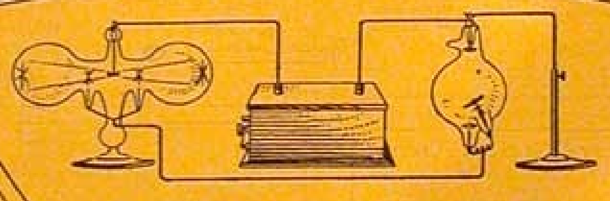
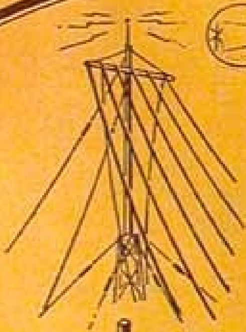
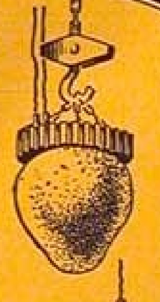
IN THIS NUMBER
Television and the Telephot
PRICE 10 CENTS DECEMBER, 1909

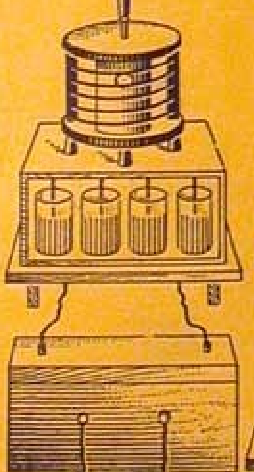
Vol. II. No. 9

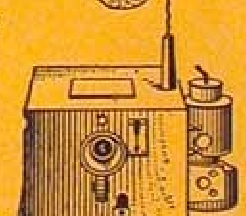
MODERN ELECTRICS

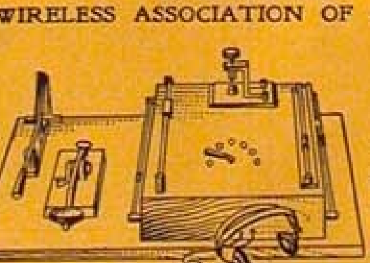


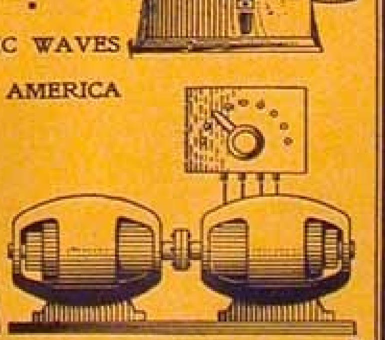












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MODERN ELECTRICS

Vol. II. DECEMBER, 1909. No. 9

Television and the Telephot

By H. Gernsback.

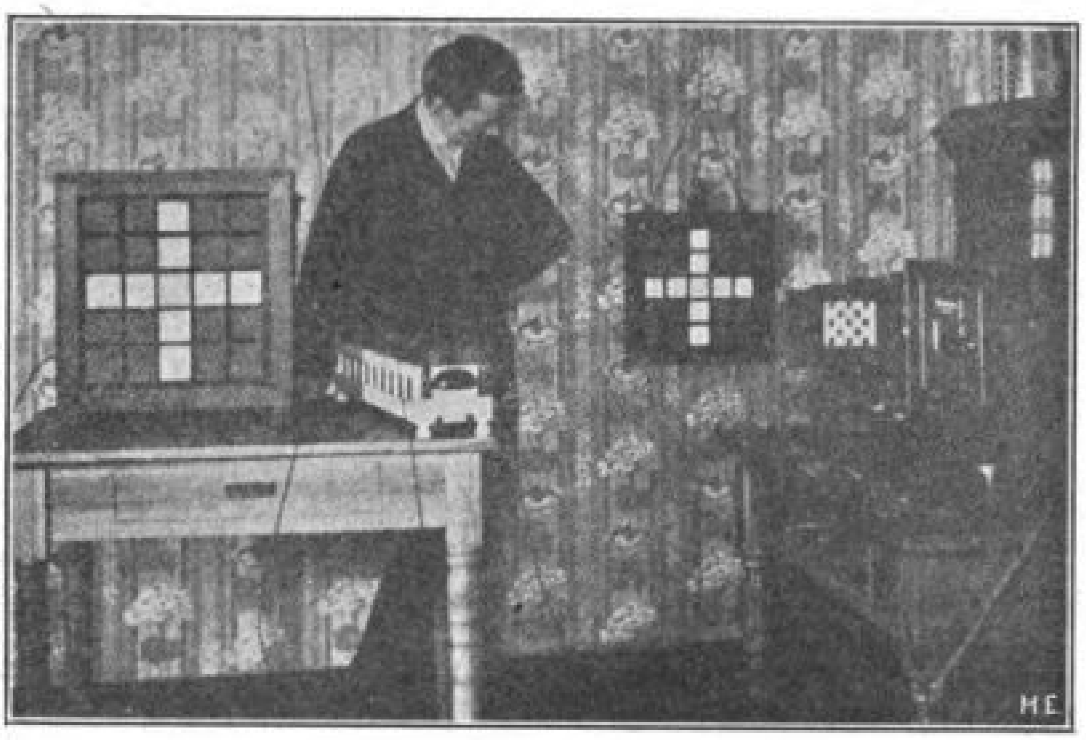


Fig. 2

Every now and then we see newspaper reports that Mr. So and So has discovered the real secret of television, only to be told again a few weeks afterwards that it has not been realized after all.

For 25 years almost, inventors all over the world have been working strenuously to solve the problem, but so far none succeeded, apparently because they all seem to work along wrong lines.

The principle of television may be briefly stated thus: A simple instrument should be invented which should reproduce objects placed in front of a similar instrument (called Telephot) at the other end of the line. In simple language, it should be possible to connect two mirrors electrically, so that one would show whatever object is placed before the other one and vice versa.

As in a mirror, the objects must be reproduced in motion (at the far-off station). The theory further requires that both instruments (one at each end) must be reversible, that is, each instrument must receive as well as transmit.

A good parallel of this requirement is found in the ordinary Bell telephone receiver. As is known, the Bell receiver (without the use of a microphone transmitter) will receive as well as transmit, that is, one can talk in a receiver and also hear the other party, using one and the same instrument.

In the Telephot it should be possible to see the party at the other end while that party should see you, both through the medium of your Telephot.

Unlike the mirror, however, you should not be able to see your own picture in your own Telephot. In this the Telephot differs from the mirror analogy.

From this it will be seen immediately how difficult the problem becomes, as if you could see yourself in your own Telephot, as well as the picture of your friend, it is obvious that there would be a "mix-up" of personalities, the consequence being that you could not recognize your friend nor yourself, while your friend at the other end could of course not recognize you nor himself.

In the telephone the case is not so difficult, as it is absolutely necessary that one party talks while the other listens; if both talk and listen, none can understand, as the voices mix up.

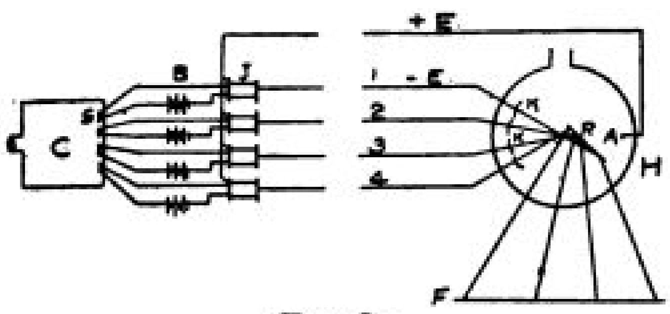
In the Telephot this parallel does not hold good, as there is nothing to restrain you from looking at your friend at the same time he is looking at you.

Of course the problem can be simplified by getting the true parallel of the telephone, thus: When you wish to see A you keep in the dark, while A stands in full light. If A wants to see you he turns off his light while you switch on yours.

However, this would be impracticable and is not the true solution of the Telephot.

So far most inventors seem to think that the problem can only be solved by means of the selenium cell, which being sensitive to light, can send out electrical impulses in the same ratio as the light falling upon the cell. Thus, if a strong light is thrown on a selenium cell a strong electric impulse is sent over the line which when operating a light relay (described below) can be made to throw a strong light upon a screen.

As a picture is made up of nothing but light and dark points it is easily to be seen that if several thousand very



M.E. -FIG 2-

small selenium cells were arranged in a plane and just as many light relays at the other end, a good picture could be projected upon a screen—in theory. The trouble is that it is practically impossible to make two selenium cells with equal sensitiveness and just this is the most important part, as if one is not as sensitive as the other, it will of course not transmit the same impulse as the former. It can be imagined easily what kind of a picture a station would transmit having several thousand selenium cells, all of a different sensitiveness!

Then the next trouble is that each cell at best requires one wire (the ground *might* be used as return). Think of two stations which, in order to work, require 3,000 to 5,000 separate wires! This seems to be as bad or worse than Sömmering's first telegraph (in 1809), which required 27 wires to operate. In Morse's subsequent telegraph only one wire is required, which unquestionably will be the case with the perfect Telephot.

Another great trouble with the selenium cell is that it works sluggishly, that is, its resistance will not drop instantaneously from the highest value to the lowest, which is a bad feature, as it would necessarily blur the picture at the other end. Furthermore, to work anywhere satisfactorily the selenium cell requires strong light.

The writer does not wish to throw cold water on selenium and selenium cells, as it is quite possible that the latter may be improved to such an extent as to do entirely away with the shortcomings mentioned above, although the greatest difficulty, the one that each cell requires at least one wire, is and will be the far greatest stumbling block.

Many different systems have been proposed in the past to solve the problem by means of selenium cells and although the list is quite long only a few will be mentioned in this article, as all systems are more or less on the same lines.

A. Knothe proposes to solve the problem as follows: C (Fig. 1), represents a camera into which the lines coming from the batteries enter. The space between each pair of wires is bridged by a selenium cell S. If now light enters the camera it falls on S (and all the other cells), and closes the current which operates the spark coils J. This furnishes a discharge as a single ray in the X-Ray pipe H at the receiving station E. This single ray is thrown as a single point on the fluorescent screen F.

It is understood that several hundred cells, spark coils and parabolic mirrors K are necessary to transmit a picture. The X-Ray tube would therefore necessarily be of monstrous dimensions. All the wires, 1, 2, 3, 4, up to several hundred, must of course, be well insulated, so that no sparking occurs between them.

All these requirements make the arrangement almost impossible and quite impracticable.

The latest "Telephot" has been designed by Mr. Ruhmer, the well-known Berlin expert. Last June Mr. Ruhmer demonstrated a working model, which although it did not transmit pictures, served well to demonstrate the usefulness of the selenium cell for certain purposes.

Fig. 2 shows the model clearly. The principle is as follows:

The transmitter has 25 squares, each containing a selenium cell. If any one of the 25 cells is exposed to light, it operates a sensitive relay, which sends an alternating current of a certain frequency over the line.

At the receiving end one resonating relay is stationed for each selenium cell at the sending station. The impulse sent from the selenium cell therefore operates only that relay having the right frequency.

Each relay operates an incandescent lamp which is placed in the same square at the receiver as the selenium cell at the transmitter.

If several cells are exposed to light at the transmitter, several alternating currents, but all of different frequencies are sent over the line. These currents do not mix, but operate only the relays for which they are intended.

These in turn operate the lamps in the various squares, assigned to them.

Mr. Ruhmer has perfected the selenium cell a good deal, and as his model worked very rapidly, it will be seen that the sluggishness of the cells has been overcome to a certain extent.

Simple geometric figures were transmitted quite successfully as can be seen in the photograph, where 9 squares at the transmitter were lighted and the same amount, in the same position were reproduced at the receiver. This is quite remarkable if it is remembered that only *one wire* is used between transmitter and receiver.

Mr. Ruhmer intends to build a transmitter containing 10,000 cells, to reproduce pictures at the Brussels international exposition in 1910. The cost will be over one and a quarter million dollars and the writer is of the opinion that it is almost impossible to operate such a model on account of the 10,000 different frequencies necessary to accomplish the result.

A simpler way could be brought about by the idea proposed by the writer some eight years ago.

Fig. 3 represents the well-known electrical harmonica, which for the sake of those not knowing the instrument, is described herewith:

A musical steel harp H is fastened to a permanent magnet NS. If any one of the steel harp-prongs is touched it will swing back and forward, at the same time sending an induced current through the windings of the electromagnet E. If we connect a similar instrument H through the line l, and ground LL' to H' it is evident that if we touch any of the steel prongs of one of the instruments, the same steel prong on the other will be made to swing. If we have 12 prongs on each instrument and we touch prongs No. 1, 6, 9, 12 of H', all at the same moment, prongs No. 1, 6, 9, 12 of H will be made to sound at the same time too, and so on.

Suppose we build such a harmonica having, say, 500 prongs P, Fig. 4, each responding readily at an extremely light touch.

Exactly over each of the 500 prongs we place a minute electromagnet E, 500 in all (only 6 shown in illustration), so when one of the small electromagnets is actioned by means of a weak alternating current flowing through same it will cause the prong underneath it to swing as long as current flows through the electromagnet.

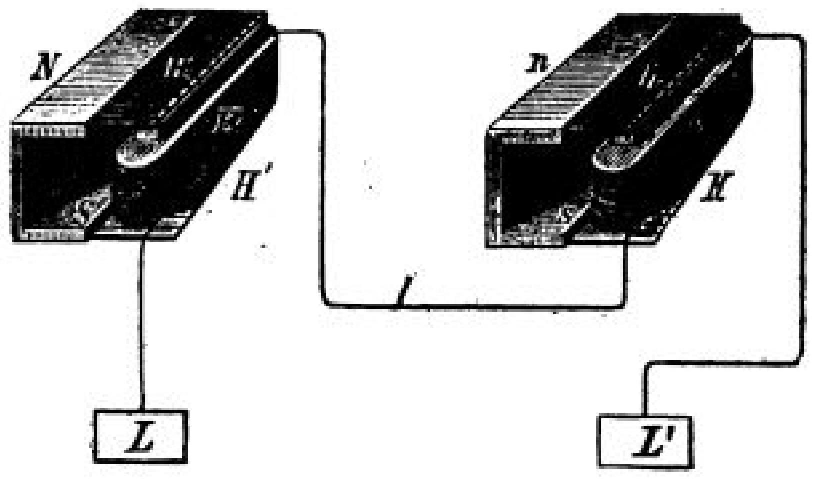


Fig. 3.

Now each of the small electromagnets is connected to a selenium cell of which 500 are placed in a plane.

It will be easily seen that if one or more of the selenium cells are acted upon by light, one or more of the small electromagnets is acted upon AND AS A PROPORTIONATE AMOUNT OF CURRENT IN PROPORTION TO THE INTENSITY OF LIGHT at the selenium cell flows through the small electromagnet, or electromagnets, it will cause the prong or prongs to vibrate IN THE SAME PROPORTION OF INTENSITY as the light falling on the selenium cell.

Thus if cell No. 1 is lighted with 10 C. P., assume that the small electromagnet connected to it causes its prong to swing through the distance of one millimeter. Then if cell No. 50 is only lighted with the intensity of 1 C. P., prong No. 50 will of course only swing 1-10 millimeter and so on. Thus each prong

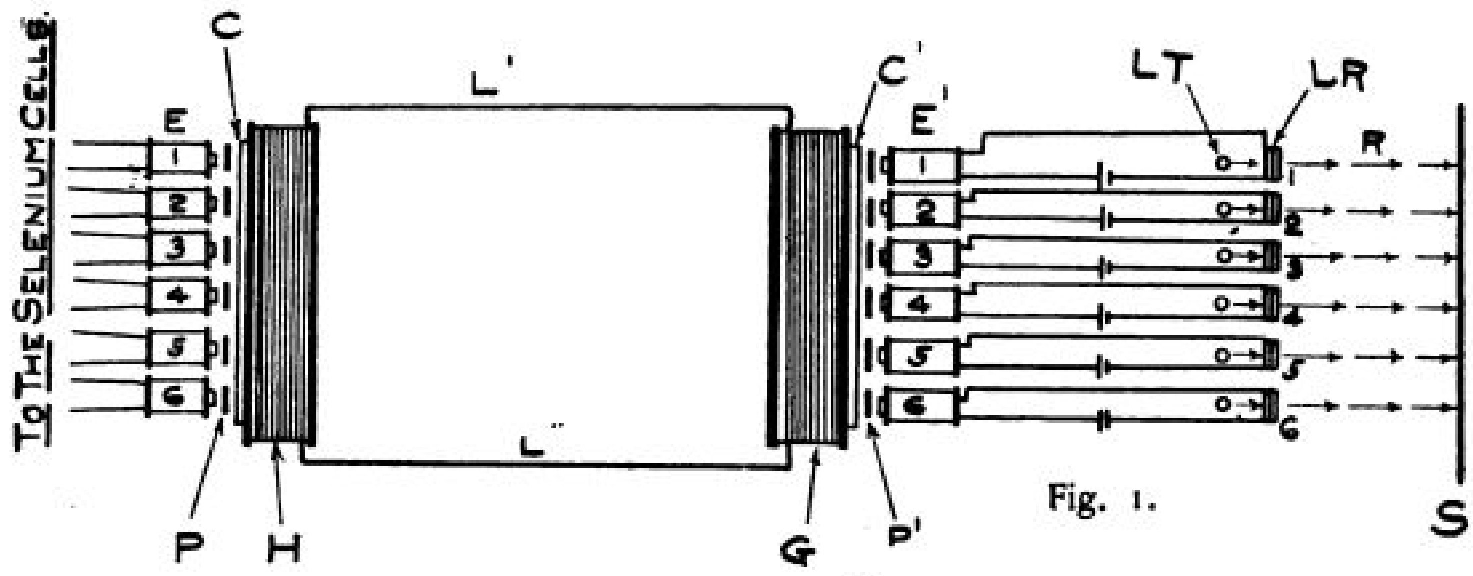


Fig. 1.

will be caused to swing in exactly the same proportion as the amount of light falling upon the selenium cell, to which it belongs.

As each prong swings it sends a current over the line L' L". If now No. 1 and No. 6 of the electromagnets are energised through the selenium cells both cause their prongs to swing and send impulses over the line. At the receiving station G, prongs 1 and 6 must swing IN THE SAME PROPORTIONATE

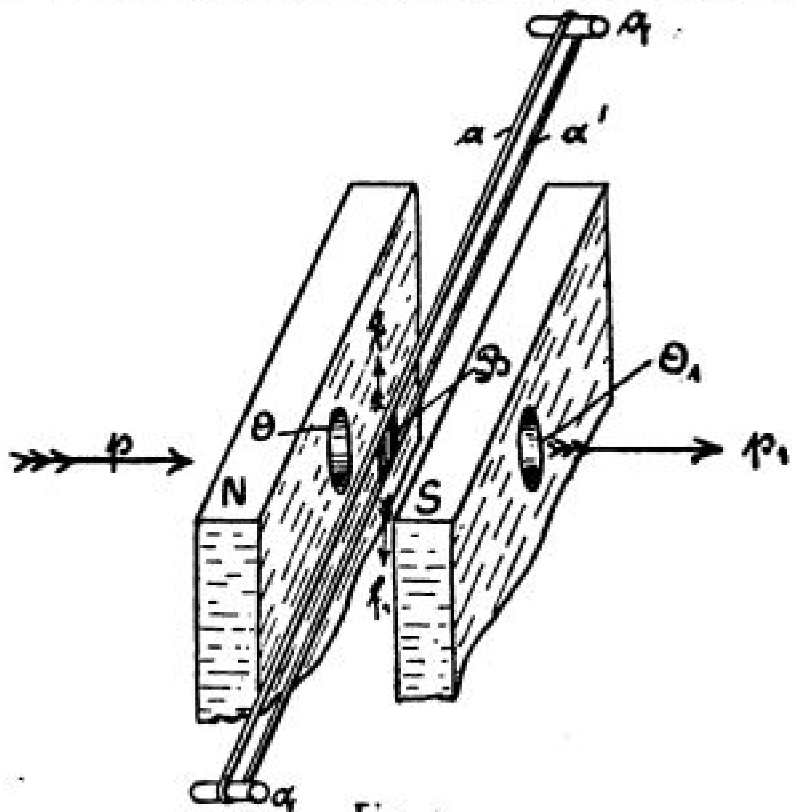


Fig. 5.

INTENSITY as the prongs at the sender H, consequently electromagnets E'1 and E'6 are energised (the prong acting as a telephone diaphragm, the electromagnets having for core a permanent magnet). E'1 and E'6 now operate the light relays LR1 and LR6.

Now, then, if the selenium cell connected to E1 is lighted with, say, 10 C.P., a proportionate amount of energy—call it 10 energies—are received at LR1. The light relay therefore passes 10 energies of the small tungsten lamp TL through its opening, and 10 energies are projected on the screen S. If the cell connected to E6 receives the light of 100 C. P. it is evident that LR6 receives 100 energies and the screen is lighted with 100 energies and so on.

Thus it will be seen that if we have enough selenium cells at H and enough light relays at G any picture in motion will be transmitted correctly and reproduced in its true phases on the screen S.

It is only a matter of building the apparatus and instruments with sufficient precision.

The light-relay used in some of the writer's experiments is described herewith:

A light-relay is an instrument which has the purpose to utilize very weak electric impulses to throw a beam of light on a screen, which in intensity is proportionate to the strength of the electric impulses. In other words, if the impulses are strong, a large amount of light is caused to fall on the screen; if the impulses are weak, a small amount of light falls on the screen, and so on.

Fig. 5 shows the instrument in the perspective. Between the poles of a strong electromagnet NS, two extremely fine metal wires A and A', are stretched. The wires may be stretched more or less by the regulating screws o and o'.

The two poles N and S, are each provided with a hole O and O', through which light rays are sent in the direction p, p'. On the two wires, A and A', a very light piece of aluminum foil B is attached in such a way that no light can pass from O to O1 normally.

