give a much better depolarizing action, but on account of the odd size of the cell it would be impractical both from the manufacturers, as well as from the consumer's standpoint.

It is to be hoped that American makers will soon change their present design, as it needs improvement quite badly.

During the past year German makers have made great advances in dry cell construction. They have found that the capacity of an ordinary dry cell can be increased from 20-50% by admixing certain metal salts to the depolarizer.

Thus a 10% addition of Cerium-oxide increases the capacity about 25%. The same increase of capacity is obtained by adding from 10-20% chloride of manganese to the depolarizing mass.

PACIFIC WIRELESS CLUB OF OREGON.

This club was formed on November 15, 1910, with a membership of ten members. It was formed for the purpose of furthering the art of wireless and to stop interference. The following elected officers are: President, Raymond Higgins; Vice-President, Rudolph Janesch; Secretary, Carl Braun; Treasurer, Lester White. All those who wish to join should notify the Secretary, Carl Braun, for particulars. 405 East Market St., Portland, Ore.

A not generally known fact is that an iron core is longest when magnetized.

A Small Nickel-Plating Outfit

By J. A. Hollander.

ELECTROPLATING is a subject much discussed, but it has usually been so encumbered by the theories and chemical actions involved that the practical side has been lost sight of.

Without attempting to go into the theoretical part of the subject, the writer has endeavored to describe a small but practical outfit for nickeling the more common metals, namely: brass, copper and iron. The expense is small, the cost of the whole, tank, anode, and chemicals, being less than four dollars.

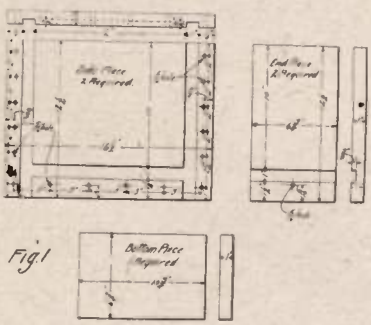


Fig 1

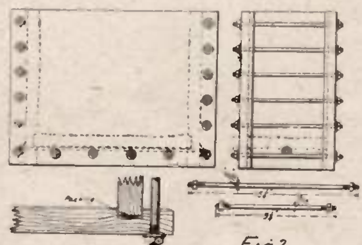


Fig 2

Tank.

To start with, we must have some kind of non-conducting vessel for holding the solution, a wooden tank is the best. One 6 inches wide by 12 inches long by 10 inches deep, is amply large for ordinary use.

Sound yellow pine one inch thick should be used. The side pieces are 12½ inches high, 16½ inches long. Cut vertical grooves 1 inch wide and ⅜ inches deep. 1¼ inches from the ends and the horizontal groove of similar width and depth 1½ inches from the bottom, joining the vertical grooves (Fig. 1.)

The end pieces are 12½ inches high by 6¾ inches wide. Cut a groove 1 inch wide and ⅜ inches deep, 1½ inches from the bottom.

The bottom piece is made 12¾ inches long by 6¾ inches wide.

Now bore five 5/16 inch holes in each end of the side pieces, starting 1 inch from the top, and ¾ inches from the ends, and 2 inches between centers. Another row of six 5/16 inch holes are bored, ¾ inches from the ends, 1 inch from the bottom and 3 inches between centers.

Next bore one 5/16 inch hole in each of the end pieces 1 5/16 inches from the bottom. All these holes are for the tie-rods.

Obtain 14 ft. of 5/16 round iron or steel rod, and saw off 16 lengths 9¼ inches long and one length 15¼ inches long. Thread the ends with a 5/16 die for 1 inch and procure washers and nuts to match, (Fig. 2).

Soak some heavy cotton yarn or packing in asphaltum and lay several strands in the middle of each groove.

Now the tank is ready to assemble. Set the pieces together (Fig. 2) and insert the 9¼ inch rods through the holes in the side pieces, and the long rod through end pieces, and draw up on the nuts.

Then give the inside four or five coats of asphaltum, one coat is sufficient for the outside. This will prevent the wood warping, thereby insuring against leakage.

Anode.

The nickel anode can be had at any platers supply house, and is 8 inches by 4 inches wide and about ½ inch thick. The price ranges from 50 to 60 cents per lb. One of the size named weighs about 2½ lbs. and will last for years. The writer has had one in use for over a year and it shows a reduction in weight of but one-quarter of a pound.

File a clean surface on one of the ears left for connections, and solder a ¼ by ½ inch brass or copper bar 9 or 10 inches long (Fig. 3). To the end of this bar solder 4 to 5 feet of flexible lamp cord for connection. The parts of the bar projecting beyond the sides of the anode should be wrapped with 5 or 6 layers of lineman's tape to prevent any possible short circuiting.

Now solder a binding post to one of the ends of 4 or 5 one-quarter inch copper rods, 9 inches long. These are to act as cathode rods.

Solution.

A solution giving the best results consists of as follows:

1¾ lbs. double sulphate of nickel and ammonia.

3/5 oz. sal-ammoniac.

1 oz. single sulphate of nickel.

3 gal. distilled or filtered water.

The double sulphate crystals should be crushed in a mortar and dissolved in hot water, as heat helps the dissolution.

Sal-ammoniac is a good conductor of electricity and in a plating solution tends to deposit the plate faster.

Single sulphate of nickel gives that bright appearance to the plate so much desired in nicely finished objects.

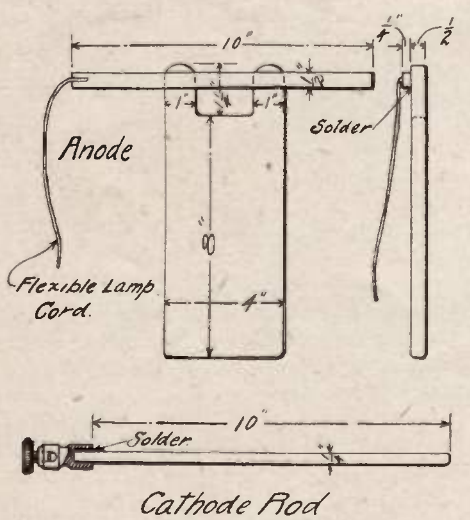


Fig. 3.

Both the sal-ammoniac and the single sulphate may be left out of the solution and still get a good plate.

Hard water should not be used under any consideration, not even when filtered, as it absolutely ruins the plate or gives no deposit at all. Distilled water can not as a rule, be had, so filtered water is the next best and the most economical.

The solution should stand at 5½ to 6 degrees Baume. If too heavy, add more

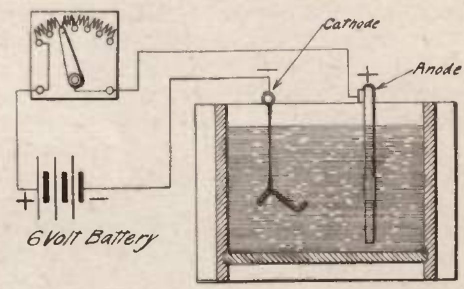


Fig. 4.

water, and if too light, more of the double sulphates should be added till the proper density is reached. Solutions standing above 7 degrees are apt to give a dark grey or black deposit and in some instances none at all. It is a good plan to test the solution before using, as a small amount of evaporation increases the density considerably.

Preparing the Work for the Bath.

If the work is desired to have a high polish after plating, it is to be understood that it must have a high polish before entering the solution.

Also it must be absolutely clean. This is the most important part of the whole process. It must not only look clean, but must be chemically clean. Too much care cannot be taken in securing the total absence of grease and foreign matter of all kinds. A few failures will soon convince one of this. If the work comes out of the bath having a mottled and dirty appearance, and the metal showing through in spots, it is sure to be due to improper cleaning.

String the work on a thin wire and swirl it around in a hot, but not boiling solution of ½ lb. of potash to 1 gallon of water. As soon as the work begins to change color remove and rinse in cold, clear water. If possible, running water should be used. If this is not available, then a large vessel full with frequent changes is the next best thing. Then dip for an instant in a solution composed of one pound of C. P. potassium cyanide to one gallon of water. Rinse in cold, clear water and hang immediately in the plating bath, twisting the small wires securely about the cathode rods.

Do not allow the work to be exposed to the air any longer than absolutely necessary, as it rapidly oxidizes and consequently the plate refuses to adhere properly.

If, after rinsing, water draws away in places, the work is not clean and should be potashed and cyanided over again. This should be repeated till water clings evenly over the entire surface, only then is the work ready for plating.

Plating.

Connect the anode to the leading out terminal of a rheostat giving small variations, and the leading in terminal to the positive pole of some source of low voltage direct current, say 5 to 6 volts. Connect the cathode rods to the negative pole by a length of flexible lamp cord (Fig. 4).

The flexible connectors are used so that the anode and cathode rods can be shifted, for instance, if there are a number of pieces to be plated, the anode is hung in the middle, but if there is but one piece of small surface, the anode is placed as far away as possible, to avoid discoloring the high parts.

From 2 to 5 volts should be used according to whether a smaller or larger surface is exposed. A six volt storage battery is just the thing. If the work takes on a dull grey or a black deposit, too much current is being used and the work must be taken from the bath and the spoiled plate removed by buffing or polishing. It is useless to attempt to plate over a piece that has once been spoiled without refinishing

A heavier current can be used at first and gradually decreased. This gives a foundation of rough plate with a fine plate for finish. The voltage can be tested with a low-reading volt-meter such as is used for testing dry cells.

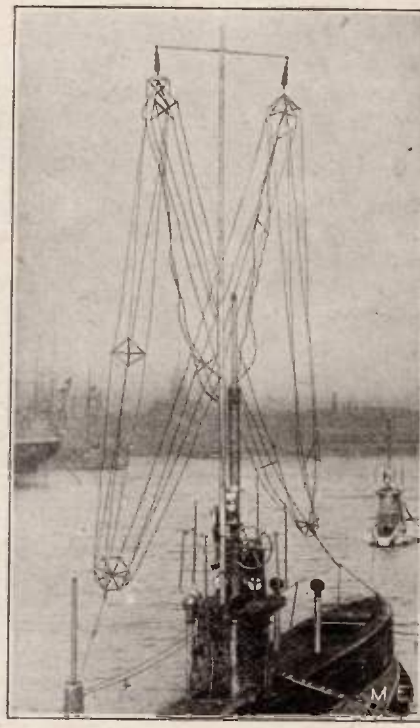
Work should not be left in the solution for more than a half-hour with a heavy current, because the plate is liable to crack and peel off. Ordinarily, with a heavy current, fifteen minutes is long enough to deposit a fairly durable plate. The smoothest and finest plate can be had by passing a very moderate current for a long time, say an hour and a half.

(Continued on page 593)

A UNIQUE WIRELESS SUB-MARINE INSTALLATION.

By Frank C. Perkins.

THE antennae and wireless telegraph mast as applied to the submarine boat "D. I." of English construction is shown, in the accompanying illustration. The wireless experiments with sub-marine made on the English Channel were successful and it is claimed that the adaption of radio-telegraphy to sub-marine boats is assured.



With the equipments shown in the photograph wireless telegraph communication may be maintained even when the sub-marine boat is submerged, the parent ship being kept informed of the movements of the sub-marine boats at all times; a task which has hitherto been impossible.

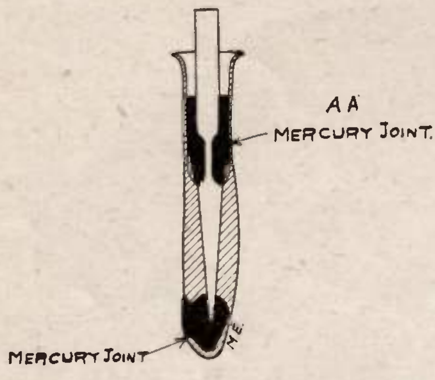
The main use to which these wireless sub-marine boats would be put in time of war would be the ascertaining of a ship's vulnerable parts, and it is held that heretofore one of the most decided checks on the utility of the sub-marine has been the lack of means of communication between them and the parent warship.

The Silica-Westinghouse Lamp

By A. C. Marlowe.

Paris Correspondent MODERN ELECTRICS.

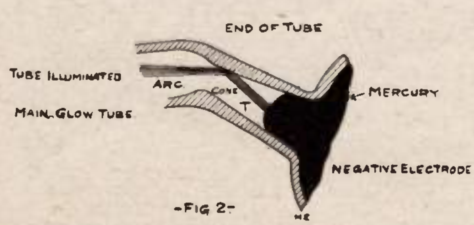
A NOVELTY in the way of electric lamps is the Silica-Westinghouse, which has been brought out at Paris. It uses the principle of a mercury vapor



-FIG. 1-

lamp, but in a different way from the ordinary. The lamp gives a great economy, as it takes much less current than the usual mercury lamp. Next to the flaming arc lamp it is claimed to be the cheapest of all to burn. However, the flaming arc gives much trouble from replacing the carbons, cleaning the globes, etc., so that the cost reckoned per year is in favor of the new lamp.

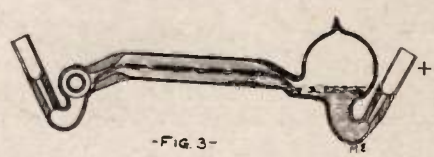
Like the usual mercury lamps, it is lighted by tilting so that mercury runs from one end to the other and makes the short circuit. Then we bring the lamp back to the first position, which breaks the mercury stream and gives the arc. The new lamp is constructed of quartz instead of glass. It is found that the power consumed in a mercury lamp depends on the pressure of the mercury vapor, and



-FIG. 2-

we should therefore work the lamp at a high heat. With glass this cannot be done, as the glass would melt. Quartz allows working at a much higher heat, and it is claimed that only half the current is used for the same amount of light. At this heat, the color of the mercury arc is much better and it has a somewhat yellow color this being increased by the glow of the quartz, so that the light resembles that of an arc lamp.

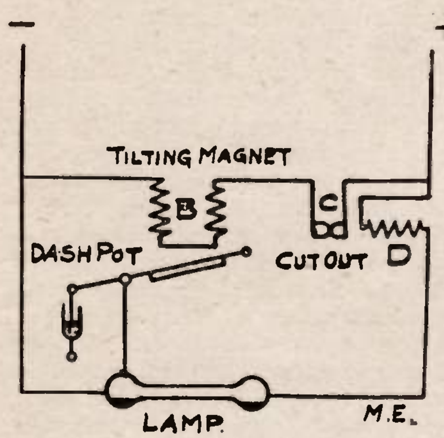
Some difficulty was found in making the joint where the wires pass through the quartz. With glass we can use platinum wire, as the expansion under heat is nearly the same, so that the wire can be sealed in, but quartz expands very little, so that another method had to be used. The new non-expansion alloy known as "Invar," which is a kind of nickel steel, will answer here, but as it cannot be brought to a red heat without losing its properties, a ground joint (Fig. 1) had to be used. The metal fits in like a bottle stopper, and a mercury filling on each side keeps a very tight joint. Another point is that the surface of the (+) pole is greater, so that it becomes hotter than the (—) pole and owing to the difference of evaporation the mercury tends to col-



-FIG. 3-

lect at the (—) pole. Fig. 2 shows the method of preventing this. The (—) pole has the conical tube T, and when the mercury accumulates in it, the level rises and the surface becomes less, which causes a greater heating at this point. The mercury evaporates more rapidly and this prevents any accumulation on this side.

In other lamps, cooling wings of metal are used to keep down the heat to the right point, but the new lamp uses a condensing bulb (Fig. 3) so that the vapor is cooled and condensed here to liquid. This gives a much better cooling. Fig. 4 shows the automatic device for working the lamp. When current is switched on, the tilting magnet B attracts its armature and draws up the end of the lamp. A dash pot is connected to this device. A stream of mercury now flows through the lamp and gives the short circuit. This causes the second magnet D to receive current, and its operates a cut-out switch C for cutting off the current from the tilting magnet B. The lamp thus falls again and becomes lighted as usual. It



-FIG. 4.-

remains in this position while burning and keeps the same when the current is switched off, so that the lamp is tilted only when the current is put on for lighting. To make sure that the current is sent into the lamp in the right direction, there is a polarized locking device placed upon the dash pot, with permanent magnet, so that current in the proper direction repels an armature and the lever is unlocked for use. Should the current be reversed, the armature is attracted so that the device is locked so that the lamp cannot be tilted without changing the direction of the current.

WIRELESS INSTITUTE.

At the regular monthly meeting of the Institute of Wireless Engineers, held in the Engineering Society's Building, New York City, on Wednesday, December 7th,, Mr. J. Martin, the chief electrician of the Brooklyn Navy Yard, read a paper entitled "Side Lights on Navy Specifications for Wireless Telegraph and Telephone Apparatus."

Several interesting points in regard to efficiency of apparatus were brought out. The most interesting being a requirement for a safety gap on transformers; percentage of leakage under humid atmospheric conditions; protective lightning switch to be operated by a rope so as to eliminate danger to the operator; the necessity for an instrument to indicate received wave lengths, which should be direct reading and used in conjunction with the regular receiving set; instruments to be mounted in genuine mahogany; name plates on all apparatus specifying size of set for which same should be used.

It was understood from Mr. Martin that copies of the Government Specifications for Wireless Telegraph sets, as issued by the Navy Department in May, 1910, could be obtained from the Superintendent of Public Documents, Washington, D. C.

At the conclusion of the paper, quite an interesting discussion developed among the members in regard to the quick variation of wave length in sending instruments; the use of so-called high frequency, 500 cycle generators and transformers; the possibility of obtaining a wave having one peak and a spark gap best suited for obtaining a uniform spark discharge. Some discussion was had regarding the Hogg compressed air spark gap. Several other types of gaps were discussed, and reference was made to the different results obtained in actual tests with same. A. C. AUSTIN, JR.

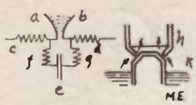
THE PORTUGAL REVOLUTION VIA WIRELESS.

As we already mentioned, the first news which the outside world obtained about the revolution in Portugal was sent by wireless, as all the wires had been cut off. Further details state that the message was sent from the "Cap Blanco," of the Hamburg-South American line, lying in the harbor of Lisbon. The message was received on the vessel "Y Piranga" of the same line lying at Santander and from their it was telegraphed to Paris. A wireless message was also sent to Berlin from the former vessel, and was received at the French Coast wireless station at St. Marie, near Marseilles, being then telegraphed to Berlin by wire. In the latter case a distance of 850 miles was covered.

Paris Letter

Unique Radiphone Arc.

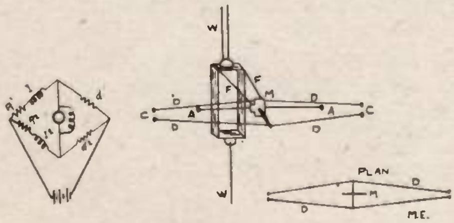
IN an improvement on the Duddell arc method for producing continuous waves, a German inventor uses an arc formed between diverging electrodes AB where the action of the heated air tends to draw up the arc and put it out. A



shunt circuit is used to control the period of the interruptions. Current is brought to the arc through the inductance coils C and D, and these are shunted by the oscillation circuit E, F, G. In this case the electrodes can be hollow tapered tubes H, K, these having conical tapered ends. The end of one tube can be surrounded by the end of the second, as we show here. It is found that the blowing action is increased by filling or surrounding one or both electrodes with a liquid containing hydrogen, such as alcohol, ether, petroleum, etc. The arc can be rotated about the tubes by producing it in a magnetic field which lies parallel to the axis of the tubes, and here the tubes are made of magnetic material, at least in part. A cooling liquid can be used to cool the electrodes, or cooling surfaces of the proper kind.

Galvanometer Relay.

The following method can be used to produce an increased effect from the

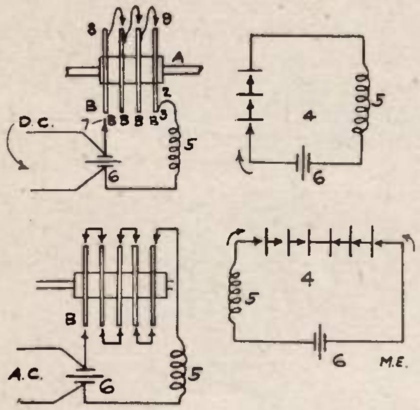


very small swing of a galvanometer coil which receives slight currents, so that the device has the effect of a relay. It can be used as a telephone relay, etc. The arrangement depicted in sketch shows the method of applying it to a submarine cable receiver. A fine wire coil C is suspended as usual by the wires W in a strong magnetic field. Silk fibres FF connect the ends of the coil to a light aluminum rider M, this being stretched by threads between fixed supports AA. As the fibres FF are joined at the top and bottom of the rider, a swing of the coil causes the rider to give a back and forward swing. A pair of fine wires DD are attached to spring supports CC and also to arms projecting from the rider (see plan view), and they are swung about under the action of the moving parts. The wires DD are inclined in such a way that they lie partly under water, and the amount in the water is changed according to their movement. A current is sent through the wires so as to heat them up somewhat, and as the resistance of the wires varies according to their position in the water, there will be a variable current in this circuit which depends on the movement of the coil C. A galvanometer or telephone in the current circuit will thus have a strong effect. Where the impulses follow closely, there will be a time lag which is due to the time taken to heat or cool the wires, but this can be suppressed by the method shown in the diagram. The two hot wires D_1 D_2 are balanced in a Wheatstone bridge with resistances R_1 R_2 which can be other hot wires, along with inductance coils I_1 I_2. The galvanometer (or telephone) G is shunted by an inductance J.

