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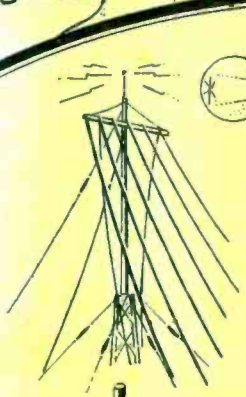
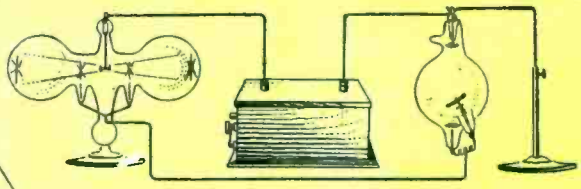
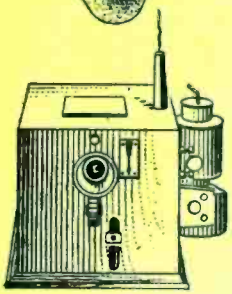
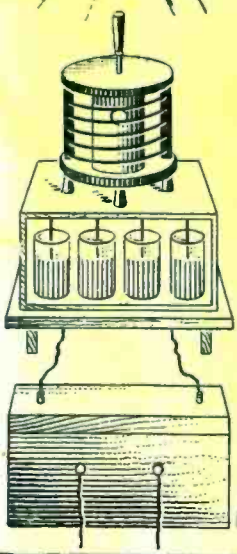
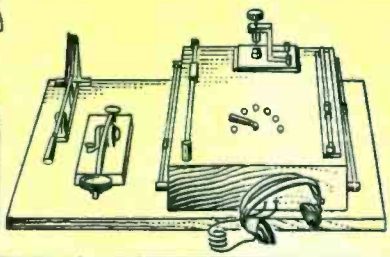
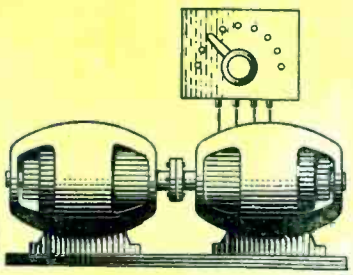












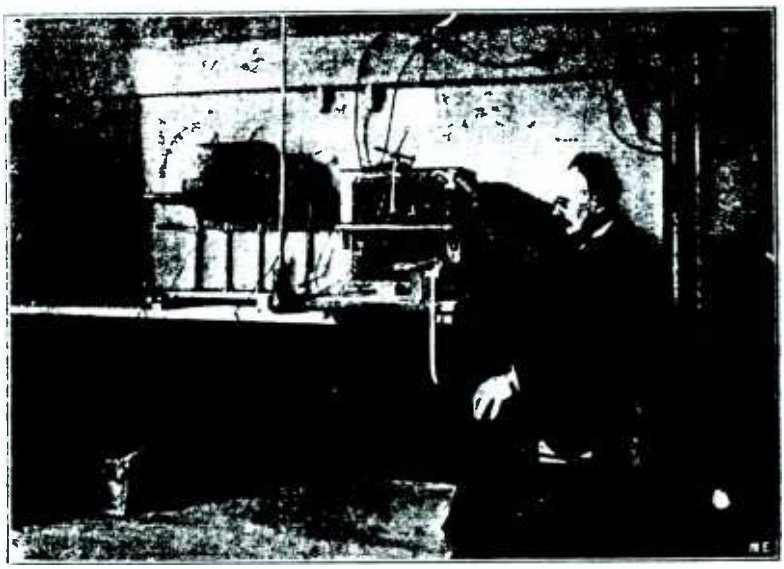
"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

MODERN ELECTRICS

Vol. II. JULY, 1909. No. 4

Dr. Branly's New Apparatus

By A. C. MARLOWE.
Paris correspondent Modern Electrics.



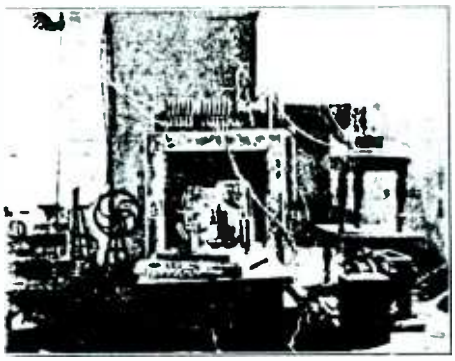
Dr. Branly Observing Paper Strip and Sending Signals

Not long since we had occasion to examine the working of Dr. Branly's apparatus—the French Edison—which he designed for obtaining wave control of distant effects. It is now set up in his laboratory at Paris, with the sending post located in one room and the receiving post in another, and the wireless signals are exchanged between the two. Dr. Branly's system was tested on a practical scale for torpedo steering some time ago, and for this purpose there was set up a short post near Toulon, on the Mediterranean coast, which is the centre of the naval operations in that region. A torpedo of special design had been fitted up with the apparatus, so that it could be controlled from the shore. In this way the torpedo could be very well controlled and could be started, stopped and put through various maneuvers. This is only one of the uses which can be made of said apparatus. Almost any kind of mechanism can be put in movement in this way by the use of a relay which releases a suitable device, and on the other hand we can close a heavy current circuit in order to start an electric motor, light lamps, and produce like effects. It is now proposed to steer airships by wave control, and Dr. Branly's method could be applied very well in this case. It is perhaps in time of war that it would have its chief interest, for torpedoes, or for firing submarine mines.

In order to have the apparatus work practically, we must have some means of protecting it against the action of outside sparks. This has been provided for by two different protective devices which we mention below.

Dr. Branly has mounted four different devices so as to show the way in which the method can be used. These are a set of lamps to be lighted, a small electric motor which is set running, also a pistol, which is fired by a solenoid, and lastly a large electro-magnet which lifts a heavy weight. We will use these four examples in order to make the system clear. To light the lamps there is used a solenoid for throwing on the current,

and the solenoid itself receives current from a relay. This in turn is operated from the sensitive relay of a coherer at the receiving station. When a wave is received at this end, the coherer works its relay, and this in turn operates the second relay so as to throw on the solenoid switch and light the lamps. This supposes that the coherer relay is connected to the lamp-operating circuit, but

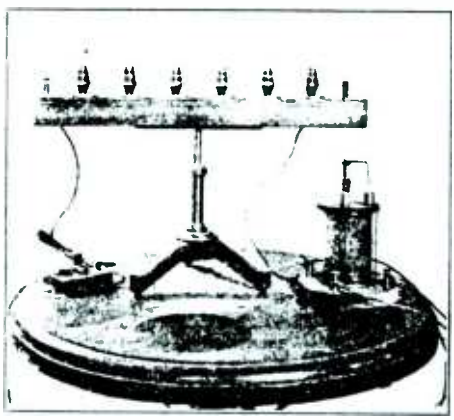


Disc Apparatus protected with Wire Gauze to Shield Against Sparks

it may be thrown over to the second circuit for the electric motor, to the circuit for the electromagnet, or the pistol firing, so that each of the four devices can be worked from the same coherer. We must now be able to connect each device to the coherer at the will of the operator at the sending post, and therefore at a distance.

To carry this out we use a device called "distributor." It consists of a shaft driven at a slow speed by an electric motor at the receiving post, and the shaft causes a set of five discs which are each provided with a fixed brush for making contact. For the first disc, the contact takes place during 1/5th of a revolution, the remainder being insulated. During this time, the coherer is connected to the lamp circuit. The second disc also carries a contact for one-fifth revolution, but this contact occurs at one-fifth further along, so that as the discs rotate we first have No. 1 for 1/5th revolution, then No. 2 comes into contact, No. 1 being now off. So that for each revolution of the shaft we make five different contacts in succession. Contact No. 2 puts on the electric motor (fan motor). No. 3 works the pistol firing and No. 4 the heavy electro-magnet. Disc No. 5 is used to connect the coherer with a solenoid switch which throws on the electric motor for driving the distributor itself. This switch has a to-and-fro action, that is, one impulse throws it on, while a second impulse will break the circuit. When contact No. 5 is on, the operator can send a spark which will either open or close the disc-motor circuit, so that he can start and stop the distributor at will.

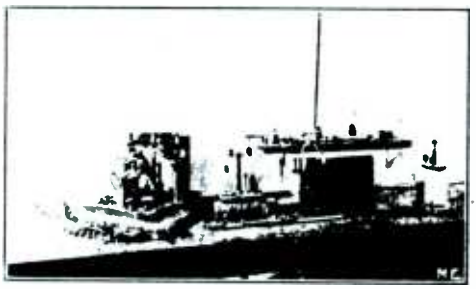
The operator can now send a signal which will operate any one of the five devices, provided he can observe the position of the five discs, so as to send the wave at the proper time. He is able to see the position of the discs by the following device. On the distributor shaft there is mounted another disc known as "control disc." It carries five projecting parts on the circumference which can bear against a fixed brush so as to make contact at each fifth of a revolution. The first contact, or No. 1, takes place when the disc No. 1, or lamp disc, begin to make contact as already noted, but the control contact is a brief one, and occurs only at the beginning of the main disc contact. The control contact is used to operate a wave-signal device which is placed at the receiving post, and this wave is sent back to the sending post. A coherer and Morse register are mounted so as to receive such signals.



Solenoid for Closing Circuit with Mercury Cups

As the distant discs revolve, the operator sees a dot (due to the control contact) made on the paper strip which unrolls before him, and this indicates that disc No. 1 has commenced to make contact. In the same way, when disc No. 2 begins to make contact (No. 1 being now off), the control disc sends a second signal back to the sending post, and this is also recorded on the strip as it unrolls. The operator sees that disc No. 1 is in contact during the time between the two control signals or dots on the paper strip,

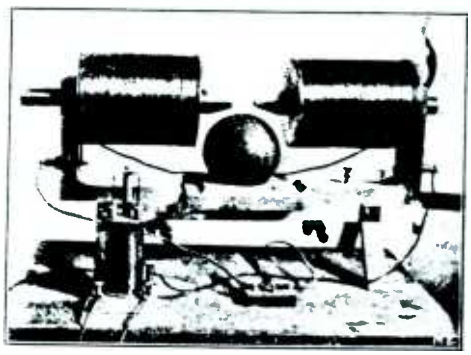
and so on. By observing the strip, he finds that disc No. 2 is in action between dot No. 2 and dot No. 3. Disc No. 3 is on in the time between dots Nos. 3 and 4, and so on. In practice the first signal is a single dot, the second one a double dot, the third signal three dots, etc., such signals being sent by sets of one, two, three teeth, etc., upon the control disc, instead of a single tooth. We are now



Device for Protecting Against Accidental Sparks.

able to operate the lamps during the time between dot No. 1 and dot No. 3 shown on the strip. In this interval we press the key, sending a wave, which operates the coherer and the lamp circuit. During the space between signal No. 2 and No. 3, we can do the same for the fan motor, as the contact is now made for it, while the lamp contact is thrown off. Between signal No. 3 and 4 we work the pistol firing, and between No. 4 and 5 the weight lifting magnet. As the control disc revolves, the contact No. 1 recommences after No. 5. During the interval between signal 5 and signal 1 we can control the electric motor of the distributor, and can now stop it if this is desired, after having produced all the four effects which we wished to carry out, or any of them. Should we wish to throw off the lamps, for instance, we allow the motor to rotate, and from signal 1 to signal 2 we send a wave. This again acts on the lamp switch, and in this is double-acting, the second impulse will break the lamp circuit. From signal 1 to signal 2 we can break the fan motor circuit, and so on, or can leave it running. In short, during the first revolution, we produce any of the four effects. During the second revolution we can throw off any one of them, or leave it on, as desired. The distributor can then go on revolving without causing any change, as long as the operator does not send waves. However, in practice it is desired to stop the disc motor when the apparatus is not in use, and the operator does this by sending the wave in the interval between signal 5 and signal 1, as above seen. When he wishes to recommence, he starts up the motor in the same way. It is to be noted that the control signals are always made on the paper strip as long as the motor keeps running, so that at any time, several hours after, the operator can observe the strips so as to note the position of the discs.

It is very useful for the operator to know whether he has succeeded in producing the effect desired in any case, for instance whether the lamps are properly lighted. This is done by the use of a check signal, which is sent out from the receiving end and is also recorded on the paper strip. On the distributor shaft is mounted an extra disc for the lamp circuit. It carries a projecting contact so that it can send a wave signal back to the first post. Such a signal can only be sent, however, should the lamp-circuit have been closed by its solenoid-switch. In such case, an extra contact is worked by the same switch, and this allows the check disc to send a signal. This signal has the form of a dash, and appears at the end of the first interval. A second check disc sends a like signal at the end of the next interval, showing that the fan-motor circuit has been properly closed, and so on. Should the dash not



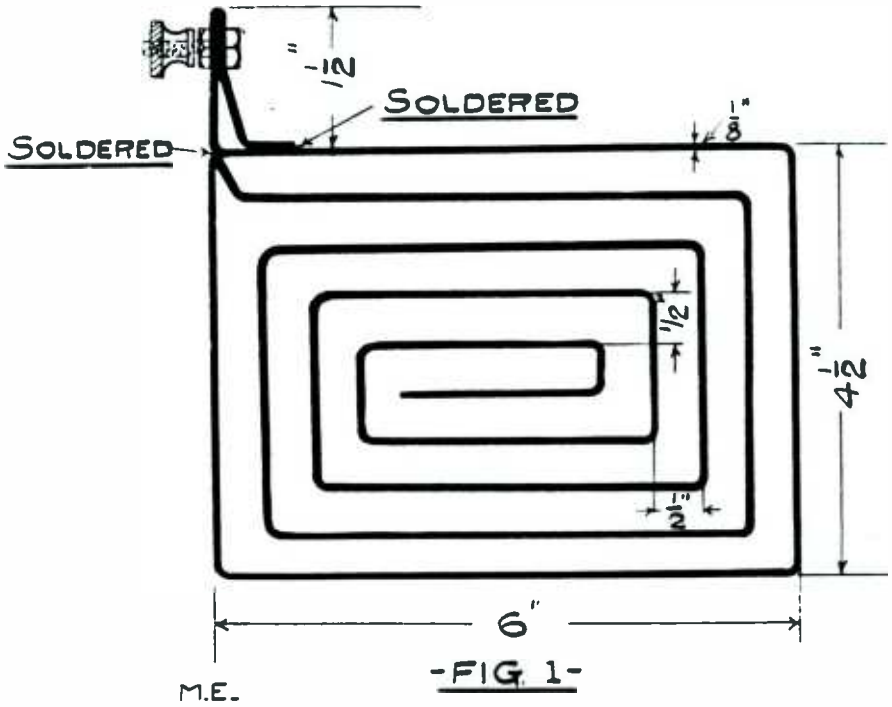
Weight Lifting Magnet, Solenoid Switch to Operate Same at Left.

appear in any case, we wait for the second revolution of the distributor, and again endeavor to close the circuit. We are thus able to tell whether anything is wrong at the farther end. There is one check signal for each of the five effects. Should we omit any of these intentionally, the check signal will of course not appear.

(To be Concluded)

The Construction of An Efficient Storage Battery

BY H. GERNSBACK.



-FIG. 1-

In the present paper the writer desires to show how with little expense and little experience a high grade storage battery can be constructed by almost anyone.

The writer, who for years was the technical director of one of the best-known storage battery companies in America, is happy to give some of his long experience to readers of MODERN ELECTRICS, most of whom have been—for unknown reasons—mislead, as far as storage battery construction goes.

The writer has had the present article in consideration for some time, but as he intended to have the experimenter construct the battery entirely himself, and as the battery should be something better than a home-made makeshift, the reader will appreciate the amount of work necessary to bring about the present model, which seemingly very simple, was not the simplest thing to conceive.

Especially the container proved a vexing problem. The writer dislikes to say "Procure a glass jar, or a hard rubber cell." He would rather have the experimenter make it himself, if in any way possible.

A container for a storage battery must naturally be acid proof. The one described in this paper is acid proof, does not break, and does not leak like glass or hard rubber.

To the writer's knowledge, a cast lead jar as the one described by him in this article has not been described previously and it will no doubt come into extensive use among experimenters, to whom the weight is not an objection.

The plate—which does not require an expensive casting machine—is simplicity itself, solid, will not buckle easily, can stand great abuse, and being made from a single strip of lead, will not corrode. The current distribution is ideal.

Two positive and one negative plate of the type described furnish a cell of 2 volts and 50 ampere hours. If therefore a 6 volt 50 A. H. battery is desired, we shall require 3 cells and 9 plates, and so on.

The only thing the experimenter needs to buy is the raw material, which should not cost very much.

Each plate requires a strip of lead 69 inches long, 1/8 inch thick, and 1/2 inch wide. This may be bought from firms carrying experimenters' materials at quite a low price.

The strip is bent as shown in Fig. 1. As will be seen the "grid" is made from a single piece of strip, soldered only in one corner (where the lug is located) to give the plate rigidity. The illustration shows that each adjacent turn is exactly 1/2 inch distant from the previous turn.

To bend the strip nicely, small pieces of wood 1/2 inch thick may be used as spacers. The length of plate is 6 inches; the height 4 1/2 inches. The lug should be about 2 inches high.

We now come to the part where all the blundering is usually done — the "pasting." This is the vital part, and on its success depends the efficiency, the life, and the capacity of a storage battery.

Pick up any text-book, or refer to most any article in the current press as to paste battery plates. It is invariably stated there: "Mix the red lead with a solution of sulphuric acid 1 part, water 4 parts, and apply to grid."

Whoever originated this famous time-old "formula" will probably remain a mystery forever. It seems that someone made a jocular statement way back in 1880, and the technical press, for lack of something better, eagerly snapped it up and has been keeping on recommending it for the last 30 years. It goes without saying that those who recommended it never tried it, as it is practically impossible to obtain a sound plate made thus. Nine times out of ten, as soon as the dried plate is immersed in the electrode, the filler falls all to pieces, to the disgust of the maker.

If by some miracle this filler stays in place, it will surely "shed" during formation or subsequent use. Besides, the capacity is very low.

Good pasting mixtures usually are kept secret by manufacturers, as thousands of dollars must be spent and long years of experimenting sacrificed to test out formulas.

There are to-day less than 40 good formulas in the world, and very few good ones are added to the list each year.

The greatest difficulty is the time test. A plate made up with a new mixture, may give a capacity twice as great as any other plate of same size and weight. It will work splendidly for some months and then suddenly lose all its efficiency.

Another variety is the plate which must be "coaxed." This plate may give barely any capacity during the first 3 or 5 charges, and improve by leaps and bounds during the subsequent ones.

Such plates are technically termed "hard" ones and are very often the best ones.

It may be stated that very little changes in the mixtures change the whole structure and capacity of a plate, thus a variation of only 5 per cent. in the formulas given below (or other good formulas), may make a difference of 30 to 40 per cent. in the ultimate capacity of the plate.

The formula and directions given below were worked out by the writer and took two years to be perfected. Over 2,000 test plates had to be made.

A few words about the "pasting" process.

For the positive plate pure red lead is used. For the negative plate litharge. Both are an oxide of lead and are readily procured from supply houses.

Make the following mixture:

Red lead, 100 parts by weight.

Sulphate of ammonia, 11 parts by weight.

The latter is a very cheap chemical. The commercially pure kind which resembles dry sand, should be used. It should be crushed to a powder (by rolling a clean, round glass bottle over it), and then *thoroughly* intermixing it with the red lead.

The sulphate of ammonia serves to make the plate porous, as no plate can give a large capacity unless the electrolyte can circulate freely in its pores.