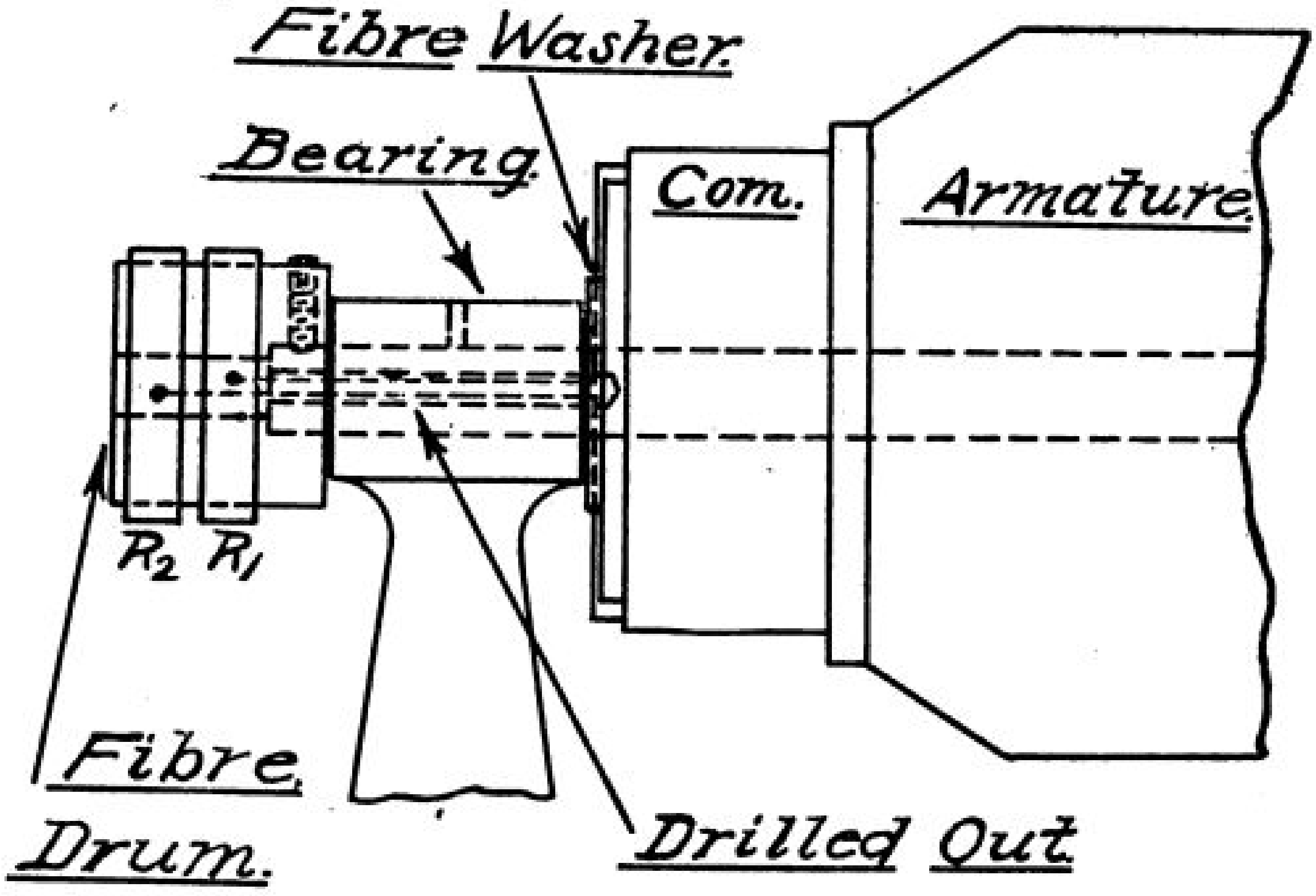
If, however, a weak current passes from a to a1, the aluminum foil is deviated in the direction f or f1, as the case may be. In order to obtain very exact motions of the foil the thin wires are best replaced by fine metal bands 0.01 millimeters thick, 0.25 millimeters wide and about 6 centimeters long. The resistance of each band is about 75 ohms.

As far as the writer knows his plan so far is the only feasible one which can

(Continued on Page 416)

How to Convert a D. C. Dynamo or Motor Into An A. C. One

By H. W. SECOR.



—Fig. 2—

In the present article the writer will endeavor to describe some points about alternating current which may be of use to wireless experimenters.

The source of supply generally is from a commercial 110 vt. 60-120 cycle circuit, but this is not available by every one, and as the A. C. transformer has so many good points to commend it for use in wireless telegraphy, a method will be described for obtaining A. C. from a motor or dynamo wound for D. C. Many experimenters own a fair sized D. C. dynamo, say ¼ to 2 H. P. which may be used to good advantage to supply A. C. when arranged as below.

It is advisable that the machine be wound for a voltage of anywhere from 80 to 220 volts. If not giving a D. C. voltage within the above limits, it should be rewound. To obtain a single phase A. C. from a two-pole or bipolar field D. C. machine, connect two brass slip rings, R, and R2 to two directly opposite points on the commutator, as shown in Fig. 1, where B and B2 are the D. C. brushes bearing on the commutator, and b and b2 are the A. C. brushes bearing on the two slip rings, which can be mounted and wired as shown in Fig. 2. The fibre drum carrying the two rings is clamped onto the end of the armature shaft, by means of the set screw shown. A hole is drilled through the centre of the shaft to bring the two wires out to the slip rings. The wires are brought down through the fibre washer through two small holes in the side of the shaft into the large centre hole.

The connections for a machine having four field poles and a drum wound armature are given in Fig. 3. By connecting another set of slip rings to the points marked x, and x2 in Fig. 1, two phase A. C. can be taken from the machine. If three slip rings connected at points 120° apart on the commutator are utilized, it is possible to obtain a three phase A. C. Supposing, now, that the machine has been fixed up to supply A. C. The frequency of any pole machine will be, cycles per second = R.P.M. × ½ No. field poles. For a bi-polar machine, running at, say, 3,600 R.P.M., or 60 R. P. second, the frequency will equal 60 × 1 = 60 cycles per second, or 120 alternations.

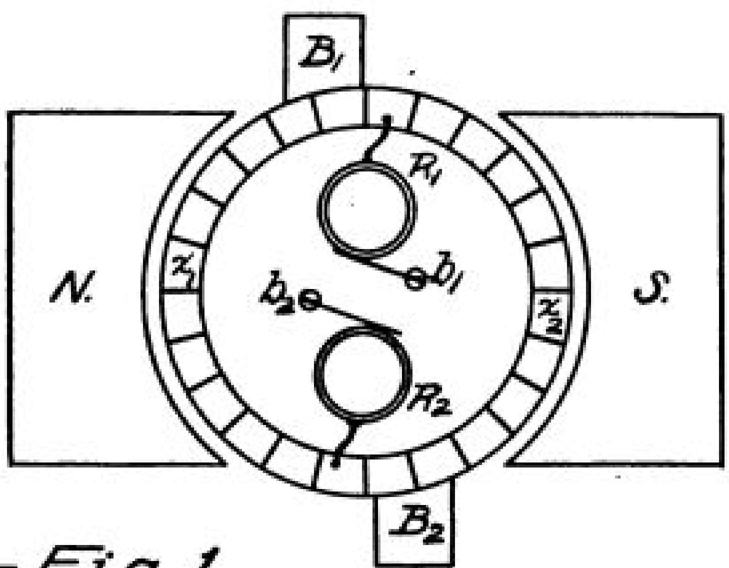
The machine may be driven by its pulley from an engine or water-wheel, in which case 85 per cent. of the D. C. power rating will be available in A. C.,

i. e., if the D. C. rating was 10 H. P., the machine would give 8.5 H. P. in single phase A. C. The voltage is 70 per cent. of the D. C. voltage rating. If the D. C. voltage is 110 volts, the A. C. volts will be 77 volts. Another method of operating the machine is to supply D. C. to commutator brushes, running it as a D. C. motor, when A. C. may be taken from the slip rings. In this case it is evident that the machine must have sufficient power to equal the motor power + the generated power, or else the machine will be overloaded and burn out.

The machine may be operated as a synchronous S. P. A. C. motor from an A. C. circuit and supply D. C. power from its commutator brushes.

The A. C. is generally fed to a high tension transformer, with a suitable key for breaking up the current into dots and dashes, interposed in the primary circuit. See diagram, Fig. 4.

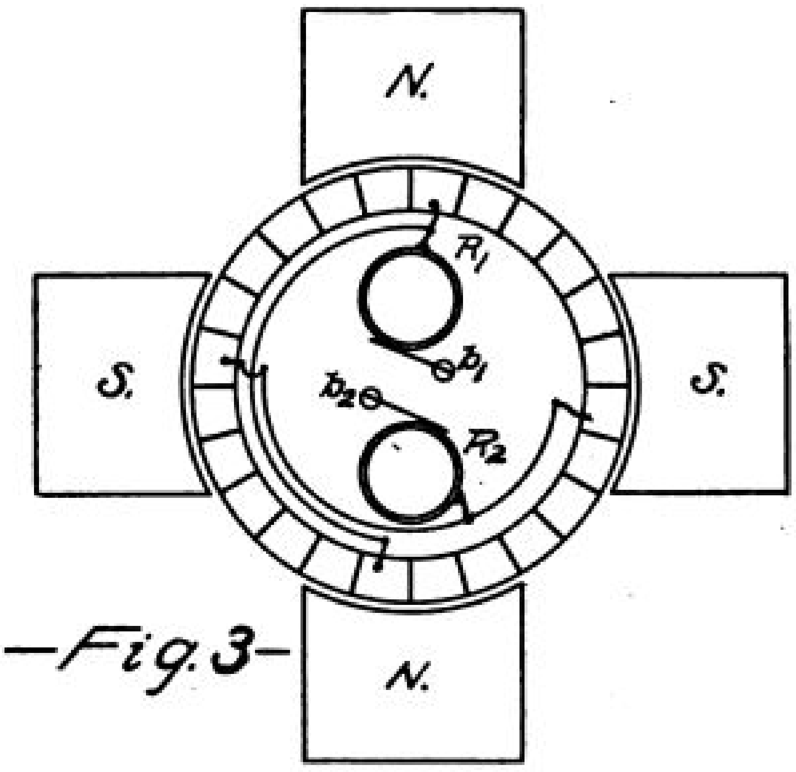
It is sometimes desired to run an ordinary induction coil on A. C. This may be connected up (with the vibrator cut out) to operate satisfactorily by putting an electrolytic interrupter in series with the primary circuit and the key.



—Fig. 1—

A word may be said here as to the measurement of A. C. Many stations have an A. C. voltmeter and ammeter connected up on their A. C. supply circuit to show how much power is being used. But, here is where many a mistake is made in multiplying the volts by the amperes, as read off the above named instruments, to find the watts used. It is most always the case that this is erroneous, due to the E. M. F. and the current not being in phase, the current lagging behind, owing to inductive effects of the circuit. A compensated direct-reading wattmeter, if connected into circuit, will indicate the true or actual watts being used, while the volts resultant from the product of the volts by the amperes is what is known as the apparent watts, usually rated in kilovolt amperes, a kilovolt-ampere being 1,000 watts.

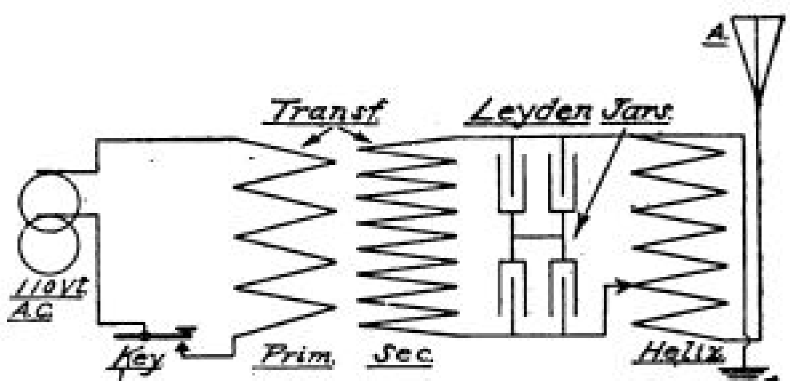
The true watts divided by the apparent watts gives a ratio called the



—Fig. 3—

power factor. From this it will be seen that, knowing the power factor and the apparent watts, the true watts can be found by multiplying the apparent watts by the power factor. Example:

An A. C. voltmeter and ammeter read respectively 110 volts and 20 amperes. The product of these is 2,200 watts, or 2.2 kilovolt-amperes. A watt-



—Fig. 4—

meter is connected into circuit simultaneously, and registers 1,800 watts or 1.8 K. W. The power factor is then

$$\text{P. F.} = \frac{1.8}{2.2} = 0.81.$$

Now, 2,200 watts, multiplied by .81 = 1,782 watts, the actual watts being used. This latter does not quite balance, owing to the decimal places not being carried far enough in the power factor.

Airships and Wireless Telegraphy

By Our Berlin Correspondent.

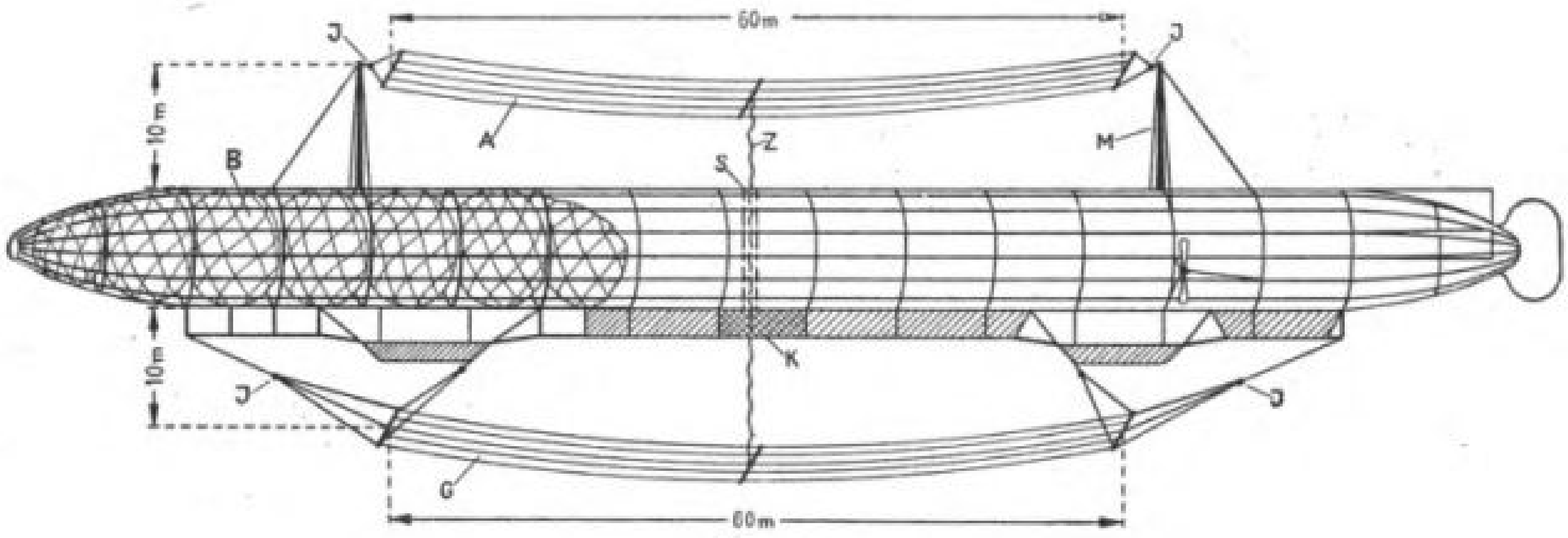


Fig. 1.

How serious the German people consider their present gas-carrying airships and how much they believe in the future of the Zeppelin airship type, is shown in a long article appearing in one of the German periodicals.*

Although Americans have little or no faith in the Zeppelin and kindred airships, and firmly believe in the heavier-than-air machines, it is interesting to note how strenuously the Germans are trying to gain supremacy of the air by their present gas-carrying types, and they are already equipping their airships with wireless telegraphy in order to use them more efficiently in warfare.

Wireless telegraphy in airships is not a new idea. In fact, it was suggested already when Marconi telegraphed across the Channel, but aeronauts have been backward up to a few months ago, to install wireless apparatus in their cars, on account of the danger. It is not a very pleasant sensation to have a few thousand cubic feet of inflammable gas above one's head and work a key (which sparks), and look at the fiery spark gap which itself would immediately inflame the gas which leaves the balloon almost constantly.

Therefore most experiments with wireless telegraphy in airships were until recently confined to receive messages only.

It is not the danger of the direct spark of the spark gap that is so threatening, but the danger of stray sparks leaping from the metal skeleton to the gas bags as in the Zeppelin type shown in Fig. 1, that is to be feared mostly.

*E. T. Z.

Mr. K. Solff, who suggests the various types of airship antennae in this articie, does not favor the one shown in Fig. 1, as although it is the ideal one to use on account of being almost perfect from the electrical standpoint, there is still danger from stray sparks. Referring to Fig. 1 MM represent collapsible masts; A, flat-top aerial; G, counterbalance aerial; JJ, insulators; K, operating room; S, open shaft; Z, lead-in from aerials; B, gas-carrying ballonets. It is suggested to have both aerials 60 meters long and 10 meters high.

In Fig. 2, a simpler aerial system is shown. The aerial proper is suspended from the kite D, and is from 200 to 400 meters long. G again is the counterbalance aerial, while HH are insulating cords holding the wire G.

From the electrical point of view, the system shown in Fig. 1 is, of course, better.

Fig. 3 shows an aerial system for directional waves. AA represents the antenna proper, while GG shows the counterbalance. TT will be the direction of the outgoing waves.

While the three different systems shown may prove satisfactory in some cases, Mr. Solff forgets two important points.

He does not tell us what is going to happen when the antennae shown in Figs. 1 and 2 collapse and fall on top of the airship *while the operator in K is sending*. The sparking that will immediately take place will surely explode escaping gas or worse yet, will ignite one or more of the ballonets with disastrous results.

While this does not hold true so much for the antennae shown in Fig. 3, which the writer considers the only real safe one, to a certain degree, it rests to be seen just what is going to happen when the lower aerials of Figs. 1, 2, and 3 touch the ground when landing. The

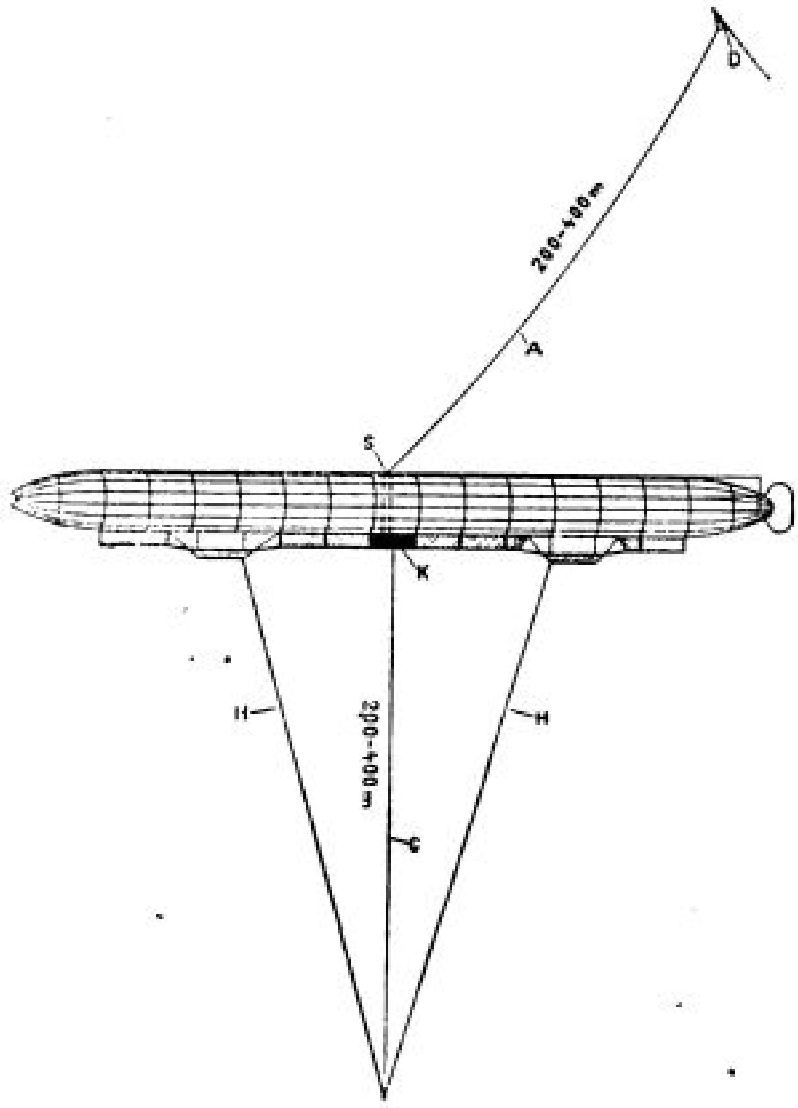


Fig. 2.

one shown in Fig. 1 will surely be damaged more or less. The ones shown in Figs. 2 and 3 are not quite as bad off, but might easily get entangled in treetops or objects on roofs when sailing low.

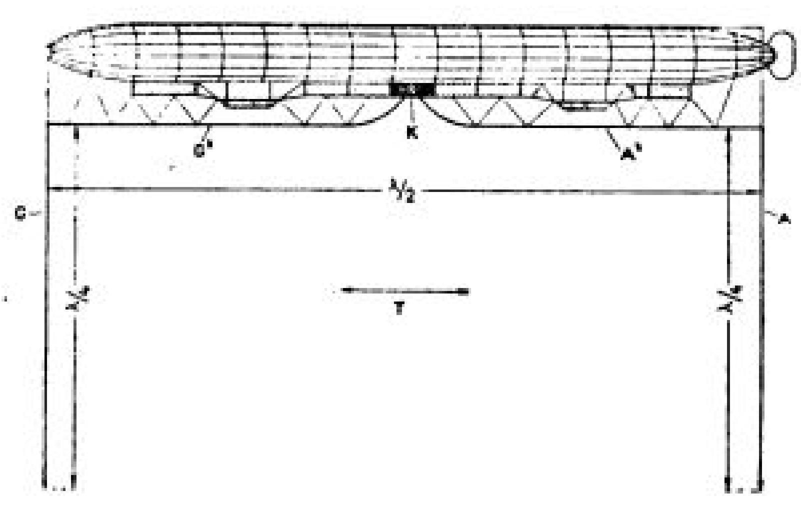


Fig. 3.

All in all, the writer is of the opinion that the aerial system illustrated in Fig. 3 is the most suitable for airships if by means of a motor driven drum the entire aerial can be rolled or hoisted up close to the body of the airship, within a few seconds.

This refers to G and A, as well as to G' and A'.

NEW MAVER'S WIRELESS.

The long expected new edition of Maver's "Wireless Telegraphy" is now ready for delivery. The new title of the book is "Maver's Wireless Telegraphy and Telephony—A Handbook of." The book is now divided into two parts, Part 1 being devoted to wireless telegraphy; Part 2 to wireless telephony. An amateur wireless department has been added to the book, in which the arrangement of circuits and the construction of apparatus for amateur stations is described at length and in plain language. A valuable table of wave lengths is also given, from which any one knowing the inductance capacity of an aerial may at once ascertain the wave length in meters; or, knowing the wave length in meters desired, the capacity and inductance necessary to obtain such a wave length may readily be found in this table.

Full descriptions are given of latest improvements in all the important commercial wireless telegraph and telephone systems, including the Marconi, Telefunken, Massie, Stone and Poulsen wireless telegraph systems, and the Telefunken, DeForest, Ruhmer, Poulsen, Fessenden and Marjorana wireless telephone systems. The Telefunken and Lepel singing arc systems, and the directive wireless systems of Braun, Stone, Artom, DeForest, Marconi and Bellini-Tosi are also treated of in this edition. Many practical suggestions for the operation of wireless systems are also to be found herein. The clearness and completeness of the diagrams are a feature of the book. Nothing of importance contained in the first editions of this work have been omitted from the present edition, but an idea of the new matter contained in the new edition will be obtained when it is considered that 150 pages of new matter and 135 new diagrams have been added, making a total of 366 pages and 258 illustrations. In fact, as previously intended, this volume now constitutes three books in one, namely, Wireless Telegraphy, Wireless Telephony, and Amateur Wireless Telegraphy. The book is bound in cloth, and will make a valuable Christmas gift to friends. Price, $3.00.