Spark Intensifier.

A Russian inventor, M. Eisenstein, devises a method for producing high power sparks. For this he uses a special kind of spark gap. He uses a number of revolving dics B mounted on a shaft A. He increases the sparking distance so as to use a higher power in the spark, owing to the increase of resistance, and uses the principle of a discharge from a metal point to disc, as it is more difficult to make the spark in this case so that such a spark uses a higher power. All the discs are insulated from the shaft. One disc has a brush 3 which connects to the oscillating circuit 4, and this latter has the usual inductance 5 and condenser

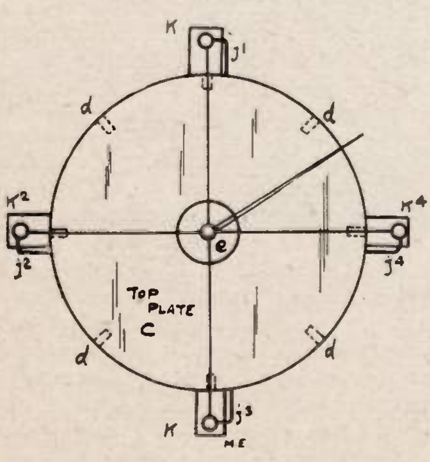
6. using direct current here. The other end of the circuit goes to a metal point



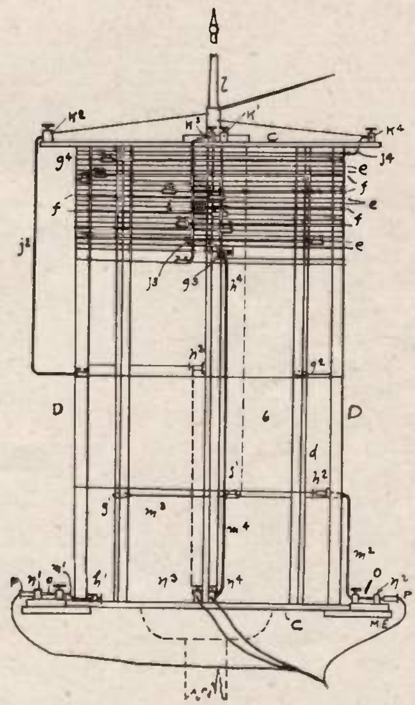
7 lying opposite the first disc. Here we have a discharge, and as is known, this is more difficult to make than in the ordinary case. The brush 8 bears upon the disc and it has a metal point facing the second disc, and so on, so that there are several gaps in series, as the other diagram shows. The current takes the direction of the arrow, so that we use a higher power here. In the lower figure is the method for using alternating current. The discs and points are mounted so that in any case the current is obliged to go through several spark gaps in series, as shown by the arrows, thus giving the same effect as above. In this case the brushes are replaced by metal points.

New Loose Coupler.

We illustrate a new coupler which can



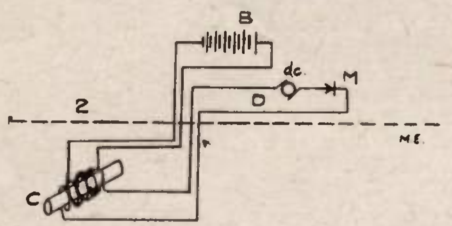
be used for wireless telegraph or radiophone work. It consists of a hard wood rack made of two end plates CC and the uprights DD, etc. Upon it are wound wire coils of copper and nickel-iron wire diveded into four sections of equal value. These can be coupled in parallel with the spiral tuning device, and the use of the coupler increases the length of the aerial circuit. Adjustment is made until we have the best sound and color of the spark, or for radiophone work, the clearest sound in the telephone. One of the four sections of the coil is shown here. It is made up of turns of silicon-bronze wire E (about 1/12 inch) and of other



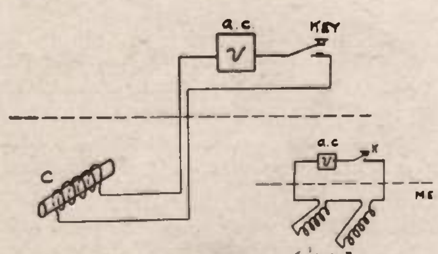
turns of nickel-iron wire F (about 1/6 inch). Each section has 14 turns of (E) and 6 of (F). The terminals are at G_1, G_2, G_3, G_4 and H_1 to H_4 respectively. Double-screw connectors join the bronze and the nickel-iron wires. Each section is connected to the main line terminals K_1 to K_4 by brass wires (1/16 inch). The four terminals K are joined to the aerial L, using ebonite insulation here. The ends H_1 to H_4 are connected by brass wires M_1 to M_4 to the jack plug couplers N_1 to N_4, having brass ends and ebonite handles. All the plugs are connected in parallel by cords to a central plug (not shown) which leads to the spiral tuner. The whole device is supported on a wood upright resting below on a glass plate. We use the device by connecting the aerial line to the upper end of the jointed rod L_1 then increase the coupling by using the plugs N_1 to N_4 until the best effect is observed. The lower section (N_1) should be used to begin with.

Under Water Signal.

Signals can be sent under water by using a bell, but these must be sent at slow speed owing to the time taken by



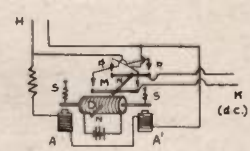
the water to set up its vibration. Besides, a high pitch of sound cannot well be used with a bell, although a sharper sound has the best effect in this work. The present electrical method is claimed to be much better. It is based on the principle brought out by Peukert in Germany, using a vibrating current which is sent into a coil surrounding a large mass of iron, and a sound is given out by the metal. A very small current can produce the effect. The diagram shows the method in general, using an alternating current source, a key and a mass of iron (or other metal) surrounded by a coil. The metal lies under water. To work with microphone currents we use



the microphone transmitter M_1, the direct current dynamo D and the metallic mass C under water which has one coil wound to take the microphone current. It also carries a magnetizing coil which is supplied from a storage battery D. Thus a small effect in the microphone causes a variation in the effect upon the metallic mass. A telephone receiver is used at the distant point in a similar manner. In figure is shown a reinforcing method, using a key to make the signals and a pair of coils. The coils are spaced at a distance which is equal to half the wavelength of the sound, so that they produce a combined effect.

Simple Current Rectifier.

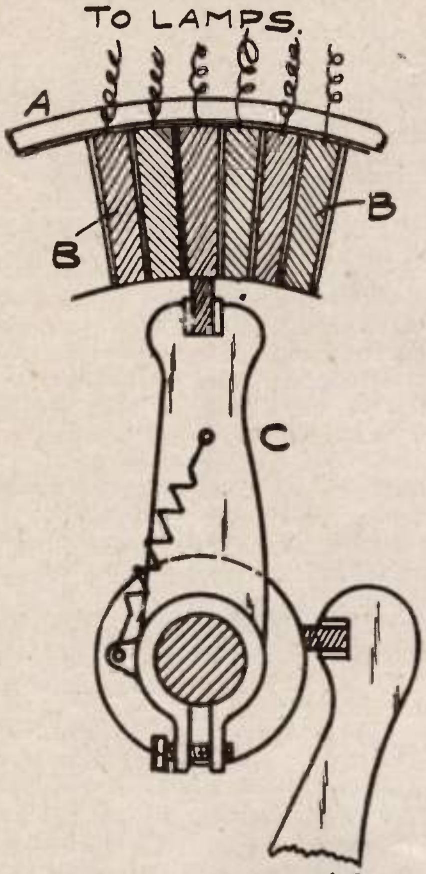
A current rectifier which is very simple to construct and is claimed to give good results is shown in drawing. It can be used on an alternating current circuit in order to give rectified current for battery charging, etc. The alternating current (H) supplies two magnets AA^1. A swinging coil D receives current from a battery, and it is mounted on the shaft NN. At every half wave the coil is attracted in one direction or the other, and



the shaft carries a reversing switch M so as to reverse the connections of the alternating current circuit (R, etc.) at each swing of the coil, and we thus take off rectified current at K.

Electrical Economizer.

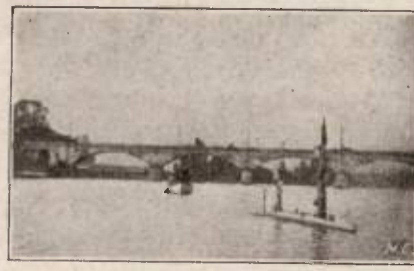
When the current is cut off from an incandescent lamp, the effect of the light persists on the retina of the eye for about 1/10th second, so that the idea would occur to cut off the current at intervals while keeping up the same impression on the eye. We would then have the same effect and use much less current, as it is now put on for only a fraction of the time. A French inventor claims to realize this by sending every 1/40th second a very short current which lasts 1/400th second. However, it is not practical to use simply an intermittent current of 1/40th second, but he uses instead a set of 100 lamps (for instance) connected to a rotary commutator so that each lamp receives current for 1/4,000th second. On a main shaft which is driven by a motor at 2,400 r.p.m. is mounted a pair of brushes C, D. Brush C bears against a set of 100 strips B, each strip



being connected to one of the lamps. A common wire from all the lamps goes to the source of current and returns to the brush D, so that current goes to each of the lamps in turn. The brush makes a revolution in 1/40th second and gives contact at each strip for 1/4,000th second. A higher voltage than ordinary must necessarily be used in this case.

WIRELESS TORPEDO CONTROL

THE present view shows some experiments with apparatus for distant control of torpedoes invented by M. G. Gabet, of Paris. He has been experimenting on the Seine with the torpedo, using wireless sending apparatus upon the boat which lies in the background. In this way he was able to put the torpedo through various evolutions with very good results. The torpedo proper lies under water and a few feet above it is a cylinder which serves as a float, this carrying a part of the apparatus. On the



two masts are mounted the aerial wires and also the signal lamps. These latter are powerful oxy-acetylene lamps of 2,000 candle power and they have lenses so as to send a strong beam back to the sending post. An electro-magnetic shutter works with the beam so as to give check signals to show when the apparatus works well. M. Gabet's experiments have been attracting much attention at Paris, and an account of the apparatus was presented to the Académie des Sciences.

WIRELESS ON DEPARTMENT STORE.

Courtesy of P. C. Kullman & Co., New York.

This illustration shows the wireless station atop the Wanamaker store in New York City.

MODERN ELECTRICS

A Magazine devoted entirely to the Electrical Arts.

Published Monthly by

Modern Electrics Publication
NEW YORK CITY

H. GERNSBACK, EDITOR
A. C. AUSTIN, JR., ASSISTANT EDITOR
H. W. SECOR, ASSOCIATE EDITOR

Subscription Price For U. S. and Mexico $1.00 per year, payable in advance.

New York City and Canada, $1.25.
Foreign Countries, $1.50 in Gold.
Stamps in payment for subscriptions not accepted.
Checks on out of town Banks cannot be accepted unless the usual exchange is added.

SINGLE COPY, 10 CENTS

Forms close the 20th of the month preceding date of publication. Advertising rates on application.

The Editor will be pleased to receive original contributions of timely interest pertaining to the electrical and the afiliated arts. Articles with good drawings and clear photographs especially desired. If accepted, such articles will be paid for on publication, at regular rates. **No manuscripts will be returned unless return postage is enclosed.**

Address all communications to:

MODERN ELECTRICS PUBLICATION
233 Fulton Street, New York, N. Y.

Chicago Office: 45 La Salle St.
Paris Office: 137 Rue d'Assas
Brussels Office: 23 Rue Henri Maus

Entered as second Class matter March 31, 1908, at the New York Post Office, under the Act of Congress of March 3, 1879.

Vol. III **JANUARY** **No. 10**

EDITORIAL.

IMPORTANT ANNOUNCEMENT.

It affords the editor great pleasure to anounce that he has secured the American rights for the well known book, "Der Praktische Elektriker" (The Practical Electrician) by Prof. W. Weiler, of the University of Esslingen, Germany.

This book is, beyond the shadow of a doubt, the most popular electrical work in Europe, and has already been translated in French, Russian and Danish, but the English translation was not made heretofore, as no satisfactory arrangements could be made by several leading publishers with Prof. Weiler. The readers of Modern Electrics, are therefore to be congratulated, that they will get free of cost, the translation of such a valuable work.

Prof. Weiler's book, which just appeared in its 5th edition, has 708 pages, containing 570 illustrations, all of them hand chiseled wood cuts, all of which will be reproduced in Modern Electrics.

Prof. Weiler's book is especially written for young people and is written in a non-technical way, and the entire matter is treated in such simple language, that even the layman will have little trouble to thoroughly understand every sentence.

Modern Electrics will publish each month a chapter, and the Editor personally will translate the entire book.

Inasmuch as the book is quite large, it will take in all probability, from one to one and one-half years' time to finish the entire work, and the Editor advises his readers to carefully keep all the copies, which wil be very valuable, as they will form a complete course in electricity.

The reader will soon find by perusing the various chapters, that Prof. Weiler has an unusual ability to present the apparatus themselves, and the workings of same in a remarkable novel manner, and not only that, but there will be shown a great many apparatus, instruments, etc., which are not known at all in this country, and there will be also an abundance of new experiments that can be made with most of the instruments and apparatus that will surprise the average reader. The series will begin with the next issue, and you should not fail to get a copy of same.

AN INVENTOR'S GUILD.

TO improve the unsatisfactory conditions under which American inventors have for years felt that they were laboring, some of the most prominent mechanical engineers, scientific authorities, and inventors of this country have formed an organization which they have named the Inventors' Guild. The organization was effected at a meeting in the Engineers' Club.

Thomas A. Edison is one of the organization's members. Its officers are: President—Ralph D. Merson, consulting engineer; First Vice President—Charles W. Hunt, inventor of coal-handling machinery; Second Vice President—Charles S. Bradley, inventor of electric devices; Secretary—Thomas Robins, inventor and manufacturer of conveying belts, and Henry L. Doherty, inventor of gas-making machinery. Peter Cooper Hewitt, who invented the mercury vapor lamp, and Prof. Michael I. Pupin of the Electrical Engineering Faculty of Columbia University, are members of the guild's Board of Governors. Other members are Prof. Northrup of Princeton, Prof. Thomas of the University of Wisconsin, and Prof. Pierce of Harvard.

According to the constitution of the guild, its purpose is "to further the interests and secure full acknowledgment and protection for the rights of inventors; to advance the application of the useful arts and sciences, and to foster social relations among those who have made notable advances in the application of the useful arts and sciences." The guild is not permitted to indorse any commercial enterprise or to allow its name to be used for any commercial purpose. It will meet every month at a Broadway guild.

Some of the conditions which the guild will try to remedy are the delays and ineffectiveness of the United States Patent Office, the expense and tardiness of litigation, the injustice of "rich corporations" to poor inventors in delaying and prolonging suits and increasing legal expenses to a point which makes such suits prohibitive, and the disadvantages to which American inventors are subject in the patent offices of foreign countries.

The guild intends to accomplish these objects, by employing competent agents and legal advisers, by appealing to all the inventors of the country, by interviewing members of Congress as to the advisability of reforms in patent laws, and, more particularly, by seeking reforms in the present machinery of the United States Patent Office. Public opinion will also be appealed to.

The scope of the guild is National. Its present members are:

Bion J. Arnold of Chicago, Dr. Leo H. Baekeland of Yonkers, W. H. Blauvelt of Syracuse, Charles S. Bradley of New York, Alexander E. Brown of Cleveland, H. L. Doherty of New York, Thomas A. Edison of Llewellyn Park, N. J.; Carleton Ellis of Montclair, N. J.; Stephen D. Field of Stockbridge, Mass.; James Gayley of New York, Edward R. Hewitt and Peter Cooper Hewitt of New York, Charles W. Hunt of West New Brighton, Dr. John R. Kelley of Pittsfield, Mass.; T. S. C. Lowe of Los Angeles, Ralph D. Mershon and Ambrose Monell of New York, Prof. Edwin F. Northrup of Princeton, Prof. G. W. Pierce of Cambridge, Mass.; Charles E. Pope of Pittsburg, Prof. M. I. Pupin, Thomas Robins, Dr. F. Schneiwind, and C. H. Smoot of New York, Prof. Carl Thomas of the University of Wisconsin, F. L. O. Wadsworth of Pittsburg, Arthur West of Bethlehem, Penn.; Dr. W. E. Winship of New York. and B. F. Wood of the Pennsylvania Railroad, Altoona, Penn.

The membership is limited to fifty at present, because a larger organization would merely be unwieldy and would not accomplish so effectively the specific results desired.

The force of men at work on the patent files at present is too small to keep them up to date, and there is not room enough for more employes to be put to work. The files have never been properly indexed, although an attempt has been under way for years. The result of this condition is that it often takes four or five months for an American inventor to even get a first answer to his application for a patent. The surplus which the Patent Office has paid into the United States Treasury is between $6,000.000 and $7,000,000. A new Patent Office building, costing $4,000,000 of $5,000,000, should be put up in order to furnish adequate accommodation for the clerks and protection and accessibility for the files.

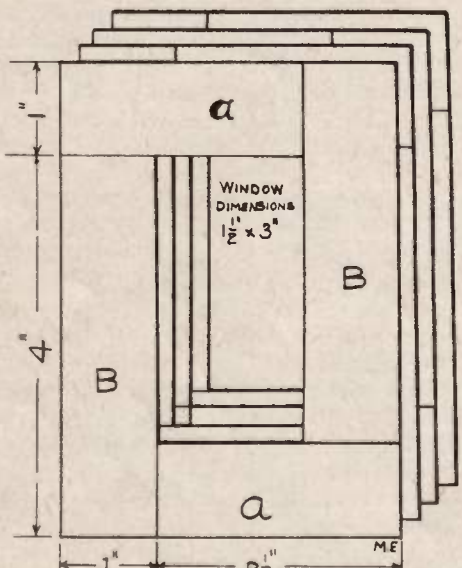
The guild will also investigate the condition of the laws regarding patents, so

(Continued on page 593)

Construction of a 50-Watt Laboratory Transformer

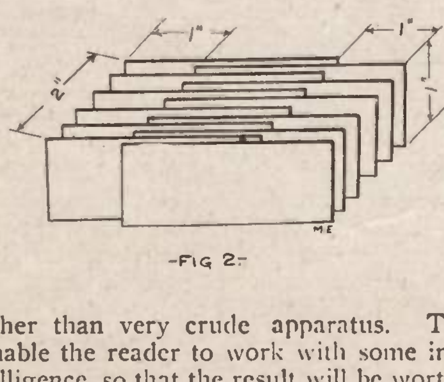
By Charles F. Frassa, Jr.

It has been only a short time since small transformers built for efficient and practical use were introduced into the amateur's laboratory, yet today they are so popular that a number of



-FIG. 1-

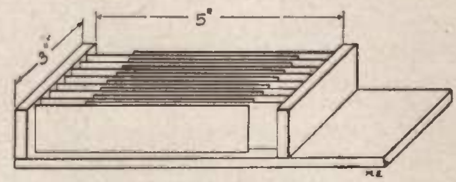
firms are manufacturing great numbers of these apparatus, and many amateurs are building them for themselves. Popular as they are, there are very few amateurs who understand the principle of the transformer well enough to construct



-FIG 2-

other than very crude apparatus. To enable the reader to work with some intelligence, so that the result will be worth the expense of time and material, I will give a few points on the theory of the transformer.

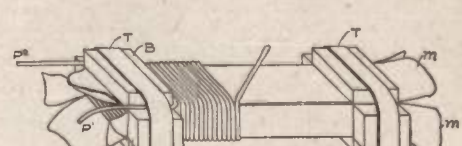
The transformer consists essentially of



-FIG 3-

a soft iron core, forming, for best results, a closed magnetic circuit; and on this core, two coils, the primary and secondary, which are two independent circuits.

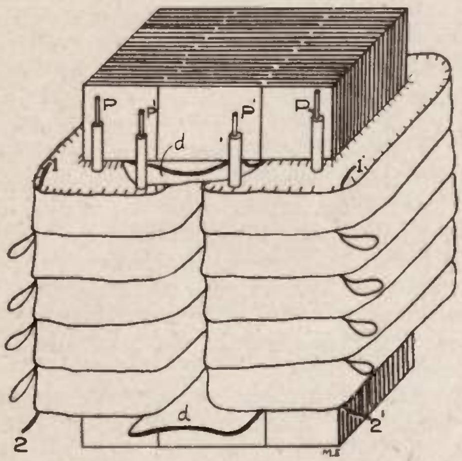
The current which is to be transformed is led into the primary coil, and sets up a magnetic flux through the core. This magnetic flux threads through the secondary turns and induces an electromotive force in them. To obtain the greatest maximum output, the product of the number of turns and amperes flowing in them, known as ampere-turns, must be nearly the same in both the primary and secondary. If the secondary current is greater than the primary current, the number of turns must be less, since the



-FIG. 4-

product of amperes times turns or ampere-turns is constant. If the secondary current is less than the primary current, the secondary will have more turns than the primary.

Assuming the number of watts to be constant, if we have a small current the voltage will be large, and as we have seen before, a great many turns are necessary. If the current is large, the voltage and number of turns will be small. From this it will seem that there must be some relation between the voltage and number of turns, which is true. If the voltage of the primary and secondary coils of a transformer are measured, and their number of turns counted, it will be found that the voltages are proportional to the ratio of the number of turns. If the number of secondary turns is greater than the number of primary turns, the voltage of the secondary is greater than in the primary, and the transformer is of the type known as a step-up transformer; if the number of secondary turns is less than the number of primary turns, the secondary voltage will be less than the primary voltage, and the transformer is a step-down transformer.



