March 1910
Vol. II #12

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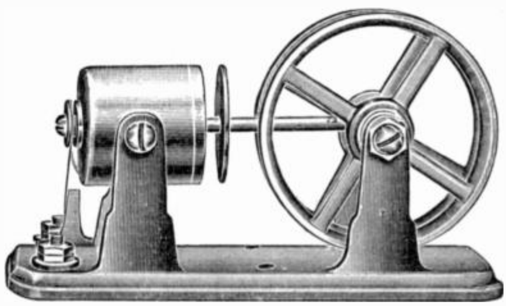

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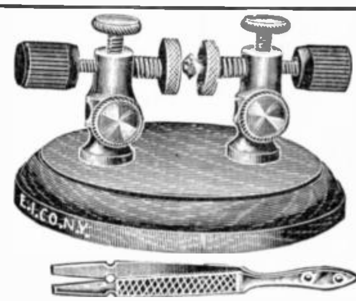

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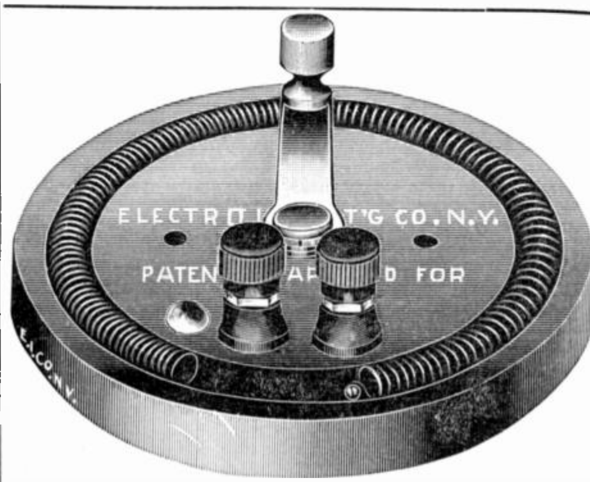

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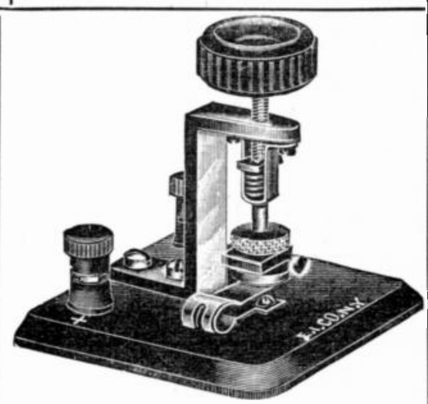

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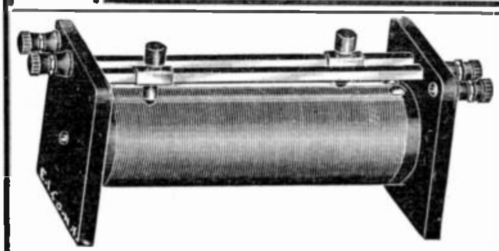

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MODERN ELECTRICS

Vol. II. MARCH, 1910. No. 12

Condensers for the Production of Electric Oscillations

By William E. Smith.

A CONDENSER essentially consists of a pair of conducting surfaces separated by a dielectric, and the familiar Leyden jar presents itself as an illustration. There are not many solid dielectrics which are capable of being used for charging voltages reckoned in thousands of volts, and the number available for condenser construction is still more limited when questions of cost and internal energy loss in the dielectric are considered.

Glass of certain composition, ebonite, mica, micanite, or mica sheets built up with shellac, almost exhaust the list of solid dielectrics suitable for very high pressures. On the other hand, compressed gases and also certain insulating liquids can be usefully employed as dielectrics in the construction of high pressure condensers. Deferring for the present a further consideration of dielectric properties, it may be said that glass, micanite, and ebonite constitute almost the only available commercial solid dielectrics for condenser construction.

Of these, English flint glass is by far the best material to use, comprising either equal bulk or equal energy storing power, but it is brittle and liable to flaws. Its dielectric constant is high (from 5 to 10), but its dielectric strength is inferior to that of good ebonite or micanite. Ebonite has great advantages for certain quantitative work, as its dielectric constant is constant for a wide range of frequency. Micanite has greater dielectric strength than either glass or ebonite, but its dielectric constant varies considerably with frequency.

A condenser is constructed by applying sheets of flexible metal to the two surfaces of a sheet of dielectric. Usually tinfoil is put upon sheets of glass or ebonite or micanite, or the glass or ebonite may be silvered by an electrochemical process or metallic paint put upon it. By far the usual process is to stick sheets of tinfoil upon glass with some adhesive such as shellac, varnish, siccotine, or isinglass.

In the construction of high tension condensers, no adhesive containing water, such as gum or paste, should be employed, as the water cannot evaporate. A thin shellac varnish, made up of absolute alcohol or anhydrous methylated spirits or wood naphtha, answer well for glass. The tinfoil sheets must be made to adhere perfectly to the surface of the dielectric, and care taken to exclude air bubbles. It is much more difficult to secure good adherence between tinfoil and ebonite, but the shellac solution answers well for micanite as the dielectric.

If glass is used it should be of good quality of flint glass, and should be absolutely free from bubbles. Any flaw of this kind is a weak place which sooner or later gives way.

In making an ordinary Leyden jar a considerable margin (at least 25 per cent of the height) should be left uncovered with tinfoil, and this bare dielectric should be well varnished with anhydrous shellac varnish.

The method of securing contact with the tinfoil surfaces is important. The outside coating of the jar should be embraced by a brass or copper strap with a terminal and a tightening screw (see Fig. 1), and the brass or copper stem should end in a screw terminal, and should not have the ordinary chain, but be provided with spring extensions, which press tightly against the inner tinfoil surfaces (see Fig. 2). The object is to prevent any sparks at these contacts, which would quickly pierce the glass. The jars so constructed can easily be joined in parallel or series by the use of thin copper strips. The Leyden jar should have its capacity marked on it, expressed in fractions of a microfarad.

Instrument makers still maintain the absurd custom of denominating Leyden jars as "pint size," "quart size," or "gallon size." The so-called pint size has a capacity of about 1-700 microfarad, and the so-called gallon size about 1-300 microfarad.

Glass Leyden jars, as usually made, will stand charging to 20,000 volts. Hence the energy storing capacity of the "pint size" (being equal of ½ (V2) is about O. 28 of a joule at this pressure, or nearly 3/16 foot-pounds. This is a very small storage compared with

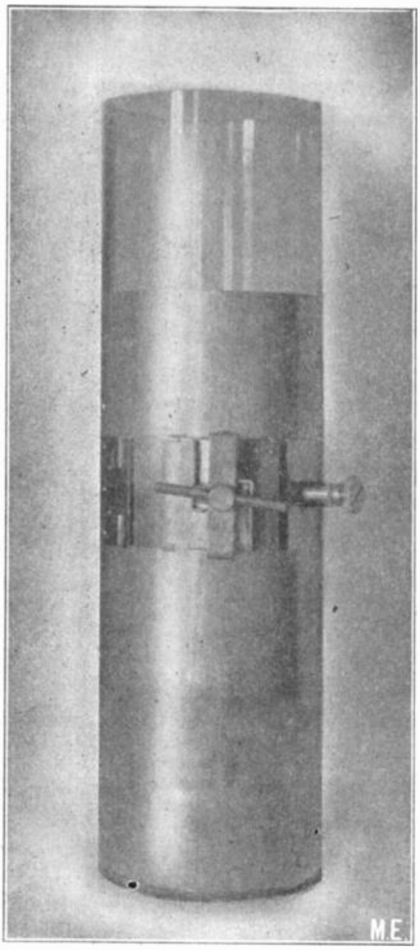


Fig. 1.

the over-all bulk of the jar. A more satisfactory form of condenser for many purposes may be constructed by covering flat sheets of good flint glass with tin or aluminum foil on both sides. The foil sheets should be cut 1 inch smaller each way than the glass plate. The glass should be carefully selected and free from bubbles or flaws, and about one-tenth or one-eighth inch in thickness.

The sharp edges should be taken off with an emery wheel. The foil is then stuck on with shellac varnish and the margin of the plate varnished. Each foil sheet must have a wide foil lug attached to it, and the lugs on opposite sides of the same plate must be at opposite corners, but at adjacent corners of neighboring plates.

Plates should be prepared like right and left hand gloves, so that when piled one on the other the lugs on the adjacent condenser plates fall upon each other. The coated plates should, however, be prevented from coming into absolute contact by sheets of fibre inserted between the plates. A pile of any number of such plates may be made, and when bound together with silk tape may be placed in a stoneware or glass case, which is filled up with vaseline or double-boiled linseed oil. The oil prevents a brush discharge over the edge of the plates. The positive lugs are then all connected to one terminal, and the negative lugs to another terminal placed on the cover of the case.

Glass plate condensers of the above form can be made without oil insulation if the glass plate margin beyond the foil is large enough, but the use of oil is essential for very high-tension work.

In some cases glass tubes are employed, coated partly outside and partly inside with tinfoil. Test tubes silvered inside and outside for half their height make very convenient small condensers.

Thin glass has a higher dielectric strength than thick glass, and hence nests of thin tubular glass condensers joined in series have often been employed.

Moscicki has suggested the use of glass tubes made thicker at the ends than in the middle, coated within and without with tinfoil in the middle portion as a method of making condensers.

He came to the conclusion, as the author and others had done long previously, that glass was the most suitable dielectric for high pressure condensers, and he employed it in the form of glass tubes O. 5 mm. thick, but these tubes were thicker up at the ends, as otherwise he found they were perforated at the edges of the tinfoil by a voltage which the central portions of the glass could easily sustain. These glass tubes are coated with tinfoil or silver by deposit, the foil being put on with turpentine and air bubbles carefully excluded. A condenser for a power of 2.5 kilowatts is made with 25 tubes of glass of which the diameter is 3 cms and the thickness of wall 0.5 mm. These are contained in a cylinder of glass 47 cms. high. The total weight varies from 25 to 30 pounds. (Fig. 3) shows one of

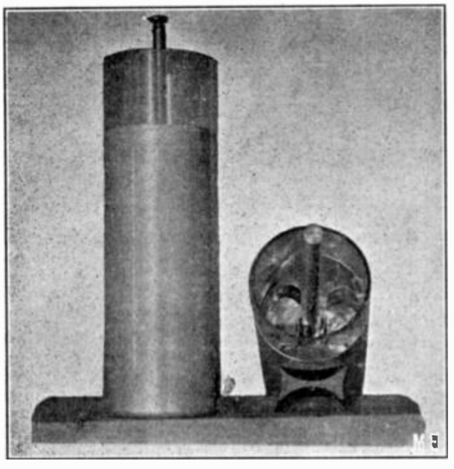


Fig. 2.

the condensers as is used by the Government.

Such condensers will stand a working pressure of 20,000 volts. It is claimed for these cylinder condensers that they can be operated at a higher voltage per millimeter of thickness of the glass than flat plate condensers, and do not fail or heat on continuous working, and that with an alternating current having a frequency of 50 m. the dielectric loss by surface discharge does not exceed 1 per cent. of the average storing capacity.

It is well known that in the absence of flaws a plate condenser or Leyden jar is most usually punctured by the electric strain at some place near the edge of the tinfoil where the electric density is greatest. Mossicki states that a glass condenser plate is more easily punctured at the edges of the tinfoil when it is immersed in oil.

For the construction of condensers intended for very high pressures, micanite sheets, 1-10 inch or 2.5 mm. in thickness, may be employed as the dielectric. To these, sheets of tinfoil one inch smaller each way may be affixed by means of a shellac varnish, and the coated plates immersed in a stoneware or glass case, filled with double boiled linseed oil. As this oil does not dissolve shellac, a wooden box, well coated in the interior and with all joints covered with shellaced paper, may be used to hold the oil.

For quantitative purposes, condensers constructed of metal plates placed in paraffin oil are to be preferred, since the dielectric constant of paraffin oil is not like that of glass, a function of the frequency. If ebonite is used as the dielectric the difficulty is to make the tinfoil stick to the ebonite. The adhesive called siccotine or else India rubber solution may be employed.

The author has, however, found that a better plan is to cut sheets of ordinary tin-plate in pairs with right and left handed lugs, and pile these together with sheets of ebonite interposed on the plan just described for making a glass plate condenser. The pile of condenser plates must be strongly compressed, bound together with silk tape and immersed in insulating oil.

In some cases condensers of adjustable capacity are required.

If only small capacities are required, this may be provided in the form of an air condenser with flat plates, which can be moved to or from each other, or the

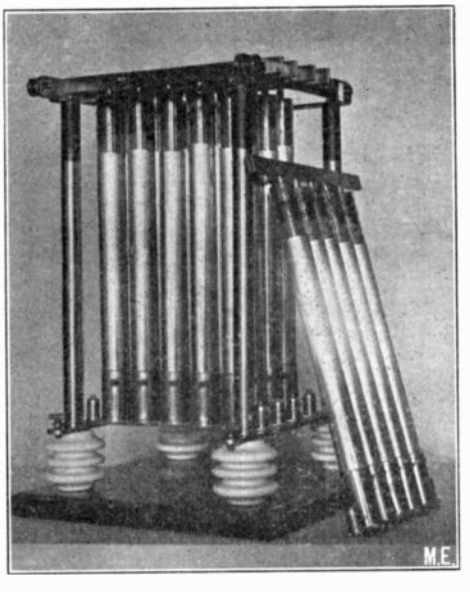


Fig. 3.

plates may be immersed in some liquid dielectric, such as paraffin oil or turpentine. The most convenient form of sliding condenser consists of a thin-walled cylinder of fibre, closed at the bottom and lined within up to an inch of the top, with a closely fitting cylinder of metal. The outside of the cylinder of fibre is also covered with a closely fitting cylinder of metal, and the arrangement resembles that called a dissected Leyden jar. By drawing the outside cylinder more or less off the fibre one, the capacity is reduced, and the capacity corresponding to various positions of the outer cylinder can be marked on the fibre one.

Another form of condenser of adjustable capacity, suitable, however, only for a small range of variation and for small capacity, is made as follows:

On an ebonite or hard wood cover are fitted a number of pairs of quadrant shaped plates, one above the other. These resemble the fixed plates in a Kelvin multicellular electrostatic voltmeter. All these quadrant plates are connected together and to one terminal on the cover. In the centre is a metal rod in pivot, carying a number of quadrant shaped metal plates which are spaced apart by the same distance as the fixed plates. The rod is so held that the plates on it are interspaced with the fixed plates. It is then put in a glass jar and filled with insulating oil. (Fig. 4.)

