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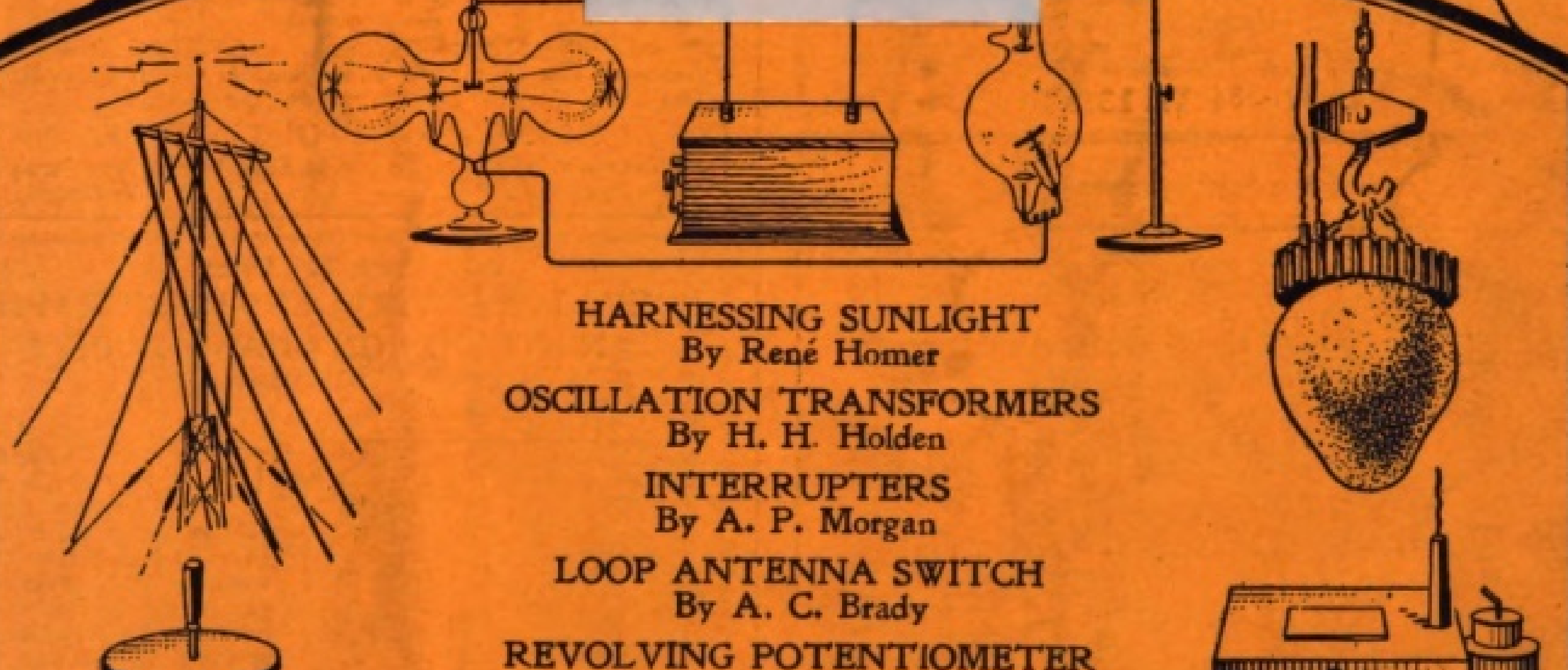
MODERN ELECTRICS



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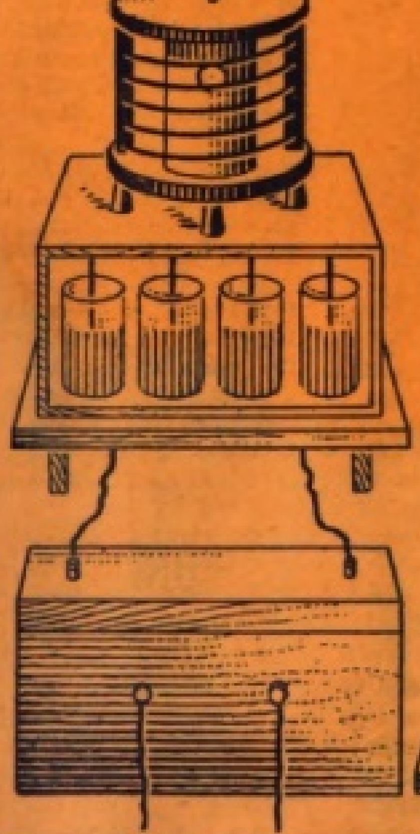

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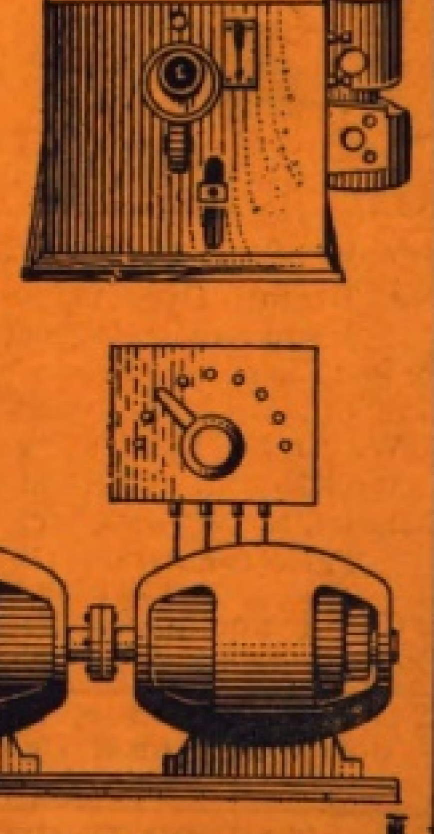

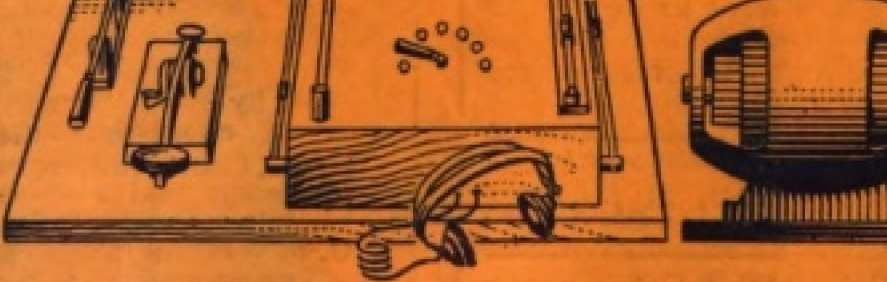

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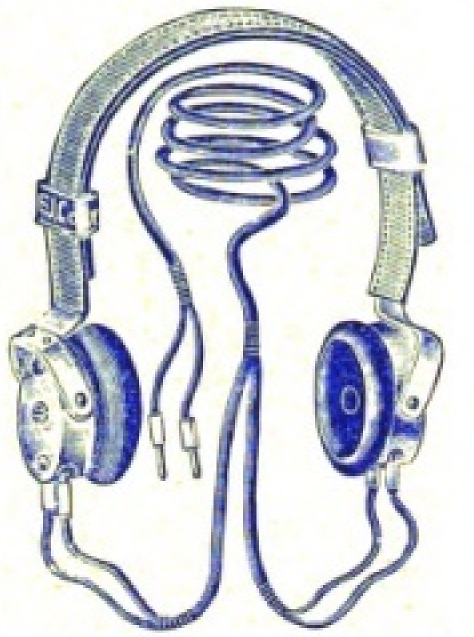

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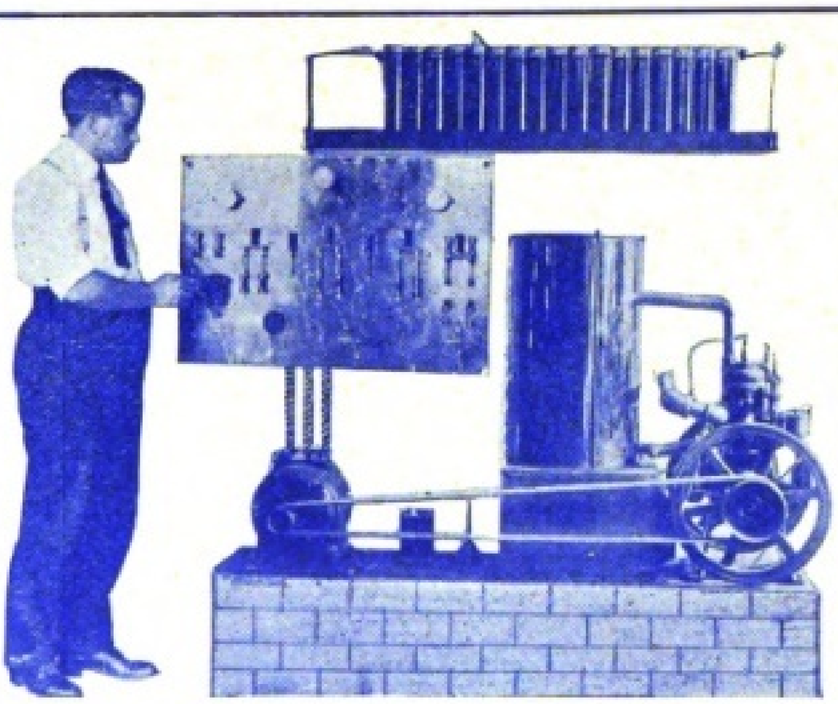

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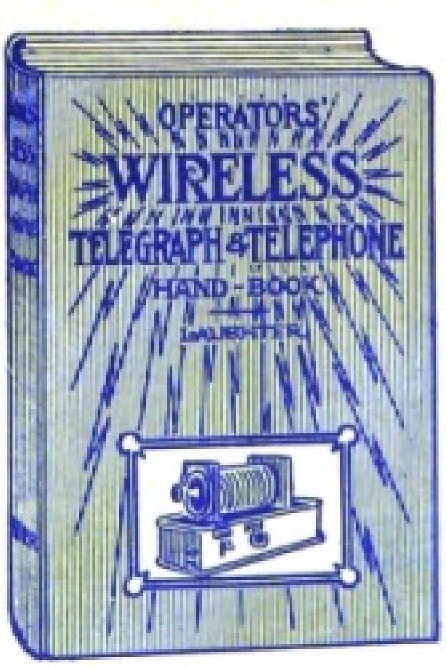
BY VICTOR H. LAUGHTER



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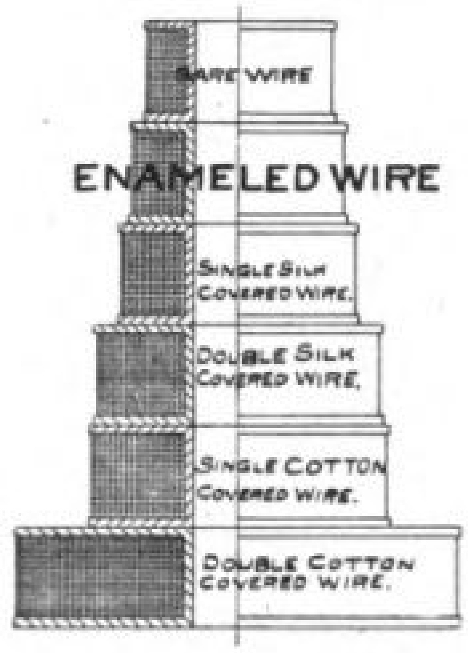

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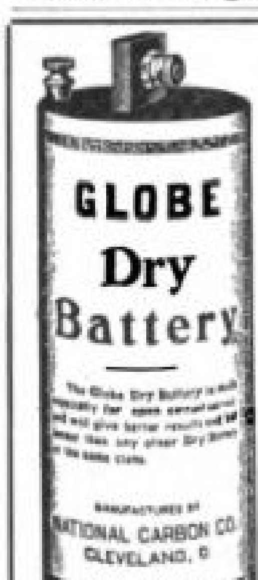

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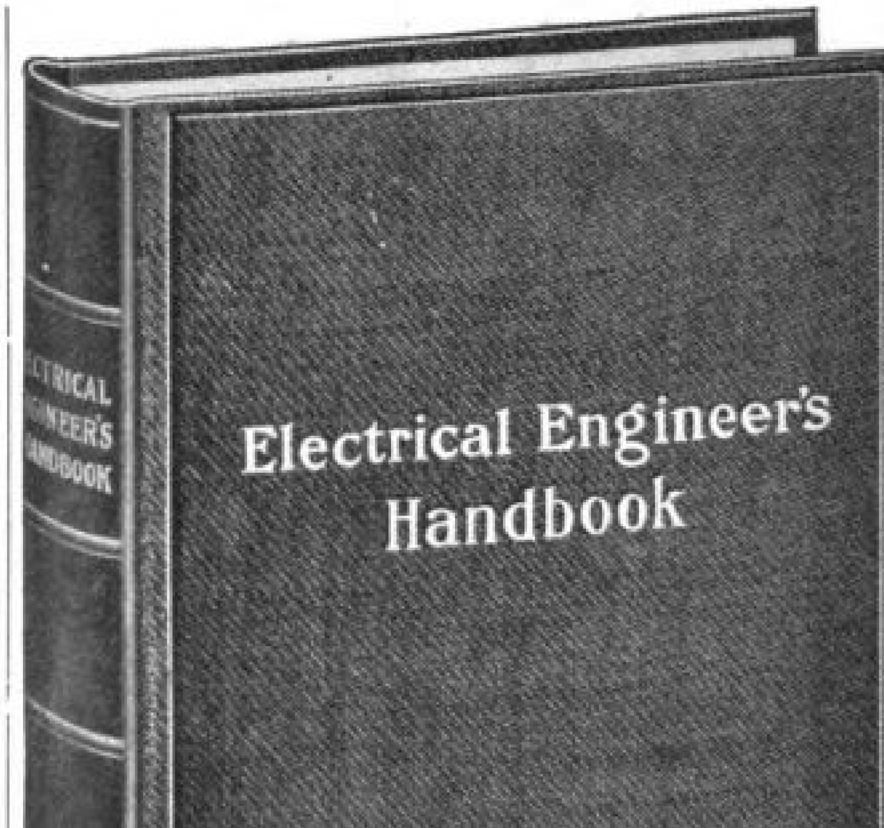

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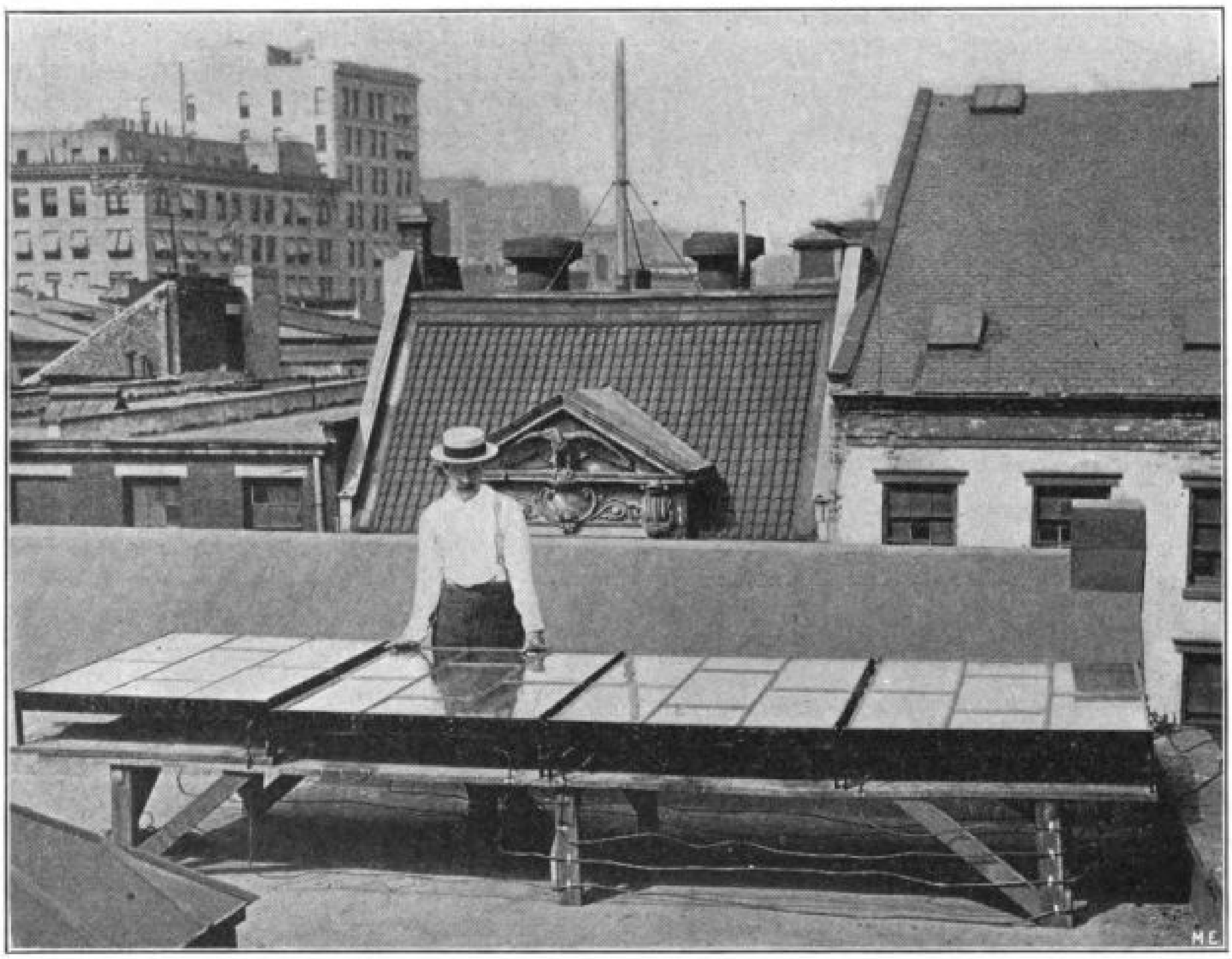
MODERN ELECTRICS

Vol. II. SEPTEMBER, 1909. No. 6

Harnessing Sunlight

By René Homer



Mr. Cove and his Sun Electric Generators

Four units are shown in the picture, each containing 1804 plugs of the new secret alloy. These units develop 60 watts each: 6 amperes at 10 volts. One form upon which he is experimenting will show a voltage of 500 per 10 sq. ft., though the amperage is very slight.

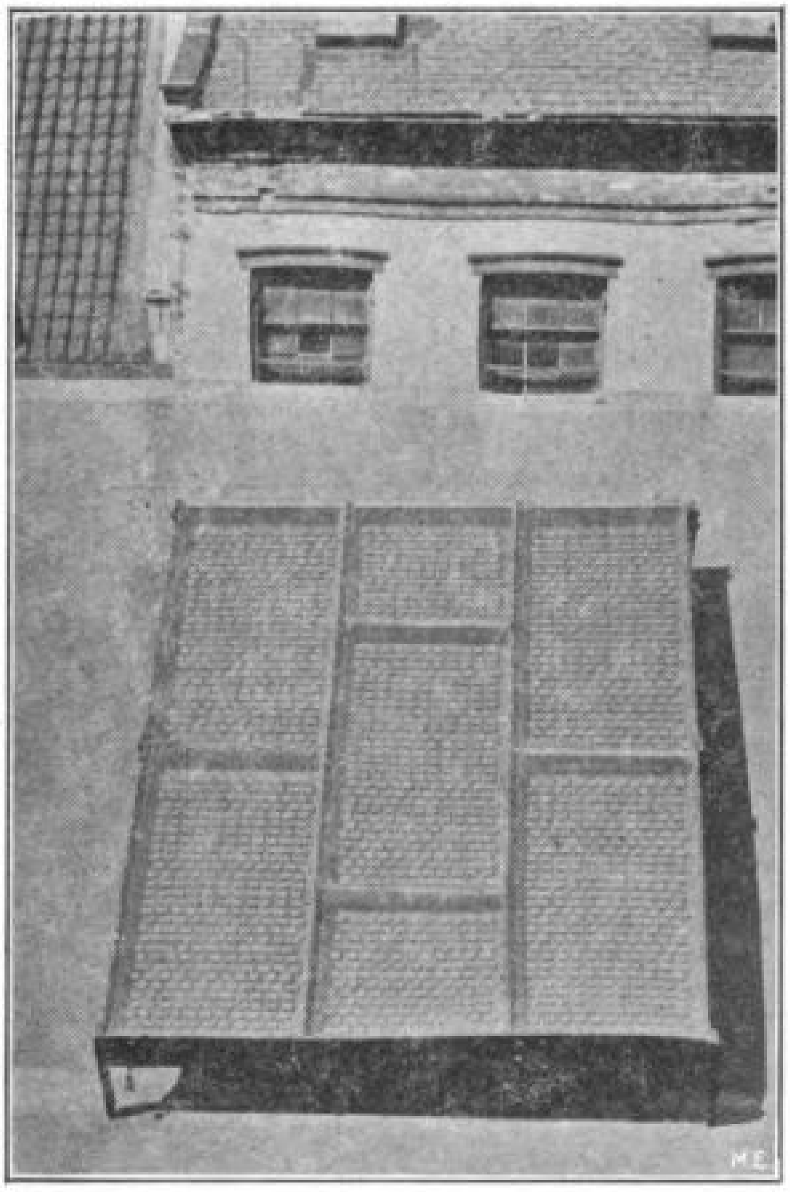
It has been the contention of many eminent scientists during the past two centuries that the energy expended in any way upon the earth came originally from the sun. Thus the power derived from streams, waterfalls and the combustion of wood, coal and oil is directly traceable to the work done by the sun in lifting vapor to fall in rain or snow for the formation of streams or the growing of the trees and other vegetation that form the coal beds and petroleum deposits. So quietly does the sun do this work that the billions of tons of water constantly lifted from the ocean and the land for the slow growth of trees attracts no attention.

Our present civilization is mainly dependent upon the energy we develop from coal and petroleum, without which our great activities would at once come to a standstill. The mines, factories, railways, automobiles and even airships would become useless; the water, gas and electric supply of our cities would be taken away and all our cities rendered uninhabitable, and yet the total amount of energy furnished by combustion of all the coal and petroleum of our world is quite infinitesimal when compared with that furnished us by the sun.

Dr. Langley estimates that a very small fraction of a second indeed would be taken by the sun in consuming all of the coal in the State of Pennsylvania. If the sun were one solid block of coal, it would have burned to the last cinder in about five thousand years. This leads scientists to the conclusion that the energy of the sun is not dependent upon combustion, but is due rather to the gradual shrinking of the vast gaseous world in which even the most obdurate metals are in a vaporous form.

Dr. Langley points out that the contraction of 300 feet a year would give out the immense quantity of heat which we receive, and yet this shrinkage would be hardly visible in the most powerful telescope for a period of 10,000 years.

The coal beds and petroleum deposits are doomed to exhaustion in the comparatively near future, but the sun's rays will continue to pour down through our atmosphere for millions of years.



Sun Electric Generator

showing the plugs that do the work. There are 308 of these plugs in each large box and 132 in each of the two smaller compartments, a total of 1804 in a space 4 feet by 3 feet.

Not ten per cent. of the latent energy of coal is turned into actual efficient power in the steam engine; so many chemical processes, in each of which some non-productive element enters, are necessary, that the final result is very small. A tremendous change in the industrial efficiency of the country would immediately take place if the latent energy could be developed to its utmost extent.

All that is necessary to compel the sun to do our entire mechanical work is an adequate method of harnessing the tremendous amount of power going to waste.

Mr. George H. Cove, of Somerville, Mass., who has been studying this problem for many years, has at last succeeded in perfecting a device for generating electricity direct from solar energy.

It is an old truth that great ideas are simple ones, and the Sun Electric Generator, as Mr. Cove calls his device, is no exception to the rule. The apparatus consists of a little metallic frame which looks like an exaggerated window. The frame contains a number of panes of violet glass behind which are set through an asphalt compound backing many little metal plugs. One end of these plugs is always exposed to the sunlight, while the other end is cool and sheltered. The invisible rays of the solar spectrum and the invisible ultra-violet rays after passing through the violet glass set up a reaction in the peculiar metal alloy used, which produces a continual flow of electrical current into storage batteries.

The apparatus is automatic, there being a circuit breaker to sever connection between the separator and storage battery whenever the sun is not shining, and start automatically whenever the sun appears. The apparatus is not affected by weather conditions, and a few clear days suffice to store enough electricity to do away with any possibility of interruption in the service on cloudy days. Ten hours' exposure of the type now being experimented upon will produce enough power to light thirty large tungsten lamps for three days. It is only necessary to increase the size of the generator in order to store enough electricity in a few hours of sunshine to furnish light for a week or more.

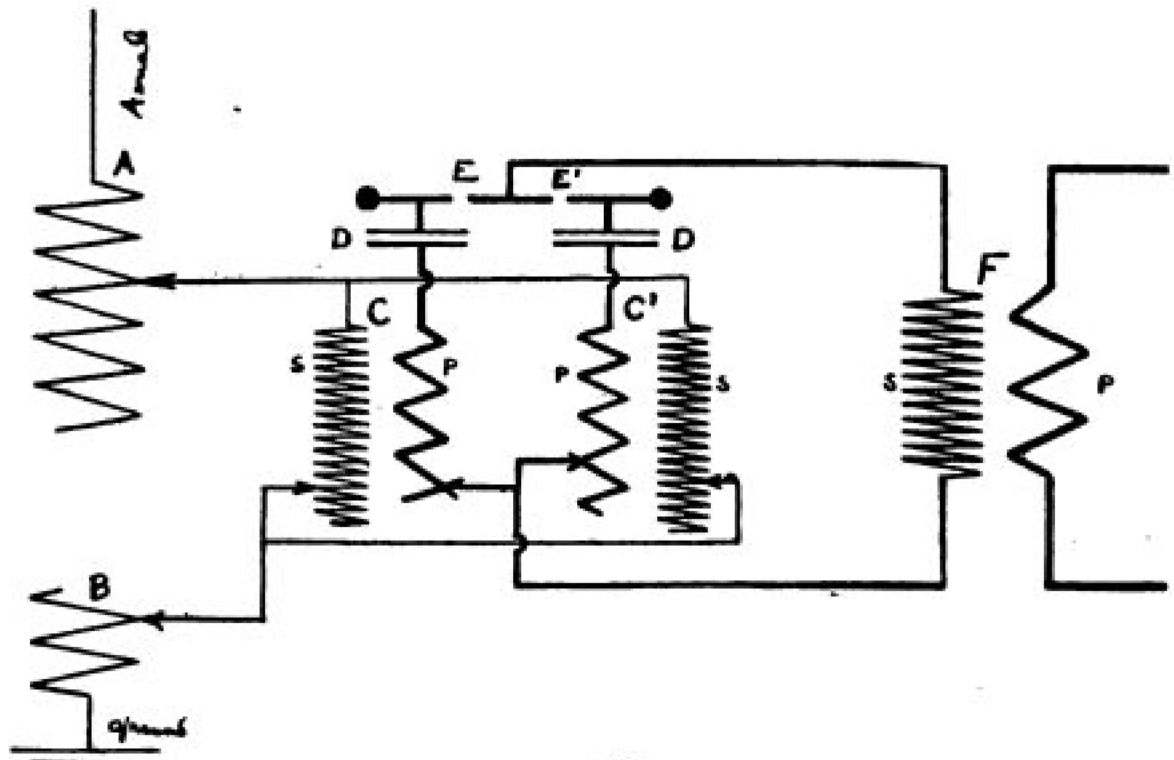
One form of generator shows a voltage of 500 per ten square feet, although there is but a slight flow of current. The generator which has attracted so much attention contains 1804 plugs, which, although individually quite feeble, develop together 60 watts: 6 amperes at 10 volts.

It is not too much to say that Mr. Cove has revolutionized our conceptions of power generation. Already we can picture the liner of the future propelled by invisible current stored in batteries by the Sun Electric Generator on a far-away desert and fed into the hold of the vessel in much the same manner as the cartridge belt is fed into a machine gun. The

(Continued on Page 272)

Oscillation Transformers

By H. H. Holden.



#1

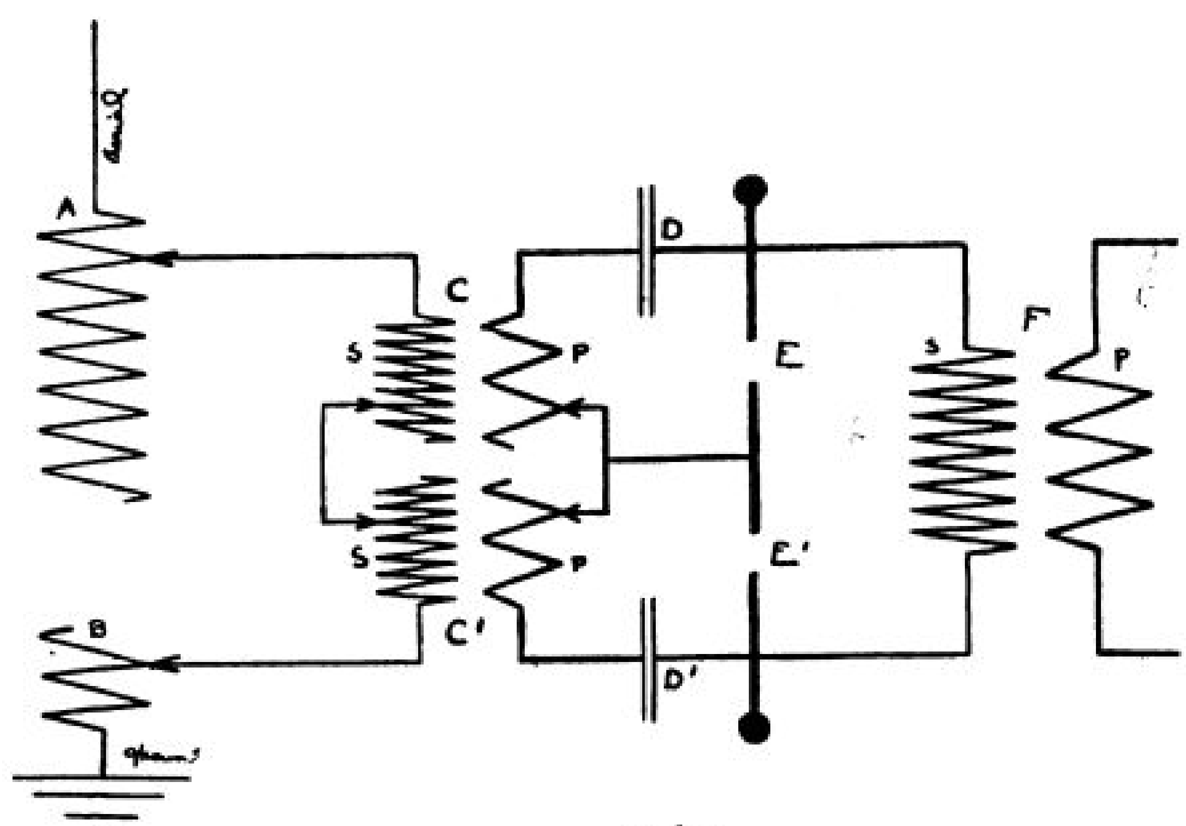
With the increase in number of wireless stations comes the necessity of much sharper tuning instruments than were found necessary a year or even six months ago.

Inductive or loose coupled receiving apparatus of various forms has been used with much success, some companies claiming to be able to tune to within two or three per cent. by their use, but as yet I have seen very little discription of loose coupled transmitting instruments.

I know several amateurs who have as perfect tuning instruments for their receiving as one could wish to see, but have very simple and old-time transmitting "hook-ups," and some of them have sets powerful enough to cover at least 45 miles.

A good loose coupling would add very much to their transm[illegible]ts and would afford much interestin[illegible], for I think that there are great cha[illegible] to improve on tuning.

An oscillation transformer or loose coupling is very simple to make after one has found out the approximate size and number of turns of wire needed on the primary and secondary; this can be found out by winding the wire temporarily on cardboard tubes of different sizes, a little experimenting will tell what the requirements will be for a particular



#2

set, as each set may need different size tubes or wire.

The primary should be of quite large wire and be made variable as to length by either sliding or clip contacts and the secondary of a smaller wire, usually six to eight sizes difference between the primary and secondary is best; sometimes, however, only two or three sizes difference will give better results.

There should be two of these transformers used to get the best results, using a separate condenser and spark gap for each.

The total capacity of the two condensers should be about equal to that needed for a single condenser when used without the oscillation transformers.

There are several ways that these may be connected up and some very interesting experiments can be made.

Figure 1 shows one arrangement that gives very good results. A, the aerial inductance having a variable contact; B is the ground inductance with variable contact; C and C' are the oscillation transformers havin[illegible]iable contacts on both primary [illegible]dary windings; D and D', co[illegible]rs; E and E', spark gaps, and [illegible]e induction coil or transformer.