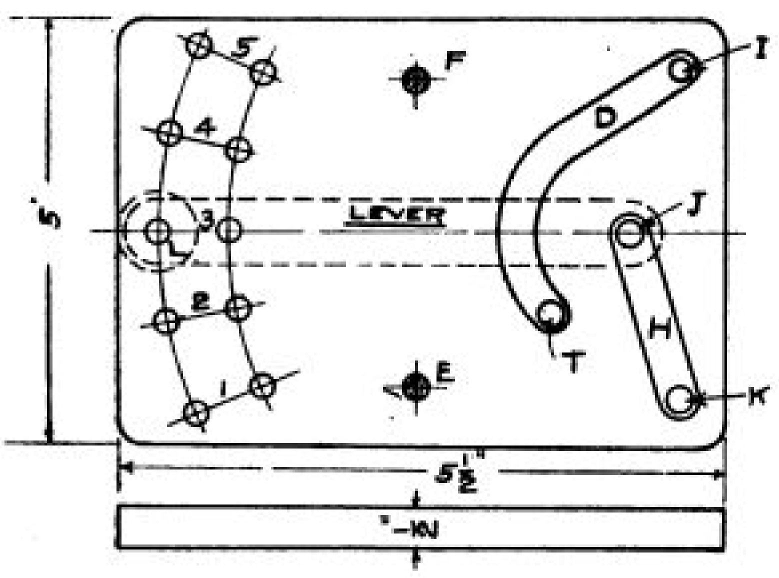
Bi-Polar Selective Switch

By Walter E. Keever.

Many experimenters in wireless, wishing to test and compare the efficiency of different types of detectors, find it decidedly inconvenient to disconnect their wiring and attach to each instrument as used. A single-pole selective switch is unsatisfactory because it leaves all of the detectors connected on one side, thus disturbing the balance of the circuit. To obviate this difficulty the writer has designed and constructed the bi-polar selective switch herein described, and finds it works very well.

Diagram shows a five-point switch, but more points may be added by simply using a larger base. For a five-point switch, cut a piece of oak 5 by 5 1/2 inches and about a half-inch thick. Smooth well, stain and shellac.

Fig. 1 shows the "ground plan." Dotted lines represent switch lever (de-

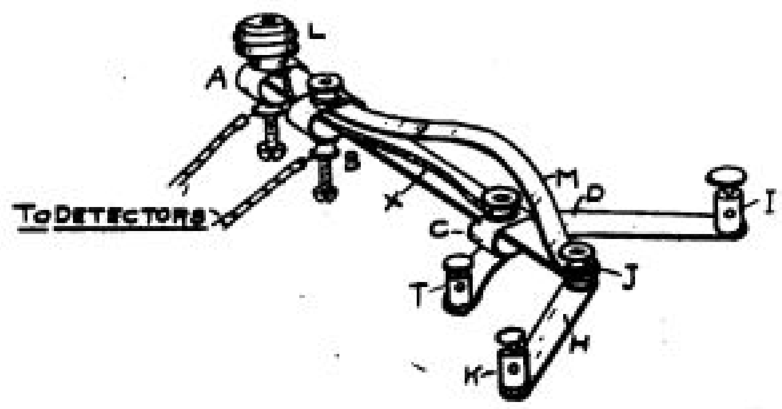


-FIG. 1-

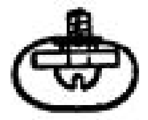
M.E.

tailed in Fig 2), pivoted at J; handle at L. The conducting strips D and H, of thin sheet bronze or copper, are fastened down at one end by binding posts I and K. Curved strip D is fastened at inner end by an ordinary brass-headed upholstering tack, T. The straight strip H is fastened down, as shown in Fig. 2, by jamb-nut (under the lever) on pivot J, making good electrical contact.

In Fig. 1, the five pairs of switch points are shown—1, 2, 3, 4, 5—made of binding posts from "dead" dry batteries. All jamb-nuts shown are secured from the same source. The outer line of points should be one inch from inner line. Use a compass in laying off arcs. In boring holes be careful that each pair lines up exactly with the pivot (J) of switch lever. Shove the binding posts up through holes and clamp firmly with flat nuts on top of base. Now screw on



M.E.



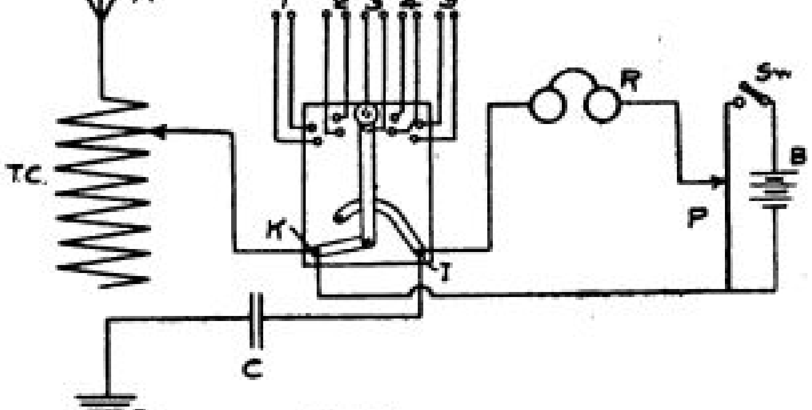
-FIG. 3-

-FIG. 2-

the knurled jamb-nuts, first polishing both faces of each, as they serve also for contacts.

A, B and C, Fig. 2, are strips of thin sheet bronze or copper, one-half inch wide and 2 1/2 inches long, bent into an oval, with ends perforated and hooked over binding-post screws that run up through wooden switch lever. They should have sufficient spring to retain their oval shape and yet yield slightly to the pressure of lever, thus making up for any inequalities in height of switch points. B and C are fastened by jamb-nuts and A by knob L—a wooden teakettle knob, with bottom part sawed off and a jamb-nut sunk in top.

The bow spring shown in Fig. 2 is made of stiff, flat spring brass, 1/2 inch wide, with ends slotted to slip under jamb-nuts at B and J. This spring



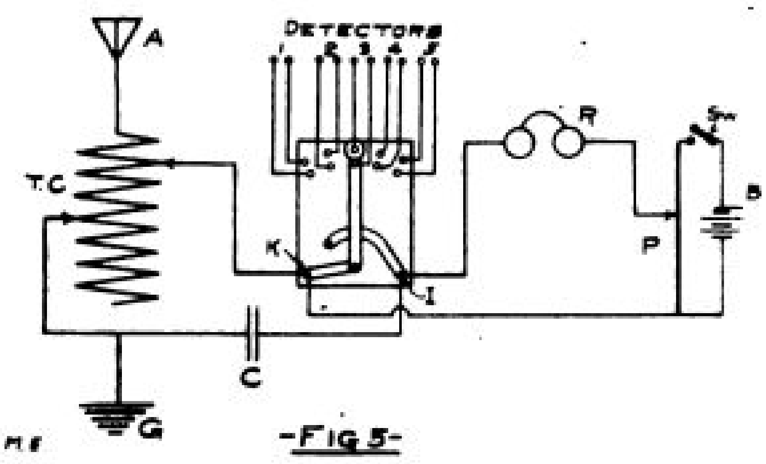
-FIG 4-

M E

serves also as an electrical connection between B and K (through H and J). M is a strip of copper running around end of lever to insure good connection between J and H.

The switch lever itself is made of hard wood and is 3/4 inch wide, 3/16 inch thick and 5 inches long.

Wire X connects contacts A and C (thence through strip D to binding post

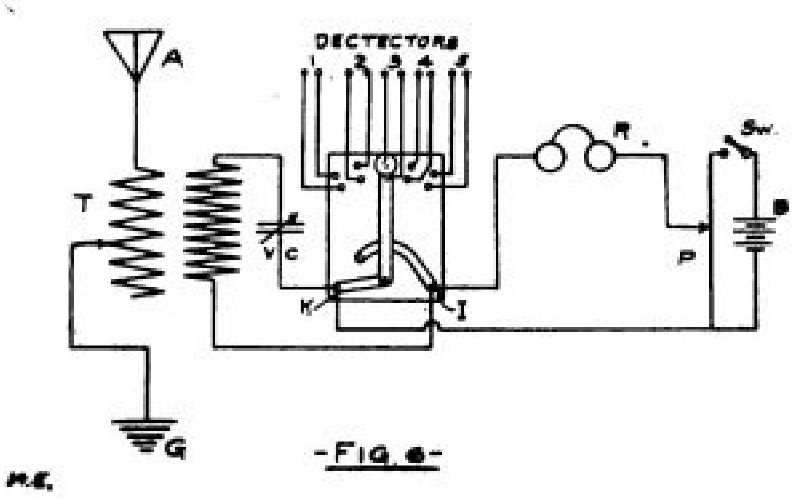


I). For sake of symmetry the writer used two wires, running one on each side of jamb-nut. One end of X is soldered to a copper washer which goes on top of A and is clamped down by L. Other end is soldered to slotted copper strip which slips under jamb-nut on C.

E and F, Fig. I, are small wooden posts one inch long, fastened with screws up through base. They merely serve as buffers, and are not absolutely necessary.

The completed bi-polar switch should be mounted on short wooden legs to raise it about 1/4 inch from table.

In wiring up, consider the switch as a detector and wire to posts I and K accordingly. If you intend to use battery with any of your detectors, I and K should be double binding posts, to accommodate two wires.



From each detector run two wires to its pair of points on the switch. All these wires should be of same size and length, and well insulated.

Using single slide tuner, connect instruments as shown in Fig. 4, for double slide tuner as shown in Fig. 5, and for receiving transformer as shown in Fig. 6.

HEROES OF WIRELESS TELEGRAPHY.

Wireless telegraph operators on steamships appear to be the heroes of marine disasters nowadays, circumstances having compelled them to take the place formerly held by the gallant sailors and officers who stood at their posts in the hour of danger and refused to leave until passengers were rescued. "Jack" Binns, who figured so nobly and efficiently yet modestly in the Republic accident last January, and who by staying at the key and sending out the distress call of "C. Q. D." speedily brought help when it was sorely needed, was a type. Of similar mettle was George C. Eccles, wireless operator on the steamer Ohio, which was wrecked on the Pacific coast. Eccles made the trip unexpectedly. He had resigned and was about to accept another position, but yielding to importunities of the company, which was short of men, he consented to fill the position temporarily. He remained in the wireless station until the ship made the plunge to the bottom, and then leaped out, but too late. He had saved others, but he continued in that work of self sacrifice until it was impossible to find safety.

In quiet talks with these heroes of the "wireless" one gets a glimpse of their attitude toward their employment, their employers and the public they serve. To be sure, the fundamental principle is that it is "all in the day's work." Much as is the case with the trained professional soldier, they have well-defined duties to discharge and they accept the situation in the spirit in which the disciplined soldier or sailor carries out orders. Yet there is a wide difference, for it is the fundamental duty of the "wireless" operator to help and save and not to destroy. Perhaps the ethics of the matter cannot be summed up more effectively than in the simple, straightforward statement of "Jack" Binns himself, who, when asked if Eccles could have got out, replied instantly: "Get out? Why, it wasn't his business to get out. He couldn't get out till everybody else was saved. He was there to stick until his messages brought help for the passengers. That's the wireless game—to stick."

Binns steadfastly refused to be lionized when his exploit on the Republic brought fame and applause, and then and since has behaved in most manly fashion.

(Continued on Page 431)

Secondary Coil Impregnation

By C. C. Whittaker.

The efficiency of a home-made induction coil, in nine cases out of ten, falls much below the estimated efficiency before construction. This is due to a variety of causes which the amateur instrument maker finds it difficult to overcome. Such difficulties as not being able to "lay" the adjacent coils of the secondary close enough together and of not being able to sufficiently insulate these are common annoyances which seem to be inevitable.

The practice of winding a secondary by first letting the cotton or silk covered wire run through molten paraffine certainly does insulate the wire, but it is practiced at great expense of space. A secondary wound with no paraffine and immersed in paraffine oil or linseed oil will behave well providing all the air can be expelled from the coils. The expulsion can best be accomplished by the aid of an air pump.

In the following paragraphs I shall endeavor to explain a method which is very satisfactory and easy to operate.

Looking at the illustration, the tank which contains the paraffine or oil should be one-half again as long as the assembled secondary. This will allow the whole secondary to be suspended by the rod, R, above the paraffine or oil while the air is being exhausted.

The tank itself should be made of material sufficiently heavy to withstand the atmospheric pressure to which it will be subjected. The bottom edges should be soldered to render the tank air-tight. The top edge is filed smooth so as to fit the plane surface of the top cover. This cover has the suspension rod running through its center and held in place by a set screw. Near one edge is soldered a small metal tube to serve as a connection for exhaustion.

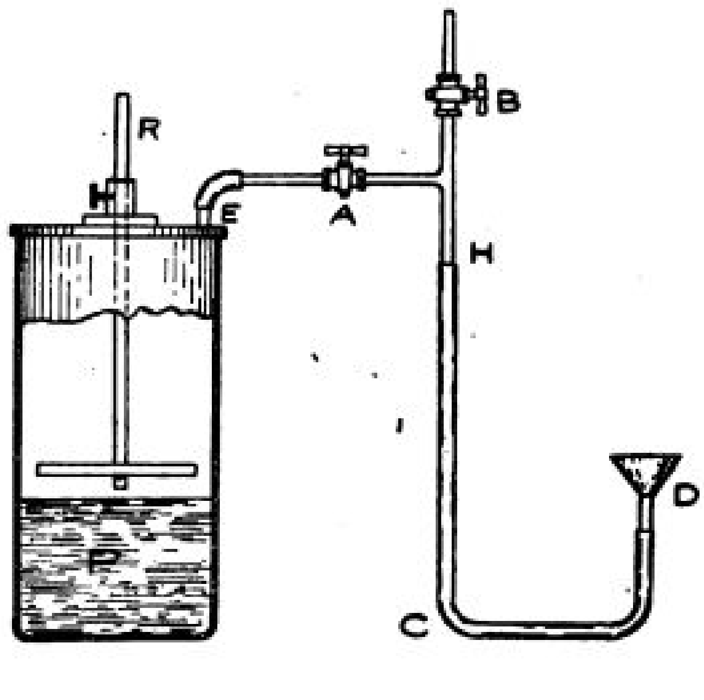
This top is held in place by the atmospheric pressure from the outside. A soft rubber washer smeared with vaseline will effectually stop any air from entering while exhaustion is taking place. The suspension rod should also have a slight coating of vaseline.

The exhaustion can be carried on by any form of air pump. In case the experimenter has no pump at his command, the following description will be of interest to him:

A very efficient air pump can be made by the following directions with the aid of the illustration.

The T-shape tube containing the stop cocks A and B can be made either of glass or metal. It is connected to E by a piece of heavy rubber tubing. Another piece of tubing of the same diameter and about four feet in length extends from H to D. The end at D terminates in a funnel.

The operation of the pump is as simple as the construction. The tube H C D is filled with mercury. A is closed and B is open. The funnel is now



raised until the level of the mercury rises to the stop cock B, when it is closed. D is now lowered somewhat more than thirty inches below B. A nearly perfect vacuum now forms between the top surface of the mercury and B. If A is now opened and quickly closed, the air in the tank will expand and fill the vacuum. D is now raised to the level of B and B is opened to allow the imprisoned air to escape. When the level of the mercury again reaches B, the valve is closed and the process is repeated.

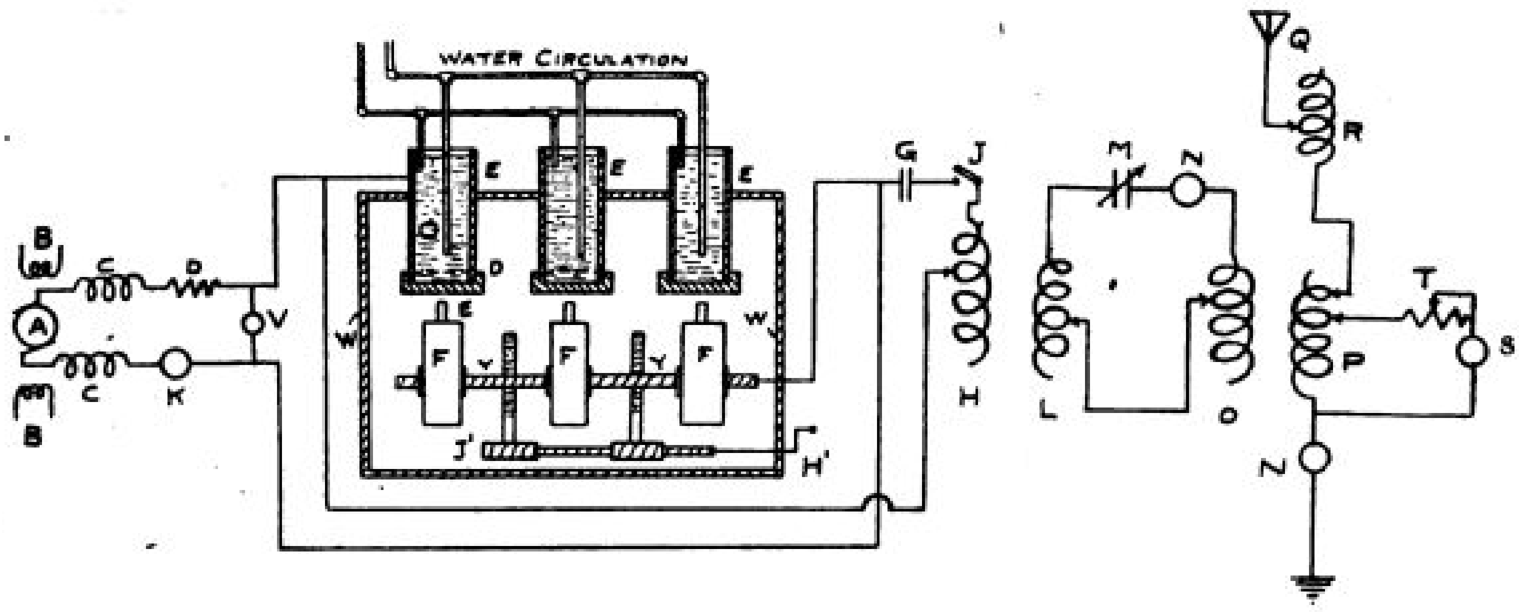
When the exhaustion has been carried on to a sufficient degree, the paraffine may be melted and the coil lowered into it by the rod R. After doing this it may be well to start the pump again on account of the gases given off by the hot paraffine.

After being thoroughly saturated, the coil may be lifted from the liquid and allowed to cool.

The Colin & Jeance Radiophone

By A. C. Marlowe.

Paris Correspondent Modern Electrics



Our readers will remember the remarkable results in radiophone work which were obtained by Lieutenants Colin and Jeance, of the French Navy. The trials were carried out on the Mediterranean, using a shore post at Toulon, while the second post was mounted on the war vessel Conde. In this way they were able to cover the distance of 120 miles. While it was known that their apparatus was based on the use of arcs in series, combined with Tesla coils, a full description could not be obtained, owing to the fact that the inventors were connected with the government service, and for this reason it was desired to keep the invention a secret. Owing to the fact that the French patent law has just been issued, we are now able to give the following description of the apparatus:

Current is supplied from a generator, A, which has a variable field circuit, B, so as to change the voltage in the proper way, using the two choke coils, CC and the rheostat D, with the voltmeter V and ammeter K. The apparatus for the arcs is enclosed in the box W, which is designed to contain either a gas or a liquid. The positive electrodes for the arcs are formed of the cylindrical reservoirs C, which are of copper and have a large diameter. They are cooled by a water circulation on the gravity principle, using the piping which is seen at the top. At the bottom of the electrode is the flat-surfaced cap D which is used for the arc. The lower electrode is formed of a thin carbon rod, E, which is from 1 to 3 millimeters diameter, and it is mounted on the top of a radiating cylinder, F, of large size, which is provided with cooling wings. A large carbon can also be used here. A plate, Y, carries all three electrodes, which have a sliding fit, and the whole set of electrodes can be moved up and down by using the screw and worm-gear set, I', with the outside handle, H', so as to give the adjustment of the arcing distance. An automatic regulating device can also be used for the purpose. When the arcs are formed in free air the carbons E can be of larger diameter. A glass-covered eye-hole allows of looking at the arcs from the outside.

The first part of the circuit is made up of the arcs in series, also a variable condenser, G, a variable inductance coil, H, using the voltmeter V at the terminals of the arcs. The switch, J, breaks this first circuit. For the second circuit there is used the variable inductance coil L, which forms the secondary of a Tesla transformer, whose primary is the coil H of the first circuit. We have also the variable condenser, M, the ammeter N and the variable inductance coil, O, which forms the primary of a second Tesla transformer, with the variable self inductance P, this being the secondary of the transformer. It has one side grounded through the ammeter N'. A properly chosen point on the coil P is connected to the aerial Q through the entrance coil R, which is adjustable.

The microphone S is in a circuit, having one of its ends grounded and the other comes off from an adjusted point on the Tesla transformer. In it is the variable resistance T and an ammeter.

(Continued on Page 481)

Detectors

By George F. Worts.

The wireless wave detector, indispensable to any wireless station, is, as is usually understood, the most delicate piece of apparatus in the whole outfit. Accordingly, it should receive careful attention. Detectors should be kept out of the sun and in a dry position. Their component parts should be kept in a perfect condition and covered up when not in use.

There has been a great deal of discussion lately concerning the relative sensitiveness of various detectors. Electrolytic, silicon, carborundum and perikon is the order in which they rank as to merit, according to the views of most experimenters.

The electrolytic detector, perhaps the most well known, exists in many forms, the simplest of which consists of a fine silver plated platinum wire, the point of which is immersed in an acid solution contained in a metal or carbon cup or a glass cup, with electrodes. Foreign nations use the electrolytic type of detector in many complicated forms. For delicate work a potential regulator capable of very fine adjustment is necessary. This is found in the potentiometer. For general use the electrolytic detector cannot be excelled except in vicinities where there is a great deal of local high power interference, in which case the platinum wire is eaten away rapidly and substitution of a different type of detector is necessary, such, for instance, as the thermoelectric.

The silicon detector is the most popular of all thermo electric detectors and unsurpassable for work with local high power interference. It should be used with the crystal fastened on lead and using a steel hair wire or a needle on a spring for the contact. Other thermo electric detectors are equipped with substances similar in function to the silicon, as molybendite, iron pyrite, etc. It is best to use a detector stand on which any crystal can be used.

The carborundum detector is one of the most popular of the crystal typ . A battery and potentiometer are necessary for its successful operation. The carborundum detector is as easy to work with as any other of the crystal detectors being used, and possesses the very desirable characteristic of remaining in almost permanent adjustment. Green crystals, as has been stated in a previous issue of this publication, are more sensitive than the blue crystals. The ground side of the crystal should be coated with tin or gold foil.

The perikon detector, composed of copper and zincite pyrites, has not come into general use as yet by amateurs. It is of the thermo electric type and has a very promising future. Records have been made along the Atlantic coast, a New York station having heard Key West (Marconi) several times with the perikon detector.

A good way to find the most sensitive point of a detector is to connect up a key sounder and battery near the detector. The key should be pressed several times. A sharp click in the telephone receiver, when the key is raised, will be heard when the detector is at its most sensitive point. This is due to the electric impulse sent out from the coils of the sounder when the current is quickly withdrawn from them.

A high capacity variable condenser should be shunted across the detector. By means of this very faint messages may be intensified or cut out, as desired.