When the movable plates are turned by the rod so as to be quite within the fixed plates, they form with these last a condenser of which the oil is the dielectric. When they are turned so as to be quite apart from the fixed plates, the capacity is greatly reduced. If the rod carries a pointer moving over a scale, the scale can be calibrated to show the capacity of the two sets of plates with respect to each other for any required position of the movable plates. The rod is, of course, connected by some form of spring or bearing contact with the second terminal of the instrument. Fig. 4 shows the type of adjustable condenser as is used in the transmitting circuits in wireless telephony. Fig. 5 shows the type of adjustable condensers used in the receiving circuits. In the construction or selection of condensers, especially those of large capacity for wireless telegraph work, we have to give due weight to various considerations. We have to consider questions of durability, energy, dissipation, bulk, and cost.

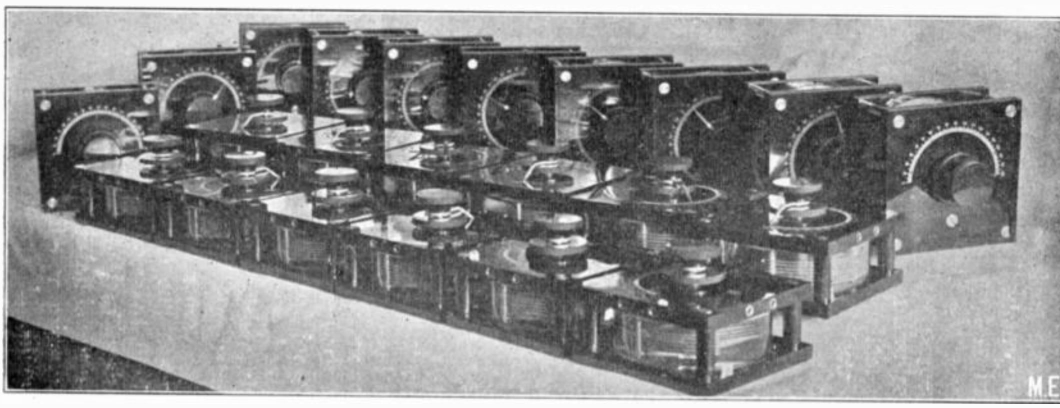


Fig. 5.

The ordinary Leyden jar is simple and not objectionable where small capacities alone are concerned, but its energy storing capacity is small as compared with its bulk, and its use is out of the question when large capacities such as 1 or 2 microfarads are concerned.

When large condensers have to be in continual use, the dielectric hysteresis becomes important, and also any tendency in the dielectric to "age" or become brittle by long use. Glass gives some trouble in this last respect. Ebonite is too costly to be used for large capacities, and micanite has too much dielectric hysteresis. Hence attention has been recently directed to the use of air as a dielectric.

Owing to the relatively small dielectric strength of air at normal pressures, we are either obliged to use very large plates set far apart, or else to employ compressed air as the dielectric.

Since the dielectric strength of air at atmospheric pressure is very nearly 38,000 volts per centimeter, and since a factor of safety of at least 5 or 6 should be used to avoid considerable energy loss by brush discharge, it is seen that if we wish to work an air condenser at a voltage of 100,000 volts, the plates must be at least 20 cms. apart.

The use of compressed air, however, presents great advantages. The dielectric strength increases almost proportionately to the pressure. Hence if, instead of employing air at atmospheric pressure as the dielectric, we compress

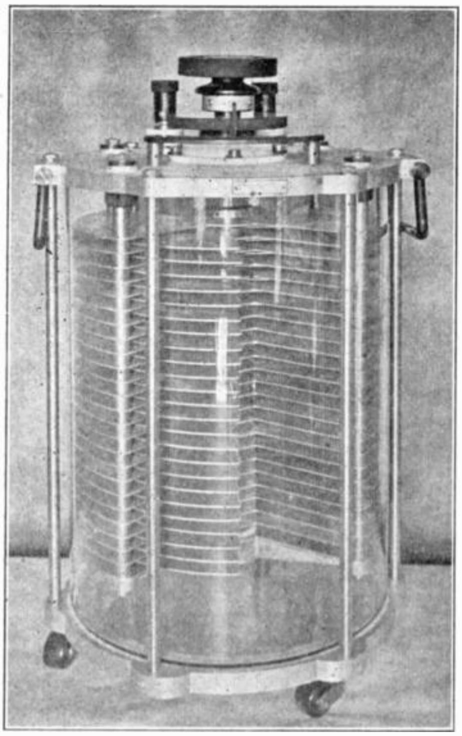


Fig. 4

it to 140 pounds to the square inch, it attains a dielectric strength far greater than that of glass. Also the dielectric constant is slightly increased.

Moreover, as Fessenden has shown, brush discharges are at high air pressure almost abolished. Accordingly an air condenser can be advantageously constructed with compressed air as a dielectric.

Metal plates kept at a small distance apart are enclosed in a strong iron vessel in which the air can be compressed under 10 or 12 atmospheres. Thus Fessenden states that in air at 175 pounds' pressure per square inch metal plates 0.083 inch apart will withstand, without sparking, a voltage of 27,500 volts. At this rate an air condenser of 1 mfd. capacity to stand 100,000 volts could be contained in a space of 500 cubic feet, and would not exhibit energy loss by electric brush discharge or dielectric hysteresis to any sensible degree. It seems evident that use of compressed air, or, better still, compressed nitrogen or carbon dioxide, as a dielectric for condensers will be found to possess many advantages in the constructing of high voltage condensers at reasonable cost for wireless telegraph power stations.

SPARK TELEGRAPHY VS. WAVE TELEGRAPHY?

By Moore Stuart.

THERE has been quite a discussion of late in most of the technical magazines concerning the merits and demerits of the spark-system, i. e., disruptive discharge of condensers, against that of the undamped oscillation waves for wireless transmission of signals, but with all its merits the spark system of wireless communication is doomed to die an early death, or as soon as the American wireless engineers learn more about the foreigners' work along this line, especially that of Poulsen the Danish engineer.

In the first place the spark method is almost absolutely untunable in comparison with the undamped wave system of Poulsen. The idea of tuning, wave-length, etc., being wrong.

In the disruptive discharge of the condensers, the discharge is oscillatory in its nature, but of the "damped" variety, that is, in what appears to be a single spark is in reality a number of minute discharges, the condenser charging, discharging and then charging again in the opposite direction, but each charge and discharge is smaller than the succeeding one till about the tenth oscillation, when equilibrium is restored, to be upset again by another touch of the key.

Now the first charge and discharge of the condenser being practically the only part of the oscillations that are really doing useful work, consequently they are the only part that can be tuned and used to figure the wave-length, etc.

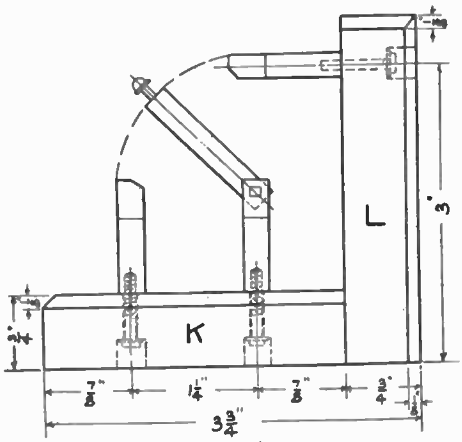
Now supposing this useful oscillation is impressed upon an antenna and creates waves in the ether. When these waves came to a tree or other obstruc-

(Continued on Page 607)

A Simple Aerial Switch

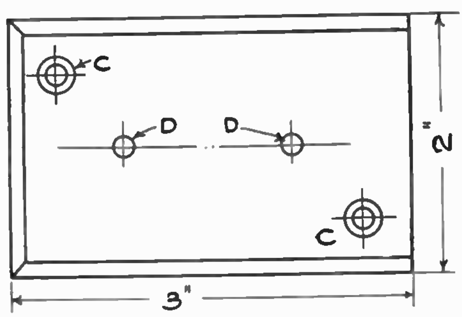
By N. U. Isance.

Taking a piece of hard wood, cut it into a block 3 inches by 2 inches, as per



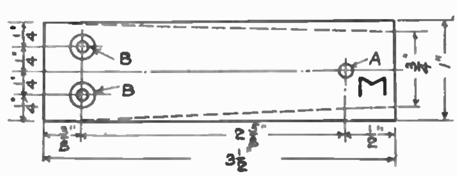
M.E. -Fig. 1-

Fig. 2, with a 1/8 inch bevel on three sides. Bore two holes DD, Fig. 2, in the middle, 1 1/4 inch apart, 7/8 inch from the ends. In these holes are inserted the



M.E. -Fig. 2-

threaded screws of the uprights, by a hole sunk in from the bottom to receive the head of the screw. This comprises the



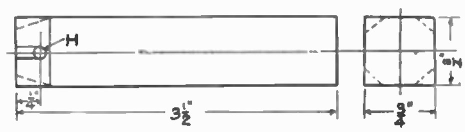
M.E. -Fig. 3-

base K, Fig. 1. For an upright L, Fig. 1, take a piece of wood and cut it into a piece 3 1/2 inches by 1 inch by 3/4 inch, as Fig 3. To relieve the stolid looking effect of so chunky a piece, plane down as per dotted lines, Fig. 3, so that the right end M, is about 3/4 inch wide.

A hole, A, is bored in middle of Fig. 3, 1/2 inch from smaller end, to receive the third metal upright in the same manner as the two former were bored. Two other holes are bored at opposite end and countersunk to receive the screws which fasten it to base K, as is shown in the assembled piece, Fig. 1. Bevel 1/8 inch as before.

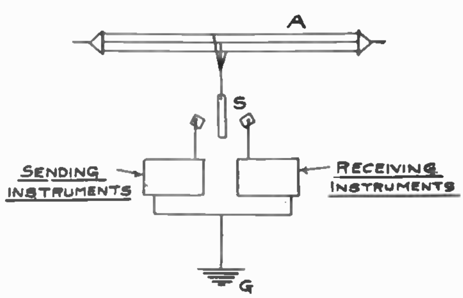
The knife switch and contacts are taken from any S. P. D. T. switch, but the handle is removed if desired, although it is not necessary.

The handles, Fig. 4, are made from a square piece of wood 3 1/2 inches by



M.E. -Fig. 4-

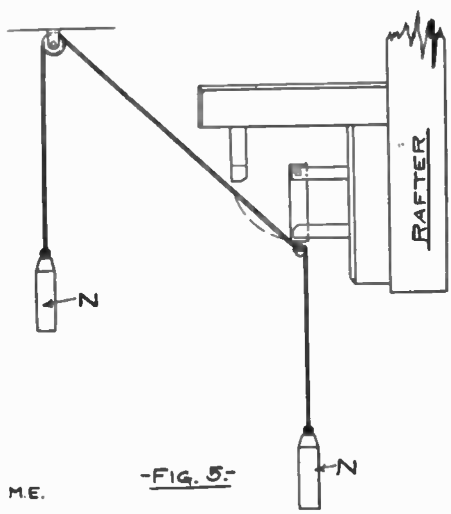
3/4 inch by 3/4 inch. If a turning lathe is not handy, they may be made round by first changing the square into an octagon by planing, then a 16-sided polygon, etc., till finally a very good circular piece is obtained. A hole is bored, H, Fig. 4,



M.E. -Fig. 6-

about 1/4 of an inch in from one end and a groove cut for the cord to lie in. By cutting on dotted lines all around the piece, a better finished handle is obtained. Before assembling the wood parts, give them a thorough sand papering and two coats of some mahogany, cherry, or black walnut stain.

After assembling parts, a long cord is procured. At one end is fixed one handle. It then is fastened to the knife of the switch, from thence through a pulley in ceiling and down to the second handle. The switch is fastened to a rafter or any other method by screws, for which counter-sunk holes in base should be prepared, as per cc, Fig. 2. Fig. 5 shows the finished product and the diagram for connecting to instruments. I would suggest that another 2-point switch be inserted between aerial and this one. Connect one point to the switch just described, the other directly to the ground. Leave this second switch on ground when not



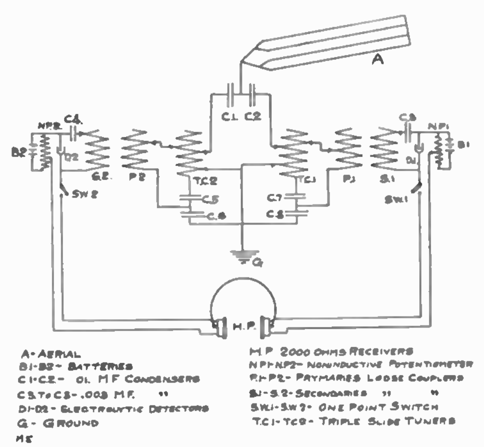
using instruments, as a protection against lightning.

A DUPLEX WIRELESS RECEPTIVE SYSTEM.

By George F. Worts.

A diagram is given below of a tuned wireless receptor capable of receiving two different messages at the same time without interfering with each other. A hook-up, such as this, has long been desired by many wireless experimenters, who communicate with two stations having a difference in wave length. Each of the sides of the set terminates in one phone of a pair of head receivers, or, if desired, can lead to separate pairs if two persons wish to listen in. The outfit needed is an enlargement of the one usually seen in an up-to-date amateur's station. The complete outfit will consist of the following: Two loose couplers; two triple slide tuners; eight fixed condensers; six of .003 micro farad capacity and two of .01 micro farad capacity; two electrolytic detectors; two potentiometers; two sets of batteries for the detectors, and one pair of head phones with separate leads from each receiver. This set will constitute as up-to-date an outfit as can be desired by any amateur. The loose couplers can be made as the one described in the "How to Make" book, or purchased from any reliable wireless experimenter's house. A fixed condenser, possessing .003 M. F. capacity, will have 180 square inches of tinfoil between paraffined paper. One possessing .01 M. F. capacity, will contain approximately 600 square inches. The head phones should be wound to a resistance of 1,000 or 1,500 ohms each.