[illegible]nother diagram is shown in Fig. 2 which gives the connections for the same transformers and is very good also.

In the first diagram the transformers are shown as being connected in multiple and have a multiple spark gap, while in the latter one they are in series and have a series spark gap.

It will be seen that the kind of wave emitted from a transmitting set thus arranged can be changed a great deal by varying the different inductances, the different adjustments will not all give maximum radiation, but that has to be a secondary thought when selectivity is desired.

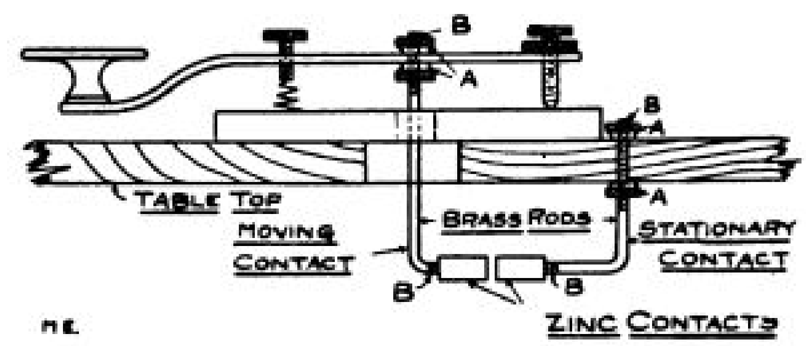
WIRELESS KEY.

By Oscar Oehmer.

It is indeed surprising that the wireless amateur has not devised a key which will serve his purpose. In many stations to-day the Morse key of ten years ago is still in use and is the cause of much annoyance.

The author will give directions for changing the old key to one which will break a heavy current without over-heating and arcing.

Procure one foot of 5-32 brass rod and one round battery zinc and four thumb nuts from dry cells. Cut the brass rod into two pieces 4 1/2 and 5 1/2 inches and bend up 1/2 inch on one end of each. The bend should be 90 degrees. Now run an 8-32 die 1 1/2 inches down both rods and also thread the bent ends as far as possible.



Next cut four 1/2 inch pieces from the zinc rod, and drill a hole about 3/8 inch deep in one end of each with a 29 drill. Tap out the holes with an 8-32 tap. Now drill a No. 18 hole in the lever of the key half way between the trunnion points. This completes the work, and the key is assembled as shown. This key should have a condenser shunted around it, the capacity of which is of little importance. Also the operator may submerge the contacts in oil in any convenient vessel, so arranged, of course, that it will not interfere with the movement of the key. The old contact points are of no further use and should be removed.

WIRELESS SHIP LAW.

Washington.—Senator Frye, of Maine, chairman of the Committee of Commerce, introduced a bill providing that all ocean-going steamships carrying more than fifty passengers shall carry efficient wireless apparatus. Steamships which make trips of less than 200 miles from starting point to destination are exempted from the operation of the proposed bill. A fine of $2,000 is provided for all violations of the measure, which is to take effect one year after the date of its passage. The penalty clause of the bill contains this proviso:

"That it shall constitute a good defence to a prosecution under this act for the defendant to show that the corporations supplying efficient apparatus for radio-communication have entered into a combination for the purpose of maintaining or enhancing the rental or price of such apparatus."

Interrupters

By A. P. Morgan.

One of the greatest sources of annoyance in operating an induction coil lies, without doubt, in the interrupter. Too much importance cannot be attached to this instrument, for upon it depends the satisfactory transmission of wireless messages, or the taking of an X-ray shadowgraphs, etc.

In wireless telegraphy very faint signals are heard the most distinctly if the rate of interruption is high. The human ear is the most sensitive to sounds somewhat higher than the tones produced in wireless telegraphy. This seems to argue for a very high speed of interruption. It

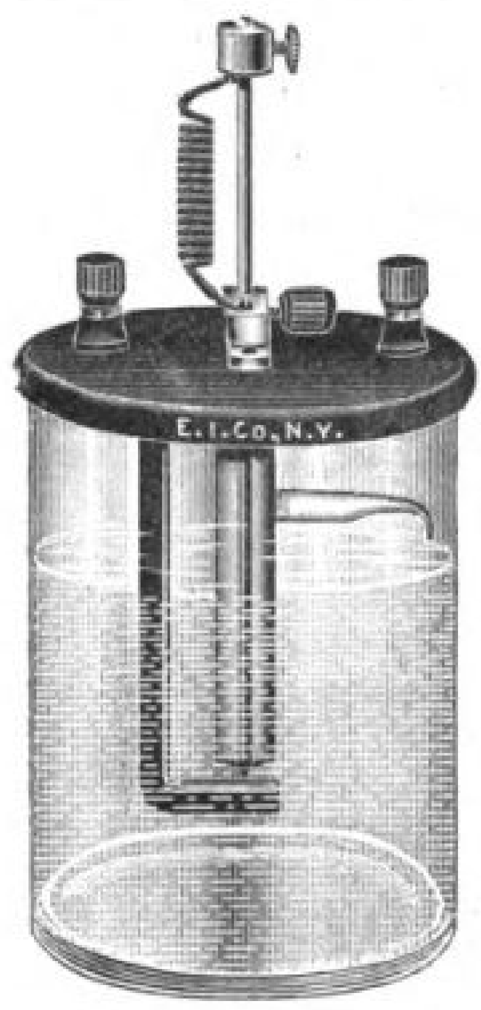


Fig. 1.

might be well to explain here that the rapidity of oscillation and speed of interruption are totally different from speed of break. The ideal speed of break is instantaneous, and then no condenser is required.

Where a condenser is shunted across the secondary of an induction coil, as in a wireless transmitter, if the speed of interruption is too great, harmful oscillations are set up in the secondary. Again, if too fast, the rise and fall of the secondary currents will run into each other because the break will occur before the primary current has reached a maximum and the reverse secondary current has died away. As the core diameter of a wireless coil is generally larger than the ordinary there is also a great loss in energy, for with a rapid vibrator there is not sufficient time to properly magnetise it before the current is again broken.

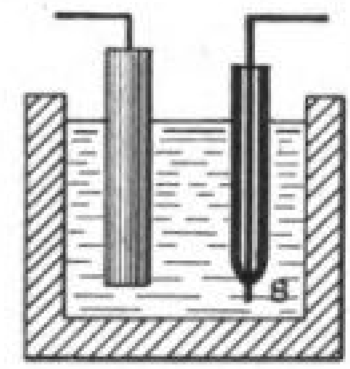


Fig. 2.

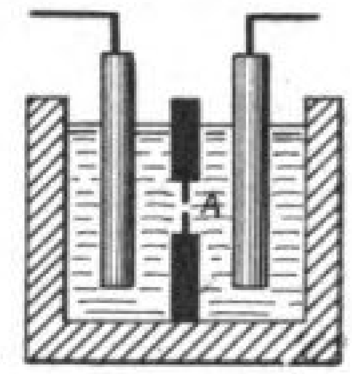


Fig. 2 A.

Another loss of energy is in the eddy currents and hysteresis lag, as these are directly proportional to the speed of the vibrator.

Thus it is seen that from the standpoint of the induction coil, a low rate of interruption is desirable. As there are other factors also to consider, the interrupter must be atonic or adjustable. An ideal interrupter is designed to give the

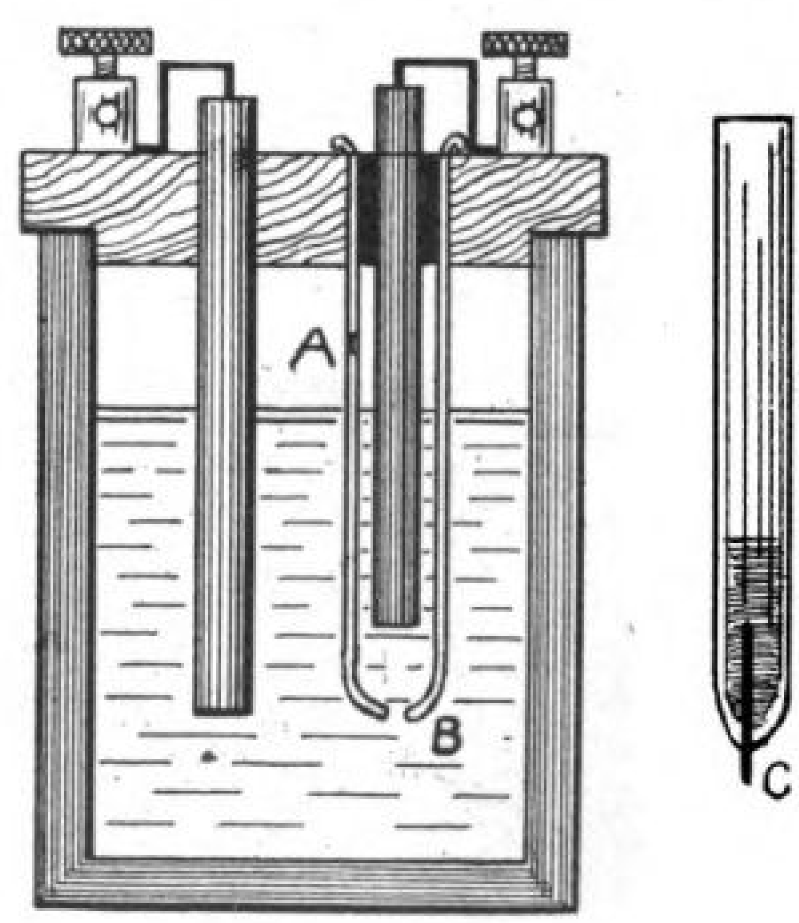


Fig. 3.

longest possible time after the primary circuit is "made" and before the "break" occurs, which must be as sharp as possible.

A neat and efficient interrupter which fulfills these conditions and gives excellent results with small coils is illustrated in Fig. 1.

Large coils generally use some form of mercury or a turbine interrupter. The last named is essentially a centrifugal pump driven by an electric motor, and so arranged that it throws a revolving stream of mercury against a circle of brass teeth. Every time the mercury hits one of the teeth the circuit is made and when it passes between two it is broken.

The best form of interrupter for X-ray and experimental work is the electrolytic. The only disadvantage is that a potential of 40 volts or over is necessary. Fig. 2 shows the cross section of a Wehnelt and a Caldwell interrupter. The Wehnelt consists of a lead plate acting as a cathode and placed in a solution of dilute sulphuric acid. The anode is a piece of platinum wire (B) placed in a porcelain tube having a small hole in the bottom so that only a small amount of surface is exposed to the liquid. Upon the passage of a strong current through the electrolyte a succession of rapid interruptions, due to the formation of gases on the small electrode, take place and are adjustable through great ranges by raising or lowering the platinum wire and thus increasing or decreasing the surface exposed. The only disadvantage is that with heavy currents the liquid becomes quickly heated and the gases prevented from forming freely.

Such an interrupter may be easily improvised by sealing a piece of No. 22 platinum wire (Fig. 3, C) in one end of a glass tube and immersing it with a lead plate or rod in a solution of sulphuric acid (dilute).

The Simon or Caldwell interrupter operates by exceeding a certain current density at one part of a solution. It consists of a vessel containing dilute sulphuric acid as an electrolyte which is divided into two parts by means of a diaphragm or partition having a small hole in the center. Connection is made to the two sections of the electrolyte by strips of lead. (Fig. 2A.)

If the end of a hard glass test tube is heated with a pin flame and then a hole varying from 1-32 to 3-32 of an inch made in it by blowing on the open end of the tube and thus bursting the soft glass, it may be made to serve as an excellent Simon Caldwell diaphragm. It should be set up in a glass jar and supported by a wooden cover as in Fig. 3. Two leaden rods are placed in the electrolyte, one inside the tube and the other outside. The smaller the hole the higher the rate of interruption and the smaller the amount of current flowing.

Both of the improvised types of electrolytic interrupter described above are non-adjustable. If any range of work is to be attempted in experimenting they should be made adjustable. Fig. 4 gives a scheme for an efficient interrupter of both types, and which may be very closely adjusted.

It is desirable that in raising or lowering the electrode the motion imparted be perpendicular and not rotary. This is accomplished in the following manner: A piece of so-called 1/4-inch "brass" curtain rod which in reality generally consists of an iron rod covered by a thin sheet of brass, the edges of which are folded over into a groove. A piece of such rod is stripped of its brass and threaded as shown by E in Fig. 4. A piece of 1/4-inch brass tubing 1 1/2 inches long (D) is fitted with a pin (F) projecting through so that when the tube is placed over the rod E the pin will engage the slot and the rod may be slid in or out of

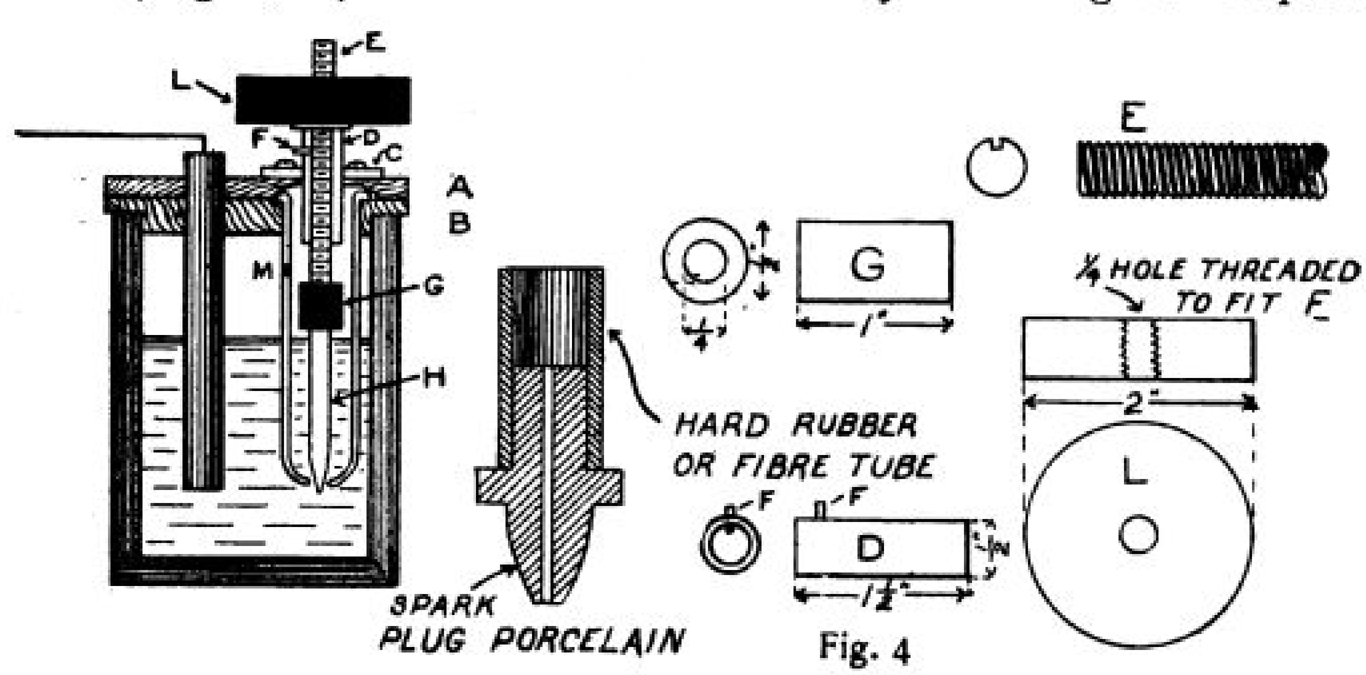


Fig. 4

the tube but not twisted. The tube is passed through the wooden cover of the interrupter jar and held perpendicular by soldering to a large brass washer (C). The brass washer is bored to receive two small screws which fasten it to the cover. A large nut made of fibre or hard rubber serves as an adjusting handle. It is about 2 inches in diameter and 5/8 inch thick. It is threaded to screw on the rod E and thus raise or lower it when revolved. The pin F prevents the rod E from revolving. The porcelain of a spark plug is fitted tightly into a fibre or hard rubber tube and serves to shield the wire, used as the anode, from the liquid save at its point or end. The reason porcelain is used is that it does not crack easily. A piece of platinum wire to fit the hole in the porcelain is fastened to E. The porcelain and its supporting tube are fastened below the rod E to the cover.

The Simon Caldwell interrupter makes use of the same mechanism, save that the size of the hole in the test tube is adjustable in size or area by raising and lowering a 1/4-inch pointed glass rod into it. (See H in Fig 4.) H and E are connected by G, which is a piece of fibre or hard rubber tubing fitting tightly over both. The cover of the jar consists of two parts, A and B, one supporting the adjustable electrode, or in this case the glass rod, and the other the test tube or hard rubber tube and porcelain in the case of the Wehnelt type.

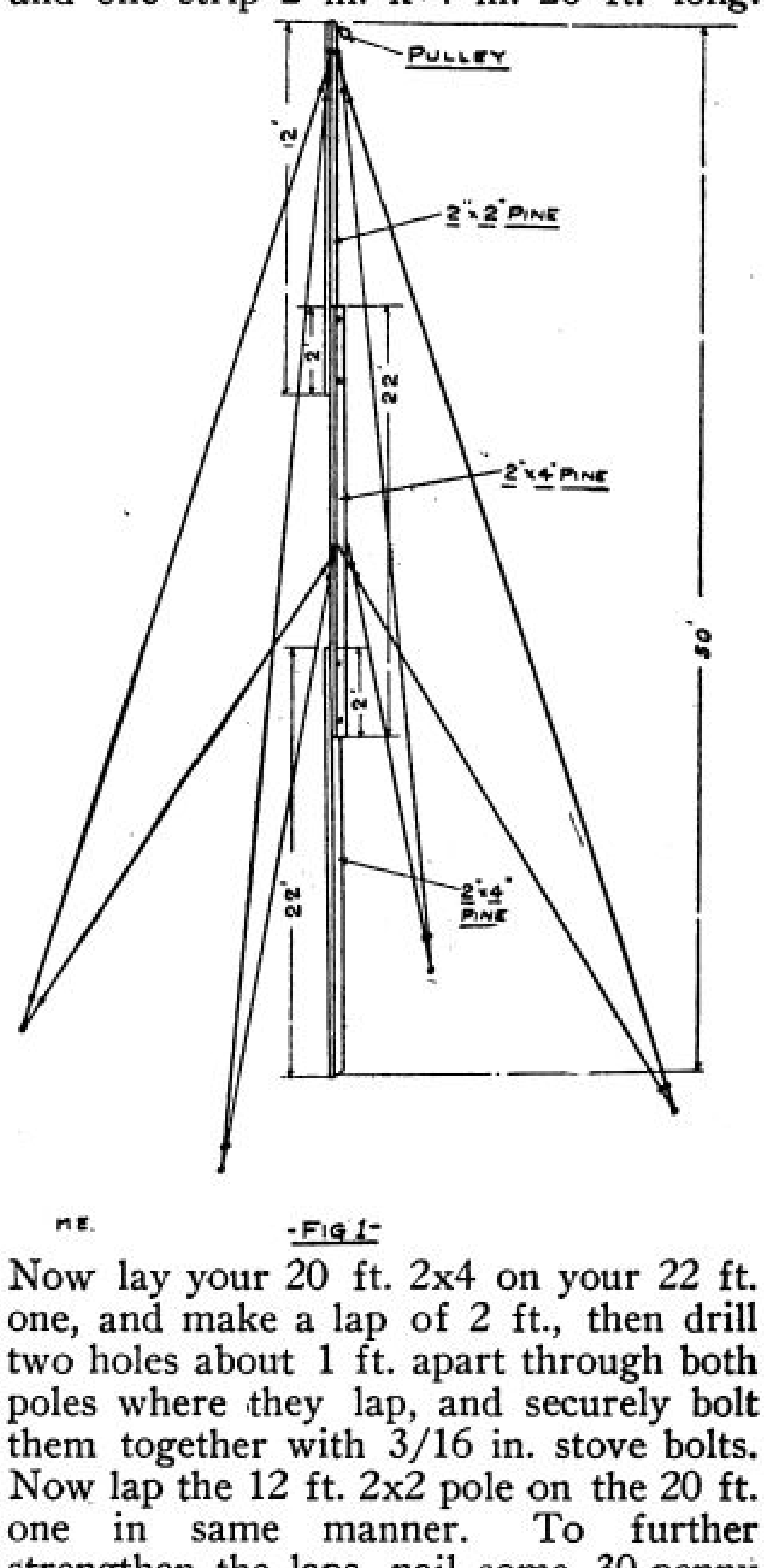
Holes (A. Fig. 3, and M, Fig. 4) are always made in the tubes above the level of the electrolyte. The liquid tends to rise in the inside of the tube, and by this means is permitted to flow back into the jar. A deep jar is desirable, and the wooden cover should be paraffined. The lengths of the various parts are somewhat optional, and may be made to suit the depth of the jar.

THE CONSTRUCTION OF AERIALS AND AERIAL SUPPORTS.

By C. B. De La Hunt.

Most amateurs consider a high aerial very expensive and hard to build, but this is not the case, and below I will endeavor to give a description of one constructed by the writer, which has given very good results, both in its receiving qualities and stability, as it has stood a 35-mile-an-hour wind, with very little strain. I first tried to construct this pole of iron pipe, but the small pipe would bend when raised, and a large pipe is too expensive for the average amateur.

First go to a lumber mill and procure one strip of pine 2 in. x 4 in., 22 ft. long, and one strip 2 in. x 2 in., 12 feet long, and one strip 2 in. x 4 in. 20 ft. long.

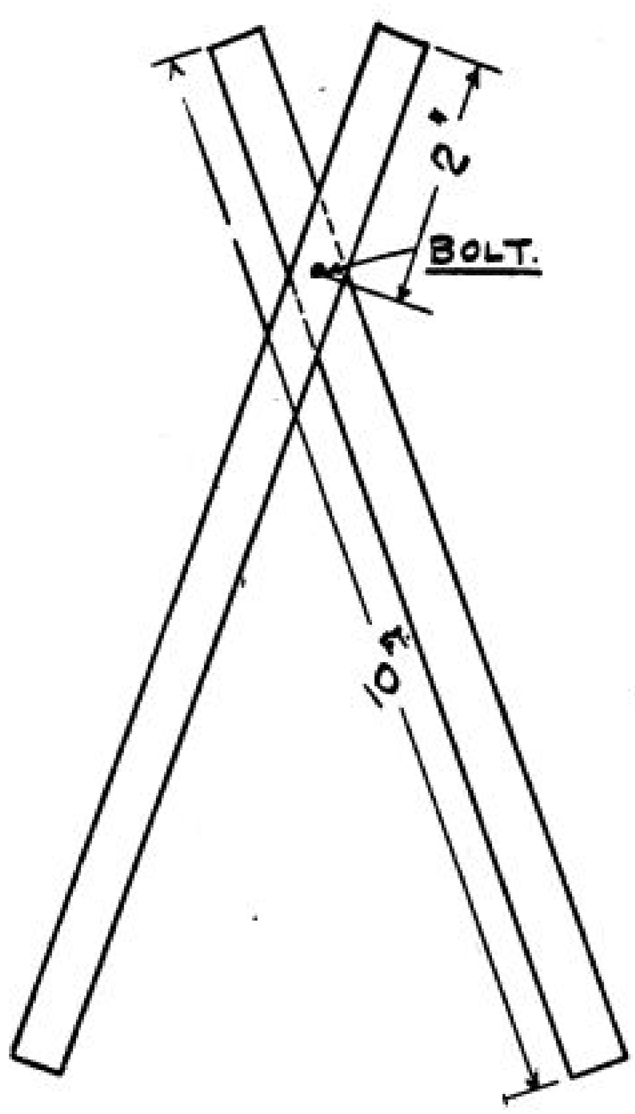


ME. -Fig 1-

Now lay your 20 ft. 2x4 on your 22 ft. one, and make a lap of 2 ft., then drill two holes about 1 ft. apart through both poles where they lap, and securely bolt them together with 3/16 in. stove bolts. Now lap the 12 ft. 2x2 pole on the 20 ft. one in same manner. To further strengthen the laps, nail some 30-penny nails through the poles where lapped, and bend them over on the other side. Now fasten the pulley you wish to use to the top of pole, and six inches from the top put a screw-eye on every side of same. This is for your first set of guy wires. The second set of guy wires should be put about 25 ft. from the top, and put on in the same manner.

Now get some No. 14 telephone wire, and fasten in all of the screw-eyes. Be careful to have your guy wires long enough so as you can get a good lead. Next put a stout 100-ft. rope through the pulley at top, and your pole is ready for hoisting. Figure 1 shows the pole complete.

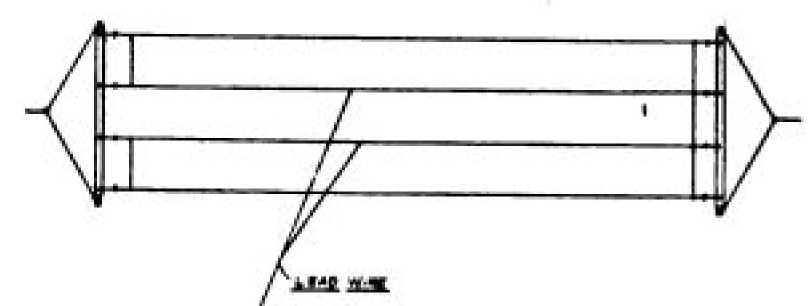
Take two strips 10 feet long, and cross them about two feet from the top. This is to be used in holding the pole as it is drawn up. Now get a block and tackle and fasten it to the lower back guy wire. Fasten the other end to the top of house or some other convenient place where a good hold can be had. Now dig a small hole about six inches deep, and place the end of pole in same. This is to keep the pole from slipping when it is being hoisted up. Next get three or four friends to hold the top guy wires, one to pull up on the block and tackle, and one to operate the crosspiece under the pole. Pull up on the rope until the top of pole is high enough to allow the crosspiece, shown in Fig. 2, to be put under same, then as fast



M.E -FIG 2-

as the pole is pulled up, keep moving the crosspieces, keeping the weight of the pole resting on them; this will make the hoisting of the pole very easy. I found it very convenient to put my pole up against the back of house, as this gives it additional support, but if the house is not in a convenient position, you should dig a hole about three or four feet deep to support it. Having pulled your pole up until it is perpendicular, secure all of your guy wires tight, and your pole is ready for use. The description is of a fifty-foot pole, as this is most used by amateurs, but higher poles can be put up in the same manner by making the lower pieces larger, and adding more sets of guy wires. If a horizontal aerial is wanted, hoist another pole in the same way.

I have always found that an aerial about 60 ft. long, composed of four strands of No. 14 copper or aluminum gives best results, connected and insulated as per figure 3. The spreaders should be about six feet wide, and the porcelain knobs on the ends should be



M.E. -FIG 3-

about 1½ or 2 inches long. The insulators on the aerial wires can be made of strips of rubber or any other good insulator. The lead in wire should be well insulated from all wood or iron, and a suitable ground switch should be placed outside so as to ground the aerial during lightning storms.

The aerial and poles constructed in this manner have given the writer excellent results, besides being inexpensive.

SCHOOL TO HAVE WIRELESS PLANT.

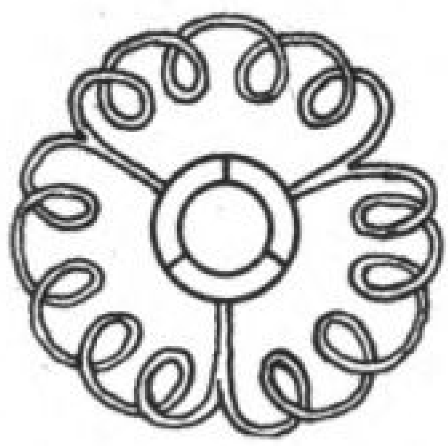
"Q. 89, congratulations and best wishes upon installation of wireless plant. Q 6."

This wireless message will pass between two Queens schools during the coming school term, for the board of superintendents has authorized the installation of a wireless telegraph plant on the roof of P. S. 89, Orchard avenue and Fifth street, Elmhurst, L. I. "Q. 6" will at last receive the call for which it has been awaiting for months.

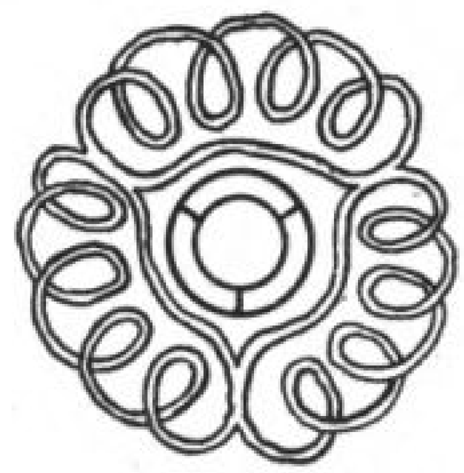
"Q. 6" is the call of P. S. 6, Steinway and Jamaica avenues, Long Island City. Some months ago the boys in that school constructed a wireless plant of their own making on the school roof, and when it was found to be in working order they appealed to the other schools having wireless plants to communicate with them. They waited in vain, for no other school had a plant. The call for "Q. 6" did not come before the school was closed for the summer. Shortly after the schools reopen, however, the long waited for message will be received.—*N. Y. Globe.*

A Simple Induction Motor

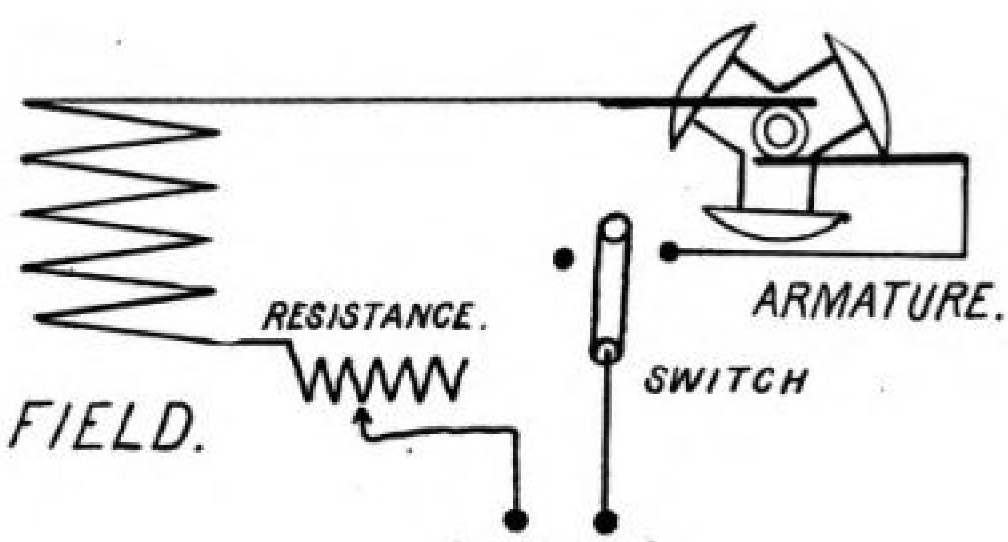
ALFRED POWELL MORGAN.



CIRCUIT OF STARTING COILS.



CIRCUIT OF RUNNING COILS.



Almost every dabbler in electricity has, at some time or other, tried to run a small three-pole battery motor in series with resistance on the alternating electric lighting circuit. Such a motor is always very useful in a laboratory for running circuit breakers, agitators, models, etc. It is always best to have a motor wound and built for use on the alternating current. This is not always possible, and a motor must be improvised. The toy three-pole armature motor will run on the alternating as well as the direct current, but unless wound for 110 volts will heat considerably and spark so badly as to ruin the brushes and the commutator, because of the excessive voltage.

The remedy for this is to run it as an induction motor, whence it will run without brushes and without current being led into the armature. Remove the brushes and bind a piece of bare copper wire around the commutator so that it short-circuits the segments. If the armature is then speeded up by giving it a couple of sharp twists or winding a string around the shaft and then pulling it as one would spin a top, and the alternating current connected to the field coil alone, the motor will continue to revolve at a good rate of speed. The motor should be started first and have reached a good speed before the current is turned on or it will be almost impossible to turn the armature because of the magnetism.

Most commercial induction motors are self-starting, and provided with a hollow armature, which contains a centrifugal governor. When the motor is at rest or starting, four brushes press against the commutator and divide the armature coils into four groups. After the motor has attained the proper speed the governor is thrown out by centrifugal force and pushes the brushes away from the commutator. At the same time a metal ring is pressed against the interior of the commutator, short-circuiting all the sections and making each coil a complete circuit of itself.

Where the motor is in an awkward position or concealed it would be difficult to start such an improvised induction motor as described first. But to provide a small motor with such a governor would be exceedingly difficult, and therefore it may be provided instead with an extra set of coils for use in starting only. In this case the brushes are allowed to remain on the motor, but are only used for starting. The leads of the armature windings are removed from the commutator and all connected together. Then one or two layers of wire are wound over each of the old coils to form coils which are similar but only smaller. These new coils are connected to the commutator as the old ones were before being removed, and as if the motor was to be used for direct current. The connections to the current are made as in the diagram. The switch is thrown to the left for starting, and after the motor is up to speed, thrown to the right, when the motor will run as an induction motor.