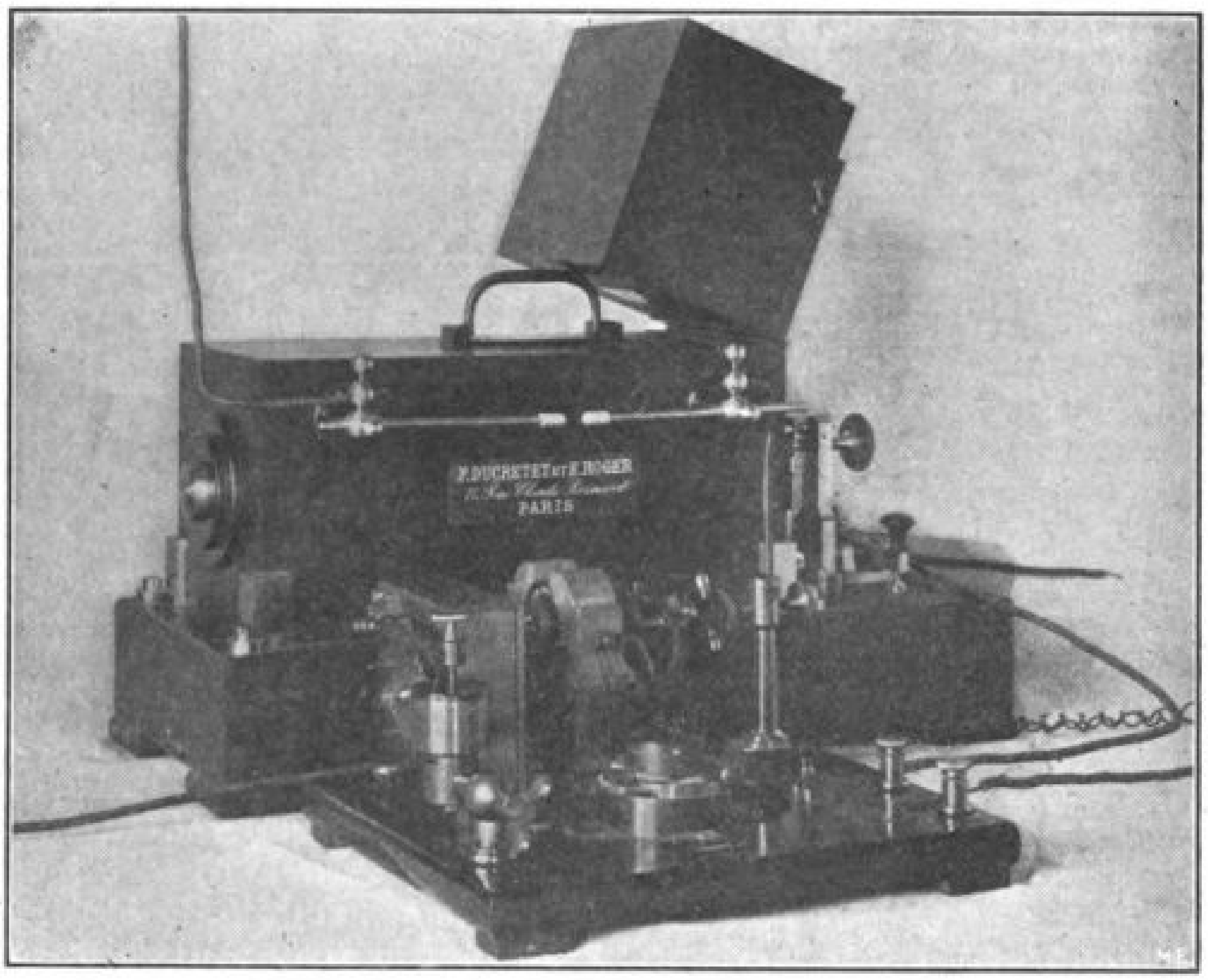
While transmitting a switch should be cut in across the detector to prevent it from any danger of burning out.

The writer would suggest to amateurs to not be contented with receiving only with a well known type of detector, but, instead, experiment with different substances, and, perchance, discover some wonderful new material that would place fame and fortune at the feet of its discoverer or originator.

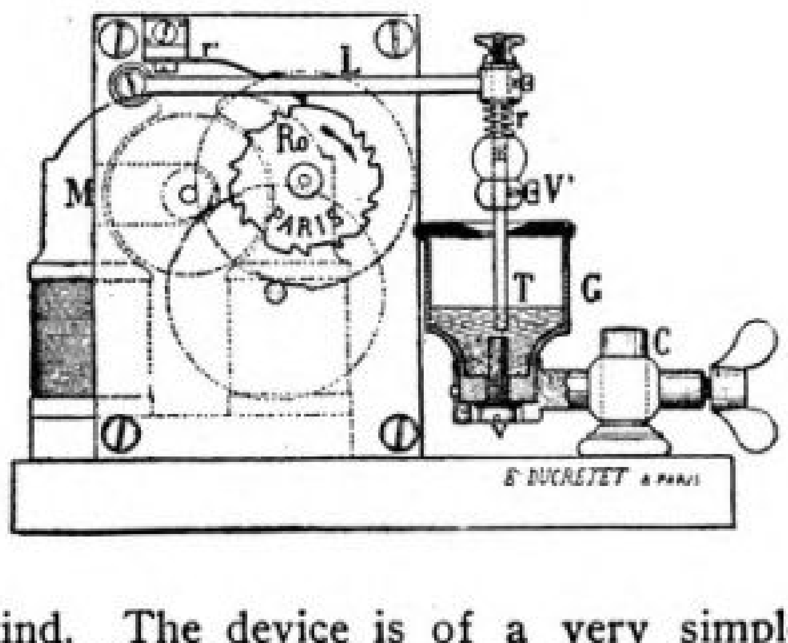
NEW BATTERY ELECTROLYTE.

Attention is called to Patent No. 940,734 on this month's patent page. This solution we believe when used in bichromate of potash-style cells will give good results.

Automatic Wireless Signaling



An automatic system of sending signals for wireless is brought out by the Ducretet firm of Paris. It is intended to be used for lighthouses and in similar posts where signals are to be sent to warn ships which come within range, or to give conventional signals of any kind. The device is of a very simple operation, as will be noticed by the accompanying views. Such an automatic sending key was desired by Engineer Blondel, and afterwards applied by Captain Moritz, a naval officer. The present apparatus is an improved one of this kind. It has a cam wheel R which is interchangeable, and each wheel has a series of teeth corresponding to the Morse signals for the name of the lighthouse or post, or any suitable signal. The cam wheel is operated by a set of gearing from a small electric motor, which is provided with an automatic speed governor. A condenser, or other suitable device, is used to cut down the sparking at the break, this latter being worked from the cam wheel by the lever L and rod T. We thus have the signals sent on the usual principle, but these are automatic, owing to the action of the cam device. The liquid used in G (to minimize the spark) is either alcohol or petroleum.



TELEVISION AND THE TELEPHOT.

(Continued from page 406.)

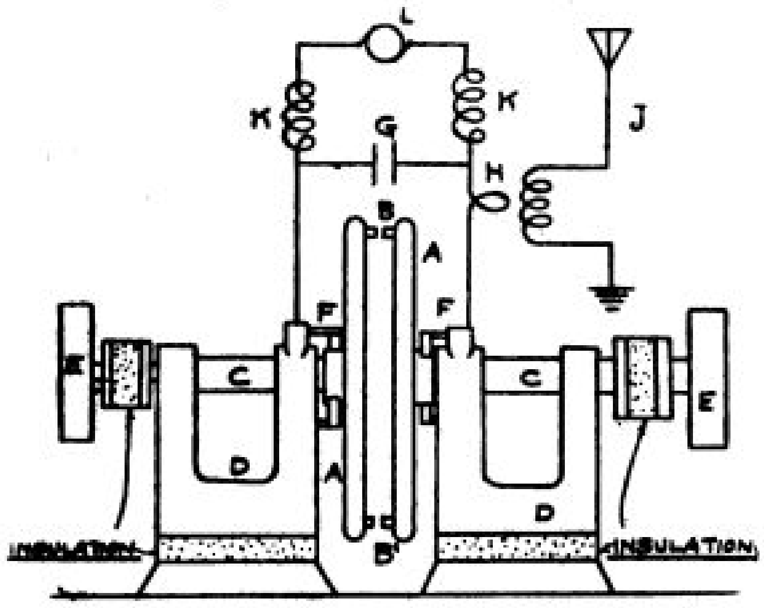
be used to transmit objects in motion over a single wire and at the same time receive a proportionate amount of energy at the receiving end to that received by the selenium cells at the transmitter.

No patents were taken out on this invention by the writer, as he considers the device too complicated for general use. He shall, however, consider himself happy if it will be the means to bring us nearer to the practical Telephot.

Paris Letter

NEW MARCONI SPARK GAP.

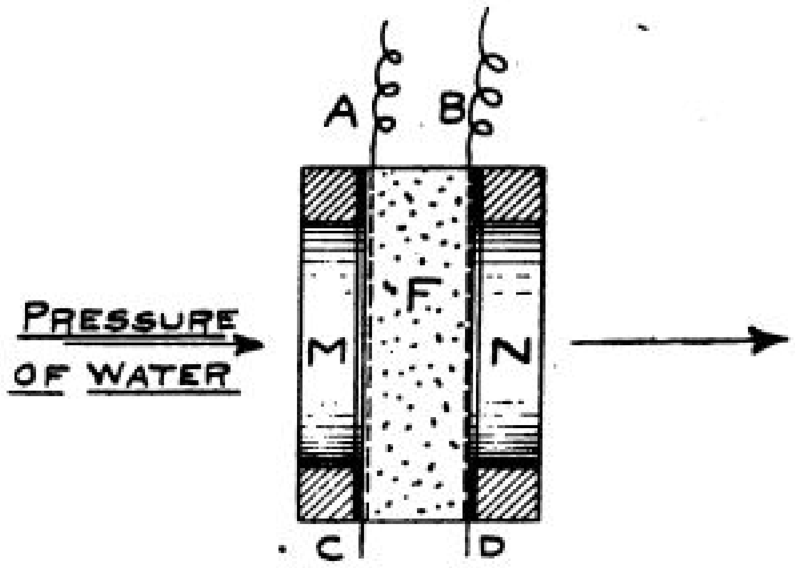
A new form of spark discharger is brought out by the Marconi Wireless Company. The discharge is produced in the small spaces between sets of projecting points, and these latter are carried on two rotating discs (Fig. 1) in such way that the points lie facing each other. The two discs A A' are given a very rapid rotation and in the contrary directions. On the discs are noticed the two sets of contact projections B B'. Each of the revolving discs is mounted on a shaft C, which is held in bearings and rotated by the insulated pulley E. The bearings D are insulated from the ground. Current comes to each of the discs by the sets of brushes F. These brushes are connected to the circuit which is seen above the apparatus. The condenser G is connected through the self inductance coils K to the generator L, and this circuit is joined to the aerial J by means of the coupling at H. The whole thus forms an oscillating circuit. It is found good practice to use discs of 20-inch diameter, each carrying two projecting teeth and each disc is rotated at 3,000 revolutions per minute. Copper is the best material for making the projections, as has been found by testing



-FIG. 1-

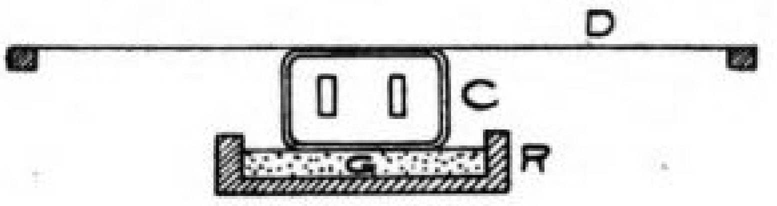
different metals. We give to the condenser G and choke-coils K values such that the oscillation period of the circuit is equal to the time elapsed between two consecutive discharges of the condenser, or else a multiple or sub-multiple of this value. By this device we can discharge the condenser twice as fast as with a single rotating disc. High power can be used in this case, and we can send sets of regular waves upon which a suitable receiver can be tuned, and a note is produced in the telephone which can easily be distinguished from the noises caused by atmospheric disturbances.

NEW MEANS TO GENERATE ELECTRICITY.



- FIG. 2 -

It is well known that an electrical effect is obtained when a liquid is forced through a porous diaphragm at a considerable pressure, but as this effect is a very slight one it could not be used as a source of current. B. Schwerin has found a method of greatly increasing the current which can be thus obtained, so as to adopt it for practical use. The main parts of his device are a porous filter F (Fig. 2), having on each side the wire gauge sheets A, B, the whole being pressed between the metal rings M N, using insulating rings C D. Current is taken off from the two wire gauge pieces. A liquid is forced through the filter at high pressure. The success of the method lies in various details found by his researches, especially in the use of suitable liquids, and also ammonia, which is found to give a good result. A very high pressure is needed for the liquid, and the pores of the filter must be as fine as possible. The filter is formed of a substance in the shape of very fine powder, such as carbon or quartz, and the liquid is best sent through the device in a closed circuit of piping. With a constant pressure of 5 atmospheres and a carbon filter of 3 inches' thickness and a surface of 32 square inches the internal resistance is 1,000 ohms with distilled water, but adding ammonia we reduce the resistance and also have twice the electromotive force and ten times the current, so that changing the liquid gives 20 times the energy. To show the effect of the pressure, in one case 10 atmospheres' pressure gave only 0.04 watt, while 80 atmospheres gave as high as 2.56 watts, (A), (32 volts and 0.8 ampere) showing that a considerable amount of power can be obtained by such a method. This does not depend upon the rate of flow of the liquid, but

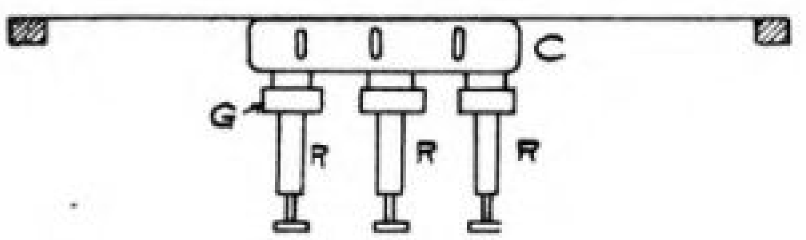


-FIG. 3-

upon the three factors—pressure, nature of liquid and diameter of the pores.

NEW TRANSFORMER.

In Fig. 3 will be seen the construction of the telephone transmitter which was employed by the Swedish inventors. Engner and Holström in their experiments between Stockholm and Paris. On this occasion they were able to work over a 2,500 mile line with very good resalts. Their object in the present transmitter is to transmit as much as possible of the pressure of the diaphragm to the carbon granules so as to secure the highest effect. This they carry out by the use of the diaphragm D, which



-FIG. 3, a-

carries in the central part where the effect is the greatest, a light steel box of cylindrical shape, C, so that the flat bottom of the box presses upon the surface of the carbon grains, G, contained in the holder, R. In this way we have the pressure upon a considerable surface of the carbon grains. Usually the steel box is made to press upon a certain number of holders which are mounted underneath at TT, and these latter are placed in separate adjustable supports for regulating the pressure, as shown in 3A.

A LETTER TO SANTA CLAUS.
WITH ALL EXCEPT VERY OLD-FASHIONED CHILDREN, THE WIRELESS HAS SUPERSEDED THE MAIL-BOX.

—*Puck*.

THE LAY OF THE WIRELESS MAN.

What are the wild waves saying?
'Tis this I fain would know.
My aerials hang a-swaying
So gently to and fro.

I'm higher than the treetops,
And longer than the yard.
What are the wild waves saying?
'Tis this I've on my card.

When sliding up my tuning coil
I do it very slow.
But what the waves are saying
I've not yet learned to know.

Condensers, coils and rheostats
All stand in bright array.
But none of these inventions
Will bid those wavelets stay.

With thousand-ohm receivers
I coax them, rain or shine,
To tell me all their secrets.
However, they decline.

I'll beat those wilful wavelets
By sending C. Q. D.
To my old friend, the editor,
Who'll boost me through "M. E."
WILLIAM J. COQUELIN.

The Construction of An Efficient Aerial

By GEO. F. WORTS.

For the benefit of the casual wireless amateur, who contemplates setting up a station, the writer will endeavor to explain methods for successful aerial construction and erection. Without any egotistical presumptions on his part, the writer will mention foremost that he can speak from actual experience in matters that pertain to aerials, having constructed and erected about twelve aerials for various amateurs.

To say the least, aerial erection under ordinary amateurs' conditions is very trying. Fortunately, however, property owners, or those whose permission it is desired to obtain for the trespassing of aerials on neighboring property, are usually generous minded enough to appreciate the benefits derived from a wireless laboratory, and permission is usually forthcoming. The trouble arises, however, when the physical obversities are contemplated. A good aerial should possess these two physical properties—height and length. If either were necessary instead of both it would be an easy matter to construct an aerial.

In erecting an aerial of average length and height—about 60x60 feet—the first thing to consider is the location. There is usually just one *good* location about a prospective station, and with a little forethought the amateur can invariably find this.

The aerial proper—excluding supports, lead wires, etc.—should be hung directly above the wireless room. The leading in wire, or wires, should lead directly into the room and not twine artistically about the house, as is often the case. The aerial should be of the flat top, horizontal type, in preference to any other except the umbrella, which in almost all cases is too big a job, mechanically, to undertake. The slanting aerial is not as efficient as the parallel aerial.

In selecting the flat top, horizontal aerial two points some distance apart and at an elevation that is equal and clears intervening and surrounding objects should be considered. Trees naturally suggest themselves to the reader, but are to be considered only as a last resource. They absorb too much energy for practical use. Two poles on houses that are of medium height and some distance apart are the usual conditions for aerials, and are quite suitable for most requirements. Some amateurs have exceptionally good fortune. Those, for instance, that live in the vicinity of tall smokestacks, between which they can rig their antennae.

In erecting the aerial, where there is a clear space between the two supports, the aerial wires should be strung between the two spreaders upon the ground, or roof, as it may be. Tarred rope should be fastened to each spreader and the aerial hoisted by means of a pulley at the top of each pole. This instruction sounds simple, but took about five attempts at aerial erection before the points were arrived at.

When trees or other objects lay between the two supports, a strong cord should be thrown across the space for each wire. This is the simplest method and one that the writer has used more than any.

The question next arises concerning materials.

The wire in an aerial may be one of three kinds: Copper, phosphor bronze or aluminum. The copper or phosphor bronze should be soft-drawn stranded wire, as the stranded wire does not kink easily, withstands strain and has a much larger capacity for radiation than a single wire. However, if a single wire is used it should be no smaller than No. 14 B and S gauge. Iron wire should not be used, as its magnetic qualities antagonize and dampen the incoming oscillations, rendering it, therefore, practically useless for wireless purposes. Possibly the best all around aerial wire is aluminum, as it is light and very strong and an excellent conductor. It is best to use insulated wire of the same size as the aerial wires for the leads in.

For the aerial spreaders, bamboo rod is about the best procurable, being both light and strong. It can be purchased quite cheaply at almost any hardware store.

Pulleys should be of wood, or galvanized iron, preferably, and secured stoutly to the supports. The rope should

(Continued on Page 421.)

MODERN ELECTRICS

A Magazine devoted entirely to the Electrical Arts.
PUBLISHED MONTHLY BY
Modern Electrics Publication
NEW YORK CITY, N. Y.

H. GERNSBACK, 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 affiliated 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
84 West Broadway, New York, N. Y.

Chicago Office: 112 Dearborn Street
Paris Office: 136 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. II. DECEMBER 1909. No 9

EDITORIALS.

The Editor desires to open an experimental department for the use and benefit of experimenters and amateurs dabbling in electricity and wireless.

Almost every experimenter at one time or another has had occasion to construct some apparatus in a novel manner, or he simplified seemingly complicated instruments. New connections, diagrams, etc., are often worked out; sometimes a simple change brings forth unexpected results, etc.

All these things should be recorded and published for the benefit of other students, and the Editor believes that MODERN ELECTRICS is undoubtedly best suited for that purpose, as up to date over 23,000 copies are read by people interested in this work.

The Editor therefore invites all experimenters to send in the result of their experiences, which will be published hereafter in the experimental department.

As long as the idea is original it will be welcomed, and gladly published for the benefit of others.

Do not be backward in sending in your account; we do not need fancy drawings. A rough sketch will do almost every time, and can be worked out satisfactorily by our artists and draftsmen.

Not alone will others gain through your experience and experiments, but you yourself. If the idea is of sufficient value you can always point out that it was published first in Modern Electrics, which in a way may protect your rights for the future.

All contributions for the experimental department will be paid for at regular rates.

Remember, no idea is too small; if it has been published before we will of course let you know at once.

We prefer as many sketches or drawings as possible if the subject warrants it. If you can take photographs of the objects or articles, so much the better.

Address all such contributions to: "Experimental Department, care of Modern Electrics."

25 DOLLARS IN GOLD.

The "results" contest (see editorial. November issue) closes December 31. There is not much time to lose. Did you send your postals to our statistical department? If not, you still have a good chance.

So far, Illinois is in the lead, next California, then New York. Remember, twenty five dollars in gold for a few postal cards.

HARTFORD WIRELESS ASSOCIATION.

320 Wethersfield Ave., Hartford, Conn.

The Association was formed Oct. 21, and the following officers elected: W. J. Hickmott, Jr., President; D. N. Cole, Treasurer; H. E. Chapman, Secretary. At present the Association has only eight members, but more are expected as soon as the forming of the Association becomes known. The Association requests all amateurs interested in Wireless Telegraphy and living near Hartford to write to the secretary for membership blank.

Nearly all of the members are making the greater part of their apparatus, as in that way they become more familiar with the parts of the station. During the winter it is planned to have talks given by men prominent in electricity and men who have had professional experience with wireless telegraphy.

One curious experience I would like you to publish, as we never have seen or heard of it before. It was noticed by one of the members that once in a while there would be a regular series of dots in quick succession. One day this happened several times inside a few minutes and no answer could be thought of as the dots were faster and different than from a wireless station. At last an automobile stopped out in front of the house and the sound kept up a regular purr. The only explanation was the spark jumping across the gap in the cylinders of the automobile.

All members read MODERN ELECTRICS and are very pleased with it.

H. E. CHAPMAN,
Secretary.

S. S. KOREA MAKES GOOD.

The Pacific mail liner Korea has had a double set of wireless installed as an experiment. We are glad to hear she is still in communication when 14 days out from S. F. for Hongkong, by means of her 5 K. W. set.

The following message was received from Operator S. A. Phelps:

"2,623 miles beyond Honolulu. In touch with coast every night. All well."

At the time this message was sent the Korea was 4,700 miles out and could be understood clearly.

THE CONSTRUCTION OF AN EFFICIENT AERIAL.

(Continued from Page 419)

be manila, about one-half inch, and tarred, to prevent its rotting. Always keep your aerial pulled up tight.

For light transmitting—that is, up to 1-4 K. W., the insulation need not be of high capacity. Porcelain cleats may be used for strain insulators. Two at the ends of each wire are sufficient. For higher power than 1-4 K. W. the aerial may be insulated as described in a previous article by the writer. All metal supports for the aerial should be insulated to prevent leakage.

The size of the aerial may be left to the reader's judgment, but for all round work, efficient transmitting and long distance receiving under any conditions, a four-wire aerial 100 feet long, with wires three feet apart and suspended 60 to 75 feet above the instruments (distance not measured from the ground), using the loop method of connection, constitutes as efficient an aerial as most amateurs would wish to possess.

SAFE.

The boy stood on the burning deck,
He did not shake with fright.
For his ship had a "wireless"
And he got off all right.

—*Judge*.

The Measurement of Electric Waves

By M. A. Deviny.