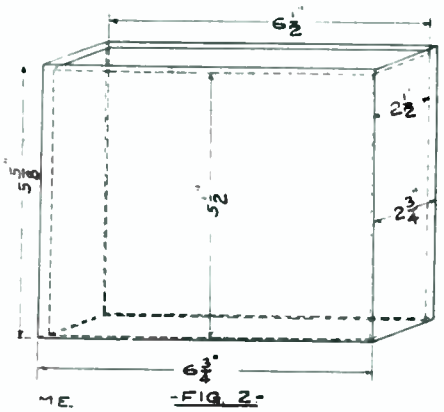
Now add to the mixture under constant mixing a solution of pure, strong ammonia, 26 degrees. This should be done in the open air, unless you are used to the strong fumes, which, by the way, are harmless. It is of the utmost importance that the mixture is stiff; it must under no circumstances flow or run. Only a stiff paste will make good plates.

Never mix any more paste than for one or two plates, as the paste hardens to a stone-hard cement in less than 40 minutes and it can not be used afterward, but must be thrown away.

Now take a clean grid and place it on a sheet of clean smooth paper, flat down. In order to make a nice plate, the grid with its paper should be placed on a smooth surface, such as a stone slab, a metal plate, etc.

Now we must "pack" the grid as rapidly as possible, as the paste hardens soon.

The packing must be done very carefully. Take a thin piece of wood, or if you have a small cement trowel, you have the ideal tool. Take small quantities of the paste and fill the plate, applying considerable pressure so as not to leave air holes. Fill up all the interstices and let the paste come above the edge of the grid at least 1/16 inch. Move your trowel or wood piece back and forward repeatedly to do away with all air holes.



ME. -FIG. 2-

Now take two or three pieces of blotting paper or cardboard, or any other moisture-absorbing paper, and place it on top of the packed grid. On top of this place a heavy piece of smooth board and on top of this place weights, such as stones, etc., to the extent of 200 to 250 lbs.

Or, if you have a letter press at your disposition, you may put the pasted plate between blotters and thus press out the surplus liquid and make the packing process more perfect.

The pressing process should last about 10 to 20 minutes for each plate. The paper is now carefully peeled off the moist grid. This must be done slowly, with patience, as chunks and small pieces are often clinging to the paper; and such holes cannot be filled in afterward, as they fall out during forming.

The plate is now ready for drying and should be placed *face downward* on a smooth, clean board. The drying must be done in the sun, and it takes about 24 hours' time to thoroughly dry the plate. It may be turned from time to time so that both sides are dried evenly. When dry it will be very hard and of a beautiful vivid red. Next it is "scraped" with a straight, sharp-edged knife. All the surplus red lead must come off, till the bright metallic lead of the grid is exposed. Both sides of the plate are scraped, of course.

When enough plates have been made and when they have been thoroughly dried and scraped, we are ready for the sulphating process.

This is done as follows:

Make a solution of sulphuric acid and distilled or rain water of 1,100 degrees. When cooled down take a plate and immerse it QUICK in the solution. See that each part of the plate is immersed. Withdraw the plate at once out in the air. You will note that the plate gives off much gas. Now dip the plate again into the solution but leave it in it for 3 to 5 seconds. Withdraw again. You will observe that the red color changed to brown. Immerse a third time and leave it in the bath for 20 hours.

After this the plate is taken out of the sulphating bath and placed in running water for at least 2 hours. It should then be well washed off with a stiff brush and is then ready for forming.

The negative plate is made by using the following mixture:

Litharge, 100 parts by weight.

Sulphate of ammonia, 6 parts by weight.

Mix thoroughly in the same manner as for the positive plate.

The moistening solution is made as follows:

Strong ammonia, 26 degrees, 10 parts by weight.

Best glycerine, 2 parts by weight.

Mix thoroughly by shaking the solution

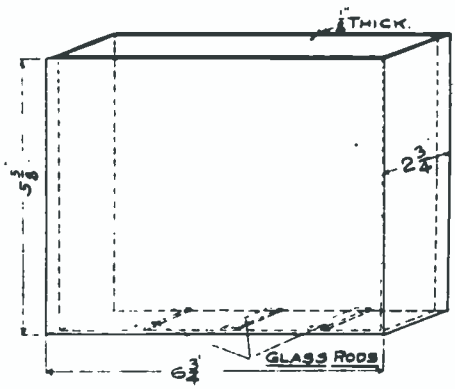
The glycerine plays an important role. It gives a wonderful texture to the formed plate, which is not obtained in any other manner. The surface of the plate feels like silk and is highly porous. While the plate is rather soft (the fingernail easily makes an impression) the material thus obtained is very tough and stands great abuse, mechanically as well as electrically.

This paste is worked exactly as the

one for the positive plate, but must be worked quicker, as it sets rapidly. The plate is then packed and dried as explained above, but does not need sulphating as the positive one.

If enough plates are made we are ready to construct the container or jar.

This is cast from one piece of lead. The form or mould, which you can either



-FIG. 3.-

make yourself or have your carpenter make for you, is simple. The only requirements are that the wood must be very dry and very hard. Maple is the best.

Fig. 2 explains the form better than words. A solid center block of dimensions as given, is made. Around this is built a wooden box, the walls of which in order to obviate the danger of warping, should be at least one inch thick.

When the finished box is placed over the block, there will be a clear space of 1/8 inch inside. Both block and box are placed on a board on which a film of dry, fine sand has been placed. The spacing between block and box must be done accurately.

Next melt in a ladle a sufficient amount of lead to which is added 8 parts of antimony. The antimony serves the purpose to harden the lead. The finished jar therefore is stiff and can not be bent easily.

The lead melts much faster than the antimony and it will take somewhat longer to melt the latter.

As soon as melted pour the metal quickly without stopping in the mould. The metal must cover the block about 1/8 inch, and as the box is this much higher it will only be necessary to fill up the metal to the upper edge of the latter.

When cold the form is opened and the finished jar taken out. It will appear as in Fig. 3.

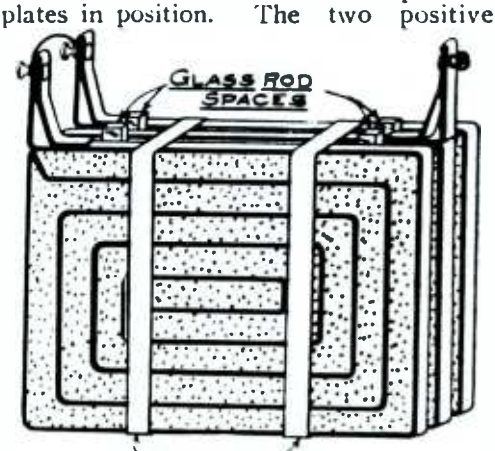
In order to prevent sticking, it is well to rub all the inside parts of the form with talcum. To further facilitate withdrawing the block from the metal jar, it may be made a little wider at the bottom than at the top, but this will make the jar thicker at the bottom and somewhat heavier.

From a single form 4 to 6 jars can be made. After this the heat chars the wood and makes the form useless. As most experimenters, however, will hardly make more than 3 to 4 jars, one form will usually do.

Next all plates are provided with binding posts, which may be taken from old dry cells. The mode of connection is shown in Fig. 1. The back part must be soldered and should then be painted with black asphaltum paint to safeguard against corrosion.

Next the elements are assembled as shown in Fig. 4. Each element or unit is composed of 2 positive and 1 negative. The plates are spaced 1/4 inch apart from each other by 4 glass rods 1/4 inch thick, as shown. If glass is not at hand, use well paraffined pieces of wood.

Two stiff rubber bands are placed around the element which keeps the plates in position. The two positive



-FIG. 4.-

M.E.

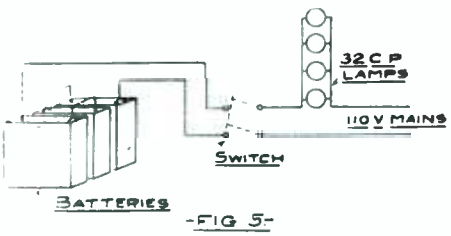
plates are joined together by a heavy piece of lead wire or lead strip.

In ordinary storage batteries there is usually one more negative plate than positive. As will be seen, the writer uses one more positive than negative. The reason is that it is really the posi-

tive which gives the capacity, and by using more positives, greater capacity per weight is had. Of course, we really lose one positive, as one side of each positive (the one away from the negative) is lost. If we should put a negative on each side of the positives our capacity would be 100 ampere hours, but this would increase the cell unduly, and besides most experimenters are satisfied with a 50 A. H. battery.

Next we place three short pieces of glass, or hard rubber rod in the bottom of jar, Fig. 3, and carefully place the element in the jar so that the plates rest on the insulating rods. The element must be placed so that it does not touch the lead jar, which would short circuit the plates.

An excellent plan to prevent this is to cut 4 pieces of glass to fit the 4 inside walls of the jar. Short circuiting is then impossible.



-FIG 5-

If all the cells are assembled the positive plates of one cell are connected to the negative of the next. This leaves one positive and one negative end terminal.

All cells are then filled with pure sulphuric acid (electrolyte) of 1,180 degrees.

The positive terminal of the battery is then connected *to the positive of the charging current,* the negative of the battery *to the negative of the charging current.*

The charging current should be preferably 110 volts and about 4 amperes. Only direct current, of course, can be used.

Four 32 C. P. 110 volt lamps connected as per diagram in Fig. 5 will give 4 amperes, necessary to charge the batteries.

It is, of course, not necessary to use 110 volts, any voltage will do, as long as it is about 20 to 33 per cent. higher than the voltage of the battery. If we have, say, 4 cells, the voltage of same will be 8 (2 volts per cell), therefore the charging current must be about 11 to 12 volts. The amperage under all circumstances should be 4.

The battery is then charged for 12 hours. At the end of this period it is discharged through a resistance, lamps or a motor, etc. The positive plate is now chocolate brown, while the former white negative is of a beautiful dark slate gray.

After discharging the battery is again charged for 12 hours, discharged, charged and discharged a third time.

The battery is formed now.

All the elements are now taken apart. The forming electrolyte is thrown away and all plates and parts thoroughly washed with a stiff brush.

Then all elements are assembled anew and placed in the clean container, in which the regular electrolyte of 1,250 degrees is poured.

The battery is recharged at once and is now ready to do hard work.

With ordinary care it should last for years.

To safeguard the brass terminals from corrosion, keep them always well covered with vaseline.

This battery will stand hard work and short circuits—unless prolonged—and is especially to be recommended for wireless work.

It is self understood that the jars must be insulated from each other and must not touch under any circumstances. By placing each jar on two porcelain wire cleats the insulation will be perfect and no shunts are liable to be created.

SOME DONT'S.

Don't run any cell below 1.8 volts.

Don't wait long to have it recharged.

Don't test it with an ammeter alone.

Don't lay a screwdriver or file across the connections to make it spark.

Don't recharge with alternating current.

Don't bring a lighted cigar near a battery during the charge.

The Tuba Lamp

By Our Berlin Correspondent.

In the August issue of last year the writer described this lamp, which as will be remembered is a combination of the ordinary incandescent lamp and the mercury vapor lamp.

The new type, which its inventor, Mr. Robert Hopfelt, is now making, is shown in the illustration. The old type, in which the U tube is enclosed in a glass bulb, has been illustrated in the writer's article in the August, 1908, issue.

Mr. Hopfelt made the following statement:

"In the year 1906 a patent was granted to me on a lamp, in which the carbon filament did not burn in a vacuum, but in mercury vapor mixed with another condensing gas.

The mercury, of which only a very small quantity is contained in each lamp, is at the bottom of the U tube if the lamp hangs vertically. However, it does not make any difference in which position the lamp hangs, as it works just as well in a horizontal position.

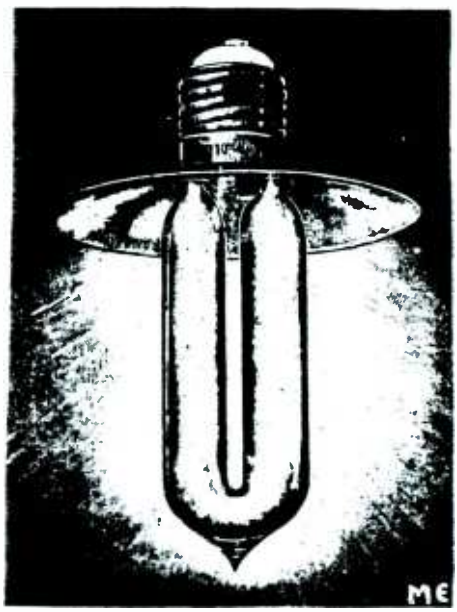
A further advantage of the new lamp is that it works on both direct and alternating currents. It is of course evident that the new lamp can be made for all voltages, in fact, the company which now manufactures my lamp makes them from 100 to 250 volts.

At first sight it would appear that the lamp would not stand transportation, but this is, of course, not so. In fact, the breakage is less than with the ordinary incandescent lamp and 50 per cent. less than with the Tungsten lamp.

The Tuba lamp lasts from 600 to 700 hours and gives a pure white light. All the new lamps, as per illustration, are frosted and have a nickeled reflector attached permanently to it. Size over all is 4 1/2 x 3 1/4 inches. The size of the V tube only is 3 1/4 x 1 1/4 inches. All lamps take 1.6 watts per candle, which, considering the pure white light the lamp gives, seems to be a great advance. The selling price of the new lamp is much less than for instance that of the Tungsten lamp, and if one considers that the factory guarantees safe delivery of the lamp, it is about the best all around lamp now made.

Several novel points were found in the new lamp. One is that the candle power output increases as the lamp grows older, and the current consumption decreases, contrary to other lamps, which grow duller while taking more and more current. The following values make the above clear; they were obtained by the Berlin State Laboratory:

Time in Hours.	Candle Power.
0.2	29.6
24.0	30.0
100.0	35.5
200.0	38.4



Another phenomenon is that some lamps (which not having been pumped out as well as others) light up in the dark merely when shaking them. The light obtained is, of course, very weak.

Very few people know that the life of frosted incandescent lamps is from 20 to 25 per cent. shorter than that of clear lamps.

No satisfactory explanation has as yet been found to explain the phenomenon. Some claim that the heat inside of frosted bulbs is higher than that of clear ones, while others think that the strongly reflected light in the inside of bulb destroys the filament more rapidly.

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EDITORIALS.

It undoubtedly interests our readers in what parts of the world MODERN ELECTRICS is being read.

Naturally the greatest amount of the 18,000 subscribers is located in the United States. Next comes Canada, then England.

The other countries are represented as follows: Mexico, Australia, (New Zealand), Transvaal, Portugal, Germany, Spain, Belgium, France, India, Turkey, Cape Colony, Luxembourg, Japan, China.

Mexico has the greatest, China the smallest amount of subscribers after England.

There are several more foreign countries, which, however, having only one or two subscribers, are not included in above list.

There is practically no civilized country on the globe to-day where MODERN ELECTRICS is not being read, and the amount of subscribers in the foreign countries increases rapidly.

That our foreign readers take a lively interest in wireless matters is demonstrated in this issue's wireless contest, where a subscriber from Australia carries off the prize. It is interesting to note what kind of instruments he uses and how he brings about the varied effects—considered from the American standpoint.

We can learn a great deal from our cousin antipodes, not alone in wireless but in other everyday matters.

WIRELESS IN CHINA.

(Consular Report.)

Consul Gracey, writing from Tsingtau, says in regard to the plan for using wireless telegraphy in China:

"The acting president of the board of communications has sent an order to the telegraph administration in Shanghai directing it to obtain from foreign firms tenders for wireless telegraphic installations which the government desires to establish between the Altai mountains and Ahslen, in the Northwest of Chinese Turkestan.

"The question of a wireless telegraph installation in the interior was pointed out by the administration as one of the most important needs of China to-day. It is said the board considers it practically impossible to establish the ordinary land lines across the great deserts between Peking and the extreme Northwest, but the natural difficulties could be surmounted by the use of wireless. Balkson's system is considered by the board to be the newest and most efficient, and the administration was instructed to make the necessary inquiries, and was also given a list of questions as to the technical matters which it was its business to answer."

MESSAGE FROM MARS? NO, FROM HAWAII!!

Through experiments at a wireless telegraph station on Mt. Wilson—a mile high—near Los Angeles, the loftiest known station in the world, local officials of the Southern Pacific telegraph school have succeeded, they believe, in tracing to their origin mysterious signals that have puzzled operators for more than a year, reports of which have attracted the attention of scientists the world over.

Also the experimenters have read for the first time signals sent from the Hawaiian islands, more than 2,000 miles distant.

The success of the tests just completed may result in the installation of a permanent station on Mt. Wilson, for the purpose of reaching out still farther in the field of wireless communication.

Among the strange signals picked up was a cipher code, apparently used by Japanese naval or merchant vessels. It is made up of numerals, each figure representing a letter or word. These signals are supposed to have been sent from points on the ocean not far from Seattle.

In carrying on their tests on the mountain, the operators and electricians suffered greatly from the cold. Their station was out in the open, and their most important work was done at night.

With a railroad lantern on the telegraph desk the men remained at their posts, receiving instruments strapped to their heads, listening for anything that might be picked out of the ether.

GUIDING VESSELS AT SEA.

Some time since the question was brought up of using a method of signaling to ships by wireless in order to show them their position at sea, and the route which they should take. A company has been recently formed in France in order to operate a system of this kind. They propose to apply it specially to the entry of harbors so as to indicate to the vessels the proper course to take when entering the port. A new method has been devised which is claimed to be much superior to what has been proposed. Two posts are erected, one on each side of the harbor, upon islands or projecting points of the coast. They send out waves which are below the regulation limits of 300 meters, and each post has a motor-driven device which sends automatic signals of a certain character and a uniform duration. Each station in the region has a characteristic signal. On the vessel there are three different devices. The first instrument has an electrolytic detector and a chronograph device for observing the time-length of the signal, so as to identify the station. To determine the distance of the ship from the station there is used the method of measuring the energy of the waves. The reading of the energy corresponds to distances which are indicated on a chart, using a series of circles or zones around the station. A first approximation is made by using a sliding resistance which cuts down the current in the detector to zero, thus indicating the energy. For the exact measurement a direct reading balometer of a special kind is used, and by taking two readings we find the intersection of the circles on the map for the two posts, and therefore the position of the vessel. The latter can thus be steered while observing the instruments, so as to keep in a certain line or course. This method is claimed to be superior to what has been proposed, as it is direct reading, while other methods take three minutes, say, to find the point, and meanwhile the vessel could have run 6,000 feet ahead.

ALTERNATING CURRENT BATTERY.

At first thought it seems incredible that there could be such a thing as a primary or other battery giving an alternating current. However, such a cell has recently been invented by a Frenchman.

The electrodes are composed of ordinary sheet iron, which are placed in a solution obtained by mixing equal parts of a concentrated solution of bichromate of potash with a 2 per cent. solution of ordinary sulphuric acid.

When tested by means of a voltmeter this cell will give a reading between 0.4 to 0.5 volts. In five or seven seconds the polarity is reversed to 0.4 to 0.5 volts. If one has a voltmeter with center scale, the needle will first show plus 0.5 volts; after a few seconds it will show minus 0.5 volts, and so on. This is kept up for hours. No satisfactory explanation of the odd phenomenon has been obtained as yet.

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 existance M. E. will oppoint one) name and address of owner.