Such a motor will run in either direction, according to whether it is started towards the left or right. If the field coils are wound with a finer wire than the ordinary toy motor, so as to increase the resistance, it will operate more efficiently. It is needless to say that if a low-resistance battery motor is used on the 110-volt circuit proper resistance should be placed in series with it, which may be lamps in series multiple, water resistance, etc.

WIRELESS MEDICINE.

Treating a sick man on board the lonely Nantucket lightship by wireless, is the latest achievement of those aboard the ship. A few days ago Capt. Doane, of the light vessel, was taken sick, and as there was no doctor aboard, the crew did not know just what to do. A wireless message to the naval hospital at Newport, however, brought detailed instructions from one of the surgeons there, and the prescription that was sent was put up from the medicine chest on the lightship by the crew. The naval surgeon was kept constantly informed of the captain's condition, and he began to improve soon after the long distance treatment began. —*Scranton Republican.*

Wireless prescriptions represent the absent treatment that treats.—*Boston Transcript.*

DIRIGIBLE BALLOON CONTROLLED FROM LAND BY WIRELESS.

In a private test before representatives of one of the European governments, Mark O. Anthony, an electrical engineer, succeeded in sending a small dirigible balloon, controlled by wireless electricity, out over the ocean near Sandy Hook, a distance of one mile and a quarter, directing the movements of the craft by manipulation of an ordinary keyboard on the beach.

Persons who saw the experiments from a distance of several thousand yards state that during some of the flights a brisk breeze was blowing in shore, but that the little dirigible, with its large propeller, at all times made good headway and appeared to be much steadier and to travel faster than other and larger craft they had seen which were operated by a pilot aboard.

Since last April he has been at work perfecting a large model and is soon to go abroad to conduct trials before officials of one or more foreign governments. The purpose of his tests near Sandy Hook was to prove the practicability of his invention for use in the life saving service. Mr. Anthony declared that what he had already done proved to the satisfaction of those who saw the model work that it could be used successfully at life saving stations, and that it could be inflated from large hydrogen tanks and sent out over a ship one mile from shore in less time than surf boats could reach the ship in ordinary weather.

"WIRELESS" TELEPHONE BOOTH HELD WHISKY.

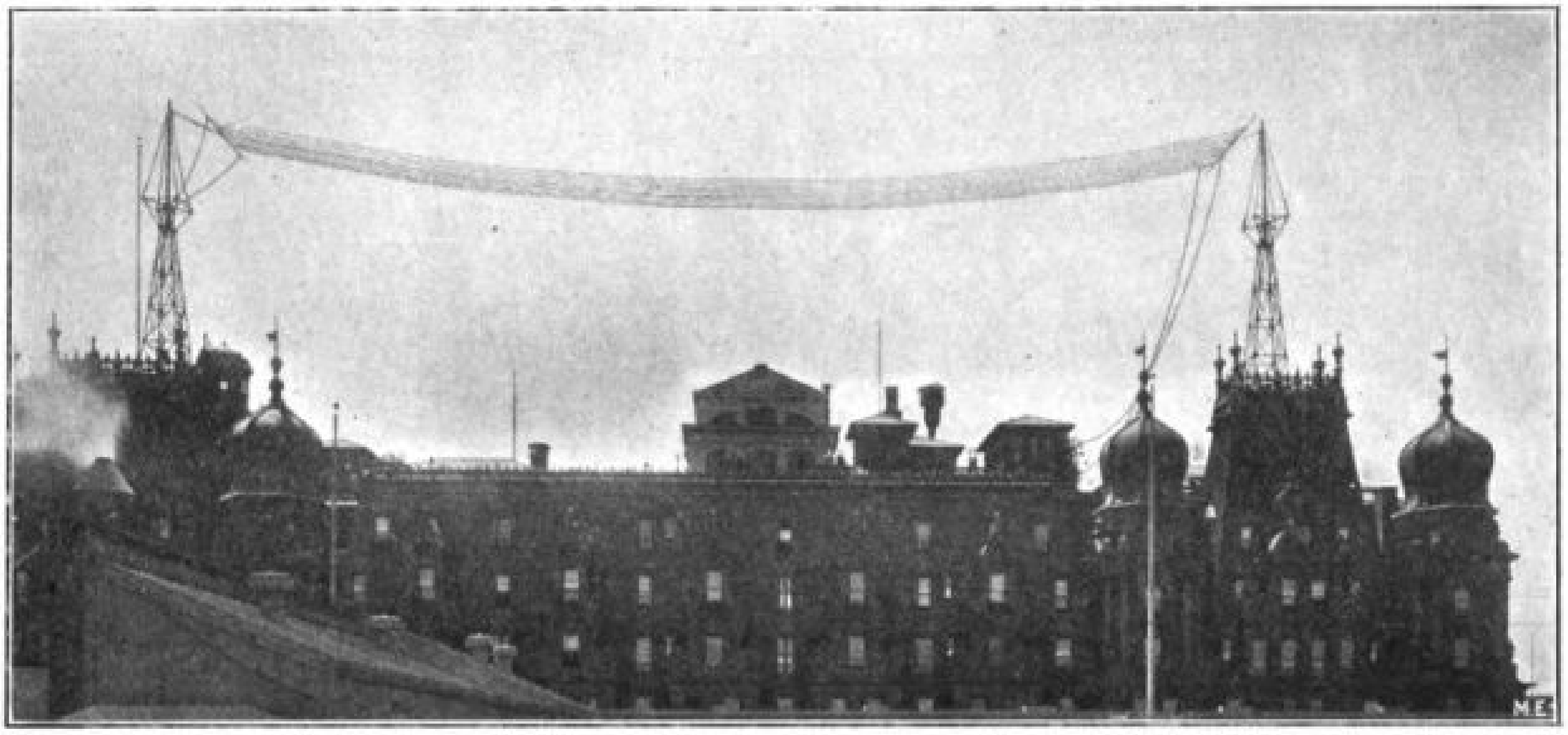
Ashtabula, Ohio.—What is believed to have been a clever scheme for violating the Rose law in a "dry" town came to light in a raid made by the police.

Someone who saw a barrel rolled into a building formerly a saloon, reported to the police and a squad was detailed to search the place. Finding the barrel of whisky, as expected, the police became curious about a screen and discovered that it hid what appeared to be a telephone booth.

Further scrutiny disclosed that it was a "wireless" telephone that hung on the wall, and when a policeman lifted the receiver the box on the bottom of the instrument flew open, disclosing a receptacle of convenient size for a glass or bottle.

Wireless Stations About New York

No. 2—Station at the Waldorf-Astoria



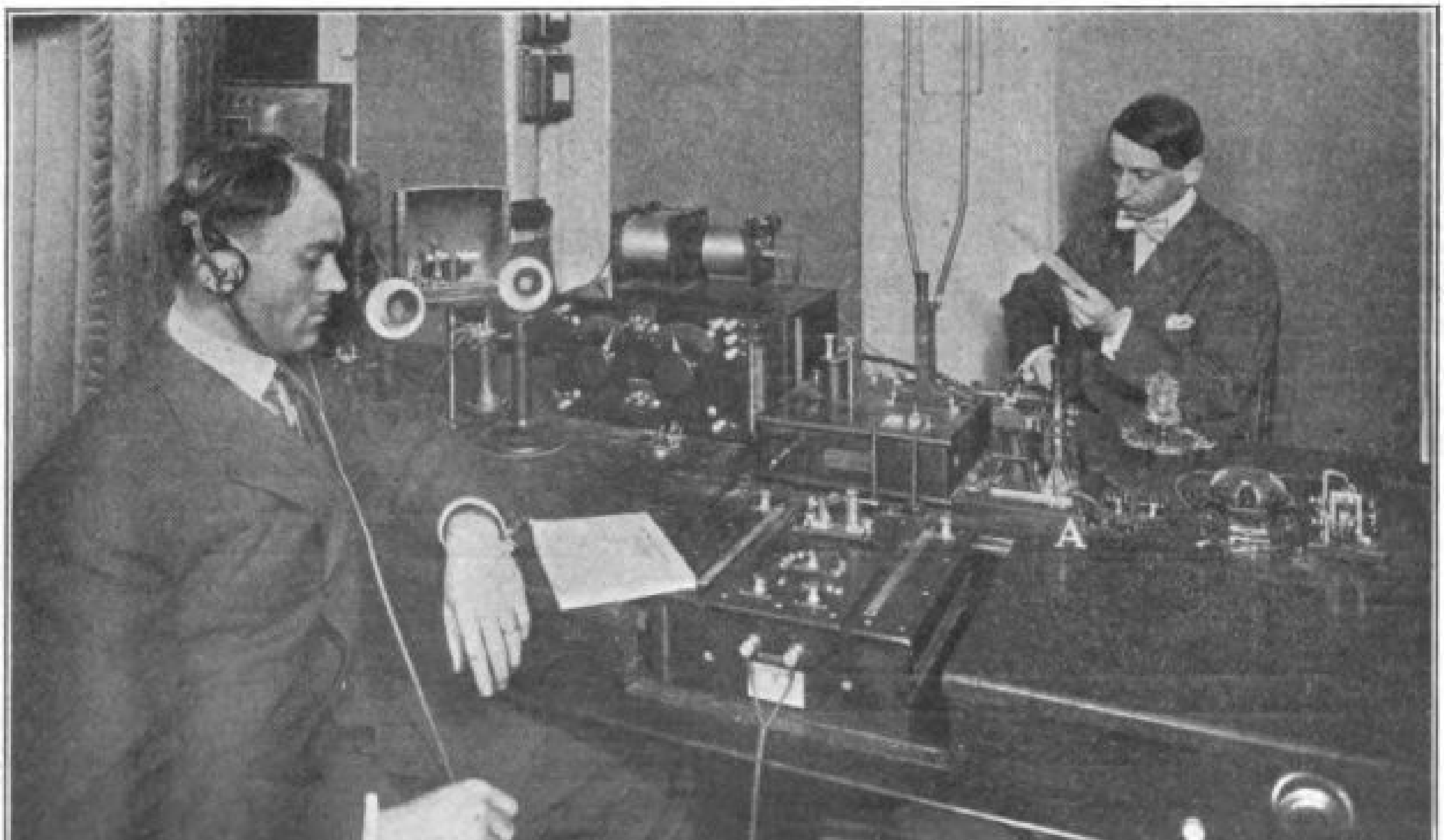
This station without a doubt is the most popular one in New York. It is located on the top of the beautiful hotel, and the lofty aerial stretches its wires clear over one side of the famous roof garden.

The aerial is quite a big affair, having twelve wires. The stretch between the two steel towers is 236 feet. The towers themselves are 84 feet high, and the aerial is 300 feet above the ground. Each one of the wires is insulated from the spreader by two 10-inch electrose commercial insulators, which are connected "in series", as one single insulator was not deemed sufficient to hold the high potential.

The operating room is a model in every respect. Operator E. N. Pickerill takes especial pride in having everything spick and span.

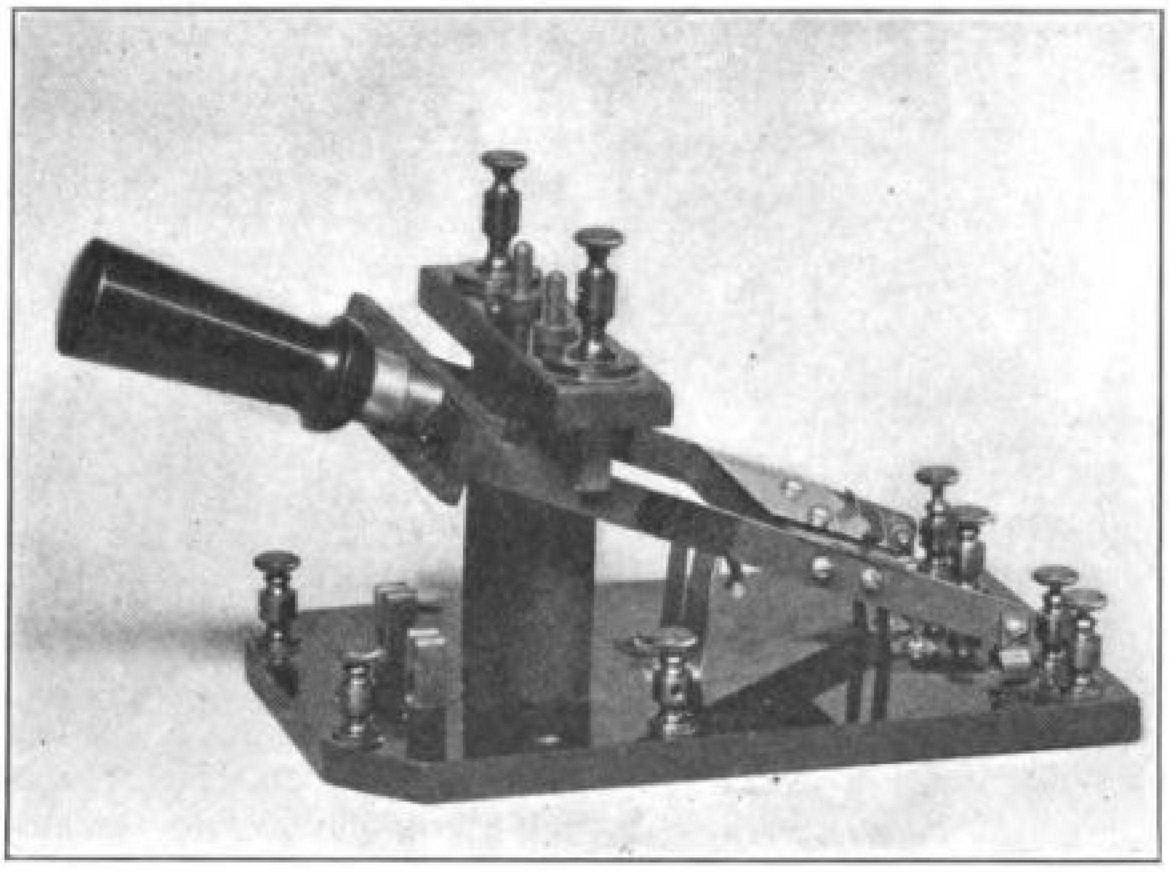
The output of the station is 5 k. w., and is in daily operation with Chicago and steamers far out on the Atlantic. Contrary to other stations, this one has no regulation wireless key, but a common telegraph key, which in turn works the heavy magnet-operated key shown at A. The operator therefore

(Continued on Page 271.)

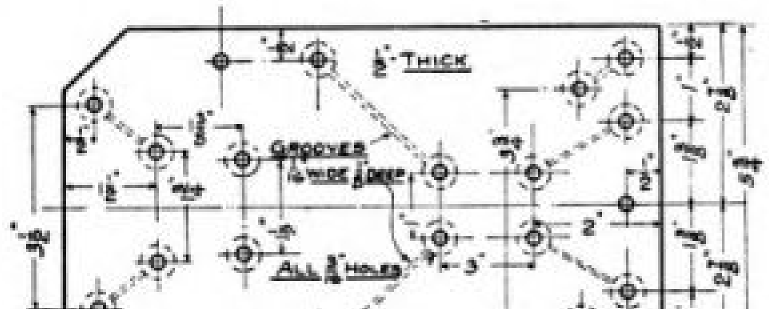


Construction of a Loop Antenna Switch

By A. C. Brady.

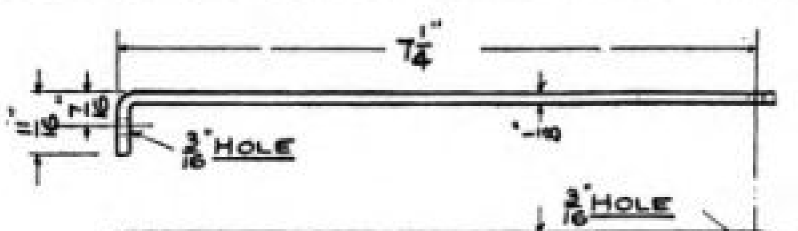


The switch described below, which is designed somewhat after the old De Forest type, is the one referred to in the article, "Relay for Aerial," published in last month's issue of Modern Electrics.



-Fig 1-

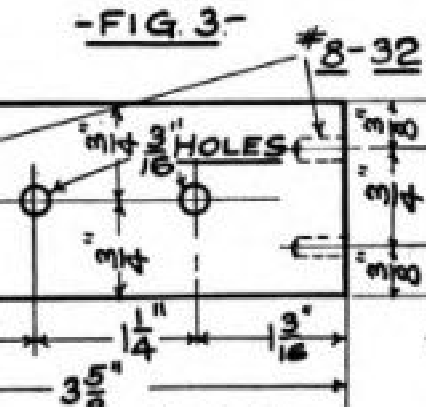
This switch is constructed in such a way that it is possible to throw from the receiving to the transmitting instruments very quickly and easily. It is also so arranged that it is impossible to put a current into the coil or transformer when



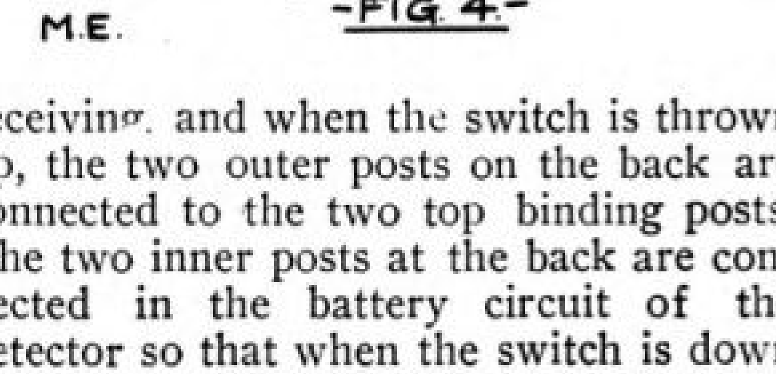
-Fig 2-

the switch is in position for receiving, even though the key should accidentally be depressed.

Referring to the cut, the two top binding posts are for the two aerial leads for receiving, loop connection. The two front posts on the base are for the primary circuit of the coil or transformer. The side posts may be used either for closing the circuit of the aerial relay or for the independent vibrator. The four posts at the back of the switch are for



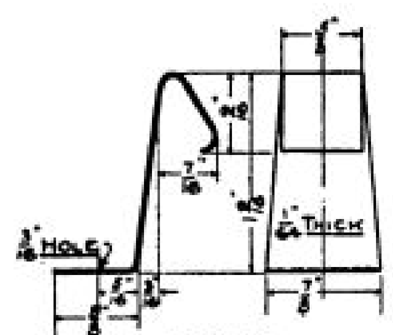
-FIG. 3-

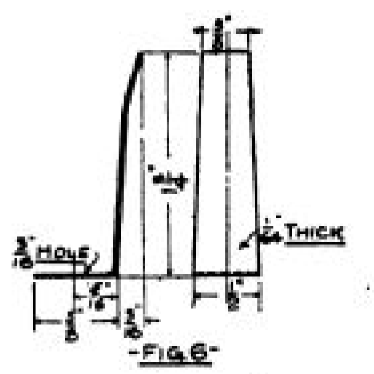


-FIG. 4-

receiving, and when the switch is thrown up, the two outer posts on the back are connected to the two top binding posts. The two inner posts at the back are connected in the battery circuit of the detector so that when the switch is down the closed receiving circuit is opened while transmitting. The construction of the switch is as follows:

The base should be made of hard rubber ½ in. thick, and cut to the size as shown in Figure 1. The edges of the rubber after cutting may be rubbed down with fine emery paper and then oiled. This will give the rubber somewhat of a polish, and give the switch a much nicer appearance when finished, than when simply filed off. Holes in the base should be bored as per Fig. 1 and countersunk ¼ in. Grooves should be made between the holes as shown. These also should

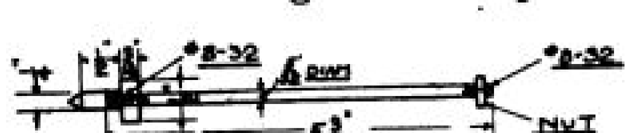

-Fig 5-

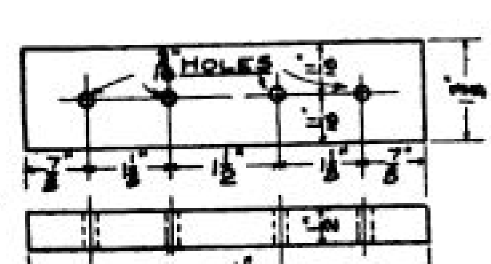

-Fig 6-

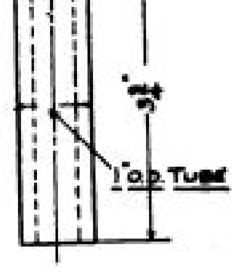
be ¼ in. deep. The two long blades of the switch are made of copper ½ x ⅛, holes bored and turn made at end as per Fig. 2. The two holes in the middle of the bar are not shown in Fig. 2, but these should be made large enough to pass an 8/32 screw, and position can be approximatelv determined by referring to photograph.

Fig. 3 shows the small brass plate which is screwed to the rubber piece shown in Fig. 4, this piece being placed between the two arms of the switch, as shown in the photograph.

The springs which make contact on the brass piece just described should be constructed of spring german silver, the forward contacts being made as per Fig. 5,

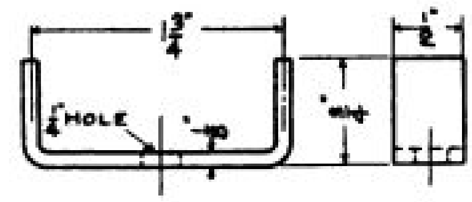

-Fig 7-

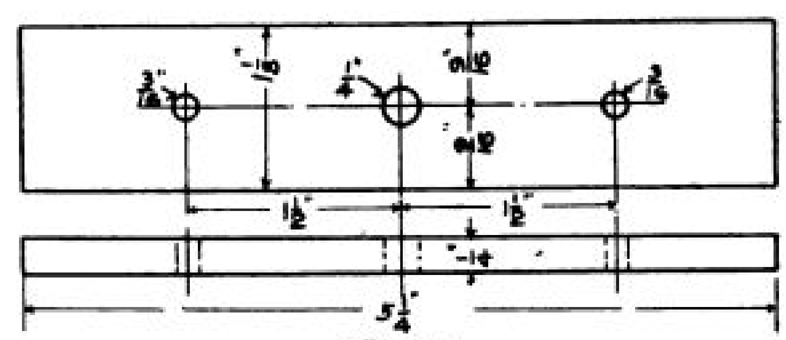

-Fig 8-


-Fig 9-

the rear contacts as per Fig. 6. The photograph gives an idea of the appearance of same when set on the base.

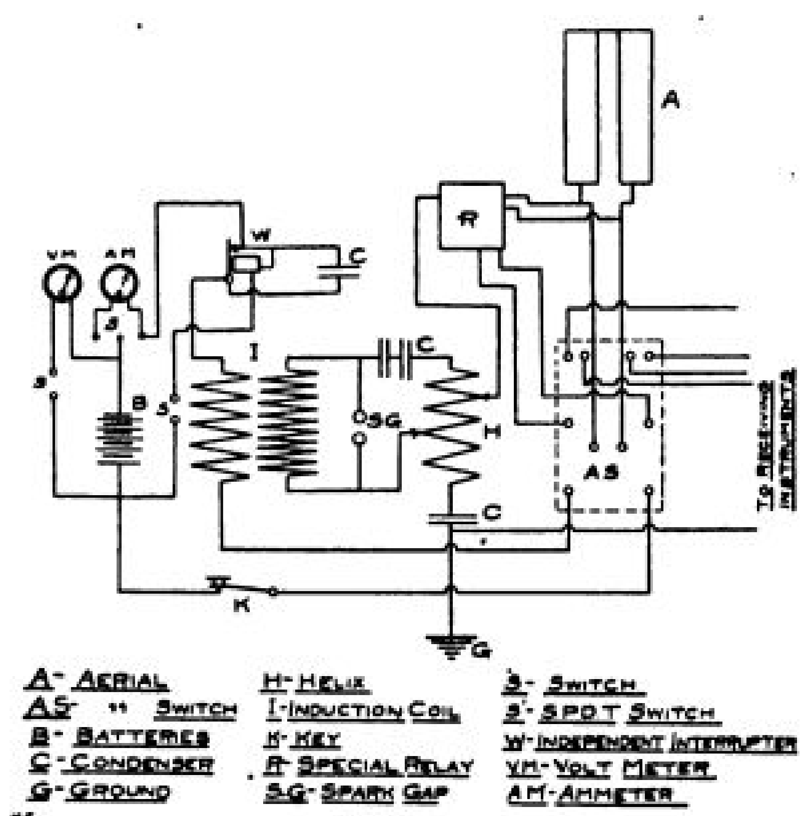
The standards are made from hard rubber tube 1 in. outside diameter, and 3¾ in. long, as shown in Fig. 9. The outside of these standards may be polished by placing same in a lathe and rubbing down with emery paper, and then oiling as described. These are fastened to the base by means of the brass rod,


-Fig 10-


-Fig 11-

dimensions of which are shown in Fig. 7.

The top cross piece of hard rubber should be drilled and finished as per Fig. 8, edges being rubbed down and polished as described. The top contacts



-Fig 12-

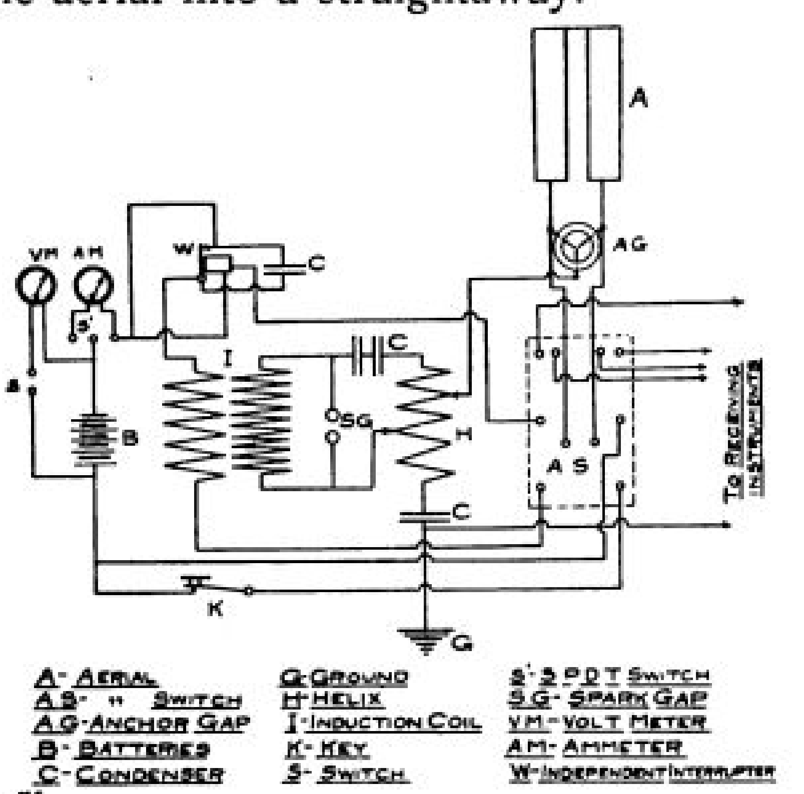
may be taken from any knife switch, and should be screwed through the rubber directly into the base of the binding posts.

The blades closing the primary circuit are in reality one piece, which is formed as per Fig. 10. This piece is made from the same copper stock as the long arms, and is mounted on the crosspiece of the hard rubber, which should be drilled as per Fig. 11. The screw which holds the handle of the switch also holds the primary circuit blades. The handle may be obtained through almost any good electrical supply house.

The rear fastenings for the arms as well as the two upper and lower knife contacts, may be taken from old porcelain base knife switches.

The switch should now be assembled, and the countersunk holes in the base, after connections are made where needed, should be filled in with some good insulating compound. It might also be advisable when setting up the switch for operation to raise same at least ½ in. from the surface of the operating table by small rubber blocks, this precaution being taken to obviate the danger of leakage.

The diagram shown in Fig. 12 shows connections of the switch when used with the relay described in last month's issue. It is understood, however, that there should be a battery just sufficiently powerful enough to close the relay in the circuit. This was inadvertently omitted in the diagram. With this connection the loop system may be used for receiving, and when the switch is thrown down for sending, the relay is operated, converting the aerial into a straightaway.



-Fig. 13-

Diagram as per Fig. 13 shows the switch when used on the loop system for both transmitting and receiving, the two forward german silver contacts being used in this case to close the circuit of an independent vibrator for the coil.

Many other connections will suggest themselves to the amateur who constructs this switch and, generally speaking, the experimenter will be well rewarded for his efforts in building same.

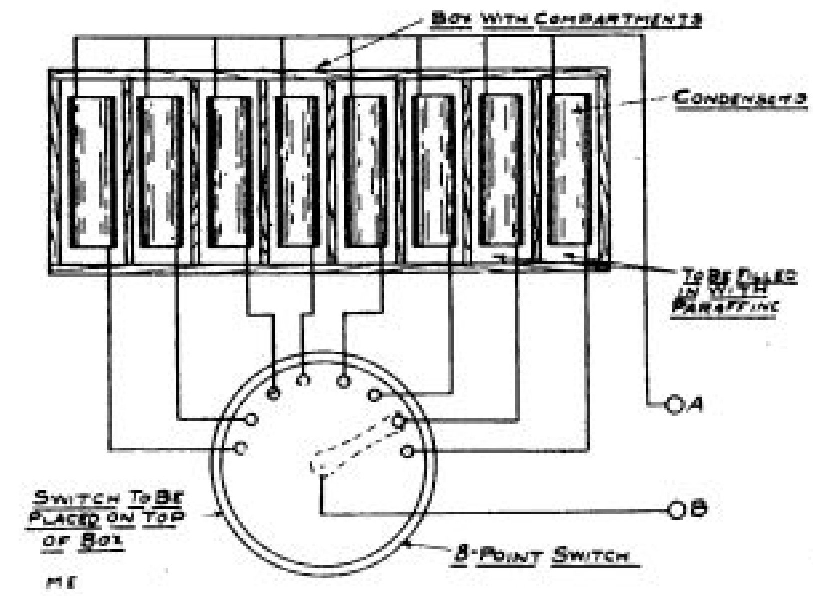
If you are keeping your copies for reference, it is necessary to obtain one of our beautiful binders, holding twelve issues. It is made of a rich, red vellum, stamped with gold lettering. Price prepaid, 50 cents.

SEMI-VARIABLE CONDENSER.

By T. W. Huntington, Jr.

For amateurs who do not wish to buy an expensive variable condenser, the instrument described in the following lines, while of course not as efficient as the variable condenser, will be found to give very satisfactory results.

The apparatus consists of 8 small condensers, the tinfoil sheets varying in size from 17½ to 42 square inches of tin foil in each condenser.



Begin by cutting strips of tin foil 3½ by 5 in., 3½ by 6 in., 3½ by 7 in. and so on up to 3½ by 12 in., making two strips of each size. Also cut pieces of smooth paper, preferably writing paper, 4½ by 6 in., 4½ by 7 in., and so on up to 4½ by 13 in., of these making three of each size. The paper should be well soaked in hot paraffine and allowed to cool.

Next place on one of the 4½ by 6 in. pieces of paper one of the 3½ by 5 in. pieces of tin foil previously made perfectly smooth. See that the tin foil is placed exactly in the center of the paper. On top of the tin foil, 2 in. from one end, place a piece of fine wire 6 in. long and bared for half its length. Next is placed another piece of paper, again a piece of tin foil, of the same size as the first piece, all the time keeping the tin foil in the center of the paper, then another connection wire, two inches from the same end as the first piece of wire, but on the opposite side, so as to avoid any possibility of a short circuit. Another piece of paper is placed on the second piece of tin foil, and the three sheets of paper and two sheets of tin foil are then rolled together, beginning at the end nearest the connection wires, and a rubber band is placed on the outside. In making these condensers too much care can not be exercised to see that the two sheets of tin foil do not come in contact.

The same directions can be followed in making all seven condensers, but when rolling them, mark the length on the outside.

When they are all finished and bound with rubber bands, each one should be tested. This is done with a telephone receiver and a battery. One pole of the battery is connected to the receiver, while one pole of the battery and one of the receiver is connected to the two wires of the condenser. If there is no short circuit in the condenser there will be a faint click in the receiver when the circuit is opened and closed. If there is a short circuit, there will be a click as loud as when the receiver is shorted on the battery. In this case the condenser must be taken apart and the short circuit found

Prepare some melted paraffine in a large, flat bottomed pan, having it at least 1½ in. deep. After testing the condensers, immerse them in liquid paraffine, handling them by the two wires to be used for connections, taking care not to pull the wires from their places.