Small one point switches, SW1, SW2, are placed in the circuit of each phone to cut out either if desired. The efficiency of the outfit can be greatly improved by using variable condensers in the circuit. One shunted across the primary of each loose coupler



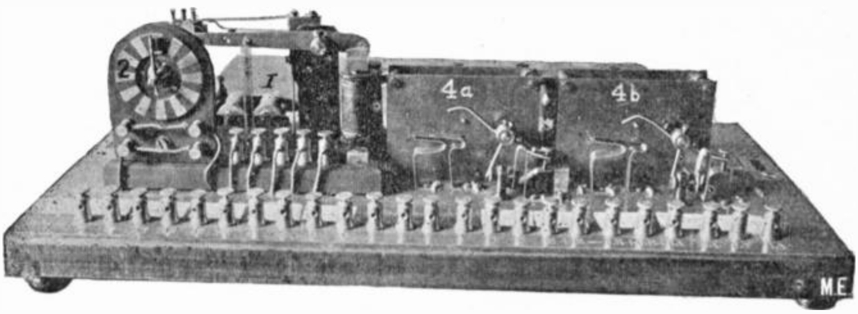
and one across each detector will make much better work possible.

A "FIPS" ADVENTURE.

Went out boating to sea. Storm. 50 meters wet wavelength. Receiving station (the boat) put out of commission by forced "oscillations." Stomach out of "tune" through long waves. Boat and I "cohere" and "decohere" frequently. Tapper not required. Detector: steamship. Call letter: "Help." Aerial: Rope from steamship. Choke coil: Rope coiled around my neck. Oscillations: "Dampened," or rather wet. Ground: Thank God, none, else I wouldn't write this!—"Fips."

German Wave-Control Device

Berlin correspondent MODERN ELECTRICS



AMONG the various devices for wave control which have been brought out of late, the one which we present here has several advantages which make it well adapted for practical use, at least in some cases. It is constructed by the Wirth-Knauss firm of Nuremberg and some time since there were made some experiments with it in order to control an electric motor launch on the Dutzendteicke. One post was installed upon a lighthouse on shore. Under these conditions the experiments were quite successful, and the boat was put through various evolutions which showed that it could be easily steered by the present method. The photograph represents the outfit which is used at the receiving post and it is placed upon the motor boat in this case. Referring to the diagram, the device is operated in the following way:

Under the action of the electric waves coming from the distant station, we have an effect produced on the coherer 38, and a current is consequently sent from the battery 37 into the electromagnet 39 of the relay. This latter will then close the circuit of battery 13 and electromagnet 14. The armature of the electromagnet is carried on a pivoted arm 8, which carries at the other end a pawl in order to operate a ratchet wheel at each impulse of the current. Succeeding wave impulses cause the ratchet wheel to advance by one, two, three teeth, etc. At each advance, the metal arm 5 which is mounted on the same shaft with the ratchet wheel, will make contact with one of the projecting contacts 3 or else in the intervening and insulated space, according to the odd or even impulses. In practice we have an ebonite disc as seen in the photograph at II., with metal sectors or insulating spaces. When the arm is in contact with the metal piece, the current from the battery 4 is closed and one of the electric motors of the series I to VI is set in rotation, this according to the position of the arm on the contacts. By the action of the motors a spring contact device is operated so as to close a heavy current circuit leading to the machine or other device to be controlled.

In the photograph we have a device mounted for controlling two movements; for instance, the right and left hand steering for vessels, torpedoboats, etc. At I is the relav, II the revolving contact device, IVa and IVb are the spring contact devices and each has in the rear a small electric motor. According to the odd or even number of wave signals received, we have the rotating arm lying on a metal sector or an insulating gap. When upon the first sector, we make contact for the electric motor of IVa and the spring contact is acted upon, so that two seconds later a contact is made for the steering apparatus, this latter being an electric motor or solenoid operated device for moving the rudder, and the movement takes place to the left. With the arm lying on contact No. 2, a like action takes place for the second motor and the device IVb causes the steering of the rudder to the right. The odd-numbered sectors will all operate the first motor and the even numbered sectors the second motor. Should the contact arm remain but for a short time upon a metal sector, the device will not make contact for the steering effect, seeing that the small motors of IVa, etc., require two seconds' running before the spring contact device comes into action. This gives an advantage, as waves are sent back to the controlling post and the operator reads the signals on his paper strip so that he can check up any errors and correct these by sending new impulses, this in the interval of two seconds before the effect can take place. Should he have wrongly sent an impulse for right hand steering, this is shown on the strip and he has time to send the proper impulse before the steering mechanism has actually operated. Motor No. IVa is now stopped and the second one put on. The inventors are to make tests with the apparatus for steering torpedoes and claim that these can be steered

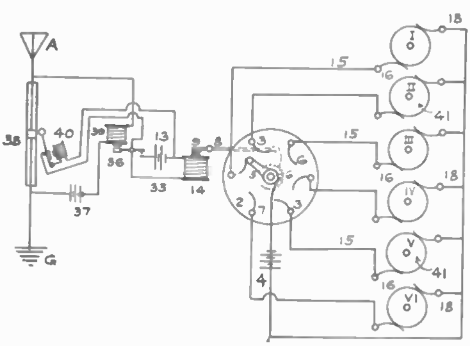


Fig. 1

with security for a distance of 5 or 6 miles and then fired when at the enemy's ship.

DEFENDS AMATEURS FOR EFFORTS WITH WIRELESS.

Mr. Frank G. Whitney, in the Los Angeles Herald, reports as follows.

I have been reading your articles about amateur wireless interference, and I would like to say a few words in behalf of the amateur.

There are a few instances where amateurs, either wilfully or innocently, interfere with the commercial stations, but these are rare, considering the number of wireless stations in Los Angeles.

There are nearly 200 stations in Los Angeles, owned by young men and professional telegraph operators. In most cases these stations are far in advance of the commercial stations. The amateurs have no trouble tuning each other out, and I have heard as many as eight amateur stations talking at once without interfering with each other. With the commercial stations it is different; with their old style equipment they cannot tune out the weakest amateur station. Why not give the amateurs a rest and suggest that the commercial stations get up-to-date equipment?

An incident connected with the burning of the St. Croix will illustrate the efficiency of the amateur station compared with the commercial stations.

At about 7 o'clock on the evening of the burning of the St. Croix the operator of the big station in Boyle Heights was calling the St. Croix, not knowing that she had burned. While he was calling "CX" an amatuer in town was copying the story from the stations up north. After he had copied the story he went to the 'phone and called the commercial station, and told them that it was no use to call "CX," as she had burned to the water's edge, thereby giving the commercial station its first knowledge of the disaster. This goes to show that the amateur stations can be useful as well as troublesome.

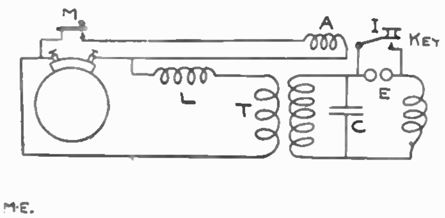
I fully agree with you that all stations should be under supervision of some responsible party and made to register. Then, if declared a nuisance, the station should be taken out. I think that one or two reprimands should be given first.

Wireless telegraphy is young yet, and who knows but some of these same amateur experimenters may some day invent something that will be of the greatest value to the country? For my part, I say: Help the amateur, not hinder him.

Paris Letter

KEY SENDS WHEN OPEN.

M. Bethenod, who is connected with the Eiffel Tower service, brings out the following method. We often use the coupling shown here, in which the alternating transformer T charges the condenser C, and we also have the spark balls E and the primary of a Tesla transformer or Oudin resonator on the condenser terminals. The self-induction L in the primary circuit deadens the short circuit produced by the spark at E and also serves for tuning. For the key, we can no longer simply cut the circuit when using a high power, and some advise the use of a key in the os-



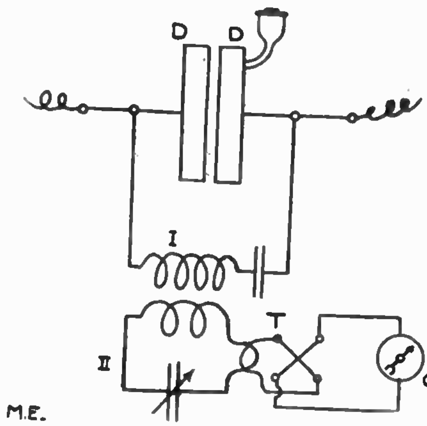
cillating circuit or antenna, or otherwise by using a self-induction or rheostat in the primary circuit adjusted so that the spark does not pass, and the key short-circuits the rheostat, etc., so as to give the spark. M. Bethenod now overcomes the disadvantages of these methods by using a simple short-circuiting key at E. When the key I is closed the transformer is in short circuit and the current works only on the self-induction L, being therefore low. To send signals, we open the key. This method has several advantages. At rest, the power is small, so that the plant can be of smaller size. No specially good contact is needed at the key. The power at I is small, this being represented by the secondary current of short circuit. When at rest, the condenser C has no tension upon it. A relay device can be used to operate the key.

WIRELESS VISIBLE IN ARC LAMP.

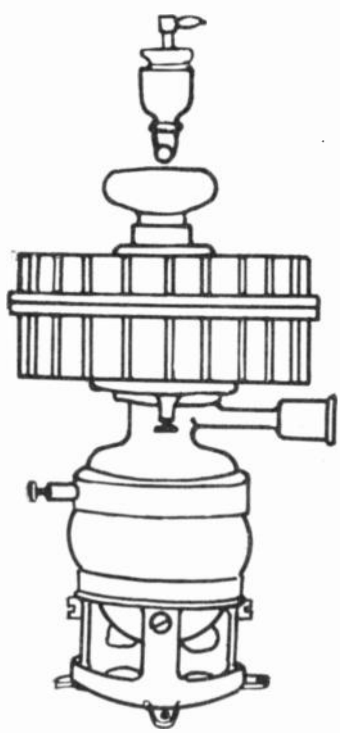
It is found that signals can sometimes be received from a distant station by simply observing an arc lamp. On one occasion it was noticed that an arc lamp in a public hall commenced to flicker and this in an unusual way, and upon examination this was seen to be due to waves coming from a wireless post, as the fluctuations of the light corresponded to Morse signals. There is also a sound given by the lamp which follows the same variations, so that the message can be read off by sound.

THE PEUKERT GENERATOR.

What is known as the Peukert generator has been recently brought out in Germany, for producing high frequency currents. It acts on a peculiar principle which we already mentioned, using two flat discs, one of which is rotated and the discs being separated by a thin layer of oil. Current is passed between the discs D D. The result is a rapid series of breaks in the circuit and the device is thus used to produce waves in the circuit E seen below. According to the most recent data, minute sparks pass between the discs when one or both are rotated. In one experiment there was used a current of 2 amperes through the discs, at a constant speed of 800 r. p. m. The voltage was 40 volts in this case and the gap between the discs about 0.02 millimeter. Using a gap of 0.15 millimeter the voltage was increased to 60 volts. The speed has no effect on the difference of potential. Undamped oscillations are only obtained when the applied direct current is more than 5 amperes. The en-



ergy used here is found to be small, however. Dr. A. Wasmus, who carried out a series of experiments, states that he coupled the primary circuit I by Wien's method with a tuned circuit II and finds that this latter circuit is excited by "impact." A point to be noticed is that the frequency and damping of the secondary circuit are independent of the conditions of the primary and these depend only on the arrangement of the secondary. A closer coupling leads to a greater transfer of energy from primary to secondary. At present there are being manufactured generators working on this principle. The discs with cooling wings are placed above and are horizontal, being on the vertical shaft of the electric motor seen below. Copper plates are found to be the best. One type has a 60 watt motor and it was tested for 10 hours, using alternating or direct current varying from 440 to 1,500 volts and with a capacity of 0.5 to 1.0 microfarad in the primary circuit. The results were very good. One gap cannot stand more than 4 amperes, but the constructors use multiple gaps each taking 500 volts. With 5 gaps we



M.E.

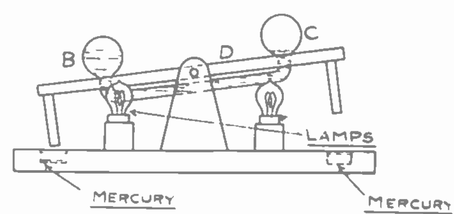
use therefore 4,000 volts. The wave emissions can be broken at regular intervals by using insulating and conducting sectors on the discs so that when rotated the wave sets take a period corresponding to a regular musical note. This can be used for a tuning system with telephones.

EIFFEL TOWER SENDS SIGNALS

The Eiffel Tower station is organizing a regular service of time signals which will be especially useful for vessels. Such signals will be sent out each day at midnight, and to give the best result the signal will be repeated three times in succession at midnight, exactly, then twice afterward at two minute intervals. A different signal is used in each of the three cases so that a vessel, for instance, will be likely to receive at least one of the signals and will understand the difference in time for each.

A CLEVER FLASHER.

An ingenious rocker device and one which can be easily made, is here represented. The rocking lever is automatic



M E.

and works from one side to the other at intervals, so that it closes switches for lighting lamps, etc. To the pivoted arm D is fastened a tube and pair of bulbs B. C. containing a volatile liquid. At each end of the base and near the bulb is placed a heating resistance so that after the lever has been tilted down to one side, the bulb becomes hot and the liquid partly evaporates, and is forced by the vapor pressure into the other bulb. This causes the beam to tilt to the other side where the second bulb becomes heated in like manner, and so on. The beam operates a mercury switch at each end so that any desired effect, such as lamp lighting, can be produced in an alternate manner.

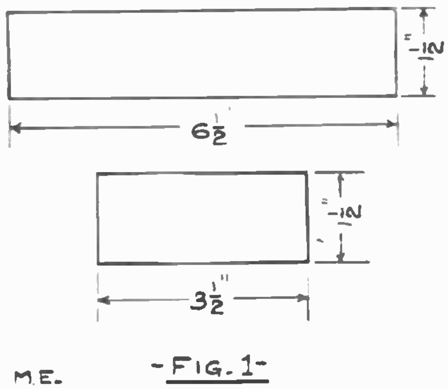
W. A. O. A.

If you are a new subscriber, and happen not to have read the January, 1909, MODERN ELECTRICS, drop us a postal and we will send you free of charge a handsome pamphlet setting forth the purpose of the Wireless Association of America and a free membership card. Address all communications: Wireless Association of America, 84 West Broadway, New York.

A Small Transformer

By Louis Potter.