-FIG. 5-

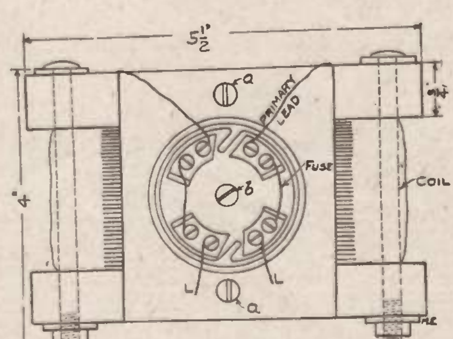
The primary current, measured in amperes, is proportional to the current taken by the secondary, and the secondary current to the current required. If too great a current is drawn from the secondary, the coils will heat, and the heat from both coils if intense enough may burn up the transformer. Therefore the current must be limited to a predetermined value, which is obtained from previous experience, or by calculation.

Another matter of importance in the construction of the transformer is the insulation. Each turn of wire in the coils should be well insulated from the next, and the primary and secondary from one another. Should a few turns not be sufficiently insulated, and a short circuit occur, the turns which are short circuited will act as a closed circuited secondary, and a heavy current will flow through these turns. This current will heat the coil and may burn up the transformer. Special care should be taken to insulate the primary from the secondary, for if they should come into contact, the apparatus on the low voltage side would probably be destroyed by the high voltage current flowing through it.

The following design for a laboratory transformer is very liberal: a low magnetic density is used in the core, and the windings are given a liberal rating. The output for continuous operation is 50 watts, but for short intervals, 75 watts may be carried without harm to the transformer. The primary is wound for 110v., and the secondary for a maximum of 25v., and a minimum of 2½v., being divided into ten equal sections. The total range of current available is from 2½v. to 25v., and from 2a. to 20a.

The core is composed of a number of thin leaves of sheet iron, each of which should not be more than .025 inch thick, if thinner, all the better. The strips are of two dimensions, namely, 1 by 2½ in., and 1 by 4 inches for the yokes and cores respectively Fig. 1 gives an idea of how they are laid to break joints in the magnetic circuit. To enable the coils to be wound conveniently, the cores are assembled first, after the plan shown in Fig. 2.

For the cores two forms of material are available to select from. These are black sheet iron, or stove pipe iron, and tin can iron which may be obtained from tin cans. If you use stove pipe iron, have the tinner cut it to size on his tin cutter when you purchase it. Have enough cut to make a core two inches thick, when clamped together tightly.

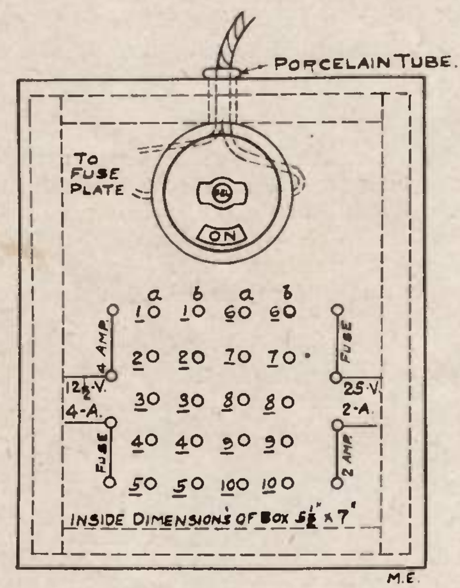


-FIG. 6-

If you use tin can iron, procure a number of tin cans, and melt the solder off of them, and remove the ends. The cans should then be cut open on the sides and taken to the tinners shop, where they may be cut to proper size. The can sheets should be put through the tinners pipe rolls to flatten them. This may be done by raising the back roller, or lowering it, as the case may be, so that it will tend to straighten the sheet instead of curving it. The two front rollers of the machine should be screwed down as tight as possible and yet pass the sheet, which will make the sheet perfectly flat.

When the sheets are flat, set the gauge on the cutter for first 2½ and then for 4 inches, and cut enough sheets 2½ and 4 inches long to make 360 strips of each length 1 inch wide. Then change the gauge to cut 1 inch and cut the above sheets into 1 inch strips.

The most economical way of cutting these strips out of tin can sheets is to cut the four inch length from the width



-FIG. 7-

of the can sheet, which when cut into 1 inch strips will make as many strips as the sheet is long, and cutting the 2½ inch strips from the length, the average can having a circumference of about ten inches, making 16 sheets 2½ inch by 1 in. per can. Of the 4 by 1 inch strips there will be 10 per can.

Possibly some of my readers may criticise me for using tin can iron for a transformer core, since they may believe it to be an inferior grade of iron. From my experience I find it to be a fairly good grade of soft sheet iron, and when worked at low magnetic densities, gives fairly good results. Having built transformers with both tin can and stove pipe iron, the only grades of iron available to the average amateur, and having obtained better results in some instances with the tin can iron, I do not hesitate to recommend it to the amateur for any electrical use for which he may find it convenient.

In the complete core, any section has the form shown in Fig. 2, the strips projecting alternately, first on one end and then on the other, the projecting ends being equal to the width of the strip. This could be done by piling the sheet on top of one another, but a better and simpler way of building a good core is by means of the device shown in Fig. 3. This is constructed of scraps of wood,—the one which I used was made of cigar box wood, and of the dimensions shown in the illustration. To build the core in this device, place the first strip (a) in the holder touching the left upright. The space between this strip (a) and the right hand upright will then be one inch. Then place (b) next to it, touching the right hand upright, and continue alternately until 178 pieces are in place, this being the number required if tin can iron is used. If other material is used, there should be enough strips to make a core 2 inches thick when tightly compressed.

Now remove the sheets from the holder, and holding them tightly between the thumb and fore-finger so that they will not be moved, put the sheets in a vise and clamp tightly until all the sheets lie perfectly flat, and the core becomes compact. Loosen up the vise slightly and push the solid part out far enough to bind it securely with tape. This will hold the sheets together, and by pushing the rest of the core out for short lengths at a time, the whole core may be taped. Prepare the other core in the same way.

The next step is to prepare the core for winding. Cut four strips of muslin, two 2 inches by 6½ inches; and the other two, 1 inch by 6½ inches, and after shellacking, put on the sides of the core, leaving the ends extend over the ends of the core. Cut eight ½ inch blocks, 1 inch wide, four of them 2 inches long and the other four 1 inch long, and fasten them over the ends of the core as shown in Fig. 4 by wrapping a layer of tape over them. The space between the blocks on both ends should be three inches.

Let the end of the wire project through the end blocks as at (p1) for about 4 inches, and wind on 413 turns of No. 20 B & S enamel wire per core. The total number of turns on both cores will then be 826. The final end should be brought out as at (p2). Cover both ends of each coil with several layers of tape to insulate and strengthen them. The coils should be wound in layers, and each layer shellacked before winding the next.

Now wind on two layers of shellacked muslin 3 inches wide, and prepare a set of four blocks similar to the end blocks, and tape them on the primary coil about ½ inch from the end. There will now be a space about ½ inch wide between these blocks and the original end blocks for the first section of the secondary. Leaving out an end long enough for connecting, wind 21 turns of No. 16 B & S gauge enamel wire into this space, shellacking each layer before proceeding to the next. When the first coil is completed leave a loop for connections, and move the blocks down another half inch and wind the second coil; continue in this way until five coils are wound on the core. The primaries and the secondaries of both cores are wound in the same manner, and in the same direction. On both cores there will now be together 4 primary ends, and 4 ends and 8 loops on the secondaries.

When the coils are wound, remove all the winding blocks by unwinding the tape on them, and pull the ends (m) Fig. 4 back over the core, enclosing and protecting the coils. Then cover the whole by winding on two layers of tape one-half inch wide. This completes the cores.

Set both cores on end as shown in Fig. 5, about 1½ inches apart, and after inserting the piece of shellacked card board (d) which is 1½ inches wide by about 2½ inches long, drive the first yoke strip in the space left between the first two core strips on the one side, and touching the core on the other side. Then drive the next strip in from the second core, and touching the first. Continue alternating in this way until the whole top is filled. Then turn the transformer over, and fill the other end. The completed core should appear as in Fig. 5. Do not try to drive the sheets in place with a hammer, for this would bend them. Use a light oak stick or an old steel table knife and hit them with the handle end. Do not try to drive the sheets in place with one blow: hit each several times from the top, and then hit it on the end to drive it in place against the other core.

In order to prevent vibration of the core sheets and insure good operation, the yokes should be clamped between wooden strips as shown in Fig. 6. For these clamps cut four strips of wood, each 5½ inches long by ¾ inches thick by 1 inch wide, and drill ¼ inch diameter holes at a distance of ½ inch from each end. Put the four ¼ inch bolts through the holes as shown, placing washers under the heads and nuts. Clamp the yokes tightly in the vice, so that all the sheets will be pushed into position, and then remove from the vice and put the clamps in place and tighten them up flush with the face of the yoke. Then cut a block of oak ¾ by 3½ by 3 inches, and fasten on the clamps by the two wood screws (a) shown in the illustration. Next, get the half of a rosette which con-

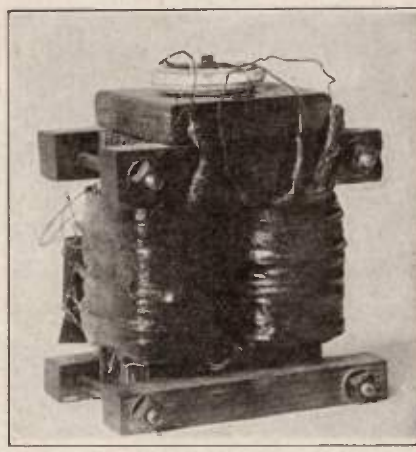


FIG. 8

tains the fuses, and fasten it in the position shown by means of the screws (b). Remove the old fuses, and insert 1 amp. fuses. Connect the ends of the primary so that the current will flow in opposite directions around the two cores. If you have forgotten how they were wound, connect either pair of ends, and a test for porper connections will be given later. Connect the other two ends to the screws on the rosette or connection plate.

We are now ready to test the primary coils for proper connections, and the secondary coils to determine which parts of the loops are the beginning, and which the ends of the coils. Connect the 110v. supply wires to (L) and (L). If you have an alternating current voltmeter at hand, connect to the ends of either of the five coils and turn on the current. If the primary connection is properly made.

the volt-meter will indicate from 12 to 15 volts. If the volt-meter indicates very little or no current, the primary is connected wrong, and should be corrected. This is done by reversing the connections on one of the coils.

If a volt-meter is not available, the transformer may be tested by means of a 10 volt tungsten sign lamp, such as may be had in almost any city. Connect the lamp to the first end, and to the loop of the fourth coil, which gives a series of four coils, or 10 volts. If the primary is connected properly, the lamp will light up brilliantly, if not, there will be little or no light. A wrong connection in the primary may also cause the core to vibrate and hum violently. When the proper connections are determined, solder them securely.

If you have a volt-meter, test the secondary after connecting all the ten coils in series. With proper connections in the two sets of coils on the two cores, the reading should be about 25 volts. Then cutting one loop at a time, and starting with the end of the wire left out when winding the coil, as the beginning of the first coil, and test all coils for the beginning and end with a battery and a bell, buzzer or telephone receiver. Tag or label the beginning and end of each coil.

A containing box shown in Fig. 7, and of the dimensions shown should be constructed of oak. The whole interior of the box should be lined with sheet asbestos, and the exterior stained or shellacked. Place the transformer in the box, and fasten in place with screws driven into the clamping strips. The primary and secondary connections are also shown in Fig. 7. The beginning of each coil of the secondary is indicated by the numbers 1a to 10a and the ends by 1b to 10b.

The connections to the rosette plate on the transformer are made by means of a flexible cord run through the porcelain tube in the end of the box. The flexible cord should terminate in a connection plug for connecting to an electric light socket.

The cover should now be prepared for the primary snap switch, and the secondary circuits. These should be arranged as in Fig. 7. Obtain twenty battery binding posts from old batteries or from your dealer, and after countersinking the holes in the cover at the proper points, insert the binding-posts, and make the secondary connections. The secondary circuits should also have binding-posts for fuses, which are shown at both sides of the secondary connections.

By leading a pair of wires, each running down the columns, as down one and two, and continuing down three and four, all the coils will be connected in parallel, and 2½v. 20 amp. will be available. By cross-connecting, as 1b to 2a; 2b to 3a, continuing in this order until all the coils are connected, the coils will be connected in series, and 25v. 2 amp. may be taken from 1a and 10b. To obtain any other desired voltage, divide this voltage by 2½ and this gives the number of coils to connect in series. To obtain a certain number of amperes, divide by 2, the capacity per coil, and connect this number in parallel.

Combinations of series and parallel connections will still further increase the variable capacity. From the above, it will be seen that almost any voltage from 2½ to 25v., and any amperage from 2 to 20 amps. may be obtained.

The capacity of this transformer when enclosed in the box is 50 watts for continuous operation, and 75 watts for periods of one hour. If removed from the box, 75 watts may be taken from it continuously, and 100 watts for one hour. I have repeatedly drawn 100 watts continuously for one hour without any serious results other than heating to an uncomfortable degree. A number of times I have had the secondary on a dead short circuit for two or three minutes without burning out the coils, but they became very hot.

The secondary current should be led through fuses which may be placed on the sides of the secondary connections as shown, and the fuses should be of ample capacity to carry the rated current, and the end wires from any combination of connections should run to these fuses.

This makes a very useful little piece of apparatus for the amateur's laboratory, embodying as it does, a neat substantial source of current supply in a portable form. It eliminates the use of batteries, and their attendant inconveniences, and contains nothing to spill on the clothes or on the floor.

It may be used to operate small motors, miniature incandescent lamps, 10 volt tungsten sign lamps, and miniature elec-

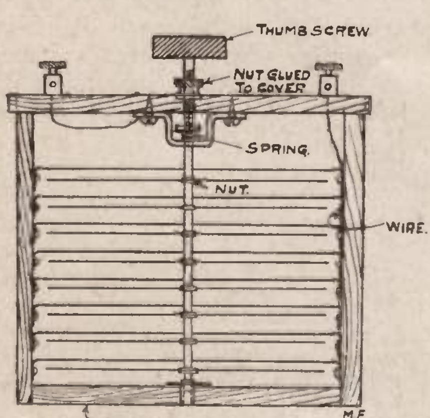
(Continued on page 593)

This department has been started with the idea to encourage the experimenter to bring out new ideas. Every reader is welcome to contribute to this department, and new ideas will be welcomed by the Editors. WHEN SENDING IN CONTRIBUTIONS IT IS NECESSARY THAT ONLY ONE SIDE OF THE SHEET IS USED. SKETCH MUST INVARIABLY BE ON A SEPARATE SHEET NOT IN THE TEXT. The description must be as short as possible. Good sketches are not required, as our art department will work out rough sketches submitted from contributors. IT IS THEREFORE NOT NECESSARY FOR CONTRIBUTORS TO SPEND MUCH TIME IN SKETCHING VARIOUS IDEAS. When sending contributions enclose return postage if manuscript is to be returned if not used. ALL CONTRIBUTIONS APPEARING IN THIS DEPARTMENT ARE PAID FOR ON PUBLICATION.

FIRST PRIZE, TWO DOLLARS.

Unique Variable Condenser.

WHERE compactness is desired, in portable wireless sets especially, condensers of the rotary or slide plate type, take up twice as much room as they should; while condensers changing their capacity by a switch do not do so gradually enough. In the drawing of the condenser it may be seen that the plates may be nearly any size or shape, depending upon the space to be filled. The stationary plates should be 3/8 inches apart. The capacity is regulated by turning a thumbscrew. It should be short enough to al-



low a leeway only of about 3/16 inches for the movable plates. Battery nuts are soldered to the movable plates, as shown. Holes are, of course, made in the centre of the plates to allow the 8/32 threaded rod to pass through. The top of the rod should not be threaded so as to allow it to slide easily. If the plates are round, the thumb-screw may, of course, be fastened to the rod B directly.

Contributed by

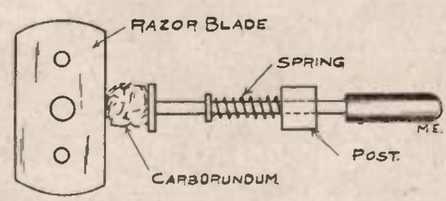
L. C. MUMFORD.

SECOND PRIZE, ONE DOLLAR.

An Audible Detector.

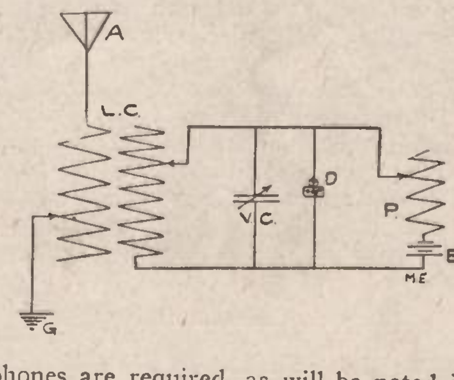
Something new and novel in detectors may be constructed by following the instructions and diagram below.

The detector consists of carborundum



(selected blue crystals), which make contact upon a discarded safety razor blade. When in proper adjustment the detector will respond to signals in close proximity with a clear ringing tone, sufficiently loud to be heard several feet away.

Light contact upon the sharp razor edge, with a strong battery produces best effect. The proper point of contact will best be found by experiment. No tele-



phones are required, as will be noted in the diagram, and no special form of tuning is necessary.

Contributed by

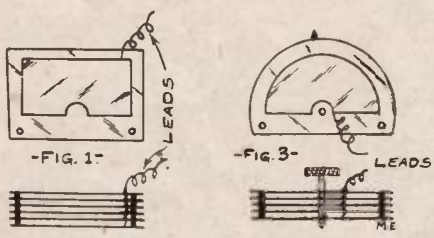
C. A. PETTINGILL.

A NOVEL ROTARY CONDENSER

All rotary condensers I have seen described call for the use of brass or aluminum plates and much mechanical skill in making. Here is a description of one that has neither of these objections but still is a good instrument. All dimensions given may be changed, also the number of plates is optional.

A box about 5½ inches x 5½ inches x 1½ inches is required. For the size given, the stationary plates are made of paraffined paper 5¼ inches x 2½ inches. Each plate is made of two of these with tinfoil between ½ inch smaller all around. Leads are brought out (Fig. I). These are assembled on two rods with washers between (Fig. II).

The rotary plates are made of thin card board (paraffined), each sheet of which is ½ inch *more* than a semi-circle of 5 inches diameter. (Fig. III). Each plate



-FIG. 1- -FIG. 3-

-FIG 2- -FIG. 4-

consists of two of these with tinfoil between *less* than a semi-circle of 4 inches diameter. Leads of small wire (No. 30) are brought out near the centre.

A piece of No. 12 copper wire about 6 inches long is soldered to a brass rod 2¾ inches long about 1 inch from one end. The rotary plates are then assembled on the brass rod with washers between, the No. 12 wire is bent at a right angle and forced through the ends of the plates with washers between. (Fig. IV).

The upper end of the rod is put through a hole in the top of the box and the lower end in a recess in the bottom. Any details omitted may be obtained from the drawings.

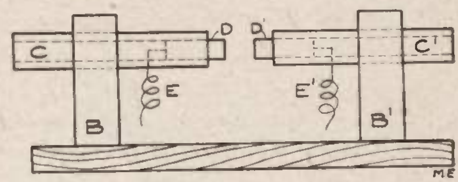
Contributed by

M. H. HAMMERLY.

A WELL INSULATED SPARK GAP.

Below is a description of a spark gap that is high grade, i. e., has rubber insulation without being expensive.

Base A is 4 inches x 2 inches x ½ inch; ½ inch from either end is glued or nailed 2 uprights B and B¹ each 2 inches x 2 inches x 1 inch; ½ inch from the top of either is bored a hole just large



enough to allow a hard rubber tube like that used on phone wiring to be slipped through. If the hole is too large, there will be side play.

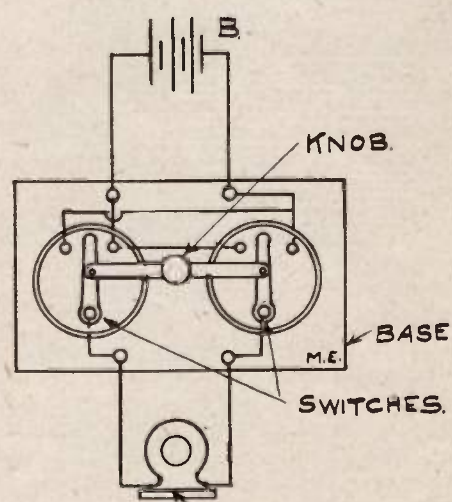
C and C¹ are rubber rods 3 inches long, D and D¹ are ¾ inch pieces of zinc pencil such as used in a wet battery. To each is soldered a wire E and E¹ which is brought through a hole in the tubing. Paraffine is poured in each. Connections are made to the two wires.

Contributed by

M. H. HAMMERLY.

A REVERSING SWITCH FOR BATTERY MOTORS.