After all bubbles have ceased coming from the ends, remove them and place them in an out-of-the-way place to cool. When cold they will be firm and hard. They should be tested again with the receiver and battery to make sure all connections are perfect and to guard against short circuits.

Place the condensers in a previously prepared box, preferably with compartments to hold each separate condenser, and an eight point switch on the cover. Connect the condensers as per diagram, and place two binding posts on one side of the box, to which are to be connected the two wires from the instruments. These binding posts are marked A and B in the diagram.

The construction of the condenser may be varied so as to make the separate condensers 5 in., 5½ in., 6 in., and so on, up to 12½ in. in length, thus making 16 condensers instead of 8, and having a much finer adjustment.

If this condenser is to be moved from place to place it will be advisable, after having placed the separate condensers in the box and having made the connections, to pour melted paraffine over them, so as to prevent the condensers from moving, and perhaps causing a short circuit or a broken wire.

AN AUTOMATICALLY LIGHTING REFRIGERATOR LAMP.

By Grady B. Medearis.

The switch herein described will be welcomed by grocers, butchers and all who have to enter an artificially lighted refrigerator. Hitherto, upon entering, one had to "fan the air" for the drop

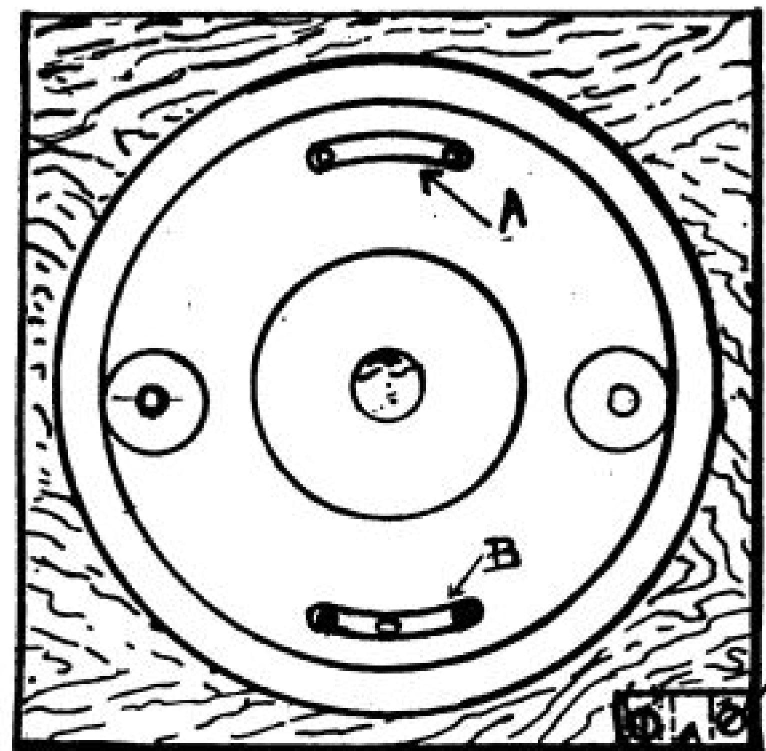


Fig. 1.

lamp, while this automatic switch lights the electric lamp the instant the door is opened, and turns it off when the door is closed.

A large size snap switch of the "Perkins" style was used by the writer, one having two contacts; these contacts, together with the small binding posts, are sawn off smooth with the small plates (A) and (B), Fig. 1. The working parts in the center will have to come out and the coiled spring, movable contacts, etc., stripped off the central rod. This rod is replaced, to be used to keep the top in place.

The porcelain base is then inverted and the screws holding plates (A) are removed; with this plate as a model, holes

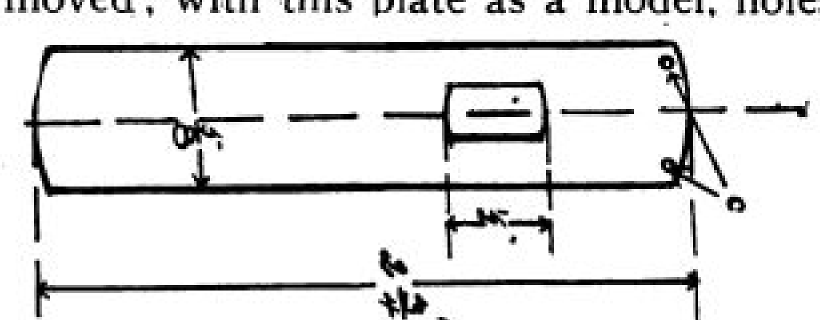


Fig. 2.

are drilled in a piece of spring brass 5/8 inch wide and 2 3/4 inches long. These holes (C) will have to be threaded the same as the original plate. A slot is also cut in the spring (see Fig. 2) so that when it is screwed in the place of (A) Fig. 1, it may be moved up and down without touching the central rod.

A base 2 1/2 inches square and 1/2 inch thick is next prepared, the porcelain base being screwed to it centrally. A block 5/8 inch high and 3/8 inch thick is screwed in the lower right-hand corner (Fig. 1, E). Through this block drill a

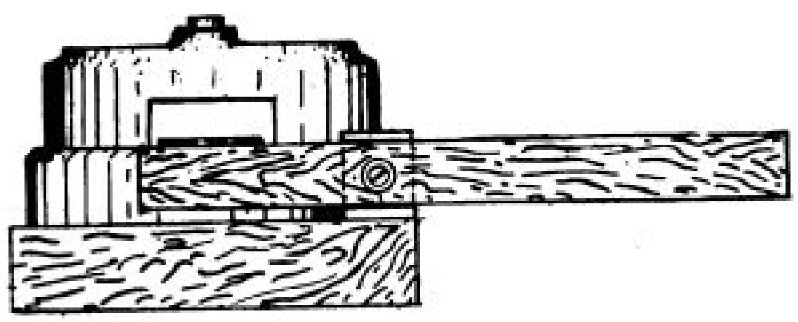


Fig. 4.

hole 1/8 inch diameter. Make a lever 4 1/2 inch long by 1/2 inch square, with a 1/8 inch hole 1 1/2 inches from one end; bolt this lever to the small block, as shown in Fig. 4. In the top of the snap switch a slot 3/4 inch long and 1/2 inch high must be cut to allow for the movement of the spring. Place the top on and instead of the winged thumb nut, put a plain nut on and run it up tight.

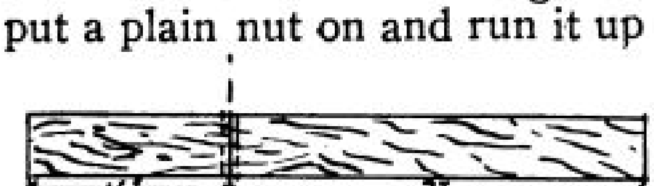


Fig. 3. Lever.

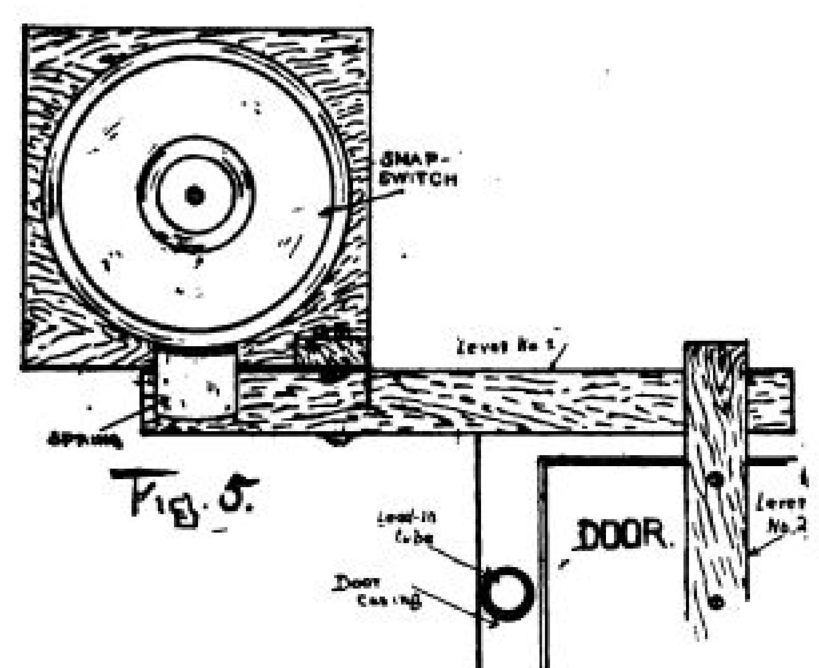


Fig. 5.

The completed article is screwed above the door, on the side opposite the hinges. A lever is put on the door in an upright position so that when the door is closed it will press the free end of the other lever, thus raising the spring. By adjusting the thickness of the levers the door can be pulled to after entering and still not turn off the light; the latch has to be thrown to pull the door in tight enough to work it.

The wiring is done as follows: One wire is led directly to the lamp through a porcelain tube in the door casing. The other wire is connected to the spring of the switch, the contact under the spring being connected to the remaining pole of the lamp. Of course the lamp will have to be turned on all the time. Fig. 5 shows the switch in position on the door casing.

NAVY'S NEW WIRELESS SYSTEM.

A recently devised system of wireless telegraphy, conceived, perfected and applied in Massachusetts, has made it possible for United States ships in foreign waters to get in touch wit'. the home government without the use of any of the Atlantic cables. This system, which will ultimately carry with it an interchangeable method by which wireless telephony may also be used, marking a new era in naval history, is in operation in the Charlestown Navy Yard, under the guise of "a more powerful system," surrounded with every secrecy with which the government can guard it.

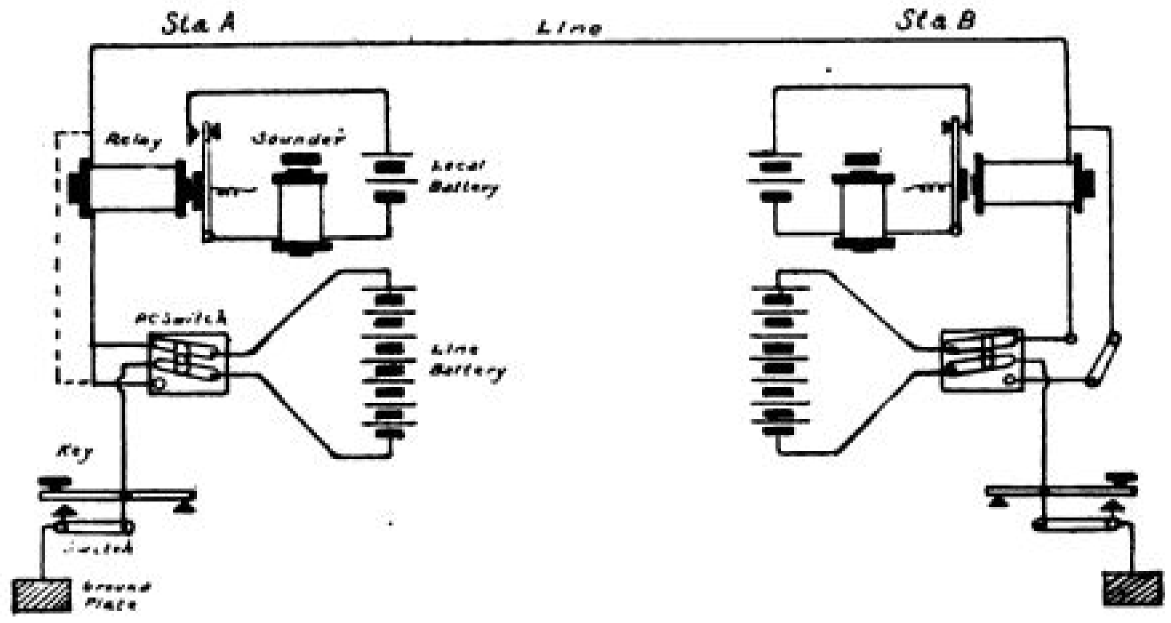
The battleship Connecticut is already equipped with it, and it is being installed on the fasted scout cruisers in the world, the Salem and Birmingham, now docked at the yard.

The installation of the machinery and the wiring are under the direct charge of Reginald A. Fessenden, of Brant Rock, who invented and developed the new system.—*N. Y. Press.*

SPECIAL.

A Combined Open and Closed Circuit Telegraph System

By C. M. Frykman.



Below is a diagram of the circuits of a telegraph system which requires a line-battery of only half the number of cells at each station as that required by the ordinary open-circuit systems, yet it has the advantages of the latter system, that an open-circuit battery may be used and that current flows in the line only when telegraphing.

Although the batteries are, in a sense, normally connected in a closed circuit, no current flows when the line is not in operation, as the batteries (which, of course, should have equal voltage) are then connected in such a way that they oppose each other. This is effected by means of a pole-changing switch. When one station desires to call the other, its line battery is reversed by the pole-connecting switch, thereby connecting the batteries at both stations in series on the line as in the ordinary closed-circuit system.

Instead of connecting both of the outer points of the pole-connecting switch to the relay, the lower point may be connected as indicated by the dotted line at station A on the diagram. This will disconnect the relay while transmitting, thereby lowering the resistance of the circuit,—or a two-point switch may be arranged as shown at station B, so that the relay may be connected or cut out, as desired.

The reversing of the line battery can be accomplished in other ways than by a pole-changing switch, viz: By a pole-changing key, or with a pole-changing device operated by an ordinary key. With these methods the battery would be reversed for every signal, whereas, with a pole-changing switch, it is reversed only before and after sending a message.

On short lines having good ground connections, or if a return wire be used instead of the ground, no local circuit will be needed, the sounder being connected directly to the line in place of the relay. A high-resistance sounder should then be used.

Although the diagram shows only two stations, it is evident that more than two may be connected on a line. In this case the stations are connected in multiple or bridged on the line instead of in series, as in the ordinary open-and-closed-circuit systems.

MARCONI STATION BURNS—SERVICE TO EUROPE STOPPED.

The Marconi wireless station at Glace Bay, N. S., was destroyed by fire recently, causing a loss of several thousand dollars. The power house was not injured, but in the building burned were the operating room, condenser room and a quantity of valuable machinery and wireless apparatus.

The operating building is the chief one of the plant, and wireless communication across the Atlantic will be interrupted by the fire, but wireless service with steamers of the coast line will continue.—*N. Y. Mail.*

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EDITORIALS.

We wish to point to an article, printed elsewhere, which is taken from a New York newspaper, and which refers to amateur interference in wireless.

To anybody who has only a little knowledge of wireless, the absurdity of that article, and similar ones making their way in the daily press, becomes immediately apparent.

Such articles appearing frequently in the daily press, serve only to mislead the public at large, besides showing the paper's gross ignorance which permits such untruthful articles to appear in its columns.

We think it is about time that our daily press would "read up" a little on wireless and get more familiar with facts instead of printing anything and everything as long as it sounds nice to the editor, who doesn't know any better.

Once for all, the press should bear in mind that messages cannot be "stolen" under any circumstances. There are too many stations to-day in operation, all of which are wide awake. Nor is it possible to "intercept" a message to-day.

With the advent of receiving oscillation transformers it is practically an impossibility to try and confuse a message that is being sent to somebody else, as it is always possible to tune out the party who wilfully or through gross ignorance tries to interfere.

Amateur interference is, and has for some months been, a thing of the past. The amateur can no more interfere with the up-to-date commercial station than if he tried to deprive New York City of sunlight when there are no clouds in the sky. Both are equally impossible.

AMATEUR MEDDLING.

Under above heading, the New York *Evening Telegram*,—ordinarily well informed,—prints the following beautiful lines:

"Report of disaster to a torpedo boat participating in the naval manoeuvres off Provincetown, Mass., caused much uneasiness until official denial was made, a few days ago.

"The flashed message, 'torpedo boat rammed and in distress,' turns out to be the result of a government message intercepted by an amateur student of wireless. The message was correctly stolen and the torpedo boat was theoretically 'rammed and in distress.' It was part of the war game, but the amateur student of wireless did not know that.

"Sending out so alarming a report as an actual occurrence with no name of any particular boat caused untold suffering, and there should be some way of checking such meddling in future. It is possible to conceive of instances where good might come of such picking up of messages, but, a little knowledge being a dangerous thing, the opposite is more liable to be the result, as happened in this case."

Despite the fact that there are hundreds of stations in a radius of 100 miles from Provincetown, of which, talking conservatively, at least twenty must have been listening—one amateur "stole" the message, apparently by putting fly-paper on his antenna to more efficiently "intercept" (that beautiful word!) the message, or by having some new-fangled vacuum suction machine on top of his house whereby he "stole" the message so efficiently that not a wave reached the other stations!!

If the *Telegram's* correspondent would only get up an apparatus whereby he could "steal" a message without anybody else getting a piece of it, he would not need to write such nonsense anymore; indeed, he would be well off for the rest of his days. He might as well attempt to invent a phonograph, which before an audience of hundreds of people who are not deaf could—despite its shrieks to be heard for blocks—be made to be heard by only one person, at the will of same, to the exclusion of the others.

WIRELESS HERO DIES IN SAVING 128 LIVES.

The coast liner Ohio, of the Alaska Steamship Company, struck a submerged rock in the Pacific off Steep Point, near Ketchikan, Alaska, early on August 27th, while pushing northward in a fog from Seattle to Valdez with 128 passengers aboard. All the passengers were rescued by other vessels which rushed to the sinking steamer's aid on the call of the wireless "C. Q. D."

Purser F. J. Stephens, of Seattle, sank with the ship as he was still lowering passengers over the side into the boats. Wireless operator George C. Eccles went down sitting at his machine and still sending the story of the wreck to the operator at Ketchikan. The quartermaster and two seamen also were drowned.

At one o'clock in the morning United Wireless Operator Booth, of the Ketchikan station, was sitting in his cramped little office fronting the sea, on the South Alaskan archipelago, when the receivers began ticking frantically the wireless danger call for help, "C. Q. D.! C. Q. D.! C. Q. D.!"

Booth hurried back his answer. "What ship?" he demanded. "Where are you?"

"Steamship Ohio!" came the quick reply. We've struck rock off Steep Point. Ship sinking. One hundred and twenty-eight passengers aboard. Get help at once or everybody will be lost."

Booth knew the Steep Point rocks are a hundred miles off the mainland, opposite Ketchikan—and he knew that the Ohio must have fouled her course in a fog. Also he knew the steamships Humboldt and Rupert City, of the same line, must be threading the tortuous channels not far from where the rock-wrecked boat was going down. Five minutes afterward he had tuned his machine to their wireless apparatus, and signalled both of them, though they were a league apart at sea, and had sent them full speed to the rescue.

Then came another desperate message from the Ohio.

"Ship sinking fast," it ticked in frantic speed. "Cannot hold out another hour. Passengers being taken off in small boats. Captain and crew will stick to the last. (Signed) Eccles."

Booth, in his little cage at Ketchikan, could do no more than flash word to Eccles that help was on the way. Then he picked up the Humboldt and Rupert City again.

"Both headed for Ohio," they responded. "Reach her in half an hour."

Booth was ticking this out to Eccles aboard the sinking ship when the latter broke in with his final message. It said:

"Passengers all off and adrift in small boats. Captain and crew going off in last boat, waiting for me now. Good-bye. My God! I'm"——

Booth at the land end of that wireless dispatch knew that Eccles, of the Ohio, had gone down in the final plunge of the wrecked ship still flashing out his message.

The Ohio, which then bore another name, was the craft in which General U. S. Grant made his famous round-the-world trip and has also figured largely in Jack London's and Rex Beach's tales of the wild new North. All the ships of her line have recently been equipped with wireless, the operators having had their emergency signals changed from "C. Q. D." to "S. O. S." after the Republic accident. Amateur operators had contracted the habit of practising it indiscriminately.—*N. Y. American.*

What Can We Say to Mars—and How?

The Chicago "Inter Ocean," referring to Mr. Gernsback's article, "Signaling to Mars," in the May issue, recently printed the following editorial, which needs no comment:

"An expert in wireless telegraphy tells us in a current technical paper how that system can be used to signal Mars. His reference to Professor Pickering's $10,000,000 mirror scheme as a 'feasible arrangement' suggests that we receive the argument as to his own plan with some reserve. But it is interesting, none the less.

He estimates that an output of 70,000 kilowatts from a single wireless station would be sufficient to span the 35,000,000 miles, between the two planets when they are closest. The conclusion is based on a consideration of the amount of power required for transmitting messages certain distances on the earth. But it is manifestly out of the question, he continues, to build a single station with that output. Must the scheme be abandoned?

Not at all. At the present rate of construction, in fifteen or twenty years the combined output of all the wireless stations in the United States, Mexico and Canada will amount to the required 70,000 kilowatts. All that will then be needed will be to connect the various stations on a special day, using the telegraph wires for that purpose, with some central station, say, at Lincoln, Neb. The operator at that point will press a magnetic key at a moment agreed on. A force of 70,000 kilowatts will immediately set the waves in motion to Mars.

While this strikes us as fully as feasible as Professor Pickering's mirror maze, and even as much more feasible than the scheme of the man who is thinking out a balloon to take him up ten miles, and thus get him nearer to his objective than if he remained on the earth, the full 35,000,000 miles away, yet it must be confessed that the plan has serious defects.

The first defect is that it requires us to wait fifteen or twenty years to signal Mars. When we consider how this unwarranted delay would prey on the health and spirits of those who are impressed with the importance of getting into communication at once, we see how wrong it would be to submit to that condition.

The second defect is one that this plan possesses in common with Professor Pickering's mirror project and that of the man who wants to creep a little closer in a balloon before venturing on a signal. This is the failure to provide some method of conveying an idea to Mars or receiving one in return when the apparatus gets to work. Even after we have signaled Mars at great expense and Mars has flashed at us, perhaps in spite of similar difficulties, there will still be no possibility of intelligent communication.

Suppose, for instance, that our wireless waves should reach Mars with ease and cause all sorts of disturbances or that our mirror-flashes should do all Professor Pickering hopes, how would that improve the situation? In the absence of a mutual language the conversation would not possibly get beyond something like this:

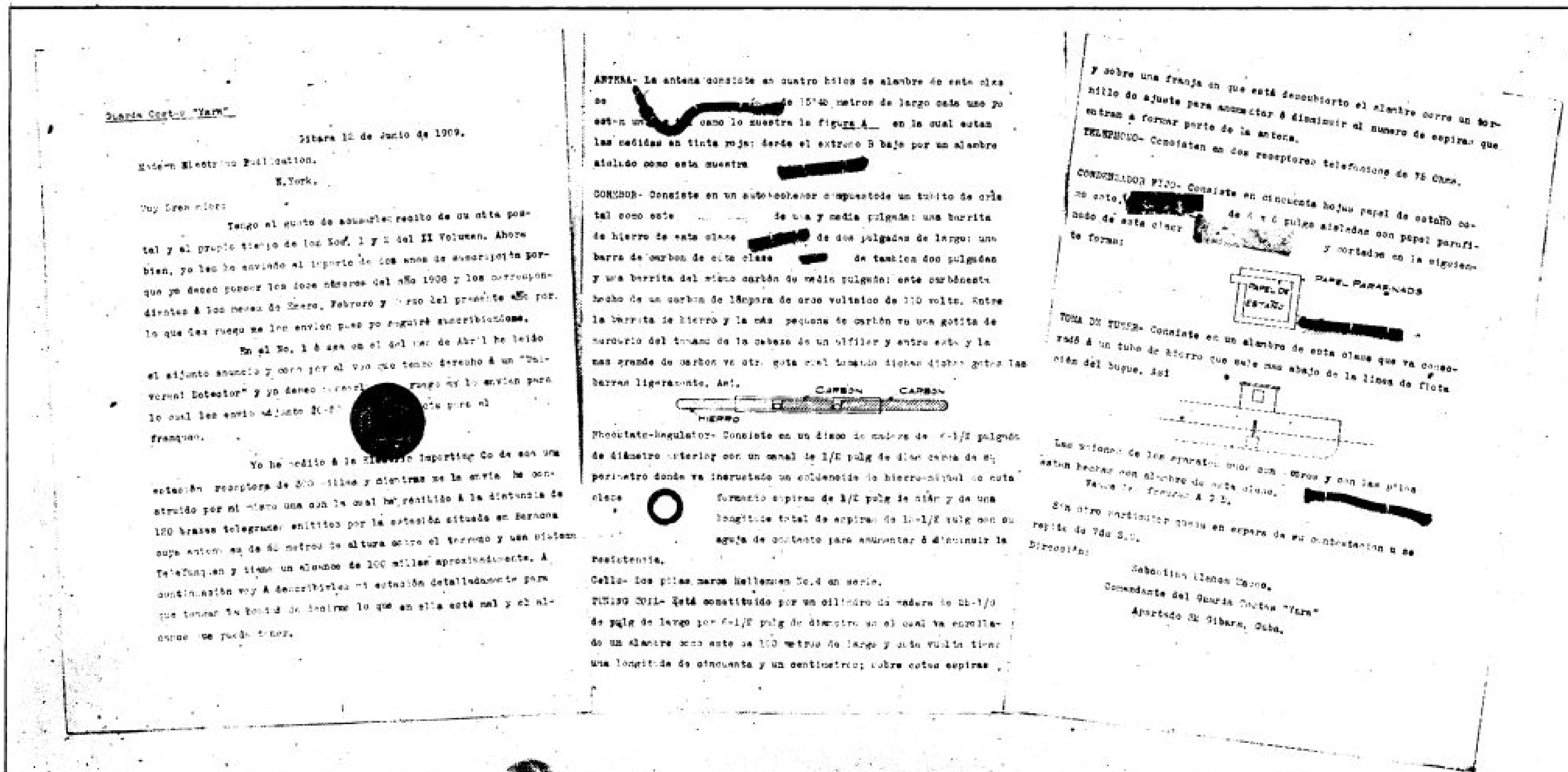
Earth. "Wave-wave-wave!"
Mars: "Flash-flash-flash!"
Earth: "Wave!"
Mars: "Flash!"
Earth: "Wave-wave!"
Mars: "Flash-flash!"
Earth: "Wave-wave-wave-wave."
Mars: "Flash!"

After a few years that sort of thing would grow monotonous. It would even get on Professor Pickering's nerves. But there would be no help for it. Even after a rest of a quarter of a century the interrupted conversation would be resumed in the same terms:

Earth: "Wave-wave-wave!"
Mars: "Flash-flash-flash!"
Earth. "Wave-wave!"
Mars: "Flash-flash!"
Earth: "Wave!"
Mars: "Flash!"

We would suggest to Professor Pickering, the balloon man and the wireless expert that they consider this aspect of the question. If we can't say anything after working years to perfect an apparatus, why waste time on the apparatus? Mars is already flashing rays at us every night. Why not be content with them and let it go at that?"

An Original Letter


Guarda Costa "Yara"

Gibara 12 de Junio de 1909.

Modern Electrics Publication.

N. York.

Muy Sres míos:

Tengo el gusto de acusarles recibo de su atta postal y al propio tiempo de los Nos. 1 y 2 del II Volumen. Ahora bien, yo les he enviado el importe de los anos de suscripción porque yo deseo poseer los doce números del año 1908 y los correspondientes á los meses de Enero, Febrero y [illegible] del presente año por lo que les ruego me los envien pues yo seguiré suscribiéndome.

En el No. 1 ó sea en el del mes de Abril he leido el adjunto anuncio y como por el veo que tengo derecho á un "Universal Detector" y yo deseo [illegible] ruego me lo envien para lo cual les envio adjunto [illegible] para el franqueo.

Yo he pedido á la Electric Importing Co de son una estación receptora de 300 millas y mientras me la envia he construido por mi mismo una con la cual he recibido á la distancia de 120 brazas telegramas emitidos por la estación situada en Banes cuya antena es de 42 metros de altura entre el terreno y una distancia [illegible] y tiene un alcance de 100 millas aproximadamente. A continuación voy á describirles mi estación detalladamente para que tengan la bondad de decirme lo que en ella esté mal y el alcance que pueda tener.

ANTENA- La antena consiste en cuatro hilos de alambre de esta clase [illegible] de 15'40 metros de largo cada uno [illegible] como lo muestra la figura A en la cual estan las medidas en tinta roja; desde el extremo B baja por un alambre aislado como esta muestra

COHESOR- Consiste en un autodecohesor compuesto de un tubito de cristal como este [illegible] de una y media pulgada: una barrita de hierro de esta clase [illegible] de dos pulgadas de largo: una barra de carbon de esta clase [illegible] de tambien dos pulgadas y una barrita del mismo carbón de media pulgada: este carbón esta hecho de un carbon de lámpara de arco voltaico de 110 volts. Entre la barrita de hierro y la más pequeña de carbón va una gotita de mercurio del tamaño de la cabeza de un alfiler y entre esta y la mas grande de carbon va otra gota cual tamaño [illegible] gotas las barras ligeramente, Asi.

Rheostate-Regulator- Consiste en un disco de madera de [illegible] pulgadas de diámetro exterior con un canal de 1/2 pulg de diam cerca de su perimetro donde va incrustado un solenoide de hierro-niquel de esta clase [illegible] formando espiras de 1/2 pulg de diám y de una longitud total de espiras de [illegible] pulg con su aguja de contacto para aumentar ó disminuir la resistencia.

Cells- Las pilas marca Hellensen No.4 en serie.

TUNING COIL- Está constituido por un cilindro de madera de [illegible] de pulg de largo por [illegible] pulg de diametro en el cual va enrollado un alambre como este de 100 metros de largo y cada vuelta tiene una longitud de cincuenta y un centimetros; sobre estas espiras y sobre una franja en que está descubierto el alambre corre un tornillo de ajuste para aumentar ó disminuir el numero de espiras que entran á formar parte de la antena.

TELEFONO- Consisten en dos receptores telefonicos de 75 Ohms.

CONDENSADOR FIJO- Consiste en cincuenta hojas papel de estaño como esta [illegible] de [illegible] pulgs aisladas con papel parafinado de esta clase [illegible] y cortadas en la siguiente forma:

TOMA DE TIERRA- Consiste en un alambre de esta clase que va conectado á un tubo de hierro que sale mas abajo de la linea de flotación del buque. Asi

Las uniones de los aparatos unos con otros y con las pilas estan hechas con alambre de esta clase.

[illegible] A 2 B.

Sin otro particular quedo en espera de su contestacion u se [illegible] de Vds S.S.

Dirección:

Sebastian Blanca [illegible].

Comandante del Guarda Costas "Yara"

Apartado 32 Gibara, Cuba.

We receive hundreds of strange and queer letters in the course of a month, but the one of a Cuban subscriber reproduced herewith, is so much out of the ordinary and so original that we cannot refrain from publishing it.

As will be seen, Mr. Sebastian Blanca has pasted, sewn, stitched and attached the various materials on which he asks information, right in the very text of the letter, which could by no means have been an easy performance.

Revolving Potentiometer for Wireless

By Bernadotte Anderson.