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

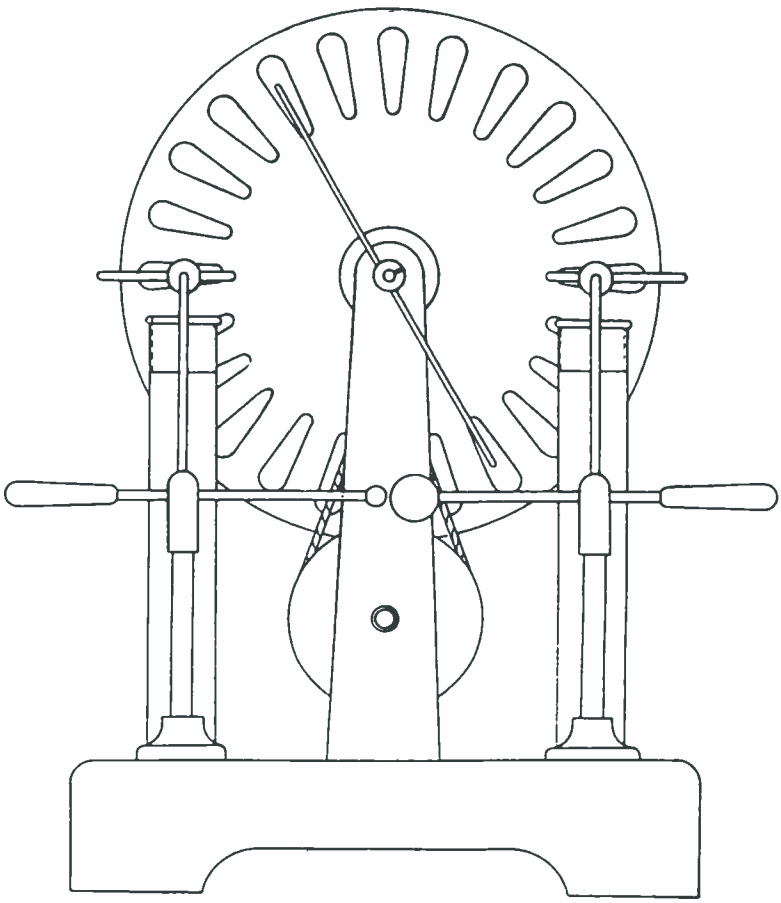
NAME AND ADDRESS OF OWNER.	CALL LETTER	APPROXIMATE WAVE LENGTH IN METERS.	SPARK LENGTH OF INDUCTION COIL.
C. A. Stone, 632 Cincin. ave., New Haven, Conn.	G.K.S.	35	1 ins.
Harry Brant, Evesham ave., Govans, Md.	S.S.S.	51	1 "
A. P. Morgan, 358 Valley Road, Upper Montclair, N. J.	M.M.U.	350	3 KW.
A. G. Rayeraft, Manhattan, Nevada	A.R.M.	200	12 ins.
A. G. Rayeratt Tonopah, Nevada	N.K.M.	200	12 "
E. N. Harris, Renton, Wash.	3—B	235	5½ "
Branson M. DeCou, Blair Academy, Blairstown, N. J.	B.M.D.	180	6 "
Malcom H. Smith, 135 Prospect st., Gloucester, Mass.	M.S.M	170	¼ KW.
A. Inderbitzen, 125 W. 105st st., New York City	A—1	200	2 ins
John Christenson, 750 W. Diversey ave., Chicago, Ill	J.C.C.	45	2 "
J. L. Douglas, 213 Main st., E. Orange, N. J.	J.L.D.	210	1 "
Ralph T. Morse, 2304 N. Del. st., Indianapolis, Ind.	R.T.M.	115	2 "
Kenderick Noble, 11 Shonnard Terrace, Yonkers, N. Y.	K.N.Y.	85	½ "
Mervyn Sullivan, 2835 22nd st., San Francisco, Cal.	M.S.M.	110	1 "
E. L. Showers, 783 Hemlock st., Los Angeles, Cal.	E.L.S.	270	2 "
Wm. Kuhn, 1422 W. 9th st., Los Angeles, Cal.	W.E.K.	270	2 "
John Love, Curly, Nebr.	J.K.L.	300	6 "
*V. Doran, Roseville, Cal.	V.D.M.	210	..
Earle Godfrey, 145 St. Charles pl., Atlantic City, N. J.	G.X.M.	100	2 "
C. F. Williams, 25 Blymyer ave., Mansfield, Ohio.	F.W.M.	110	2 "
Henry L. Winans, 736 6th st., Petaluma, Cal.	L.W.M.	75	1 "
*Stanley Russell, 25 Hancock st., Somerville, Mass.	S.R.M.	125	..
Ely Raymond, 9 West ave., So. Norwalk, Conn.	R.D.M.	525	2 "
Russell Frost, Jr., 12 West ave., So. Norwalk, Conn.	R.F.M.	525	2 "

NAME AND ADDRESS OF OWNER.	CALL LETTER	APPROXIMATE WAVE LENGTH IN METERS.	SPARK LENGTH OF INDUCTION COIL.
Lowell M. Alexander, Box 124, Sparta, Ill.	L.M.A.	200	..
Geo. Rauch, 216 W. 20th st., Little Rock, Ark.	K.C.M.	300	3 "
L. W. Virtue, 512 Belmont ave., Seattle, Wash.	L.V.M.	25	¼ "
Ernest Waidler, Toledo, Ohio.	R.W.M.	250	2 "
*Geo. D. Henderson, 2827 Southport ave., Chicago, Ill.	G.H.M.	375	..
M. E. Flores, 1921a Blake st, Berkeley, Cal.	M.F.M.	200	3 "
John T. Meyer, 315 W. 49th st., New York City	J.T.M.	100	1½ "
*Jos. M. Hoffmann, 129 E. 92d st., New York City.	J.M.H.	175	..
Andrew M. Coyle, 157 W. 123d st., New York City.	A.C.M.	200	2 "
*Chas. Griffis, 1815 Union ave., Los Angeles, Cal.	C.W.M.	250	..
N. Hayward Carr, 17 Central st., Newport, R. I.	C.H.M.	150	¼ "
J. C. Sewall, 21 W. 126th st., New York City.	S.P.M.	90	½ "
R. R. Rees, 521 W. 9th st., Erie, Pa.	R.R.R.	130	¼ "
*Rudolph M. Rom, 83 Bartlett st, Brooklyn, N. Y.	R.M.R.	350	..
R. H. Depew, Jr., 1019 Hillside ave., Plainfield, N. J.	R.D.M.	250	1 "
*Harry A. Roberts, Portland, Me.	H.A.R.	100	..
Karl Schlitz, 28 Jefferson st., Brooklyn, N. Y.	K.S.M.	60	2 "
E. A. Robertson, 246 Manhattan ave., New York, N. Y.	E.A.R.	Var	15 "
Lakewood Wireless Tel. Co., 12511 Detroit st., Lakewood, Ohio.	L.W.S.	75	7½ "
Lloyd Stevens, 23 R. D. No. 4, San Jose, Cal.	L.S.M.	175	2 "
Wm. F. Crosby, 136 Pow ave., Newark, N. Y.	W.F.M.	200	½ "

Receiving stations only.

The Construction of a Static Machine

By MARTIN I. LEWIS.



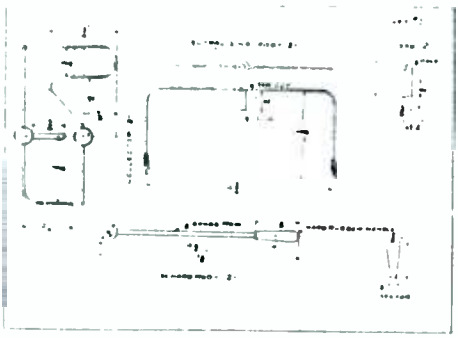
By referring to the drawings any one should be able to build a satisfactory static machine. We will first consider the plates, as these are the vital parts of the machine. They are to be cut from clear window glass, of as white a color as can be obtained; six inches in diameter, with a ¼-inch hole in the exact center of each. One word about drilling holes in glass. This is a very easy operation if you have a small breast drill and a good sharp diamond-pointed drill. The drill should be operated at a pretty good speed, with a slight constant pressure until half way through, when the plate should be turned over and the hole finished from the other side. The hole can be reamed out to the proper size with a small rat-tail file. Keep the drill well lubricated with a mixture of turpentine and camphor while drilling.

Next, the bosses. In this case, a pair of spools were used with the flange cut off at one end and a piece of brass tubin ¼-inch outside diameter, ⅛-inch inside diameter, and 1¼-inch long, driven into each. A groove should be cut in the end of each boss to take the belt, as shown in drawing.

Now wash the plates clean, and dry them thoroughly. Cut two washers from thin felt or flannel, and glue one on the large end of each spool with warm carpenter's glue; smear a little glue on the other side of the flannel washers, and allow them to dry for about five minutes. Then press firmly onto the glass, exactly in center of same, and al-

low them to dry about twenty-four hours. After drying, the plates should be given four coats of shellac varnish, being sure that each coat is dry before the next one is applied. In fact, it is a good idea to warm the plates between each application. They should be of a nice amber color if varnished properly.

Now cut out of heavy lead foil or tin foil, 48 sectors, as shown in drawing, and stick them onto the plates with thin glue or thick shellac. The best way to do this is to lay the plate down on a full size drawing of the same, and paste



a sector over each one, shown on the drawing; in this way you will be enabled to stick the sectors on evenly and have them properly spaced. The driving pulley should be turned out of well-seasoned wood to size shown in drawing, with a ¼-inch hole through the center of same for the driving shaft.

The base board is shown very clearly in the drawing, and needs no special comment other than it should be made of some wood which will not warp. Well seasoned poplar or walnut is best. It should be finished smooth and given a couple of coats of black enamel.

The standards, the details of which are shown clearly in drawing, are of wood, and care should be taken that the holes for the two shafts are exactly opposite. They are to be glued in the holes mortised in base.

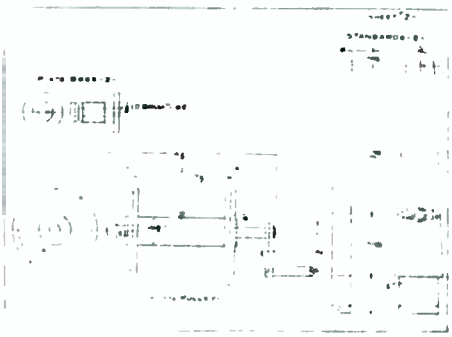
The balls used on the various parts can be ordinary lead bullets drilled to take the brass rods. The neutralizing rods are of No. 18 copper wire, fitted with brushes of tinsel cord, such as is obtainable at any dry goods store. The neutralizing rods are soldered to a piece of ⅛-inch inside diameter brass tubing, which is split with a hack saw from end to end; the tubing then is pressed together so that when placed on the plate shaft it grips the same firmly. The plate shaft is to be of ⅛-inch Bessemer steel, and the driving shaft of ¼-inch Bessemer steel shafting.

The crank should be made of ⅛-inch sheet brass, to which has been sweated a brass nut to screw on end of driving shaft.

The collecting combs are made of No. 18 copper wire, with two points soldered on each, and shaped and made to dimensions shown in drawing. They embrace both plates as far as the inside edge of the sectors.

The collector supports consist of two ¾x6-inch test tubes, procurable at any supply house, varnished with shellac; each one should be fitted with a rubber cork through which a hole has been drilled, so that the collector holder fits tightly in same.

The discharging rod supports are of ¼-inch glass rod 4½ inches long. The metal heads on top of each are of brass rods ⅜-inch in diameter, with a ¼-inch hole ½-inch deep drilled in one end of each, so as to set firmly on the glass supports. A little cement applied to the supports before placing the brass heads on them will make them secure. A 1/16-inch hole should be drilled in top of each head to take the connecting wires of the collecting combs. Also drill one ⅛-inch hole in each horizontally to take



the discharge rods, one of which is fitted with a ½-inch ball and the other with a ¼-inch ball. The discharge rod handles are made from ¼-inch hard rubber rod to size, as shown.

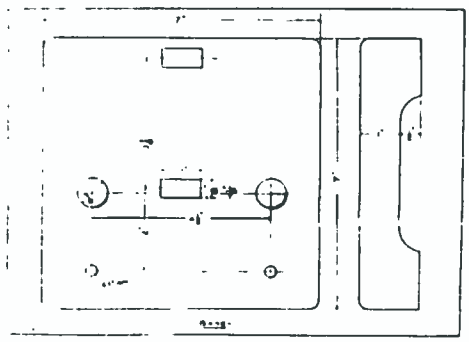
The machine should be assembled as shown, crossing the belt farthest from the crank side. The other belt should be straight, in order that the two plates may revolve in *opposite* directions. The brushes should be placed so that they divide the plates into four equal parts.

And for a right-handed person turning the crank, the rear one should set in the position shown in the sketch of the completed machine. The other brush should be set just opposite.

ASSEMBLING.

We will assume that you have completed the various parts of the machine, and that you are now ready to assemble same.

Glue the standards, test tube collector holder and the discharging rod supports in their respective places. When the glue has become quite dry give the base and standards a couple of coats of medium thick shellac, to which has been added enough lamp black to make a nice smooth black varnish. (Do not varnish the test tubes or rod supports with black varnish; they should be varnished with



pure shellac.) Now put the driving pulley in place, clamping same to the shaft by means of the screw in the center of same. The plate shaft should next be inserted through the holes near the top of standards provided for same. Of course, the plates are placed on the shaft as you push it through. The screws on top of the standards should now be screwed down until they clamp the shaft quite firmly and prevent same from turning. Now we are ready for the belts. I find that common cotton string heavily beeswaxed is very suitable for this purpose. Take a piece and pass it under the driving pulley on the crank side of the machine and over the boss, tying the end together tightly. Now pass another piece of string under the driving pulley, but cross it before passing around the opposite boss. This will cause the plates to revolve in opposite directions. Now press the neutralizing rods on the ends of the plate shaft so that the brushes gently wipe the sectors as the plates revolve. Screw the crank onto the end of driving shaft.

Now set up the collector combs by pushing the short brass rods on the ball through the hole in rubber cork and glueing the corks in their respective test tubes. Connect the long end of the collector with the discharging rod head. Pass the rods through the holes in head for that purpose, and press on the handles. The machine is now complete, and should generate instantly.

I have a machine made exactly like the one described, and it has never yet failed to give me excellent results. You will readily see that by increasing each part in proportion you can build as large a machine as you wish.

W. A. O. A.

The Wireless Association of America was founded solely to advance wireless. IT IS NOT A MONEY MAKING ORGANIZATION. Congress threatens to pass a law to license all wireless stations. The W. A. O. A. already has over 2,000 members—the largest wireless organization in the world. When the time for action arrives, the thousands of members will exert a powerful pressure to oppose the "wireless license" bill. This is *one* of the purposes of the W. A. O. A. There are more

WIRELESS BUTTON.

Commencing July 1st the price of the Association button will be raised to 20 cents instead of 15 cents. The manufacturer found it impossible to continue making the buttons for 15 cents. Hence the raise in price.

The finish of the new button is much better than the old style. It is heavily triple silver plated and wears for years. Background of letters is hard dark blue enamel, flashes of pole are laid in in hard red enamel.

Button has screw back. It is the handsomest button made. Your money back if you don't like it. Send for free W. A. O. A. membership card. It protects your interests.

A green wrapper on MODERN ELECTRICS means your subscription has expired. You want to know what's going on in Electrics, don't you? Send in your sub. before you forget it.

Correspondence.

H. Gernsback, Editor,
New York City.

Dear Sir:—I hope you will allow me a little of your valuable space, as I wish to correct an impression given by your excellent editorial in the March issue. Wireless telegraphy is by no means a "dead art" in England, and it has many enthusiastic devotees. Personally, I was one of a group of four stations using ten-inch coils and long antennae, and there are many other private stations of various sizes. It is, of course, necessary to have a license from the Postmaster-General, but *no charge* whatever is made for it, and one only has to explain that the station is to be used for experimental (as opposed to commercial) purposes.

This license places the experimenter under a moral obligation not to (1) interfere during the transmission of other messages; (2) listen in on Government messages; (3) use all means in his power to assist ships in distress if his station is so placed that he may receive their messages. Failure to comply with these perfectly reasonable conditions may lead to the infliction of a fine or the confiscation of the offender's apparatus.

For obvious reasons, the Government reserves the right to take control of wireless instruments in the event of war, if deemed necessary.

I hope that my brother wireless enthusiasts in America will be guided by your well-timed remarks, and that there may be no need of legislation.

I am sure that a little thought will convince them that it is as much a breach of good manners to interfere with a wireless mesage as it would be to "butt in" on private conversation. Both may lead to painful results.

Wishing you every success, I am,

Yours very truly,

L. R. GLEASON.

London, England, June 1, 1909.

WIRELESS SAVES 410 PASSENGERS.

On June 12, wireless telegraphy played a prominent part in the saving of the crew and passengers of the Cunard line steamer "Slavonia," which is a total wreck, two miles southwest of Flores Island, of the Azores islands.

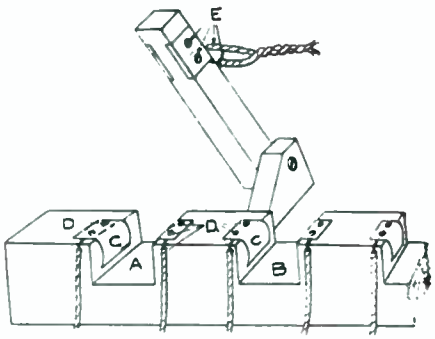
The wireless feat of the steamer "Republic" was equalled if not excelled. The steamer "Prinzess Irene" was 180 miles away when the thrilling call, "C. Q. D." was picked up. Immediately upon receipt of the message of distress the operator flashed back his answer and learned the location of the stricken ship.

The "Prinzess Irene" then hastened at full speed to the rescue, and every soul on board the "Slavonia" was saved.

A NOVEL SWITCH.

A few weeks ago I decided to make a small switchboard to use with a few cells of dry battery. The thing which puzzled me most was how to make the switches. After trying to make two or three different kinds, I decided to use this one, since it was the easiest.

First take a piece of redwood, or any other wood which does not split easily, one inch thick, and two inches wide, the length is immaterial. Three-quarters of an inch from one end cut a notch, 5/8



M.E.

inch wide and one inch deep, as at A. Then one inch, or as far apart as you wish the switches, cut another notch of the same dimensions, as at B, and make as many notches as there are to be switches.

Then get some spring brass, 3/4 inch wide, 1/32 inch thick, and cut off pieces one and one-half inches long. Bend these at right angles, so that, when placed on the edges of the notches, they will come 1/8 inch from the bottom, as at C. Then place a piece of wire under each brass and fasten them in place with screws, D. It is better to bend the piece of brass which is in the notch, a little, as it will then make a better contact.

Now get a piece of the same kind of wood 1/2 inch thick, 3/4 inch wide, and

cut off a piece for each switch 4 1/2 inches long, and on one end of each bore a small hole. Then take some more pieces of brass, one inch long, and fasten two of these, with a piece of flexible wire under each, on the other end of the piece of wood with small tacks, as at E. Be sure that the tacks do not touch each other, because they would make a short circuit. Now assemble the parts as in the illustration, or in whatever manner you wish. These switches cost practically nothing, but are very efficient. It is, of course, understood that each notch has a lever. Only one is shown in illustration.

Contributed by

L. DRUMMOND BROWNING.

AUTOMATIC RINGING BATTERY TELEPHONE.

BY H. W. SECOR.

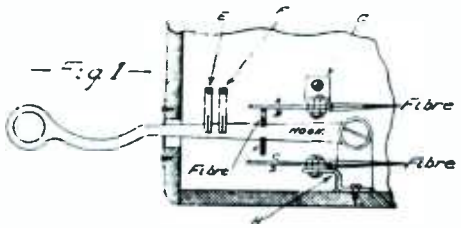
The purpose of this article is to explain how to make any common telephone automatic ringing, i. e., either party calling up the other by simply lifting the receiver off the hook.

Referring to Fig. 1. E. and F. are the regular talking contact springs, E going to the transmitter, and F to the induction coil, P and S, see Fig. 2. G and H are brass arms, serving as supports for the springs, A, B, C, and D. These springs are made of spring brass, and are about 1 1/2 inches long, 3/16 inch wide and quite stiff (about No. 24 gauge).