RECENTLY I made a small transformer which works very well. When run on 110 or 220 volts A. C. it will furnish voltages from 5 to 1,000, so that many experiments can be performed with it. By using an aluminum-lead rectifier in conjunction with this transformer, storage batteries may be economically charged from the alternating light circuit.



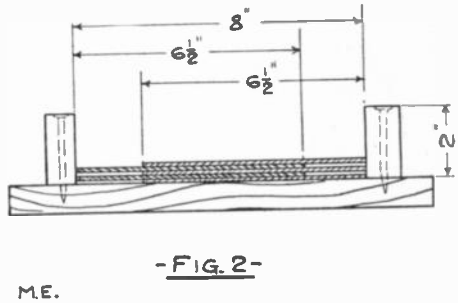
-Fig. 1-

The core laminations are cut as shown in Fig. 1, from stovepipe iron about twenty to the inch. Only two sizes are made 1½ in. by 6½ in. and 1½ by 3½in. Enough of each size should be cut to make a pile three inches deep. This is best done at a tinshop on the square shears, as then all the pieces will be of a uniform size.

About ten lbs. of iron will be required. The pieces should now be dipped into shellac varnish and allowed to dry. On the bench or other firm place nail two strips of wood about two inches wide, so as to leave a space of eight inches between them. This is to help build up the legs of the core. Begin by placing one piece of the 6½ in. iron touching one of the wood strips and the next piece of the same on top of it, touching the opposite piece of wood. By this method each piece of iron overlaps its neighbor by 1½ in., as shown in Fig. 2. Continue piling up these 6½ in. pieces until two piles each 1½ in. is formed.

Now squeeze them very tightly together and wind with tape for a distance of five inches in the middle. These are the legs of the transformer upon which the wire is to be wound.

Now get 4 lbs. 18 D. C. C. magnet wire, 2 lbs. No. 14 D. C. C., 1 lb. No. 24, D. C. C., 25 ft. No. 18 rubber-covered wire and about 10 ft. of No. 14 R. C. If the very high voltage is not wanted the No. 24 wire may be left out. On one leg wind the 4 lbs. of No. 18 wire,

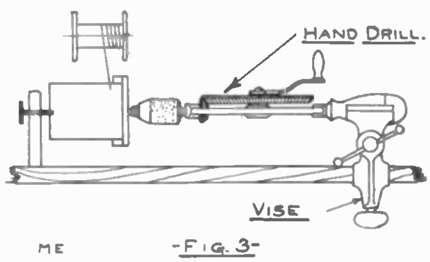


-Fig. 2-

shellacing each layer and taking taps off from each layer.

The No. 18 rubber-covered wire is used for these taps, the joints should be soldered and covered with friction tape. To wind these legs will require a winding machine, which can easily be made out of a hand drill, a vise and some pieces of wood. One good method is shown in Fig. 3.

The taps should be tagged A. B. C., etc., because if they were not endless confusion would result when we came



-Fig. 3-

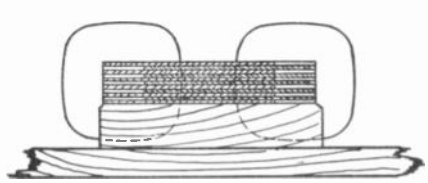
to connect them up. The four pounds should make about ten layers, consequently ten taps could be brought up Over the outside of winding cover with friction tape as a protection.

On the other leg wind the No. 14 D. C. C. wire in four layers, in the same way as the first leg was wound. Take off taps from each layer, using the No. 14 rubber-covered wire. Tag these 1, 2, 3, etc., in distinction from the other winding. Tape this winding also. If a voltage of over 250 is wanted, the No. 24 wire should be wound on over the No. 14, taking off taps from every layer. One pound of this wire makes about ten or twelve layers. Letter these taps I, II, III, etc. The two legs should now be shellaced all over and set aside to dry.

When they are perfectly dry place the two legs on the bench with the cores two inches apart, raise the ends enough to clear the windings from the bench. Interleave the shorter pieces of iron in between the end pieces as shown in Fig. 4. This cut is greatly exaggerated but serves to show the principle. The completed transformer may be mounted on a board as shown in Fig. 5 or it would better be immersed in a can of transformer oil. In the latter case the taps could be brought up to a board on top, with the numbers written in ink below the binding posts, on a piece of white cardboard. Whichever way it is fastened, the core ends must be firmly clamped or a loud humming sound will be produced. Especially if this transformer is to be used for continuous service should it be immersed in oil.

If the supply current is 110 volts 60 cycle, connect it to "A" and "E"; if 220 connect to "A" and "K." Then the voltage between any two adjacent leads of the No. 18 wire will be 20.

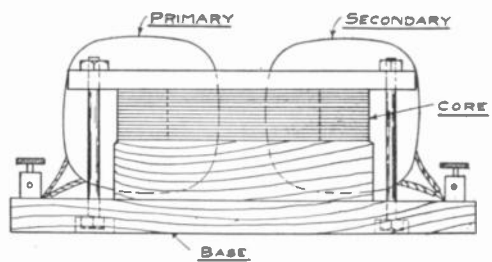
Thus on the No. 18 wire any voltage can be obtained from 20 to 240 in jumps of 20 volts. For a heavy cur-



M.E. -FIG- 4-

rent for running induction coils, etc., at a low voltage (5 to 30) connect onto "1" and "2," "3," "4" the leads from the number 14 wire, 20 amperes at 15 volts can easily be passed by connecting to "I" and "3," while the 110 volts is at "A" and "E." For charging storage batteries the current may be drawn off from "1" and "2," "3," depending whether one or two batteries are being charged. This is, of course, in series, with a chemical rectifier. Ten-point switches may be fitted up to these leads for ease of variation. In this case, however, the contact arm must not cover two points at a time, for if it should that section of wire would be short-circuited and with possible damage.

If a very high voltage is wanted, connect onto the No. 24 wire from I to X. In this way about 1,000 volts are produced in steps of 100 volts. The ex-



ME -FIG. 5-

perimenter who does not want to be killed should be very careful in experimenting with 1,000 volts.

WIRELESS ASSOCIATION OF MILWAUKEE.

The "Wireless Association of Milwaukee" was organized by Messrs. H. Zeuner, Frank Schroeder, Emil Koubeck and A. F. Toepfer.

The object of the association is to prevent experimenters and amateurs from interfering with the Commercial Stations by having them as members and an appointed time for sending.

There is much interest shown in the association by the attendance of its members.

The following officers were elected:

Mr. A. F. Toepfer, 439 6th Ave., president; Mr. Emil Koubeck, 482 American Ave., vice-president; Mr. Frank Schroeder, 824 19th Ave., secretary; Mr. Henry Zeuner, 558 6th Ave., treasurer.

Meetings held every Tuesday evening.

Anyone who owns or operates a wireless station in or near Milwaukee and wishes to join may communicate with

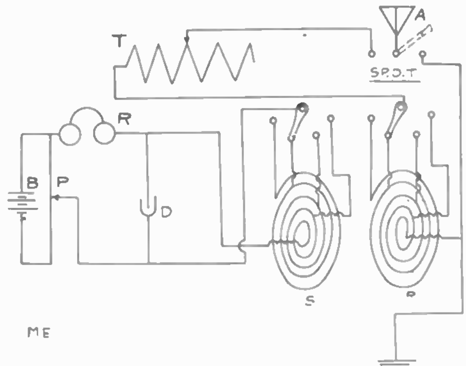
MR. FRANK SCHROEDER,
824 19th Ave., Milwaukee, Wis.

Pancake Tuner

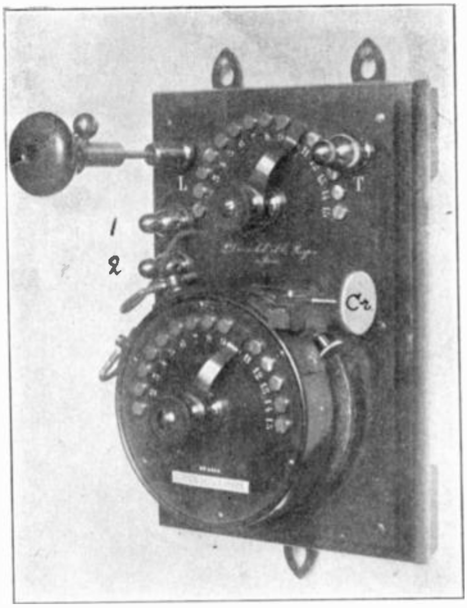
By A. C. Marlowe.

Paris correspondent Modern Electrics.

We illustrate the most recent form of tuning coil which is constructed by the Ducretet firm of Paris. It is a transformer in which the two windings are formed of two flat spiral coils placed facing each other. The first coil is in the primary circuit and is connected in the circuit from aerial to ground by the terminals L and T. The winding is made in sections and a circular switch allows of putting a greater or less num-

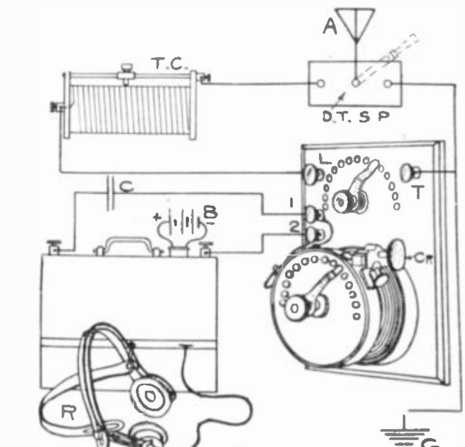


-Fig. 2-



ber of sections in the circuit so as to change the value of the inductance according to the wave length of the sending station. The other coil forming the secondary circuit is connected to binding posts 1 and 2 and is wound with finer wire and a larger number of turns so that we produce an elevation of tension which can act better upon the detector. Like the primary, it is wound in sections and has a commutating switch. By turning the milled head of the rack and pinion screw Cr we can move the outer coil back and forth and separate it more or less from the inner fixed coil, and this allows us to adjust for close or loose coupling as desired.

These three means of adjustment are indispensable for securing the best conditions for reception. It is possible, after a few rapid trials by acting at the same time upon the switches and the coupling, to obtain an almost perfect tuning between posts. This is especially useful in the case of undamped and continuous waves such as in radiophony. In the diagram the electrolytic detector is contained in the box on the left. Above it is a tuning coil S which is placed in the aerial circuit and seems to



-Fig. 1-

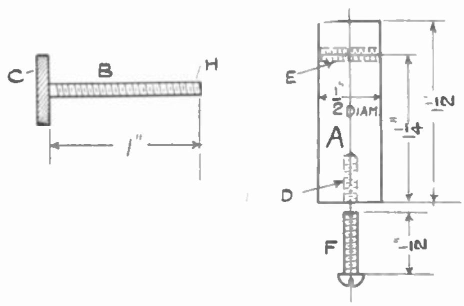
give a closer tuning in the case of great wave lengths. The switch serves to put the aerial to ground when not in use or in case of storms.

A Simple Hot Wire Ammeter

By C. W. Schwartz

First, obtain a base, the material is optional so long as it is an insulating agent, it will need to be about one foot long, three inches wide, and about a quarter of an inch thick; six holes must be bored in this, two are for binding posts and the other four are for standards which will be explained later, Fig. 2 is a plan of the base with the holes marked H', H², H³, H⁴, those marked B' and B² are for the binding posts, the exact position of the holes is not marked, as this is optional so long as the general plan of Fig. 2 is carried out. Now get four ⅛-in. screws, each 1 inch long, shown at B (Fig. 1), at H drill a small hole; C is a hard rubber handle.

Secure four lengths of ½-in. brass rod, each 1½-in. long, one of these is shown at A (Fig. 1). At E drill and tap out a hole to receive one of the ⅛-in. screws,



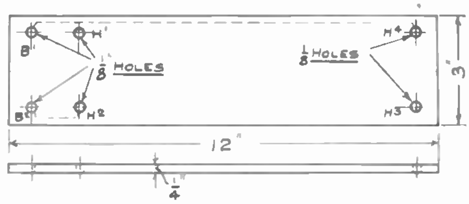
M E -FIG 1-

E should be about ¼-in. from the top, at D drill and tap out a short hole to receive the screw F, this should be about ½-in. long and made of ⅛-in. stock. This screw is to hold the post A in an upright position on the base, which is done by passing it up through one of the holes H (Fig. 8), and then screwing the post on top of it.

When set up it should look like A (Fig. 3), where B is the base; P is a binding post, which is secured to the base in the same manner as was post A.

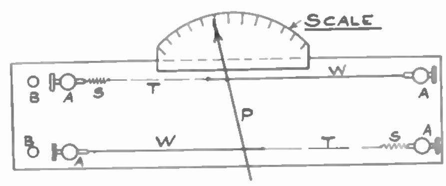
After the posts have been set in position and the screws countersunk in the base, the electrical connections had best be made, these are shown by dotted lines in Fig. 2, binding post B' is connected to brass post H⁴, and binding post B² to brass post H². Now we are ready to make the delicate part of the instrument: procure two 6-in. lengths of No. 40 bare copper wire, and two similar lengths of fine thread, preferably silk, and two small close brass springs about ⅛-in. diam.; we now lack but one thing, a pointer. This is best made from a 6 or 8-in. length of No. 16 or No. 18 aluminum wire.

The top view of the instrument complete is shown in Fig. 4, where T, T is

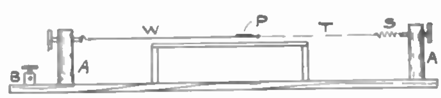


M E -FIG. 2-

the thread, W, W the fine wire, S, S, brass springs and P the pointer, the fine wire is fastened at one end to the pointer and the other end is made fast to the regulating screws by means of the small holes in the ends. The threads are fastened to the pointer directly opposite the wires, to the other end of the threads is fastened the springs, which are in turn fastened through the small holes of the regulating screws. One end of the pointer should extend some distance over the side of the base, under which can be fastened a scale, the other end should have some sort of a weight attached, so that when the regulating screws are screwed up the pointer will swing clear of the base and just balance.



-FIG 4-



M.E -FIG 3-

The operation of the instrument is as follows: The current passes through one of the fine wires, thence through the pointer and out the other fine wire. As

(Continued on Page 586)

A Magazine devoted entirely to the Electrical Arts.

PUBLISHED MONTHLY BY

Modern Electrics Publication

NEW YORK CITY, N. Y.

H. GERNSBACK, EDITOR.

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

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

SINGLE COPY, 10 CENTS.