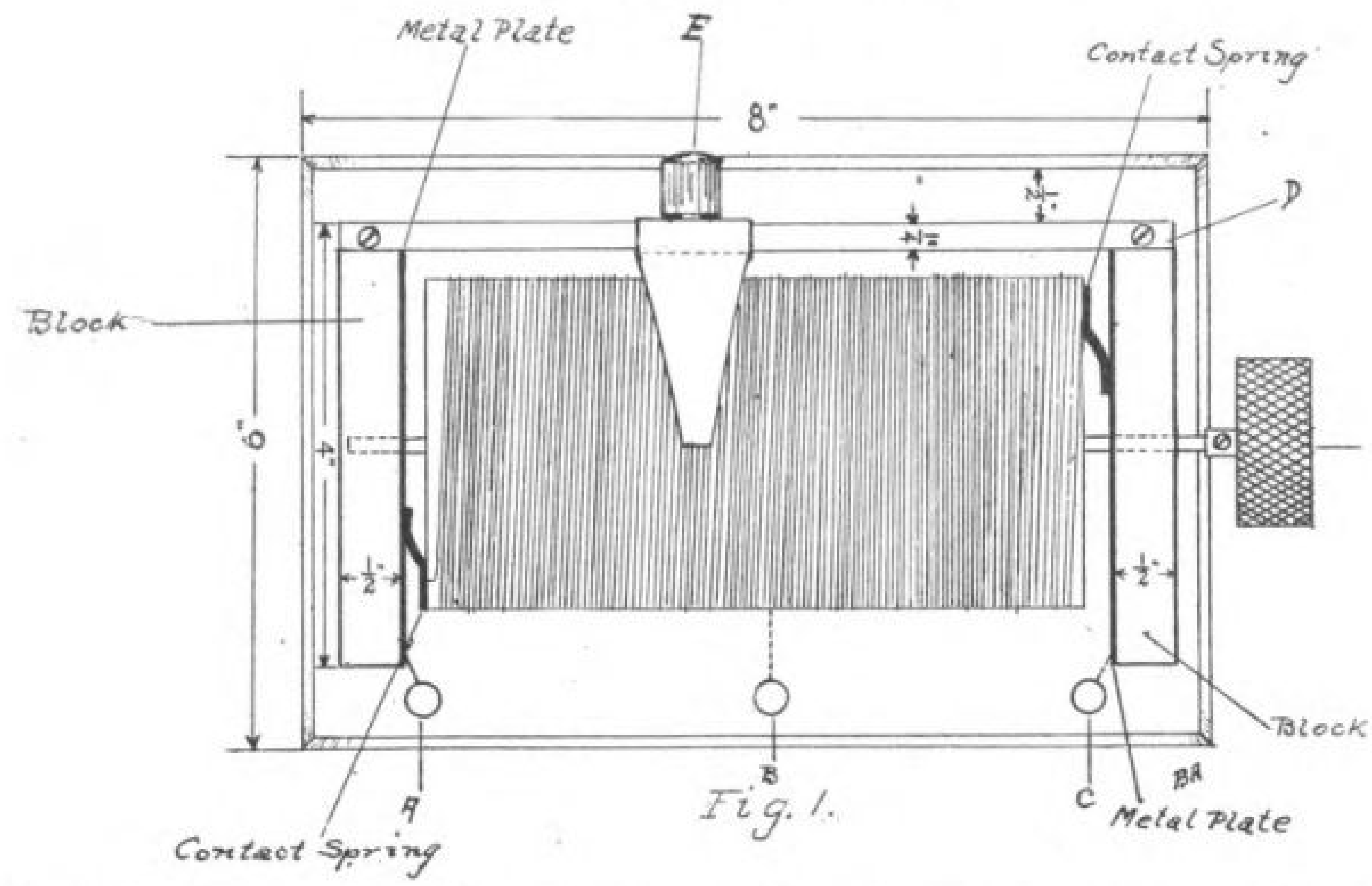


Fig. 1.

The following is a description of a potentiometer which the writer has devised, in which the resistance may be varied gradually and accurately.. The working principle of this device can readily be understood from Fig. 1. By moving the slider E on the rod D the approximate regulation can be determined, then revolving the cylinder brings it to the maximum or minimum, as the case may be. As the Electrolytic detector is such a favorite among all experimenters, on account of its extreme sensitivity, fine adjustment, etc., this potentiometer will serve admirably well, as the tone and sharpness of the signals can be adjusted to a high degree.

On a cylindrical form 3 in. in diameter and 6 in. long, wind full No. 26 bare german silver wire, each consecutive turn being spaced by a common thread. This form should be made by procuring a mailing tube of this diameter and length and fitting wooden circles about ¾ in. thick in the ends. This coil must be shellacked after being wound, and it will be necessary to apply it to the cylinder a little at a time as the winding progresses, owing to the quick drying qualities of the shellac. This is to prevent the wire from slipping on the form after wound. Holes are drilled in the wooden ends of the cylinder, so that a 5/32 in. round rod will fit tightly in them in order that the cylinder will revolve with the axle. Two spring contacts of good tension are cut out of spring brass and fastened on each end of the cylinder. The ends of the wire are soldered to these spring contacts. Two pieces of wood, or other suitable material 4 x 4 in., and about ½ in. thick are now obtained. Also two pieces of 1/32 in. brass or copper 4 x 4 in. Holes are drilled in each of the four corners, so that these plates can be fastened to the blocks by round-head wood screws. After the plates have been screwed on the blocks, a hole, slightly larger that the axle on the cylinder, is drilled through them. Care should be taken to drill the hole at right angles to the surface. A base board 6 x 8 in. and about ¾ in. thick is now made and finished up as desired. The blocks are now screwed rigidly on the base board ½ in. from one side, so that 1½ ins. will be allowed for binding posts, and the distance between the blocks should be 6½ in. This will allow ¼ in. for the spring contacts, it being already understood that the cylindrical form on which the wire is wound, is 6 in. long. The cylinder is now placed between the blocks and 10 in. of 5/32 in. round brass rod is slipped through so that one end fits flush with one of the blocks while the other projects enough so that the knob for turning the cylinder can be fitted on. Procure 7½ in.

of ¼ in. square brass rod and drill holes ¼ in. from each end of convenient size in order that same can be fastened to the blocks. A slider is made out of heavy brush copper as shown in Fig.2, on which

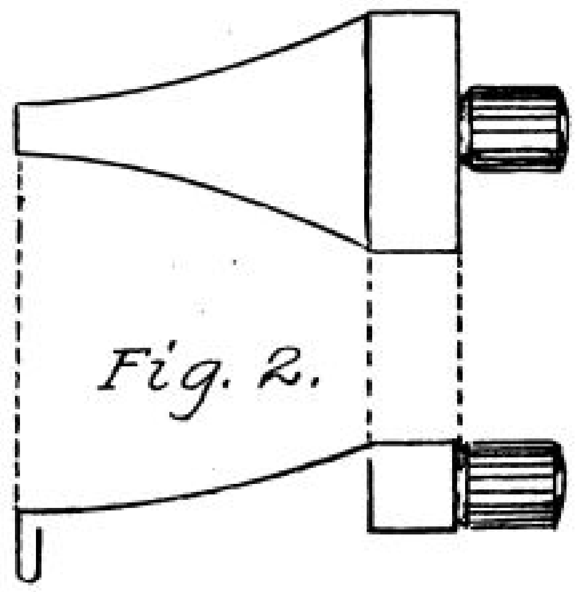


Fig. 2.

Slider

is fastened a rubber handle. Niches ¼ in. deep are now cut out of the blocks on the side opposite to where the binding posts are to be placed. After the slider is slipped on the square rod, the rod is fastened on the blocks, when it will fit flush with them. The slider should have enough tension to make good contact on the wire. Three binding posts are now placed on the other side of the base, and connections are made as shown in Fig.1; viz, a wire from B to D; A to Metal Plate; and C to metal plate.

Fig. 3 shows the connections for the potentiometer as used in a wireless set.

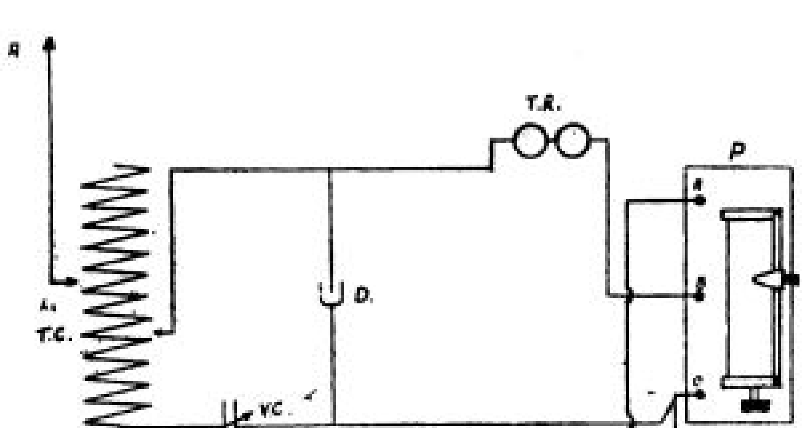


Fig. 3.

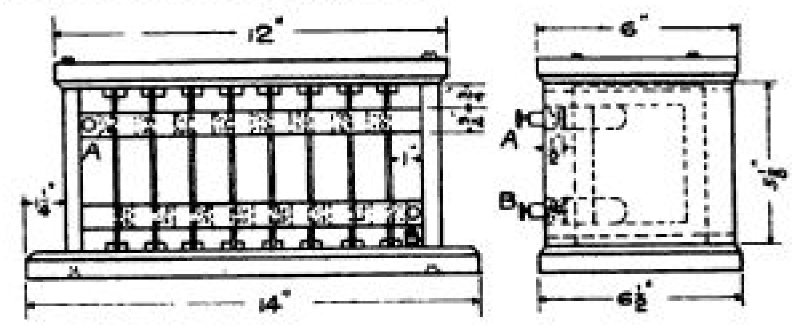
This type of potentiometer will, no doubt, eventually replace the "broom stick" type.

By substituting No.28 bare copper wire on the cylinder, this type will answer well for a tuning coil, and will be capable of receiving very long wave lengths. However, No. 20 bare copper wire will answer for ordinary wave lengths.

ADJUSTABLE CONDENSER FOR TRANSMITTING CIRCUIT.

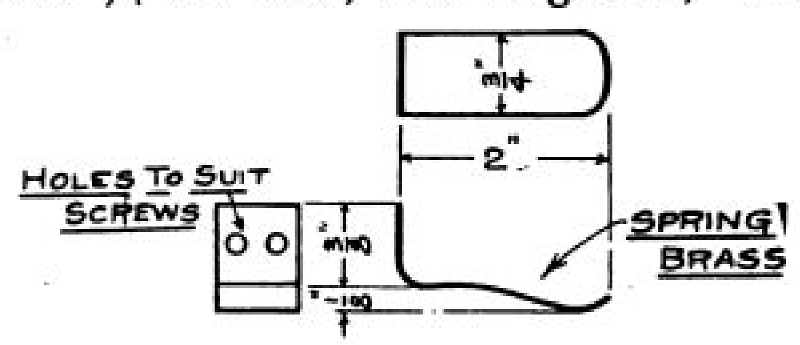
By Harold Birkmire.

The high tension multiple condenser described below is a very neat appearing piece of apparatus which can be cheaply constructed by any one who follows the directions here given.



-Fig 1- -Fig 2-

Out of some good, dry ¾ in. stuff make a base 14x6½ a top 12x6½; two end pieces 5⅛x6; and make the two contact spring holders 11½x¾x½. Procure a piece of tongue and groove flooring about 9 feet long, and with a rip saw carefully take off both sides of the groove thus providing material for the channels which plates run in (see Fig I). Then get two tin boxes, such as those which Nabisco wafers come in, and with an old pair of scissors, cut out 16 spring contacts ¾ in. wide, like Fig. III., and



M.E -Fig 3-

punch holes in base for screws (½ in. screws [32]).

You will need eight 5x4 glass plates (the photographic plate is the ideal thing) and some good tin or aluminum foil. Cut out sixteen pieces of foil 3 x 4 inches, using a ruler and an old Gillette blade. Clean plates with ammonia water, and when thoroughly dry, quickly brush very thin coat of shellac over the place where foil is going to be; wait a few seconds for shellac to begin to get hard, and then apply foil and smooth it tight to glass. Repeat process with all plates. Trim off superfluous foil and all sharp points. Paint the one-inch margin, which you will have, with black asphaltum, and set plates aside to dry.

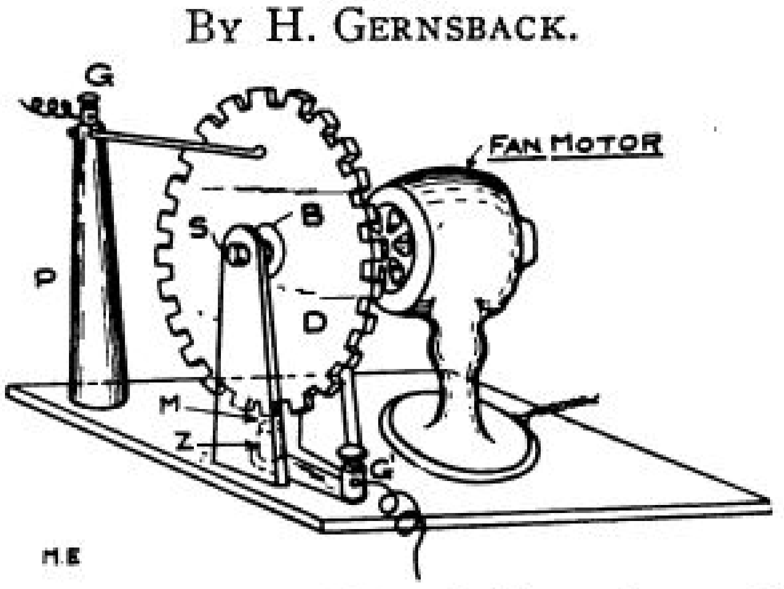
We now have our parts, and need only assemble them. We will take the top first, and supposing our 6 inch channel pieces cut, we mark off 2 in. from end and nail with small wire brads the first piece; try a piece of glass for thickness, find it ⅛ in., and accordingly leave space and nail next channel piece, so forming first channel. The rest is easy. Each plate is 1 in. from neighboring plate, etc. And 1/8 in. x 8 = 8/8 in., or 1 in.; therefore, 10 in. is allowed between two end pieces. Treat the base the same as top piece, allowing for its extra length. See dimensions, Fig. I.

The spring contacts do not present any difficult problem, and the only thing necessary to say is that after they are all screwed on the holders they can be set, by bending, for any pressure desired when in place. The binding posts A and B are respectively connected by a bare copper wire to all springs on holders they are on.

A good mahogany stain and shellac will make this completed instrument the best looking in your station.

A NOVEL NON-HEATING SPARK GAP.

By H. Gernsback.



The writer, while visiting the well-known New York physician, Dr. Besser, was shown a novel spark gap which for simplicity and efficiency can hardly be equalled.

Dr. Besser confesses himself an amateur, and his wireless set, one of the most powerful amateur sets in New York City, was almost entirely built by him, notwithstanding the fact that it has an output of 3 K. W.

A great many original points are found by looking over the Doctor's set; one is that he fills his Leyden jars with salt water, which—on account of the good conductivity—increases the output of the station not a little.

The most interesting part, however, is the spark gap. On this Dr. Besser has a patent, but the Doctor told the writer that he had no objection if amateurs construct it themselves, as long as they do not sell or market it.

A 110-volt fan motor, deprived of the fan, is used. A zinc or brass disc (D), 6 inches in diameter and 1/4 inch thick, has around its circumference about 24 teeth, as shown in illustration. Care is taken that the sharp corners are well rounded off by filing.

The disc has in its center two hard-rubber flanges (B), screwed on the disc on each side to insulate the shaft (S) from the disc.

Or, if this is not desired, another arrangement may be had by leaving off the flanges (B) and by having instead of metal shaft S, one of hard rubber or other insulating material.

The disc is now attached to the shaft so that it runs perfectly true without wobbling.

About 1/4 inch from the teeth at the bottom, on an insulated plate, a round zinc rod (Z) about 1/2 inch in diameter is stationed.

On the same base, which carries the zinc rod, a hard-rubber pillar (P) is fastened, which carries spring H, pressing lightly against the disc D, and brings the current to same from binding post G. Another post (G1) leads the current off.

Now the motor is started up to full speed and if a coil or transformer circuit is connected to G and G1 a heavy spark will crash in M. This spark is surprisingly steady and never arcs—a very important feature.

To demonstrate the efficiency of this spark gap Dr. Besser pressed down the key of his 3 K. W. set for fully five minutes without interruption. Immediately after stopping the disc was found to be absolutely cool, as if it had not been used at all.

The rapid revolutions of the disc give a far better cooling, than if a powerful fan was blowing on a common spark gap.

A further advantage—and an important one—is that the frequency of the spark may be easily varied simply by increasing or decreasing the speed of the motor.

CORRECTION.

Referring to article, "A Conductive Wireless System," in the August issue, it should be stated that in Fig. 3 the telephone receiver was omitted by mistake, and in Fig. 4 a battery of several dry cells must be used. E. E. Gourley.

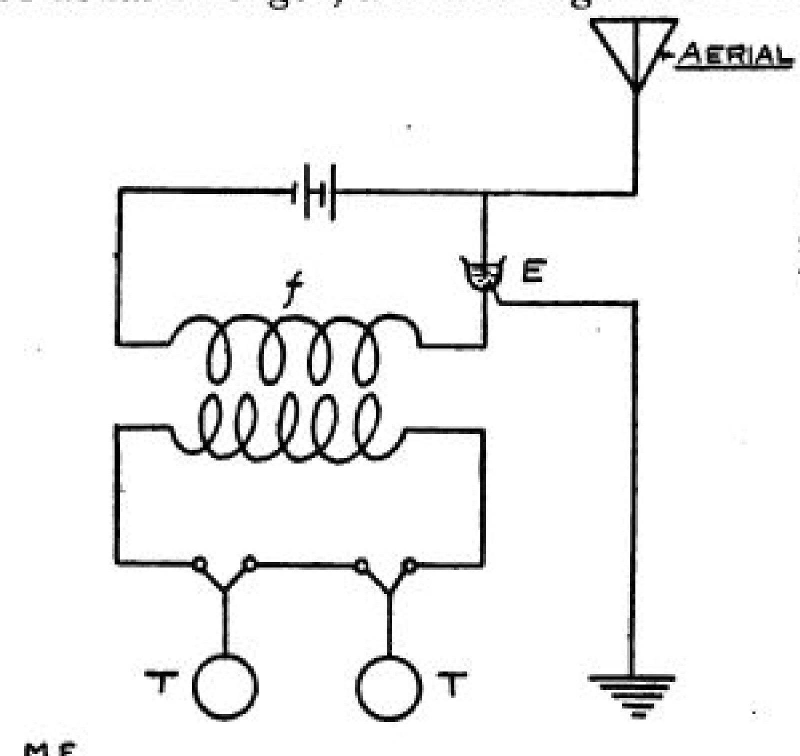
Paris Letter

A NEW DETECTOR.

A new form of detector was presented to the Académie des Sciences by G. Petit. It consists of a fine metal point which presses against a piece of natural iron pyrites with an adjusted pressure. As in the Perikon detector, no battery is used, but the new detector has an advantage over the latter and also over electrolytic detectors in that it is not deteriorated by strong waves. The Government service has been using such detectors for some months past in signalling across the Mediterranean to Algiers, and it is found that the sensitiveness is constant, and is about the same as in the best detectors known. The pyrites can be shifted by two screws so as to find the most sensitive part. The metal point is mounted at the end of a balance arm which has a sliding weight for regulating the pressure upon the pyrites at the contact.

A NEW IDEA IN RECEIVING CIRCUITS.

M. Paul Jégou has been making some interesting experiments with detectors. When we mount a telephone and an electrolytic detector in series, there is always a slight action upon the telephone diaphragm caused by the polarization current coming from the detector, so that the diaphragm is kept permantly pulled to some extent. In order to remove the current from the telephone, he uses a transformer so as to give an inductive coupling. Thus the fine wire coil is in series with the detector and the heavy coil with the telephone, as seen in fig. 1. It is found that the sound in the telephone is much improved by using this method. He also finds that he can use simply two cells of Leclanché battery giving about three volts, and thus dispenses with the potentiometer and storage battery, so that we have an advantag. here. In this way the sound in the telephone is very sharp, and can easily be perceived. When using the inductive coupling he notes a curious fact, that we can cut off the battery altogether, and when waves are received we can still hear a sound in the telephone. This sound is weaker, and is about what would be heard when using 1.8 volts in the ordinary case. It has been already shown that when a detector is coupled directly with a telephone we can perceive very strong waves, but the strength of these latter must be such that this is not useful for practical work. However, by the use of the inductive method, we are able to receive the waves of usual strength, and although the effect



-FIG 1-

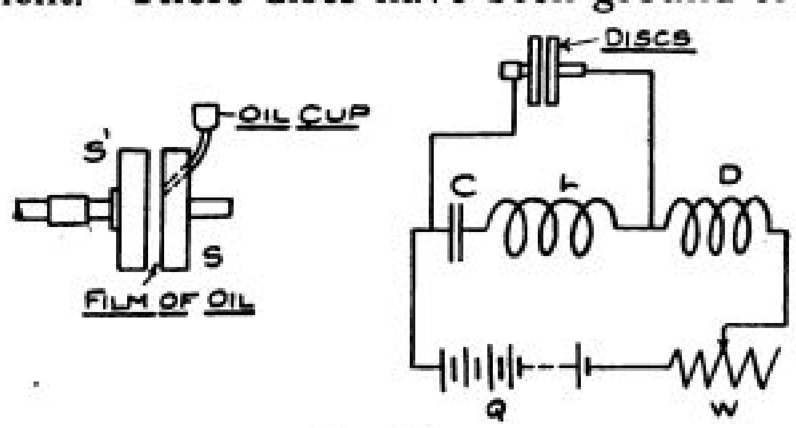
is much weaker, it is at least far stronger than what would be perceived by using a direct coupled detector without a battery, as in this latter case no effect can generally be had with ordinary waves.

STEERS TORPEDO WITH ULTRA-VIOLET RAYS.

A new method of torpedo steering by the use of selenium cells has been brought out in France which is quite ingenious, at least. From a shore post or a vessel there is directed a beam of ultra-violet rays towards the enemy's vessel. This beam is thrown by a searchlight, and the apparatus is arranged so as to have a narrow beam of parallel rays without any spreading of the beam. Owing to the use of ultra-violet rays the beam is invisible. The torpedo has an arm projecting out of the water on either side, and the two arms are separated by some distance. On the end of each arm there is mounted a lantern having a lens and a selenium cell placed at the focus, and the lantern is turned in the direction of the sending post. The torpedo is launched so that it moves in a straight path, in which case the beam of the searchlight lies directly in the middle between the two arms and the lanterns receive none of the rays, as they are out of the path of the beam. Should the torpedo now deviate out of the straight course, one of the lanterns will come in the path of the beam and the rays will fall on the selenium cell. This closes the current, which acts by means of a suitable electromagnet apparatus upon the steering mechanism, so that the torpedo is directed back to the original path. The same occurs for the other side, so that the torpedo can never leave the path of the beam to any extent, but keeps on a straight course.

NEW APPARATUS GENERATING HIGH FREQUENCY CURRENT.

A novel device for producing high frequency waves has been patented by a German firm, the Polyfrequency company. The two metal discs S and S' (Fig. 2) are mounted so that S is fixed, while S' revolves with a uniform movement. These discs have been ground to-



M.E -FIG. 2-

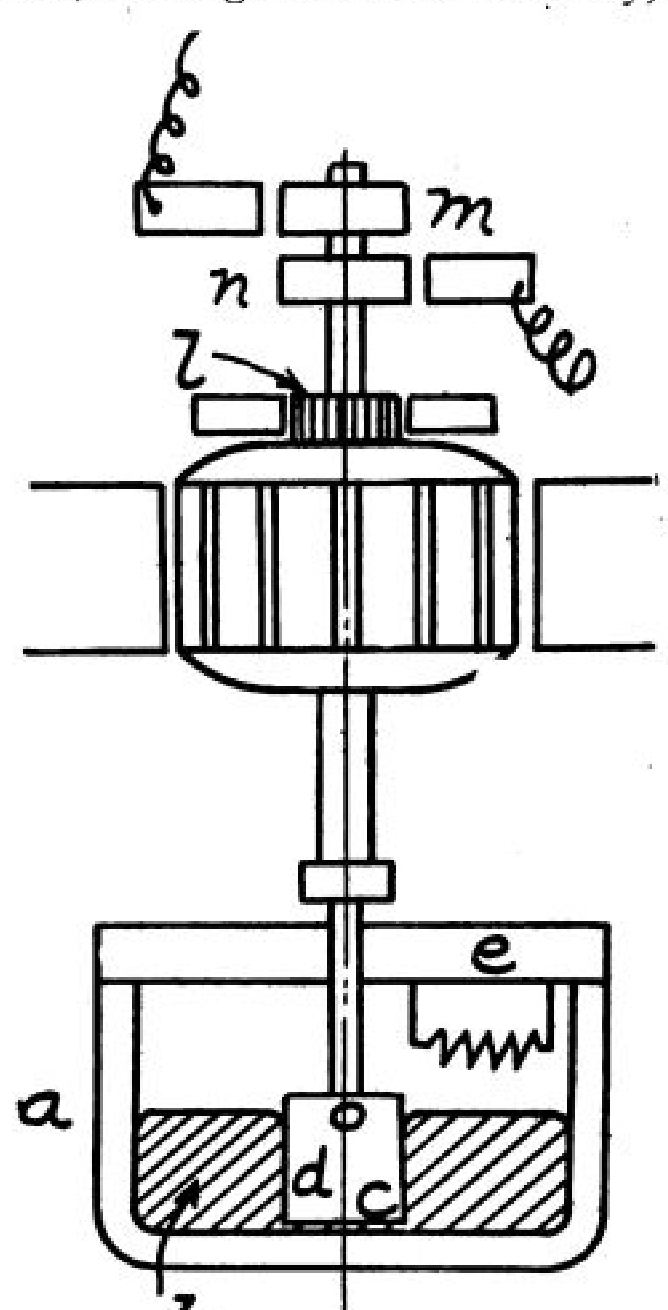
gether so as to run quite true, and they are nearly touching, being separated only by a thin layer of oil which is fed in from one side. A direct current is passed between the discs, and it is found that the very thin layer of oil gives a resistance which is modified by the voltage, so that it diminishes as the voltage rises. The exact nature of the action which occurs here is somewhat obscure, but in practice it is found that when the oil is constantly supplied between the discs we have a regular and periodic change of resistance and therefore of current. The battery Q and the resistance D are connected to the two discs and in shunt on the discs is mounted the condenser C and the self-induction coil L. In the shunt circuit there are now produced electric waves of high frequency, the frequency being mainly determined by the values of C and L. When the discs are run at a constant speed with a regular oil feed, the waves are constant in frequency and amplitude.

NEW GERMAN WIRELESS PLANT.

A large station is building in Germany on the Finow Canal which will be devoted speciallv to testing systems of wireless telegraphy and aerophony. The mast is 230 feet high and to it will be fitted various types of aerials, so as to make comparative tests upon these and secure data which have not been obtained up to the present.

NEW MERCURY INTERRUPTER.

A new form of mercury interrupter has been invented in France by M. Drault, for use with alternating currents. Such interrupters must run at the speed corresponding to the frequency of the current in order to be used to advantage, so that the current waves are cut when at their highest point. When an alternating current motor is used, this must be brought up to speed, usually by hand, so that the interrupter is not easy to work. In order to have a self-starting motor, the system shown in Fig. 3 is used. The motor armature has a commutator (*l*) like a direct current armature and also the two collector rings *m n* for use with alternating current. To start the motor from the source of alternating current, we first switch the current on to the commutator, when the motor will run, although in a defective way, and

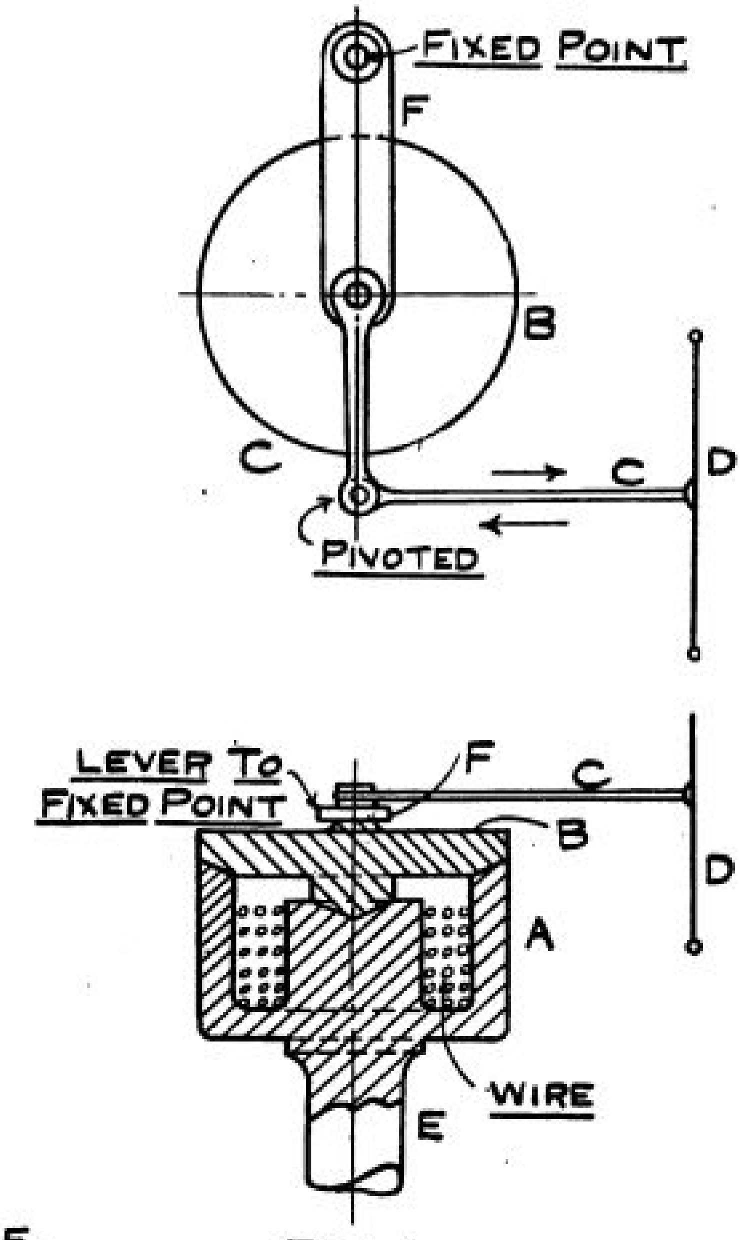


-FIG. 3-

thus come up to speed. The current is then thrown on to the collector rings so that the motor now runs on alternating current and at the required speed corresponding to the frequency. The mercury interrupter has the rotating cylinder *c* which acts by centrifugal force to draw in the mercury and send it out by the orifice *d* upon a contact tooth *e*. When the mercury strikes the tooth it closes the circuit of the interrupter.

LOUD SPEAKING 'PHONE.

A new form of loud speaking telephone receiver is shown in Fig. 4. The

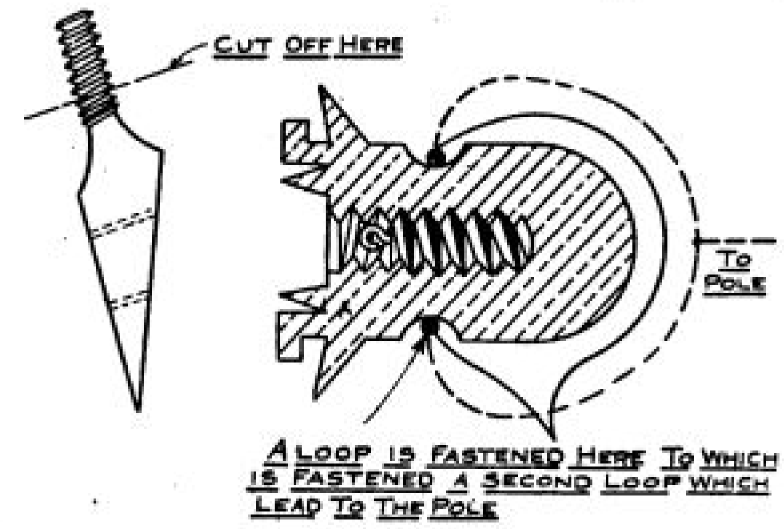


M.E. -FIG. 4-

telephone magnet A which receives the current is made in the sketched shape, with the winding lodged in a recess. Upon the magnet is a conical piece B, which fits into it. This piece is held from above, while the magnet is made to rotate at a given rate by means of the vertical shaft E. The piece B is fixed upon the arm F which is mounted on a fixed support in the rear. An arm C passes from the piece B to the middle point of the telephone diaphragm D. When the magnet piece is rotated and there is no current passing, the slight friction between A and B will cause the diaphragm to receive a constant pull and no sound will be given out from it. Should the magnet receive current waves, the magnetic effect will cause a variable friction between A and B, so that there will be a variable effect upon the diaphragm and it will give out sounds corresponding to the current.

AERIAL INSULATOR.

Procure an ordinary glass insulator, such as used on telegraph or on telephone lines. Also a wooden bracket, such as



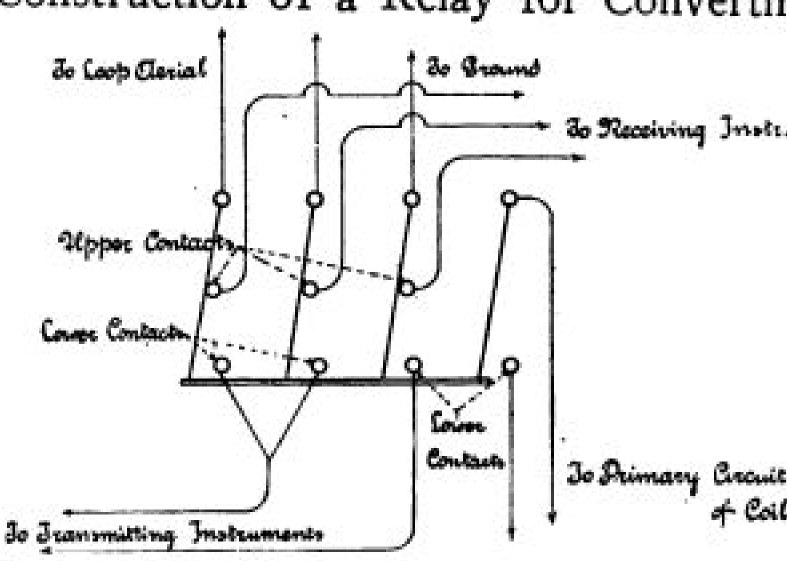
is always used with them. Cut off bracket as illustrated and screw a large screw-eye in end. Now screw the wooden part tightly into the insulator and it is complete. It is best to use two of these on each side of the aerial, but one will do. When two are used, the screw-eyes of each should be connected together by a heavy wire, 8-10 inches long.