Figure 1 shows the working of a simple switch for reversing small motors. Obtain two (2 point) battery switches; a piece of hard wood, ½ inch thick, 2½



inches wide by 5 inches long; 4 binding posts from old dry cells; 2 wood screws and a few short pieces of No. 18 wire. Drill 4 holes in the piece of hard wood, as shown. With the wood screws fasten the two 2-point switches to the base shown; next remove the wooden or fiber handles from the switch levers, and fasten one of them to a piece of fiber F, at S, then fasten this to the levers with small machine screws. Put the four binding posts in place and make connections under base. Connect as shown in diagram.

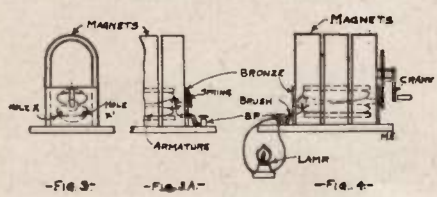
Contributed by

JOS. L. WURM.

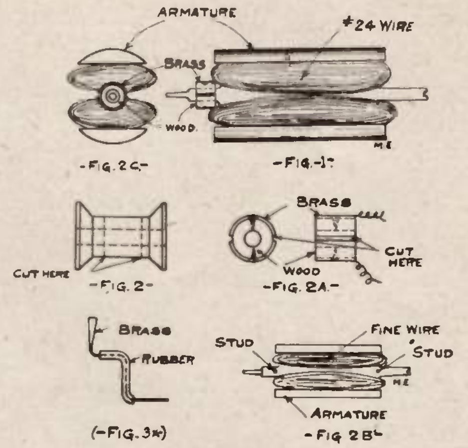
HOW TO CONVERT AN ALTERNATING CURRENT MAGNETO INTO A DIRECT CURRENT ONE.

Many experimenters own a telephone magneto giving high tension A. C. and would like to use same to produce low voltage direct current. I shall try to describe as briefly and clearly as possible how I accomplished this:

First remove all the fine silk covered wire from the armature, and also take



out the studs 1 and 2, Fig. 2B. Then take an ordinary thread spool, Fig. 2, and cut off ends as shown at dotted lines. Hollow out the bore till it fits the armature shaft tightly in the position shown at Fig. 1. Then cut a piece of brass tubing which will fit the piece of spool tightly, a little shorter than the spool; at one end of the tube, drill two small holes to take small wood screws, on opposite sides of the tube; then force the tube onto the spool, and fasten it to same with short wood screws; if the screws project on the inside of the spool, remove them, and cut them off a little, so they do not project. Force the spool onto the shaft as shown, Fig. 1; then with a hacksaw cut a slit on both sides of the tube, half way between the screws, so as to leave two sections; this is the commutator. Wind the armature with some No. 24, D. C. C. copper magnet wire; attach the two terminals of the winding to the segments of the commutator by means of the small screws. The armature is then finished. As there is no space for brush holders in a telephone magneto, you will have to remove the bronze bearing plate, at the end toward which the commutator will face.



Drill two holes in the plate (Fig. 3, x and x¹) 3/16 inches in diameter, to pass the brush holders through. The brush and holder are in one piece; a piece of No. 12 brass wire is flattened at one end, and filed square, then bent as shown at Fig. 3x. A piece of rubber tubing is slipped on the wire; two binding posts are fastened to the base (B. P., 3A) and the brass wire brush holders passed through the holes in the bronze plate, then through the lower hole in the double post, adjusted to fit the commutator and clamped tight in the post. When the brushes are in position, they should be as in Fig. 3A. Screw the gear wheel on the armature shaft, and also the crank to its shaft. Fig. 4 presents the appearance of the magneto after the change. When the crank is turned as fast as is possible with the hand, it should give enough current to light a 4½ volt, 6 C. P. tungsten incandescent lamp to its full brilliancy. In this manner an ordinary 3 magnet telephone magneto may be used to charge storage batteries, light lamps, operate spark coils, toys, etc., and also for numerous electrical experiments.

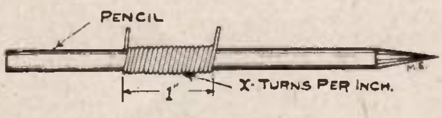
Contributed by

JOS. L. WURM.

RESISTANCE MEASUREMENT.

I give herewith an approximate method of measuring the resistance of a piece of copper wire, without any apparatus to speak of.

Take an ordinary round pencil and wind the wire on it for one inch length, then count the number of turns per inch.



This number squared, and divided by 80, gives the number of ohms per inch of wire.

$$\text{Resistance of wire in ohms} = \frac{x^2 \times l''}{80}$$

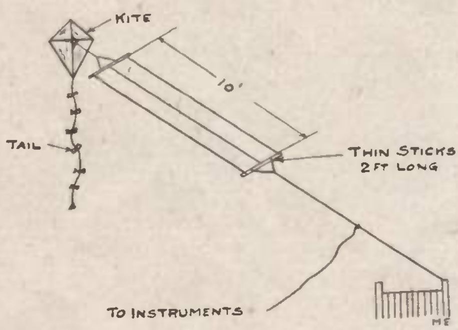
where l = length of wire in inches.

Contributed by

W. R. Cooper.

IMPROVED KITE AERIAL.

It is impossible for some amateurs to get an aerial high enough so as I saw



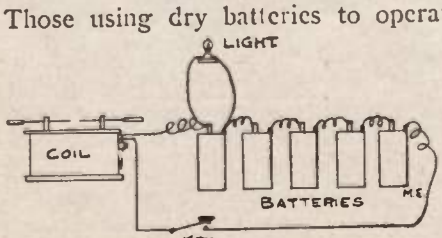
a figure in a magazine of a box kite with only one wire. I tried this and it worked fairly well, but as I wanted much better results, I took in my kite and added the other two wires; this done I put it up once more, and this worked excellently.

Contributed by

M. H. Braughton.

METHOD OF TESTING FOR WEAK BATTERIES.

Those using dry batteries to operate



spark coils and having no means of testing the batteries will find the following a very efficient way of doing so.

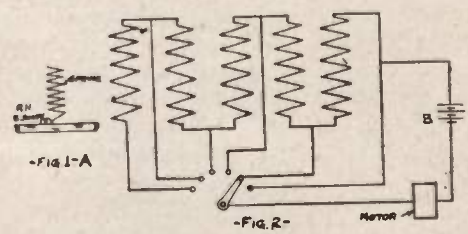
First take a 2½ volt miniature lamp and fasten it in a socket. Then place it across the two terminals and the battery if any good at all will light the lamp nearly up to candle-power. Then press the key and if the light dies down the battery is good, but if the lamp burns bright the battery is dead, as the current goes through the lamp instead of the battery.

Contributed by

Howard W. Eaton.

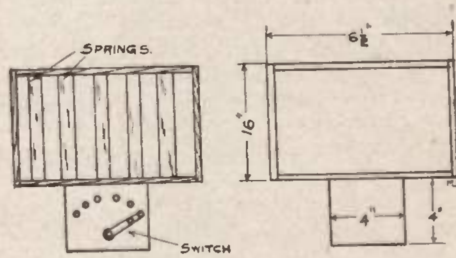
A BATTERY RHEOSTAT.

The following is a description of a rheostat which may be used to regulate spark



coils, toy engines and motors, or dim miniature lamps:

Procure five springs from worn out shade rollers (these may best be obtained by carefully splitting roller), and remove the wooden plug, metal end, and rod. Then make a frame of well seasoned wood 1 inch x ½ inch of the dimensions shown in Fig. 1. Bevel the upper long edges and fasten the pieces together with round head brass screws.



-FIG. 3- -FIG. 1-

Give this frame a coat of shellac and then fasten springs to frame by round head screws (1a). At the same time solder pieces of No. 18-22B and S copper wire to the ends of each spring and shellac them to prevent rust. Now obtain a six pointed switch and mount it on a square block of ½ inch wood and fasten block to frame by brads and glue. Then make the connections shown in Fig. 2

Another scheme is to fasten the frame to underside of bench or table and run wires to a separate switch mounted on switchboard or wall.

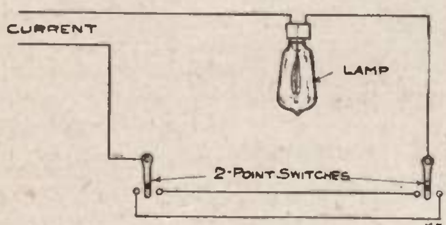
Of course the number of springs is only limited by the number obtainable. The completed rheostat is shown in Fig. 3.

Contributed by

STUART R. WARD.

LAMP CONTROL.

Find enclosed a diagram of a simple way of turning an electric light on and off at two different places, such as to turn it on when starting up a stairway,



and on reaching the top to turn it out, and vice versa, when coming down.

The light may be located at any desired place along the stairway, the landing, or at the top, being a good locality.

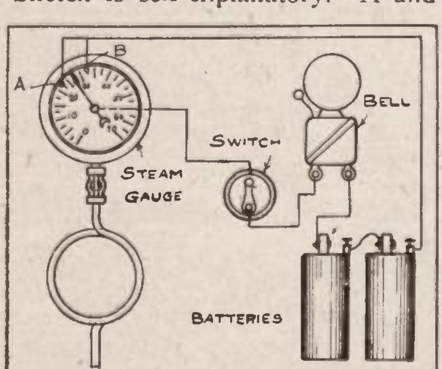
I hope that this diagram may be of some value to your readers.

Contributed by

MELVIN C. JOHNSON.

AN ELECTRIC GUAGE ALARM.

Sketch is self-explanatory. A and B



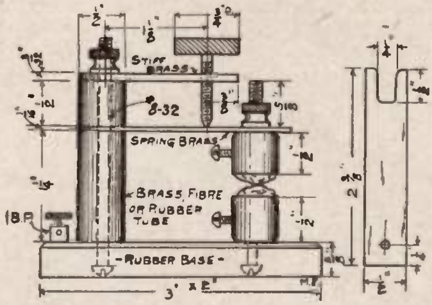
are insulated contacts.

Contributed by

CHESTER M. RICKER.

SIMPLE DETECTOR.

The idea of this detector is that it can be changed from a Silicon to a Perikon or other crystals very easily. To change



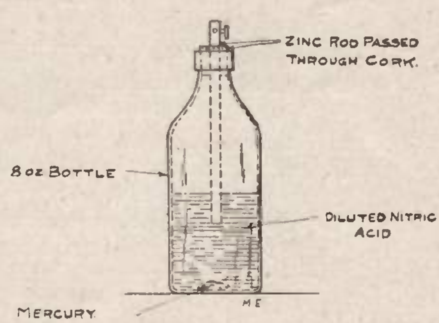
from any two elements, loosen binding nut on upper cup, on spring, reverse, and you have a blunt point of brass for any single crystals, such as silicon. This detector can be made cheaply and is very efficient. Diagram enclosed covers all points including stock and dimensions.

Contributed by

EDWARD DE MELLO.

NEW METHOD OF AMALGAMATING BATTERY ZINCS.

While amalgamating a large number of zincs I found that the following method was quick and simple: Take an 8-ounce bottle, bore a hole in the cork large enough to admit the zinc. Fill bottle half full of slightly diluted nitric acid, then pour in a small quantity of mercury. Insert zinc in bottle closing tightly with



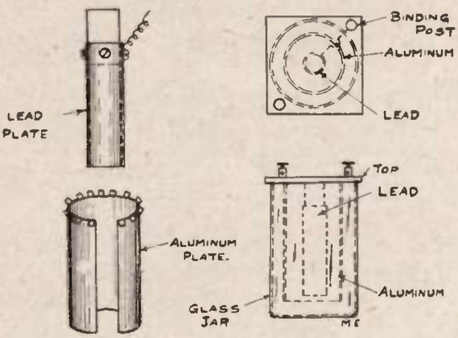
the cork. Shake vigorously and in a short while the zincs will be covered with mercury. Copper wires are also coated in this manner. The effect on brass is similar, but it is rendered extremely brittle.

Contributed by

E. K. SCHADT.

A SIMPLE RECTIFIER.

Many expernmenters having alternating current, wish to obtain direct current for many purposes. To make a small chemical rectifier, which will change A. C. to D. C., and which on 110 volts will give about 100 volts and 5 amperes, the following materials are needed:



4—Aluminum plates, size 5" x 5" (a small aluminum pan can be cut up for this);

4—Lead plates, size 4" x 4";

4—1 qt. battery jars;

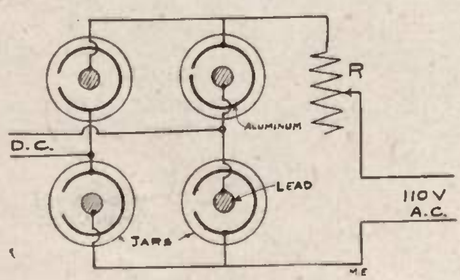
8—Battery binding posts;

4 oz.—Bichromate of Potash;

4—Pieces of wood, size 5" x 5" (for top).

To assemble:

Bend the lead plates around a 1½' piece



of 1" curtain pole and fasten with small screws. Fasten connection under one screw. Fasten curtain pole to top.

Notch the upper edge of aluminum plates and bend out small ears and fasten to top with screws. Fasten connection under one screw.

Mix up solution in one large jar so that all electrolytes shall be of the same strength. Fill jars two-thirds full. Connect up as shown. For a rheostat shown in diagram, use a water or any other type of resistance.

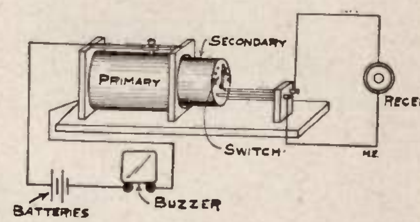
Contributed by

RALPH ELLIOT,
JOE MAHAN.

LOOSE COUPLER TEST.

Oftentimes a wireless operator meets with some difficulties in receiving messages and is unable to locate the trouble. The loose coupler may be the source and for that I am submitting a simple test.

Connect a dry cell to the primary with a buzzer in series as per diagram and move the primary slide to the last turn. Push the secondary coil in, full distance, and connect to its terminals a receiver. Start the secondary switch from point one and slowly switch on all points. At first the buzz in the receiver is quite



faint, but as the points are increased the buzz increases. Now if any one of the points do not give the buzz in the receiver, there is a defect and that defect is right in the secondary winding and its connections to the switch. If, for example, points 3 and 4 fail to give the buzz it shows that sections 3 and 4 of the secondary are not conected to the switch.

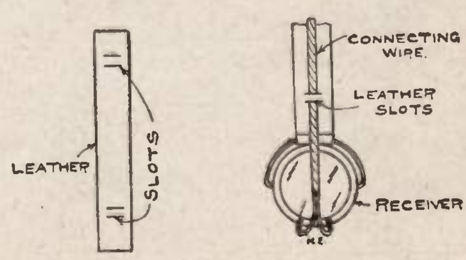
The above information will prove very valuable to the amateur in guarding him against purchasing defective loose-couplers.

Contributed by

JOHN F. HARNING.

FASTENING HEAD-RECEIVER CORDS.

Many times when amateurs purchase a



pair of phones, which are not connected in any way, they often wonder how to fasten the connecting wire which passes over the head to the head-band.

Just take off the leather from the band and with a very sharp knife, cut two small slits in the leather (Fig. 1) about an inch and one half from the end of the leather. This should be done at both ends. After the slits are cut, replace the leather on the head-band, and, taking the connecting wire, insert it in the slits as a basket-weaver would weave a basket, as in Fig. 2.

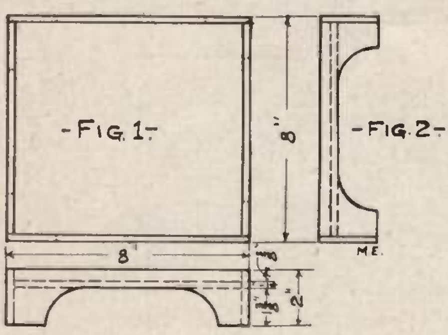
Contributed by

D. F. CRAWFORD.

A SIMPLE ELECTRIC TOASTER.

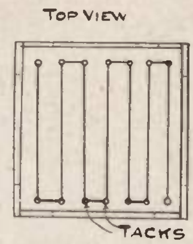
The following is a descirption of a very cheap and efficient toaster I have made.

The material needed is: 4 pieces of ¼ inch hard fiber 8 inches x 2 inches, and one piece 8 inches x 7½ inches, a piece of ¼ inch asbestos 8 inches x 7½ inches and a piece 1/32 inch thick and same size. Also a piece of lamp cord, some resistance wire, some ⅜ inch tacks and a piece of wire netting 8 inches x 7½ inches. Cut the 8 inch x 2 inch fiber pieces to the shape shown in Fig. 2 (an ordinary metal saw will easily cut it) and screw them to

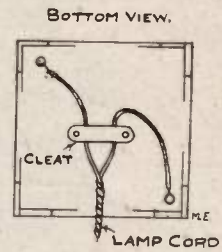


the large piece of fiber, leaving a box 8 inches x 7½ inches and ⅜ inches deep at the top. In this box lay the piece of ¼ inch asbestos, and drive tacks along two sides as shown in Fig. 3. Take a piece of fine resistance wire of such length that it will heat red-hot when connected to your current supply and wind around the tacks.

Now screw an ordinary wiring cleat to the under side of base and fasten your lamp cord as in Fig. 4. Push each wire through a small hole in base and fasten to your resistance wire. Lay your sheet of thin asbestos over the heating coil and over this tack a piece of ordinary wire netting.



-FIG. 3-



-FIG. 4.-

Connect an attachment plug to the other end of your lamp cord and the toaster is complete.

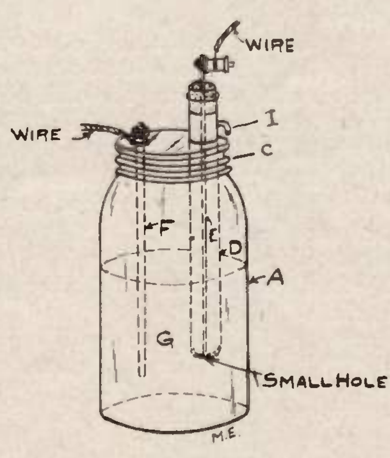
Contributed by,

H. BOSSHART.

A LIQUID INTERRUPTER.

The articles necessary for making this interupter are as follows:

A. One Mason fruit jar;
B. Rubber band;
C. Jar cover;
D. Glass test tube;
E. Copper rod ⅛ inch thick and about 7 inches long;
F. Metal rod bound with lead foil or better a lead rod of the same size as "E."
G. 20% solution of sulphuric acid, enough to fill jar about half full;



H. Small pin hole in bottom of tube;
I. Large hole, escape for heated gases and air.

Accompanied by the illustration one has a very good idea of how this interrupter is made. The cover may be made from jar cover or of hard fiber sheeting. The small hole in bottom of jar is to allow the acid to run up in glass tube to a level with acid in the jar.

This interrupter is made to work on 110 volts, direct or alternating current.

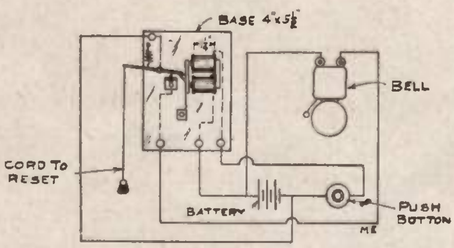
Contributed by

F. v. H. KIMBLE.

AN AUTOMATIC CIRCUIT CLOSER.

Make a base 4" x 5½". Make the magnets 1¼" long and wind with No. 32 double silk covered wire; they should be mounted ½" from side of base and their center should be 2½" from one end of the base.

The armature N is made of soft iron 3/32" thick. Fasten the spring K to this, and bend into the form of a hook projecting about 3/16" outward from the middle of N. The other end is fastened to block P.



The lever L is 2¾" long, ⅛" thick and ¼" wide. This lever is pivoted at a distance of about 1⅛" from the end. This is accomplished by boring a small hole through this into a block on the base.

S is a screw which goes through a piece of strip brass bent at right angles. D is a spring which is fastened to a nail Y, and above the pivot on L.

All points can be made clear by looking at sketch.

Contributed by

HAROLD BEVERAGE.

CORRECTION.

The article entitled "A Unique Condenser" in this department, on page 517 of the December issue, should have been credited to Herbert Schlech.

Book Review

DIE AUTOMATISCHE TELEPHONZENTRALE MUNCHEN-SCHWABING. By J. Baumann. Munchen, 1910. Price Mk, 1.50.

A GERMAN pamphlet covering the installation of the automatic telephone between the cities of Munich and Schwabing, well illustrated with several photographs and diagrams of the apparatus. The description includes the design and layout of the central exchanges.

CONSTRUCTION OF INDUCTION COILS AND TRANSFORERS. By H. Winfield Secor, MODERN ELECTRICS Publication, N. Y. City, 1910. Price, 25 cents.

A new handbook giving complete instructions and data, for the construction of induction coils, tesla coils, and open and closed core wireless transformers.

A compilation of long desired information for those who wish to build their own coils and transformers.

Data is given for any size spark coil up to 20 inches, and both types of wireless transformer up to a capacity of 3 K. W. Many useful tables including enamel wire, core weights, dielectric inductivities, etc., are given in the appendix.

TELEPHONE AND TELEGRAPH ENGINEERS' POCKETBOOK. The International Correspondence Schools, Scranton, Pa., 1908; cloth; 398 pages; 150 illustrations. Price, 50 cents.