The springs, A and C, have a piece of platinum wire inserted at their ends, which make contact on 2 pieces of platinum foil on springs, B and D. The springs A, B, C, and D are insulated from each other and from their supports by means of fibre washers between them, and the whole clamped together by a screw and nut, as shown. On top and bottom of the hook saw or file out 2 recesses and fit into them 2 pieces of fibre 3/8 inch square by 1/8 inch thick. These actuate the springs A, B, C, and D. The hook spring, tending to push the hook up, is not shown for the sake of clearness.

From Fig. 2 it will be seen that 4 wires are required for a full metallic system; but inasmuch as No. 4 wire is used for ringing only, it may be substituted by the ground as shown, the dotted line indicating the No. 4 wire if used.

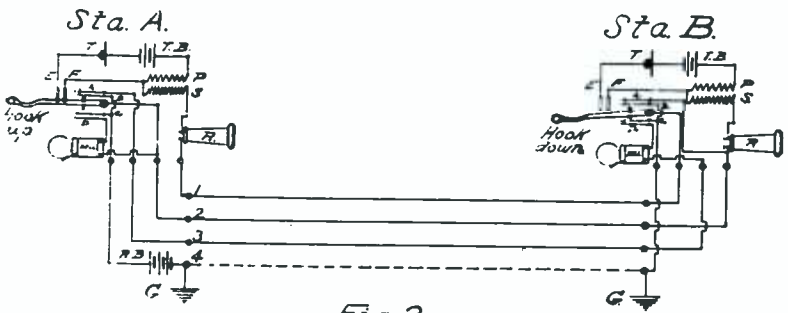
By following out the circuits in Fig. 2, it will be evident that raising the receiver from the hook at station A, will ring up station B, which will continue to ring until B answers his telephone or A replaces his receiver on the hook. R B is



—Fig 1—

the common ringing battery for the system. Wires 1 and 2 are used for talking and wires 2, 3 and 4 (or ground) for ringing. There are no push buttons or switches to operate, and as only 3 wires are really necessary, this wrinkle should commend itself to busy people as a time-saver.

A green wrapper on MODERN ELECTRICS means your subscription has expired. You want to know what's going on in Electrics, don't you? Send in your sub. before you forget it.



—Fig 2—

Paris Letter

"TELE-AUTOCOPIST."

A visit to the Ducretet establishment at Paris showed several new apparatus. One of these is the Senat "tele-autocopiste," and it is designed to reproduce drawings at a distant point, belonging to that class of instruments where the drawings is made on metal foil with an insulating ink and wrapped about a phonograph cylinder. A metal point passes over the lines of the drawing and makes a series of contacts, and this gives the reproduction on a second cylinder at the other end. In the present instrument the receiver has a metal point, which is pressed by an electromagnet against a sheet of carbon copying paper upon the cylinder, so that the drawing appears in black and white on a sheet of paper underneath. Each cylinder is run by a synchronous motor and the mechanical part is well carried out, so that the apparatus is one of the best which has appeared. It was described by M. Cailletet before the Academy of Sciences quite recently. They also have a new spark-break between two heavy zinc discs, the whole being placed inside a glass cylinder, so that the noise is much lessened and the deafening report is no longer produced. The gases are driven off by a continuous draught made in the cylinder by a small motor-driven fan and rubber tube, so that the inside of the cylinder is kept clean.

PICTURES BY WIRELESS.

An apparatus of somewhat the same kind as the above for transmission of drawings has now been operated at a distance by wireless. This is carried out in France by two young military telegraphists, Messrs. De Mailly-Chalon and L. Chantelot. As before, the metal point passes over the foil containing the drawing, but when the contact occurs, this causes waves to be sent out. When the lines of the drawing break the contact, the waves cease, and at this time a metal point is brought against the paper on the receiving cylinder, so that the point traces lines which are like the original. One use to which the apparatus can be put is the secret transmission of messages. The writing made on the metal foil is reproduced at the other end, but the sets of waves will, of course, not be intelligible to outside persons.

NEW INDUCTION COIL.

An improved method of insulating induction coils has been brought out in Germany by Robt. Bosch. It is intended for high-tension coils. As seen in Fig. 1, the usual coils have a strip of insulation between the layers, which extends out at each end of the layer so as to improve the insulation. But the end wires can become loose from a lack of stiffness, and the upper layers may fall down at the ends. Besides the ends of the coil are not well protected from moisture and are not compact. The improved method uses a narrow strip *b* having the thickness of the wire and it is fastened by shellac along the edges of each insulating sheet, the strips being put on beforehand. We thus have a definite space between the strips, which is filled up with wire, and the winding is easier to carry out. The detail of the prepared sheet is seen at 3. Again, the ends of the sheet can be turned up and overlapped, as in Fig. 4, or rolled up as in Figs. 5 or 6. A cord can be inserted before rolling up, as seen at 7, shellac being used in all these cases to make the whole solid.

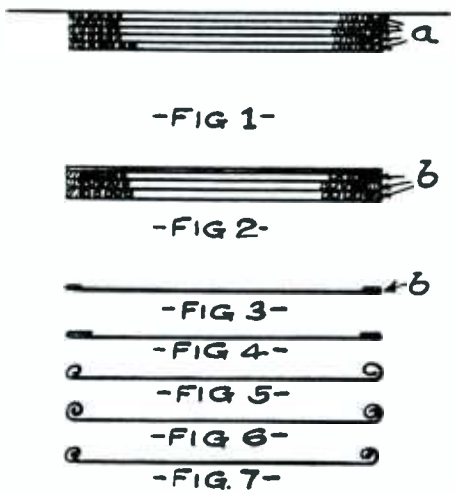
WIRELESS AIRSHIP CONTROL.

The Australian Government is to make experiments with wave-control for airships, and is now having two airships built in France for the purpose, at the Clement establishment, the same which constructed the well-known airship "Clement-Bayard." One of these will have 700 cubic yards capacity, and the other will be a smaller one, of 150 cubic yards. Each one is to have a 80-horsepower motor. The mechanism for steering by the vertical and horizontal rudders is fitted with a device for carrying out the wave control from a post on the ground. During the tests of the new airships they will not be mounted by a pilot, but the steering will be carried out entirely by wireless.

AIRSHIP ORIENTATION BY WIRELESS.

Airship matters are very active in Germany just at present, and the Zeppelin Company proposes to have a regular airship service between some of the principal cities. In connection with this, a

group of prominent engineers at Mannheim have brought out a somewhat original project. It is proposed to found in Germany a hundred wireless posts whose range will be 30 to 40 miles each, and they will send out a conventional signal at five or ten minute intervals. Each station will have a different signal and will be sending while the others are out of action. On board the airships there will be a wireless post so as to take the signals. Thus the pilots will observe



what are the nearest stations signaling to them, and can learn their position in this way, day and night, and during the worst fogs.

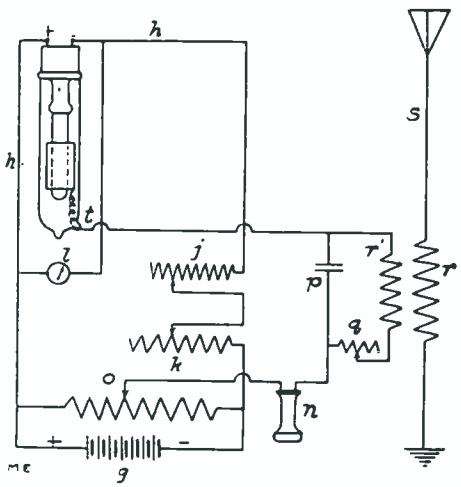
NEW CONDENSER.

The use of paraffined paper for condensers, which has many drawbacks, is replaced by other material, according to a recent German process. The new condenser is formed in the shape of a stiff tube, which can be given a rough handling and will not suffer from hard use. Paper treated with shellac is rolled under pressure or tension on a mandril, this latter being kept pressed against a heated rotating or fixed cylinder. This causes the paper to be well heated and all moisture is expelled, and the shellac becomes liquified. Sheets of tinfoil are laid in the cylinder at the proper distances corresponding to the capacity which the condenser is to have, and the tinfoil is thus wrapped along with the shellacked paper in a tight roll. Ends are left out on the alternate sides for connecting the tinfoil sheets together. Such a condenser is not easily broken down in the insulation. It is well cooled owing to the tubular form, and is claimed to have a smaller size than the ordinary kind for a given capacity.

TUNGSTEN OSCILLATION VALVE.

It will be remembered that Prof. Fleming devised what he called an "oscillation valve." Inside an incandescent lamp he places a third terminal, and we have what is known as the Edison effect, negative electricity passing across the space from the extra terminal to the positive terminal when the carbon filament is burning. It appears that the negative electricity is carried across by means of electrons coming from the carbon. When electric oscillations are passed in such a device, the waves will only pass in one direction, and we have an oscillation valve. This can now be used as a wave detector, by connecting in a telephone.

Dr. Fleming has recently patented what he finds to be a great improvement, namely that a tungsten filament is much better than an ordinary filament, and the effect is increased ten or twenty times. Tungsten seems to be the only material which will produce this effect, and it is not due to a high temperature, seeing that tantalum does not produce it and is no better than carbon in this respect. His new arrangement includes a battery *g* connected to the lamp ends, having a variable resistance *j k* in series, and a

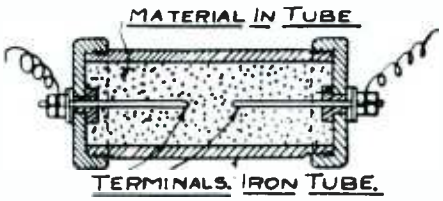


potentiometer *o* in shunt across the battery terminals. A carbon cylinder surrounds the filament inside the lamp, and from it passes the extra wire which is sealed in the bulb. The antenna *s* is connected to a transformer coil and to ground. The second transformer coil *r*

is connected to a fixed condenser *p*. One end of the condenser goes to the extra lamp terminal *t* and the other end to one pole of a telephone. The second pole of the telephone is connected near the middle point of the resistance which is in shunt on the battery, and this position is varied until the best effect is heard in the telephone.

NOVEL RHEOSTAT.

A new form of electric resistance for rheostats and the like has been patented in Belgium by Hankin and Wolff. It consists of a metal tube, such as a short piece of gaspipe, which has a cap at each end, as shown in illustration. The pipe is entirely filled up with a granulated material which is a poor conductor, and through each cap is inserted a metal rod projecting inside the tube and into the material, so as to carry the current, the ends of the two rods being separated by a certain distance, so that the current must pass through a certain length of the



ME

material. For the poor conductor, they use iron in a granulated state or plings, taking a finer grain in the case of light currents, and the reverse. The granulated iron is first wet and then dried in the air, so that each grain is covered with oxide. Before putting in the tube, the mass is again moistened and then well rammed into the tube. The two end rods are insulated from the mass of the tube by bushings or in any proper way. It is found that such a device answers very well as an electric resistance, and its range can be varied greatly. In practice, the space between the inner ends of the rods should be about double the distance from the rod to the sides of the tube.

AEROPHONY IN FRANCE.

During an interview with Capt. Ferrie, the chief of the French Government wireless service, he states that the military authorities are very well pleased with the results which Lieuts. Jeance and Colin are obtaining in the way of aerophony by their new apparatus. The most recent official test was made between Paris and Melun, as already mentioned, a distance of 30 miles, and not as was erroneously reported in the Paris daily journals, clear across the county. This latter test had to do with wireless telegraphy, and not with aerophony work. The experiments with the new system are being continued, and we may expect the distance to be increased before long. He confirmed the report that the Eiffel Tower plant had succeeded in taking the messages which were being sent from the Marconi post of Glace Bay, in Canada, to Cliffden, Ireland, but there is no exchange of messages carried on between the Tower and the Marconi posts as yet. Speaking of the new Tower plant, he expects it to be completed about the month of November.

Lieuts. Jeance and Colin give the following account of their new method of aerophony by means of arcs, which is used in the above experiments. They wish to obtain arcs which have a fixed and invariable action as nearly as possible when using the principle of several arcs in series. The second point is to obtain a continuous and regular oscillating effect in the antenna by the action of the arcs. They use an improved method for making the arcs, in which the positive electrodes are large copper cylinders with flat ends and these are cooled inside by a circulation of insulating cooling liquid. The negative electrodes are very thin carbons, held in supports which have a large radiating surface. When the circuits are adjusted, the arcs are very steady and the positive electrodes are no longer attacked, while the negative electrodes increase slowly and regularly in length on account of the deposit of carbon formed on the end, coming from the decomposition of the surrounding atmosphere of hydrocarbon gas.

To obtain the steady effect in the antenna, they use a second oscillatory circuit having an invariable character, together with an adjustable self-induction forming the secondary of a Tesla transformer, whose primary is formed by the adjustable self-induction of the oscillatory arc circuit, together with one or more adjustable condensers and a self-induction used as the primary of a second Tesla transformer. This intermediate circuit is tuned to one of the wave periods of the arc circuit. A fourth variable self-induction is connected by a chosen point to the antenna and by one

Continued on Page 164)

Wireless Department

Antennae.

By Greenleaf W. Pickard.

(Concluded.)

Both as a radiating and receiving antenna, this type is extremely directional, requiring that the sending or receiving station shall be in its own plane for best results, and not receiving from, or sending to, stations at right angles to its own plane.

The writer considers the ground connection, when used, as a part of the antenna, and unfortunately, a much neglected part. A proper ground connection should bear much the same relation to the antenna proper that the roots of a tree bear to its foliage and branches above ground. The time-honored practice of digging down deep, thereby reaching a more or less permanently moist stratum, and then interring a few square yards of sheet metal, is probably one of the worst ways of making a ground connection for a wireless station. It is not sufficient that the ground connection should merely show a low steady current resistance, but it must be of small high frequency resistance, or impedance, as well, and this is best secured by area, without regard to reaching moist soil, or using deep holes and trenches.

For a land station, probably the best ground connection that can be made consists of an acre or so of wire netting, or a radiating, cobweb-like network of wire, simply laid on the surface of the ground. This will not, as a rule, show up prettily when measured by the Wheatstone bridge, but its high frequency resistance is but a small fraction of an ohm, owing to its large electrostatic capacity to earth.

Perhaps the next best thing for a ground connection is the steel framework of a modern office building. This is well illustrated by the efficiency of stations erected on top of such buildings, despite the otherwise unfavorable conditions around such stations.

On shipboard, a good ground connection is the rule, rather than the exception. We can hardly imagine a better ground than the continuous metal structure and plating of a steel vessel.

In the practical construction of antennae, we should be governed more by mechanical than electrical considerations, at least in the matter of the wire itself. Contrary to the bulk of the publications, and the opinions of many engineers, it is almost immaterial from the electrical standpoint whether the wire is stranded or solid, or copper or aluminum, or insulated or bare. Compared with the other losses in the transmitting and receiving circuits, almost any metal antenna structure other than iron, that is mechanically strong and properly disposed, will have relatively small losses from ohmic resistance.

In this connection, the writer cannot resist the temptation to add a few words on joints. It is unfortunately only too common to find unsoldered splices, and in some cases these joints are not even twisted together, but are made after the pattern of the "bell hanger's" joint. While in transmitting, it is likely that such splices have but little evil effect, it is quite the contrary in receiving. Here the small potentials in the receiving circuit are often unable to bridge the high resistance, corroded joints, and not only are portions of the antenna actually insulated from the rest, and hence ineffective, but the joints that do conduct have so high resistance that serious damping, and consequent loss of energy take place. This reduces not only the intensity of the signals, but also, because of the increase in damping, seriously affects the sharpness of tuning.

Antennae have other uses than those of wireless communication of intelligence. Among these uses may be men-

tioned the one of direction finding, or the location of a distant station. This, as discovered in 1899 by the writer, may be accomplished by a long horizontal, or "L" antenna, either by having several of these, pointing to the principal points of the compass, or a single one that can be swung around, and noting the point where the signals come in loudest. This, however, will not determine, even under favorable conditions, the bearing to much less than 20 degrees of arc.

Stone proposed the use of two vertical antenna, separated in space by a half wave-length of the radiation from a distant station. Aside from the commercial impracticability because of limitation to definite wave-lengths, and the impossibility of using very long waves, this method will give bearing of a distant station to within some 5 or 10 degrees of arc, and is therefore, of some utility.

The writer's ungrounded loop, mounted in such wise that it can be rotated about a vertical axis, is capable of locating a distant station to within less than one degree of arc, as determined by a series of careful tests at Dorchester, Mass.

In the future, we will probably have as the equivalent of the present antennae, a device which will mold, so to speak, the electrical waves. It will perhaps be some combination of circuits that will form the electrostatic and magnetic lines of force in their proper relation, intensity and dimension without the necessity for extremely large vertical or horizontal dimensions. In addition, it will be directive, and under exact control as regards direction, without the necessity of actually moving or rotating any large or extended conductor. It will be energized from some of the several sources of continuous or undamped waves, and will project a gliding beam of electrical waves along the earth's surface, in as parallel and compact a bundle as is consistent with the wave-length employed.

Owing to the relatively great length of even the shortest electrical waves that can be used for practical wireless communication, it is out of the question to expect anything resembling the beam of light from a searchlight. But it is possible, and should be practicable to concentrate a relatively large amount of the electrical wave energy in radiation along a fairly definite path. To what extent this can be done over great distance is at present unknown. As the electrical waves used in wireless communication differ from those of light in that they glide along the conducting surface of the earth, with their feet resting thereon, it is likely that however parallel they may be at the start, there will be a certain amount of spreading out with increasing distance, as is the case with the radiation from the directional antennae of to-day.

The writer is to some extent "speaking by the book" regarding the antenna of the future. He is at present engaged in some investigations along novel lines of antenna structure, that promise improved results.

It has been stated that wireless communication is now a simple engineering proposition. This is to-day undoubtedly true for installations of small power and range, but there are still many unsolved problems in long distance working.

We know that in addition to the losses caused by imperfect conductivity of the earth's surface, there is a still more serious factor, which we call atmospheric absorption. The exact cause of this is still unknown, and the laws governing its variation are at present uncertain. This effect, it is true, can be minimized by suitable selection of wave-length, it having been found that waves of the order of 3,000 meter or longer, suffer relatively little absorption. Also, undamped waves suffer less absorption than damped waves of the same wavelength, for no very clearly understood reason.

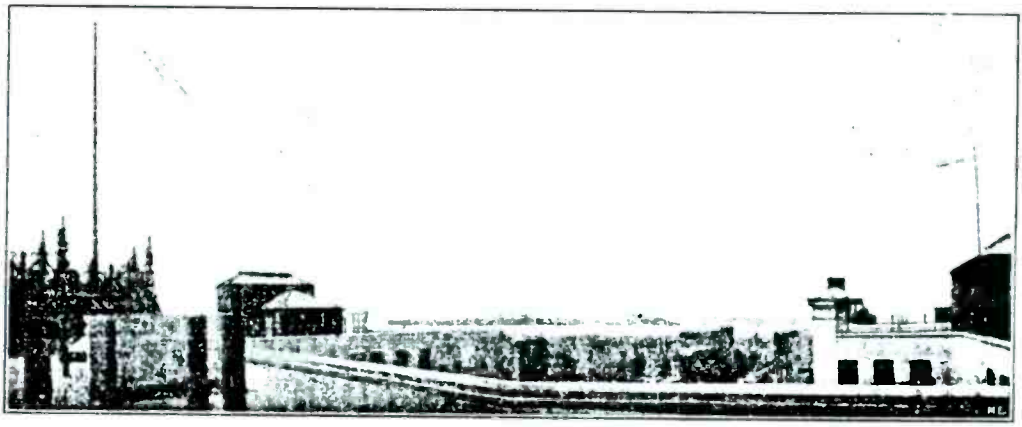
The various instruments and mechanisms of wireless stations are at present in a very unstandardized state. There is, under given conditions, an antenna, a transmitting circuit, and a receiving circuit that will give the best results. This has as yet not been worked out.