Contributed by M. W. DOBRZENSKY.

SIMPLE METHOD OF CONVERTING LOOP ANTENNA TO STRAIGHTAWAY.

By SAMUEL STEBBINS.

I have read Mr. Austin's article in the August MODERN ELECTRICS on "The Construction of a Relay for Converting



Loop Antenna to Straightaway," and, while there is no doubt that the method there described is a very good one, I beg to offer, in the use of a four-pole switch with three upper contacts as per enclosed diagram, a method much simpler and yet one which is, to my mind, just as effective.

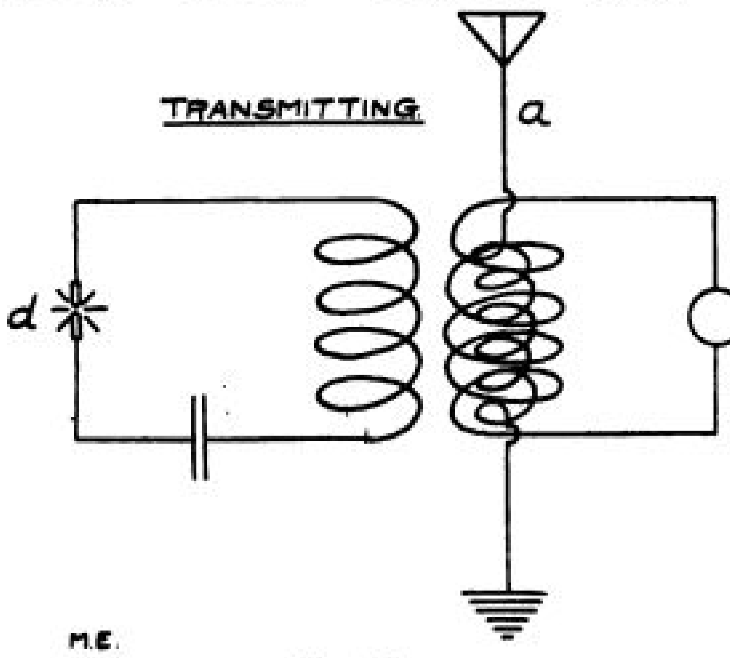
BACK ISSUES.

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

London Correspondence

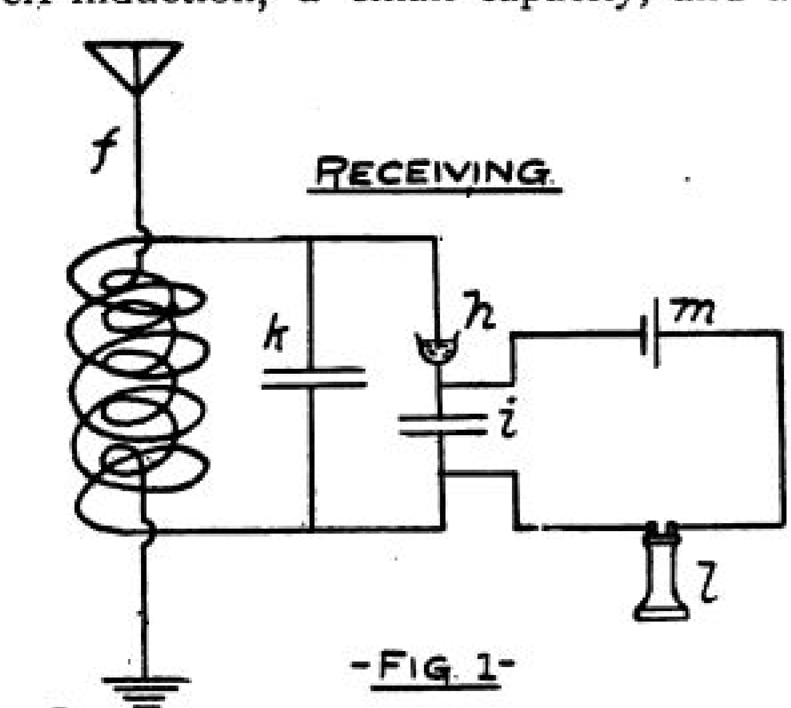
NEW AEROPHONE ARRANGEMENT.

A new arrangement for aerophone circuits consists in the use of an exciting circuit coupled with the



-FIG 1-

transmitter circuit with a very loose coupling, while at the receiving station there is used a detector, which is coupled as closely as possible with the receiving circuit. The aerial *a* (Fig. 1) is in close coupling with the microphone circuit *b*, while the coupling between the exciting circuit (which includes the arc *d*), and the aerial is made less than 3 per cent. The receiving station has the aerial *f* coupled as closely as possible with the detector circuit containing a high self-induction, a small capacity, and an



-FIG. 1-

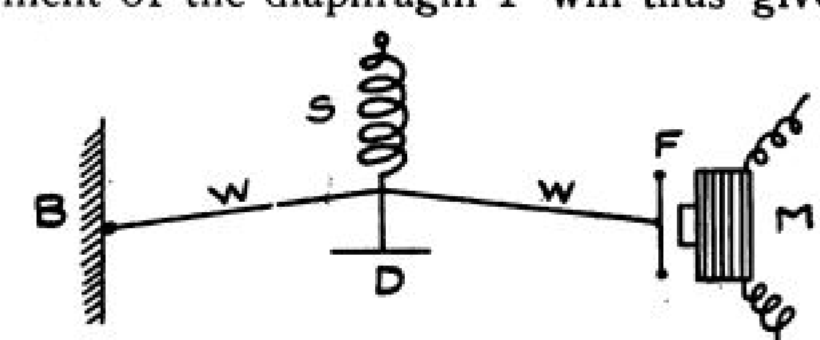
electrolytic or like detector *h*. In series with the detector is a condenser, *i*, and to it is connected a telephone receiver *l* and battery *m*. The microphone circuit and the detector circuit can be conductively connected to the respective aerials, or the microphone circuit can be inserted either directly in the aerial or connected with a condenser or a self induction coil, and this combination then inserted in the aerial.

NEW TELEPHONE CABLE.

Measures are being taken by the British Post-office department to lay a new telephone cable across the Channel to the French coast. The cable will be equipped with Pupin coils, and it is expected to have a much better operation of the telephones in this way.

LOUD SPEAKING 'PHONE.

Mr. Blagdon Phillips has devised a loud-speaking telephone receiver (Fig. 2) which consists of a ferrotype diaphragm F and the electromagnet M. To the ferrotype is conected a fine wire W, which is fixed at B. Midway on the wire is a spring S, which is fastened to it, and the straightened end of the spring serves to hold a diaphragm D. A slight movement of the diaphragm F will thus give



-FIG. 2-

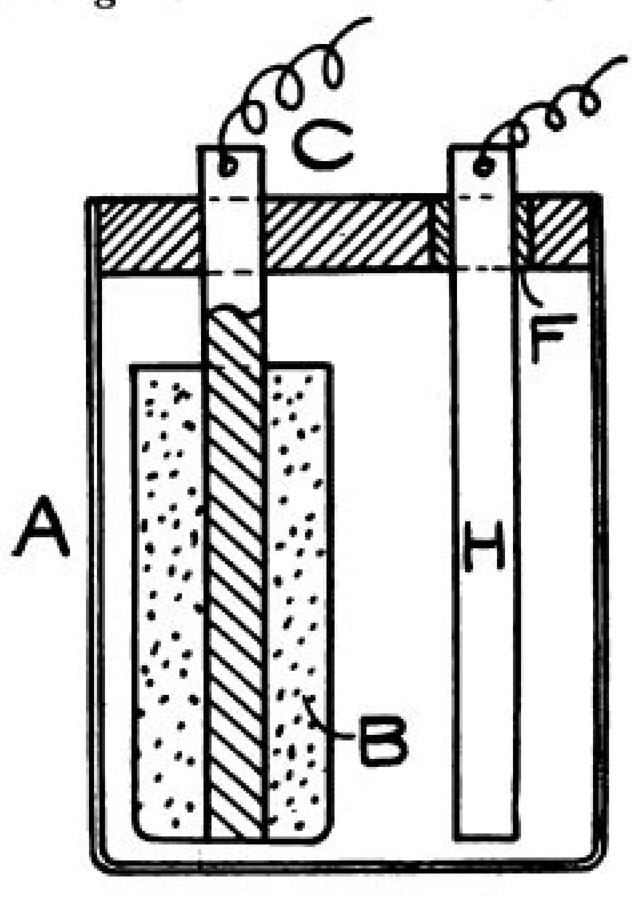
an amplified movement to the second diaphragm, and the sound will be increased.

ENGLISH WIRELESS CONTROL.

The Postmaster General recently expressed the idea that the large coast stations which are used for connecting with ships should be in the hands of the government. For this reason, no more licenses had been given for an extended period, and the time is now limited to three years. In this way the State will be able to take control of such plants. The government has been making overtures to the Marconi company for several of the large posts, but Mr. Marconi states that the offer was too small to be acceptable.

SIMPLE METHOD TO SEAL BATTERIES.

A tightly closed cell using a liquid is made as shown in fig. 3, using a jar A, a cathode C, and a depolarizing mass B. The cell is partly filled with sand, and we then pour in resin or a mixture of 80 per cent. asphalt and 20 per cent. paraffin around the short tube F lying above the sand. When this is solid, we pour out the sand and put the anode, a zinc rod H, through the tube F. The cathode C

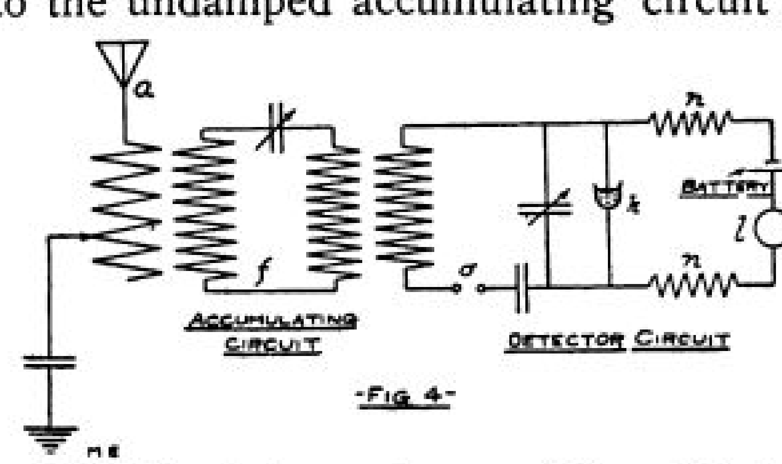


-FIG. 3-

is a carbon which is packed around with a mixture of graphite and manganese peroxide enclosed in a linen cover.

ACCUMULATING CIRCUIT FOR WIRELESS.

The following is a new arrangement for a wireless telegraph system (Fig. 4). In the receiving system, the detector circuit, containing a constantly operated circuit breaker, is coupled to the aerial circuit preferably through an energy accumulating circuit, but when the aerial circuit is not strongly damped the accumulating circuit can be left out. The energy received by the aerial *a* is transferred to the undamped accumulating circuit *f*,



-FIG. 4-

and if the interrupter *o* of the detector circuit is open, the energy will accumulate there. But if the detector circuit is closed at *o*, there is a sudden transference of energy from the accumulating circuit to the detector circuit. Instead of having a complete break at *o*, we may have the interrupter *o* shunted by a high resistance. The choke coils *n*, *n*, between the detector *k* and the receiving instrument *l* prevent the waves from passing through the instrument.

WIRELESS IN SAFE.

The latest is a wireless burglar safe-alarm. The thing could hardly be any simpler. Suppose that you are a poor burglar and have not made a good "haul" for weeks, and you have with great trouble opened a heavy safe in which you know is located a lot of cash.

But just as you open the door, a contact closes the circuit of a spark coil in the safe, which operates the coherer and alarm of the watchman and the latter, before you recover from your astonishment, "operates" a club on your skypiece. Wouldn't it jar you?

Or if instead of summoning the watchman, the coil operates a coherer (in the wall behind you), which closes the circuit of a dozen revolvers, also hidden in the wall and all pointing at your legs and these revolvers actually commence to "talk back" and put a dozen holes in your legs, wouldn't it go on your nerves?

A WIRELESS BLOCK SIGNAL SYSTEM.

A new system of block signalling and train control has followed close upon the heels of wireless telegraphy, and is founded on the same basic principle.

This system has dispensed with signal posts, used by practicallv every every other system. Hertz discovered that electric oscillations produced in a common circuit create a disturbance called an electric wave in the surrounding ether. This —the principle of wireless telegraphy— has furnished a medium to span the gap between the rails and a moving train and is something inventors have long sought. This new system is practicable for both steam and electric lines.—*Lewiston Journal.*

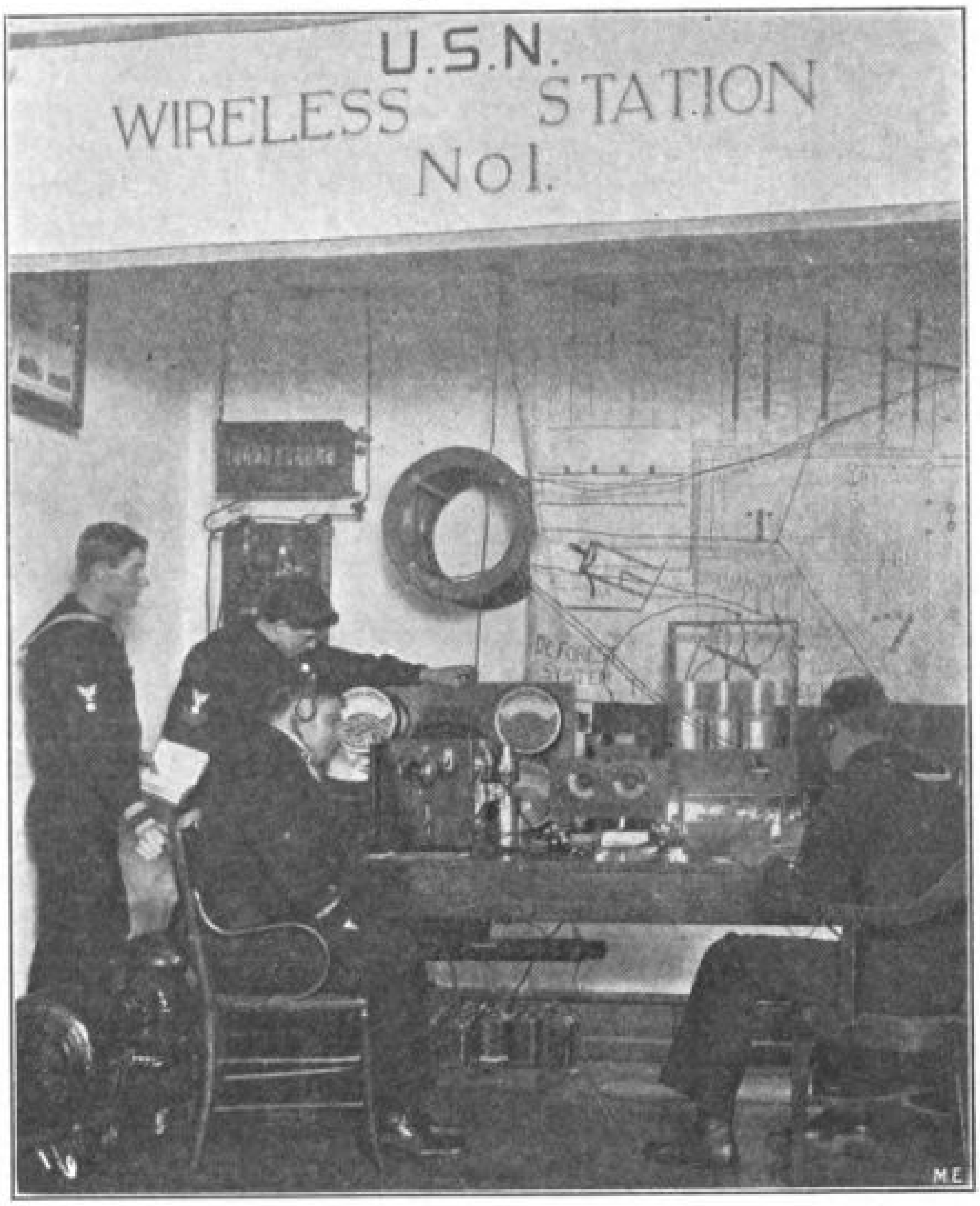
WIRELESS STATIONS ABOUT NEW YORK.

(Continued from Page 253.)

does not actually handle heavy currents.

The loose coupler shown in the photograph is used almost entirely, and Operator Pickerill states that it is so far the greatest advancement in the new art, as absolute tuning can be had. The electrolytic and carborundum detectors are used in preference to all other types.

Wireless 'Phone for U. S. Navy



That Uncle Sam seems to take notice of the wireless telephone is conclusively shown in our engraving.

The Bluejackets, as will be seen are being instructed in practice as well as in theory concerning the latest branch in the art.

Uncle Sam believes that is necessary to train the men on the water so that they know not only how to handle and operate the instruments, but also where to look for trouble and how to remedy it, when occasion requires it.

No, Alexander, a loose coupler is not located between two railroad cars. Far from it. It is the loose coupling between a dog's chain and his little house. We, however, consider a "close" coupler better in this case.—"Fips."

Why is it that when you are just trying to send to your friend, that some "kid" across the hills butts in on you and asks you to send him a "few sparks" as a test; and when you have done it, you find that your friend has gone, as he did not hear you. And not only that, but—your father comes up and tells you to stop "that infernal noise," as he has a headache? Why is it?—"Fips."

HARNESSING SUNLIGHT.

(Continued from Page 244.)

railroad train of to-morrow, instead of taking on coal and water, will "plug" into the power house at the terminal station and pump out enough electricity to make the trip from New York to Chicago. The aeroplane of the future will dart hither and thither, her motors driven by electric energy transmitted by wireless from some far-away Sun Electric power plant. But best of all is the part it will play in the life of the masses, bringing them cheap light, heat and power, and freeing the multitude from the constant struggle for bread.

Wireless Telegraph Contest

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

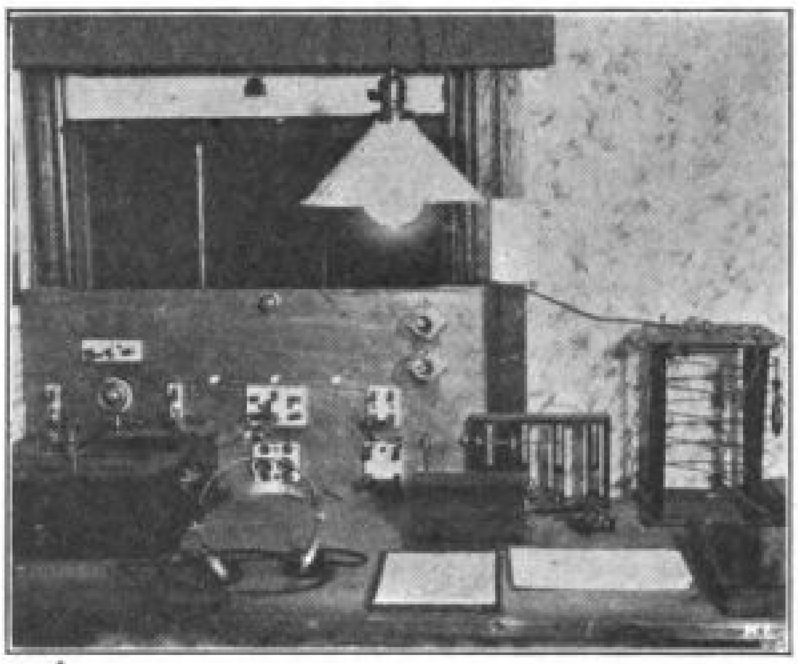
PLEASE NOTE THAT THE DESCRIPTION OF STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED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

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

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

FIRST PRIZE, THREE DOLLARS.

Enclosed find photo of my wireless set. The entire apparatus, except phones, coil, condenser and key was home-made, the many hints in MODERN ELECTRICS being a valuable asset. Sender—spark coil operated on 110 volt alternating current. Spark gap made by myself. The balls are automobile bearings, E. I. Co. condenser, helix of No. 10 brass wire wound on dry wood frame; contacts made with spring clips.



Receiver—Tuning coil enameled wire on wood coil single slide; potentiometer own make; electrolytic, carborundum, molybdenite detectors all home made; 1500 ohm phones. I have a variable condenser not quite finished.

Aerial—Three copper wires strung from iron pipe mast on the roof, well insulated; ground by water pipe. With this apparatus I can receive about 200 miles. Although I can send but three miles, I intend installing a stronger instrument in the near future.

I have a workshop at the end of the yard where I experiment in electricity and chemistry. I am a constant reader of MODERN ELECTRICS, and would not be without it. C. H. BRUBAKER.

Pennsylvania.

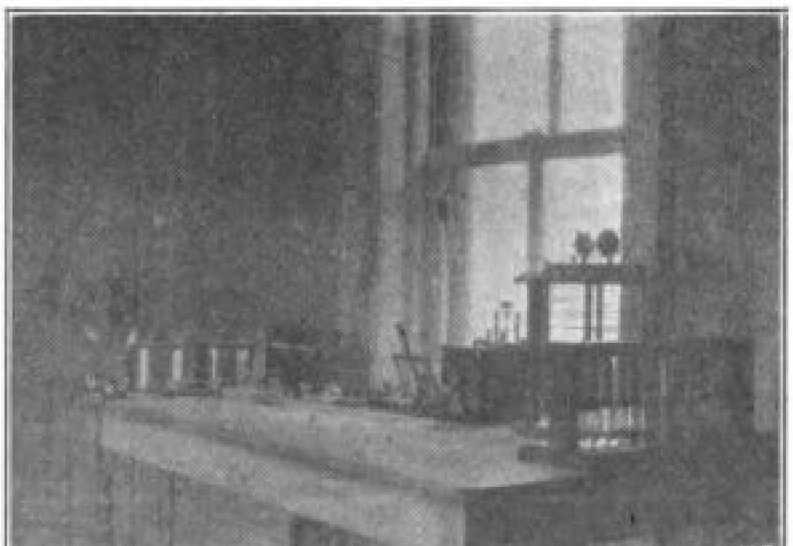
HONORABLE MENTION.

The following is a description of my New York station:

Photo No. 1 shows the whole station. At the extreme left of the picture is the sending condenser, Shoemaker type, made of twelve of the E. I. Co.'s small jars in a mahogany frame. Next to this is the sending inductance, and on it stands the muffled gap, used when I wish to send without disturbing any one. Then comes the coil, a 3-inch one, and above this is an open gap. Between the coil and the aerial switch is a "wireless" key, and above these is the anchor gap.

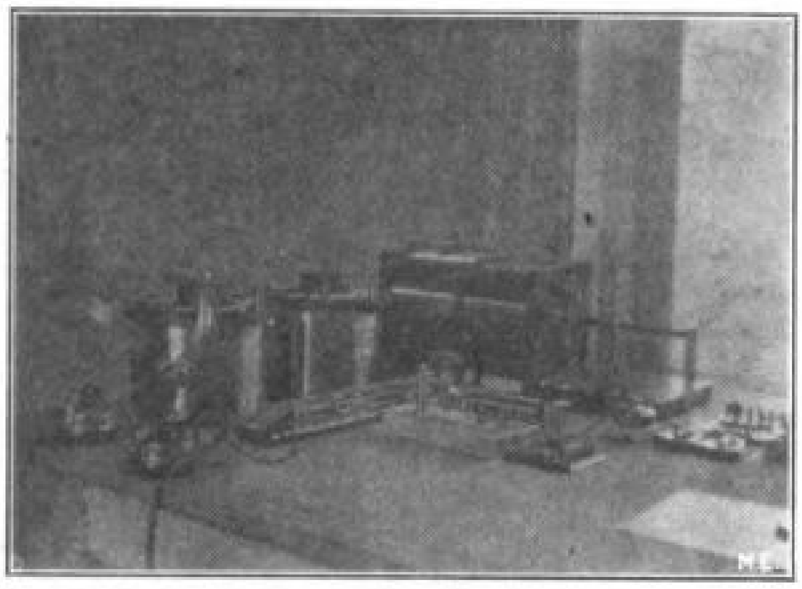
On the left of the aerial switch are a number of switches, to change from one detector to another, cut out batteries and potentiometer when using thermo-electric detector, shortening switch, etc., and a lock switch which controls the power supplied to the induction coil.

At the rear of the table is the receiving transformer. In front of this is a tubular condenser of .003 M. F. capacity. The electrolytic and Ferron detectors and a potentiometer are used.



The two rotary variable condensers each contain eleven rotary and twelve stationary 5-inch plates, 1-32 apart, and have a maximum capacity of .001 M. F. each. The head receivers are 1000 ohms each, E. I. Co.'s.

The aerial consists of six 3-32 stranded phosphor bronze cables 18 inch apart at the top and 40 inches at bottom, supported by a 60-foot mast, and the power is derived from eight Edison primary batteries.

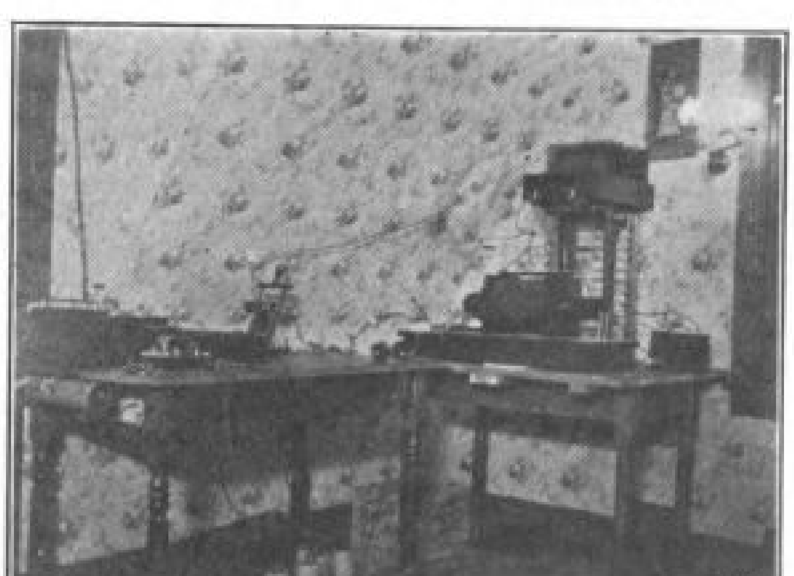


This set gives very satisfactory results. I have picked up the 5 K. W. New Orleans station and have received the Bellevue-Stratford in Philadelphia when the 15 K. W. station at the Brooklyn Navy Yard, five miles away, was sending (though I believe they only use about 10 K. W.) with absolutely no interference.

BOWDEN WASHINGTON,
New York City.

HONORABLE MENTION.

Enclosed you will find photo of my wireless outfit. I have a 7-inch spark coil, sending helix 18-inches high, 12-



inch diameter, 12 turns, No. 8 hard brass wire, glass plate condenser, 8-inch by 10-inch square, double-head receivers, 3000 ohms 1500 each. My new silicon detector which I am using now is used with two tuning coils, having a total of three slides. The condenser I am using with this detector consists of 25 pieces of tinfoil, 1 inch square. I have made several condensers but find this gives best results.

My electrolytic detector is of the E.I. Co. style. Aerial is of No. 22 copper wire, four strands, 70 ft. high, and 100 ft. long.

G. G. KRUSEN.
Philadelphia, Pa.

HONORABLE MENTION.

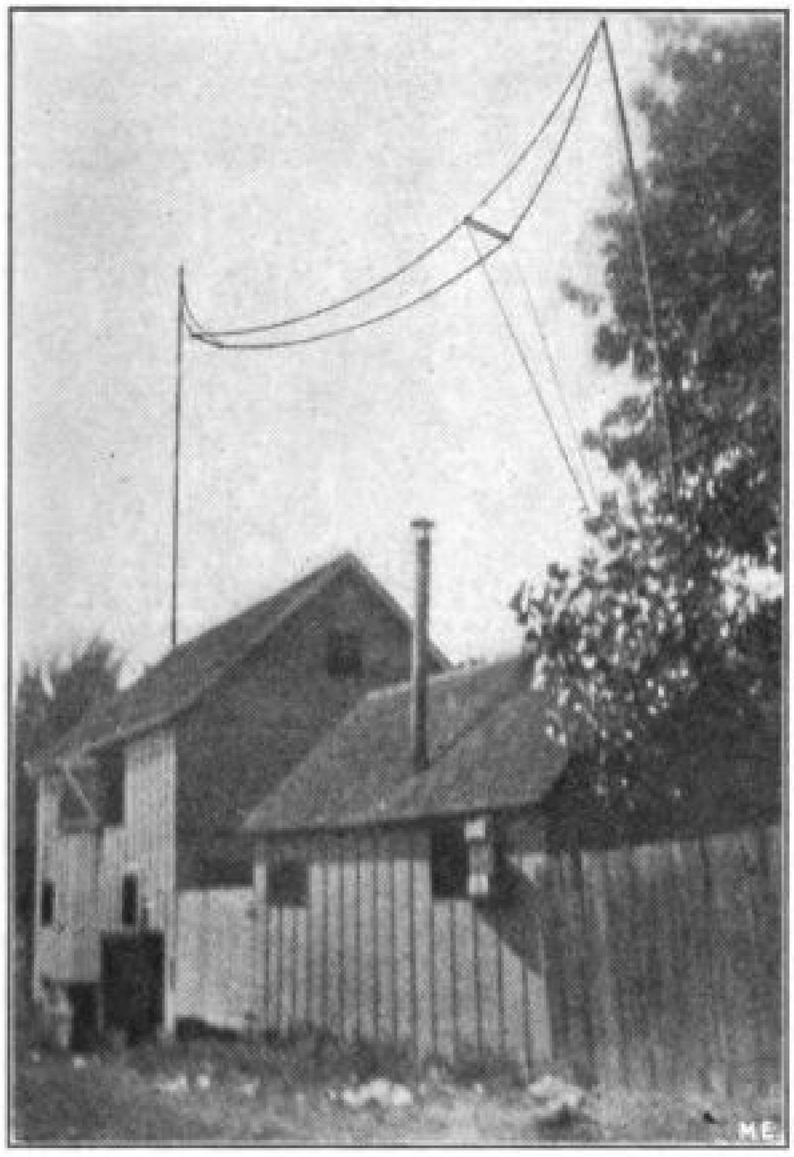
Please find enclosed photo of my wireless apparatus, which was mostly constructed by myself. The sending consists of 1¼ in. coil, with two pounds of 34 B. & S. gauge wire on secondary, two

one-quart Leyden jars, zinc spark gap, which is seen on top of the Helix. The Helix contains 24 feet of No. 8 B. & S. wire, with clamps to make the connections. I use Morse key and twelve dry batteries connected in multiple.

The receiving apparatus consists of four different detectors, electrolytic, silicon microphone, and decoherer set, with 150-ohm relay and 20-ohm sounder. By the use of the switchboard any detector may be used. My tuner is double slide, and wound with 300 feet of No. 24 wire. My variable condenser consists of six 6x8 inch stationary plates and seven movable. I carry on conversation with a friend who lives a mile from my station.

My aerial is four-wire, fifty feet long, and on poles fifty-five feet high. One pole is on the shop, the other on the barn.

The water motor under the table is used to run the dynamo on the table; the



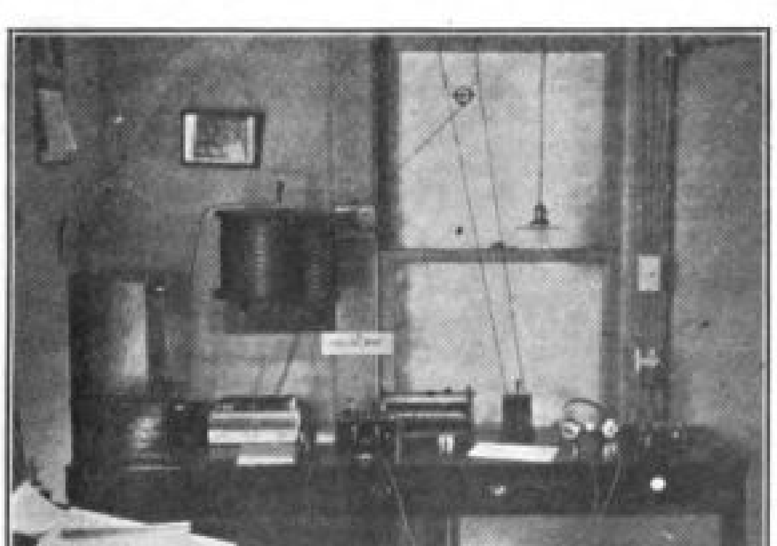
large motor is used for power on 110 volts A. C.