A very useful little book, pocket-size, which will be found of much practical value to those engaged or interested in telephone or telegraph work.

The forepart of the book contains tables of roots powers, circle dimensions, trigonometric functions, copper and aluminium wire etc.

Full treatment is given of the primary and storage cell, electrical measurements, as applied to telephone and telegraph work, puncture tests, electrostatic capacity measurements, location of faults, functions of the wire chief's testing circuits, etc.

The section on telegraphy includes, telegraph repeaters, multiplex telegraphy, simultaneous telegraphy and telephony, wireless telegraphy and telephony.

Huge Electric Sign

The above is a photograph of the Tangier sign at 31st Street and Broadway, New York City.

This sign is 160 feet long, 40 feet wide, and contains, in the letters alone, one thousand incandescent bulbs. The letters of TANGIER are 20 feet high and it is so arranged that it shows TANGIER at noon-day, sunset, sunrise and by moonlight, and changes its entire appearance three times in every minute. It is said to be the biggest electric sign in the world and is the first ever used in this way by a real estate concern. It is of solid angle steel construction and cost over $7,000 for the skeleton work alone.

The Advertisers' Handbook. The International Correspondence Schools, Scranton, Pa., 1910; cloth; 414 pages; numerous illustrations. Price, 50 cents.

The advertisers handbook, as its title suggests deals with the many important points to be observed in modern advertising and contains schemes and layouts for copy of advertisements to be used in anything from a small brochure to a double-page newspaper display. Some of the more interesting topics are, plans, laying out copy, typography, illustrations, mediums, management, and other details, such as proof-reading, exact copies of all type fonts, half-tone work, etc., etc.

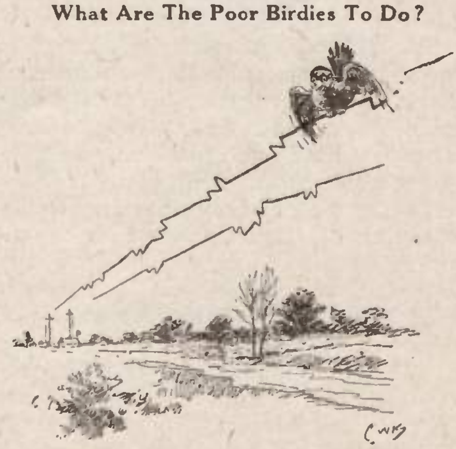
The Tesla High Frequency Coil. By E. T. Cunningham and George F. Haller. 130 pages; 56 illustrations. The Van Nostrand Co., New York, 1910. Price, cloth bound, $1.25.

A new book, dealing with the construction and operation of standard seven and twelve inch Tesla high frequency coils, for use in electro-therapeutics.

The practical details for construction of suitable transformers and coil windings are given; also glass plate condensers, motor-driven Interrupters, Electrolytic Rectifiers, Etc.

A thoroughly practical work, written from the results gained by actual experience with this apparatus; and its action explained in a very clear manner, devoid of any mathematical treatment.

What Are The Poor Birdies To Do?



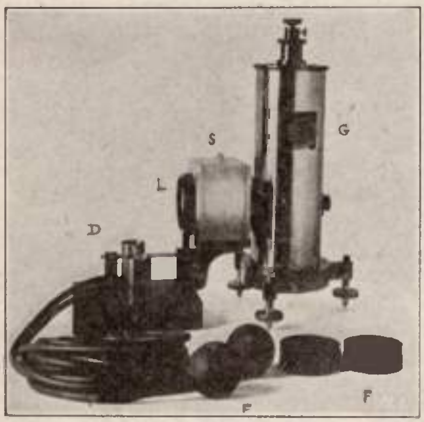
"It's pretty tough on us since they've done away with telegraph wires. One can scarcely get a secure foothold on one of these wireless messages before it's gone."

—*Judge.*

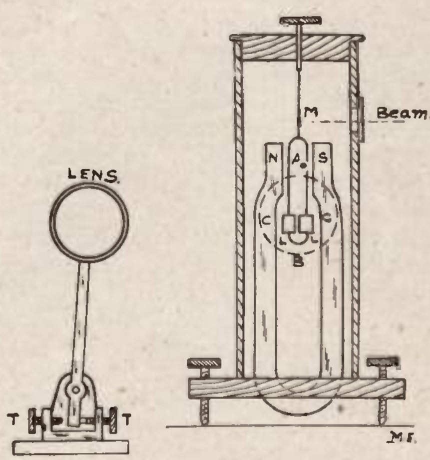
Improved Photometer

By A. C. Marlowe.

THE photometer apparatus which we present here is the invention of Dr. Ch. Féry, Professor at the Paris School of Industrial Physics. It is used



to make a direct reading of the value of a source of light and at the same time is free from some of the objections which are peculiar to photometers. For instance in an instrument in which the brightness of the light is judged by the eye alone, comparing it with a standard light, the results are apt to be variable. What is needed is an instrument which does not depend upon the eye to estimate the light, but it must not be overlooked that such an instrument must be sensitive to only the parts of the spectrum which affect the eye, otherwise we will be measuring rays which have no value for actual lighting. This is the fault with photographic methods or instruments based on selenium, etc. Should we use a thermo electric couple to measure the total radiation in the form of heat we are working with many rays which do not effect the eye, such as the infra-red rays. Dr. Féry uses a thermo-electric measuring device for the rays, but in this case he uses a special screen so as to cut off all the rays which do not effect the eye. When this is done we can now measure the value of the rays from a lamp and this shows the actual amount which the eye would perceive. He finds that such a screen can be formed of a flat cell filled with acetate of copper. This cuts down the light to but 1 to 4 per cent of its value, but the proportion of the rays remains the same. He then devises a thermo-galvanometer so as to measure this small amount of radiation in the form of heat. A thermocouple is made from a bent copper wire B and a second one of constantin alloy A, the two wires being soldered together so as to make two thermo-electric joints. These are covered by absorbing pieces of blackened silver LL, so that when one joint or silver piece is lighted and the other kept darkened, a thermo-electric effect is set up and current flows around the wire circuit AB. We thus have a swing of the coil which is suspended (along with a mirror M) between the poles of a permanent magnet NS. The amount of swing as seen by the beam of light reflected from the mirror on a screen corresponds to the value of the light, and the instrument is very sensitive, seeing that with a scale placed 6 feet off we have a swing of 20 inches for the light beam when one of the blackened plates L receives light from a candle placed 3 feet off. When the color screen is used as is needed in practice, the effect is much smaller, but it is enough to give good readings. For instance with a Carcel gas burner at 3 feet distance we have a swing of 2.5 inches on the screen. In practice we use first a standard lamp at the fixed dis-



tance and measure the swing of the beam on the screen. We thus have a basis of comparing other lamps. The lamp to be measured is put in the place of the standard and at the same fixed distance and we again note the number of degrees of the swing. By comparing the two we

(Continued on page 587)

Platinum As A Useful Metal

By Moore Stuart.

OWING to the increasing demand for platinum for use in automobile, electrical, dental and jewelry manufacture, the price has of late been steadily rising, until, at the present time platinum is regarded as a good investment. Jewelry manufactures have turned from soft to hard platinum and are using the metal in much greater quantities than they ever did before. The hard platinum contains generally from 10 to 20 per cent. of iridium, which imparts hardness to the alloy. This is the same alloy much used in electrical work, namely, for contacts.

As late as two or three years ago, jewelers say their only use of platinum was in the mounting of diamonds. Since then the metal has come into use in the mountings of other precious stones and also in the making of various articles of jewelry such as watch and neck chains, in which platinum is beginning to displace gold.

The platinum chains cost nearly twice as much as gold and may be seen in big variety in the jewelry stores.

The variations in the tints of platinum is a development made by the use of alloys. Formerly the metal always had a silver white or gray tint, but now it is also made in rich bluish tints. The silver tint is said to be the best background to set off the brilliance of diamonds, but the other tints are adding to the popularity of the metal for other purposes.

Soft platinum is now sold at $35.00 per ounce, which is an advance of $7.00 an ounce in ten months, or $10.00 in a year.

Two years ago it sold for $18.60, so that it has gone up about 80 per cent. in that time.

With 10 per cent. of iridium in the platinum alloy it now costs $35.50, and with 20 per cent. the price is $39.00.

The alloys have gone up more rapidly than the pure platinum. Iridium in a separate condition has been going up most of all and is now quoted at $60.00 per ounce—double the price of three years ago.

Iridium has no commercial use except in making alloys. The alloy osmiridium, also called iridosmium, used in making gold pen points has been advancing with the other compounds.

The iridium comes in the same ore as the platinum, often as a natural alloy. The Russian Government is said to be restricting the output so as to boost prices. Wholesale dealers say the increased use of the metal is the sole cause of the present advance in prices. Besides the supply from Russia the wholesale dealers are now getting larger quantities than formerly from several States in this country, from Colombia in South America, and also from Canada.

IMPROVED PHOTOMETER.

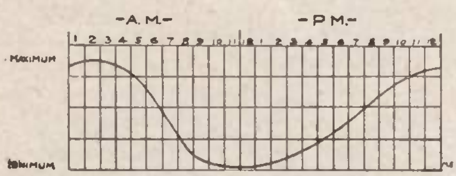
(Continued from page 586)

have the value of the second light, taking into account only those rays which have an actual effect on the eye. In the photograph the instrument is shown mounted on adjusting screw supports and it is protected by a cover of thick copper so as to keep the heat uniform on the inside. The mirror lies opposite the opening G. Before the opening in front of the blackened plates L is the color screen S in the shape of a small vessel with glass sides holding the liquid. A lens in front concentrates the light from the lamp to be measured and throws it upon one of the blackened plates L. To avoid working always in one direction, which would change the zero point, we can shift the lens to either side so as to throw the light on one plate or the other. This is done by using the stop screws T to limit the movement of the lens. The shifting is done by using the two rubber bulbs E and the dash pots D, as for a photographic shutter. By means of the diaphragms F, the light can be cut down when a very strong lamp is to be tested.

The Effect of Winter Upon Wireless Wave Propagation

By George F. Worts.

THE coming of winter has induced many an amateur experimenter to bring out his dust covered instruments and "sit in" with the hopes of again picking up some of the long distance stations that were so numerous a year ago. About the middle of September sees the



Characteristic Curve Showing Relative Propogation Of Wireless Impulses For 24 Consecutive Hours

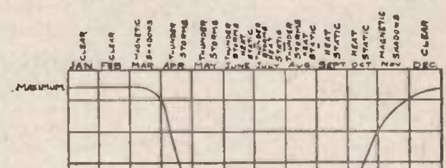
last of "static" and from that time on long distance work becomes less difficult and by the first of December the air is as clear as it will become all winter and extreme long distance transmissions is easily accomplished. About the middle of March the sun again evinces its effects and the radii of wireless stations are gradually reduced to their minimum.

In the months of March and November a peculiar phenomenon occurs constantly to stations working very far apart. The signals will be coming in "like a top," some atmospheric change occurs and the signals will gradually die out. This is very aggravating to the operator trying to "get stuff through" and may be explained by analogizing the wireless to the sound wave. There are what are known as sound shadows. A vessel may be lying in or behind a sound shadow, the nature of which has never been satisfactorily explained and a fog whistle, a most penetrating noise producer, near at hand, is absolutely absorbed or "headed off" by the sound shadow so that those aboard the vessel are utterly unconscious of any sound. Thus, intervening sound shadows or rather magnetic shadows may be attributed as the cause of the dying out of the signals on long distance wireless communication. The singing spark seems to have the desirable quality of being able to cut through intervening magnetic shadows without weakening.

If local conditions are not considered we may account for the variation in the propagation of wireless impulses as being *inversely* proportional to the amount of static electricity in the air. That the sun directly and indirectly controls the amount of static electricity is undoubtedly true. In the winter the days are shorter and the nights longer. Less of the sun's heat is absorbed by the earth and by the air near the surface of the earth. Consequently there will be less thermo-electric disturbance known as static and caused by heat lightning and invisible discharges.

One of the indirect influences of the sun is caused by its effect upon trees. In the summer the foilage of trees decreases both the radiative and receptive ability of stations in their vicinity. In sending they absorb transmitted energy by their actual capacity as conductors and in receiving are detrimental inasmuch as they accumulate static electricity and discharge it to the ground; this being another cause of the much dreaded static.

Reference might be again made to Mr. Fanning's well founded theory upon the detrimental effect of the sun upon wireless transmissions. He compares the earth to the revolving armature of a motor with the sun as a field, antagonizing any transverse currents which might be wireless impulses. In the night



Curve Showing The Radiativity Of Wireless Stations During 12 Consecutive Months

time the antagonistic influence does not evince itself owing to the absence of the sun. Owing to the earth's tilting away from the sun during the winter the affects of the sun are less marked than in the summer. At night this effect upon the earth's atmosphere declines from sun

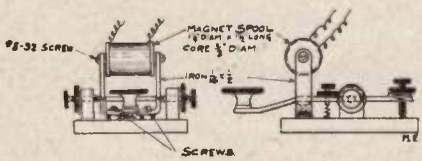
(Continued on page 589)

A Magnetic Blow-Out Key

By H. WINFIELD SECOR.

A GREAT many stations have everything refined down to pretty good shape as far as working qualities go, with the exception of the key which often gives more or less trouble, owing to the large amount of energy which is carried by them, or rather meant to be carried by them.

A condenser made of tinfoil and paper or celluloid and tinfoil, if of sufficient capacity will cut down the flashing at the

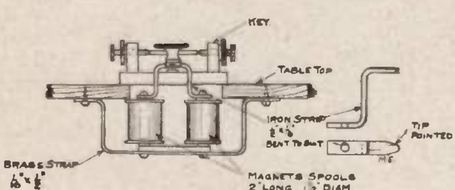


-FIG.1-

key contacts, and another simple method to overcome these effects is to place the contacts under oil, so that the break takes place in oil and any flashing or sparking is quickly extinguished.

One of the most efficient keys for handling large quantities of power is the magnetic blow-out key, several of which have been recently installed in large amateur stations.

A key of this type and capable of breaking large currents can be easily and



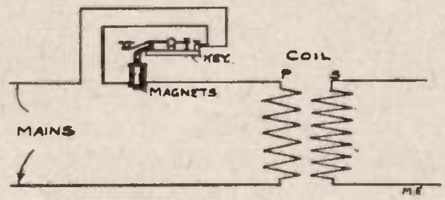
-FIG 2-

simply constructed from an ordinary key.

Fig. 1 illustrats a single pole type and Fig. 2 a double pole type; the latter being the better of the two, but the former will be found of good service for small currents.

No dimensions are offered, aside from that of the magnet bobbins and these may be deviated from without deterring from the actual worth of the instrument.

Having made the magnet bobbins and the pole pieces (of soft strip iron), as shown, the bobbins should be wound



-FIG.3-

full with wire of the same guage as on the primary of the transmitting coil.

The magnets are then connected in series with the main circuit as in Fig. 3.

KNIGHTS OF WIRELESS.

ON the 28th of October, 1910, a wireless club, called the "Knights of Wireless," was formed by several boys of Flatbush. The officers are: F. S. Hager, President and Operator; William Pontius, Treasurer; I. M. Saunders, Secretary; Emil LeRoy, Assistant Operator. The object of the club is to instruct the amateurs of Flatbush. Any person in our locality having a wireless station may join the club. All applications must be made to

I. M. SAUNDERS, Secretary.
1271 East 35th St.,
Flatbush, Brooklyn, N. Y.

THE EFFECT OF WINTER UPON WIRELESS WAVE PROPAGATION.

[Continued from page 588]

down until two or three A. M., when the air is at its highest state of conductivity to wireless impulses. From that time until day-break the influence of the sun becomes gradually stronger and when dawn arrives abnormally long distance work that is accomplished easily in the night time is practically impossible.

The curves here shown, show the varying distances over which wireless communication is possible at different times.

Wireless Telegraph Contest

Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three (3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have a wireless station or laboratory (no matter how small) have a photograph taken of it by all means. Photographs not used will be returned in 30 days.

PLEASE NOTE THAT THE DESCRIPTION OF THE STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED TO.

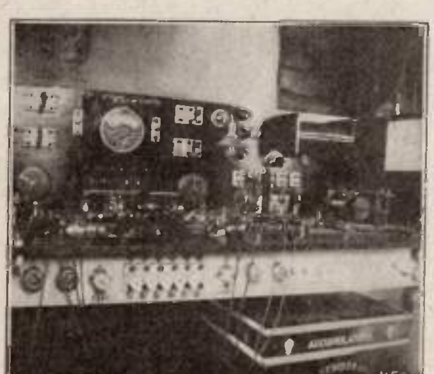
It it also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE $3.

Enclosed find a description of the wireless table shown below. This table consists of a wireless telegraph and special test table on which I have many in-

struments and switches in use.. On this photo one-half of the outfit consists of Electro Importing Company's tuning coil of the double slide type, loose coupler, potentiometer, variable condenser,



phones, and many articles too numerous to mention. Also underneath the table is an accumulator box, which consists of accumulators or storage batteries, wet and dry cells. Also some switches are shown on rear board of table and the 10 point switch controls the voltage for spark coil work, and any cell can be charged or discharged separate as well as any group consisting from 1 to 10 batteries. I have an account of the different experiments I carry on in the laboratory.

The transmitting consists of a ½ K. W. transformer of the closed core type and a ½ K. W. oscillation transformer; 3 sets of spark gaps, consisting of mufflers, etc. Aerial switch, ground and aerial detecting lamps. Aerial consists of 4 strands No. 14 aluminum wire, 65 feet long and 18 inches apart, also reaching about 35 feet from ground at the highest; and later I will install different apparatus and aerial. But, as stated before, all instruments cannot be seen on the photo, as underneath the table quite a lot of apparatus are also used.

WILLIAM S. MOUL.

York, Pa.

HONORABLE MENTION.

Enclosed please find photo of the portable wireless set, owned by myself. A box kite 6 ft. in height serves as aerial. The transmitter is a one inch coil, two leyden jars, manufactured by the Central Scientific Co., and a brass and zinc spark gap made by myself. A helix

not shown in picture is sometimes used when a larger aerial discharge is desired.

The key has extra heavy contact points and is small and light. The receiving set is a single slide tuner and a detector (silicon) (carburundum). Two pairs of phones are carried and there is room for five more. We ues E. I. Co., Bunnell and Holtzer-Cabot phones, but I like E. I. Co. the best.

The Ohmage is from 500 to 4,000. The set when closed looks like a small chest and weighs 20 ounces approximately.

HOWARD DODGE.

Valparaiso, Ind.

HONORABLE MENTION.

The enclosed photo shows a very complete portable set I made in my spare

time. Everything is home made with the exception of the phones and dry cells. The phones are E. I. Co.'s Amateur type; the batteries are flash light cells.

The set consists of two detectors, Electrolytic and Mineral, 2 dry cells, .003 micro-farad fixed condenser, 2 point switch for the Detectors' Potentiometer of the non-inductive type, double slide tuning coil. The whole set is mounted in a mahogany cabinet size 9" x 7" x 5" which sets over the instruments and is fastened by small catches on the bottom of the box. This set when connected to my aerial which is made of 4 wires 18" apart, 55 ft. long, 60 ft. high at one end and 40 ft. at the other end, using the loop aerial hook-up gives me excellent results. I have heard B. F. and B. R. plainly as well as nearly all the Great Lake Stations. I use this set in connection with the Boy Scout Maneouvres and have a portable aerial which is not shown. My sister is also a wireless enthusiast as the picture shows.

I talk daily with some of my friends who have outfits. Everything in my set was made from odds and ends found around the house and well serves to show what an inexpensive study Wireless really is. I have obtained a great deal of help from MODERN ELECTRICS Magazine. I am 14 years old and have been studying Wireless for about one year.

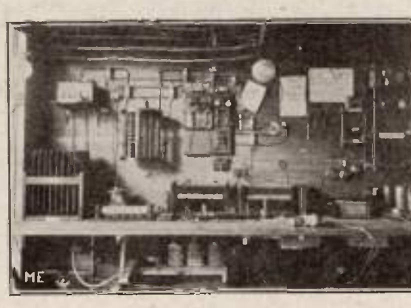
A. M. SOUTHCOTT.

Canada.

HONORABLE MENTION.

The following is a description of my station: Aerial, 5 wires, aluminum, 60-70 feet high; 70 feet long; ground, on water and gas pipes. Receiving, 1000 meter D. S. tuner, E. I. Co. 640 meter S. S. tuner, and 350 meter D. S., tuner in series, giving about 2200 meters with aerial; E. I. Co. 2000 ohm head set; electrolytic, silicon and universal detectors, with selective D. P. detector switch; variable condenser of slide plate type, with 11-6x8 brass plates, 1/16 inch apart; fixed condenser, potentiometer, and buzzer test set.

Sending—E. I. Co. one-half K. W. transformer, special zinc spark gaps, plate glass condenser, 8—11x14 inches plates; electrolytic interrupter, sending helix, 40 feet No. 6 aluminum wire on hardwood drum; variable choke coil;



special wireless key with condenser shunted around it, and also micrometer spark gap and high resistance graphite rods to cut down kickback and spark at key.

Also an automatic sending key for rapid sending and dot making, used with a larger contact relay; suitable fuses, ground for lightning, etc. An E. I. Co. aerial switch is used to change trom sending to receiving and vice versa.

All wood work is highly polished mahogany, wiring of green silk cord, and tuners wound with enameled wire, which adds to the attractive and neat appearance of the whole station.