Details of apparatus are in, if anything, a still more confused state. Both transmitting and receiving apparatus suffers from inefficient complexity, or equally inefficient but preferable simplicity. There is here much room for

(Continued on Page 169)

Wireless Stations About New York

No. 1.—Station at the Plaza Hotel.



This is one of the loftiest stations in New York. It is located at the top of the beautiful eighteen-story structure at Fifth avenue and Fifty-ninth street, 300 feet above the ground. The location is an ideal one, as there are no intervening objects in a wide radius.

From the top of the hotel one overlooks a great stretch of Long Island to the east, and the Palisades of New Jersey at the west. In the illustration the Palisades Hills can be dimly made out in the background.

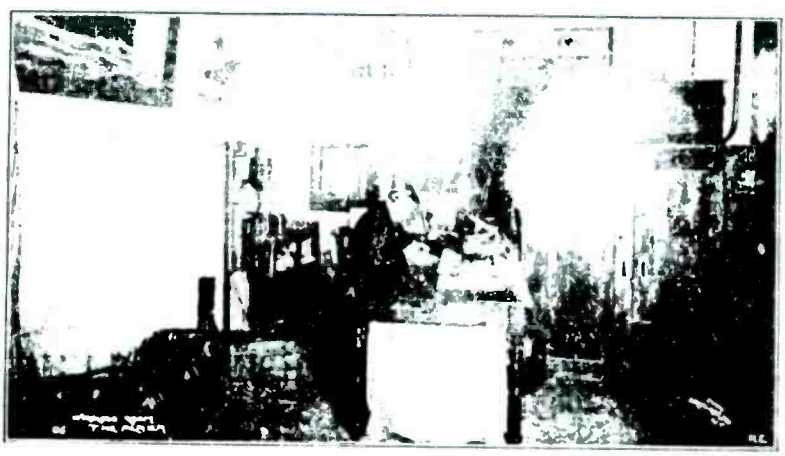
The aerial system is composed of six wires each 175 feet long, suspended between two masts, thirty-five feet high. The total distance of the aerial from the ground is therefore 335 feet. As will be seen from illustration the antenna is of the "L" shape variety.

The power of the station is two K. W. The station in good weather reaches about one thousand miles. It is usually in touch with ocean steamers as far down as Jacksonville, Fla. Guests of the hotel are able to be in communication with friends at sea for days, either when the latter depart or before docking.

The technical side of the station does not present many new features except the spark gap and Leyden jars, which are housed in a wooden "safe"! The safe had to be constructed to muffle the noise of the spark which grew objectionable to guests.

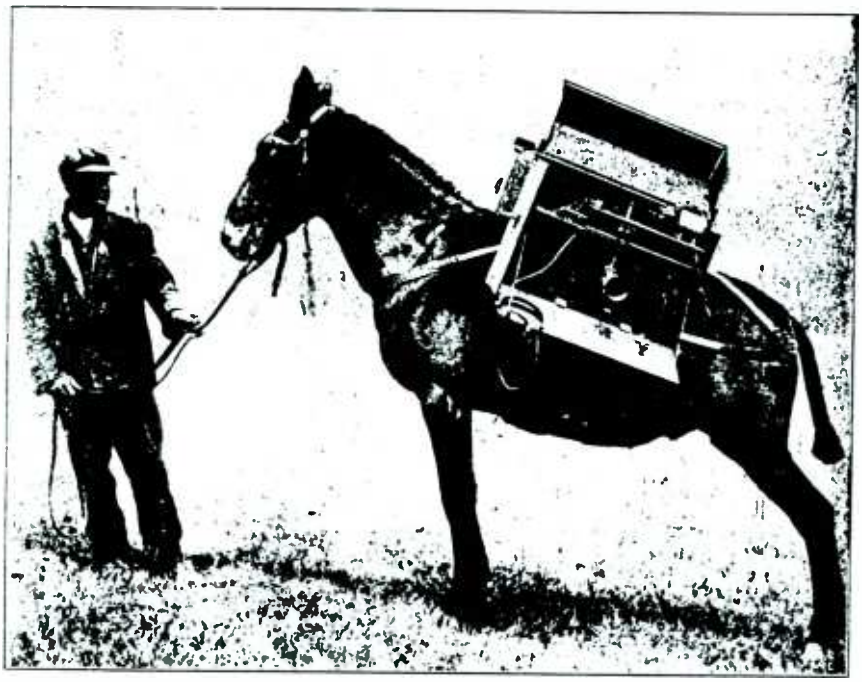
The word "safe" is not misplaced, as the construction is truly safe like, except that the material is wood. The walls are about six inches thick, filled with sound deadening material. The arrangement is so perfect that the spark can not be heard twenty feet away from the "safe."

The carborundum detector is usually used in connection with a pair of E. I. Co.'s 3,000 ohm receivers and a loose coupler.



Recent Developments in Aerophony

By Lee De Forest, Ph. D.



Transportable Radio-Telephone Outfit for Field Use.

From recent experiments I feel certain that within a short time we will be able to be in wireless communication between our station atop the Metropolitan Tower in New York and the Eiffel Tower in Paris. What the more distant future will bring forth in the science of wireless neither I nor anyone else can tell with accuracy, but definite and hitherto rudimentary factors are developing so rapidly that it is impossible to say how soon we will be able to talk across the ocean and over still greater distances. The delay in beginning the experiments by wireless across the western ocean has been occasioned very largely by the fact that the Metropolitan Tower is unfinished, and we have been unable to conduct experiments from that point.

I believe, however, that by July this factor of delay will be eliminated, and we will obtain more definite data from which an approximate date for a satisfactory and complete demonstration across the ocean will be made.

I may say that the possibilities of the Radio Telephone are almost limitless, and I confidently predict that within the next five years every ship of large tonnage that goes to sea will be equipped with the wireless telephone, and will be in telephonic communication in every part of the civilized world.

Already sounds have been carried by means of the ether waves to a distance of 600 miles, the demonstration being made from Paris to a station near Marseilles during May, 1908.

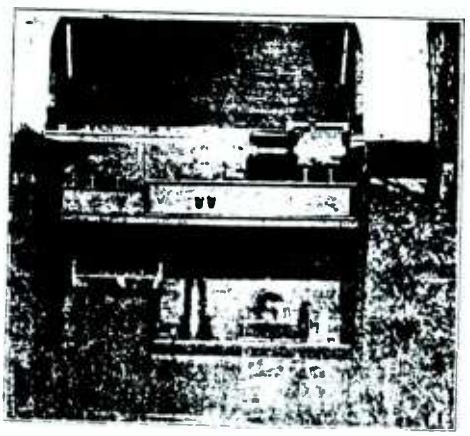
Over a year has drifted into history since that time, but we have never attempted to make a long distance record, although it may be readily understood that hundreds of improvements have been made in the apparatus since that spring day when the Old World learned that it was possible to transmit over 600 miles of land without the use of wires.

Eight years ago messages could only be sent by wireless telegraph over a distance of fifty miles, and now even by the old-fashioned spark system, wireless telegraphic communications

are almost daily held across the Atlantic. The record of wireless science shows marvelous developments since then. Aerophony is still in its infancy, but a strenuous infant it is.

Some years ago I learned through experimenting along certain lines that attuned speech could be transmitted from one point to another through the ether. The original apparatus was naturally crude, and like all other laboratory devices, simply elementary. Subsequently, tuning, detecting, and sending instruments have been vastly improved. The end, however, cannot be predicted, for each day yields its quota of definite information which clearly points to almost infinite possibilities of the raidio wireless telephone. To show how these improvements tend unmistakably toward transatlantic wireless conversation in the near future, I will call attention to the following facts:

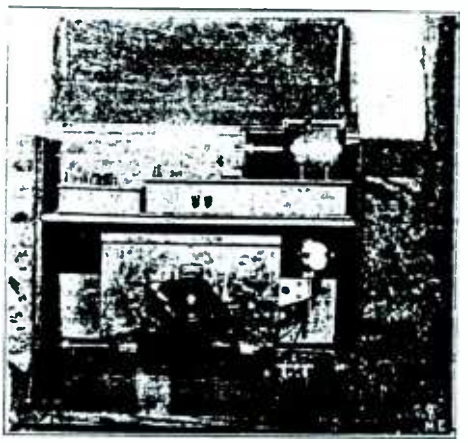
Our apparatus was installed on the American battleship fleet in October, 1907. This elementary device was guaranteed for a distance of five miles only, but proved satisfactory over a distance of 35 miles. During the tests which finally led to the installation of the Radio Telephone on this great



Wireless Telegraph Set [illegible]

fleet which circled the globe, an incident occurred which even at that early date proved the efficiency of the instrument. One morning the battleship Kentucky went aground, and the Virginia, on which the wireless apparatus had been installed was able to telephone to the Norfolk Navy Yard, five miles away, news of the accident. The officials at the Navy Yard tried to send a wireless telegraph message to the Kentucky, but failed, and then came the triumph of the telephone, when the Virginia was able to take by ear all instructions and convey them to the grounded battleship.

Our apparatus was installed on vessels of the Italian fleet a few months later, and in September, 1908, was in-



Radio Telephone Set (rear view of Photo No. 1).

stalled on the Channel fleet of the British Navy. We easily covered a distance of sixty miles. Since that time it has been operated successfully between shore stations of the Admiralty and vessels of the fleet. One specially hard test was made, which recorded the transmission of 154 code numbers (some in six and seven figures) at sixty miles, with only two mistakes, as reported a few months ago in this magazine. This is a feat which can not be excelled by wire 'phone at that distance.

Even the best of the above mentioned instruments have since been greatly improved upon. The early type of apparatus was cumbersome to a degree, although perhaps no more so that the earliest wire telephones. To-day the device has been greatly simplified. The number of parts has been reduced, and the entire apparatus takes up a fraction of the space it did eighteen months ago.

One of my latest inventions renders it possible to send and receive several messages at once through a single antenna. Far less power is used, and we now have an automatic arc and a

perfected tuning device which prevents interference and insures absolute secrecy of communication between two given points. Probably the most marvelous of all devices which together compose the successful radio telephone of to-day is a specially sensitive receiver which I invented, and is called the Audion.* This looks like a small incandescent lamp, but into the bulb there is sealed a grid and a plate of platinum, which we connect with platinum wires. This does the work which is performed in wireless telegraphy by the detector or coherer, but is infinitely more sensitive. I have also succeeded in combining the wireless telegraph and telephone in one instrument, which system is known now as the sparkless wireless system.

I became convinced that further progress along the old lines of wireless communication was a hopeless dream. The possibility of interference with messages was too great. In my new system, while the tuning possibilities are almost limitless, a feature is that it is noiseless, and it can be operated at a much lower voltage than the older methods. The speed by which a spark transmitter can be operated cannot exceed forty words a minute. I expect to attain a speed of 40,000 an hour, and in my opinion there is no question but the public can easily be induced to communicate by wireless instead of by mail or ordinary wire. The cost, too, will be greatly reduced. A retrospective view is but an indication of what may become a fact in the future. A few years after Dr. Roentgen discovered the X-ray, surgical operations were possible that were unthought of before his discovery.

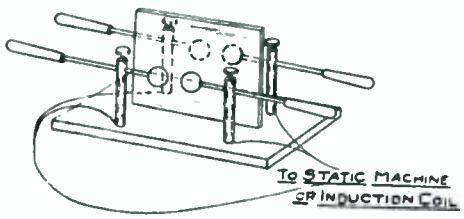
Who can say that some discovery will not be made in radio telegraphy and telephone at any time? Long distance aerophony is already a proven fact, and I thoroughly believe that but a few short years will elapse before we will be in actual vocal accord, not only with Paris, but with every other capital of the nations of the Old World.

*Described at length in October issue this magazine—Editor.

ULTRA VIOLET LIGHT.

By Ernest M. Symmes.

Ultra violet light possesses the property of ionizing air and thus rendering it conductive to electrical charges. An interesting demonstration of this can be made as follows: From a static machine or from an induction coil arrange two micrometer spark gaps in parallel, as shown in Fig. 1. Adjust until sparks are jumping through both. Now place a plate of thick glass, of iron, or other heavy metal, near one so that it screens the light from the other. It will be found, if adjustments have been properly made, that the sparks will not jump through the gap so screened while the screen is in place, but will begin again so soon as the screen is removed. The explanation of this is that the spark in the first gap produces a considerable amount of ultra violet light. This light, falling



M E. Fig 1.

on the air between the terminals of the second gap, ionizes the air, and so makes it more conductive than when this ionization is prevented by screening off this ultra violet light. Thin plates of glass, black as well as white, thin plates of aluminum have little effect, while thick plates of glass, as well as sheets of the denser metals, cut off this light almost completely.

PARIS LETTER.

(Continued from Page 158)

end to the ground. When the tuning is carried out, the radiated waves are simple and quite constant as to wave-length and energy. As regards the microphones, they use a certain number of these in series, so as to suppress trouble from variations in the microphone resistance and to lessen the sparks, also to increase the sensitiveness and clearness of the transmission. The microphone is of special form so as to avoid the use of combustible matter, and the granulated carbon is placed in a cavity hollowed in a plate of marble or slate. The diaphragm is kept at the right distance from the carbon by metal washers.

C. Q. D. NUMBER

The Wireless Screech

OUR MOTTO ..——.. ...——.

THE ETHER: FULL OF SPARKS CLEARING.

No. 999 JULY, 1909 Price One Spark

The Wireless Screech

A Magazine devoted entirely to the Wireless Sparks.

Published when we feel like it, by **Interplanetarian Wireless Pub. Co.**

"Fips" *Editor.*

Subscription price for U. S. and the Cosmos, 10 Sparks, payable when you've got the dough.

Forms close when the boss says so. Advertising rates excessive—so don't ask.

The Editor is overwhelmingly displeased to receive contributions unless they are sent in a barrel. If the article is N. G., he'll keep the barrel and return the M.S. (if return postage is sent); if the article is very bad he'll sue you. Good articles are not acceptable. The Editor is the only man who can write a good article. So don't try.

HYMALAYAN OFFICE:
1186 Summit st., Ontop, Hym.

IDIOTORIALS.

"FIPS" OUR EDITOR

We have had so many thousand flattering requests to continue this noble paper, that we have thought it our duty to resume operations at the old stand and bark—beg pardon—screech some more.

Our last efforts in the February issue were so overwhelmingly strenuous that we have had brain-fever right along and could not settle down to screech as usual, but we are now ready again to create all kinds of disturbances, if necessary. The editor was also delayed somewhat by having to invent a new "Wireless Lolly-Pop" for the girls in the office. This "Lolly-Pop" is automatic, and disappears as soon as the boss appears on the horizon.

The Editor wishes to warn all wireless screechers to refrain from overspeeding messages. Some amateurs send their messages so fast that they exceed the speed limit and are liable to arrest by the traffic squad. The other day a Chicago screecher sent so fast that the receiving aerials within a radius of 100 miles from the sender were knocked down senseless by the impact. This, of course, is ill-practice, and should cease immediately.

WIRELESS AROUND THE WORLD.

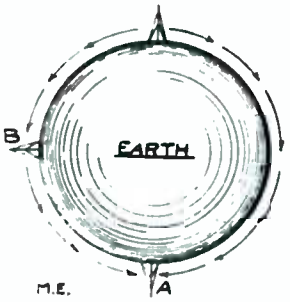
By Our Kalamazoo Correspondent.

By perusing last issue of M. E. a statement will be found referring to the Eiffel Tower plant, which statement cold-bloodedly asserts that as soon as the plant is completed, it will be possible to send messages around the world.

That this will be a nice state of affairs can be easily seen by referring to illustration.

At the top we see the Eiffel Tower. B, say, is New York; A, perhaps Australia.

Now suppose that a message is flashed from the tower. It will, of course, travel in all directions, north, south, east and west. As the waves are powerful enough to circle the globe, they will, of course, ALL OF THEM, hit A. The poor fellow stationed at A will have the time of his life. The message will pour in on him literally from every point of the compass and smother him, so to speak.



However, the fellow at A is not half as bad off as the one in New York (at B). He will experience the queerest things going.

Next suppose a message is flashed from the tower. Naturally the time it will take the waves to reach from the tower direct to B (western route) is short, but (as the message travels around the globe) it will take a little longer for the same waves to travel over the route 4 times as long, viz.: Tower — A — B. (Eastern route).

We therefore have the queer phenomenon of a Wireless Echo, which, to my mind, had never been thought of.

Suppose the tower sends this message: "KEEP OFF THE AIR."

By the time the second letter E has reached New York, over the short route, the first letter K will arrive in New York after having traveled over the long route. By representing the large letters, as the ones received over the short route, the small ones over the long route, the following will give an idea how the future aerogram from Paris will read:

"K EkEePe — pO FoFf — fT HtEh — eA IaRir."

The worst thing, however, would be wireless talk from Paris. The poor New York fellow could, of course, get nothing but a "stuttering" message, as each letter would lag in afterwards.

Ain't it awful to live in such an age?

The Grattle.

This Department is for the convenience of the screecher who asks fool questions. All questions will be answered by way of our automatic waste basket. When an urgent reply is wanted paste it on a 11 Dollar bill and send it via wireless by special delivery. As soon as we have spent the money we'll write again sending our answer C. O. D. or C. Q. D.

A WET QUERY.

(2649). T. Uber, Cooney Island, Miss., writes:

1. If you send an electric current through a water pipe, is there any current in the inside of the pipe?

A.—1. Yes, a wet one.

2. Why don't you get a shock when you stand on the third rail?

A.—2. Beg pardon, you do; especially when the train knocks you down.

WHAT IS ELECTRICITY?

(2650.) Z. Inegap, France, Del., writes:

1. What is electricity?

A.—1. A word composed of 11 letters.

2. Explain an electrical block-system.

A.—2. A lot of *block*-heads asking *systematically* a lot of *electrical* fool questions which *block* our files.

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.

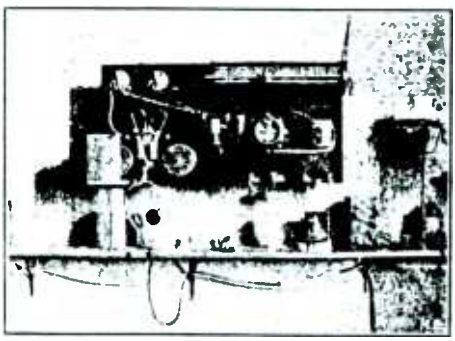
This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE, THREE DOLLARS.

Herewith photo of my Wireless Installation at my workshop.

Aerial: Consists of two copper wires, each 225 feet long, looped 6 feet apart, at one end 52 feet high, and joined together at the lower end, 32 feet high, then brought into room to switchboard, total length of aerial 456 feet. Wave length 1,824 feet=561 meters. Resonance 1,824 feet: divided by 206=78.3.

Receiving circuit: Tuning coil (top right hand of board), capacity 120 metres, sliding contact connected with No. 1 (R. H.) of a series of three switches, then through adjustable condenser to No. 2 (middle) switch, from thence to coherer—steel and carbon rods with drop of mercury between, this self restoring coherer (exactly in middle of switchboard) has worm and wheel micrometer adjustment, and being only used as a "call," operates 1,000 ohm polarized relay, having "impedence" coil of 1,000 ohms between it and relay to force battery current through coherer. Relay closes "local" sounder circuit (shown at right.)