There are probably no more important measurements made about a large wireless station than those of the length of the radiated and received waves. So much of the efficiency of the transmission of energy and the adjustment of the instruments depends upon an accurate knowledge of the wave length that it is highly important that we be able to measure it with precision. On account of the many variable factors in the di-

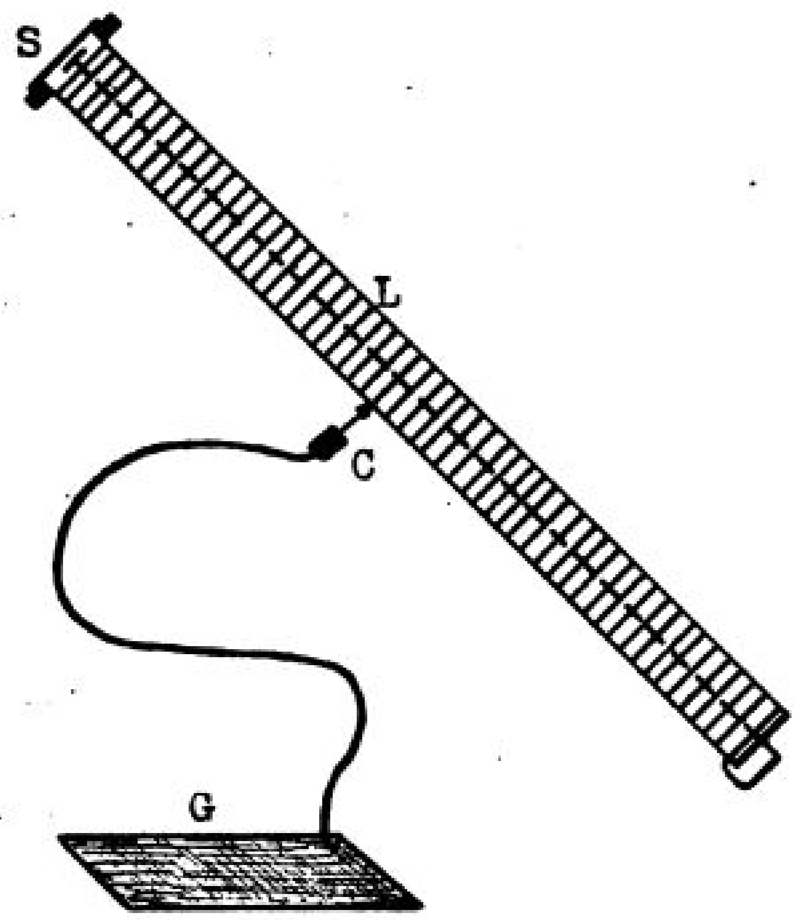


Fig. 1

mensions of the circuits and the class of instruments used in the different stations, it is hardly practicable to apply any definite rule which would be so general as to enable us to calculate the wave length with any degree of accuracy, and hence we must depend upon certain instruments which have been designed for the purpose. The principles underlying the operation of these instruments are rather complicated, but most of them depend upon the measurement of some factor of the aerial circuit bearing a direct relation to the length of wave.

The velocity of all forms of etheric wave motion is constant, as the elasticity and density of the ether in free space is constant. The length of the waves produced in this medium therefore depends upon the number of impulses imparted to it in a given time; the fundamental equation connecting wave-length, velocity of propagation and frequency having been found to be $W = V/N$. Since we know the velocity to be 186,000 miles per second, it can readily be seen that by measuring the frequency we can readily determine the length of wave that will be produced. Thus, if it were possible to produce electric waves with a frequency of one cycle per second, the length of the wave would be 186,000 miles and but one wave would leave the aerial per second. If the frequency were doubled, the wave length would be 93,000 miles and two waves would leave per second, while for a frequency of 186,000 per second, the aerial system would emit 186,000 waves each one mile long, and so on.

It follows from this that if we were able by some means to determine the frequency of oscillation in our transmitting aerial, we could accurately measure the length of the emitted waves. How, then, are we to do this? We cannot employ any of the means commonly used for similar measurements of low frequency currents and we must therefore resort to some entirely different method. There are two general methods available by which it may be done. The first is to cause the current to be measured to set up stationary waves upon a long helix of fine wires of known inductance, and to measure the distance between the nodes and loops of potential established upon it. From this we can easily calculate the frequency, or if the coil be provided with a suitably calibrated scale we may read the frequency directly.

The second method is to cause the circuit in which we desire to measure the frequency to induce a current in a second circuit having known values of capacity and inductance. By varying either or both of the latter factors, we can bring the circuit into resonance with the first. When this has been accomplished the oscillation constants of both circuits are the same and their frequencies are equal. From the known values we can calculate the frequency of the second circuit or read it on a scale as before.

Most of the wave measuring devices now in use depend upon the second method as it is the most reliable and accurate for general use.

Among the early wave meters on this plan are those of Dr. Slaby and known as "Slaby rods," a diagram of which is given in Fig. 1. This instrument consists of a long glass tube L which is

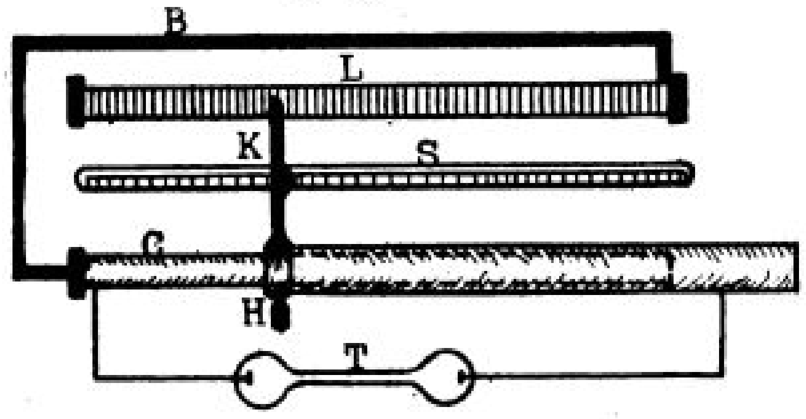


Fig. 2.

closely wound with a single layer of fine silk-covered wire forming an open circuit of relatively large inductance. At one end of the tube is placed a fluorescent screen S, somewhat similar to those used in X-ray fluoroscopes. One end of the coil is connected to the screen, while the other end is brought up through the inside of the tube and terminates in a disc a short distance from the surface of the screen. The metal plate G is laid upon the ground when the instrument is in use, and is connected through a flexible lead to a suitable contact-maker C by which contact may be made with any part of the helix, thus varying its effective length. The instrument is also provided with a scale (not shown in the figure) which is placed upon the helix and calibrated to read directly in wave length.

In using the instrument it is placed parallel to the aerial and the contact-maker slid along the coil until the screen glows brilliantly. When this condition is reached, the aerial and the instrument circuits are in resonance and the scale reading opposite the point of contact gives the length of wave directly in either feet or meters.

Slaby rods are not suitable for measuring wave lengths covering very wide ranges, and for this reason they are sold in sets, each one being adapted for measurements between certain limits. Owing to the numerous improvements made in this line, these instruments are seldom used now, they having given place to the more accurate and convenient closed circuit types.

One of the best wave measuring instruments yet produced is that designed by Dr. Fleming, and called by him the "cymometer," a diagram of which is shown in Fig. 2. This instrument is of the closed circuit type, having both a variable inductance and capacity, and with recent improvements it can be used to measure both transmitted and received waves.

The device consists of a long vulcanite rod L of comparatively small diameter which is wound with a single layer of fine wire forming the inductance. One end of the coil is free, while the other end is connected to the inner coating of the sliding tubular condenser C through a heavy copper bar B. The sliding contact on the inductance coil and the outer tube of the condenser are connected both mechanically and electrically through the rod K. The latter is provided with a handle so that as the inductance is al-

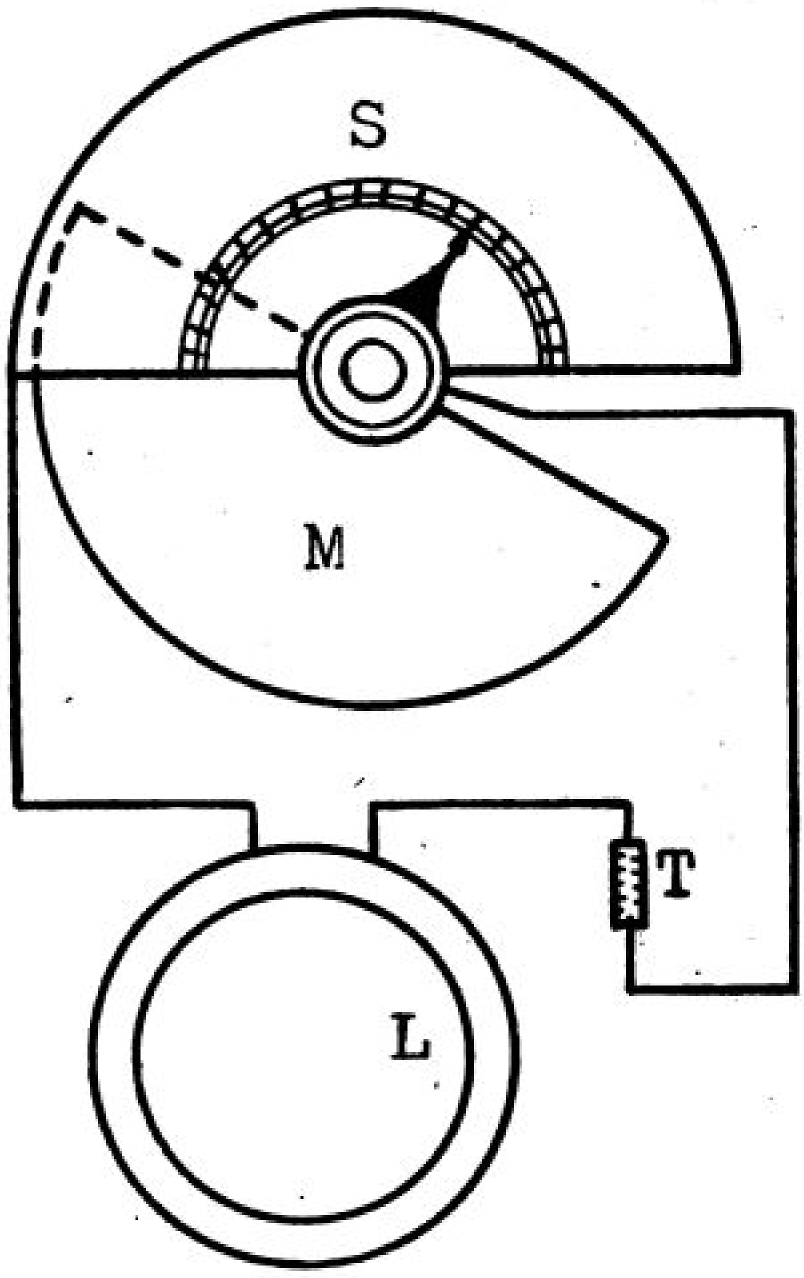


Fig. 3.

tered by sliding the contact back and forth, a similar change in the capacity of the condenser is effected. By the use of this construction it has been found that the oscillation constant or $\sqrt{CL}$ of the circuit is almost directly proportional to the displacement of the handle; a feature which allows of the use of uniformly calibrated scales. A neon vacuum tube T is connected to the outer and inner tubes of the condenser to indicate when the point of resonance has been reached, and a pointer is attached to the slider which moves over the scale S.

In using the instrument, it is placed so that the copper bar is parallel to some portion of the aerial circuit, and the handle is moved up and down until the current induced in the instrument is a maximum; this condition being reached when the neon tube glows most brilliantly. When this is done, the pointer attached to the movable member indicates the wave length on the scale below.

In practice these instruments are made in various standard sizes measuring wave lengths up to 2,500 meters. They are usually provided with four scales reading the wave length in both feet and meters, the oscillation constant of the aerial or other circuit and the number of oscillations per one-millionth of a second. It is also possible to use them for measuring very small values of capacity and inductance and for this purpose they have been found to be extremely accurate. A more sensitive detector than the neon tube has lately been employed, and with this improvement it is possible to measure the lengths of received waves, and to plot resonance curves.

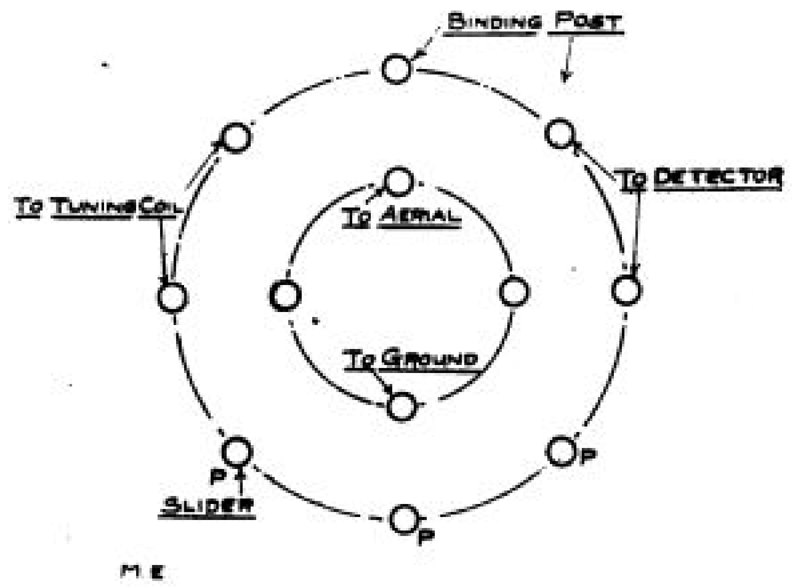
One of the most widely used wave meters at the present time is that of Donitz, which in principle somewhat resembles the one just described. It consists of a hard rubber case in which is placed a variable condenser of the rotary type. This is connected in series with a fixed inductance coil L (Fig. 3), which is placed outside of the instrument. One part of the circuit connecting the two consists of an exceeingly fine platinum wire which is placed in a thermo-ammeter or air thermometer T, which is used to indicate resonance.

In using the instrument, the inductance coil is placed above or below the aerial tuning coil so that a current will be induced in it. The condenser knob is then turned until the thermometer reading is at its highest value while the pointer which is attached to the movable disks then indicates wave length directly upon the circular scales on top of the case.

In order to give the instrument a suitable range, three inductance coils of different values are furnished with each and a separate scale is provided for use with each coil. Several instruments closely resembling the Donitz meter, or ondameter as it is called, are now manufactured and they have proven to be highly accurate and very convenient to use.

WIRELESS SWITCH.

One often wishes to change his wiring quickly in order to try some new diagram. This may be done by following above diagram. All wires connect to some one of the binding posts. The



posts are in a circle, with a smaller inner circle for the aerial and ground and any other instrument. With the above diagram a connection can be made in several seconds. All that one has to do is to join one binding post to another and the connection is made.

More "Modern Electrics"

Many of us wireless tickers
O'er our circuits pour in vain,
During all but muggy weather,
Ever linger full of pain,
Reading naught but batt'ry action,
No good morse to break the strain.

Even Job would lose his patience,
Listening on and not complain,
Easy lies no head with phones on,
Catching calls, gets on the brain,
The only way, my sparking brother,
Rests with you to entertain,
If the knowledge you would gain,
Call upon "Modern Electrics"
Surely you wont call in vain.

WILLIAM J. COQUELIN

Wireless Association of America

Wireless Registry

This department has been started with the idea to bring the wireless amateur in closer touch with commercial land and ship stations. Each month a list of new members will be printed here and once each year an official BLUE BOOK will be issued by MODERN ELECTRICS giving a list of all the members who registered during the year. Each member will receive the Official Blue Book free of charge. The Blue Book will also contain a complete list of commercial and government stations, their call letters, wave length, etc.

To register a station requires: Total length of aerial (from top to spark balls), spark length, call letter, (if none is in existence M. E. will appoint one) name and address of owner.

Fee for Registry (including one Blue Book) 25 cents.

NAME AND ADDRESS OF OWNER.	CALL LETTER	APPROXIMATE WAVE LENGTH IN METERS.	SPARK LENGTH OF INDUCTION COIL.
Robert J. Goldman, New York, N. Y.,	M.R.G.	80	1 ins.
Richard Johnstone, San Francisco, Cal.,	R.J.	196	1 "
H. T. Hardinge, New York, N. Y.,	G.X.	135	1 "
J. M. Sattler, Nutley, N. J.,	V.D.	100	½ K.W.
Stanley B. Chase, Groton, Mass.,	S.A.	150	1½ ins.
F. Herbert Carl, San Francisco, Cal.,	F.H.C.	130	3 "
Richard Gaschutz, Brooklyn, N. Y.,	M.R.D.	110	3 "
Monroe Jacobs, New York, N. Y.,	M.J.	65	½ K.W.
Fortuna Robert, Manchester, N. H.,	R.N.H.	200	1 ins.
W. H. Crane, New York, N. Y.,	W.	70	1½ "
Abe Garion, New York, N. Y.,	A.G.	160	2 "
C. R. Runyan, Yonkers, N. Y.,	Y.S.	250	½ K.W.
Leo R. Clark, Rochester, N. H.,	L.R.C.	175	½ "
Victor Schleuder, Springfield, Minn.,	A.B.	60	½ ins.
E. Bernascein, New York, N. Y.,	B.W.	600	1 "
Weyman S. Crocker, Fitchburg, Mass.,	M.W.S.	70	½ K.W.
Harris J. Krim, New York, N. Y.	H.J.K.	200	
Mackenzie School, Dobbs Ferry, N. Y.,	M.S.	200	¼ K.W.
M. Cadenassa, San Francisco, Cal.,	O.Q.	200	¼ "
E. F. Waits, Corinth, Miss.,	M.C.F.	300	4 "
Bamberger Bros., New York, N. Y.,			
Ernest Amy, New York, N. Y.,	M.E.A.	92	3 ins.

NOTE: Parties having registered after May 1st are not entitled to the present Blue Book, but to the one to be published May, 1910.

A NOVEL IDEA.

Some New York dealers are now selling Geissler tubes for Christmas trees. We had occasion to see a sample tree set up with about twelve tubes, and the effect in the dark green tree was tremendous. The soft light and the many different colors give an indescribly pretty effect which can not be imagined, but must be seen.

The tubes, which were of the liquid and plain type, were run from a one-inch spark coil and six dry cells, or a six-volt storage battery. The tubes were all connected in series, of course, the connections being made with thin copper wire, invisible to the eye.

EXPERIMENTERS.

Have you read this month's editorial? If not, do so at once; it will interest you surely.

EELS!

After trying the eel stunt last month I found out the following:

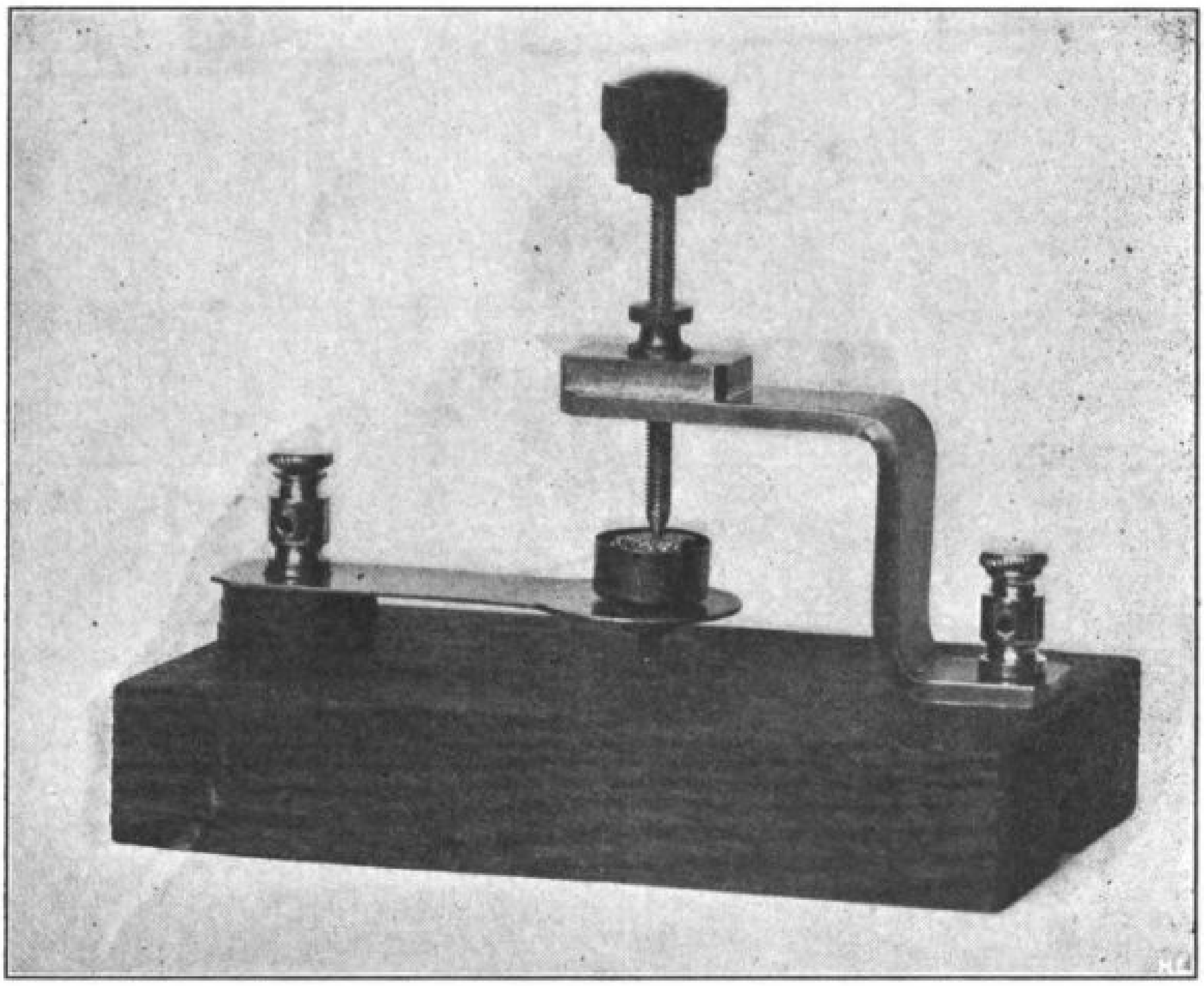
1. The eel electricity is very slippery.
2. The electric eel's favorite food is storage cells.
3. Cat electricity and eel electricity don't mix.
4. The electric eel is wireless.
5. If knocked down by one, call C. Q. D.
6. Two eels' tails placed opposite each other furnish an excellent spark gap.

"Fips."

We wish to buy a number of back issues from April, 1908, to September, 1908, inclusive. We shall pay a good price for these issues, if in good condition. We would like to hear at once from readers who desire to dispose of above copies.

A Silicon Detector

By James D. Thomas.



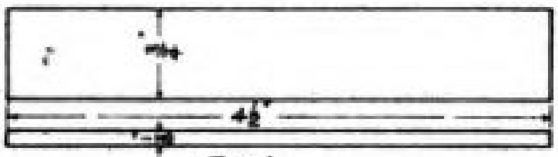
A silicon detector, when used with telephone receivers of from 1,000 to 2,000 ohms resistance, is very sensitive, and does not get out of adjustment easily.

The following detector was made by the writer at a total expense of $1.00, and gives excellent results; however, telephones of high resistance must be used, for without such phones the advantages are not so appreciable.

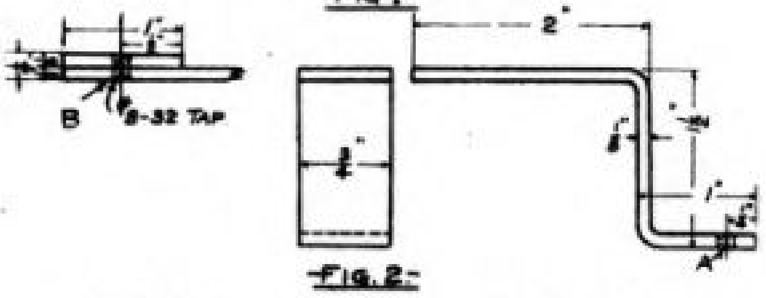
For the standard, a piece of brass, Fig. 1, 4½ inches long, ¾ in. wide by ⅛ in. thick, is bent to shape, as shown in Fig. 2, and a hole drilled at A to let a No. 8 screw pass. Next make a piece, as per Fig. 3, 1 in. long, ¾ in. wide by ⅛ in. thick; this piece must be soldered or sweated on the end of the standard, B. Fig. 2, rounding the corners to make a nice appearance, as shown in Fig. 4.