Sedalia, Mo. GLEN NEIGHBORS.

HONORABLE MENTION.

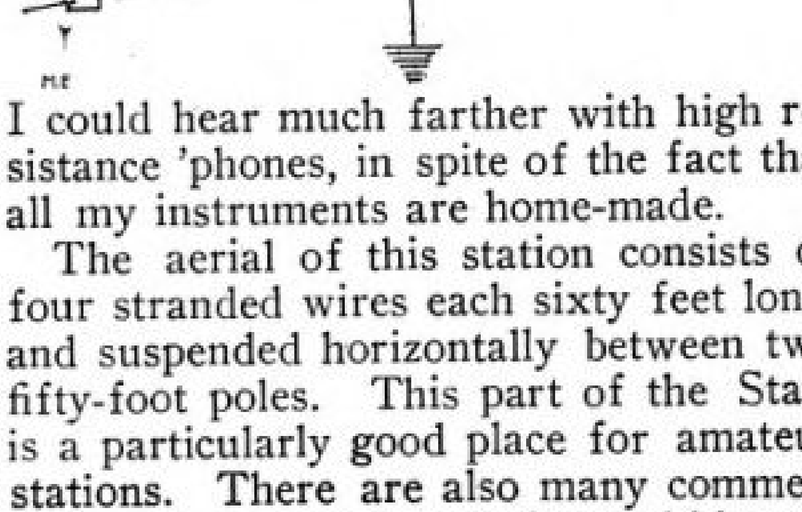
I enclose herewith a photograph of my wireless station and a diagram of my connections. All the instruments, with the exception of the keys and telephone receivers, are of my construction.

For sending I use a closed core transformer, which consumes about ¼ k. w. energy and gives a secondary discharge



of 15,000 volts. I use 110 volts alternating current in the primary, and regulate this current by resistance coils under the table. Above the transformer, at the extreme left, is the condenser, consisting of alternate sheets of glass and tin-foil and immersed in linseed oil. The spark gap is made of heavy zinc discs, and is mounted within a muffler of black fibre. On the outside of the muffler is wound the sending helix of heavy brass wire, and supported by fibre strips. The anchor gap is suspended near the leading in insulators, and is of the ring type. My key is an ordinary Morse key, with heavy platinum contacts. With this transmitting outfit I have sent up to distances of thirty miles, but I think it is capable of sending farther. The connections are shown in the diagram.

In receiving I use either an electrolytic or perikon detector. These are mounted, together with the potentiometer, switches and receiving condenser on or within the one box. I have tried several forms of crystal detectors, but the electrolytic and perikon give the best results. My tuning coil is of the double slide type, and is wound with bare phosphor bronze wire. My telephone receivers are aluminum case, 75 ohm receivers, and in spite of their low resistance give good results. Lastly, the aerial switch; this is mounted on hard fibre, and is made for quick action. The receiving instruments are connected as shown in diagram. With this receiving outfit I have read messages from distances of 1,000 miles, and believe that



I could hear much farther with high resistance 'phones, in spite of the fact that all my instruments are home-made.

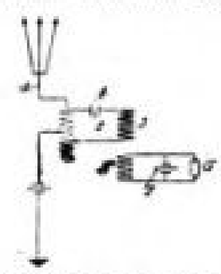
The aerial of this station consists of four stranded wires each sixty feet long, and suspended horizontally between two fifty-foot poles. This part of the State is a particularly good place for amateur stations. There are also many commercial and government stations within our receiving range.

Much of the success that I have had in wireless work is due to the pointers found in MODERN ELECTRICS; consequently, I follow your magazine closely from month to month.

Long Beach, Cal. P. E. PALMER.

Electrical Patents for the Month

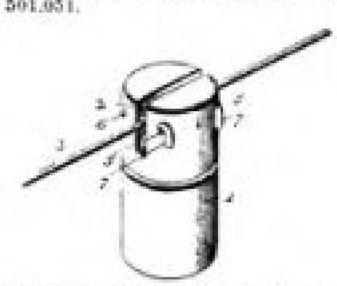
931,586. RECEIVER FOR WIRELESS TELEGRAPHY AND TELEPHONY. Simon Eisenstein, Kiew, Russia. Filed Mar. 27, 1908. Serial No. 423,638.



1. In apparatus for wireless telegraphy, the combination, with a resonant circuit and a primary receiving transformer coil in said circuit, of a secondary transformer coil arranged to be continuously moved with respect to the primary coil and connected with a detector.

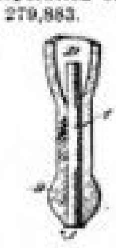
2. In apparatus for wireless telegraphy, the combination, with a resonant circuit and a primary receiving transformer coil in said circuit, of a secondary transformer coil outside the circuit arranged to be continuously moved into and out of the field of the primary coil, and a detector connected with said secondary coil.

931,507. INSULATOR FOR ELECTRIC WIRES. Aaron V. Siler, Newark, Ohio, assignor of one-half to Andrew Jasper Siler, Massillon, Ohio. Filed June 9, 1909. Serial No. 501,051.



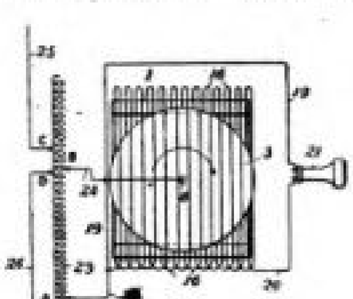
An insulator comprising a body portion having a slot formed therein for receiving a line wire, the bottom of said slot being convex, transverse perforations extending through the insulator on either side of the highest point of the convex bottom, and pins adapted to extend through said perforations for engaging the line wires.

929,745. WIRELESS COMMUNICATION. Clifford D. Babcock, New York, N. Y., assignor, by mesne assignments, to United Wireless Telegraph Company, New York, N. Y., a Corporation of Maine. Filed Sept. 25, 1905. Serial No. 279,883.



1. The method of making an electrode for a liquid detector of wireless telegraphy oscillations, which consists in inserting a conductor into a glass tube having a thin wall, so that the end of the conductor is substantially flush with the end of the tube, and then heating the flush end of the tube while the conductor is so inserted, to seal together the proximate lateral surfaces of the tube and conductor near to and next their flush end surfaces and cause a part of the glass constituting the wall of the extreme flush end of the tube to be drawn away from the end while leaving covered with glass all the lateral surface of the conductor next its end, the heating being effected repeatedly and successively whereby there is formed an enlarged curved portion of glass above the end of the tube, thus reducing the thickness of the extreme end wall of the tube.

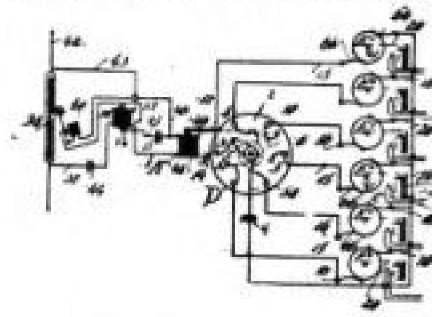
930,780. MAGNETIC DETECTOR. Joseph Murgas, Wilkes-Barre, Pa. Filed Mar. 17, 1909. Serial No. 483,964.



1. In an electric oscillation detector, the combination with means for producing a normally stationary magnetic field, a conductor of magnetic material movable in said field, means for continuously moving said conductor in said field, and means in inductive relation to said field, for rendering the passage of oscillations manifest, said last mentioned means and said conductor together constituting a condenser through which the oscillations pass.

930,588. RECEIVING ELECTRIC SYSTEM. Christopf Wirth and Christof Beck, Nuremberg, Germany. Filed Mar. 18, 1909. Serial No. 484,167.

1. In a receiving electric system of the kind described, the combination with a receiving circuit, of a distributer controlled by said receiving circuit, electromotors, circuits controlled by said distributer and including said electromotors, cut-outs, operating circuits including said cut-outs, and intermediate gears connected with said electromotors and adapted to actuate said cut-outs only when said electromotors are permitted to run for a sufficiently long time, whereby said operating circuits are closed or opened.

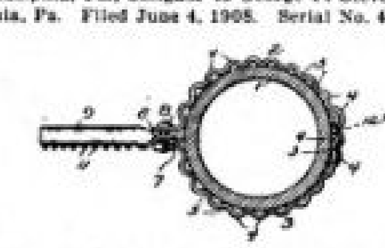


930,746. AERIAL CONDUCTOR. Simon Eisenstein, Kiew, Russia. Filed Mar. 27, 1908. Serial No. 423,643.

In a system for wireless telegraphy and telephony, in combination, a supplementary capacity, an aerial conductor, and a self-induction in the form of a lengthening coil in series between the supplementary capacity and the

aerial conductor, immediately below the capacity and at the top of the aerial conductor.

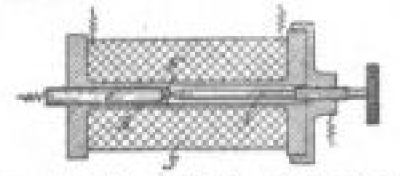
931,706. ELECTRIC GROUND-CLAMP. Frank Stevens, Philadelphia, Pa., assignor to George F. Stevens, Philadelphia, Pa. Filed June 4, 1908. Serial No. 436,550.



1. A ground clamp for attachment to pipes and the like, comprising corrugated sections, the corrugations of one section interlocking with the corrugations of the other.

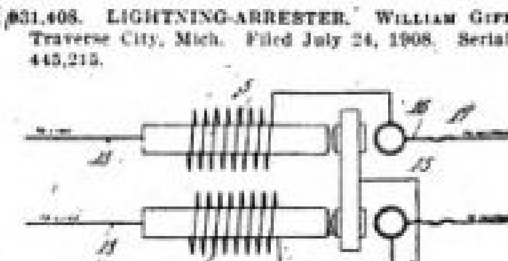
2. A ground clamp for attachment to pipes and the like, comprising two interfitting corrugated sections, and being adjustable by interlocking certain ones of the corrugations of one section with those of the other section.

931,632. ELECTRIC SIGNALING. Johann Mládek, Prague, Austria-Hungary. Filed Apr. 19, 1907. Serial No. 369,136.



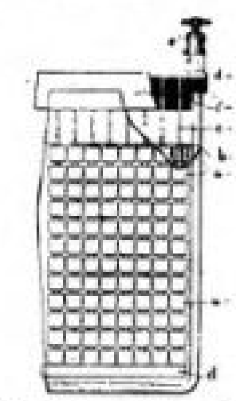
1. In a receiver for electric transmission at a distance of signs and signals by impulses of induced currents of opposite polarity the combination with the magnetic parts of the receiver of a sensitive easily springing contact device which is maintained by the residual magnetism of the magnetic parts of the receiver in the position given to it by a current impulse for the purpose of altering the state of the local circuit.

931,408. LIGHTNING-ARRESTER. William Gifford, Traverse City, Mich. Filed July 24, 1908. Serial No. 445,215.



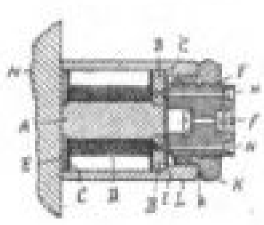
1. A lightning arrester having an impedance coil provided with a core of magnetic material, said core being included in the circuit between the line and the instrument to be protected, and an air gap included in a ground branch connected to the line on the line side of the impedance coil.

930,213. SECONDARY ELECTRIC BATTERY OR ACCUMULATOR. Walker Moseley, London, England. Filed Mar. 29, 1909. Serial No. 486,500.



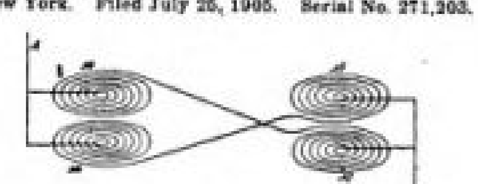
An accumulator plate consisting of a series of conical cups, adapted to receive and hold a semiliquid solution of oxid of lead, each cup being provided with a perforated stem, the said stem being made a little higher than the rim of the cup, vertical rods of lead upon which the said cups are threaded, lower and upper bars of lead to which the said rods are fixed, and cross bars of vulcanite for supporting the upper bars.

930,177. ELECTROMAGNET. David J. Hauss, Aurora, Ind. Filed Sept. 2, 1908. Serial No. 451,279.



1. In an article of the character indicated, a core of magnetic material having a non-magnetic disk attached to one end, a magnetic disk attached to the opposite end, a coil of insulated wire encircling said core, and a tubular housing of magnetic material recessed upon the interior to receive said disks and to form a shoulder against which said disk of magnetic material seats and is locked when the parts are assembled.

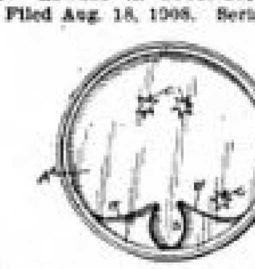
930,508. RECEIVER FOR HIGH-FREQUENCY ELECTRICAL OSCILLATIONS. Frederick K. Vreeland, Montclair, N. J., assignor to Wireless Telegraph Exploitation Company, New York, N. Y., a Corporation of New York. Filed July 25, 1905. Serial No. 271,203.



1. A receiver for high frequency signal impulses wherein are combined two relatively movable coils arranged in close inductive relation with their magnetic fields mutually opposed, such coils being connected in parallel, substantially as set forth.

2. A receiver for high frequency signal impulses wherein are combined two relatively movable and geometrically similar coils arranged in close inductive relation with their magnetic fields mutually opposed, such coils being connected in parallel, substantially as set forth.

930,704. PUZZLE TOY OPERATED BY STATIC ELECTRICITY. Edward A. Sullivan, Toronto, Ontario, Canada. Filed Aug. 18, 1908. Serial No. 449,080.



1. A puzzle to be operated by static electricity comprising a casing provided with a glass top, and a suitable bottom, a pocket having the wall thereof extending upwardly from the bottom and provided with a suitable opening, and a plurality of electrically excitable light articles or objects located within the casing and adapted to be moved by the electricity generated by friction between a suitable body and the glass, as specified.

2. A puzzle to be operated by static electricity comprising a casing provided with a glass top, and a suitable bottom, a pocket having the wall thereof extending upwardly from the bottom and provided with a suitable opening from which extend deflecting flanges, and a plurality of electrically excitable light articles or objects located within the casing and adapted to be moved by the electricity generated by friction between a suitable body and the glass, as specified.

Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending August 17th.

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

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

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

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

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

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

RECEIVING DISTANCES.

(298.) Leland K. Swart, New York, says:

1.—How far could I receive with the following instruments: Single slide tuning coil, variable condenser, fixed condenser, electro-lytic detector, 1 1,000 ohm receiver, rheostat regulator or potentiometer, aerial 40 feet high, 50 feet long, 3 strands of copper wire?

A. 1.—About 300 miles.

2.—About what time are the stations sending in my receiving radius?

A. 2.—Very nearly all the time. That is, there are so many stations now that there is almost always one that is operating.

3.—Will the E. I. Co.'s "Electro"-lytic detector work on short range as well as a coherer will?

A. 3.—Most assuredly.

WIRELESS QUERIES.

(299.) Louis B. Manpin, Nebraska, asks:

1.—Please tell me how far the enclosed diagram of a receiving station will cover.

A. 1.—Not more than 3 to 5 miles.

2.—I want to complete a receiving station where a sounder can be operated at a distance of 75 miles. Can you give me a diagram for it?

A. 2.—It is very difficult to cover such a long distance as this with an automatic receiver unless you use apparatus which should cost several hundred dollars, and then it is not altogether satisfactory, as the action is not positive enough.

AERIAL 1760 FEET LONG.

(300.) Edward Tinkham Chappell, Michigan, writes:

1.—How far can I receive messages with an electro-lytic detector, 400-meter tuning coil, potentiometer, stationary condenser composed of five plates of glass with tinfoil on one side of each. Plates 10x16 inches, 2 1,600 ohm receivers, aerial 180 feet high and four blocks long (440 feet to the block) composed of 1 aluminum wire?

A. 1.—Your aerial is too long. If you change it to one block long made up of 4 wires about 4 feet apart you would probably be able to receive from 700 to 1000 miles.

2.—How far can I send with the same aerial, E. I. Co.'s new ½-kilowatt transformer run on 110 volts alternating current, sending Helix, stationary condenser composed of four glass plates covered with tinfoil on both sides, four negatives and four positives, plates 1 inch apart so that they are adjustable, zinc spark gap with 4 brass balls (each ¼-inch apart) in between the rods, and an oscillation transformer?

A. 2.—If you change your aerial, as stated above, you would be able to send over 100 miles.

GAS PIPE WIRELESS 'PHONE.

(301.) Clarence C. Townsend, Nebraska, asks:

1.—While experimenting with a wireless receiving outfit, using a gas pipe for ground and a water pipe for aerial, as shown in the July (1908) issue, I found that when a telephone receiver, without any other instruments, is connected across the two pipes I could hear the conversations taking place on the ordinary wired telephone lines. Please explain.

A. 1.—Yes, this is caused by an action which is technically known as vagabonding or "raising" currents.

2.—Could a ½-inch induction coil be run on a six-volt alternating current without a vibrator for wireless work?

A. 2.—No.

3.—Could a medical induction coil be used instead of the bell on the signal device shown in the June (1909) issue?

A. 3.—Yes.

WAVE LENGTH OF U. S. STATIONS.

(302.) Gus Flexner, Kentucky, writes:

1.—What is the average wave length of the Government land stations in the United States?

A. 1.—Between 400 and 600 meters.

2.—How far can I send with a 2-inch spark coil, adjustable condenser, inductance coil, as described in the September issue of MODERN ELECTRICS, and an aerial composed of four strands of No. 14 aluminum wire 12 inches apart stretched between two poles 60 feet and 40 feet high; length of aerial 100 feet?

A. 2.—Probably about 10 miles.

3.—What would be the wave length of my station if leading-in wires were 62 feet long and were fastened to middle of aerial, as shown in diagram?

A. 3.—We figure your wave length as about 150 meters.

WIRE FOR RECEIVERS.

(303.) EDWARD L. LONG, New York, asks:

1.—Number and kind of inclosed wire?

A. 1.—The wire inclosed is No. 40 B. & S. gauge SSC. German silver wire.

2.—Resistance per 100 feet?

A. 2.—Resistance is about 1,800 ohms per 100 feet.

3.—Would this wire do to wind a telephone receiver?

A. 3.—No German silver wire cannot be used to wind wireless receivers.'

FIVE-INCH COIL.

(304.) LAWRENCE OHL, Minnesota, writes:

1.—Will you please give dimensions for a 5-inch spark coil?

A. 1.—Core 10 inches long and ⅛ inch in diameter, wound with 20 ounces of No. 12 wire. Secondary 8 inches long, 4 inches in diameter, wound in 100 sections with 6 pounds of No. 34 wire. Condenser 60 sheets of tinfoil, 9x5. Current, 6 amperes at 18 volts.

2.—How far could I transmit?

A. 2.—Probably about 50 miles.

3.—I have a pair of contacts, the surface being 3-32 inches in diameter. Would they be too small? They are of the shape shown in the diagram.

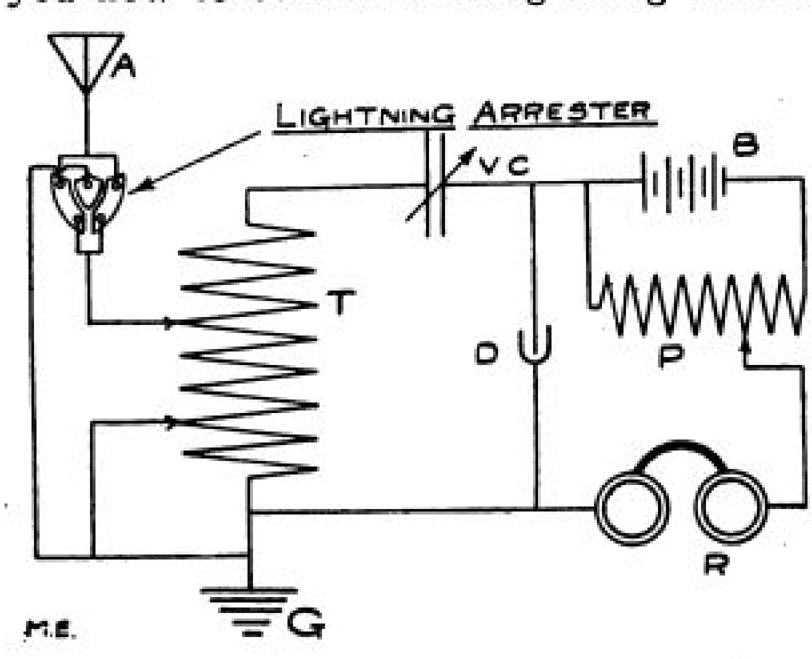
A. 3.—You should have contacts at least 3-16 inch in diameter for use with this coil.

LIGHTNING ARRESTER.

(305.) EDWARD J. SUFFERY, New Jersey, writes:

1.—Please show me how I am to connect a lightning arrester like the sketch. I have enclosed the diagram of my receiving station.

A. 1.—Diagram given below will show you how to connect this lightning arrester



to your receiving instruments. It is, of course, understood that this arrester cannot be used if you have a transmitting station, as the high tension current impressed on the antenna will jump the gap in the lightning arrester the same as the lightning itself does.

ENAMELED WIRE.

(306.) MAXWELL H. SMITH, Brooklyn, N. Y., writes:

1.—In what way will I be able to fasten the enameled wire on my tuning coil to keep it from stretching?

1.—We would suggest that you wind the wire on a cardboard tube and fasten the wire with shellac.

2.—What is, and how to mix the solution for the electrolytic detectors?

A. 2.—A 20 per cent. solution of nitric acid should be used in electrolytic detectors, that is, one part of pure nitric acid to four parts of water.

3.—How can I cut glass tubing and have smooth edges?

A. 3.—First mark the tube with a file then break it, and afterwards rub down the edges on a fine piece of emery paper.

TUNING COIL.

(307.) IVAN H. WAUGH, Kansas, writes:

1.—How much No. 18 annunciator wire will it take for a tuning coil to tune up to 1500 meter wave lengths?

A. 1.—About 5 pounds.

2.—How many feet of No. 18 annunciator is there to one meter wave length?

A. 2.—Approximately 3 feet. The meter is 39¼ inches and on account of the inductive winding of the tuning coil a length of 3 feet will be about equal to one meter.

DETECTOR QUERIES.

(308.) F. C. WHITTEMORE, Pennsylvania, writes:

1.—What is an "audion detector"?

A. 1.—The audion detector was described in our October, 1908, issue.

2.—What is Ferron detector?

A. 2.—The Ferron detector is one form of a crystal detector using iron pyrites.

3.—How can I adjust my electrolytic detector?

A. 3.—First by cutting all resistance out in your potentiometer, allowing all the battery current to pass through the closed circuit. Then screw down the Wollaston wire until it barely touches the acid, leaving it there until a "boiling" noise is heard in the phones; then adjusting the potentiometer until the boiling becomes very faint. The detector is now at its most sensitive point.

ELECTRIC PERPETUAL MOTION AGAIN.

(309.) J. F. DWIGGINS, Tennessee, writes:

1.—Can a dynamo and a motor be constructed and connected (motor driving dynamo by belt or otherwise) so that the dynamo will give a greater output with same voltage than the motor consumes?

A. 1.—Absolutely no. If this were possible in any way we might have a battery running a motor, the motor running a dynamo a little bit larger than itself, the dynamo running another larger motor, and so on, until we could be running a large power plant from one dry battery. This is the same old story as the boy who tried to lift himself by his own bootstraps.

2.—Is there a wireless near me? If so, where?

A. 2.—We would refer you to the wireless blue book.

TANTALUM DETECTOR.

(310.) H. A. Rahn, Pennsylvania, writes:

1.—What is the trouble with a tantalum detector that will only respond to the first wave of a message?

A. 1.—We should think that the detector is not adjusted delicately enough. That is, that the tantalum wire presses too much upon the globule of mercury and the imperfect contact is more easily broken upon the reception of a message.

2.—Which is the best detector for local city receiving?

A. 2.—We would suggest either electrolytic or carborundum.

.3—For long distance work, which is the best, a tuning coil, two sliders, or tuning transformer?

A. 3.—We have always found the tuning transformer to give better results for long distance work.

WIRELESS QUERIES.

(311.) Merlyn Dennis, Chicago, Illinois, writes:

1.—If a spark is jumping in a gap of 1 inch and a Leyden jar is connected across the gap, should the spark remain the same length?

A. 1.—No. When a Leyden jar is shunted across the spark gap it always decreases the length of the spark, but makes it much more powerful.

2.—What difference does it make where the instruments are placed in relation to the aerial?

A. 2.—A great deal of difference. As we understand it, you mean by your question whether the instruments are on a level with the antenna or some distance below.

3.—How far could I receive with the following aerial: 35 feet long, 30 feet high, 2 strands of No. 14 bare copper wire, 2 feet apart, electrolytic detector, 75 ohm receiver, tuning coil, 300 feet of No. 26 enameled wire, rheostat, fixed condenser 250 square inches? My instruments are about 25 feet from the aerial, but on about the same level.

A. 3.—100 to 150 miles. If you place your instruments 15 to 20 feet below your aerial your receiving radius will be increased probably 50 per cent.

STATIC MACHINE.

(312.) Chas. Van Gendz, Kansas, writes:

1.—Will ebonite answer better for the plates of the static machine described in the June issue than glass?

A. 1.—Ebonite may be used for the static plates of the machine described, but will not give such good results as glass, and care must be taken not to leave the machine in a damp or hot place on account of the tendency of the ebonite to warp.

2.—How long a spark should this machine throw using glass plates?

A. 2.—About three inches.

3.—What is a good way to get a hole the size of a penny in a sheet of window glass?

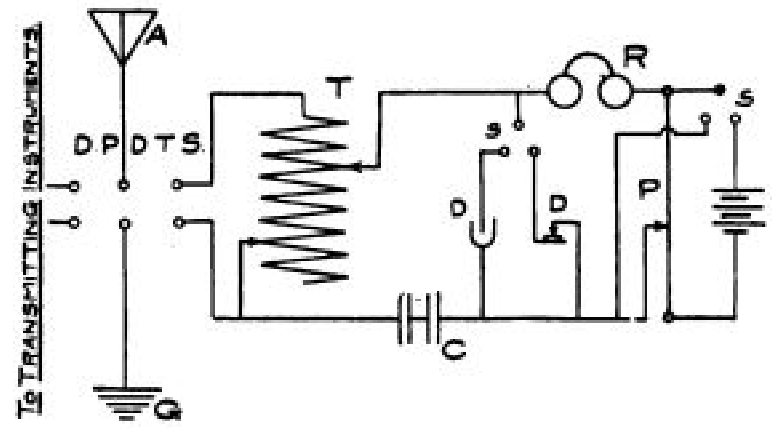
A. 3.—First drill a small hole with a diamond drill, then ream out the hole with three-cornered file to required size, using plenty of turpentine for lubrication.

ANCHOR GAP.

(313.) Edward F. Doherty, Washington, writes:

1.—Please give diagram for connecting up following instruments, using 3-point switch for two detectors, tuning coil, fixed condenser, electrolytic detector, silicon detector, D. P. D. T. switch and 2000 ohm receivers.

A. 1.—Diagram given below.



2.—What is the approximate distance that I should be able to receive with above instruments using either electrolytic or silicon detectors, my aerial being 107 feet high, aerial 240 feet long, 5 wires?

A. 2.—800 to 1000 miles.

3.—Does an anchor gap give less capacity to the sending instruments?

A. 3.—An anchor gap does not effect the capacity of the sending instruments, but by introducing resistance it cuts down the energy impressed upon the aerial, thus reducing the effective transmitting radius.

BICHROMATE CELLS.

(314.) Lloyd S. Foster, Kentucky, writes:

1.—The potassium bichromate in my plunge battery, the electrolyte of which is sulphuric acid and potassium bichromate diluted, has crystallized in a solid mass in the bottom of the cells. How can I remove same without damaging the jars, and how can crystallization be prevented?

A. 1.—It is impossible to prevent crystallization in this type of battery. The only way to remove the crystallized mass in the bottom of the jars is to pour water, just as hot as the jars will stand without cracking, into same and leave the crystals to dissolve.

2.—Will the following aerial work for half-mile communication: One horizontal wire in an attic 40 feet long 25 feet from the ground, terminating in a triangle containing 12 feet of wire and 30 feet from the ground; No. 14 copper wire being used, and triangle is placed on roof perpendicularly?

A. 2.—Yes, we think so, but you should use four wires which would ensure much better results.

3.—Is there any danger from lightning, the triangle having been withdrawn within attic, but the lead wire running for twelve feet on outside of house?

A. 3.—In our opinion there would be very little danger from lightning.

½ K. W. TRANSFORMER COIL.

(315.) J. M. Smith, California, writes:

1.—How far will the E. I. Co.'s ½ K. W. transformer coil send on a 6-volt storage battery?

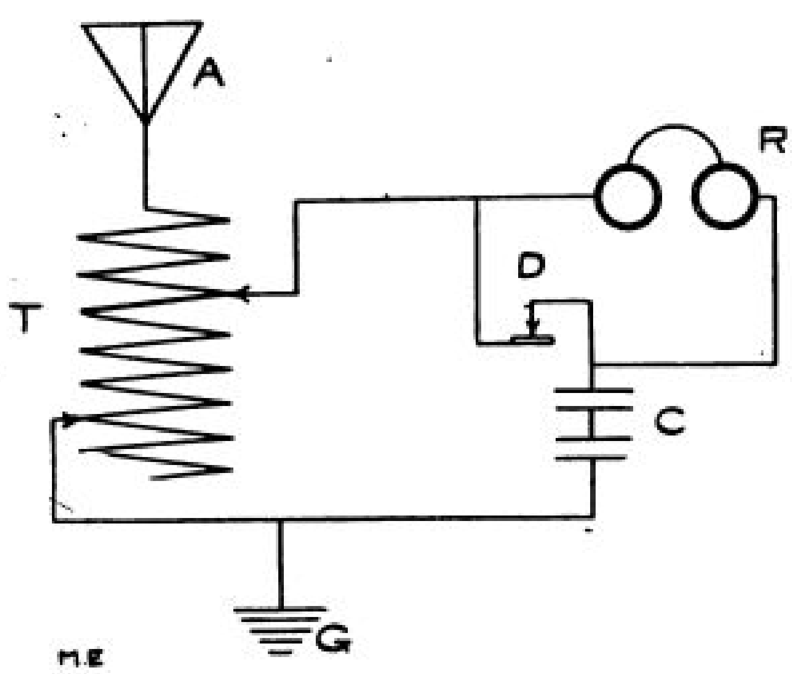
A. 1.—25 to 50 miles, depending upon the correct adjustment of the inductance of the transmitting circuit.

2.—Will 20 feet of No. 6 bare copper wire do for a helix?

A. 2.—Yes, and with good results.

3.—In using a silicon detector, how can the humming from an arc light be cut out?

A. 3.—We believe if you use diagram given below you will have no difficulty in cutting out the humming from an arc light by using a silicon detector.



FIVE HUNDRED MILE STATION.

(316.) A. L. Rider, Maryland, writes:

1.—Being a reader of your paper, I ask you as a favor to kindly tell me where I can get detailed instructions for building a wireless plant capable of receiving and sending messages 500 miles distant.

A. 1.—We refer you to our advertising columns, as no printed information for the construction of such a station is to be had, in our estimation.

SOUNDER FOR WIRELESS.

(317.) H. R. Deane, Ohio, writes:

1.—Can a telephone receiver which is wound for 75 ohms be rewound for 1000 ohms and have ampere turns enough on its bobbins to give good results?

A. 1.—Yes, if No. 50 single silk-covered wire is used.

2.—Is there no telegraph sounder used in wireless telegraph?