When "call" is heard and answered switches 2 and 3 are moved to left, cutting out coherer and switching in either "Electro-lytic" detector (shown on shelf over centre bracket) or magnetic detector (shown on lower felt of board) which depends for its action on the "hysteresis" of the soft iron band 37 inches long, consisting of a number of annealed iron wires forming a complete circuit revolving round two insulated wheels driven by clockwork; this band, having a linear speed of 72 inches per minute, passes through a glass tube 3/16 inch inside diameter round on which is wound primary of 13 feet insulated copper wire, 5 ohms resistance, in series with aerial tuning coil condenser and earth, the two horseshoe magnets shown above and between the wheels, with their "like" poles together, magnetises the soft iron band as it passes through the tube. A secondary wire is wound on a bobbin over the primary, the resistance of this secondary exactly balances the resistance in the head telephone receivers and is in series with them: no battery is used with this detector. But when a Hertzian wave is received, it immediately demagnetises the band and by induction a sharp click is heard in the telephone receiver.

If the "Electro"-lytic detector is used instead of the magnetic one, a battery and potentiometer is in series with it. But personally I prefer the magnetic detector, as phones of lower resistance are used, and it suits my ear better.

Switch No. 1 (R. H.) has an arrangement at the back of the switchboard for automatically cutting out all receiving circuits when sending, and also automatically cutting out all the sending circuit when the receiving apparatus is used; this obviates any liability to accidents. Every circuit is also safeguarded by lightning arresters and fuses.

Sending circuit: Consists of coil (shown in lower shelf over right-hand bracket) energized by accumulators (not shown in photo). Two keys—one for sending, and the other is used to supply current to coil, which when used the coil is kept going continuously—and earthed when signals are not being sent. The second key is used only for signals and automatically cuts out the earth of first key. Thus signals are more uniform. I am now using only one key, having another plan in contemplation to serve the same purpose.

With the exception of telephone receiver and a few minor articles, the whole installation was made by me. My re-

ceiving circuit has a very large range. The sending is limited by the capacity of the spark coil, which is sufficiently strong to send to my house some miles away, at which my son has another installation, very similar. As there is a law in force in this country prohibiting the use of wireless telegraphy except by the Government, I have obtained permission to experiment and erect the installation described above.

W. J. HUGGINS.

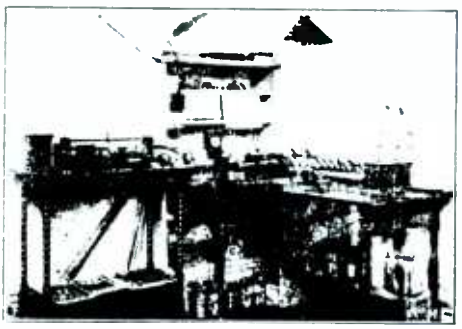
Timaru, New Zealand, Australia.

HONORABLE MENTION.

Enclosed please find photograph of my wireless station, which has been in operation for about a year.

I use two separate systems for receiving, one with the ordinary tuning coil, variable condenser and "Electro"-lytic detector, the other with an inductive tuner, variable condenser and "Electro"-lytic or silicon detector. I get much better results with the loose-coupled system, especially when selectivity is desired, as very accurate tuning can be done on the inductive tuner.

Receiving instruments: At the extreme left of the left-hand table is an E. I. Co.'s variable condenser, which is an absolute necessity in an up-to-date wireless station. To the right of it are two tuning coils, connected in series with a single slider on each, and a total wave-length of about 2,000 meters. In front of them is a plate glass condenser, composed of ten 5 x 7 glass plates. To the right of it is a pair of E. I. Co.'s 2,000 ohm head receivers. At the left of the other table is an inductive tuner, with



a wave-length of about 1,500 meters. At the back of the table is a switchboard, by means of which either system or any kind of detector may be either cut in or out. In front of it are three detectors, an E. I. Co.'s new "Electro"-lytic, a silicon and a carborundum, the two latter made by myself.

Sending instruments: At the right of the detectors is a two-inch coil used in connection with the 110-volt A. C. and a Wehnelt-Caldwell interrupter. To the right of it is a zinc spark gap and in front of it a Morse key. Under the table are three Leyden jars of different sizes and at the left of them the interrupter.

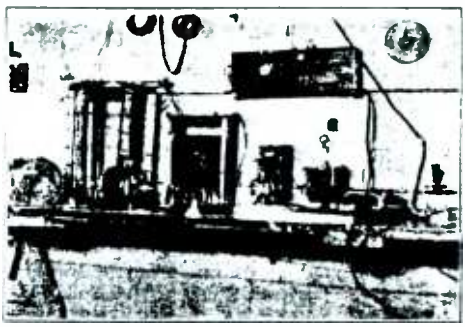
My aerial is made of 6 aluminum and 2 copper wires, and has a span of 150 feet and is about 50 feet high.

With these instruments I have heard stations 300 miles away. Many of them have been made by myself from descriptions given in MODERN ELECTRICS and have always found them very satisfactory. I take several electrical magazines, but MODERN ELECTRICS is better than all the rest put together.

Montclair, N. J. FRED MILLER.

HONORABLE MENTION.

Enclosed photo of my wireless set.



On the left-hand side of this picture you will see the helix, with spark gap attached to the top. To the right of the helix is the condenser, containing eight plates, 6 x 8, an E. I. Co. 2-inch coil, which gives very good satisfaction. Further you will see a small motor of the rotary type which is used on the interrupter of the coil. The interrupter is run by one storage battery, while the coil is run by five of them. The storage batteries cannot be seen in the picture as they are set upon the floor.

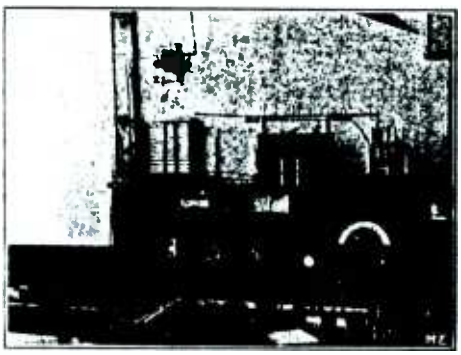
Above the condenser and coil is the tuning coil, detector, condenser and one pair of E. I. Co. 1,000 ohm receivers. You will also see in the centre of the picture a D. P. D. T. switch and relay and key.

My aerial is 65 feet high by 180 feet long and can receive messages from commercial stations and steamers; also wireless telephone. My wires extend in along the roof on large glass insulators and run through the wall through a porcelain tube, which is connected on a S. P. D. P., in case of lightning. I am a member of the Wireless Association of America.

New York City. W. F. REISS.

HONORABLE MENTION.

Enclosed please find flashlight photo



of my wireless station.

I have been experimenting with wireless for about two years; and at present use close coupled tuning in both sending and receiving. Although most all of the apparatus is home-made, very good results have been obtained owing to the fact that it was made from reliable instructions, printed for the most part in MODERN ELECTRICS.

The transmitting apparatus comprises an induction coil, helix, and plate glass condenser. The induction coil, which is operated on the 110-volt A. C. lighting circuit, through a Caldwell electrolytic interrupter, gives a heavy two-inch spark. The helix is wound with No. 10 copper wire and makes possible the use of several different wave-lengths. The sending condenser consists of five glass plates which are held in a rack, and the connections are so arranged that different capacities can easily and quickly be obtained.

Directly above the helix is seen a small Geissler tube which is used in tuning the transmitter.

The spark takes place between two zinc rods 1/4 inch in diameter, and using a 1/4 inch gap; the range of my station is about 10 miles.

The receiving instruments are in two sets, one consisting of a coherer and decoherer, 400 ohm polarized relay, and sounder, the other using the electrolytic detector and telephone receiver. The first set is used only for calling and by means of a S. P. D. T. switch, either it or the phone set can be connected to the antenna.

The receiving set also comprises two tuning coils of 300 meters capacity, a fixed condenser, a variable condenser of the rotary type, made from directions in MODERN ELECTRICS and a potentiometer.

The antenna is made up of four 30-foot aluminum wires No. 14, held in a horizontal position at a height of about 50 feet.

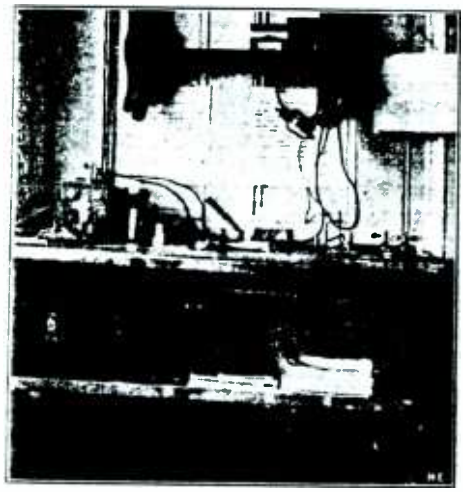
I have two friends, one about two miles distant, the other about a half-mile, with whom I am in constant communication. Both, together with myself, think that MODERN ELECTRICS is the most instructive and helpful magazine on wireless that we know of.

St. Louis, Mo. A. S. BLOTTERMAN.

HONORABLE MENTION.

I enclose a photograph of my wireless station, of which the following is a description:

The transmitter consists of a 1-inch "Electro" spark coil, an "Electro" zinc spark gap, and a 1-pint Leyden jar, or



condenser. The coil is run by the dry cells seen under the table.

The receiver comprises a tuning coil, seen mounted beneath the table top; an "Electro" universal detector stand; and two carborundum detectors; a set of head phones and 1 dry cell.

The aerial is of the inverted "L" type, and is made of 4 aluminum wires No. 14,

6 inches apart, and the whole 75 feet high.

Ground is gotten through pipes.

With this set I have sent over 6 miles, and received over 200 miles.

It might be of interest to you to know that my first inspiration came from MODERN ELECTRICS, which has been of great help to me since, and which I heartily recommend to every amateur.

A pile, being 12 first issues, of M. E. may be seen under the table at the right.

DOUGLAS HILLYER.

New Brighton, N. Y.

HONORABLE MENTION.

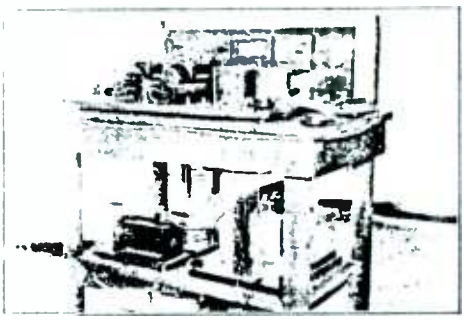
Enclosed is a photo of my wireless station. Before going into details I wish to state that table and instruments were made entirely by myself in spare moments after school, the only thing that was bought being two 75 ohm receivers, which I attached to a head band almost identical to the one described in the June issue of MODERN ELECTRICS. The instruments are made entirely of mahogany and polished brass which I turned on my lathe.

The Sending Outfit: The sending outfit shown on the lower shelf consists of an air insulated glass plate condenser, made of 8 x 10-inch photographic plates and coated on both sides with tinfoil, as shown, an hexagonal helix having eighteen turns of No. 12 copper wire, and a 1-inch coil built especially for alternating current. It is built up of twelve thin, spool-like wooden sections which are run full of No. 34 black enamel wire, then boiled in paraffine and afterwards assembled on a heavy insulated primary. The primary, wound with many turns of No. 14 D. C. C. magnet wire, gives a choking effect and in connection with a Wehnelt-Caldwell interrupter, described in a back number of MODERN ELECTRICS, gives fine results. The key with its big, zinc contacts that prevent excessive wear, is shown on the top of the table behind the receivers. This outfit in connection with a 120-foot, three-strand aerial 35 feet high, has sent six miles and can doubtless send farther.

The Receiving Outfit: The receiving set shown on top is of the loose-coupled type, described in the October issue of MODERN ELECTRICS, and was chosen on account of its selectivity, as there are numerous stations in this vicinity. Few minor improvements, such as making sliding contacts on both the primary and secondary, were added, and give much better results. The resistance of the potentiometer, the first coil from the right, is about 1,000 ohms, and was made that high because it keeps the potential of the batteries more constant. The detector is of the electrolytic type; it is by far the most sensitive with which I have worked.

I hear most of the commercial messages passing between the boats and the land stations on Lake Erie, and numerous amateur stations.

The switch on the left of the back board shuts off the sending power, while the D. P. D. T. switch in the center is my aerial switch. I always shut off my sending power while receiving so that an accidental touch of the key will not burn out my detector. The little switch



on the right connects the lamp shown, in series with my aerial when I tune up my sending circuit. It takes the place of a hot-wire ammeter.

I would recommend black enamel wire with which the coil and receiving set is wound, to any amateur, as it makes neat and efficient apparatus.

WALTER D. APPEL.

E. Cleveland, O.

ANTENNAE.

(Continued from page 160.)

intelligent design by those possessing that rare and useful engineering faculty, sense of proportion.

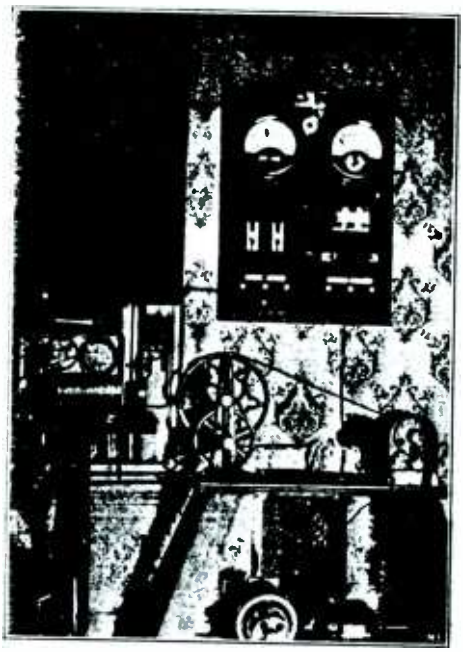
Certainly there is room, and to spare, for the work of the many investigators, engineers, and users of wireless communication. We are all specialists to an extent, each having his department. It is to the synthesis, the weaving together of these many strands, that we must look for the future development of this art.

Laboratory Contest

FIRST PRIZE THREE DOLLARS.

I am sending you herewith two photographs of my Electrical Laboratory.

The vertical photo shows my testing switchboard, on which are mounted two double reading D. C. volt and ammeters. Voltmeter reads on one scale up to 15 volts in 1-5 volt divisions, and on the other scale up to 150 volts in 2 volt divisions.



Ammeter reads on one scale up to 10 amperes in 1-10 divisions, and on other scale up to 100 amperes in 1 amp. divisions.

The D. P. D. T. switch connects the ammeter to either shunt which are also mounted on the board.

Two S. P. S. T. switches disconnect the volt meter and six binding posts are used for connections.

On top of board is hanging a battery voltmeter (watch case) and directly above is a goose neck with battery lamp for lighting switchboard.

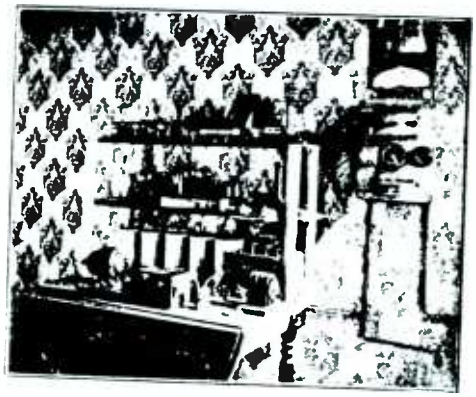
Directly under board is my hand power belted to a shunt dynamo giving up to 15 volts. On the floor beneath are two dynamos, one giving 7½ volts, the other 110.

Standing on hand power base is an automatic signalling device for sending a wireless signal at a set time, by connecting with an alarm clock. This I made from an old phonograph. The spring, bearing on the toothed wheel breaks the circuit and gives the dots and dashes, as the instrument is connected in series with the spark coil.

On the window casing is mounted a buzzer with the contact screw grounded (as described in MODERN ELECTRICS) for testing the receiving apparatus.

Standing upright is my portable receiving outfit, consisting of one cell dry battery, auto-coherer, "Rheostat-Regulator" and D. P. 75 ohm receiver. Two binding posts on left are for connecting to ground and antenna. Small switch on top disconnects battery. The other photo shows my charging and lighting switchboard.

Large 3 P. D. T. switch is a charging switch of my own design which, when thrown to right connects four E. I. Co. type R. E. storage batteries in parallel and at the same time connects the five 100 A. H. Edison batteries to the storage cells which begin to charge them. On throwing to left it disconnects the Edison and throws storage batteries in series and may be used for lighting, running coil, etc.



D. P. S. T. switch is main switch, directly above is a 5 amp fuse block for protecting the storage batteries.

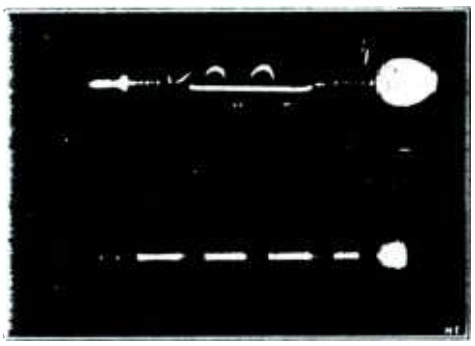
S. P. D. T. switch is for changing the connections of storage batteries on ammeter so I can see (when charging) how much current goes into cells, and when discharging how much current goes out.

S. P. S. T. switch connects dynamo with storage batteries so I can also charge them with the hand power dy-

namo. On the top of table are shown 5 Edison batteries, four R. E. storage batteries (in box). One inch spark coil (in oak box I built by myself) buzzer and decoherer, and telephone magneto. On edge of first shelf is a polarized bell (which rings through over 1,000 ohms) which I use for testing out in connection with magneto.

On first shelf, beginning at the left is a filings coherer (own make) Rex motor, bell and buzzer, electro-magnet, a spark gap stand (with spark passing between balls) also two zinc tipped brass rods for changing into zinc gap. Small Grenet battery, another Rex motor and S. P. 75 ohm bell receiver.

On top shelf, beginning at the left, is rack with large and small incandescent lamps, three relays of different resistances, Edison spark coil, automatic cut-out (for gas-lighting circuits) and a sensitive laboratory balance. On outer edge are two Geissler tubes, the one on right containing fluorescent liquid.



These tubes were lit up when I took the photo, and show up nicely.

I also enclose photo giving close view of these tubes in operation. It gives a good idea of the discharge, and also shows the layer light nicely.

The E. I. Co.'s system of lighting with Edison and storage batteries is very satisfactory. I am now lighting my laboratory, bed room, and cellar and expect to install lights all over the house in the near future.

I also use the current for operating my spark coil, motors, etc.

West Reading, Pa. WM. H. WAGNER.

HONORABLE MENTION.

Enclosed you will find a photograph of my electrical laboratory. I have made most of the instruments myself. The apparatus consists of dynamos, motors, telegraph, telephone, bells, batteries, lights, induction coils, Leyden jars, tools and numerous other things which I will describe later. The tools consist of a carpenters' set and an iron working outfit, part of which may be seen at the lower right hand corner and center of the picture.

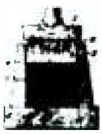
I have several medical induction coils which I made myself. Two may be seen on the bench near the tools. The lights which are seen at the top of the picture are used for illumination and experiments. Some are on the switchboard and others are on separate circuits. The

switchboard controls a set of 12 dry batteries in series and parallel, eight chromic cells, and three storage cells, which I made myself. The other switches control various things, and the rheostat is also on this board. The six point switch in the lower right hand corner controls the dry cells. The telephone seen at the side of the switchboard is part of a system which connects with those of three other boys who are also interested in electricity. The telephone lines may be seen on the left side of the picture along the wall. The alternating bells seen above the phone are used for calling or testing. They were made by myself as was also one of the battery bells seen below. I also have telegraph instruments which cannot be seen which I have on the same lines. At the left of the picture are several small battery motors. In the center in front of the case is my direct current dynamo motor which is run by a large bicycle wheel. I fitted a reversing armature and a single field switch on it. On either side of this may be seen alternating dynamos which I constructed from old telephone generators. I also have a generator which is used for calling on the telephone system and for testing.