Now bore a hole at C. Fig 4 through the center of the brass bushing and standard with a No. 29 drill and tape out for 8.32 screw, as per Fig. 5; this is a brass rod threaded with an 8.32 thread, and is 2 ins. long. On one end it should be filed down to a flat point about 1.32 in. in diameter, and insulated handle with a threaded metal bushing screwed on the other end. Next, cut out of spring brass 1-32 in. thick the piece as shown in Fig. 6, and drill hole at A to let a No. 8 screw pass. Now comes the most important part of the detector—the Silicon itself, and its holder. Great care must be taken in making this part, and two or three should be made, as Silicon differs, one piece being more sensitive than another in the detection of waves. Get the round brass cup from the top of the round carbon rod in a Columbia or Ever-Ready dry battery, Fig. 7, and saw the screw off, then file the bottom smooth so it will be flat. The screw may be left on and a hole bored to let it pass in the center of the ring on brass spring, as shown in the photograph, but the range of adjustment will not be as great as if it were filed off.

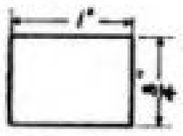
Now take a lump of fused silicon and chip off a piece about 3-16 in. thick and about ½ in. across the face; grind the flattest side down on a fine emery wheel until it assumes somewhat the shape as shown in Fig. 7 A. There may be a few pits in the face of the



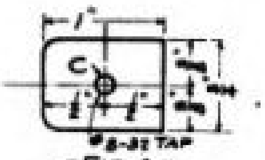
-FIG 1-



-FIG. 2-

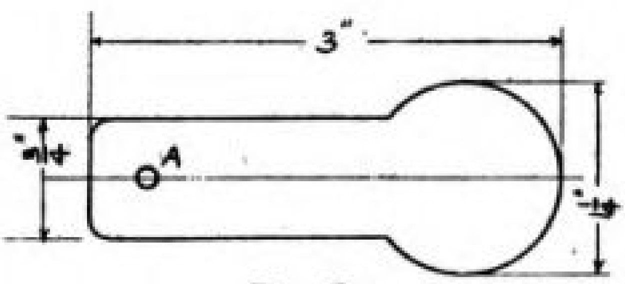


M.E. -FIG. 3-

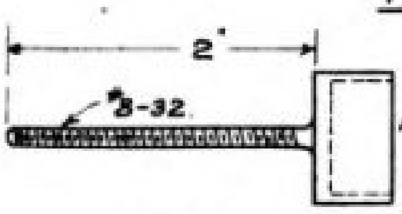


-FIG. 4-

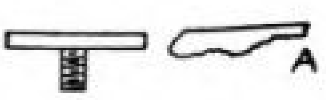
silicon after grinding, but if not too many it will work all right. Take the brass cup, and heating it over a blow torch or Bunsen burner, fill about half full with solder, using soldering paste as a flux. When quite hot press the silicon (face up) down in same, being careful to keep the face of the silicon as level as possible; allow to cool about a minute, then immerse in water so as to entirely cool it. This cup sets on the round part of the spring, Fig. 6, and is made separate, so that it can be easily replaced in case of accident or damage to one. The base is made as per Fig. 8, and holes drilled at A and B large enough to accommodate a No. 8 screw, countersinking them so as to accommodate washer and screw head. The standard is fastened down by the screw passing through the wood at one of the holes in the base, and screwing into a bind-



-FIG. 6-



-FIG. 5-



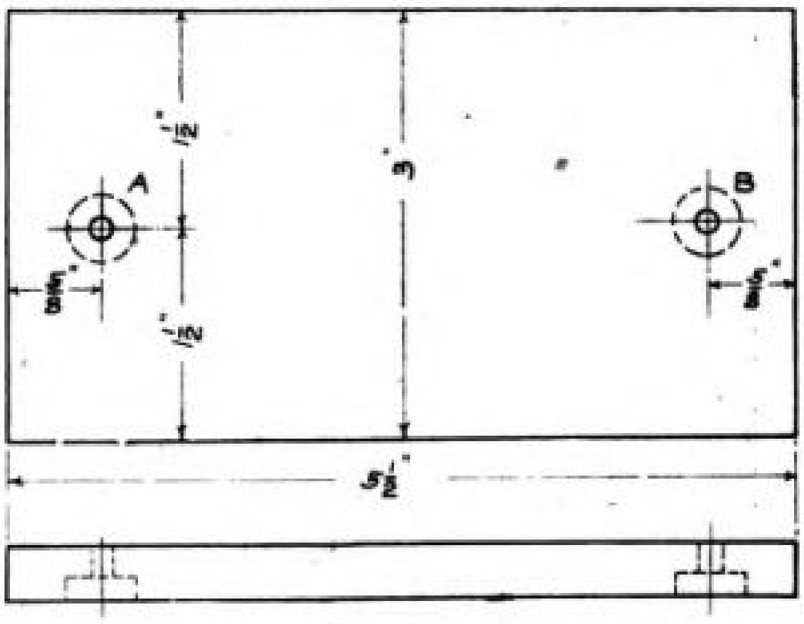
-FIG. 7-

M.E.

ing post, which serves as means of connection. The spring is held down in the same manner as the standard, the spring being held up from the base by a brass or fibre washer about 5-16 in. thick by ¾ in. wide.

The pointed screw, Fig. 4, is now screwed in the standard, with the nut from a dry battery binding post screwed on between the insulated handle and standard to act as a set nut when adjustment is accomplished.

The adjustment is accomplished by screwing the brass point down until it slightly presses on the silicon, then moving around under the point until the signals are heard loudest. The point should be screwed with more or less pressure on the silicon, depending on the sensitiveness of the piece of silicon used. When adjustment has once been found, it will not be necessary to bother with it again unless the detector is jarred or silicon moved, when it may be necessary to readjust.



M.E. -FIG. 8-

It will not be necessary to give a diagram of connections, using the other different instruments needed, such as tuning coil, condenser and phones, as many good diagrams have been given in MODERN ELECTRICS.

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 a laboratory (no matter how small) have a photograph taken of it by all means. Photographs not used will be returned in 30 days.

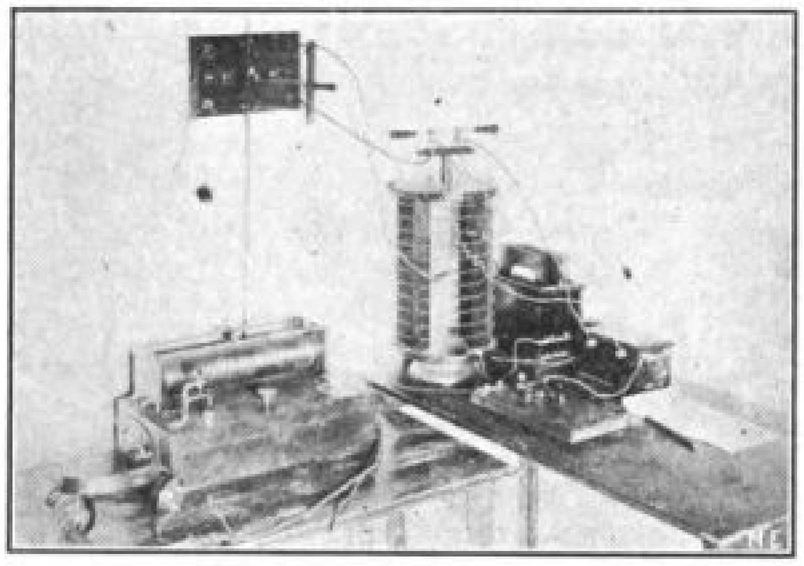
PLEASE NOTE THAT THE DESCRIPTION OF STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED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

It is 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, THREE DOLLARS.

Recently I had a photograph taken of my wireless outfit for the purpose of entering it in the prize contest. All the instruments are home made, with the exception of the receivers, spark coil and key.



The receiving set, which is mounted on a case, is 8x16x4 inches, and includes tuning coil, detector, potentiometer, intermeshing condenser, set of "electro" 1,000 ohm receivers and a test buzzer. Push button being hidden in the picture. Potentiometer is adjusted with a rotary motion. The aerial and ground are connected to two binding posts at the end of the case and the receivers at the other end. The wooden parts are finished in ebony and the metal parts in polished brass and silver plating. I use the E. I. Co.'s R-1,000 set-up and get perfectly satisfactory results.

The sending instruments consist of a 1-inch coil, Helix, spark gap, and an adjustable condenser having four plates, 6x10 inches. I am using the Fessenden set-up. The switch is a T. P. D. T., cutting one side out when the other is working.

My air wire is stretched between two poles, 50 feet high, and 100 feet apart. It consists of four wires and is used either straightaway or looped. The ground is led to the cellar and a square yard of copper by a number ten wire.

I receive from the ports and merchant vessels on Lake Michigan and have a partner a mile and a quarter away and we are in constant communication.

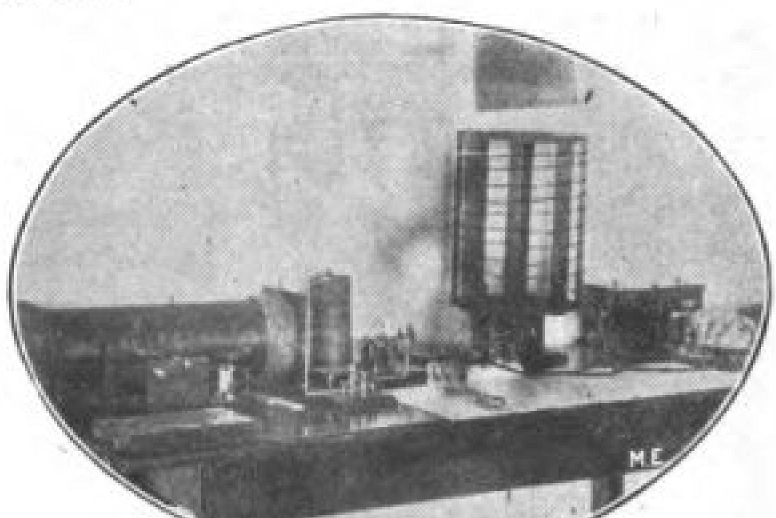
Wisconsin. M. J. Bishop.

HONORABLE MENTION.

Enclosed find photo of my wireless station, which is in my room. I have been experimenting with wireless for about six months.

On the right hand side of my table is an E. I. Co. one-inch coil. I have a condenser shunted across my spark gap. My hand can be seen on the key. The helix, which I made myself, is wound with ten turns of No. 6 copper wire. At the left of the helix is a D. P. D. T aerial and ground switch.

I am going to use a signaling outfit for signaling me when out or in my room, but otherwise I use the DeForest system.



At the left of the table is my 300 meter length tuning coil, which I also made myself. It has a secondary winding, which can be seen on the right side. An E. I. Co. double slide tuning coil can be seen in front of my large one. I use the electrolytic detector, which gives very good results. My condensers are made of photograph plates and tinfoil.

I gain a great deal of information from MODERN ELECTRICS, which I buy monthly. CARL PETERSON.
South Dakota.

HONORABLE MENTION.

Enclosed you will please find photo of my wireless station. The transmitter consists of a 1-2 K. W. transformer, zinc spark gaps, one of which is an E. I. Co.'s, Glass plate condenser made up of 40 platés, 8x8 in., helix and anchor gap. The picture was taken before I completed the transformer, and has a 1-inch coil in its place, with a pint Leyden jar. The glass plate condenser may be seen on the shelf of the small table. It has a battery and buzzer sitting on it, used as a test. For receiving I use silicon and perikon detectors, two tuning coils, condenser and my own connections. My aerial is made up of four copper wires,

No. 16 B and S gauge, 75 feet long; the highest end is 80 feet high and the lowest end is 70 feet. With this aerial I get splendid results. It is insulated with E. I. Co.'s insulators. My phones are of the double pole pattern, wound to 1,000 ohms each. MODERN ELECTRICS is a great help to me, and, as other boys say, I would not do without it.
DEREK BREITENBACH.
Washington, D. C.

HONORABLE MENTION.

Enclosed please find photos of my wireless station. I have devoted eight months experimenting with wireless. The transmitter consists of an E. I. Co. one-inch coil run on twenty dry cells, wireless key with zinc contacts, zinc spark gap and a condenser of low capacity shunted across the secondary—all home made. The spark obtained is 1-8 inch long and the same thickness. I can at all times telegraph a distance of seven miles.

The receiver consists of a double slide tuning coil of 300 meters' capacity, po-

tentiometer, carborundum, electrolytic detectors—all my own make—and a Murdock mineral detector, 3,000 ohm phones, fixed condenser and two batteries. I employ a D. P. D. T. switch to change from transmitting to receiving. I also use a three point switch for detectors.

The aerial consists of two number 14 magnet copper wires strung from a redwood tree 100 feet high, running 250 feet, to a tank thirty feet high, from which the wires run to my station.

The ground wire is attached to a water pipe and also to copper plates immersed in damp soil, covering 100 feet of surface. With this set I have heard Khuku, Oahu, the fifteen K. W. set, 2,200 miles from my station. The above description is my experimental station in my country home, ten miles from Santa Rosa.

I have found MODERN ELECTRICS to be the most perfect explanatory magazine on wireless.

San Francisco, Cal LEONE CADENASSE.

HONORABLE MENTION.

The following is a picture of my wireless station:

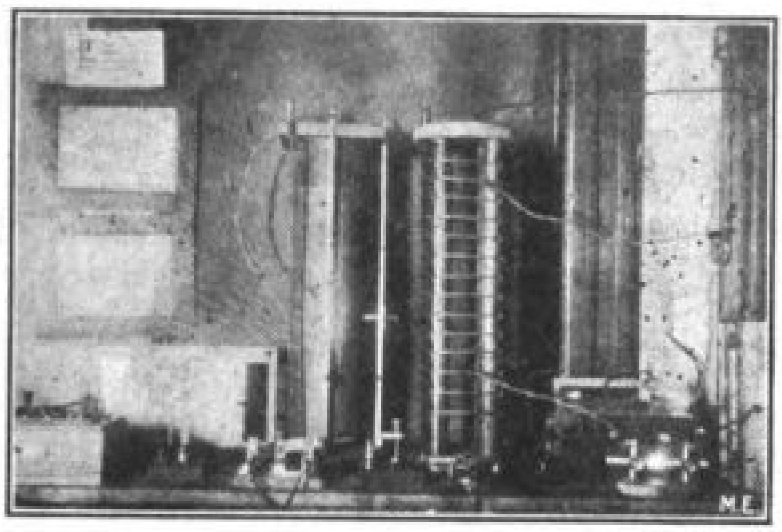
At the right of picture will be seen my sending station.

A sending helix having 13 turns of No. 10 copper wire, one zinc spark gap, two induction coils giving about a 1 1-2 spark, connected in series operated on 110 volts, and an electrolytic interruptor which cannot be seen; two condensers using gas chimneys, a telegraph key and a Geissler tube, used as a hot wire ammeter.

At the left of the picture will be seen my receiving station.

A tuning coil of 632 meters, adjustable condenser made up of plates of brass, one 300 ohm potentiometer, one 1,000 ohm receiver, two detectors, an electrolytic and a silicon. By using the double pole double throw switch either detector may be used.

My aerial is made up of four strands of No. 12 copper wire, 20 feet long, on top of the house, and 30 feet from the ground. The ground connection is made from the gas pipe to instrument with No. 8 wire.

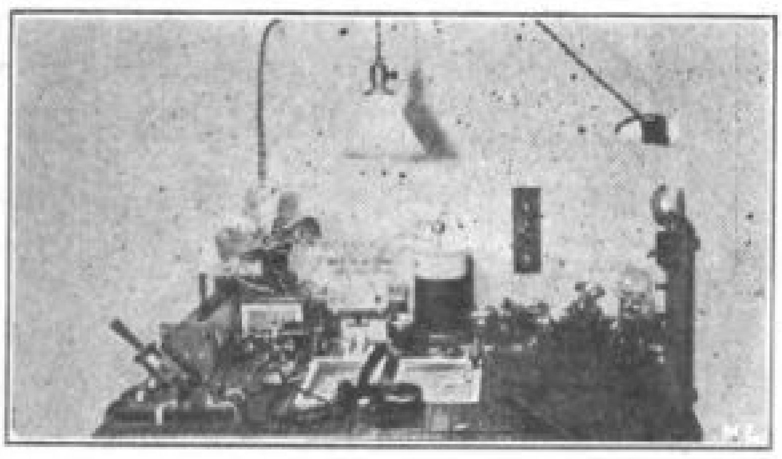


I made all the instruments myself, with the exception of induction coil (auto type), 1,000-ohm receiver and double-pole double throw switch. To your magazine is due my success in building my wireless station, and I would not be without it. THOS. BRENDEL.

Detroit, Mich.

HONORABLE MENTION.

Photograph published herewith represents the wireless station of Mr. Joseph Lesmeister, Harvey, N. D. He would like to get in communication with some wireless experimenter nearby. Mr. Lesmeister is also a member of the W. A. O. A.



HONORABLE MENTION.

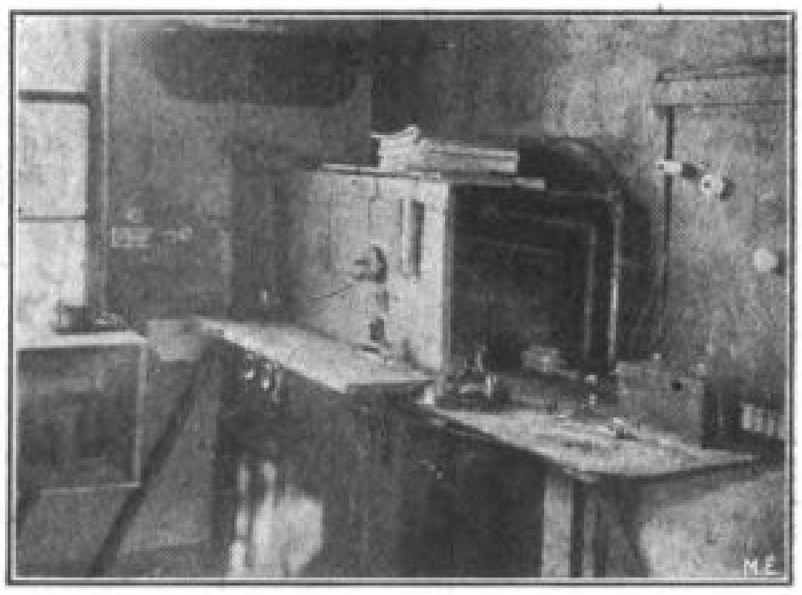
Enclosed find a photograph of my wireless outfit, part of which I made myself, with many helpful hints from MODERN ELECTRICS, of which I am a constant reader.

The receiving instruments consist of tuning coil, condenser, silicon and tantalum detectors, both home made; either can be thrown in by a 2-point switch, which is between them. I find the silicon is the most sensitive; a rheostat, which takes the place of a potentiometer; a pair of 75-ohm receivers, which are now replaced by a pair of the "E. I. Co.s" 2,000-ohm receivers, and a double pole, double throw switch to throw in receiving or sending. The S. P. S. T. switch on the edge of the bench is the ground switch.

The sending instruments consist of two inch spark coil, spark gap on top, Morse telegraph key, helix and plate glass condenser are on the side and not in the picture; switch in front of coil is for the batteries, of which there are eight.

Ground is made with an "E. I. Co.'s" ground clamp on the water pipe underneath the bench.

Aerial consists of two strands of No. 14 aluminum wire, 60 feet long, 75 feet high at one end and 30 feet at the other end. Each wire is five feet apart.



The telegraph shown is one I have with a friend of mine.

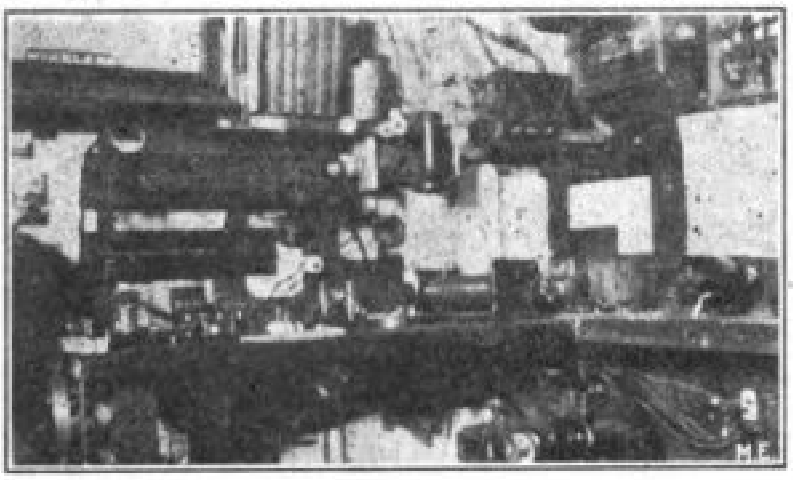
Connecticut. NORMAN E. SOULES.

HONORABLE MENTION.

Enclosed you will find a photograph of my wireless station, which I have made myself. It consists of tuning coils, variable condenser, fixed condenser, carborundum, electrolytic and perikon detectors, a rheostat, switches and head phones.

On the left of the picture may be seen one of the tuning coils; right under this is a brass tube variable condenser, with which I have had excellent results. To the right may be seen another tuning coil, while under the bench right by my hand may be seen a large double slide tuner, that I made from an old MODERN

ELECTRICS, and which is very useful to my station. I have also had very fine results with my "electrolytic" detector. On the table are the detectors, switches



and rheostat. I have one pair of Sullivan phones and a pair of E. I. Co.s 1,000 ohm phones, which I get very good results from. On the shelf above may be seen the coil Leyden jars and helix.

I use the United Wireless Company's wiring system, and am able to receive messages as far away as Cape Hatteras, N. C., and Cape Cod, Mass.

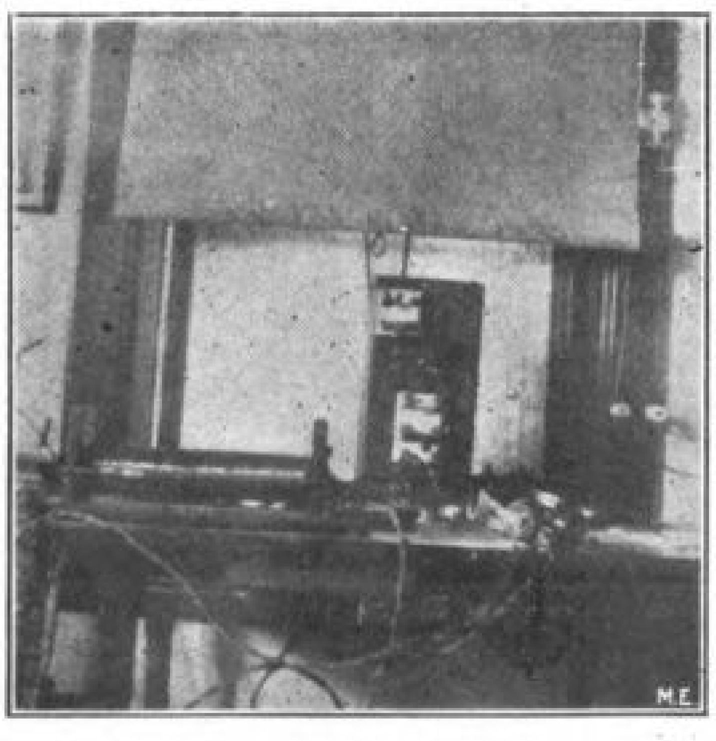
My aerial consists of four pounds of aluminum wire on our barn, which is over 200 feet from the house. It is four strand looped, and I run two base wires from it to the house. The total height is about 70 feet from the ground and it is about 70 feet long.