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

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

Address all communications to:

MODERN ELECTRICS PUBLICATION
84 West Broadway, New York, N. Y.

Chicago Office: 112 Dearborn Street
Paris Office: 136 Rue d'Assas.
Brussels Office: Rue Henri Maus.

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

Vol. II. MARCH, 1910 No. 12

EDITORIALS.

During the past two years the "Wireless Craze" was in vogue and it affected over 100,000 people, young and old, in the United States.

Now the tide has turned, quite suddenly. We now have the "Wireless Scare!"

Following the publication of the various wireless bills, which were first published in January in this magazine and then copied by the foremost newspapers in this country, some experimenters and amateurs, who ought to know better, are becoming unduly alarmed.

For the past few weeks the Editor has been besieged by readers from East and West to give advice if it would be wise to invest their savings in wireless apparatus, pending the decision of the several wireless bills.

Personally the Editor does not believe that the Roberts bill will ever pass the House, at least not in its original form. If it should become a law at all, it will certainly be in a revised shape and no matter what will happen, it may be stated right here that it will not throttle the experiments of the amateur.

A law should, however, be passed to restrict any and all experimenters from sending out wavelengths that interfere with Government or commercial stations.

Even the most arrogant and selfish amateur must admit that the rights of others should be respected. While he may "own" the air above his house, it does not necessarily mean that the police would allow him to shoot off a 10-inch cannon on top of his house all during the night and thereby disturb the peace.

This, however, is just what he does in the wireless sense, and he should be stopped from disturbing the "wireless peace" by all means.

Had the amateurs heeded the Editor's warnings and taken his well-meant advice as given in the editorial of the March, 1909, issue, the Roberts and all other bills would never have been drawn up.

Part of that editorial is reprinted herewith:

It is also advisable to use as little power in transmitting as possible. As long as the station to whom you intend sending, gets your signals clear enough, be satisfied. Do not try to use more power than is absolutely necessary, and you will not interfere with the big stations.

The Editor wishes to advance another idea. Most experimenters owning sending apparatus, usually also own receiving instruments capable of picking up stations several hundred miles distant. To do this, high aerials are required. It is therefore suggested to use *two separate aerials, one a very short one for sending, the other tall one for receiving.* This will be the ideal combination to steer clear of all trouble.

You can "receive" as much as you wish—nobody cares—but if you do not wish to have your aerial chopped down some nice morning, take the Editor's advice and erect AT ONCE a separate sending aerial—not over 30 feet long, and use a small sending helix, to keep the wavelength down.

The Editor shall be pleased to receive contributions as to the construction of the new double aerial and in order to develop the idea he will pay a *monthly prize of* \$3.00 in cash for the best picture of the double aerial.

The new sending-receiving aerial will be known hereafter as the *Duplex Aerial.*

Book Review

MANUAL OF WIRELESS TELEGRAPHY—for naval electricians. By Lieut. Commander S. S. Robison, U.S.N., United States Naval Institute, Annapolis, Md. Profusely illustrated; canvas. Price, \$1.25.

All through this book technicalities are dispensed with as far as possible and the reader is led from the very fundamental principles of the art, to practically the highest application of wireless telegraphy to-day. The theory of various instruments utilized is very clearly and concisely treated, and in such a manner that an amateur can readily understand the principles governing the use of same. Notes on installation and care of stations are given; also rules governing operation. There are also a number of valuable tables. Altogether it is a book every student of the art should have in his library.

HOW TO MAKE WIRELESS INSTRUMENTS.—By various authors, including H. Gernsback, A. C. Austin, Jr., A. P. Morgan, A. M. Curtis, M. A. Deviny L. Spangenburg, H. H. Holden, etc. Modern Electrics Publication. New York, 1910. Ninety-four pages; with diagrams and many illustrations; paper. Price, 25c.

This book, as the title suggests, is a "How to make it" book, and every amateur will do well to obtain a copy. Edition is limited. A number of different types of detectors, including microphone, carborundum, silicon, electrolytic, tantalum, etc., are described; also receiving and sending tuning coils, close and loose-coupled, erection of aerials, construction of a small transformer, aerial switches, resonance apparatus, and a complete two-mile wireless station are fully treated upon.

The best thing about the book, however, is that all instruments are described in a non-technical manner, enabling the veriest tyro to build a complete wireless station at a very low cost.

ELEMENTARY ELECTRICAL CALCULATIONS.—How made and applied. By T. O. Sloane, A.M., E.M., Ph.D. D. VanNostrand & Co. New York, 1909. 304 pages. Cloth. Price, \$2.00.

This book is written as far as possible in such a manner that any one with a fair knowledge of mathematics may, by a little study, advance himself considerably in the mathematics required in electrical calculation. The introductory chapter describes the various methods which may be used in these calculations. Ohm's law, resistance, best methods for arrangement of batteries, electro chemistry, magnetism, capacity and inductance, alternating current and demonstrations by calculus are thoroughly treated.

PATENTS, DESIGNS, AND TRADEMARKS.—By Kenneth A. Swan, B. A. (Oxon), of the Inner Temple, Barrister-at-Law. D. Van Nostrand & Co., New York. 386 pages. Cloth. Price, \$2.00.

This is the first book on this subject since the New Patents Acts recently enacted in England. It thoroughly treats all phases of the subject, and any one intending to take out a patent under English law wiuld do well to obtain a copy of the book. Information is also given regarding patents in foreign countries. The subject is treated in a form readily comprehensible to the layman who is not familiar with legal terms.

AUTOMOBILE DRIVING SELF-TAUGHT—By Thomas H. Russell, M.E., L.L., B. The Charles Thompson Co., Chicago, Ill., 1909. 222 pages. Flexible red leather. Well illustrated.

Altogether a very "classy" little book, and one which every amateur automobilist should own. One knowing nothing of automobile driving will after a thorough study of this book feel thoroughly competent to drive almost any car under the most trying conditions. The care and cleaning of the engine are well described; also how to judge a car when purchasing.

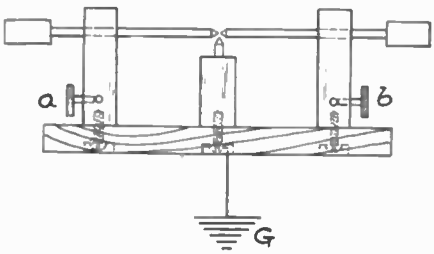
IGNITION, TIMING, AND VALVE SETTING.—By Thomas L. Russell, M.E., LL.B. Charles Thompson Co. 1909. Chicago, Ill. 223 pages. Flexible red leather. Profusely illustrated.

This is a companion book to "Automobile Driving Self-Taught, and one knowing very little of internal combustion engines will after a perusal of this book, feel himself confident to tackle almost any obstinate case of "Won't Spark." In fact, those who feel themselves thoroughly acquainted with ignition systems will find much of value in this book, which will prove of material aid to them in the operation of any gas engine.

Precaution Against Kickbacks

By Cyril C. Lotz.

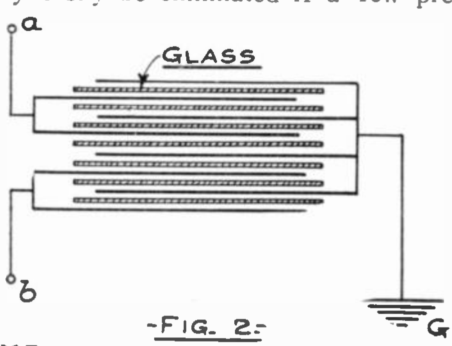
MANY amateurs are troubled with the static kickback, which exists to a more or less extent wherever an induction coil or transformer is used.



ME - FIG. 1-

Where the current employed is taken direct from the mains, and a large transformer is employed, the kickback produced is often so pronounced as to start arcs in the electric light fixtures and puncture meters, especially when the latter are located near the instruments.

All likelihood of trouble of this kind may easily be eliminated if a few pre-



-FIG. 2-

M.E.

cautionary means are employed. The devices usually used to insure protection from the kickback are:

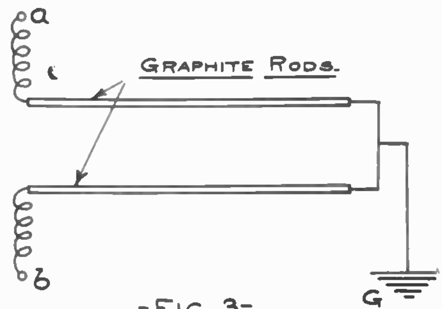
(1) Micrometer spark-gaps.
(2) Condensers.
(3) Graphite rods of high resistance.

The first, the micrometer spark-gap, may be arranged as shown in Fig. 1. Connect A and B across the mains and G to the ground. The points of the gap should be sharp and placed as near together as possible.

The condenser must be made with glass or mica as a dielectric and of considerable capacity. Fig. 2 shows connections and construction. As before, A and B are connected across the mains and G to the ground.

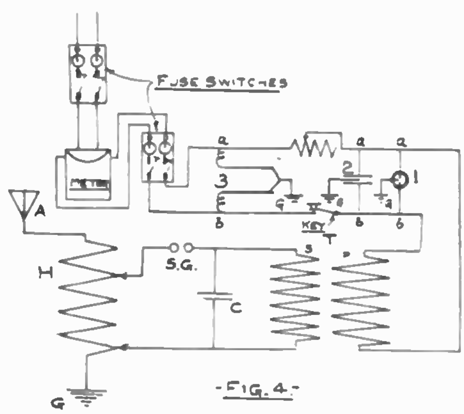
The third class, graphite rods, are by far the most reliable. The rods should have a high resistance—1,000 ohms or more—and should be large enough to stand considerable heating, as they get very hot when left connected in any length of time. Fig. 3 shows the connections.

The manner of their connection into the transmitting system is shown clearly in Fig. 4.



ME. -FIG. 3-

The gap is placed at (1) especially to prevent any exceedingly strong kickback, as occasioned by the breaking down of the transformer, from puncturing the resistance. The condensers are placed at (2). The graphite rods are placed (3) in front of the meter switch.



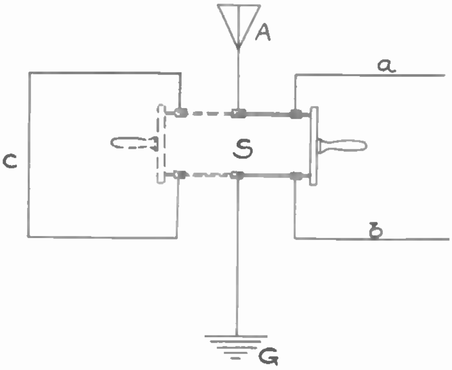
-FIG. 4-

ME.

When such precautions are used it is hardly possible to have any trouble from fires, punctured meters, transformers and generators as has often been the case in the past. So let us hope that the amateurs will modernize their stations in this one more important matter.

HELPS FOR THE AMATEUR.

As every modern experimenter is perhaps seeking an easy method to accomplish certain results a few sugestions may not be amiss.

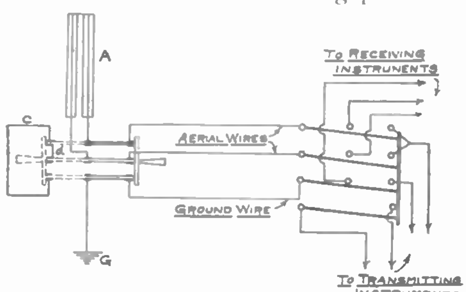


-Fig. 1-

ME

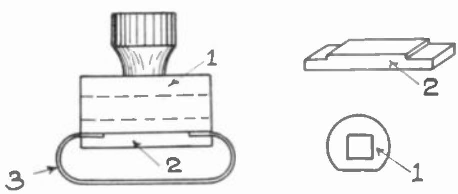
I have an easy and quick method for grounding aerial during storm, etc.

Referring to accompanying drawing, Fig. 1, G represents ground, A the aerial and S a double pole double throw switch. The aerial and ground wires are secured to the middle binding posts.



ME -Fig 2-

The binding posts on one end of the switch are connected by a heavy copper wire e, about No. 10 B. & S. Wires a and b from the other two posts go to the instruments.



ME. -Fig. 3-

This switch is to be connected between aerial and aerial switch and should not be confused with the aerial switch. For looped aerial connect as per Fig 2.

Connect two posts as at d, then connect the two outside posts.

Diagram shows four pole switch also, used as described by Mr. Stebbins in the September issue.

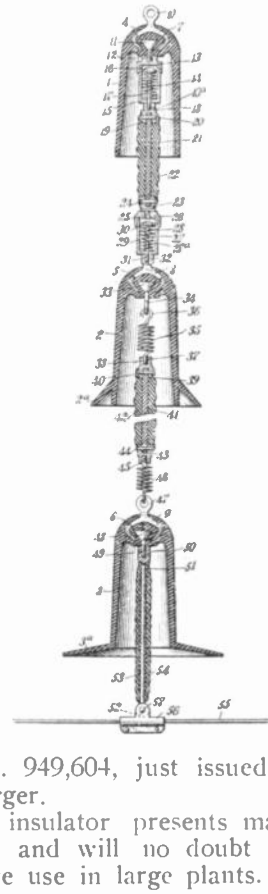
A good slider is made by taking a piece of 1/2-inch brass rod, 1 inch long. Bore a 3/16-inch hole lengthwise and file out square. Holding file parallel to one side of hole file to depth of about 1/16 inch.

Take another piece of brass 1 inch long, 3/8 inch wide and on one side at ends file to a depth of 1/16 inch or less, and 3/16 inch long. Take a piece of spring brass 2 1/2 inches long, 3/8 inch wide and solder ends in these notches as per diagram. File off superfluous solder flush with brass piece 2.

Now solder this to flat surface on No. 1 and attach a handle or knob to top and you have a strong and neat slider.

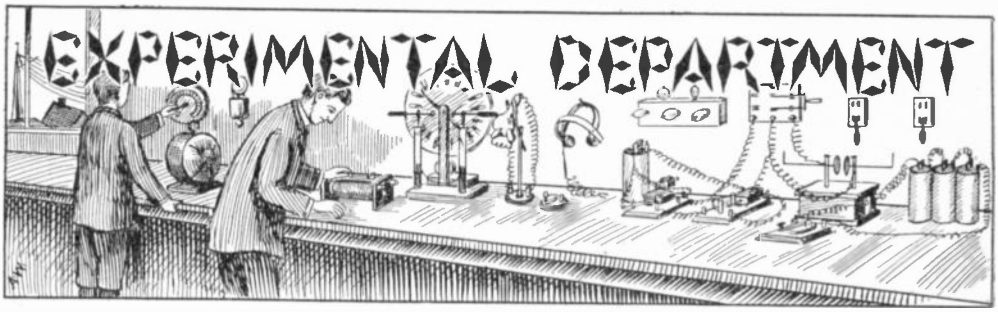
NEW WIRELESS INSULATOR.