This station has been in operation for over a year. Have had Fort Omaha and Fort Leavenworth, F. S. and F. L., the only two large stations in a large radius, and also many local and nearby amateur stations.

I also have a portable set which I use to communicate with the main station.

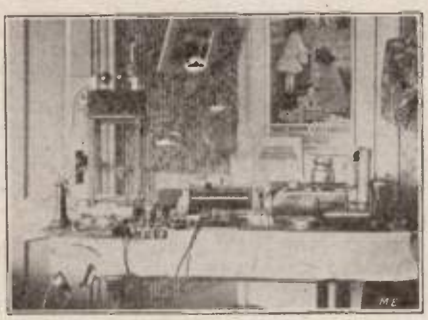
HUGO HEYN.

Nebraska.

HONORABLE MENTION.

The description of my station photograph is as follows:

The receiving is the loop system; composed of two double slide tuners, silicon detector, potentiometer and battery, fixed and variable condensers. These are sometimes used with the electrolytic detector. The receivers are two seventy-



fives which have been wound up to five-hundred ohms each.

The transmitting is straight away; consisting of a one inch coil, key, helix, condenser and two spark gaps.

This picture was taken some time ago. Since then I have been continually making improvements.

Yours truly,

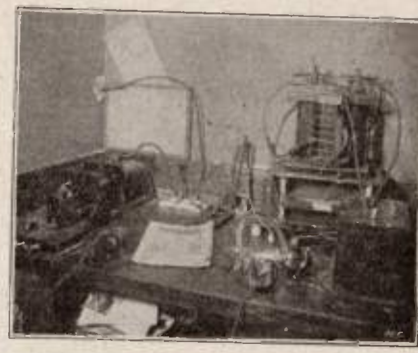
Mass. STANLEY R. RUSSELL.

HONORABLE MENTION.

THE accompanying illustration is of one of my wireless outfits.

I am the proud owner of three outfits; this outfit however is my "Old Steady." A brief description will not be amiss.

My aerial is composed of four No. 14 aluminum wires spaced 18 inches apart, and is eighty feet long, 75 feet high at



one end, and is anchored out in the yard to a tree, about 30 feet from the ground; the lead-in being from the lower end and composed of two bare aluminum wires No. 14, which in themselves would make quite an aerial.

As will be seen my receiving outfit is composed of a home made loose-coupler, designed and constructed by myself. One silicon detector stands immediately in front of tuner which is of mahogany, with a fixed condenser concealed in the base with binding posts on the outside for condenser, detector and for the telephone connections. My head phones can be seen lying on the table and are E. I. Co. 2,000 Ohm. Pro., and one single 2,000 Ohm. Murdock.

Connection to my aerial is made by means of an ordinary D. P. D. T. switch.

Transmitting instruments are as follows: One E. I. Co. one-half K.W. transformer coil; Helix, condenser and zinc spark gap mounted on and in a mahogany case, which is at right, in rear.

I also use a magnetic key operated by six dry cells and an ordinary fifty cent telegraph key which in turn controls the 110 volt current. An E. I. Co., electrolytic interrupter is situated down in the basement directly under table, which by the way is a very good place for it as the gases and vapor are not of the most pleasing kind.

Have had excellent results with this outfit, thanks to information and suggestions read in M. E., which paper *cannot be beaten* anywhere at any price. I heartily recommend it to anyone interested in Electricity or Radio communication.

B. B. BIGNALL,
Illinois.

HONORABLE MENTION.

This is a photo of my home-made receiving station which I made myself. It

consists of a fixed condenser, double slide tuner, one detector, a double throw D. P. switch, and a 1,000-ohm headband receiver. My aerial is 30 ft. long and made of 4 wires which are No. 14 aluminum wire.

CLARENCE E. THREEDY.
Chicago, Ill.

WIRELESS ASSOCIATION OF WOODBURY.

A WIRELESS Association has been formed among the operators in Woodbury and vicinity. The following officers were elected: Louis Pime, President, 73 Red Bank Ave., Woodbury, N. J.; George C. Eldridge, Vice-President, Glover St., Woodbury, N. J.; John H. Krimm, Secretary & Treasurer, 28 Penn St., Woodbury, N. J.; Norman Zippler, High St., as Director, Woodbury, N. J.; Thomas Henry, Director, Glover St., Woodbury, N. J.

At the last meeting it was moved that all members join the "Wireless Association of America" and the motion was approved by the Association.

This Association was formed principally to do away with interference and to increase our knowledge about wireless.

CONSTRUCTION OF A 50-WATT LABORATORY TRANSFORMER.

[Continued from page 576]

tric railways, and if well constructed, will always prove a source of usefulness and satisfaction. The appearance of the completed transformer may be seen in photograph Fig. 8.

AN INVENTORS' GUILD.

(Continued from page 571)

that corporations which infringe on an inventor's patent rights cannot any longer unduly carry a suit from court to court until the inventor's money gives out and he has to quit. As the conditions are to-day the inventor knows that there is something wrong with the laws and the Patent Office. But he doesn't know what the remedies are and how he can defend himself or improve conditions. The guild intends to employ agents and investigators and consult legal authorities until they find out exactly what is wrong and exactly how to make the wrongs right.

A SMALL NICKEL-PLATING OUTFIT.

(Continued from page 563)

If too much current is passing, a number of copper rods with the ends bent to form a hook, may be hung on the cathode rods in front of the anode, so as to take part of the current and avoid discoloring the work. These in turn can be used as anodes, but care must be taken not to let the bare copper touch the solution, as it is quickly ruined.

After a sufficiently heavy plate has been deposited, remove from the solution and rinse in cold water, then in hot, and dry in hard-wood sawdust after which finish on a soft buff.

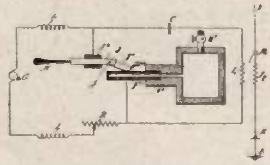
With a little patience, and a few trials, one who heretofore had no knowledge of electroplating can turn out just as good a job as an experienced plater. And further, the appearance of the plated parts will certainly repay you for the trouble taken.

Electrical Patents for the Month

978,999 RELAY Hugo Gernsback, New York, N Y Filed Mar 14 1910 Serial No 549,193

1 A relay comprising a base a standard mounted thereon, an electromagnet having a core also mounted on said base, a resilient member secured to said standard and projected in a horizontal plane, an armature for said magnet carried by said resilient member and held in a horizontal plane, means for adjusting the tension of said resilient member, binding posts on said base electrically connected with the winding of said magnet another binding post on said base electrically connected with the core of said magnet, and still another binding post on said base connected with said standard

979,277 HIGH FREQUENCY ELECTRICAL OSCILLATION GENERATOR Lee de Forest, New York, N Y Filed Feb 8 1908 Serial No 414,976

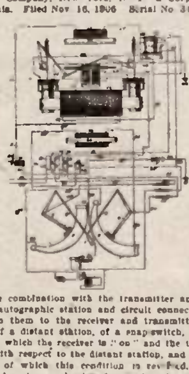


1 The combination with a source of electrical energy of a high frequency oscillation circuit comprising a capacity, an inductance and a non-conductor coated with a conductor of the second class, said coated non-conductor being associated with a circuit bridged across the terminals of the energy source and the capacity

979,275 OSCILLATION RESPONSIVE DEVICE Lee de Forest, New York, N Y, assignor, by mesne assignments, to De Forest Radio Telephone Co, a Corporation of New York Filed Feb 2 1905 Serial No 243,913

1 In a wireless telegraph system, the combination with separated electrodes connected to a wave intercepting means and to a local circuit, said electrodes being separated by a dielectric, of means coöperating with the received electrical oscillations for causing abnormal molecular activity in the intervening dielectric

978,128 TELAUTOGRAPH Ralph W Armstrong, New York, N Y assignor to The Gray National Telautograph Company, New York, N Y a Corporation of Virginia. Filed Nov 16, 1906 Serial No 343,696

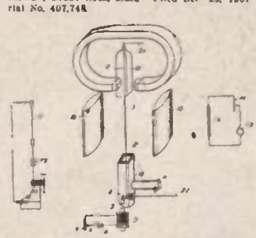


1 The combination with the transmitter and receiver of a telautographic station and circuit connections leading from them to the receiver and transmitter, respectively, of a distant station, of a snap switch, in one position of which the receiver is "on" and the transmitter "off" with respect to the distant station, and in another position of which this condition is reversed, manually controlled spring mechanism for moving the switch with a snap action to these two positions, and a lock operated simultaneously with the switch for retaining it in the latter position, substantially as described

978,606 ELECTRICAL TUNING DEVICE Lorenz H. Manstorf Brooklyn N Y assignor to United Wireless Telegraph Company a Corporation of Maine Filed Aug 24 1909 Serial No 514,441

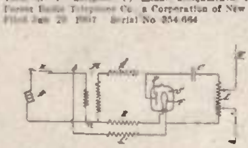
1 A tuning device for the high frequency transmission of electrical energy comprising a fixed coil a movable coil said fixed and movable coils being in inductive relation and means for bodily moving the movable coil so as to alternately present one side and then the other to the fixed coil, said movable coil being arranged at all times at one side of the face of the fixed coil

979,145 ELECTRICAL SIGNALING Reginald A Fessenden, Brant Rock, Mass Filed Dec 23, 1907 Serial No. 407,748



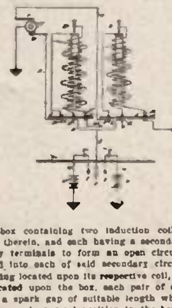
1 In a system of signaling a galvanometer, adapted to produce a motion on receipt of the signals to be detected, a source of radiant heat, a bolometer circuit and means for focusing the radiant heat so that the movement of the galvanometer determines the amount of said radiant heat falling on the bolometer

979,276 SPACE TELEGRAPHY Lee de Forest, New York N Y assignor by mesne assignments to De Forest Radio Telephone Co a Corporation of New York. Filed Jan 29 1907 Serial No 354,664



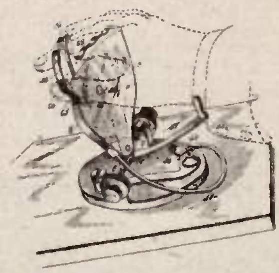
1. In an electromagnetic wave radiating system, a circuit including in series an inductance, a condenser and two separated arc-electrodes, an antenna associated with said circuit, and a generator of vibratory electromotive force operatively connected with said arc-electrodes, the separation of said arc-electrodes being such that the voltage across the gap will rise abruptly to its maximum before the condenser begins to discharge thereacross

977,870 INDUCTION COIL John Otto Heinze, Jr Lowell, Mass Filed May 22, 1909 Serial No 497,744



In a box containing two induction coils, removably mounted therein, and each having a secondary coil; two secondary terminals to form an open circuit spark gap connected into each of said secondary circuits, one terminal being located upon its respective coil, and the other being located upon the box, each pair of said terminals forming a spark gap of suitable length when the induction coils are in normal position in the box.

977,452 TELEGRAPH SENDING MACHINE Joseph Russell Jones, Port Arthur, Ontario Canada Filed Feb 9, 1910 Serial No. 542,953

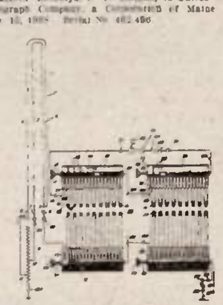


1 The combination with the pivotal supporting screws of an ordinary telegraph key, of a casing adapted to be held by said screws and means within said casing for sending dots and dashes by a movement of the casing

979,144 TRANSMISSION AND RECEIPT OF ELECTRICAL ENERGY Reginald A. Fessenden Brant Rock, Mass Filed Oct 31, 1907 Serial No 400,131

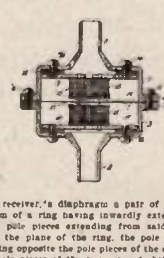
1 In a system for the transmission of energy by electromagnetic waves, a receiver and means for diverting and utilizing in said receiver the energy of the surface currents produced by electromagnetic waves

978,804 ELECTRICAL TUNING DEVICE Robert H Marriott Brooklyn N Y assignor to United Wireless Telegraph Company, a Corporation of Maine Filed Nov 12, 1908 Serial No 462,496



1 In a high frequency system of transmission of energy, the combination of a receiving circuit, a variable inductance arranged in said circuit, a local circuit, a variable inductance in said local circuit, all of the inductance in the receiving circuit being adapted to be connected either inductively or conductively with relation to the inductance in the local circuit and switching means for changing from the inductive to the conductive connection at will

977,981 TELEPHONE-RECEIVER. Harve R. Stuart, Wheeling, W Va Filed Mar 21, 1908 Serial No. 422,897



1 In a receiver, a diaphragm a pair of magnets each in the form of a ring having inwardly extending filleted arms, and pole pieces extending from said arms transversely to the plane of the ring, the pole pieces of one magnet being opposite the pole pieces of the other magnet, adjacent pole pieces of the two magnets being of similar polarity and disposed upon opposite sides of said diaphragm

Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending Dec. 27

Copy of any of the above Patents will be mailed upon receipt of 10 cents.

Queries and questions pertaining to the electrical arts addressed to this department will be published free of charge. Only answers to inquiries of general interest will be published here for the benefit of all readers. Common questions will be promptly answered by mail.

On account of the large amount of inquiries received, it may not be possible to print all the answers in any one issue, as each has to take its turn. Correspondents should bear this in mind when writing, as all questions will be answered either by mail or in this department.

If a quick reply is wanted by mail, a charge of 15 cents is made for each question. Special information requiring a large amount of calculation and labor cannot be furnished without remuneration. THE ORACLE has no fixed rate for such work, but will inform the correspondent promptly as to the charges involved.

NAME AND ADDRESS MUST ALWAYS BE GIVEN IN ALL LETTERS. WHEN WRITING ONLY ONE SIDE OF QUESTION SHEET MUST BE USED; DIAGRAMS AND DRAWINGS MUST INVARIABLY BE ON A SEPARATE SHEET. NOT MORE THAN THREE QUESTIONS MUST BE ASKED, NOR SHALL THE ORACLE ANSWER MORE THAN THIS NUMBER. NO ATTENTION PAID TO LETTERS NOT OBSERVING ABOVE RULES.

If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

MOTOR QUERY.

(814.) J. F. McLouth, Wash., writes:

Q. 1.—Have a Holtzer Cabot D. C. 110 volt motor with 5 point starting rheostat, Toothed armature with 18 slots. An excellent motor of the enclosed type intended for jewelers polishing head. By shifting brushes and running as generator can light one 110 volt carbon filament 16 C. P. lamp very bright; cannot get good light with 32 C. P. lamp, same style. Can I reduce voltage to 15-20 volts, and increase current to about 6 amperes by rewinding?

A. 1.—Yes. Use wire 6 times area of that now on it.

Q. 2.—At what speed would above develop its safe load?

A. 2.—1,600 to 1,800 revolutions per minute.

Q. 3.—Would above be suitable for recharging two or three No. 555 Electro storage batteries?

A. 3.—Yes, if shunt wound.

TUNING COIL.

(815.) Walter Dziadik, Derby, Conn., says:

Q. 1.—How many meters wave length on a tuning coil 2¾ inches in diameter and having 335 turns of wire?

A. 1.—295 meters.

Q. 2.—How far can I receive with the following instruments: One double slide tuning coil, an electrolytic detector, a potentiometer, fixed condenser and a 1000-ohm receiver? Aerial 55 feet high.

A. 2.—200-300 miles.

Q. 3.—What instruments would improve my set?

A. 3.—A loose coupler, variable condenser and set of 2,000-ohm phones.

RECEIVING RADII.

(816.)—Henry Bryniarski, Plainfield, N. J., writes:

Q. 1.—What is the receiving distance of the following instruments: Double slide tuning coil, silicon detector, variable and fixed condensers, aerial sixty feet high, sixty-two feet long, composed of four strands of aluminum wire two feet apart and a set of 1,000-ohm receivers.

A. 1.—300-500 miles.

Q. 2.—What is the receiving distance of a loose coupling coil, fixed condenser, silicon detector, aerial same as above and a set of 1,000-ohm receivers.

A. 2.—About the same; with greater selectivity.

Q. 3.—What is the best way to get a good ground for a portable wireless set?

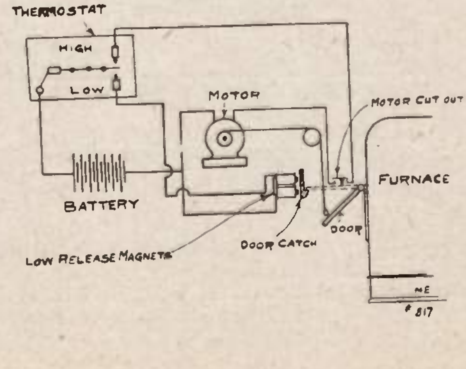
A. 3.—Drive an iron stake into wet earth or lay 8 feet by 3 feet square wire chicken netting on the grass.

AUTOMATIC FURNACE REGULATOR

(817.) Warren E. Lincoln, No. Easton, Mass, says:

Q. 1.—I have a Mesco Adjustable thermostat set at 70°. Will you give diagram, showing how I may connect it up with motor, battery, etc., so that if the temperaure rises above or falls below 70° it will open or close the drafts of a furnace, the thermostat being located upstairs, the motor and battery in the cellar?

A. 1.—See diagram below.



125-MILE RECEIVER.

(818.) JOHN M. OHIO:

Q. 1.—What is the reason that an incandescent or arc lamp will not cause a short circuit and blow the fuse.

A. 1.—Because of its high resistance.

Q. 2.—Give description of wireless receiving set to receive 125 miles.

A. 2.—Double slide tuning coil, pair 75-ohm receivers, fixed condenser, electrolytic detector, potentiometer, battery, aerial 4 wires, 75' high, 80' long.

RECEIVING TROUBLE.

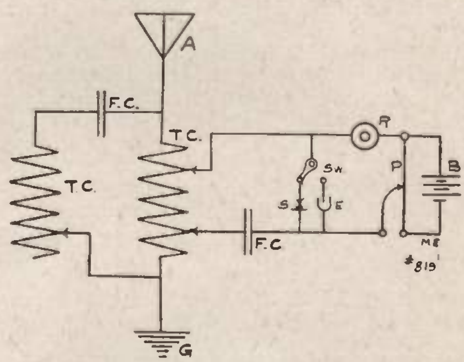
(819.) HENRY S. FLICKINGER, Cleveland, O., inquires:

Q. 1.—When I use a small coil, dimensions 2" by 12" I can hear the United Wireless Co. very loud. But when I use a 5½" x 9" coil wound with No. 20 B. & S. gauge enameled wire I only hear them faintly; the wire is wrapped on a tin core. What is wrong?

A. 1.—The tin core chokes the signals. Remove it.

Q. 2.—What is a good connection for following instruments: Tuning coils, one single and one double slide, two detectors, silicon and carborundum, two fixed condensors, two batteries, one 75-ohm head phone.

A. 2.—See diagram below.



SPARK COIL WINDINGS.

(820.) H. S. PRICE, Brooklyn, N. Y., says:

Q. 1.—Of what size wire is the primary and secondary of the E. I. Co.'s two-inch coil wound with?

A. 1.—No. 16 and 34 B. & S. gauge respectively.

Q. 2.—How many amperes does a two-inch coil draw with an electrolytic interrupter on 110-volt direct current circuit?

A. 2.—6-8 amperes.

OPERATING RADII.

(821.) HAROLD SACHS, Peekskill, N. Y., writes:

I would like to ask three questions:

Q. 1.—How far could I receive with a silicon detector, single slide tuning coil, pair of 1,000-ohm receivers? The aerial is 180 feet high, 60 feet long and 4 wires.

A. 1.—600-800 miles.

Q. 2.—How far could I send with two-inch spark coil, sending helix and spark gap with same aerial?

A. 2.—8-10 miles.

Q. 3.—How far could I receive with same set by adding a variable condenser?
A. 3.—10-15 per cent. farther.

GROUND.

(822.) JOHN FITZGERALD, St. Paul, Minn., inquires:
Q. 1.—Is water in a lake a good ground?
A. 1.—Yes.
Q. 2.—What instruments and what height of aerial would be necessary for sending 15 miles and receiving 100 miles?
A. 2.—Aerial 60 ft. long, 60 ft. high; sending 3" coil, key, battery, spark gap, helix, condenser. Receiving: loose coupler, perikon detector, 1 pair 75-ohm phones, fixed condenser.

SIZE WIRE.

(823). L. W. NAGLE, Portland, Ore, says: Please answer the following questions in the *Oracle*:
Q. 1—Please state Underwriters law for ground wire?
A. 1.—Use No. 4 copper wire.
Q. 2.—What size wire should be used to carry a 110-volt, 3 ampere current; what kind of covering to pass inspection?
A. 2.—No. 14 R. C. wire.
Q. 3.—How far would the following coil send with tuned circuit and aerial 60' high and 60' long, made up of 4 strands of No. 14 copper: Core, 2" by 14"; Primary, 2 layers No. 14 D. C. C. wire; 6 layers of empire cloth for insulation. Secondary, 3 lbs. No. 32 S. C. C wire It gives a heavy inch and a half spark; secondary is wound in 18 sections.
A. 3.—10-15 miles.

WIRELESS WAVE PROPAGATION.