I have been greatly aided by MODERN ELECTRICS, and recommend it to all who are interested in wireless.

New York. STANLEY R. MANNING.

HONORABLE MENTION.

Enclosed find photo of my wireless station. The same has been in operation for seven months. It consists of transmitting 1-2 K. W. transformer,



10-plate condenser, 14x14 inches, sending inductance, wireless key, aluminum circular disc, spark gap and a water rheostat. Receiving, double slide tuner wound with No. 22 wire, fixed condenser, iron sulphide and silicon detectors, 300-ohm phones. Aerial consists of four copper wires No. 15, 8 feet, spreaders, 80 and 50 feet high, respectively. With this apparatus I have been able to transmit messages 100 miles and pick up Friday Harbor, San Juan island in Northern Washington, 1,500 miles distant. As I am living on a hill my aerial clears everything many miles out to sea. The D. P. D. T. switch shown on the switch board changes from sending to receiving and holds the high tension current very well. The aerial leads leave from the top of the switch board. The spark gap is made of aluminum with 5 brass rings ½ inch apart, which cools the points. It is behind the tuner. The ground consists of 3 zinc plates buried from 3 to 4 feet deep in the earth which is kept constantly moist. All the wires are soldered and heavily insulated, which is a great necessity.

Los Angeles, Cal. STANLEY HYDE.

THE COLIN & JEANCE RADIOPHONE.

(Continued from Page 414)

(not shown). The inventors use a great number of microphones in series at S, and a commutating switch enables the use of a greater or less number. All the microphones are mounted on a large hollow base, which leads to a single mouthpiece of special construction. Any of the usual detectors can be employed with the apparatus. The arcs can be made to burn in air, hydrogen, coal gas or other gases; also in liquids such as water, petroleum, heavy oils, etc. The apparatus of this kind which was used in the Mediterranean tests was constructed by the Carpentier-Gaiffe-Rochefort firm of Paris.

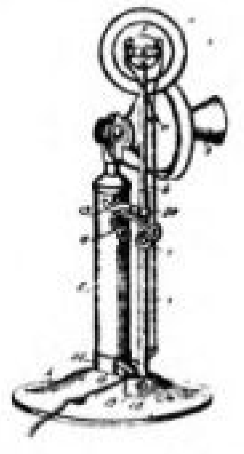
HEROES OF WIRELESS TELEGRAPHY.

(Continued from Page 412)

Doubtless Eccles if he had survived would have shown the same characteristics. It was "all in the day's work." Yet a world which appreciates the qualities which such men show will not the less esteem the deeds done and the doers thereof.

Electrical Patents for the Month

939,439. TELEPHONE ATTACHMENT. Henry R. Palmer, Seattle, Wash. Filed Mar. 3, 1908. Serial No. 419,024.

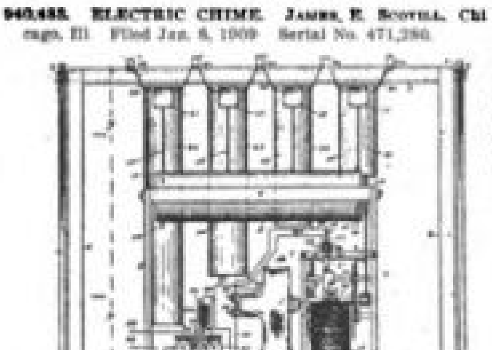


In a desk set, the combination with the transmitter supporting column, of a clip consisting of a metal strap, encircling said column and having the opposite ends thereof brought into parallel relation to each other to form clamping jaws disposed at an angle to the line of projection of the mouth piece of the transmitter, a clamping screw connecting said jaws, a tubular receiver supporting standard embodying telescopic sections and having its lower end held between the clamping jaws of said clip adapting said standard to swing toward and away from the receiver hook at an angle to the line of projection of the mouth piece of the transmitter, and a disconnecting arm adjustably mounted on said standard and adapted to interlock with the receiver hook of the transmitter and hold the receiver standard in an upright position.

939,441. APPARATUS FOR PRODUCING ELECTRIC DISCHARGES. Harry Pauling, Gelsenkirchen, Germany, assignor to The Firm of Salpetersäure-Industrie-Gesellschaft, Ges. M. B. H., Gelsenkirchen, Germany. Filed Dec. 18, 1905. Serial No. 292,296.

Apparatus for producing electric discharges having in combination stationary electrodes with a distance between them large enough to prevent ignition, a conductor successively passing and thereby alternately increasing and decreasing the distance between the said electrodes and blast pipes adapted to extinguish the discharges before short-circuiting between the electrodes may occur, substantially as described and for the purpose set forth.

940,488. ELECTRIC CHIME. James E. Scovill, Chicago, Ill. Filed Jan. 8, 1909. Serial No. 471,280.

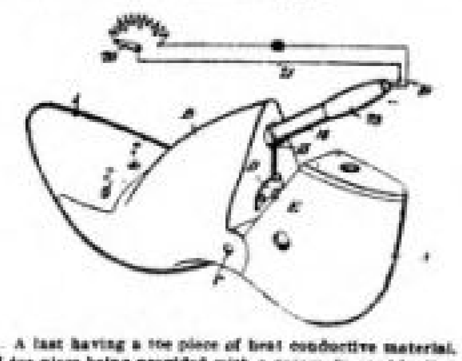


1. In an electric chime, a main frame and chime bells attached thereto, a motor circuit and a motor, means actuated by said motor for vibrating said bells, a clock arbor, a clock circuit, a current make-and-break device actuated by said arbor, a relay in said clock circuit, an oscillating armature actuated by said relay and adapted to close the motor circuit when said relay is energized, and a spacing wheel driven by said motor and provided with peripheral notches to control the time of maintaining the motor circuit closed at each operation of the chime, substantially as described.

940,734. ELECTROLYTE FOR USE IN ELECTRIC BATTERIES. Wallace J. L. Sands, London, England. Filed Aug. 22, 1908. Serial No. 449,774.

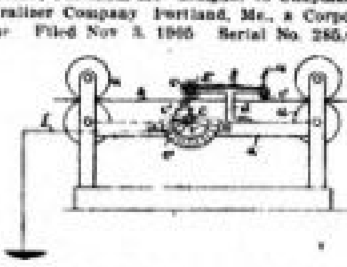
An electrolyte produced by adding to 36 fluid ounces of a mixture containing 2 volumes sulfuric acid, 2 volumes of hydrochloric acid and 1 volume of water the following: 32 ounces of bichromate of sodium dissolved in 128 ounces of water and 6 fluid ounces of a saturated solution of caustic soda.

939,212. SHOE-LAST. Adam J. Buch, Portsmouth, Ohio. Filed Jan. 17, 1908. Serial No. 411,272.



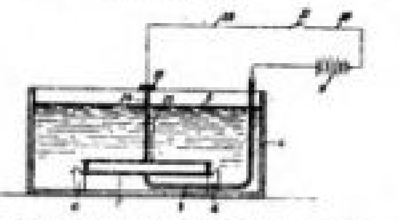
1. A last having a toe piece of heat conductive material, said toe piece being provided with a recess, in combination with an electrical heater housed in said recess, an insulating packing between the heater and the walls of the recess, and a metallic plate secured upon the under side of the last and serving to retain the heater in its recess or housing.

940,428. APPARATUS FOR NEUTRALIZING ELECTRICITY IN MOVING MATERIAL. William H. Chapman, Portland, Me., assignor to Chapman Electric Neutralizer Company, Portland, Me., a Corporation of Maine. Filed Nov. 3, 1905. Serial No. 285,677.



1. The herein described apparatus for neutralizing static electricity in moving material consisting of a comb conductor located adjacent to the moving material and connected with earth, an insulated conductor located adjacent to said comb conductor charged with electricity of the same polarity as that of the material to be treated.

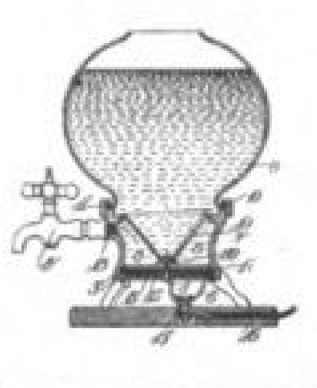
940,495. ELECTRIC PROCESS FOR MAKING PICTURES. Braxton D. Avis, Jr., Wallace, W. Va. Filed June 23, 1908. Serial No. 439,992.



1. The method herein described of making pictures, which consists in producing a conducting surface, spreading thereover a gelatinous film sensitive to light, exposing said film to the action of the light so that different portions of said film receive more light than others, and depositing a metal electrolytically upon said conducting surface and through said film so that varying quantities of said metal are deposited upon different portions of said surface.

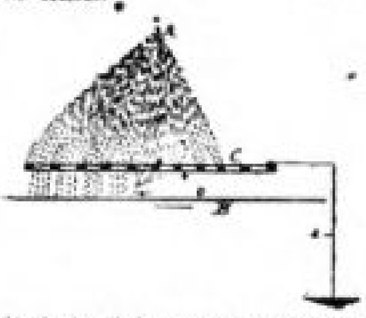
2. The method herein described of making pictures, which consists in preparing a conducting surface, coating the same with a film, the solubility of which is affected by light, exposing said film for the purpose of rendering different portions thereof insoluble in various degrees so as to vary electrical resistance of different portions of said film, and depositing a metal electrolytically upon said conducting surface through said film.

939,605. ELECTRIC WATER-HEATER. Henri G. Levy and George N. Blanchard, San Francisco, Cal.; said Blanchard assignor to said Levy. Filed Mar. 29, 1909. Serial No. 486,600.



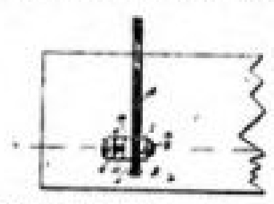
1. A heating unit comprising two sheets of insulated material the opposed surfaces of which are normally coated with a binder which will become active on the application of heat thereto; and a winding of bare metal and insulating material between the sheets forming a flat insulated coil, said winding being united to the sheets to bind the several parts and thereby form a substantially rigid heating element.

940,429. METHOD OF NEUTRALIZING STATIC ELECTRICITY. William H. Chapman, Portland, Me., assignor to Chapman Electric Neutralizer Company, Portland, Me., a Corporation of Maine. Filed Dec. 18, 1905. Serial No. 292,388.



1. The herein described process of neutralizing static electricity in a charged surface which consists in charging a conductor embodying fine radiating surfaces with electricity of high voltage and of a polarity opposite to that of the surface to be neutralized and interposing between said conductor and surface to be neutralized a perforated screen of metal or other conducting material connected to earth.

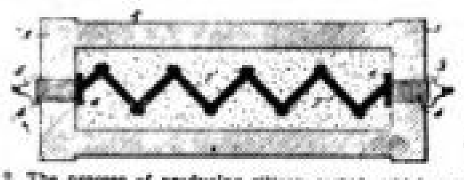
940,397. BINDING-POST. Adam Lungen, New York, N. Y., assignor to Edwards & Company, a Corporation of New York. Filed Jan. 16, 1909. Serial No. 472,642.



1. A binding post comprising a body with a pair of upwardly projecting arms, a screw journaled in both of said arms and extending therebetween, means for preventing longitudinal displacement of said screw in either direction, said arms, and a traveling nut on said screw guided by said body in a longitudinal but non-rotative movement.

941,339. PROCESS OF PRODUCING SILICON CARBID. Frank J. Tone, Niagara Falls, N. Y. Filed June 14, 1907. Serial No. 379,034.

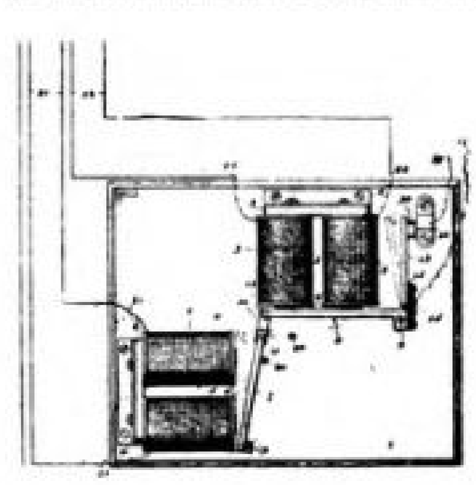
1. The process of producing silicon carbid, which consists in embedding in a charge of silicious and carbonaceous materials a resistance-conductor consisting of a linear series of separate shaped resistance-pieces of predetermined cross-section and resistance arranged in direct electrical contact, and passing an electric current through said conductor.



2. The process of producing silicon carbid, which consists in embedding in a charge of silicious and carbonaceous materials a resistance-conductor consisting of a series of separate shaped resistance-pieces of predetermined cross-section and resistance arranged longitudinally in direct electrical contact and supported by the charge, and passing an electric current through said conductor.

938,588. SELF-LOCKING RELAY. Jerome F. Keeley, Chicago, Ill. Filed Jan. 16, 1909. Serial No. 472,748.

In a device of the character described, a magnet in electrical connection with a clock control switch provided with a pivoted armature having an insulated arm secured thereto adapted to open and close a time recorder circuit switch, a second magnet also in electrical connection with a clock control switch and provided with a pivoted armature and a connecting link pivoted to said armatures, whereby each armature is self-locking and adapted to be unlocked by the other armature, substantially as and for the purposes set forth.



Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending November 23.

Copy of any of the above Patents will be mailed on 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.

A MINUTE BATTERY.

(396.) C. D. Ketcham, New Jersey, writes:

1.—Please explain why it is that when I take a silver cup, gold lined, and fill it with common water and place one plug of a 75 ohm receiver in the center and touched the other to the silver a click like that of a weak battery could be heard?

A. 1.—Because the two different metals with water as the electrolyte form a miniature battery and although the current is very weak it may be detected by a sensitive instrument, such as a telephone receiver.

2.—Which would make the best ground, the water pipe or a well?

A. 2.—The water pipe ground would probably give a greater capacity than the well ground because of the water pipe running for quite a distance under the earth, while if your ground is made in the well a wire will probably run down into the well and the only actual earth contact will be at the bottom of the well.

3.—In making a tuning coil is a core used?

A. 3.—No. Only a non-metallic form on which to wind the wire.

RECEIVING DISTANCES.

(397.) Clayton Williams, Kentucky, asks:

1.—How far can I receive with the following: T antenna 50 feet long, 4 wires, 45 feet high, electrolytic detector, fixed condenser, E. I. Co. electro tuner, 75 ohm receiver?

A. 1.—100 to 300 miles.

2.—With E. I. Co.'s Electro loose coupler in place of tuning coil?

A. 2.—200 to 400 miles.

3.—With 1000 ohm receiver, in place of 75 ohm?

A. 3.—Probably 500 miles.

TWO M. F. CONDENSER.

(398.) Maxwell Allon, Massachusetts, asks:

1.—Can a 2 + M. F. condenser, made by Western Electric Co., be used for receiving?

A. 1.—Yes, if it is not of the rolled type.

2.—Where can I have an armature for a dynamo which I am making, made?

A. 2.—Almost any experimenters' house will be glad to construct an armature for you. We would suggest that you look over our advertising columns.

3.—How is a 2,500 ohm potentiometer made?

A. 3.—There are many different ways of constructing potentiometers, some of which have been described in our recent issues. We think that the non-inductive type is the very best.

AUDION DETECTOR.

(399.) Frank Scully, North Dakota, writes:

1.—From what company can I obtain an "Audion" detector?

A. 1.—Radio Telephone Co.

2.—Would a polarized relay be better than the regular telegraph relay for use with a filings coherer outfit?

A. 2.—Most assuredly.

FIXED CONDENSER.

(400.) Marcus Leitch, Jr., New Jersey, writes:

1.—What microfarad is the E. I. Co. fixed condenser?

A. 1.—About .005 microfarad.

2.—How many sq. in. does the above contain? (of tin foil).

A. 2.—About 135 square inches.

LEAD PIPE STORAGE BATTERY.

(401.) J. Edward Cummings, Pennsylvania, writes:

1.—Through what resistance should 3 gravity cells be left working?

A. 1.—About 15 ohms.

2.—What would be the ampere hour capacity of a storage cell made as follows: Negative is a lead pipe 5 x 1¾ inches. This is used as the cup to hold the electrolyte. The positive is also a lead pipe 5 x ¾ inches. This is drilled full of small holes and holds the red lead?

A. 2.—Probably 15 to 20 ampere hours

3.—I have made an induction coil, using No. 35 wire on the secondary. As I had only 7 ounces of this wire it is not enough. Would it make any difference if I wound on some No. 32 wire, as I do not have any of the other?

A. 3.—We would not advise this, although you would probably be able to use the instrument as a shocking coil.

CONDENSER.

(402.) Frank B. Hanford, New Jersey, asks:

1.—How many square inches of tin foil would be needed in a condenser of .002 microfarads capacity, using paper, of which a sample is enclosed?

A. 1.—From 60 to 75 square inches.

RECEIVING DISTANCE.

(403.) B. Lawrence, Bronx, asks:

1.—Please let me know how far I can send with the following instruments: "Electro" transformer coil ½ K. W., "Electro" special sending helix, "Electro" zinc spark gap, "Electro" adjustable condenser, aerial on top of a house 60 feet high, aerial pole 20 feet high, 50 feet between poles, using a current of 110 volts?

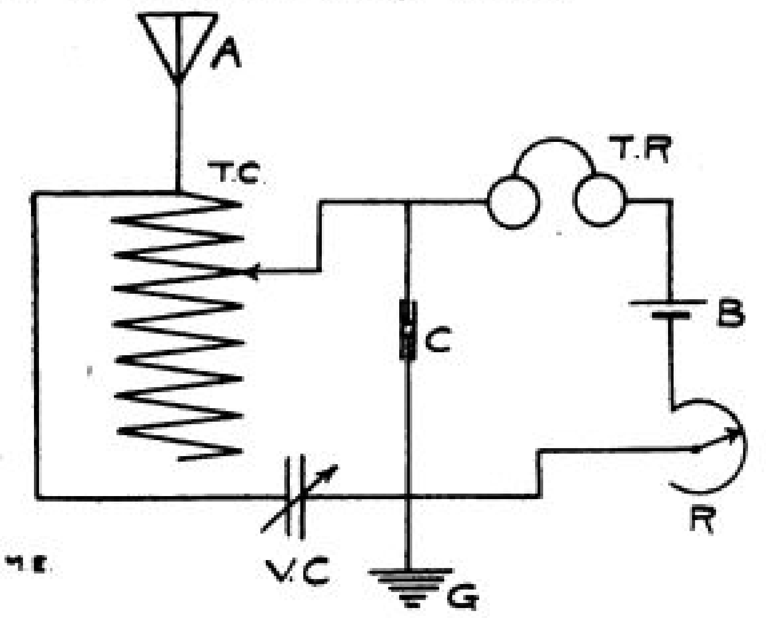
A. 1.—About 25 miles. If you use an electrolytic interrupter you should be able to send messages 75 to 100 miles.

RECEIVING CONNECTIONS.

(404) L. Dennison, Michigan, asks:

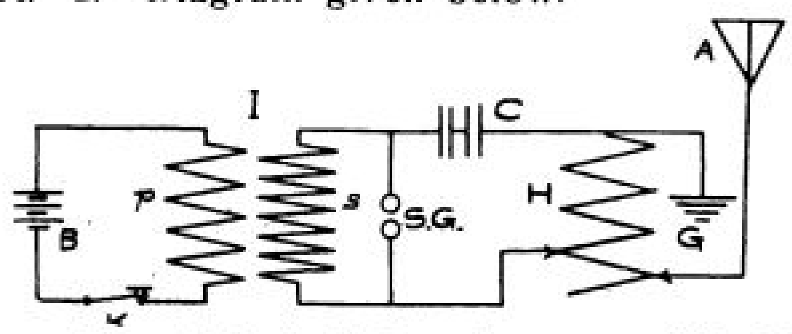
1.—How shall I connect auto-coherer, single slide tuning coil, variable condenser, 2 75-ohm receivers, 10-ohm reostat?

A. 1.—Diagram given below.



2.—How shall I connect 1 inch spark coil, zinc spark gap, Morse key, sending helix, sending glass plate condenser?

A. 2.—Diagram given below.



3.—How high shall I make my aerial? Of what shall I make my sending helix?

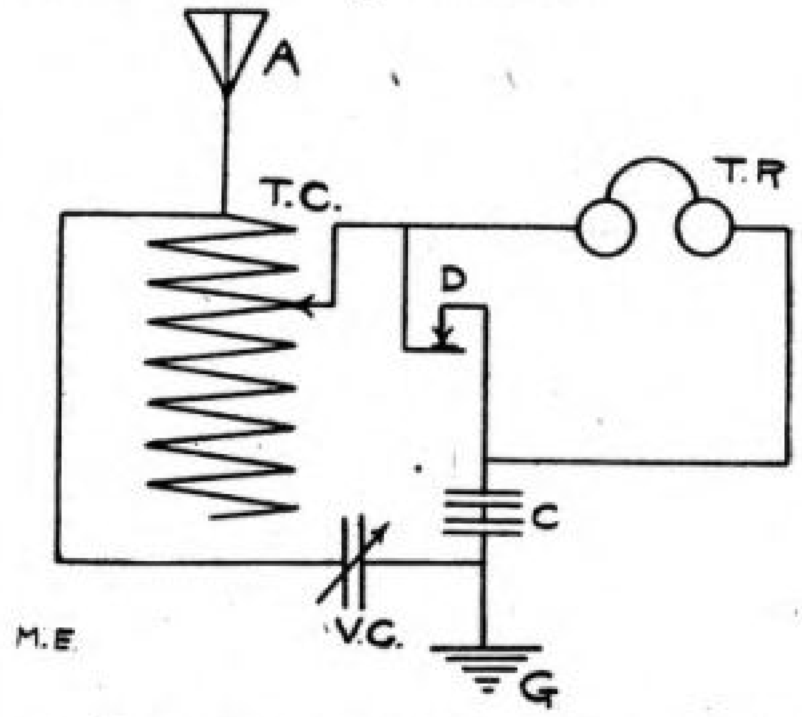
A. 3.—As high as possible. We prefer aluminum wire for use in the construction of both aerial and sending helix. No. 14 B. & S. for aerial, No. 8 for helix.

RECEIVING DISTANCE.

(405) Howard M. Anderson, California, asks:

1.—Please show diagram for the most efficient arrangement of the following apparatus: Single slide tuning coil, variable condenser, fixed condenser, silicon detector and a 150-ohm receiver.

A. 1.—Diagram given below.



2.—How far can I receive with a 60 foot aerial made up of 4 strands of No. 14 aluminum wire 2 feet apart on a pole 53 feet high, with the above instruments?

A. 2.—300 to 500 miles.

SENDING DISTANCES.

(406) Harmon Deal, Missouri, writes:

1.—Will you please tell me how far I could send with aerial 50 feet high with 4 wires 30 feet long and E. I. Co. new ½ K. W. transformer coil?