A new non-leaking insulator for wireless, especially as used for powerful high tension work, is described in Pat-

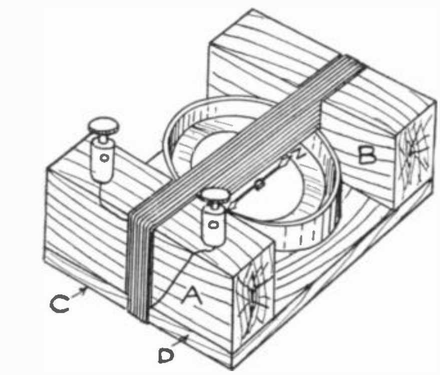


ent No. 949,604, just issued to Louis Steinberger.

This insulator presents many novel features and will no doubt come into extensive use in large plants.

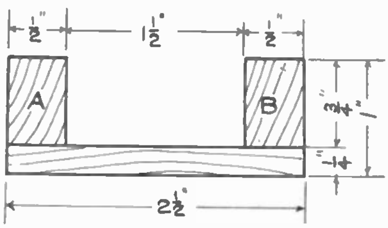


HOW TO MAKE A GALVANOMETER.



M.E. -FIG. 1-

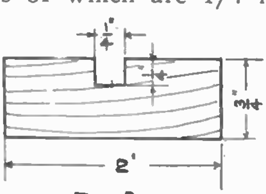
Get a good pocket compass, diameter 1 1/2 inches, and of about 1/4 inch thick-



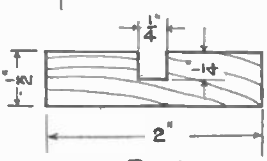
-FIG. 2-

M.E.

ness. Next cut two pieces of wood the sizes of which are 1/4 inch thick, 7/8



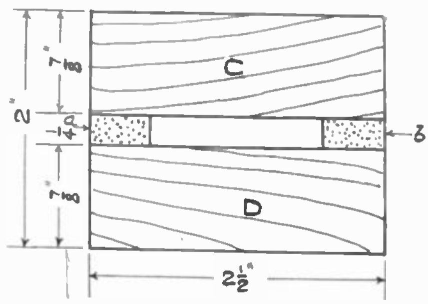
-FIG. 3-



M.E. -FIG. 4-

inch wide, and 2 1/2 inches long, which correspond to c and d on the diagram. Fasten these two pieces to a and b, whose dimensions are 1/2 inch wide and 3/4 inch high and 2 inches long, and cut a quarter of an inch square notch around the two sides of the pieces "a" and "b" of Fig. 1, as shown by figures 3 and 4.

After you have all the parts put them together, using glue or brass screws. Don't use any iron or steel in the construction of this instrument. After you have it put together wind about 200 turns of No. 27 or 28 magnet wire in the



M.E. -FIG. 5-

groove which you made, and fasten the two ends of the wire to two binding posts. After you have wound the wire the compass will just fit under the wire and between the blocks a and b.

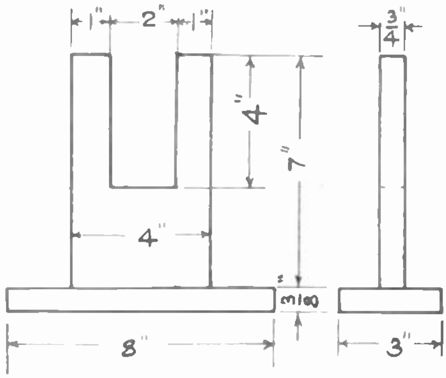
Contributed by CLARENCE LYNN.

AN ELECTRIC ALARM.

First make a wooden frame, including base and standard, out of any wood that is at hand according to dimensions given in fig. 1. Attach the standard to the base by means of 1¼ in. screws screwed up through the base, the heads of the screws should be countersunk into the base.

Now procure a glass tube about ⅛ in. internal diameter and 20 in. long, bend it into the shape shown in fig. 2. Now pour mercury into the tube by the aid of a paper funnel so that the lower bend shall be full and extending about 2 in. up on both sides.

Take a length of iron wire, or better platinum, about 2 ft. No. 28; insert it in end A fig. 2, and push it through till it comes to bend B. This is for the permanent contact. The end A of the glass tube is now placed in a glass vial or common bottle of about 1½ oz. capacity through the cork and the end of the wire taken back through the cork. The

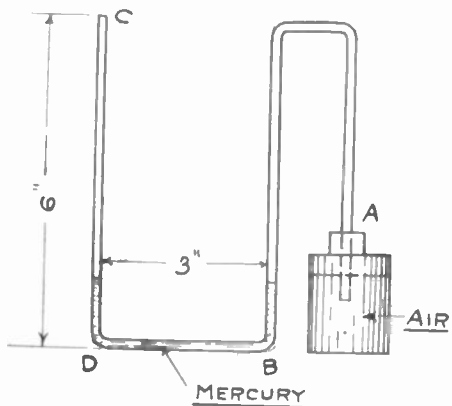


M E

-FIG. 1-

whole is then carefully sealed with sealing wax.

The bottle and tube are now mounted on the frame. A movable contact is inserted in the end C fig. 2. Both wires are taken to two binding posts which should be placed on the base. A scale can be placed on the standard behind the tube and graduated by comparison

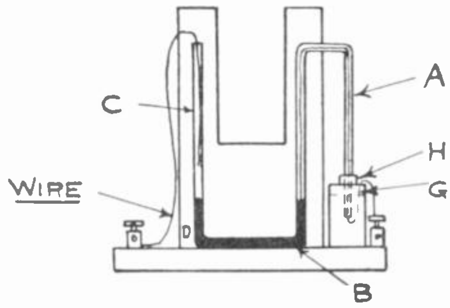


M E.

-FIG. 2-

with a standard thermometer at various temperatures. The apparatus when completed, will look like fig. 3.

Supposing a rise in temperature occurs. The air in the vial expands, consequently moving the mercury in the tube towards the left arm. The amount of movement will depend on the variation of temperature; when the mercury



M E.

-FIG. 3-

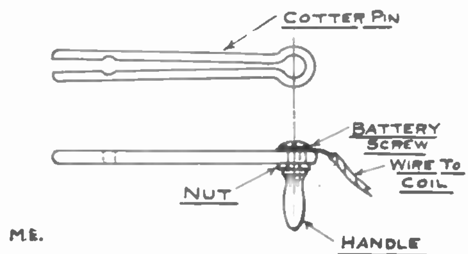
makes contact with the wire it closes the circuit and will ring a bell, light a small lamp or operate any electrical apparatus.

It is of course understood that the tube A at H must fit tight, the same being true of cork G, so that no air can escape.

Contributed by P. I. EMERY.

HELIX CLIP.

A helix clip made as per following directions is sure to give satisfaction:



Secure at any hardware store a one-inch cotter-pin, hold the sides apart and file a notch of suitable size one-quarter inch from the end.

Put a battery binding post through the eye; and put on nut and insulating handle as per drawing.

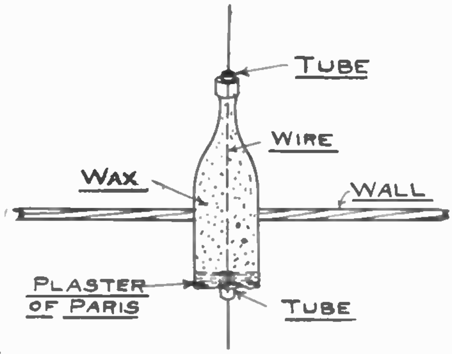
This insulating knob will enable adjustment to be made while coil is in operation.

Contributed by W. H. HALE.

A SIMPLE LEAD-IN.

Most experimenters in the "wireless field" find trouble in making a suitable lead-in for their wireless station. I have found a very simple method of making one that answers the purpose very well and will try to describe it to the readers of MODERN ELECTRICS.

I first procured an empty beer bottle and tying a string saturated with gasoline near the bottom of the bottle, holding it upside down, I allowed it to burn until the bottle became thoroughly heated at that end. Next taking a cold chisel (though any piece of iron will do) I dropped it into the bottle, thus breaking out the bottom. Then taking a piece of rubber-covered wire, I put

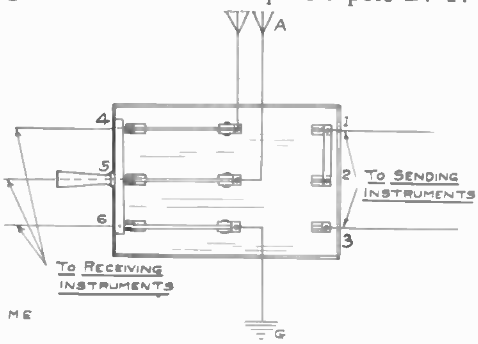


it through the bottle, first placing a porcelain tube in each end of the bottle. I next filled it with melted paraffine. To prevent the paraffine from melting and running out, a thin layer of plaster of Paris may be placed in the end of the bottle. This I find makes a very good lead-in and hope it will be of use to many experimenters.

Contributed by EUSTICE BERNHARD.

SIMPLE SWITCH.

Inclosed please find sketch for a simple switch for changing a loop antenna for receiving to a straight way for sending. A standard 25 ampere 3 pole D. T.



front connection fuseless switch has been used by me. Binding posts 1 and 2 are short-circuited with a copper bar or wire. This is a very simple switch and works very well. Throw to right for sending, to left for receiving.

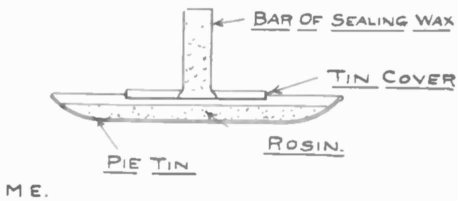
Contributed by FRANK L. GOHL.

AN ELECTROPHORUS.

The following simple apparatus is one of the earliest electric machines and was first used by Volta:

Procure a shallow pan (one of your mother's pie tins will do) and fill it full of melted resin. A pound of resin will be needed and costs about a dime. It can be purchased at any supply house. When the resin has set, put it aside and get a woolen rag. Also get a tin cover from an old coffee can, about 5 in. in diameter and holding its center in a flame, put a stick of sealing wax on this spot for a handle. The wax will melt and stick fast and makes a good handle.

To operate, rub the resin with the woolen rag; put the can cover on top of the resin, holding it by the sealing wax handle; touch the metal cover an instant with your finger and lift off by the sealing wax handle. The cover is now charged and will discharge when brought near a conductor. In dry weather it gives about a 3/16 spark. It can be used in place of a buzzer test in your wireless set by simply discharging



it to your body, or to the ground by means of the gas pipe. With it, one can do a number of experiments, such as attraction and repulsion, charging a small Leyden jar, etc.

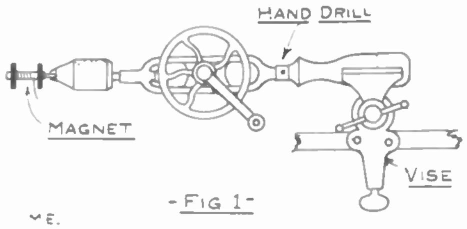
Contributed by PHILIP EDELMAN.

A SIMPLE COIL WINDER.

Amateurs who have to wind magnets or sections for spark-coils are often puzzled because they have not a lathe or magnet winder with which to do it. The following is a very simple and efficient form of a winder and gives good results:

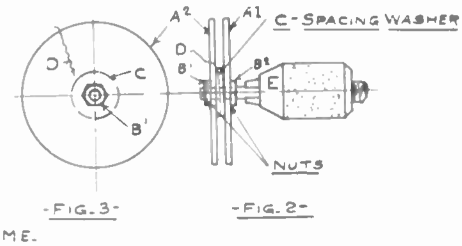
An ordinary hand drill is clamped in a vise by the handle. A screw with the head cut off is screwed into the hub of the magnet to be wound and the other end clamped in the drill chuck. The winding is accomplished by fastening the wire to magnet and turning the drill handle, at the same time guiding the wire, fig. 1.

For winding sections for spark coils the apparatus shown in fig. 2 and 3 is necessary. The size of plates A 1, A 2, will depend on the size of sections to be wound. The size of the washer C will depend on the size of primary over which the sections are to be placed. As the thickness of an ordinary section is



-FIG 1-

one-eighth of an inch the thickness of the washer should be the same. The plates should be round, of some stiff metal preferably No. 20, B. and S. brass. The whole arrangement is clamped between two nuts B 1 and B 2, on an 8-32 or 10-32



-FIG. 3- -FIG. 2-

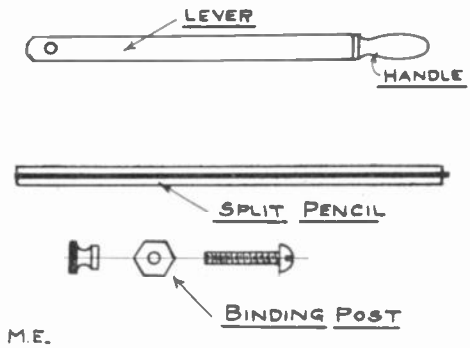
screw. which is clamped in the drill chuck E. A hole is bored in the plate A 2 to allow the wire D to protrude, Fig. 2 and 3. When the section is wound the nut B I is removed and the whole section with the metal plates slid off the screw. It is laid on a level surface and the plate A 2 carefully removed. The washer is next taken out and the section slid off the plate A 1. The sections are then laid aside until the requisite number has been wound.

Contributed by IRVING C. BENTON.

A SIMPLE RHEOSTAT.