(824.) S. W. CASE, Marcellus, N. Y.:
Q. 1.—Has any one discovered why wireless waves travel farther some nights than others, and why do wireless waves travel farther in one direction one night and farther in another direction the following night?
A. 1.—See the November issue; also this issue.
Q. 2.—Where can I get the best technical and mathematical book on wireless.
A. 2.—Dr. Fleming's book at $7.00 and G. W. Pierce's new book at $3.00 net, from Modern Electric's Publication, Book Dept., 233 Fulton Street.
Q. 3. — Have commercial transformers proved successful in wireless wave transmission. If not, why?
A. 3.—Yes; but for frequencies greater than 120 cycles, the open core type is preferable.

CONNECTIONS.

(825.) J. FALAT, N. Y., writes:
Q. 1.—How far would I be able to receive with a 75-ohm receiver, .015 condenser, silicon detector, 275 meter two-slide tuning coil and potentiometer.
A. 1.—100-150 miles with aerial.
Q. 2.—Could I send and receive wireless telephone messages ¼ of a mile, using gas pipe as aerial and water pipe as ground, if my friend had same receiving set as I have?
A. 2.—Possibly.

Q. 3.—Please give diagram to connect instruments in question 1.

A. 3.—See query No. 703 in September issue.

LABORATORY POWER PLANT.

(826.) H. HAAG, Elyria, O., writes:

Kindly answer the following questions in MODERN ELECTRICS:

Q. 1.—What would be a good all around power plant for a small laboratory? I wish to have a gasoline engine and dynamo, using no storage cells.

A. 1.—A. 3 H. P. gasoline engine, 2 H. P. dynamo, switchboard containing necessary switches, voltmeter, ammeter, field regulator, Water rheostat, small electric furnace.

Q. 2.—Would a 50-light dynamo run two 5 H. P. motors belted to lathes?

A. 2.—No. It is much too small.

Q. 3.—How far could I receive with the following outfits: 4 wire aerial, 50 ft. long, with one end 50 ft. and one 20 ft. from ground, loose coupler, large tuning coil, 2,000-ohm head phones, variable and fixed condensers, potentiometer, electrolytic and ferron detectors?

A. 3.—300-400 miles.

CONDENSER DATA.

(827.) F. RAPP, New York City, asks:

Q. 1.—Would a piece of copper or tinfoil immersed in a river, and a pound of aluminum 14 B. & S. wire attached to a kite do as a ground and aerial?

A. 1.—Yes.

Q. 2.—Give dimensions and number of sheets of tinfoil to make a condenser .01 microfarads capacity, if paraffined paper is 5" x 7".

A. 2.—It will require 4 sheets tinfoil 3½" x 5½". ;

AIRSHIP WIRELESS.

(828.) C. N. B., Butte, Mont., inquires:

Q. 1.—Would you kindly answer my ques-ion in the *Oracle* of your valuable magazine. How do "Airships and Dirigible baloons" send wireless messages without a ground?

A. 1.—See the December (1910) issue, where it is fully explained.

VARIOMETER DATA.

(829.) HYMAN COHEN, New Haven, Conn., asks:

Q. 1.—In what issue of MODERN ELECTRICS can I find the data for making a variometer?

A. 1.—In the April (1910) issue.

Q. 2.—How far would I be able to receive and send with these instruments: Receiving, aerial 4, No. 14 copper wires 60 ft. long and 50 ft. high, tuning coil, loose coupler one-slide, variable and fixed condenser, variometer, galena, silicon and perikon detectors, and one 1,000-ohm Electro Importing Co., phone, and D. P. D. T. switch. Sending, one 1-inch coil, key, helix and condensers.

A. 2.—300 miles and 6 miles, respectively.

Q. 3.—I have a Witherbee 6 volt 60 amp. storage battery jar which leaks; could I fix it by putting a glass jar inside, or can I buy a new case.

A. 3.—Yes. You may procure a new jar from the Electro Importing Co., 233 Fulton Street, New York.

DETECTOR QUERY.

(830.) W. J. Hefferman, Brooklyn, N. Y., writes:

Q. 1.—Show how to connect the following articles: Electro Tuner, Jr.; Electro Fixed Condenser, Jr.; Silicon Detector and Batteries.

A. 1.—See query 772, November issue.

Q. 2.—Can Carborundum be used in a Silicon Detector?

A. 2.—Yes, with a disc instead of the point.

D. C. SENDING APPARATUS.

(831.) Harry M. Ash, Paterson, N. J., asks:

Q. 1.—What apparatus is necessary for sending, using electric light current 110 volts D. C.?

A. 1.—An Electrolytic interrupter and induction coil.

Q. 2.—How far can I receive with the following: Loose coupler single slide on primary and secondary; double slide tuner, 3,000-ohm receivers, fixed and variable condensers, silicon, carborundum, electrolytic and perikon detectors, and potentiometer used in connection with an aerial 85 ft. highest point, 75 ft. lowest point; composed of six wires 75 feet long.

A. 2.—600-900 miles.

Q. 3.—Please give diagram for connecting above instruments?

A. 3.—See answer to query No. 733, October issue. Omit the loading coil.

NISIL WIRE RESISTANCE.

(832.) Arthur Diener, Reading, Pa., writes:

Q. 1.—How far can I send with E. I. Co.'s No. 8050 coil with independent vibrator, as described in the May (1909) issue of Modern Electrics, on ten volts with helix, spark gap, condensers and aerial 50 ft. high? Give dimensions of helix, using aluminum wire; also dimension of plate glass condenser, using 8" x 10" photograph plates, a full 1/16" thick.

A. 1.—10-15 miles. Helix of 12 turns No. 8 aluminum wire 8" in diameter. Condenser of 15 glass plates 8" x 10".

Q. 2.—What is the resistance of 100 ft. of No. 28 Nisil resistance wire? Can it be used for the potentiometer described in the August issue? If not, where can I get 30 per cent German silver wire No. 30?

A. 2.—380 ohms. Yes; from the Electro Importing Co., 233 Fulton Street, New York.

Q. 3.—How many plates give best results in a variable condenser composed of aluminum plates 1/32" thick? The stationary plates are 6" x 6", movable ones 5" x 6½". Plates spaced 1/16" apart.

A. 3.—7 moving and 8 stationary.

WHAT IS AN ION?

(833.) A. S., Canaan, Conn., asks:

Q. 1.—May a foot of German silver rod 1/8" in diameter be used as a resistance rod for a potentiometer?

A. 1.—No. It has not sufficient resistance.

Q. 2.—What is an ion?

A. 2.—Ions are the products of decomposition in any given electrolysis; those that adhere to the positive electrode are Kathions, and those adhering to the negative, anions.

Q. 3.—Is this type of aerial all right for general use. Drawing enclosed.

A. 3.—Yes. Very good.

HOOK-UP.

(834.) V. W. HILL, Chicago, Ill., says:

Q. 1.—Show how to connect the following instruments to obtain best results. Give diagram: Single slide tuning coil, electrolytic detector, and a 1,000-ohm receiver.

A. 1.—See query No. 703, September issue.

Q. 2.—How far can I receive with the above instruments with 4 wire copper aerial 50 ft. high and 30 ft. long.

A. 2.—200-300 miles.

COIL WAX.

(835.) W. A. BUGGELIN, New York, writes:

Q. 1.—I am thinking of encasing the secondary of my spark coil in some insulating compound. Would melted rosin be all right to use?

A. 1.—Mix it with beeswax and paraffine.

Q. 2.—The secondary of my coil is wound in layers and is 9½" long, wound with 6 pounds of No. 32 S. C. C. wire. One layer being wound right on top of the other without anything to separate them; after I was through winding I poured boiling paraffine over the secondary. Do you think that the secondary is insulated well enough and that it will stand the strain, as it is not wound in pies?

A. 2.—We would advise that you immerse the whole coil in hot wax until thoroughly impregnated, and if possible impregnate it in a vacuum.

CAN'T HEAR SIGNALS.

(836.) C. R. RUSSELL, Ashley, Mo., says:

Q. 1.—I have a set of wireless receiving instruments consisting of Electrolytic detector, silicon detector, non-inductive potentiometer, single slide tuning coil, fixed condenser, 2,000-ohm amateur type phones, connected as per enclosed diagram. E. I. Co.'s product entirely. My aerial consists of two aluminum wires elevated 40 feet at one end and 30 feet at other, two wires running to instruments. Ground consists of No. 14 copper wire soldered to six sq. ft. of zinc buried edgewise in channel of spring; but I can hear only static splashes and interference, and on fair days, hear nothing. Please tell me the trouble?

A. 1.—Raise your aerial to 60 feet.

Q. 2.—Please tell me my range with above outfit.

A. 2.—200-300 miles.

Q. 3.—Could it be the splices in my aerial wire that causes the trouble? As I have no aluminum solder, I just connected the wire with the standard splice; will this do? If not, where can I obtain aluminum solder?

A. 3.—Very likely. They should be soldered. Aluminum solder may be procured from the Electro Importing Co., 233 Fulton Street, New York.

DYNAMO QUERY.

(837.) ARTHUR J. MACEY, Westfield, N. Y., says:

Q. 1.—I have tried to run an E. I. Co. 1" coil on a K. & D. No. 9 generator. The coil works all right, but the generator heats up. Does the abrupt closing of the circuit cause this?

A. 1.—No; you are overloading it.

Q. 2.—Would a lamp in parallel remedy this?

A. 2.—No; intensify it; use a larger generator.

HOW TO FIND WAVE LENGTH.

(838.) Mr. Mighton, Painesville, Ohio:

Q. 1.—Please give my receiving distance with the following: double slide tuning coil of 981 meters, peroxide of lead detector, 2.000-ohm receivers (E. I. Co.), fixed condenser, aerial 45 feet high, 50 feet long.

A. 1.—350-450 miles.

Q. 2.—Please tell me the formula of how to get the meters of a tuning coil?

A. 2.—Multiply the total length of wire on the coil in meters by 4, which will give the wave length of the tuning coil.

WIRELESS STATION LOCATION.

(839.) Harold Haffa, Abilene, Kan., writes:

Q. 1.—Please tell me the New York firm that handles the secondary coils to fit the transformer described in "Construction of a Small Wireless Transformer," September Modern Electrics.

A. 1.—The Electro Importing Company, 233 Fulton Street, New York.

Q. 2.—I live in the top floor of a three-story building and would like to install a small wireless station, but would ask your advice as to whether you would think it practicable, as the second floor is a telephone exchange; the building also has circuits of 2300, 600, 220 and 110 volts A. C., including several 110-volt motors, and a 3 horse power motor for the elevator?

A. 2.—With a good set of instruments we believe it perfectiy feasible to have a station.

INDUCTION COIL.

(840.) Philip Palmland, Brooklyn, N. Y., says:

Q. 1.—I have made an induction coil as follows: Core, 1¼" x 12; Primary, 2 layers No. 12 (230 turns); Secondary, 5 lbs. No. 36 Single cotton covered, wound in 28 sections each ¼" thick, 43.000 turns in all; hard rubber tube between primary and secondary 3/16" thick. How far would this coil send if used for wireless transmission?

A. 1.—25-30 miles.

Q. 2.—If No. 32 wire was used for secondary, what would be the sending range?

A. 2.—10-15 per cent. greater.

Q. 3.—What would be the proper battery voltage to use for this coil?

A. 3.—14 volts.

RELAY VS. TELEPHONE RECEIVER.

(841.) A. J. Adams, Jr., New York City, inquires:

Q. 1.—Would you please tell me if a pony relay of five ohms rewound to one or two thousand ohms, is as sensitive as a head receiver of one or two thousand ohms, and if not, is it good for wireless work?

A. 1.—No. It may be used with a coherer and decoherer.

2 K.W. OPEN CORE TRANSFORMER.

(842.) HERMAN IBE, Pittsburg, Pa., writes:

Q. 1.—I would be pleased to have you furnish me detail specifications for a 2 K. W. open core transformer to be used in wireless telegraphy with 110 volts 60 cycle A. C.?

A. 1.—Make core of iron wire 18" long and 2½" in diameter. Primary 2 layers No. 10 B. & S. D. C. C. wire. Insulating tube 18" long with ⅜" wall. Secondary 70 pies 22 lbs. No. 28 S. S. C. wire.

LIGHTS FLICKER.

(843.) A. E. WILKINSON, Baker City, Ore., requests:

Q. 1.—Please answer the following: I have a Gernsback Interrupter which, when I press the key a few times, will blow out a 10 ampere fuse and it will not jump one inch between ¼" zinc plugs. I use a one-inch E. I. Co.'s spark coil. Please tell me how to remedy it.

A. 1.—Use a choke coil in series with the primary circuit. For construction of same see the June (1910) issue.

Q. 2.—How can I stop the lights from flickering when using the interrupter? If I use a choke coil, how will I make one and wire it up.

A. 2.—See answer to question No. 1.

Q. 3.—Should a sending condenser be shunted across the gap or in series with the helix, and if in series with the helix should it intensify the spark?

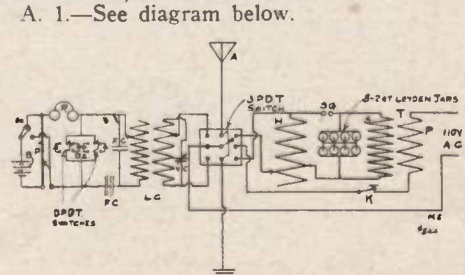
A. 3.—It should be shunted across the gap in series with the helix. Yes.

HOOK-UP.

(844. E. D BILLITER, Minneapolis, Minn., says:

Q. 1.—Give a diagram of the following instruments: 1 K. W. transformer, helix, 8 two-quart leyden jars, spark gap, key, 110-volt A. C. current, three pole double throw switch, Murdock receiving transformer, variable condenser, 1 large fixed condenser, two small fixed condensers, potentiometer, two double pole double throw switches for connecting the following detectors, electrolytic, peroxide of lead, silicon and auto-coherer with rheostat, batteries for detectors that need them, and switch for disconnecting batteries and 6,000-ohm head receivers.

A. 1.—See diagram below.



Q. 2.—How far can I send with a 110-foot aerial consisting of umbrella aerial of seven No. 14 wires, 40 ft. long, and T aerial, consisting of six No. 14 aluminum wires 100 feet long, on spreaders 14 inches apart, and my sending outfit as stated before.

A. 2.—100-150 miles.

Q. 3.—How far can I receive with the same aerial and my receiving outfit?

A. 3.—800-1,000 miles.

SPARK GAPS.

(845) A. W. ANDERSON, San Benito, Tex., asks:

Q. 1.—Would not a spark-gap made of two zinc rods on the style of the regular zinc gap and having a zinc ball of three-quarter inch in diameter, be better than two plain, straight bars.

A. 1.—No.

Q. 2.—Why will a battery motor with a two-part armature and permanent field magnet reverse when the current is made to flow in the opposite direction, and the three-part armature motor will not?

A. 2.—This is possible in the motor referred to, as the field polarity does not change with reverse of polarity in armature current.

Q. 3.—Will a galvanized iron roof of a dwelling containing about 1,500 square feet from fifteen to twenty-five feet above the ground and connected into an aerial circuit aid any in receiving, and how would it be best to connect them?

A. 3.—No, as it is not generally well enough insulated, and would dissipate too much energy in the ground.

CORRECTION.

We desire to correct an inaccuracy that appeared in the November issue of MODERN ELECTRICS, over the signature of W. Potter.

There has never been any communication directly between San Francisco and the Philippine Islands. The Philippine Islands are about 5,500 miles from San Francisco and the only near communication that has ever occurred was on November 23d. of this year, when this station picked up the U. S. A. T. Sheridan at a distance of 4,654 miles from the coast.

There are two wireless telephones on the coast of any importance, that are local inventions. That of the Universal Wireless Telephone and Telegraph Co., who operate an alternating current phone from a high frequency generator and the phone of the Aerial Telephone and Power Company who are using a new form of arc phone that is believed to be superior to even the Poulsen phone.

We call these corrections to your attention as the writer has always been an interested reader of your publication and is aware that such mis-statements will militate greatly against the popularity of an exceptionally good publication.

E. E. EIMER.

CLASSIFIED ADVERTISEMENTS.

Advertisements in this column 2 cents a word, no display of any kind. Payable in advance. stamps not accepted. Count 7 words per line, Minimum, 2 lines. Heavy face type 4 cents a word. Minimum, 3 lines.

Advertisements under "Wireless" 5 cents a word. Minimum, 4 lines. Wireless books and blue prints not listed under "Wireless," 2 cents a word.

Advertisements for the Feb. issue must be in our hands by Jan. 30.

ELECTRICAL APPARATUS.

STUDY ELECTRICITY AT HOME. A complete electrical course at home, containing 30-page detail book, 220-page text-book, 200-page experiments and over 100 pieces of apparatus. Price, complete, only $5.60. Catalogue "M. E. S." explains this and other remarkable offers. Thomas M. St. John, 848 Ninth ave., New York.

RENEW DRY BATTERIES. Formula 10 cents. Wm. Paul, 640 E. Indiana Ave., Philadelphia, Pa.

When writing, please mention "Modern Electrics."

ELECTRICAL BOOKS, BLUE PRINTS, Etc.

WIRELESS CODES AND DIAGRAMS. Blue-print of Morse, Continental and Navy Codes, 10c. Twenty Standard Wireless Circuits, 5c. A. C. AUSTIN, Jr., Hasbrouck Heights, N. J.

WIRELESS EXPERIMENTERS. Complete Formula and Tables for computing wave length of tuned stations, 20 cents; new hook-up, guaranteed to cut out all interference and static, 10 cents; any standard size or special wireless transformer data, 20 cents. H. Winfield Secor, Electrical Expert, 206 W. 23rd St., New York City.

When writing, please mention "Modern Electrics."

WIRELESS.

WIRELESS FIENDS.

Phosphor Bronze Aerial Wire as used by Government, the best yet. Just imported 25,000 feet. 1½ cts. per foot. Bornite and Zincite, the most sensitive combination, 50 cts. per set. Zincite and Copper Pyrites, 50 cts. per set. Silver plated brass cup for mounting crystals, 10 cts. each. Sliders (for square rod ¼-in.x¼-in.) with ball and spring, 20 cts. complete. Black Asphaltum, Black and White Shellac, liquid ready to use, large bottle, 25 cts. Spool containing 1000 Ohms No. 50 Copper Wire, 60 cts. Silicon or Molybdenite, large piece, 15 cts. Send postage stamp for 128 page Catalog.

LOOSE COUPLED TUNERS. Primary wound with 125 turns No. 22 Bare wire on 4 inch tube. Secondary wound on 3½ inch tube with 150 turns of No. 28 S. C. C. wire, tapped to switch every ten turns. All brass parts highly polished brass and woodwork of solid mahogany. Only $6.50. Send for circulars. Middlesex Wireless Supply Co., Somerville, Mass.

When writing, please mention "Modern Electrics."

IMPORTANT WIRELESS NOTICE! Wireless Telephone and Telegraph instruments built to order from your own drawings or ours. Questions answered and data furnished for all instruments, aerials, and complete installations. Raw materials supplied in any quantity. Prices reasonable. Write your wants to The Edelman Laboratory, 2432 Lyndale South, Minneapolis, Minn.

SPECIAL PRICES. One-half K.W. Transformer Coils, $6.50. Variable Condenser, $2.00. Receivin Transformers, $8.00. All instruments first class and fully guaranteed. Bottom Wireless Co., 217 Temple Block, Kansas City, Mo.

MAKE YOUR OWN Long Distance Detector Stand, Metal parts ready to assemble and design, $0.40. Very sensitive, fine adjustment. Have heard all stations along Atlantic coast and as far as San Juan. Detector stand complete $1.00. Edward G. Frocker, Box 14, Cape Cottage, Me.

Attention Wireless Experimenters. We have the best assortment of wireless instruments in Detroit. We keep everything in stock, no delay. Send 2 ct. stamp for catalog. Seidler, Miner Electric Co., [illegible] Detroit, Mich.

Wireless fiends save freight and expressage. Why order from the East if you can secure ALL wireless goods on the Coast? We carry largest assortment of wireless apparatus in Frisco. Can make prompt shipments. Call or send postage for catalog. Paul Seiler Electric Works, Market street, San Francisco, Cal.

All wireless goods and supplies carried in stock. Most complete assortment in St. Louis. You save money by dealing with us, and you get the most up-to-date instruments. A call will convince you. Stamp for catalog. Hance Electric Co.. Olive street, St. Louis, Mo.

When writing please mention "Modern Electrics."

FOR SALE.

FOR SALE. Receiving set worth $10.00. J. J. Healy, 314 9th St., Hoboken, N. J.

FOR SALE. One-half K.W. sending station. Electro ½ K.W. coil, condenser, helix, Interrupter, Key, $15.00. L. H. Wanbosser, 131 76th St., Brooklyn, N. Y.

FOR SALE. National Automatic Telegraph Transmitter with standard key and sounder. Complete course of Telegraphy of the Dodge Institute. Instruments used very little. Price $8.00. C. B. Caldwell, Box 23, Kenwood Park, Iowa.

FOR SALE. Have a fine independent Interrupter for Wireless work, to trade for a good D.C. voltmeter, range 0 to 110 or 120. Robert C. Denny, 505 Norton Ave., Kansas City, Mo.

FOR SALE. Two complete wireless **receiving** outfits. L. C. Gildersleeve, Mattituck, N. Y.

FOR SALE. Special—A limited number of 1 inch, 2 inch and 4 inch Special Wireless Coils, wound with Enameled Wire. Address Vergil Morris, Elizabethtown, Ind.