A. 1.—75 to 100 miles.

2.—Is this type of transformer as powerful as the ¼ K. W. commercial transformer?

A. 1.—Yes.

3.—How far could I send with 50 foot aerial, four 4 quart Leyden jars, the E. I. Co.'s special sending helix, the ½ K. W. transformer coil, with 110-125 volt alternating current?

A. 3.—25 to 50 miles, and if you use an electrolytic interrupter, about 75 to 100 miles.

THREE INCH WIRELESS COIL.

(407) Edward Ritchie, New York, asks:

1.—Kindly give dimensions and amount of wire on secondary of a three inch wireless coil.

A. 1.—About 3¼ pounds No. 36 on the secondary 5¾ inches x 3 inches diameter.

2.—Would this coil work well on storage batteries having 6 volts and 25 ampere hours?

A. 2.—Yes, fairly well; but you would have to charge the batteries frequently, the capacity being very low.

3.—If the secondary were wound in 8 or 10 sections, would it give good results? If not, how many sections are required?

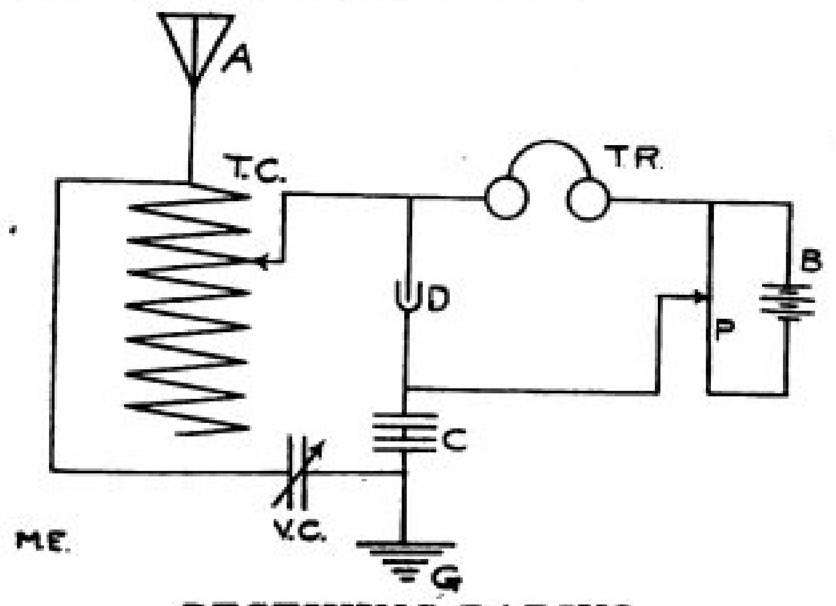
A. 3.—No.

CONNECTIONS.

(408.) Everett Baisley, Michigan, writes:

1.—I would like to have a good diagram and clear instructions for wiring and operating an Electro Importing Co.'s receiving outfit, consisting of 1 electrolytic bare point detector, 1 potentiometer, 1 single slide tuning coil, 1 variable condenser, 1 fixed condenser, 1 1000-ohm receiver. I have a T-shaped aerial 60 feet high and 55 feet long, and the nearest commercial station is 12 miles away.

A. 1.—Diagram given below:



RECEIVING RADIUS.

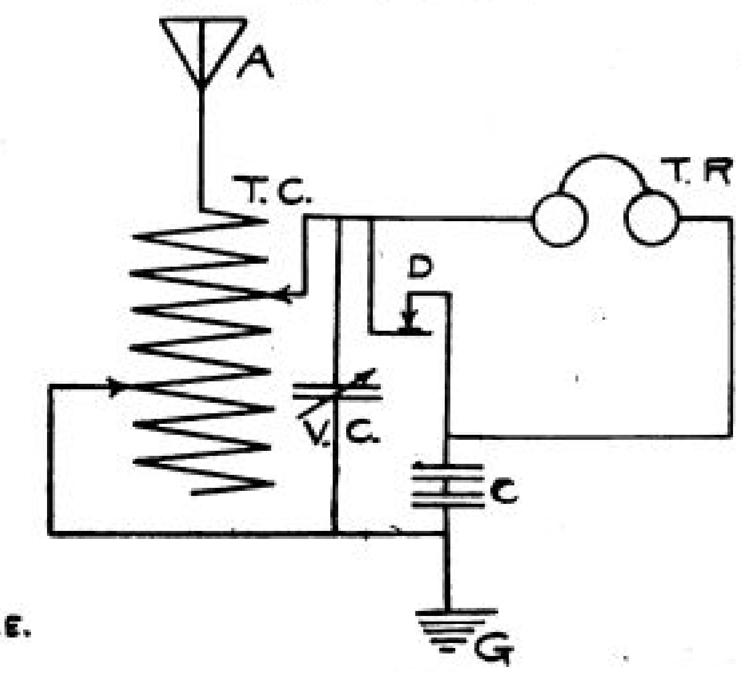
(409.) HARRY ROHRER, Philadelphia, asks:

1.—What will my receiving radius be with the following: Aerial composed of four strands No. 14 aluminum wire, each strand being 18 inches apart and 55 feet long. It is suspended between 2 poles, one 57 feet and other 40 feet high. Instruments, silicon detector, double slide tuner, composed of 275 turns of No. 20 copper wire, 16 inches to each turn, variable condenser, fixed condenser, 2 1000-ohm telephone receivers?

A. 1.—300 to 500 miles.

2.—Please give a diagram for connection of the above instruments, as I have some trouble with buzzing in the receivers from an arc light about 100 feet away from aerial.

A. 2.—Diagram given below:



WIRELESS QUERIES.

(410.) LUDWIG BEHN, Baltimore, writes:

1.—Will you kindly advise me the sending radius of a wireless set, composed of following instruments: E. I. Co.'s 2½ inch induction coil, Leyden jars, zinc spark gap, sending helix and an aerial 75 feet high, composed of 4 wires and 90 feet long, looped antennae, running into the back yard?

A. 1.—10 to 15 miles.

2.—What will be the receiving radius of this outfit: Double slide tuning coil, variable condenser, fixed condenser, electrolytic detector, potentiometer and 2000-ohm receivers, using the same aerial?

A. 2.—500 to 800 miles.

SPARK COIL.

(411.) C. HUNTINGTON, New York, writes:

1.—Kindly let me know through MODERN ELECTRICS what size spark I would get from the following: Core 11 inches long and 1 inch in diameter, 2 layers of No. 18 primary wire, secondary of No. 30, 3 pounds, with insulating tube 7-16 of an inch thick.

A. 1.—We think you would get a great deal better spark if you wound the primary with No. 12 or No. 14 wire. Probably the best spark you will be able to get with the present coil is about 1 inch.

2.—State the transmitting distance of same with 3 pint Leyden jars, Morse telegraph keys, aerial 40 feet high and 25 feet long, your wires 12 inches apart.

A. 2.—8 to 10 miles.

3.—What is the receiving distance of the following: Same aerial, ground connected with gas pipe, tuning coil (single slide), one 75-ohm telephone receiver, detector and 3 dry cells?

A. 3.—75 to 100 miles.

WAVE LENGTH.

(412.) OSWALD L. GRANICHER, California, writes:

1.—What would the wave length of my tuning coil be, which is wound with 405 feet of No. 24 black enameled wire on a frame 4 inches in diameter?

A. 1.—Approximately 500 meters.

2.—Would it increase the wave length of my station to have 810 feet on above coil?

A. 2.—Most assuredly, provided the fundamental wave length of your aerial is long enough to stand the heavy load of inductance, in the tuning coil.

3.—Would there be any current leakage in my helix, which is wound on wood covered with two coats of shellac?

A. 3.—Probably so, if your transmitting power is over ¼ of a kilowatt.

WIRELESS QUERIES.

(413.) Brooklyn, N. Y., asks:

1.—Must the ground wire from the instruments be insulated very good, or can it be laid by bell wire, just by staples?

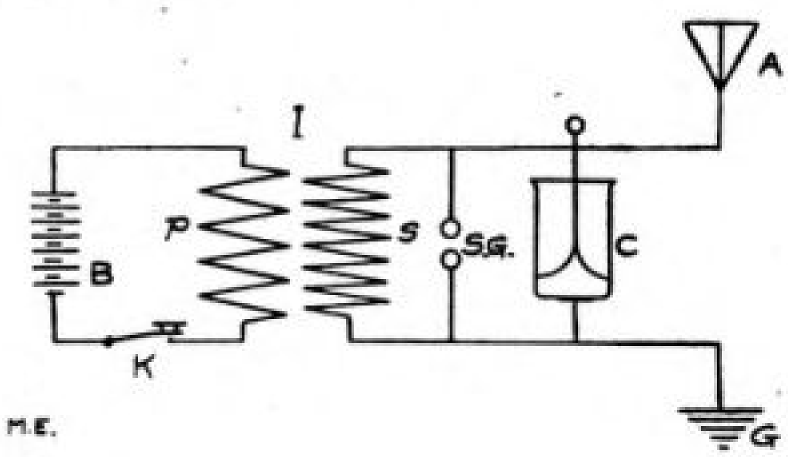
A. 1.—Ground wire does not have to be insulated at all.

2.—Why does the vibrator stick on my 1½ inch spark coil?

A. 2.—Probably your batteries are run down. Try a new set of batteries.

3.—Please give a diagram how to connect the following: 1½ inch spark coil, E. I. Co.'s zinc spark gap, 1 strap key, 7 red seal dry batteries, 1 pint Leyden jar, and give sending radius.

A. 3.—Diagram given below. Probably about 5 miles.



CHOKE COIL.

(414.) CLARENCE K. KROGMAN, Brooklyn, N. Y., asks:

1.—Please state the use of a choke coil, and how is it made?

A. 1.—The term choke coil is used to define a small coil wound similarly to an ordinary magnet, and the coil itself is used in certain circuits to prevent a kick-back caused by alternately making and breaking the circuit.

2.—How far will a sounder respond with coherer and decoherer and 1000-ohm polarized relay?

A. 2.—If sensitively adjusted, probably about 25 miles.

3.—How far will a four-inch coil operate with two quart Leyden jars, a 65 foot aerial?

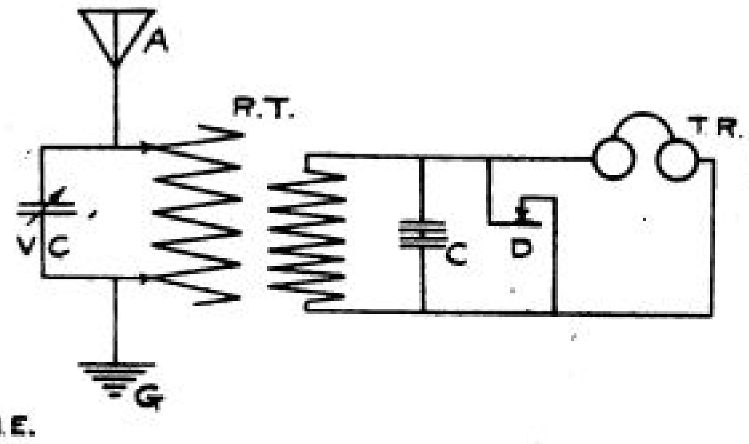
A. 3.—About 30 to 40 miles.

LOOSE COUPLER.

(415.) RALPH A. SCOTT, Massachusetts, writes:

1.—Will you please tell me how to connect up the following instruments: Loose coupled tuner, variable condenser, fixed condenser, silicon detector, and two 500-ohm phones? I have tried several wirings with fairly good results, but would like to know the correct wiring of same.

A. 1.—Diagram given below.



2.—Does it cut down the radius of a station to run the ground wire on a horizontal for a short distance?

A. 2.—Not to our knowledge.

3.—Would it be better to have two sliders on the outside coil of a loose coupled tuner?

A. 3.—We consider the two slides give a much closer method of tuning than the single slide.

WIRELESS QUERIES.

(416.) ARTHUR C. HARDY, Newton Highlands, Mass., writes:

1.—Kindly tell me in your next issue of MODERN ELECTRICS the best way to connect up telephone receivers, loose coupled tuning coil, silicon detector and variable condenser.

A. 1.—We refer you to query No. 415 in this issue.

2.—How far could I send with a 1/4 K. W. transformer?

A. 2.—Probably 50 to 75 miles.

3.—What is the best kind of detector?

A. 3.—We consider the electrolytic to be the most sensitive detector.

TUNER

(417.) CARL DRATHSCHMIDT, Yonkers, asks:

1.—Please tell me how much wire (No. 18 copper) I should put on a core (3 inch diameter) to catch messages up to 1,500 meters wave length.

A. 1.—About 5 pounds.

2.—How far can I receive with the following instruments: Silicon detector, fixed condenser, 3,000-ohm receiver, double slide tuning coil, potentiometer, 400 ohm, and a variable condenser such as was described in the November issue of MODERN ELECTRICS? Aerial is 40 feet high, consisting of 3 No. 14 copper wires 15 inches apart, 23 feet long.

A. 2.—400 to 500 miles.

3.—How can I improve this set?

A. 3.—Principally by raising your aerial to 75 or 100 feet.

RECEIVING AND SENDING RADIUS.

(418.) W. BLACKMORE, New York City, writes:

1.—What is the farthest possible distance I can receive with the following: Aerial 120 feet high, 60 feet long, 4 wires 15 inches apart, an electrolytic detector, a potentiometer, a variable condenser and a fixed condenser, a 600-meter double-slide tuning coil, 3000-ohm receivers and four dry cells?

A. 1.—800 to 1,000 miles.

2.—How far can I send with the same aerial, ½ K. W. transformer (open core), a Gernsback interrupter, 8 two-quart Leyden jars, special sending helix and a zinc spark gap, a regular wireless key and a very strong current?

A. 2.—Probably 75 to 100 miles.

WIRELESS QUERIES.

(419.) RAYMOND COTTLE, Massachusetts, writes:

1.—How far can I hear with the following instruments: Aerials 32 feet high, 84 feet long and 3 strands (single slide), tuning coil, silicon detector, condenser and a pair of 1000-ohm receivers?

A. 1.—100 to 150 miles.

2.—How far can I send with the same aerials, and the following instruments: Induction coil, helix coil, condensers, and 6 batteries?

A. 2.—As you do not state the power of your coil it is impossible for us to estimate your transmitting radius.

ELECTROLYTIC IN SERIES?

(420.) W. F. CONBERGER, Philadelphia, Pa., asks:

1.—What should my receiving radius be, with the following apparatus: Double slide tuner, variable condensers, two electrolytic detectors connected in series, 3000-ohm ear phones, aerial formed of 10 wires on 20 foot spreaders, stretched between two smoke stacks 125 feet high and 100 feet apart?

A. 1.—1,000 to 1,500 miles.

2.—Is it best to have the detectors in series or multiple, or only have one detector?

A. 2.—We have tried various combinations of electrolytic detectors, but have finally come to the conclusion that one detector only is as sensitive for all around work as the combination and it is not so much trouble to keep it in adjustment.

3.—Should I be able to hear the 10 K. W. navy station at Pensacola, Fla.?

A. 3.—We should think so.

AERIAL WIRE.

(421.) J. W. GROVE, Baltimore, Md., writes:

1.—Would No. 18 bare copper wire make a good aerial?

A. 1.—Not as good as No. 14 or No. 12 wire, as the capacity of No. 18 is hardly large enough.

2.—Give directions for making an electrolytic interrupter for 110 volts alternating current.

A. 2.—We refer you to our advertising columns: We do not advise you to make an interrupter.

3.—In wiring sending and receiving sets, what kind of wire should be used?

A. 3.—Almost any kind of flexible conducting cord will do for wiring the receiving set, but Pirelli cable should be used for wiring the sending set.

DISTANCE ON TUNER.

(422.) J. RAYMOND SHARP, Philadelphia, Pa., writes:

1.—Please tell me how far I can receive with the following instruments: Aerial, looped antenna style, 50 feet high, 40 feet long, composed of five wires No. 14 aluminum 14 inches apart. Murdock 3000 meters double slide tuning coil, Electro Importing Company's fixed condenser, silicon detector and 75-ohm receiver.

A. 1.—Probably 150 to 200 miles.

2.—Is there any scale for tuning coils such as mine by which one can tell how far distant stations are that are received from time to time?

A. 2.—No, and we cannot conceive it possible that the distance over which a message is transmitted will ever be determined in such a manner.

RECEIVING RADIUS.

(424.) FLOYD TRONBLEY, Troy, Ohio, writes:

1.—Will you kindly answer the following in MODERN ELECTRICS: How far could I send with a 1½ inch spark coil, two quart Leyden jars, zinc spark gap, aerial made with two strands of No. 16 copper wire one foot apart, 50 feet high, and water pipe ground?

A. 1.—5 to 8 miles.

2.—How far could I receive with electrolytic detector, 500-ohm receiver and same aerial and ground as above?

A. 2.—250 to 300 miles.

CONDENSER FOR ONE-INCH COIL.

(425.) LEONARD R. CHURCHILL, Massachusetts, writes:

1.—Is it possible to send eight miles with 1 inch induction coil having sending helix, condenser, etc., and aerial, 8 wires No. 14 aluminum, 1 foot apart, 25 feet long, 35 feet high, place to be communicated with in country?

A. 1.—Yes; provided conditions are right and apparatus adjusted properly.

2.—How many sheets, and of what size of tin foil are necessary to make condenser for 1 inch induction coil to be placed on glass plates 5½ inches x 3¾ inches?

A. 2.—About 15 sheets of foil 4 inches x 2½ inches.

WIRELESS QUERIES.

(426.) CLARENCE HOLT, Massachusetts, asks:

1.—How far can I receive with a double slide tuning coil, fixed condenser, variable condenser, silicon detector, 3000-ohm receivers and an aerial 35 feet high, 28 feet long, 5 wires?

A. 1.—150 to 300 miles.

2.—What distance with the above instruments, an electrolytic detector, potentiometer, a battery and a receiving transformer, a vertical aerial being 75 feet high, 50 feet long and six wires?

A. 2.—500 to 1,000 miles.

3.—How far can I send with an E. I. Co.'s 1½ inch spark coil, E. I. Co.'s spark gap, a home-made condenser and helix, with the 75 foot aerial?

A. 3.—5 to 8 miles.

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 blueprints not listed under "Wireless," 2 cents a word.

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"C. Q. D."—Wireless Troubles demonstrated magnetically. A puzzle—toy—a box of fascinating, mysterious fun—an "attractive" lesson in magnetism. An excellent Christmas box for old or young. Postpaid, 25c. silver. T. P. Adams Co., 626—M, So. 48th ave., Chicago, Ill.

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DOLLAR TUNING COIL. 50c. detector. Free literature. Burtt Mfg. Co., Wollaston, Mass.

BOYS!—"How to Make a Wireless Telegraph," 15c. coin. Written for a boy. Address, Arthur Klem, Dept. A, 24 Crown street, New Haven, Conn.

MICA PLATES.—For the condenser described in the November issue of this magazine, cut out of clear, imported mica, which we guarantee, and measuring 1 inch by 4 inches, will be sent prepaid, with four large pieces of graded mica and one piece of amber mica, for a two dollar bill. This is a bargain, as the same material would cost you $5 at any supply store. This offer is for a short time only, so act quick. No stamps, please. Orlo A. Foote, Jr., Caxton Building, Cleveland, Ohio.

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FOR SALE.—Quarter-inch coil in good condition, $4. John Maier, Jr., 5306 Congress street, Chicago, Ill.

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The Parry Stationery Co., Oklahoma City, Okla.
Bell Show Print Co., Sigourney, Ia.
The Camp Conduit Co., Cleveland, O.
The Iowa Mfg. Co., Oskaloosa, Ia.
Sam'l Allen & Son Mfg. Co., Dansville, N. Y.
The Garl Electric Co., Akron, O.
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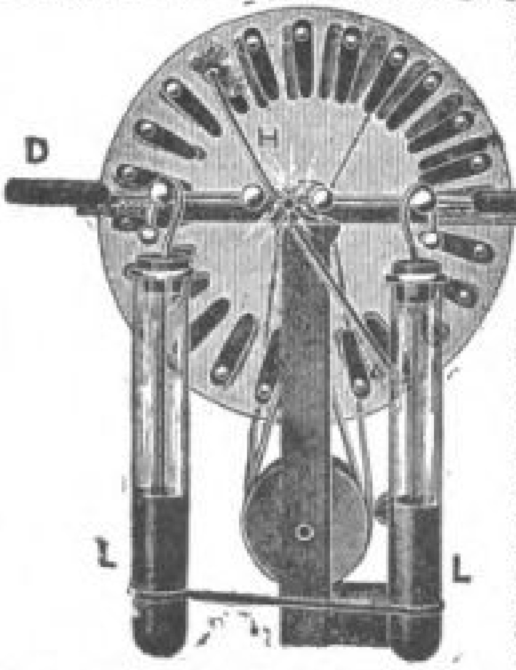

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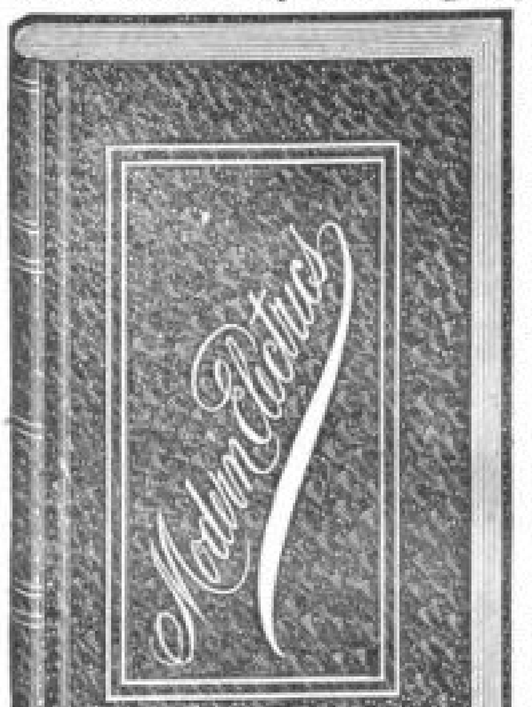

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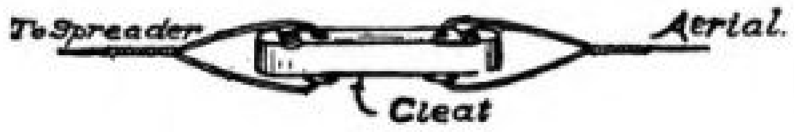
A CHEAP AERIAL INSULATOR.

When putting up an aerial for experimental work, the amateur is often bothered to secure satisfactory insulatorss.



-FIG. 1-

unless he pays a price which is beyond his means. The ordinary porcelain wiring cleat, preferably of the glazed type, makes an extremely good substitute. The aerial wire is fastened at one end through one of the holes in the cleat, while a wire or cord through the hole in the other end leads to the spreader, Fig. 1. The ropes or wires supporting the spreaders should be insulated in the same manner, but with several cleats in series, Fig. 2, to provide for ample insulation and insure the smallest possible amount of leakage. The guy wires to the pole, if the aerial is thus supported, may be treated in the same manner. If greater tensile strength is desired two or more cleats may be used in parallel

-FIG. 2-

side by side with the holes coinciding. But this is not often necessary, for an aerial constructed by the writer, each wire of which is 250 feet long, of No. 12 copper, insulated by single cleats at the end, bears the strain without signs of overload. An aerial insulated in this way hangs gracefully and makes a neat business-like appearance so desirable to the amateur.

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