Iowa. JOS. N. WALTON.

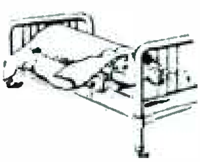
Electrical Patents for the Month

923,989. CONDENSER. Albert [illegible], Chicago, Ill., assignor to Western Electric Company, Chicago, Ill., a Corporation of Illinois. Filed Apr. 1, 1907. Serial No. 365,880.



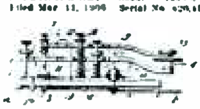
1. The process of making condensers, which consists in rolling the strips of foil and insulating material in an elliptical cylinder, and subjecting such cylinder to pressure in a rectangular mold, said pressure being imparted in a manner to shorten the longer diameter of the cylinder, and to compress said cylinder into approximately a prism.

920,068. ELECTRIC-LIGHT BATH APPLIANCE. Fulmore Collins, Chicago, Ill. Filed Mar. 8, 1908. Serial No. 419,242.



In an electric light bath apparatus, an arched reflector transverse ribs underlying said reflector and longitudinal slats overlying said reflector, electric lamps carried on the under side of said reflector and supporting legs pivoted to said apparatus and adapted to be moved into position parallel with the length thereof substantially as described.

[illegible] TELEGRAPH KEY. Lucas Wilson, Sidney, [illegible] Filed Mar. 11, 1908. Serial No. [illegible]



1. In a telegraph key, the combination of a supporting frame, a key lever fulcrumed thereon, a circuit closing lever fulcrumed on the frame at a point above the key lever, and sets of contacts arranged to open and close the circuit by the movement of the levers, the set of contacts for one lever being located forwardly of the fulcrum of the lever and the set for the other lever being located rearwardly of its fulcrum.

[illegible] ELECTROSTATIC SEPARATING PROCESS. [illegible] Blake, Lawrence, and Lawrence N. [illegible], Neodesha, Kans., assignors to Blake Mining & Milling Company, Denver, Colo., a corporation of Maine. Filed Mar. 17, 1906. Serial No. [illegible]

1. The electrostatic separating process which consists in [illegible] particles of material in contact with one another in a substantially neutral electrostatic field to produce a stream of falling particles having diverse initial contact charges dependent upon their composition and in producing a comparatively weak electrostatic field [illegible] said falling particles to deflect them in proportion to said initial contact charges.

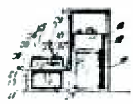
[illegible],627. OSCILLATION RECEIVER. Greenleaf W. Pickard, Amesbury, Mass. Filed Sept. 16, 1907. Serial No. 384,167.

1. An oscillation receiver which comprises two electrical conductors which respectively [illegible] rectifying properties, the action of one conductor being to oppose the [illegible] passing from it toward the other and the action of the other conductor being to oppose oscillations passing [illegible] from the other.

923,786. APPARATUS FOR PRODUCING HOMOGENEOUS DUCTILE BODIES FROM METALS OF A HIGHLY REFRACTORY NATURE. Werner von Bolton, Charlottenburg, Germany, assignor to Siemens & Halske Aktiengesellschaft, Berlin, Germany, a Corporation. Filed Sept. 29, 1903. Serial No. 290,[illegible]

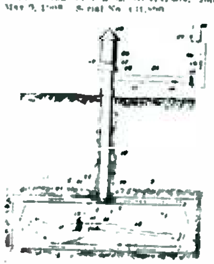
1. Means for fusing highly refractory metal, consisting of an exhausted air chamber and a pair of electrodes of highly refractory conducting material located therein, one of said electrodes being provided with means for supporting a powder of the metal to be acted upon and the other with means for adjusting it relatively to the first mentioned electrode, substantially as described.

923,171. CIGAR LIGHTER. Augustus C. Gruhler, Waterloo, Ind. Filed Apr. 22, 1908. Serial No. 428,734.



1. A cigar lighter comprising a U shaped insulating block having a slot therein, a pin mounted in the sides of said block, a wire coiled about said block and having an extension adapted to work in said slot and forming a sparking terminal, and a cap provided with a [illegible] chamber to receive said block, said [illegible] being slotted to receive the extension of said wire and forming the second sparking terminal.

[illegible] SIGNALING DEVICE FOR GRAVES. Carl [illegible] Zimmermann and Victor G. [illegible], Joliet, Ill. Filed May 7, 1908. Serial No. [illegible]

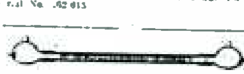


1. In a device of the class described, a casket having a [illegible] opening in the lid thereof, in combination with an air conduit [illegible] connected thereto, and a plug for [illegible] said opening, said plug being adapted to be removed after [illegible] in position and to be replaced [illegible] pipe is removed, substantially as described.

[illegible],500. WIRELESS SIGNALING SYSTEM. Guglielmo Marconi, London, England, assignor to Marconi Wireless Telegraph Company of America, New York, N. Y., a Corporation of New Jersey. Original application filed Nov. 27, 1906. Serial No. 290,[illegible] Divided and this application filed Aug. 9, 1906. Serial No. [illegible]

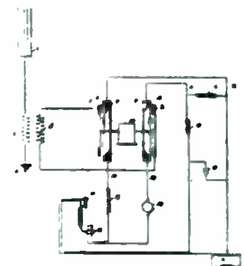
An antenna for wireless signaling systems comprising a conductor consisting of two parts supported in substantial parallelism with the surface of the earth and suitable electrical instruments or apparatus connected between the parts, the length of said conductor being substantially [illegible] one-fourth, or its multiple, of a wave length of the oscillations impressed upon it and said conductor being situated in a vertical plane coincident with that passing through a distant station.

[illegible],044. ELECTRIC METER. Willis R. Whitney, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. Filed Mar. 14, 1907. Serial No. [illegible]



1. The method of measuring an electric current which consists in causing ions to migrate through an electrolyte [illegible] proportional to the current and to react with said electrolyte to produce permanent changes in color and [illegible] rate of migration.

923,962. WIRELESS TELEGRAPHY. Reginald A. Fessenden, Washington, D. C. Filed Dec. 31, 1906. Serial No. 350,[illegible]



1. The combination with receiving and transmitting devices for wireless telephony, of an antenna and a commutator adapted to connect the antenna alternately with the receiving and sending devices with a periodicity above the limits of audition, substantially as described.

2. In wireless telephony, the combination with a receiving device and a transmitting device of an antenna and means to alternately connect it with the receiving and sending devices with a periodicity above the limit of audition, comprising two rotary commutators connected in series with said receiving and transmitting devices.

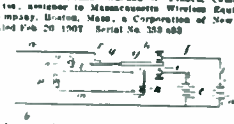
923,963. WIRELESS TELEGRAPHY. Reginald A. Fessenden, Washington, D. C. Filed Jan. 8, 1907. Serial No. 351,560.

1. In apparatus for generating high frequency electric oscillations, a discharge gap normally insulated by a medium consisting of the gases of the argon and helium group.

[illegible] RECEIVER FOR WIRELESS SIGNALING. Hugh C. [illegible], Riverside, Cal. Filed Apr. 21, 1908. Serial No. [illegible]

1. In a wave detector, the combination of an imperfect contact comprising two members, one of which is movable relatively to the other, an armature lever connected with said movable member, a magnet for controlling said armature lever, a battery circuit connected with said imperfect contact and with said magnet, and a shunt circuit connected with said battery circuit and including a condenser and a telephone receiver.

923,708. RECTIFIER. George W. Pierce, Cambridge, Mass., assignor to Massachusetts Wireless Equipment Company, Boston, Mass., a Corporation of New York. Filed Feb. 20, 1907. Serial No. 358,[illegible]



1. In a rectifying apparatus, the combination of a main alternating current line, an interrupter therein, a circuit deriving current from the main circuit, an asymmetrically conductive solid in said derived circuit to rectify and distort the alternating current therein, and [illegible] in said derived circuit to control the interrupter.

Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending June 22d

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; not more than three questions answered at one time. 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.

AUDION.

(249.) JOHN H. VAN BRUNT Missouri, writes:

1.—Where can an audion detector be purchased?

A. 1.—Radio Telephone Co., No. 49 Exchange place, New York City.

2.—Which is best for receiving, a vertical or horizontal aerial, composed of six aluminum wires?

A. 2.—We consider the compromise antenna to be better than the vertical or horizontal.

3.—Give receiving radius with following instruments: E. I. Co. var. condenser, 1,500 ohm receivers, "electro" lytic detector, 2,000 meter tuning coil, water pipe for ground, aerial a 32-foot pole on a 40-foot barn. Instruments in small house on top of barn.

A. 3.—500 to 800 miles.

4.—Is the Government station now in operation?

A. 4.—We presume you mean the new Government station in Washington. If so, no; it is in the process of construction.

TUNING COILS.

(250.) ROBERT CHEDISTER, Colorado, asks:

1.—Are tuning coils that are wound on metal less efficient than those wound on wood?

A. 1.—Yes.

1B.—Does the metal cause any magnetic effect?

A. 1B.—If the metal on which the wire is wound is magnetic itself, yes.

2.—Can the tantalum filament from a lamp be used in an electro-lytic detector?

A. 2.—Not with the same electrolyte, but by using mercury in the cup you have a tantalum detector as described in the issue of October, 1908.

3.—The platinum point on my electrolytic interruptor is rapidly eaten off when I operate my coil. How can this be stopped?

A. 3.—There is no way in which the eating away of the platinum point of the electrolytic interruptor may effectually be stopped but a large capacity condenser shunted around the interrupter will probably keep the point in a little better shape and it will not wear away quite so rapidly.

AERIAL.

(251.) NATH. G. ROBERTSON, JR., Pennsylvania, writes:

1.—What size wire should I use on an aerial 40 feet from the ground and 20 feet in length, using three wires eight inches apart? Should it be bare or insulated?

A. 1.—No. 14 bare aluminum wire.

2.—How far would I be able to transmit messages with the aerial described above and a 1-inch E. I. Co. coil, a zinc spark gap and a key and a 6 U. storage battery?

A. 2.—5 to 10 miles.

3.—How far would I be able to receive with the aerial described above and the following instruments: Auto Coherer, Rheostat, 75 ohm Receiver?

A. 3.—25 to 50 miles.

PERIKON DETECTOR.

(252.) F. CHURCHILL WHITTEMORE, Missouri, asks:

1.—Where can I buy a "Perikon Detector" as described on page 106 of the June issue of MODERN ELECTRICS?

A. 1.—Radio Telephone Co., No. 49 Exchange place, New York City.

2.—What is my receiving radius with: Double slide tuner, 2,000 ohm receivers, variable condenser, fixed condenser, potentiometer, 50 foot, four-wire aerial on top of a 100-foot house, and electrolytic detector, perikon detector, or silicon detector?

A. 2.—800 to 1,000 miles.

3.—What sort of an instrument is used on page 106 of the June issue of MODERN ELECTRICS, figure 5?

A. 3.—A variable tuning transformer.

½ K. W. TRANSFORMER.

(253.) R. A. MCCLEERY, California, asks:

1.—Is it necessary to use an interrupter with the E. I. Co.'s new ½ K. W. transformer coil or not?

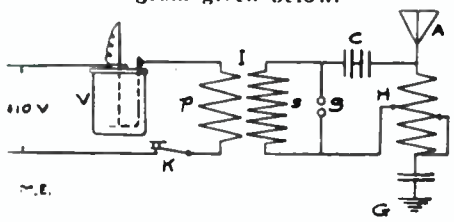
A. 1.—Yes; this coil works a great deal better with the electrolytic interrupter even when used on alternating current.

2.—How far could I send with above coil, helix, and an aerial 50 feet long and 50 feet high?

A. 2.—Approximately 100 miles.

3.—Please give diagram for using the "Electro" transformer coil, helix., zinc spark gap and condenser.

A. 3.—Diagram given below.



WIND AND WIRELESS.

(254.) J. K. JONES, Pennsylvania, writes:

1.—Does the direction of the wind have any influence on Hertzian waves? I know that when the wind blows a certain direction that sounds from the direction of the wind are heard more distinct. Does the wind affect the waves in a similar way?

A. 1.—No, except that the wind rubbing against the aerial generates static electricity sometimes when connections are favorable.

2.—Please inform me where I can purchase Nos. 14 and 16 bare copper wire; the number of feet per pound, and also the cost. The wire is to be heavily tinned for use on aerials.

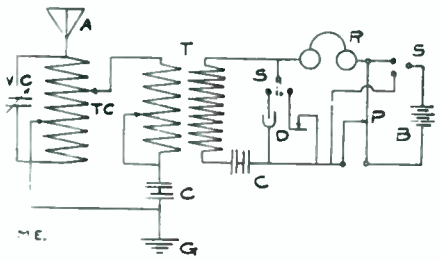
A. 2.—We would advise you to write to the Electro Importing Co., New York City.

RECEIVING CIRCUIT.

(255.) HOWARD A. CORSON, New Hampshire, writes:

1.—Please give a diagram to connect following instruments: Tuning coil, tuning transformer, variable condenser, silicon and electrolytic detector, 1,000 ohm receivers.

A. 1.—Diagram given below.

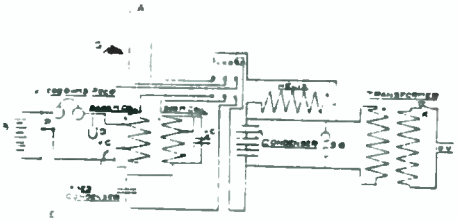


2.—How far would the above receive with a 75-foot aerial 150 feet long?

A. 2.—500 to 800 miles.

WIRELESS QUERIES.

(256.) JOHN WALTERS, JR., Illinois, asks:



1.—From how far can I pick up messages with two 1,000 ohm receivers, a non-inductive potentiometer, two tuning coils, one 2,100 meters and the other 1,600 meters, with two variable condensers of the revolving kind connecting them up as in diagram and using an electrolytic detector and carborundum detector?

A. 1.—300 to 500 miles with aerial 50 feet high; 500 to 600 miles with 100 foot aerial.

2.—How far can I send with a 250 watt transformer with Leyden jars, helix and spark gap?

A. 2.—50 to 75 miles.

3.—Is an anchor gap to any advantage?

A. 3.—No; it is distinctly a disadvantage as set forth in the article by Mr. Austin, "Hints for Wireless Experimenters," published in our May issue.

4.—How is hot wire meter connected?

A. 4.—In series with the aerial.

RECEIVING DISTANCES.

(257.) FRED L. O'CONNER, Massachusetts, writes:

1.—Will you please tell me how far I can receive with an aerial 20 feet high composed of four wires 8 inches apart, a home-made detector, receiving condenser and a 100 ohm telephone receiver?

A. 1.—About 20 to 25 miles.

2.—How far could I receive if I used a single slide tuning coil?

A. 2.—25 to 50 miles.

WEHNELT-CALDWELL INTERRUPTER.

(258.) JOSEPH SMITH, JR., Ohio, writes:

1.—Which would be the most sensitive and efficient for wireless, two 1,500 ohm receivers wound with No. 40 wire or one 3,000 ohm receiver wound with No. 50?

A. 1.—The two receivers, because both ears are covered up and all outside noise is excluded.

2.—When using a 1-inch coil in connection with a Caldwell-Wehnelt interrupter on 110 volt current, is it necessary to use an impedance or resistance coil?

A. 2.—No.

3.—Why would not No. 29 S. S. C. wire do for a tuning coil?

A. 3.—It will do. In fact, almost any size wire from 14 to 30 will do for a tuning coil, but we have found No. 24 B. & S. gauge to give about the best results.

WIRELESS QUERIES.

(259.) WM. CLARK, New York, asks:

1.—What would be the sending radius of an outfit consisting of one 1½-inch coil, one set of adjustable condensers, one sending helix, and one adjustable spark gap with aerial 40 feet high, 40 feet long, consisting of three aluminum wires one foot apart?

A. 1.—5 to 8 miles.

2.—What would be the receiving radius of an outfit consisting of Ferron detector, two 1,000 ohm telephone receivers, one potentiometer, one fixed condenser and same aerial?

A. 2.—200 to 300 miles.

3.—Will the sending outfit affect my receiving outfit if both are on the same table when in use?

A. 3.—No, if the instruments are properly connected.

4.—Would my receiving outfit work better with electrolytic substituted for Ferron detector?

A. 4.—Yes, a great deal; even as much as 50 per cent.

GERNSBACK INTERRUPTER.

260.) LEE ROLLINS, Illinois, asks:

1.—Will the "Gernsback Electro-lytic Interrupter" work successfully with a one-quarter K. W. transformer?

A. 1.—Yes, if the transformer is of an open core type; but it will not work a closed core type, nor will any other interrupter work it.

2.—Will the E. I. Co.'s one-quarter K. W. transformer work successfully on 110 V. A. C. current?

A. 2.—Yes.

3.—Will the inclosed wire be all right to use from my instruments to the antenna?

A. 3.—No; wire is not large enough; it is common lamp cord. We would advise you to use large diameter "Pirelli" cable, or other high grade cable.

TUNING COIL.

261.) LESTER MAYERS, New York City, writes:

1.—What kind, size, number and length is the wire of the E. I. Co.'s large tuning coil?

A. 1.—E. I. Co.'s large tuner is wound with about 550 feet No. 29 B. & S. gauge enameled wire.

2.—Of what is the drum composed and the dimensions?

A. 2.—Hard wood, 5½-inch diameter, 12 inches long.

3.—The dimensions and composition of the ends?

A. 3.—Paraffined hard wood 6¼ inches high, 7½ inches wide.

INTERRUPTER.

262.) EVERETT GRIGSAN, Kansas, writes:

1.—Would the efficiency of an aerial be increased by placing sharp points along the wire?

A. 1.—No.

2.—Can an electrolytic interrupter be operated with a battery circuit of, say, 6 volts?

A. 2.—No. No electrolytic interrupter works well below 50 volts.

3.—Could the aerial described and sketched by W. E., New York, query No. 275, April issue, receive messages 500 miles?

A. 3.—Yes, by raising it a trifle higher.

MICA.

263.) HAROLD C. MCELROY, Ohio, asks:

1.—Is mica and isinglass the same thing?

A. 1.—Yes.

2.—Where may solid brass balls from ½ to 3 inches in diameter be obtained; also where may ebonite be obtained?

A. 2.—Electro Importing Co., 86 West Broadway, New York City.

3.—Can No. 8 magnet wire be used instead of No. 6 in the Tesla coil by Austin in September number of MODERN ELECTRICS?

A. 3.—Yes.

POTENTIOMETER.

264.) WM. A. TAYLOR, New York, asks:

1.—What resistance should a potentiometer for wireless receiving have?

A. 1.—200 to 500 ohms.

2A.—Using a 1-inch spark coil and a 100-foot aerial, to what extent will my sending distance be increased by inserting a tuning coil at the receiving end?

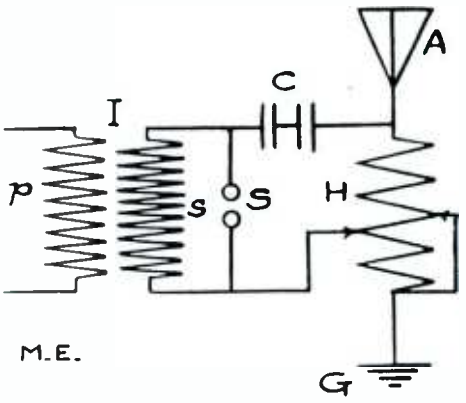
A. 2A.—About 10 per cent.

2B.—A sending helix?

A. 2B.—About 25 per cent.

3.—How should the sending helix be connected in the circuit?