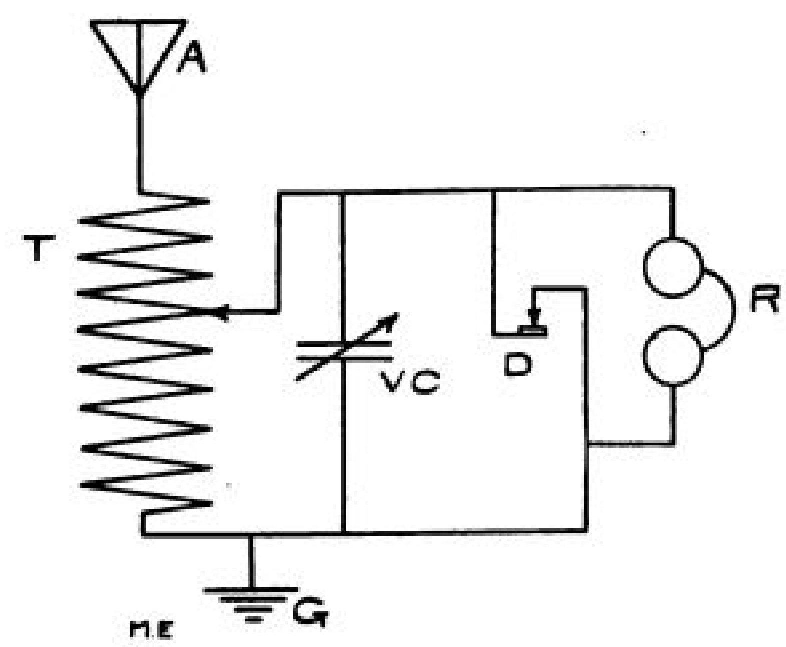
A. 2.—Not for practical work. The sounder is only used for short distance experimental wireless telegraphy, or for calling purposes.

A POOR GROUND.

(318.) J. Keenon, Chicago, Ill., writes:

1.—I have a silicon detector condenser, 1000 ohm receiver, large tuning coil, single slide, 2 dry batteries, aerial 40 feet high 4 wires 20 feet long, ground small zinc cylinder 3 feet deep, ground wire heavily insulated. Why don't it work? I can hear current break through but won't stay there.

A. 1.—You have not a sufficiently good ground for use in wireless telegraphy. We would advise you to connect your ground wire to the water pipe. Also we would advise you not to use the batteries but connect your instruments as per diagram below.



POLYPHASE CURRENTS.

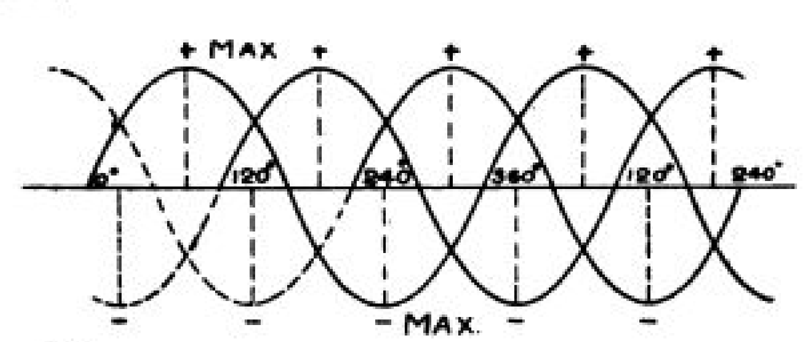
(319.) Herbert H. Wheeler, California, writes:

1.—How far will the E. I. Co.'s new transformer coil send, using only one secondary?

A. 1.—Probably about 40 miles.

2.—Kindly explain polyphase currents.

A. 2.—Polyphase current is really not one current but two or more separate currents produced from one dynamo. These currents succeed each other in such a way that if, for instance, we have three phases each separate current would be at the maximum positive point 120 degrees apart from the following currents. Diagram given below shows the currents in a three-phase line.



3.—How can a boat (model) be steered by wireless?

A. 3.—By using a wireless control relay, such as described by H. W. Secor in our April, 1909, issue, or by Dr. Branly's apparatus, described in the July, 1909, issue.

L OR T AERIAL?

(320.) Edwin Schbelar, Long Island, N. Y. asks our advice as to whether he should use a "T" or "L" type antenna with an autocoherer, fixed condenser, double slide tuning coil, potentiometer, and two 75 ohm receivers.

A. We would unquestionably advise the use of the "L" antenna with these instruments and would suggest that the four wires be placed at least 2½ feet apart, and preferably 3 feet apart.

COHERER AND DECOHERER.

(321.) Neilson Reise, Ohio, writes:

1.—Would you please tell me if two 500 ohm receivers are better than one 1000 ohm receiver?

A. 1.—We consider the two receivers better than one because both ears are covered and all outside noise is thus excluded.

2.—Will the E. I. Co.'s coherer and decoherer work a call system two miles with their 75 ohm pony relay?

A. 2.—Yes, providing sufficient energy is used at the transmitting end.

3.—My aerial is 60 feet high at one end and 45 at the other. Would it be best to bring the lead wires from the lower or higher end?

A. 3.—We would advise you to put the lead wires at the lower end of the aerial.

SILICON AND ELECTROLYTIC DETECTORS.

(322.) Ediern Angell, Jr., Massachusetts, writes:

1.—How far can I receive with a 70 foot aerial, ½ pound No. 20 wire on tuning coil, silicon detector and potentiometer and 75 ohm receiver?

A. 1.—Probably about 150 miles.

2.—Please give diagram for wiring up.

A. 2.—We refer you to query No. 314. No battery or potentiometer used.

3.—With an electrolytic detector and 500 ohm receiver?

A. 3.—500 to 700 miles.

RECEIVING DISTANCES.

(323.) R. Butler, Long Island, writes:

1.—Please tell me how far I ought to receive with the following sets: Two 500 ohm telephone receivers, 1 silicon detector, 1 tuning coil, aerial 50 feet long, 70 feet high, rigged in cone fashion, the pole being 6 feet high mounted on a 64-foot house.

A. 1.—150 to 300 miles.

2.—Also tell me how far I should receive with the same set with aerial 500 feet long, rigged horizontal with eight 100 foot strands No. 17 bare iron wire at 70 feet.

2.—We do not think that the change of aerial would make a great deal of difference in your receiving radius. However, we would suggest that you use aluminum wire instead of iron wire for the aerial.

MORE RECEIVING DISTANCES.

(324.) H. S. Dusenbery, California, writes:

1.—Please state receiving distance of the following: "Electro" lytic detector, fixed condenser, double slide tuning coil potentiometer and one 1000 ohm receiver with an aerial sloping from a 30-foot house to the ground, making the aerial 40 feet long. It has five wires about 1 foot apart.

A. 1.—Probably about 100 to 150 miles.

REACTANCE COIL.

(325.) Norman G. Brown, Massachusetts, writes:

1.—Will a 16 candle-power 110-volt lamp light up if placed in series with a condenser on a 110-volt alternating current at 60 cycles?

A. 1.—No.

2.—I have a gas lighting reactance coil wound with No. 16 wire which if placed in series with some lights on a 110-volt circuit will make a loud humming or buzzing sound. Will you please tell me if it is caused by the core not being able to reverse its magnetism as often as the current alternates, which is 60 cycles?

A. 2.—Yes.

WAVE LENGTH.

(326.) J. W. Haynes, Nebraska, writes:

1.—Please estimate my wave length. I have an aerial composed of four wires, each 62.5 feet long. One end is 65 feet from the ground, the other 75 feet. My instruments are about 15 feet from the ground. I have the E. I. Co.'s 620 meter tuning coil? (See diagram.)

A. 1.—We estimate your wave length about 150 meters.

2.—Also how far can I send with the E. I. Co.'s 2-inch spark coil with Leyden jars?

A. 2.—10 to 15 miles.

3.—How far can I receive with an "Electro" Lytic detector, fixed condenser, potentiometer and a 1000-ohm receiver?

A. 3.—From 200 to 300 miles.

WIRELESS QUERIES.

(327.) W. A. Neff, Michigan, writes:

1.—Will a common Splitdorf auto coil send a distance of three blocks?

A. 1.—Yes.

2.—How can I improve my aerial, so as to be able to catch messages from Detroit, a distance of eleven miles?

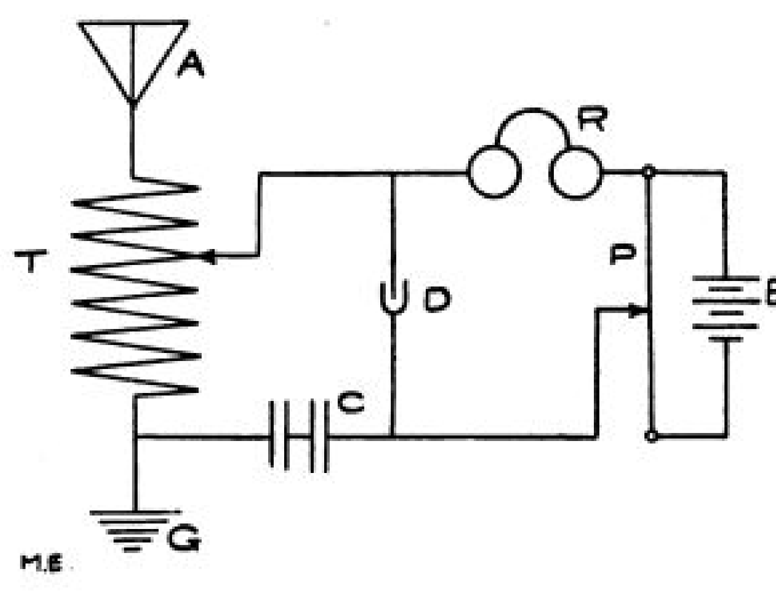
A. 2.—We would suggest that you use four wires instead of one, all in parallel for your aerial.

RECEIVING RADIUS.

(328.) John H. Dow, New Jersey, writes:

1.—Kindly give me diagram showing how I can connect the following instruments to obtain the best results: (1) Single slide tuning coil, E. I. Co.'s potentiometer, electro-lytic detector, electro fixed condenser, 1000-ohm telephone receiver, two dry batteries.

A. 1.—Diagram given below.



2.—Also state receiving range of the above set with a 2-wire aerial 40 feet high and 110 feet long.

A. 2.—150 to 300 miles.

STORAGE BATTERY.

(329.) Homer Harris, Washington, writes:

1.—How much by weight of the pastes is used in each kind of plate in the storage battery described in the July number of Modern Electrics?

A. 1.—About 2 pounds per plate.

2.—What is the greatest ampere rate at which this cell can be charged and discharged?

A. 2.—About 12 amperes.

TESLA COIL.

(330.) L. R., New York, writes:

1.—I have a Tesla coil and high frequency coil. If you would kindly send me a few interesting experiments I would thank you very much for same. The coil is about 1 to 1½ K. W.

A. 1.—We refer you to our September and October issues of 1908 containing numerous experiments with the Tesla coil.

TANTALUM DETECTOR.

(331.) ROBERT CHEDISTER, Colorado, writes:

1.—Will tantalum wire take the place of platinum in an electro-lytic detector?

A. 1.—No. Not when used with the same solution. However, it may be used with a globule of mercury in the cup.

2.—Is the enclosed wire too small for the primary of a 1-inch spark coil?

A. 2.—Yes. You must use No. 16 or No. 14 wire for the primary of 1-inch coil.

ONE INCH COIL CONDENSER.

(332.) C. V. GATES, Ohio, asks:

1.—Give data for condenser of one inch coil and amount of tinfoil required.

A. 1.—40 sheets of tin foil 6x3 inches.

2.—What effect does wind have upon wireless waves?

A. 2.—No effect upon the waves themselves. The only thing that can possibly happen is the grounding of the antenna during a violent wind storm, and the consequent weakening of the waves at that moment.

3.—In using a one-inch coil to send five miles is it absolutely necessary for the aerial to clear all trees, houses, etc., between the stations?

A. 3.—Yes.

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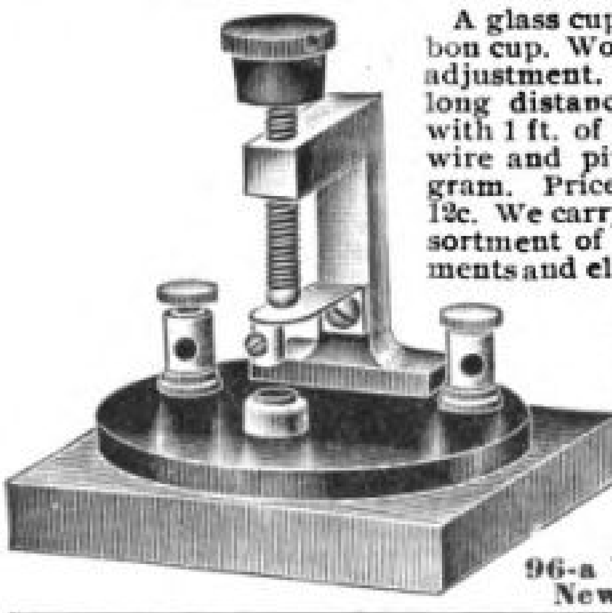

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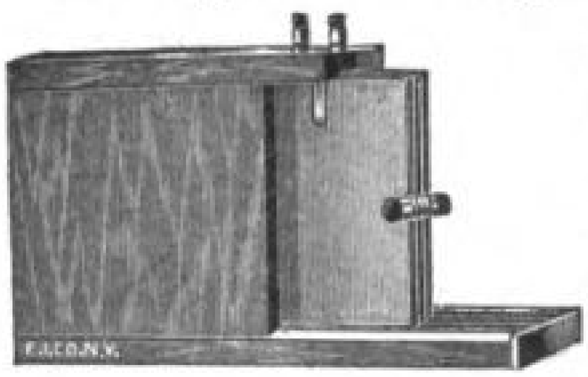

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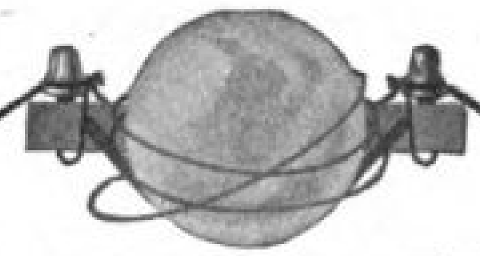

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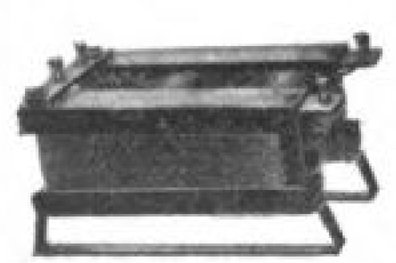

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THE AUROPHONE

You cannot iudge the value of the Aurophone by what you have seen of any other hearing device, and many of the present owners of these instruments have found absolute relief after all others had failed.

The Aurophone is practically **invisible.** It is extremely **Simple**, being a powerful miniature telephone which magnifies sound waves a hundred fold, and in many instances **actually improves the natural hearing.** Read what these prominent business men say:

Mears Ear Phone Co., N. Y.

Gentlemen: Knowing how many fake devices have been offered deaf people, I am moved to offer you this testimonial, unsolicited, hoping it may convince some other deaf person that there is something real in the Aurophone. If at any time any one in this section would like to hear from me personally regarding your instrument, I would be pleased to tell what it is to me. Respectfully, F. I. Hubbard, Alameda, Cal.

Mears Ear Phone Co.,

Gentlemen: I have been deaf for many years and have tried every kind of hearing device. I find the Aurophone the only effective aid to the deaf. Wishing you success, I am, very truly yours, J. B. Goshorn, 169 Plymouth Pl. Chicago.

We call your attention to the fact that we have adapted the AUROPHONE for use in Churches. By this means persons hard of hearing can listen to Divine Service and a sermon wherever they may be seated in the Church. We install the system without cost and give a trial of four successive Sundays. We should like to tell you more about it. Write to-day for booklet.

MEARS EAR PHONE COMPANY, Inc.
Suite 930 Monolith Building, 34th St., N. Y. City

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with 10,000 to 20,000 volt secondary, wound in sections on circular core with hard fibre tube over all the windings.

Spark Gaps, Spark Coils all sizes, Sending Helix, Keys and Switches.

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Tuning Coils, Potentiometers, Condensers, sliding rotary, fixed, and series multiple, also combination to use in connection with rotary switch control.

Telephone Receivers, hard rubber case, with nickel plated head band adjustable, also gold diaphgram and six foot cord **$3.00.**

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STYLE B 3 **6 Volts, 60 Ampere Hours**

Size 6¼x7½x7 in. Weight 27 lbs Used on board of several U. S. Battleships. Same type used in the Oldsmobile, Pullman and a number of other high-class automobiles for ignition and lighting. Six plates in each cell, 3 positives and 3 negatives. 18 plates in one battery.

Through a fortunate deal with the makers, we have purchased several hundred of these batteries, all in perfect condition except that they are of the 1908 style. As the makers have brought out a new 1909 type they did not wish to keep the 1908 type in stock and we bought the whole block. If you wish to know more about this wonderful ROYAL BATTERY, send 2c stamp and we will send you a 20 page book entitled: "Treatise on Storage Batteries." The type B-3, exactly as cut, only wider and bigger, lists at 27 Dollars (see book.)

Our PRICE NOW, to M. E. Readers **ONLY $8.00.**

This is a chance of a lifetime. We can ship at once; two styles. One Enamel—steel case, the other treated wood case. Fine rubber-belting handle, patent gas vent, etc. etc. Speak quick, only about 25 left.

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HOLTZER-CABOT Wireless Operator's HEAD RECEIVERS

Double Head Band, Leather Covered and Padded, Pneumatic Air Cushions, complete with cords, as shown.

500 ohm **$10** 1000 ohm **$11**
1500 " **12** 2000 " **13**

Write for **discount** and Booklet No. 20M2.

Continental Code Card 7x9 in. Free with each Receiver.

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.. TRANSFORMER ..

250 watt 10,000 volt transformer for use in wireless telegraphy. Special price delivered to any part of U. S., **$30.00.** Will send up to fifty miles. Speaking arcs, transformers, etc. supplied for use in wireless telephony. Drawings and plans furnished. Send for descriptive matter.

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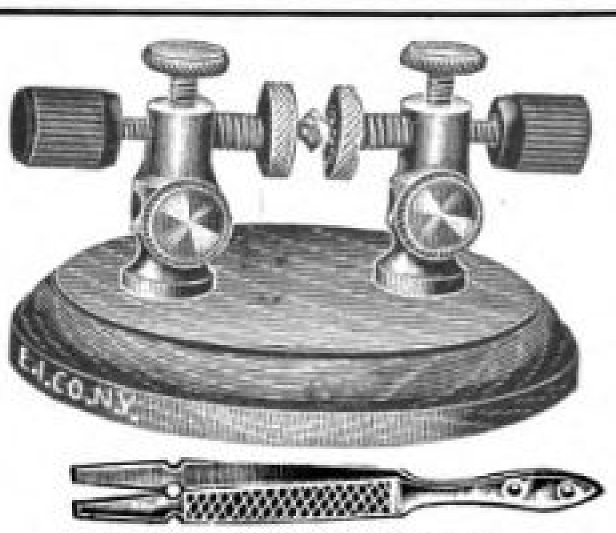

Detector Stand $1.00

Wireless Goods

of every description. We carry a complete line of Detectors, Tuning Coils, Potentiometers, Spark Gaps, Telephone Receivers, Condensers, etc.

Our prices are right, our goods of the highest precision.

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Vibration, the marvel of the 20th century, has cured uncounted thousands of people who thought they were hopeless invalids.

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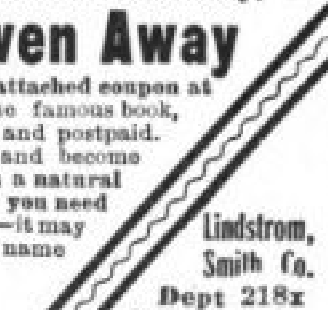
is the greatest boon that suffering humanity has ever known. It gives life and health, strength and beauty to all. It sends the good red blood leaping and coursing through your veins, puts new life into disused muscles and nerves. It shakes the disease **right out of your system.**

The White Cross Electric Vibrator is the only instrument in the world which enables you to make use of the **three** great natural forces, Vibration, Faradic and Galvanic Electricity—right in your own home! It is a perfect Massage Vibrator and Medical Battery combined for less than the usual price of **either.**

VIBRATING CHAIR FREE With a simple attachment you can transform any chair into a perfect Vibrating Chair. You can take Vibratory treatments and **Swedish Movements** right in your own home, that physicians and sanitariums charge $2 to $3 apiece for.



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Fall

The "Electro" ½ K. W. Transformer-Coil

(100 Mile Wireless Coil)

is a radical departure in ordinary coil building. Our coil is NOT SEALED IN, and is still better insulated than a sealed in coil. Our new departure is entered in our BLOCK-SECONDARIES (see cut).

These secondaries are wound with No. 30 B. & S. Enameled Wire. This means, on account of getting 3 times as many ampere turns into a given space, that our secondaries are 3 times as efficient as other ones, and that they take up one-third as much room. The primary is another marvel. We use enameled wire No. 14 B. & S. and consequently get just 3 times as much wire on the core, as if we used the common D. C. C. wire.

As there is no vibrator nor condenser to this coil, it must of course be used with an electrolytic interrupter or independent vibrator or running it from 110-120 Alternating current. The spark obtained is from 1½ to 2 inches long, but ¼ inch THICK. For wireless work it is the fat spark that counts, not the long thin spark.

PRICE OF COIL $7.50

Sent for inspection and trial on receipt of $1.00

EXPERIMENTER'S GOODS—A NEW LINE
Hard to Read—But Worth While!

P-1 Brass rod 1/4 x 1/4 inch. 20 cts per foot.

P-11. Hard rubber thumb screw with 8/32 pointed brass screw 7/8" long. Diameter 1". 12 cts.

P-15. Nickle plated brass piece. Knurled disc 1/2" diam. 1/8" thick. Shank 1 1/4" long. 1/4" threaded to take 8/32 nut. Each 8 cts.

P-16. Heavy brass washer 1/2" diam., 3/16" thick. Hole passes 8/32 screw. Each 2 cts

P-9. Brass stand polished to take 10/32 screw at bottom. Size 3 1/4" x 3/8". 20 cts.

P-17. Electrose binding post. 8 parts. Size over all 1" x 1/2". Handsomest post made, used on all our apparatus. Each 7 cts.

P-10. Zinc spark ball 1 3/4" diameter, 1" high for wireless with split brass tube 1/8" diameter each 20 cts

P-13. Nickle plated round brass piece 5/8" x 1/2" Hole to let 8/32 screw pass. Each 8 cts.

P-7. Hard rubber pillar polished. 2 1/8" x 3/8" hole 3/16" diameter. 10 cts each.

P-18. Nickle plated tack for switch points. Ball 1/2" long, head 5/16" diam., 2 sizes Each 1/4 cts.

P-5. Carbon cup for detector 5/8 x 3/8 inch 15 cts.

P-14. Large Electrose posts for 8/32 screw only. Size 3/4" x 1/2" Each 6 cts.

P-17. Nickle plated switch-handle, 2 1/8" long, 5/8" high. In 5 parts with 2 nuts & washer. Each 12 cts.

P-8. Brass cup to fit above, 8/32 screw. 5/16 inch long. Diameter 13/16"- 1/4" high each 8 cts.

P-2. Washer for 6/32 & 8/32 screw 3/8 inch diameter 2 cts for 10.

P-3 Brass rod threaded. For 8/32 & 6/32 screw. 15 cts per foot.

P-12. Hexagon nuts for 6/32 & 8/32 thread, 10 cts per dozen.

P-6. Graphite carbon cup. For detectors. Size 1" x 3/4". Each 20 cts.

P-20. Iron machine screws. 4/36, 6/32, 8/32 in stock. All lengths. Send us fair amount & we will return its equivalent in screws.

P-4. Carbon diaphragm 2 1/8 inch diameter 1/64 inch thick - 20 cts. Telephone diaphragm standard size, thinnest made. 10 cts.

On above goods positively no order for

LESS THAN 25 CTS.

accepted, if ordered without other goods.

When other goods are ordered any amount will be sold. Order by number.

NOTE. We don't sell other parts but those listed above -- therefore don't waste postage asking us for others.

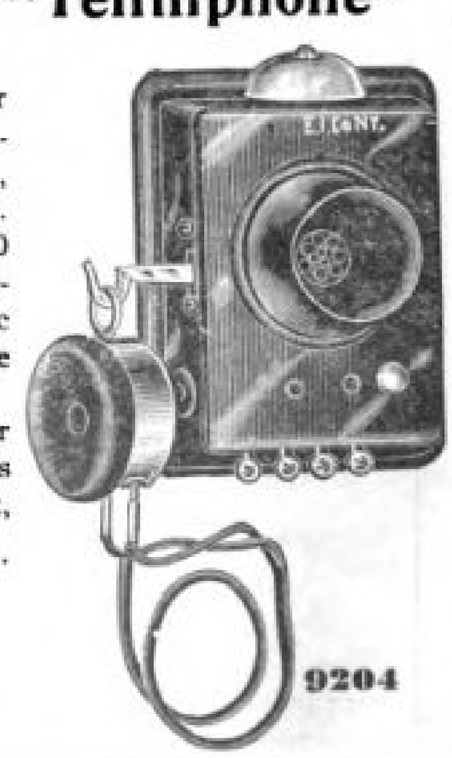
THE "Electro"-Lytic Detector

For two years this Detector has been the standard. We are closing out this style, as we are building a new type. Only 50 of the old type left. As efficient as the *new type*, and just as sensitive. The list price is $2.00. The 50 as long as they last, each

75 CENTS By mail extra 15 cents

We furnish with this Detector 1 inch 1/10,000 inch Wollaston wire. A chance you will never have again. Speak quick.

The Famous "Telimphone"



Superior to any 5 Dollar (2 station phones) on the market. ALL STEEL and fibre, not a piece of wood used. Guaranteed to work over 4000 feet. Bell, push button, receiver, transmitter, automatic hook, etc. found only in the highest grade phones.

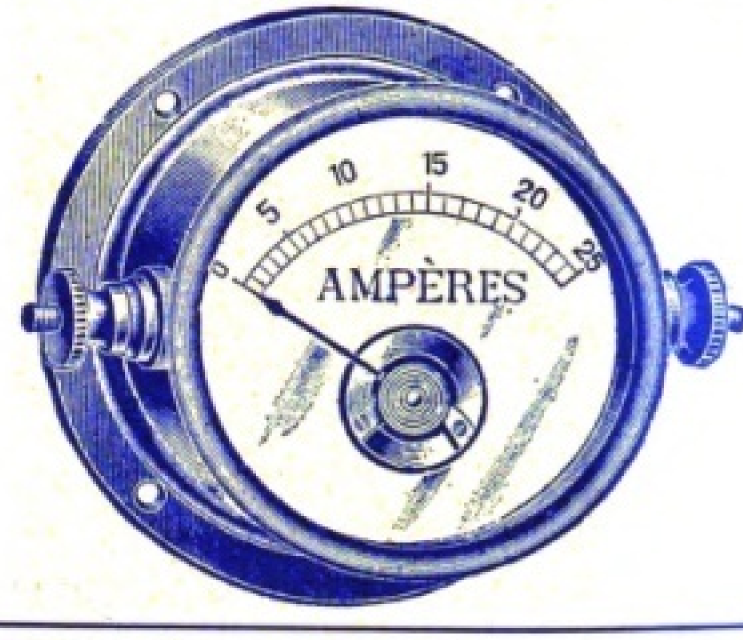
Price everywhere $3.75 for set of two. Our price this month for set of two as cut, no wire or batteries.

$3.00

9204

Bargains

IMPORTED VOLT AND AMMETERS FOR SWITCHBOARDS

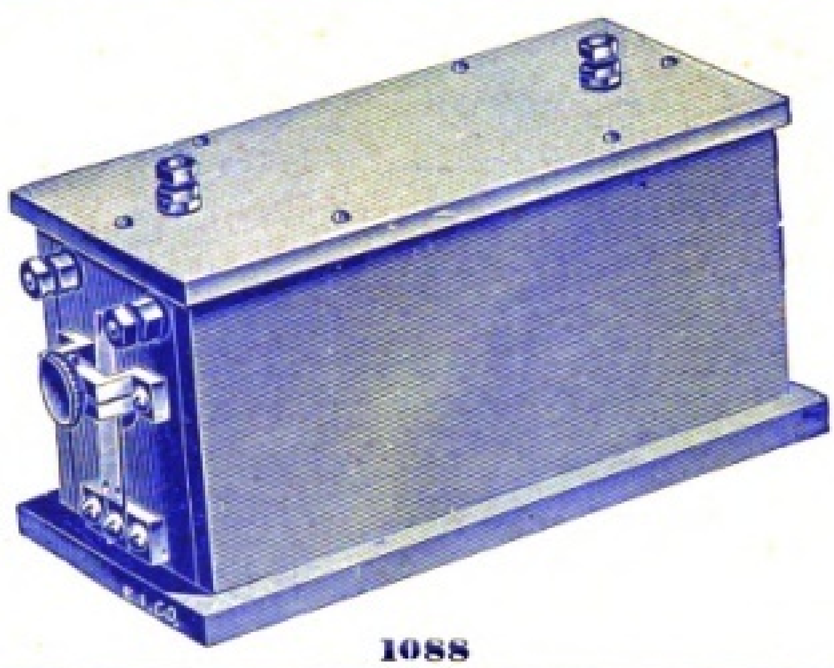


Absolutely unequalled for workmanship and accuracy. **Can be left in circuit all the time.** Highest precision. Metal triple nickel plated, fine wire spring, etc., 1-25 volts, 1-25 amperes. Diameter of face 3 inches. Our cut is too poor to do the meter justice, you must see the instrument. Price usually $3.00.

Price for this month **$2.50** For mailing add 8 cents.

SWITCHBOARD VOLTAMMETER same style as above with 3 connections. Two instruments in one. Price usually $3.25.

NOW **$3.00** By mail extra 8 cents



1088

Our Stock on 1 inch Spark Coils

is too large and we offer 75 of these fine coils almost at cost for a limited time only. Our coils are known so well that we don't have to praise them. **Ask your friend he'll know.** There is no catch to this offer. You get 1 inch spark with a 6 volt battery, or money back. As soon as the 75 coils are gone the price will be $5.00 again. This offer is similar to the one we made on the 100 2 inch coils.

No. 1088 one inch Coil, $5.00, now

$4.50

"ELECTRO" SPECIAL SENDING HELIX

The inductive effect of our new helix is extremely high; in fact, is about 2½ times as great as that of a round wire coil, on account of the metal ribbon which we use. It has been proved time and again that when used with high tension alternating currents, a flat ribbon inductance acts far more powerful.

Our new Helix is wound with 24 turns brass ribbon ½ inch wide. Total length of ribbon is 26 feet. The ribbon is thick enough so as not to introduce objectionable resistance in the circuit. Can be used up to ½ K. W.

Our patent ball bearing sliding contact is used which works with wonderful ease and does not wear out the ribbon. The contact ball is now made of hard copper to decrease resistance.

Three large binding posts are provided. Size of frame 7 x 7½ x 13 inches. Weight 4 lbs. No. **9270a** "Electro" Special Sending Helix, as described,

$5.00

9270a

Fixed Condenser

For Wireless. Built on the same plan as our well known No. 10,000 Condenser, selling at $1.00. Especially built for Silicon and Electrolytic Detectors. A neat but plain wooden case is furnished with this condenser instead of the fine oak hardwood case with which the No. 10,000 is equipped. Inside is almost the same. Partly insulated with mica. No. **10,000a** Fixed Condenser as described,

NOW, EACH **50 CENTS** By mail extra 18 cents

Our new **ELECTRICAL CYCLOPEDIA CATALOG No.** **2nd EDITION** containing 120 pages, valuable information, wireless diagrams, WIRELESS CODES, electrical photographs and the most complete assortment of wireless goods, apparatus, novelties, etc. sent to you on receipt of 2 cents postage to cover cost of mailing.

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WHAT kind of luck do you have trying to get fine results from varnish or shellac? Did you ever get hold of a varnish that would dry hard in half an hour and wouldn't show scratches and heel-prints?

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Varnish is too long at it. Everything has a chance to stick to it and spoil all hope of a fine polish.

Shellac—spite of all you can do—dries too quick. Gets a mottled look, considerably worse than no finish. But *try Under-Lac.*

You'll have a finish that will do your heart good. Brilliant, lasting—all the fine effect of expensive, hand-rubbed work, with little cost and no trouble.

Under=Lac

is made from pure gums and denatured alcohol.

Is easily and quickly applied with no lapping, pulling or crawling. Dries *hard* in a half hour and won't show marks.

Use it wherever you would use shellac or varnish. With more artistic effect and at *less expense.* Over stain, dye, filler or on bare wood.

And it has absolutely no equal for preserving and beautifying linoleum, oil cloth, etc.

A Test Package Free

Send this coupon for a free sample of Under-Lac. Prove what we say *at our expense.* Once use it and we know nothing can ever take its place for you. We are sure of the outcome if you just accept our free-test offer. Don't you think it's worth a two-cent stamp and a minute's time right now? Here's the coupon.

S. C. Johnson & Son
Racine, Wis.

"The Wood Finishing Authorities"

S. C. Johnson & Son, Racine, Wis.

I accept your offer of a sample of Johnson's Under-Lac, better than varnish or shellac, also book edition M E 9. I agree to test the sample and report results to my paint dealer.

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