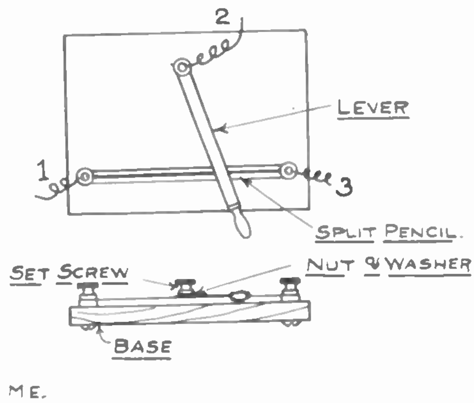
A rheostat that will put resistance in circuit gradually and not by jumps, can be made from three binding posts taken from old dry cells, a lead pencil (different grades of leads giving different resistances), and a strip of brass or copper 7x¼ in. and about 1/16 in. thick, pointed at one end to receive a handle, the other end drilled to receive a binding post. All metal contacts should be brightened up before using, and the wood shaved off at each end of the pencil, leaving the lead exposed to make contact with the binding posts.

The base of hardwood should be about 8½x7 in. and ¼ in. thick. The pencil should be split in half, taking care



that the lead is not broken in so doing. The pencil is fastened under the binding posts as shown in the illustration.

When putting the binding posts through, connections should be made at the back as there will not be any room in front.



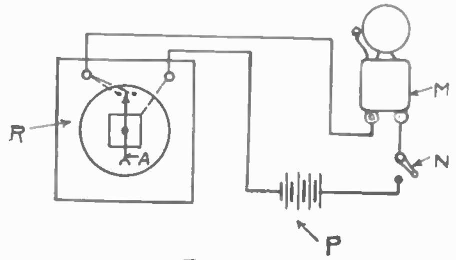
To keep the lever from loosening, the nut should be screwed down, and then the thumbscrew tightened. The resistance of this rheostat is from 50 to 80 ohms.

Contributed by CHAS. H. CHURCH.

A "TROLLEY CALL."

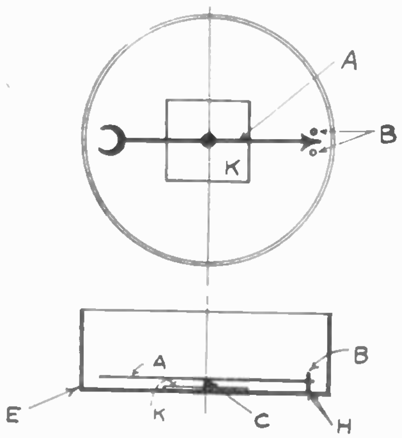
For those living on a car line the piece of apparatus described below may help you remember when a car is coming. In the diagram No. I, R. is a compass. The needle should be removed and plated with silver. (Any jeweler will plate it at a small cost.) It should then be replaced and two brass tacks driven up through the bottom of the base one on each side of the needle, B.

Fig. 2. Fig. 3 shows the standard C on which the needle A rests. One wire H is fastened to the tacks, another is fastened to C. These are connected to the binding posts as shown in Fig. 1.

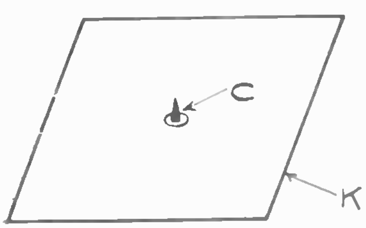


M.E. -FIG. 1-

The instrument must be placed in such a manner that the needle will rest between the tacks, touching neither. Connect it in series with a bell and battery as shown in Fig. 1. It is evident that any number of bells can be used. Fig. 1 shows the "Call" complete. Close



M.E. -FIG. 2-



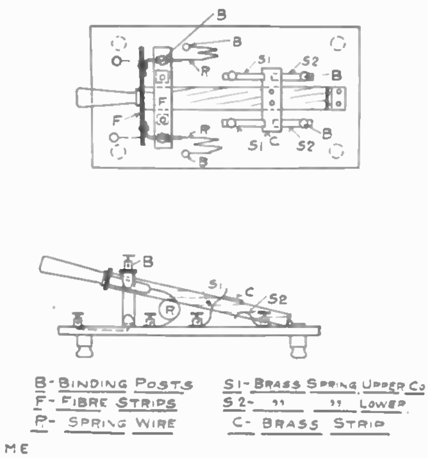
M.E. -FIG. 3-

the switch N now. When a car is coming the magnetic action of the motor will cause the needle to deviate, touching one of the tacks and therefore closing the circuit and causing the bell to ring. If directions are followed closely the bell should ring when the car is 500 to 1,000 feet distant, depending upon the power used by the car.

Contributed by FRANK G. PARKER.

A SIMPLIFIED AERIAL SWITCH.

Finding the construction of a good aerial switch as described by others, both expensive and difficult to make, I decided to construct one according to



my own ideas, and the result was both satisfactory and inexpensive, so I thought others might be interested in it.

Not much description is necessary besides the drawing, except that it is composed of a D. P. D. T. switch, using both clips and knives, while the switch arm is made of wood.

The fibre bridge is supported by two wooden columns, one on each side of the switch arm; while at the back of the switch arm is a heavy brass hinge.

Contributed by PAUL MOORE.

A SIMPLE HOT WIRE AMMETER

(Continued from Page 577)

the wires expand they allow the springs to contract, which draws the pointer towards them, and as can be seen by a little study of Fig. 4, the pointer will move to the left. This ammeter will work in any position, but works best in a horizontal one.

Modern Electrics

H. GERNSBACK, Editor

Vol. No. 2

APRIL 1909——MARCH 1910

Modern Electrics Publication

84 WEST BROADWAY

NEW YORK CITY

Modern Electrics

INDEX.

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.

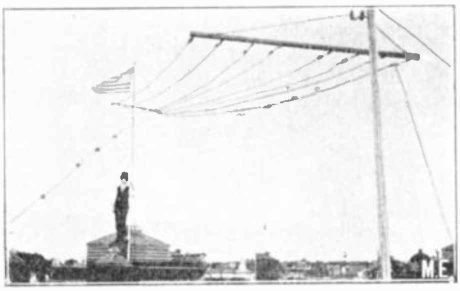
It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

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.

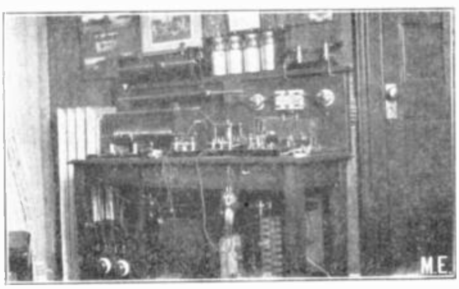
FIRST PRIZE, THREE DOLLARS

Inclosed please find flashlight photos of my wireless station. The whole outfit I constructed myself, with the exception of head phones and switches.

My aerial consists of eight No. 12



bare copper wires 50 feet long and one foot apart, strung from iron pipe masts on the roof. The iron pipe masts are made of 1¼ inch pipe, supported by guy wires. On each end of my aerial wires I have springs which always keep the wires tight and allow for shrinkage of the ropes in rainy weather.



The receiving instruments consist of two double slide tuning coils potentiometer, electrolytic, silicon and carborundum detectors which I have on separate switches so that I can cut in any one I want to use, a pair of 1,000 ohm receivers, fixed condenser, variable condenser (rotary type).

I also have a coherer, relay and sounder which give very good results for short distances, all of which are on the table in the picture.

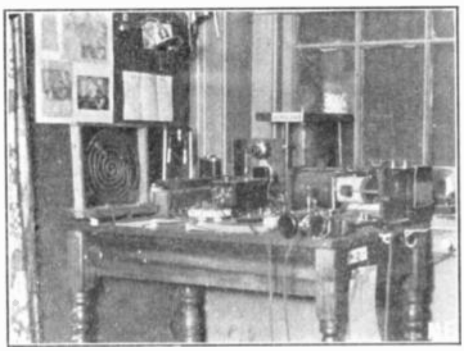
Under the table in the center is a six-inch spark coil, to the right a sending helix, 20 turns of brass ribbon, wound on an eight-inch drum; over the table to the right of the picture is the spark gap and Leyden jars; the key is on the corner of the table. With this outfit I can send 50 miles and receive from 300 to 500 miles.

THOMAS McGRATH.

New York City.

HONORABLE MENTION.

Enclosed please find flashlight photo



of my wireless station located in the attic of my home in Newark, N. J.

Most of the instruments are home-made, built after diagrams and cuts published in MODERN ELECTRICS and other magazines pertaining to wireless.

The instruments on the table are as follows: Sending 1-inch and 1½-inch induction coils, Ducretet key, seven-plate condenser (adjustable), anchor gap, rheostat, adjustable Leyden jar condenser, and Gernsback interrupter.

Receiving: 2,000 ohm receivers on headband, 1,000 ohm receivers on headband, separate 85 and 75 ohm receivers, 350-meter tuner, 1,200-meter tuner, fixed condenser, silicon, carborundum, electrolytic and ferron detectors, also Bunnell box sounding relay and giant sounders which I use in connection with experiments.

The large tuner is also used mostly for experiment.

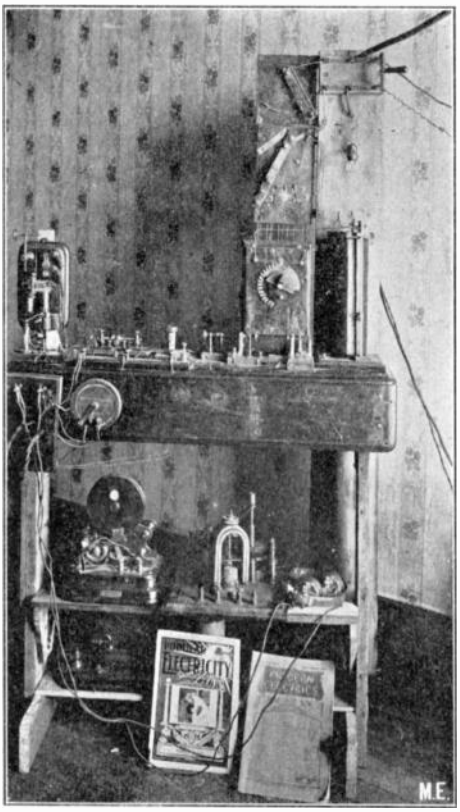
WM. D. FINKELSTEIN.

New Jersey.

HONORABLE MENTION.

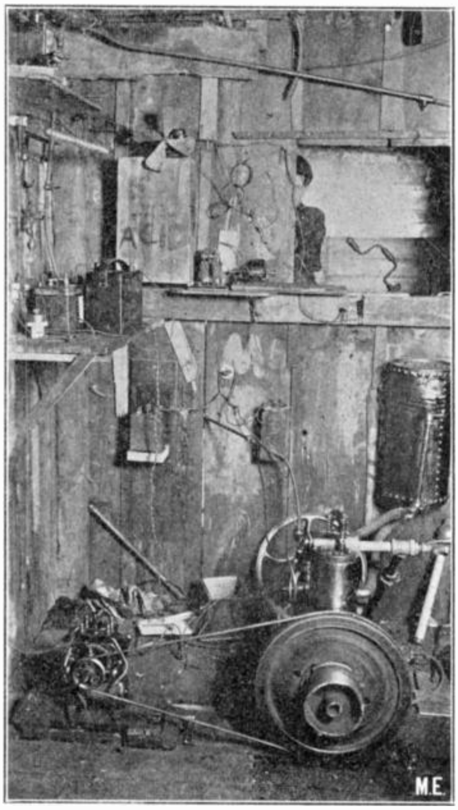
Enclosed please find photos of my wireless station, engine and dynamo. The dynamo is used to charge my storage batteries.

The wireless apparatus consists of transmitting and receiving instruments. For transmitting I have an E. I. coil transformer, which works excellently, a plate variable condenser, tuning helix, zinc spark gap. The coil has a high speed vibrator with heavy platinum



contacts. I use a heavy telegraph key to operate the coil and seven storage cells to supply current. From the secondary terminals of the coil I can get a heavy flame of fire about an inch long. By using a glass plate condenser this spark can be cut down to a white flash from a quarter to an eighth of an inch in length.

My receiving instruments consist of five detectors, tuning coil, variable condenser, potentiometer, a pair of 3,000



ohm receivers and selective switch with which any one of the five detectors may be used with their different kinds of crystals. Silicon, molybdenite and carborundum are the crystals I am using, together with others I am testing. I have a Massie set of instruments connected so that they may be used for short distances.

My aerial consists of a pole fifty-five feet high, with four aluminum and four copper wires suspended from the top of the pole to the house.

I construct nearly all of my instruments, obtaining my ideas from MODERN ELECTRICS, which I think is the best magazine for a beginner and experimenter.

HARLAN S. WEBSTER.

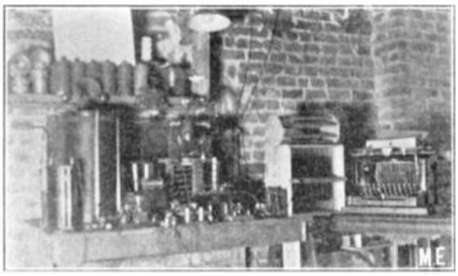
Columbus, Ohio.

HONORABLE MENTION.

The accompanying picture shows my wireless set with which I have had very good success, owing largely to the many helpful hints and diagrams found in MODERN ELECTRICS.

My antenna is made of No. 14 aluminum wire and is 50 feet high. As I live only twelve miles from New York and near many amateur and commercial stations, there is very little time that there isn't some messages in the air.

My transmitting set (at the left) consists of an E. I. Co's. one-half inch spark coil, a home-made zinc spark gap, with place for glass tube condensers, a



helix, heavy contact key and a S. P. switch conveniently placed at the right of the key for turning off the current. A porcelain base D. P. D. T. switch (shown in front of the coil) is used to throw the aerial and ground to either sending or receiving.

The receiving instruments are a pair of 2,000 ohm head receivers and a variable condenser of Electro Importing Co. make, a silicon detector, and a loose coupled tuning transformer, a large single slide tuning coil of my own construction. I also have a 2 M. F. Western Electric fixed condenser, an E. I. Co. rheostat, a coherer and decoherer, a relay and a carbon detector and 75 ohm receiver. I have a hot wire ammeter (shown behind the variable condenser) which I made from an article in MODERN ELECTRICS.

In my early experiments I made a small portable transmitting set from a medical coil, with an aluminum spark gap and condensers.

The push button at the left of the table is for a testing buzzer. I have a miniature Tungsten light, with a pull-chain socket and reflector over the table. The aerial is grounded when not in use by a double throw switch.

I am a member of the Wireless Association of America, also a subscriber to MODERN ELECTRICS, which I think is the best magazine published on wireless.

FRED J. MCKINNEY.