A. 3.—Diagram given below.



275 VOLT CHARGING CURRENT.

265.) WM. J. SAUERBREY, Pennsylvania, writes:

1.—If I connect three 32 C. P. 275 V. lamps, as shown in diagram in question 131, January issue, can I charge a Royal 6 V. 60 A. H. storage battery? The voltage on line is 275 direct current.

A. 1.—Yes; you must use about 10 32 C. P. lamps connected in the same way instead of three.

2.—What is the voltage after it goes through lamps?

A. 2.—The voltage is not changed.

250 WATT TRANSFORMER.

266.) P. R. LAUDERMILCH, Pennsylvania, writes:

1.—If the dimensions of the 250-watt closed core transformer, as described in MODERN ELECTRICS of the April issue, 1909, be increased to twice the dimensions as described, will the out put be twice as great and four times the dimensions four times as great?

A. 1.—Yes, approximately.

2.—What size transformer should be used for sending wireless messages for a distance of about 100 miles, using 80-foot aerial?

A. 2.—½ K. W. for regular work under all conditions. If only intended to be used under what is known as good wireless conditions or over water, ¼ K. W. will suffice.

WIRELESS STATION.

267.) S. SIEGEL, New Jersey, writes:

1.—Kindly inform me where I may obtain full information and all details required to build a wireless station as I am about to do so.

A. 1.—We would advise you to write to any of our advertisers.

LAMP ON SPARK COIL.

268.) RALPH HATCH, Ohio, says:

1.—Can I light an incandescent bulb with an induction coil that will give a two or three m.m. spark?

A. 1.—Yes, you can get the peculiar blue

glow in the bulb with almost any length spark.

2.—I would like to purchase a book on electricity that would be an aid to one desiring to become an electrical engineer. What would you recommend?

2.—We would advise you to write to the American School of Correspondence, Chicago, Ill.

WIRE FOR TUNER.

(269.) EDWARD T. CHAPPELL, Michigan, asks:

1.—Does it matter the size wire that the tuning coil is made of?

A. 1.—Not particularly within certain limits. For further information we refer you to query 258.

2.—How far could I send with a 68-foot aerial, 1-inch spark coil, inductance and proper receiving instruments?

A. 2.—5 to 7 miles.

WIRELESS TROUBLES.

(270.) A. R. BENEDICT, New York, writes:

1.—My aerial is situated on a hill and I have two copper wires, No. 14, 50 feet long, and poles are 30 feet high; building is about 30 feet below the hill, which makes the total height of aerial about 60 feet from the level of the ground. I am a distance of 75 miles from New York, and I think that I could pick up messages that distance. My ground is a zinc 4 square feet. I have the following: Tuner wave length 1,600 meters, "Electro Lytic" detector, rheostat regulator, 75-ohm telephone receiver, fixed condenser. Will you advise why this outfit does not work?

A. 1.—Your instruments are properly connected and the only possible explanation we can give of your trouble is that your ground is not good. We would suggest that you use a water pipe for your ground. If it is impossible to do this, you should use a plate or a piece of netting containing at least 12 to 20 square feet sunk about 4 to 6 feet in MOIST ground, or if you have water, just as a brook or a river, within reasonable distance put your plate on the bottom of the stream. We think this will overcome your difficulty.

DYNAMO.

(271.) DONALD GASTON, California, writes:

I have the parts to a dynamo and I want to get, if possible, 55 volts and about 3 amperes. The armature is 3 inches long and 1¼ inches in diameter and has twelve slots. What size wire shall I use on the magnets and what size on the armature to get the voltage mentioned?

A.—It is impossible to get such a large output from a machine of this size; about the best you can get is 10 volts 3 amperes.

AN OLD QUERY.

(272.) B. H. MATTHIES, New York, asks:

1.—With a tunable outfit, both receiving and sending, can the same aerial be used for both? It it has a D. P. D. T. switch, the center posts being connected with aerial.

A. 1.—Yes.

WIRELESS NEW YORK TO PITTSBURGH.

(273.) GUS SACHS, Pennsylvania, writes:

1.—Would like to know if I could hear New York high-power stations in Pittsburgh with following apparatus, which I am now assembling and preparing to put up: Aerial 80 feet from ground on one side and 40 feet on the other, electrolytic detector, tuning coil and condensers, potentiometer and two 1,000 ohm phones? The instruments will be about 50 feet below highest point of aerial.

A. 1.—Yes, if you raise your aerial 75 feet instead of 50 feet above the instruments.

2.—Are there any amateur stations in or around Pittsburgh?

A. 2.—Yes, a great many. Write to the W. A. O. A. for list of names.

HEAVY WIRE COIL.

(274.) CLARENCE B. DILTS, New Jersey, writes:

1.—I have a Rhumkorff coil and would like to know the length spark it will give. I do not know the exact size of the secondary wire, but I think it is No. 33 B. & S. gauge. The dimensions are as follows: Diameter of core, ¾ inch; length of core, 7 inches; length of secondary, 3 inches; diameter of secondary, 3 inches; condenser, 5 x 7, composed of 60 sheets of tinfoil.

A. 1.—With the proper voltage and amperage through the primary the above coil should give a 1-inch heavy spark.

2.—What voltage and amperage would be required to give full spark?

A. 2.—6 volts and about 5 amperes.

3.—How many miles would this coil transmit messages with a zinc spark gap, sending helix and aerial 40 feet high and 30 feet long composed of three strands of aluminum wire?

A. 3.—From 5 to 8 miles.

K. W.?

(275.) AVELAN A. AUSEON, California, writes:

1.—What is meant by "wave tuning?"

A. 1.—The alteration of the effective length of a given antenna by the variation of the sliding contact on a coil thus adding to or subtracting from the antenna the turns on the said coil.

2.—How can you make a ground switch for an aerial?

A. 2.—We refer you to query 219 in the May issue.

3.—What is meant by the letters K. W.?

A. 3.—The letters K. W. stand for kilowatt. Kilo is a French word which stands for one thousand. Watt is the electrical term for the product of the voltage and amperage. A kilowatt is 1,000 watts.

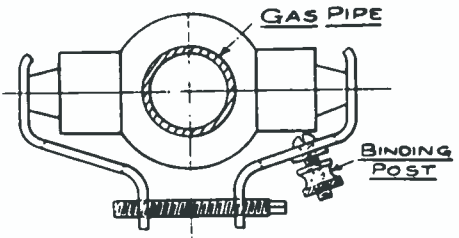
4.—What is a relay?

A. 4.—If a current is too weak to close an ordinary sounder or other instrument a relay which has a more sensitive adjustment is interposed in the circuit, which, closing local circuit, operates the sounder. The weak current is thus relayed.

A HANDY GROUND CLAMP.

A simple, yet handy, ground clamp can be made for the small sum of 10 or 15 cents.

An ordinary skate clamp, which can be bought at almost any hardware or toy store, forms the clamp proper. The binding post, which was obtained from an old exhausted dry cell, is fastened into the slit in the clamp, as shown in Fig. 1. The ground clamp is now ready for use and all that the experimenter has to do is to fasten it to the nearest water



M E. -FIG 1-

or gas pipe by either a skate key or pair of pincers.

(Contributed by RICHARD NICKELL and GROVER CHRISTERN.)

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.

Advertisements for the August issue must be in our hands by July 25.

ELECTRICAL APPARATUS.

STUDY ELECTRICITY AT HOME—A complete electrical course at home, containing 30-page detail book, 220-page text-book, 200 experiments and over 100 pieces of apparatus. Price, complete, only $5.60. Catalogue "M. E. S." explains this and other remarkable offers. Thomas M. St. John, 843 Ninth Ave., New York.

When writing please mention "Modern Electrics."

POLARITY INDICATOR and current detector. Every electrical student should have one at this remarkable price. 0-25 volts, 65c., prepaid anywhere in North America. Other voltages on application. Bonney, Westminster, Mass.

When writing please mention "Modern Electrics."

BATTERY AMMETER. Beginners' course in electricity, spark coil, ½ inch. Carbon plates, etc. Lloyd P. Foster, Ashland, Ky.

When writing please mention "Modern Electrics."

GRAPHITE RODS. Any resistance, 25c., 3 for 50c. silver. Your last chance; for 30 days only. C. E. Hale, 644 W. King st., Decatur, Ill.

When writing please mention "Modern Electrics."

ELECTRICAL BOOKS, BLUEPRINTS, ETC.

WIRELESS CODES. Send 10c. for blue print showing Morse, Continental and Navy Codes. A. C. Austin, Jr., Hasbrouck Heights, N. J.

When writing please mention "Modern Electrics."

INSTRUCTIONS IN WIRELESS TELEGRAPHY, 25 CENTS. Tells you how to make your own spark coils, relay, coherer-decoherer, tapping key, etc. Complete instructions, no red tape. Electrical Experimenters' Supply House, Dept. A., 622 Wells street, Chicago, dealers and manufacturers of wireless apparatus and electrical novelties. Send 3 cents postage for illustrated catalog.

When writing please mention "Modern Electrics."

? WIRELESS ?

Of course we have it. Coherers, Detectors, Auto Coherers, Rheostats, Static Machines, in fact all the Electrical "knick-knacks" you have been looking for. All apparatus carried in stock in St. Louis. Why pay freight and expressage to get goods from the East? Come and look over our stock. HANCE ELECTRIC CO., Olive Street, St. Louis, Mo.

When writing please mention "Modern Electrics."

A CHOICE STOCK and the finest assortment of Wireless Telegraph supplies for the experimenter and the amateur in Philadelphia. We can save you money on all these goods and shall be only too pleased to demonstrate and explain you the philosophy and working of the apparatus' tuners, detectors, condensers, high resistance phones, coherers, etc. J. Elliott Shaw, 639 Arch St., Philadelphia, Pa.

When writing please mention "Modern Electrics."

WIRELESS. New England wireless amateurs can obtain high grade wireless goods from me. All supplies kept in stock. All material guaranteed. Send 2-cent stamp for printed matter on New Detector. Springfield Wireless & Morse Institute, Room 31, 476 Main street, Walker Building, Springfield, Mass.

When writing please mention "Modern Electrics."

YOU BET

we have all up to date wireless supplies. We carry more wireless goods for the amateur than any other house on the Coast. Why pay express and freight, when you can get the goods right here at right prices? Detectors, Tuners, Condensers, Spark Coils from 1-2 to 4 inch sparx, oscillators, coherers, lamps, static machines, in fact, anything electrical you want. Call or write. It will pay you. PAUL SEILER ELECTRIC WORKS, Market St. San Francisco, Cal.

When writing please mention "Modern Electrics."

SPECIAL PRICES. 1,000 ohm wireless receiver, double pole special diaphragm, $1.75. Leather covered headband, single, 60c.; double, $1.00. "Sealed in Point" electrolytic detector, $2.00. "Eclipse" double slide tuning coil, $3.00. Sending helix, 450 meters, $2.75. "National" condensers, receiving, 30c.; sending, 75c. Morse, Continental and Navy Codes, blueprint, 10c. "Wabro" metal for spark gaps, 25c. Wireless telephone transmitter, $1.25. Waterhouse Bros., Bourne, Mass.

When writing please mention "Modern Electrics."

1,000 OHM WIRELESS RECEIVERS SENT ON TRIAL. $1.75 each. Very sensitive and efficient. New wireless detector; the best yet. Send stamp for circulars. Alden Wireless Co., Campello, Mass.

When writing please mention "Modern Electrics."

WIRELESS BARGAINS. Zincite and Copper Pyrites, 50c per set. Brass Cups silver plated for mounting crystals with solder, 10c each. No. 36 S. S. C. IRON wire for Marconi Magnetic Detector, 30c per ounce. No. 50 (1 1-2 mil.) S. S. covered copper wire for high resistance phones, 60c for spool containing exactly 1000 ohms. Wollaston wire, .0005, 15c. .00001, 25c; silicon fused, large piece 15c. Molybdenite, more sensitive than silicon 10c large piece. Graphite carbon cup for electrolytic detector, 20c. Selenium metal in sticks for selenium cells, large piece, 25c. Stamp for 120 page catalog. Electro Importing Co. 86z West Broadway, N. Y. City.

When writing please mention "Modern Electrics."

FOR SALE.

TELEGRAPH INSTRUMENTS. For Sale, number two Omnigraph, with two extra sets dials, all new, cost seventeen dollars. Three sets learners' telegraph instruments, cost seven fifty. Sixteen dollars takes all. E. D. Hooey, Milwaukee, Wis.

When writing please mention "Modern Electrics."

FOR SALE, one 500 watt air cooled transformer; price $1.00; 110 volt sec., 6 volts 89 amps., or 12 volts 40 amps.; first class; price, $9.00. H. Rickard, R. No. 2, Keokuk, Iowa.

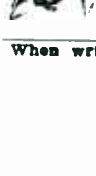
When writing please mention "Modern Electrics."

FOR SALE. Wonder dynamo, $3; water motor, $3; storage battery, 6-volt, 10-amp., $3; New Departure motor, $1; spark balls, $1; all in fine condition. W. B., 371 Johnson st., North Andover, Mass.

When writing please mention "Modern Electrics."

FOR SALE.—200-mile wireless station, with 2 K. W. transformer, every way complete; no plaything. Cost $125, yours for $75. Particulars free. Bargain for right party. A. J. Colmey, N. Main st., Canandaigua, N. Y.

When writing please mention "Modern Electrics."



$54.00 PER DAY

The record of the **CAMERA-SCOPE**

And we can prove it. Anyone can operate it. Makes 6 finished button photographs a minute. Price of Camera Scope, with supplies for making 200 pictures enough to pay for the complete outfit **$25.00.** Extra buttons 21 per hundred; extra frames, $1.50 per gross. Be independent and make money for yourself. Write today.

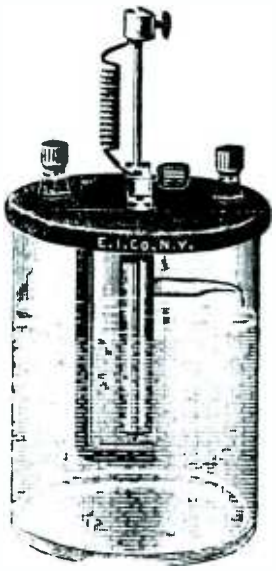
W. S. MOUNTFORD,
100A MAIDEN LANE, NEW YORK, N. Y.

When writing please mention "Modern Electrics."

Winners at

THE GERNSBACK ELECTROLYTIC INTERRUPTER

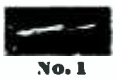
(PATENTS PENDING)



No. 8000

This interrupter is connected in series with any ordinary spark coil and the 110 V or 220 V, direct or alternating lighting current supply. No resistance or condenser is used, except a key or switch to break the current in the usual manner. The vibrator of the coil must be screwed up tight as it should not vibrate. The glass vessel is filled with the solution and as soon as the key is depressed you will get the surprise of your life. You don't get a thin, meagre spark, as with batteries, but A HEAVY FLAME ¼ INCH THICK. That this is the ideal thing for Wireless is unnecessary to mention. The spark obtained of a 1 inch coil, connected to a big sending condenser and a zinc spark gap with zincs ½ INCH THICK will crash in the gap with such a tremendous noise that it will take your breath away. AND THE SPARK FILLS THE GAP. These are PLAIN FACTS. Our usual guarantee backs them. By way of proving our statement look at the two photo's taken by Mr. Gernsback. The first one shows the full spark of a 2-inch coil run by a 6 V 60 A. H. storage battery. Exposure 1½ seconds. The second shows the FLAME of the same coil with a 110 V current and the new interrupter. Exposure 1½ seconds. The flame shoots upward, as the great amount of heat raises the discharge. You cannot appreciate the work you are able to do with this wonderful interrupter till you see it in operation. Not alone do you get a better and a heavier spark, but it is also from 15% to 25% LONGER, all depending on the construction of the coil. And that is not all. The output of the coil is increased at least 60%. That means that you can send at least 60% further with the Gernsback interrupter. This will be better understood by mentioning that two No. 14 copper wires, connected to a 1-inch coil and separated ¼ inch will fuse within 5 to 10 seconds.

The Gernsback interrupter starts with 50 volts. A metal rod of especial alloy goes through the cover, down in the glass tube. This tube at its lower end has a peculiar aperture in which the point of the rod fits. The tube at the upper end has a screw top which screws in the cover. In operation the metal rod wears itself away to a perfect point. The rod itself is fed down by gravity. Very little metal is used up; it takes about 60 hours constant work to consume one inch of the rod. New rods are supplied at a trifling cost. The rod can be left constantly in the solution without harm. The hard rubber composition top has all metal parts IMBEDDED in it (Patented). No metal exposed whatsoever. Therefore NO CORROSION as is usually experienced in other interrupters. The interrupter heats up very little, even when working for hours. The path between the two electrodes is only ¼ inch and the amount of solution heated at a time therefore is necessarily slight. This interrupter will find thousands of friends and is especially recommended for wireless and X-ray work. When used for the former it may be stated that it produces an extremely high sound in the distant receiver, which is much easier to read than the low sound produced with the old spring vibrator giving only from 150 to 200 vibrations per second, against 5000 to 7000 per second with the electrolytic interrupter.



No. 1

The interrupter is to be used in connection with ordinary spark coils from ¼ inch up to 12 inch spark length. Two coils (or more), may be connected in series and if the secondaries are connected in series, too, the length of the resulting spark is as long as the sparks of the two coils put together. Therefore two 2 inch coils will give a 4 inch spark, and so on.

No. 2

Every instrument is fully guaranteed to be all we claim for it. Mr. Gernsback would not allow his name put to it if he had not implicit faith in it. It is a guarantee by itself.

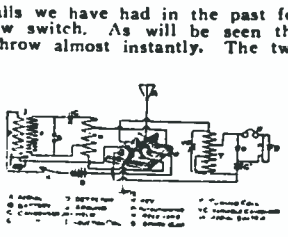
The Gernsback Interrupter (patents pending) No. 8000, as described, size 10½x5 inches. Weight, without solution, 2 lbs.

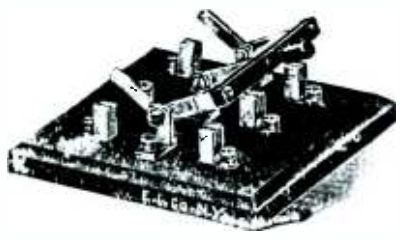
INTRODUCTION PRICE $2.50

Send for descriptive circular.

THE "ELECTRO" ANTENNA SWITCH

This switch has been brought out in pursuance to a great many calls we have had in the past for such a switch. As illustration shows this is a three-pole, double throw switch. As will be seen the throw to change the switch over is only about 2 inches, making the throw almost instantly. The two end prongs are at an angle of 140 degrees and the construction of this switch is unlike any other. By referring to the diagram below it will be seen that when the switch is thrown for receiving the primary of the coil is disconnected. If accidentally the sending key should be touched it will be impossible to damage the receiving instruments, as the coil can under no circumstances operate. The diagram shown below is standard, but of course many other connections can be devised by the experimenter. All metal parts are pure copper.





No. 8100

Hard rubber handle is provided as switch handle. This switch will stand the discharge of a 4 inch coil without jumping across. It can be used in connection with a transformer up to 5 K. W. All copper parts are almost an eighth of an inch thick. Binding post is provided at each pole of the switch and new connectors are provided which makes the unscrewing of wires impossible.

The switch can be screwed down on any table or on the wall. Size of base 7x7 inches, height over all 3½ inches, when lever is down; when lever is up, height is 5 inches. Weight 1½ pounds. This switch is built thoroughly all the way through, best material used and construction is right. There is at the present no quicker wireless throw switch on the market. We shall refund your money if it is not absolutely satisfactory.

No. 8100. "Electro" Antenna Switch, as described, price, now..... **$2.00**