When writing please mention "Modern Electrics."

METAL E. KÖNIGSLOW STAMPING & TOOL WORKS. CLEVELAND, O. DIE MAKERS. HARDWARE SPECIALTIES. STAMPING

When writing, please mention "Modern Electrics."

Closed Core Wireless Transformers

To be operated on 110 V. A. C. 60 cycles, without interrupter or resistance of any kind. Laminated annealed iron used. Maximum power factor.

PRICES:

Size	Spark length with condensers	Price
1¼ Kw.	⅜-inch	$12
½ Kw.	⅝-inch	16
¾ Kw.	⅞-inch	24
1 Kw.	1¼-inch	30

Send stamp for descriptive leaflet.

WORTS-McKISSON MFG. CO., Grand Avenue, Toledo

When writing, please mention "Modern Electrics."

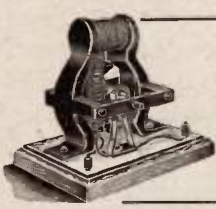
LEARN TO BE A WATCHMAKER

Bradley Polytechnic Institute
Horological Department A
Peoria, Illinois
FORMERLY PARSONS HOROLOGICAL INST

Largest and Best Watch School in America

We teach Watch Work, Jewelry, Engraving, Clock Work. Optics. Tuition reasonable. Board and rooms near school at moderate rates. Send for Catalog of information.

When writing please mention "Modern Electrics."



The White Eagle Electric Motor

Postpaid, 75c.

We make working models of inventions. Send for illustrated catalogue of Model Supplies.

The Pierce Model Works
Industry B'g., 85 5th Ave., Chicago

LEARN CHIROPRACTIC

The new method of drugless healing
EARN $50 TO $100 PER WEEK

Our free book tells how you can learn to detect disease and remove the cause by Howard's method of Spinal Adjustment. Positively the most simple, direct, advanced and scientific method of drugless healing. Based on unerring natural laws. Anyone can understand it; learned in spare time. Improve your social prominence and financial standing. Start now on the road to honor and success. Write for free book and special scholarship offer

NATIONAL SCHOOL OF CHIROPRACTIC
800 Wendell Bank Bldg., Chicago, Ill.

Special! Special!! Special!!!

2000 ohm Double Head Type Receivers with Leather Covered Head Band Complete	$ 4.50
Aluminum Wire for Aerial (240 Feet to the pound) per lb	.50
Loose Coupled Tuning Coils (Warranted Best Made)	15.00
Variable Condensers, (Aluminum Plates) Very efficient	8.00

Wireless Apparatus of every description.
Every instrument guaranteed.

FLETCHER-STANLEY COMPANY
Electrical Supplies and Specialties
32-34 FRANKFORT ST., NEW YORK

When writing, please mention "Modern Electrics."

SPECIAL COMBINATION OFFER OF WIRELESS STOCKS

One share MARCONI WIRELESS of America, Par value	$25.00
One share MARCONI WIRELESS of Canada, Par value	5.00
One share MARCONI WIRELESS of England, Common, Par value	5.00
One share MARCONI WIRELESS of England, Pref. (dividend paying), par value	5.00
Total four (4) shares (Par value $40.00), cash with order, all for	$25.00

P. C. KULLMAN & CO.
The Wireless Brokers, 68 Wall St., New York

PATENTS

C. L. PARKER
Ex-Examiner U. S. Patent Office
PATENT LAWYER
8 McGill Bldg.
Washington, D. C.

Patents, Trade Marks, Copyrights, Patent Litigation

Handbook for Inventors, "PROTECTING, EXPLOITING AND SELLING INVENTIONS" sent free upon request.

TELEGRAPHY TAUGHT

in the shortest possible time. The Omnigraph Automatic Transmitter combined with standard key and sounder. Sends you telegraph messages at any speed just as an expert operator would. Five styles $2 up. Circular free.

Omnigraph Mfg. Co.
39½ Cortlandt St., New York

When writing, please mention "Modern Electrics."

LEARN WATCHMAKING AT HOME

You can learn by our modern and original system of instruction every part of the Watchmaker's Trade at home as good or better than at a shop. You can earn money while learning and secure a well paying position or start in business after completing our course of instruction. Good watchmakers are always in demand and earn from $20 to $35 per week. For particulars apply to the WISCONSIN SCHOOL OF WATCHMAKING, Enterprise Bldg., MILWAUKEE, WIS.

When writing, please mention "Modern Electrics"

METAL PARTS For All Electrical Instruments
SCREW MACHINE PRODUCTS
MAGNET WIRE All Styles and Sizes

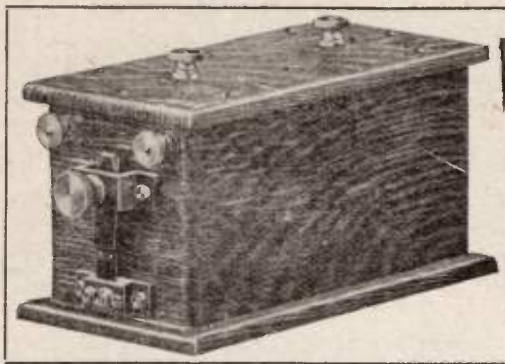
S. M. COHN & CO.
136 LIBERTY ST. NEW YORK

When writing, please mention "Modern Electrics."

HAVE YOU AN IDEA?

Write for our books: "WHY PATENTS PAY," "100 MECHANICAL MOVEMENTS," "PERPETUAL MOTION"—50 Illustrations. Mailed free. F. C. DIETRICH & CO., Patent Lawyers, WASHINGTON, D. C.

When writing, please mention "Modern Electrics."



TYPE W AMERICOIL—THROWS 5-IN. SPARK

WIRELESS COILS

For a 2-Cent Stamp we will send you our brand new AMERICOIL Catalog, entitled WHAT'S IN A COIL AND WHY.

AMERICAN ELECTRIC FUSE CO.
Dept. C
MUSKEGON, MICH.

A-B-C-CODE
WHITE PLANE

TELEPHONE
1040 MAIN

THE WHITE AEROPLANE CO.

Send for our "1911" 16-page catalogue of "model supplies" FREE

THE WHITE AEROPLANE CO.
15 Myrtle Ave.
Brooklyn, N.Y.

When writing, please mention "Modern Electrics."

PATENTS

THAT PROTECT AND PAY
BOOKS, ADVICE, SEARCH AND LIST OF INVENTIONS WANTED } FREE

Send sketch or model for search. Highest References Best Results, Promptness Assured.

Watson E. Coleman, Patent Lawyer
622 F Street N. W. Washington, D. C.

When writing, please mention "Modern Electrics."

NEW WIRELESS WONDER

AERO-FIELD RECEIVING OUTFIT RECEIVES 75 MILES

Send 2c. for Catalogue. PRICE, $4.00
ETHERIC ELECTRIC CO., 278 Lenox Avenue, New York

Sensible Christmas Gifts for MEN

"YANKEE" TOOLS

Pocket Screw Driver-No. 60

Steel—Nickel-plated and polished—very attractive. Four blades, carried in handle—Fits the hand—Fits the pocket—Fits the screws—Fits the purse.

65c. postpaid

An Acceptable Little Gift—Fit for any Man

"YANKEE" TOOLS make sensible and very acceptable gifts for all men who ever have occasion to use tools of any kind. They last for years and the giver is remembered whenever they are used. Send for book of new ideas in time-and-labor-saving tools, full of inreresting suggestions for Christmas.

A postal brings it if you mention "Modern Electrics." Ask your dealer for "YANKEE" TOOLS

NORTH BROS. MFG. CO., Dept. M., PHILADELPHIA, PA.

When writing, please mention "Modern Electrics."

NEW PREMIUMS

We offer below a new assortment of premiums any one of which may be obtained by a little extra effort. You read Modern Electrics, which means it must be good, then show it to your friends. Help us, and help yourselves. You don't have to be a subscriber to take advantage of this chance to obtain a valuable instrument for nothing; it takes just a few minutes of your time. Get the subscription, send it to us and we will forward by return mail the premiums you select. Your own (new) subscription will count. Now get busy and get a practical present **FREE.**

Junior Fixed Condenser. Used in all modern receiving sets. Special dielectric giving extra high capacity. Sealed in hard rubber base with binding posts, as shown. Sells for $0.50. (Add 6 cents for postage)

Given free for one subscription

Automatic Blow Torch. The handiest torch made. Gives a solid blast of flame for soldering purposes, without any artificial blowing. The very latest. Torch sells for $0.35. (Add 10 cents for postage)

Given free for one subscription.

"Electro" Rheostat. Rotary adjustment. Air cooled. Very useful to vary the speed of motors and small lamps. Wound with non-rusting wire.

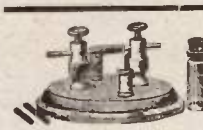
Given free for one subscription.

Electric Scarf Pins. Many unique Styles. Fitted with cord and plug, and attachable to any flashlight by removing the lamp. Scarf pin sells for $0.45.

Given free for one subscription.

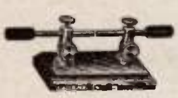
The "Electro" Flaming Pocket Lighter. Lights your cigars anytime. Fits in the vest pocket. It sells for $0.35.

Given free for one subscription.



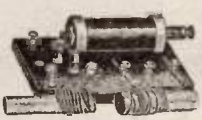
"Telim" Auto Coherer. HARD RUBBER BASE. Needs no decoherer. Complete with two carbon plugs, one iron plug, graphite-carbon grains and bottle of mercury. Auto-Coherer sells for $0.80. Add 15 cents for postage.

Given free for two subscriptions.



Zinc Spark Gap mounted on hard rubber base. Electrodes fitted with rubber handles. Pure zinc rods. Used in all of the best stations. Spark gap sells for $0.60 Add 7 cents for postage.

Given free for two subscriptions.



"Electro" Medical Coil. A1 quality. No end of fun with one of these coils, besides its therapeutic properties. Complete with cords and handles. Medical Coil sells for $0.70. Add 12 cents for postage.

Given free for three subscriptions.

"Electro" Lytic Bare Point Detector. Holds the world's record for long distance receiving. Mounted on hard rubber base. Finest adjustment. Increases your receiving range 30 to 40 per cent. "Electro" Lytic Detector sells for $1.25. Add 12 cents for postage.

Given free for three subscriptions.

Voltmeter or Ammeter, 1-12 volts, 1-15 amperes. 2½ inch face, heavily nickeled and reliable. Dead beat, a first-class instrument. These meters sell for $2.00.

Given free for five subscriptions.

"Electro" Amateur Phones. 2000 ohms resistance. Wound with No. 50 copper wire. Thin diaphragms, Leather covered adjustable headband. Weight 15 oz. 80 per cent. better than 75 ohm phones. Phones sell for $4.50. Add 25 cents for postage.

Given free for ten subscriptions.

One Inch Spark Coil. This is the coil that has sent a message 90 miles with a suitable aerial. None better made. High speed French vibrator. One inch coil. Sells for $1.50. Sent by express only.

Given free for twelve subscriptions.

We are sure you can get any of the above premiums, if you show this Magazine to your friends. They will want it right away. Then's your chance, nab 'em! before the other fellows get 'em. Strike while the iron is hot. Act now. Don't delay. You won't get this chance again. Send money orders or N. Y. Drafts, no checks or stamps.

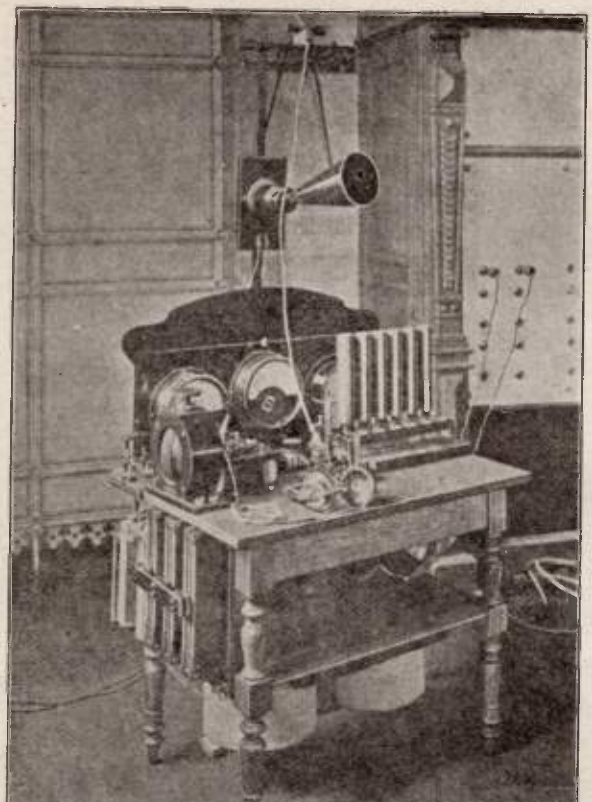
MODERN ELECTRICS PUBLICATION

233 FULTON STREET - - - NEW YORK CITY

THE WIRELESS TELEPHONE

By H. GERNSBACK

80 PAGES. . . . 57 ILLUSTRATIONS



A WIRELESS TELEPHONE STATION

THIS NEW BOOK, by Mr. Gernsback, stands in a class by itself.

It not alone describes the most important systems, but treats the subject from the experimenter's standpoint, in such a manner that even the less advanced student will have little trouble to clearly grasp the matter.

The book is the most up-to-date one and contains a digest of all the latest patterns on wireless telephony, both in the United States and abroad.

This book is an absolute necessity to the rising wireless experimenter, who desires to keep abreast with the progress of the new art, that will within five years, revolutionize telephone communication.

This book also contains directons for building small wireless telephone stations at a cost under five dollars for short distances up to one mile.

It had been our intention to sell this book for $1.00 on account of its great value, but we believe that the demand will be so great for Mr. Gernsback's book that the low price at which it is sold, will repay us in time.

As we expect several thousand orders, it will be wise to order at once, so you will not be delayed

Price Twenty-five Cents Prepaid

CLOTH BOUND, FIFTY CENTS

Send money or express order or coin, **stamps or checks not accepted**

MODERN ELECTRICS PUBLICATION

233 Fulton Street, NEW YORK CITY

INSULATORS from 1,000 to 1,000,000 VOLTS

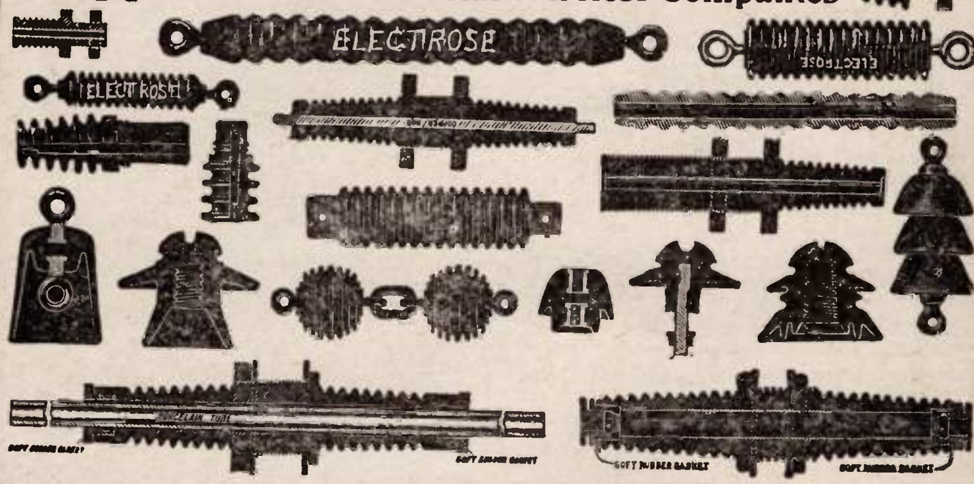
TRADE ELECTROSE MARK.

INSULATION

Standard of the World

Adopted by U. S. NAVY

and all Commercial Wireless Companies



Electrose Mfg. Co., 127-137 N. 10th St. 130-240 N. 11th St. Brooklyn, N. Y.

Four Extraordinary Offers

To make January our banner subscription month, we are willing to make the following FOUR WONDERFUL OFFERS.

Frankly, we would like to see your name appear among the 51,000 readers, who now are regular subscribers, and in order to do so, we are willing to go to an EXTRAORDINARY EXPENSE, never before attempted by any magazine.

OFFER NO. 1.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (December issue free) $1.00
2—Book, How to Make Wireless Instruments, cost .... .25
3—Book, The Wireless Telephone, by H. Gernsback, cost .... .25
4—Book, Construction of Induction Coils and Transformers, by H. W. Secor, cost .25

Total...... $1.75
(If books are to be mailed add 6c postag)
TOTAL NET.SAVING...... .75

OFFER NO. 3.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (December issue free) $1.00
2—Linen Binder (automatic) holds 12 issues M. E. gold stamped, ... .50
3—Any one of the 3 books shown in offer No. 1 .... .25

Total...... $1.75
(Mail charges for Items 2 and 3, 15c extra.)
TOTAL NET.SAVING...... .75

GREAT WIRELESS OFFER NO. 2.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (December issue free) $1.00
2—Wireless Code Chart, cardboard; size 9x12 in., Morse, Navy and Continental codes .10
3—Wireless chart with 20 Wireless Standard "Hook-ups" .... .10
4—Join the Wireless Association of America, and Wireless Pin.......... .20
5—Offical Wireless Blue Book, 32 pages, and 13x10 in. chart of U. S. stations.......... .15
6—Any one of the 3 books shown in offer No. 1 .... .25

Total...... $1.80
Mail charges for Items 2, 3, 4, 5, 6. 8c extra.)
TOTAL NET SAVING...... .80

OFFER NO. 4.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (December issue free) $1.00
2—12 back numbers of Modern Electrics, all consecutive numbers, all in good condition, each 10c.......... 1.20

Total...... $2.20
(No mail charges necessary.)
TOTAL NET SAVING.......$1.20

The offers as shown must not be changed nor can articles from any one offer be exchanged with any article or another offer. The selection is quite complete and we are positive that you will find a suitable offer among the four **IMPORTANT: For Manhattan and Canada add 25c.; Foreign 50c.**

Modern Electrics Publication 233 Fulton St., New York, N. Y.

The Greatest Magazine Bargains

We Save You As Much As 40 Per Cent. On Your Subscriptions

MODERN ELECTRICS	$1.00	OUR PRICE $3.00
COSMOPOLITAN, (or American, or Good Housekeeping)	1.50	
REVIEW OF REVIEWS	3.00	
Regular Price -	$5.50	

Modern Electrics	**$1.00**	Our Price $4.05
World's Work	3.00	
Everybody's	1.50	
Delineator	1.00	
Regular Price -	$6.50	

Modern Electrics	**$1.00**	Our Price $5.40
Pearson's	1.50	
Leslie's Weekly	5.00	
Regular Price -	$7.50	

Modern Electrics	**$1.00**	Our Price $4.25
Good Housekeeping	1.00	
The Outlook	3.00	
Regular Price -	$5.00	

Modern Electrics	**$1.00**	Our Price $4.20
Review of Reviews	3.00	
McClure's Magazine	1.50	
Woman's Home Companion	1.50	
Regular Price -	$7.00	

Modern Electrics	**$1.00**	Our Price $2.15
Pictorial Review	1.00	
Cosmopolitan, (or American or Good Housekeeping)	1.50	
Regular Price -	$3.50	

Modern Electrics	**$1.00**	Our Price $2.40
The World Today	1.50	
Pearson's	1.50	
Regular Price -	$4.00	

MODERN ELECTRICS

IN CONNECTION

	Regular Price	Our Price
With Ainslee's	$2.80	$1.80
" American Boy	2.00	1.45
" The Book-keeper	2.00	1.45
" Cosmopolitan	2.50	1.50
" Cycle & Aut'bile Trade Journal	3.00	1.80
" Farm Journal	2.00	1.45
" Fruit Grower	2.00	1.35
" Good Housekeeping	2.25	1.70
" Gunter's Magazine	2.50	2.00
" Harper's Magazine or Weekly	5.00	4.30
" " Bazar	2.00	1.50
" Judge's Weekly	6.00	5.00
" The Ladies World	1.50	1.10
" Leslie's Weekly	6.00	5.00
" Lippincott's	3.50	2.50
" McClure's Magazine	2.50	1.80
" Metropolitan	2.50	1.75
" Modern Priscilla	1.75	1.30

	Regular Price	Our Price
With Motor Boat	3.00	$2.30
" The Musician	2.50	1.80
" North American Review	5.00	4.30
" The Outlook	4.00	3.50
" Pacific	2.50	1.80
" Pearson's	2.50	1.50
" Pictorial Review	2.00	1.50
" Popular Magazine	4.00	3.00
" Recreation	4.00	3.00
" Review of Reviews	4.00	2.30
" Scientific American	4.00	3.30
" Telephony	4.00	2.30
" Suburban Life	4.00	3.05
" Success	2.00	1.50
" Sunset	2.50	1.80
" Travel	2.50	1.80
" Women's Home Companion	2.50	1.80
" The World Today	2.00	1.40

Canadian and Foreign Postage to be added to above prices.
We will gladly quote on any Magazine combination not listed above
Prompt and careful service assured.
It is impossible to get the Magazines quoted in our list cheaper elsewhere.

MAIL ALL ORDERS TO

Modern Electrics Publication

233 FULTON STREET NEW YORK

When writing, please mention "Modern Electrics"

When writing please mention "Modern Electrics."