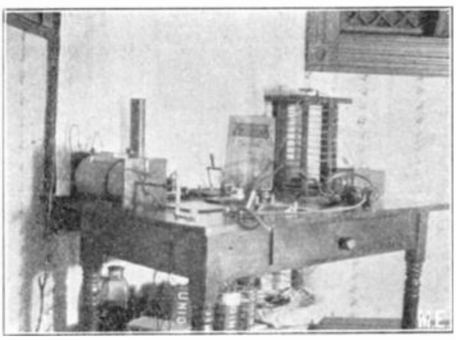
New Jersey.

HONORABLE MENTION.

Enclosed is a flashlight of my wireless, which I have constructed from data published in MODERN ELECTRICS and other smaller publications.

At the left of the photo is the receiving transformer, at the right an E. I. Co. coil, and a helix wound with No. 6 copper wire. MODERN ELECTRICS, the only electrical magazine I subscribe to, can be seen in the background. My key is fitted to break the receiving circuit when pressed.

I have received Charlestown, S. C., several times at night, and often hear



Washington speak to Manhattan Beach. Charlestown is six hundred fifty miles, Washington, two hundred fifty, and Manhattan Beach about fifteen. I get many helpful hints from M. E. and think that the experimental department has many unique ideas.

New Jersey. ARCHIE HENDRY.

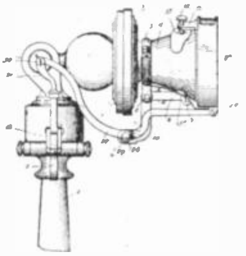
W. A. O. A.

The Wireless Association of America, headed by America's foremost wireless men, has only one purpose: the advancement of "wireless." If you are not a member as yet, do not fail to read the announcement in the January issue. *No fees to be paid.*

Send today for free membership card. Join the Association. It is the most powerful wireless organization in the U. S. It will guard your interest when occasion arises.

Electrical Patents for the Month

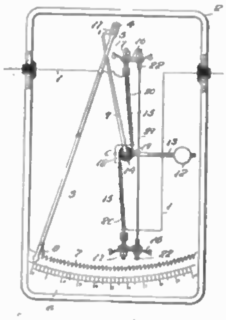
950,937. DISINFECTANT DEVICE FOR TELEPHONES. ARTHUR W. LYDA, New Castle, Pa., and ELMER C. ROBINSON, Lowellville, Ohio. Filed Mar. 19, 1909. Serial No. 484,515.



1. The combination with the mouthpiece and receiver arm of a telephone, of a disinfectant holder movably supported in front of said mouthpiece and adapted to open and close by gravity, and a pivoted lever in connection with said telephone and actuated by said receiver arm to give said holder sufficient impetus to move.

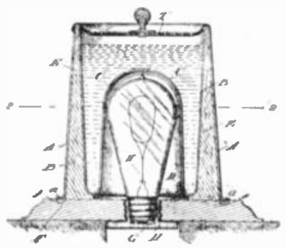
950,647. ELECTRICAL MEASURING INSTRUMENT. MAURICE J. WOHL, New York, and HARRY HERTZBERG, Brooklyn, N. Y., assignors to Abbot A. Low, Horseshoe, N. Y., Maurice J. Wohl, New York, N. Y., and Harry Hertzberg, Brooklyn, N. Y., trustees. Filed Mar. 20, 1908. Serial No. 422,275.

1. In an electrical measuring instrument, the combination of a movable indicator, an operating member adapted to have operative connection with said indicator when moved in one direction only, means adapted to move said member in this direction, a circuit, and a plurality of wires under tension arranged and adapted to be heated and expanded simultaneously by current passing through said circuit, said wires having connection with said operating member and extending therefrom in opposite directions whereby contraction thereof moves said member in the inoperative direction, and means for heating said wires simultaneously by the current in said circuit.



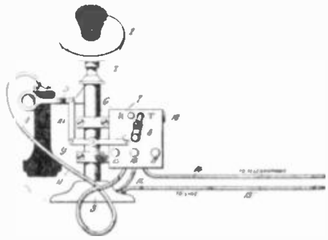
949,606. CIGAR-MOISTENER. IVAN C. TETHEROW, St. Joseph, Mo. Filed Apr. 21, 1909. Serial No. 491,237.

A vaporizing device comprising an exterior casing provided with a rounded lower edge, an integral interior casing joined to said outer casing at its top edge, insulating material between said inner and outer casings, the bottom of said interior casing being raised to provide a recess on its under side, an insulating base provided with a groove arranged to register with the rounded portion on said outer casing for holding the latter in place, electric heating means carried by the base arranged to project



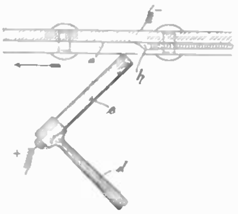
into said recess, and a cover adapted to rest on the common upper edge of the exterior and interior casings.

949,690. MEANS FOR ATTACHING TELEGRAPHONE-CONTROL MECHANISM TO TELEPHONES. WILBUR H. THOMPSON, Wheeling, W. Va. Filed Apr. 8, 1908. Serial No. 425,826.



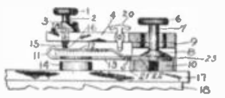
1. In a combined telephone and telegraphone system, the combination of a telephone line adapted for inter communication, a telegraphone, means for connecting the telegraphone with the telephone line for recording the telephone conversation, a telephone receiver and a switch whereby said receiver may be used at will for ordinary telephonic communication or for listening to a record of the telephone conversation.

948,764. ELECTRIC WELDING, BRAZING, OR SOLDERING. OSCAR KJELLBERG, Gottenborg, Sweden. Filed Aug. 13, 1907. Serial No. 388,305.



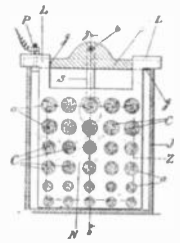
1. The herein described method of welding, brazing or soldering with an electrode containing soldering material consisting in passing a current to form an arc between the electrode and the parts to be welded and then moving the electrode in a line parallel to the part where the solder is to be applied while held at a sharp angle to the line of movement, so that the soldering material will pass from the electrode in a continuous stream and be applied in rows and layers to the parts to be welded.

950,105. VIBRATOR FOR SPARK-COILS. EDWARD B. JACOBSON, Pittsfield, Mass., assignor to Jacobson-Brandow Company, Pittsfield, Mass., a Corporation of Massachusetts. Filed Nov. 12, 1907. Serial No. 401,830.



1. In a vibrator, the combination of a contact point, a vibratile element, a contact point supported thereon, a pivotal mounting for said vibratile element to permit lateral movement, and a stop to hold the vibratile element in its normal position.

949,256. PRIMARY BATTERY. WILLIAM C. BANKS, New York, N. Y. Filed July 29, 1907. Serial No. 385,981.



1. A battery element, composed of a malleable iron plate having apertures disposed generally therein, and extending therethrough, and a series of compressed oxid of copper plugs forced under intense pressure into said apertures.

950,781. DETECTOR FOR WIRELESS COMMUNICATION. JOHN L. HOGAN, Jr., New York, N. Y. Filed Dec. 18, 1909. Serial No. 533,606.

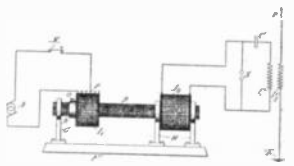
1. A member of a responsive device for electrical oscillations, consisting of the substance ferro silicon.

2. A member of a responsive device for electrical oscillations, consisting of a compound of iron and silicon.

3. A member of a responsive device for electrical oscillations, consisting of a fused mixture of iron and silicon.

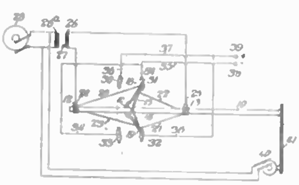
4. A detector for electrical oscillations consisting of a piece of ferro silicon in contact with two other conductors.

949,518. SPACE TELEGRAPHY. SEWALL CABOT, Brookline, Mass. Filed May 6, 1909. Serial No. 494,493.



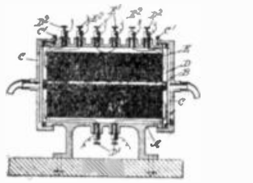
A space telegraph transmitting system comprising in combination an elevated transmitting conductor, a sonorous circuit including a condenser associated with said elevated transmitting conductor, a source of alternating current of definite frequency, an open magnetic-circuit transformer having its primary connected with said source of alternating current and its secondary connected with said sonorous circuit, and a straight sub divided iron-core for said transformer, the said primary and secondary being arranged in tandem along said core and having such spatial separation that the circuit which includes said secondary and said condenser is resonant to said frequency.

950,124. HIGH POTENTIAL-ALTERNATING-CURRENT RECTIFIER. CHESTER H. THORDARSON, Chicago, Ill. Filed Dec. 7, 1908. Serial No. 466,212.



1. A high potential alternating current rectifying apparatus comprising a plurality of rotative angularly separated, elongated, relatively light, thin arms made of non-conducting material and provided with means for bracing them from flexure out of the plane of rotation thereof and revolving at a speed in synchronism with the frequency of the alternating current to be rectified, commutator members located at the outer ends of said arms and connected with a source supplying alternating current, and a plurality of angularly separated collector plates arranged on the circumference of a circle described by said commutator members and with which the said commutator members are adapted for wiping contact, said collector plates collecting from the commutator members opposite polarities of a unidirectional current.

950,799. TELEPHONE APPARATUS. DAVID H. WILSON, Chicago, Ill., assignor to George W. Kretzinger, Chicago, Ill. Filed Dec. 8, 1902. Serial No. 134,262.



1. The combination with an induction coil having a suitable core, of a primary and secondary coil one over the other, both the primary and secondary coils being divided into separate sections, a casing for such coils, two removable end pieces connected with said casing, a telephone receiver opposed to each end of said core, said telephone receivers forming the end of the casing.

Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending March 2nd.

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.

SPARK COIL.

(479.) W. R. ALLISON, Pennsylvania, writes:

1.—I have a motor boat coil which I use for wireless and have tried to use it in series with five 16 C. P. lights on the 110 volts but can get no spark with the vibrator screwed up tight.

A. 1.—Use an electrolytic interrupter and your coil will work all right. If you use the coil vibrator on 110 volt current you will ruin it.

2.—How far could I send with an E. I. Co. ½ K. W. transformer coil and a 6-wire aerial 80 feet long and 125 feet high?

A. 2.—If you use with it an E. I. Co. special zinc spark gap, special sending helix, and special glass plate condenser, you could send 100 miles.

ANTENNA.

(480.) EDMUND KANBERG, Illinois, writes:

1.—Is the antenna as represented in the enclosed drawing suitable for use in wireless telephony?

A. 1.—Yes, any antenna will serve.

STATIC MACHINE.

(481.) JAS. HODGES, Mississippi, asks:

1.—What can I coat the carbons of a home-made arc lamp with to prevent them from heating?

A. 1.—Nothing.

2.—Can a static machine be used for wireless work?

A. 2.—Yes.

3.—Would it be harmful to an induction coil to connect it to a static machine in order to combine the spark of both?

A. 3.—No, but there would be no advantage in using them together.

4.—Is a Leyden jar any better than a plate condenser? If not, why are they used so much?

A. 4.—No. For convenience.

5.—Can the tungsten out of a lamp be used for making a detector? What electrolyte should be used with it?

A. 5.—Yes. Mercury.

6.—Can two short tuning coils be connected in series and be equal to one long one?

A. 6.—Yes, if of the single slider type.

7.—In a Wimhurst machine where is the friction to generate electricity? Are the combs put on both sides of each plate?

A. 7.—The electricity is generated by influence and not friction. No, only one side of each plate.

COHERER.

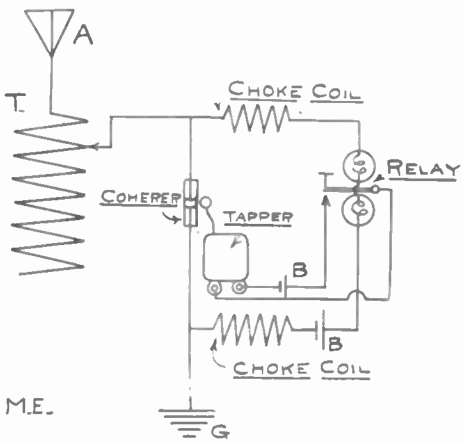
(482.) L. B. SKINNER, Florida, asks:

1.—What is the most sensitive detector that can be used to operate a relay, and where can it be purchased?

A. 1.—A filings coherer. Electro Importing Co., 86 West Broadway, New York City.

2.—Will you please give a diagram for wiring the same, using tuning coils, etc.

A. 2.—Diagram given below.



3.—Would such a system receive from Tampa, which is 25 miles away, if a relay of less than 1,000 ohms was used?

A. 3.—Possibly.

4.—Would an aerial 40 feet high at one end and 30 feet at the other be high enough to receive 25 miles if it were 50 feet long when used with the system above?

A. 4.—Yes.

WIRELESS COIL.

(483.) HOWARD B. DAY, New Jersey, writes:

1.—I have 5 pounds of No. 34 D. C. C. magnet wire which I wish to use as the secondary of a wireless coil. What size core and primary should I use?

A. 1.—Core, 8½ inches long, 1 1-16 inches in diameter. Primary, two layers of No. 12 D. C. C. Secondary, 6 inches long and 3¼ inches in diameter, divided in 48 sections.

2.—What spark length should I get?

A. 2.—About 4 inches.

3.—Is there any advantage in using two Gernsback interrupters in series with a coil?

A. 3.—Not generally. It merely doubles the frequency of interruption.

WIRELESS QUERIES.

(484.) FLOYD TROMBLY, Ohio, asks:

1.—What is the sending and receiving radius with a 4-wire aerial 30 feet long and 50 feet high, "Electro" 1½ inch spark coil, "Electro" zinc spark gap, two 1-pint Leyden jars; electrolytic detector, 75-ohm receiver and fixed condenser?

A. 1.—Sending 5 to 7 miles. Receiving 75 to 100 miles.

2.—Could a rheostat take the place of a sending helix?

A. 2.—No.

3.—How many volts are required to operate the 1½-inch spark coil, and how many will it stand if operated for, say 1 hour at a time?

A. 3.—8 to 10 volts. Not more than 5 or 6 or the vibrator will stick and pit when run for long periods.

SOLDERING ALUMINUM.

(485.) HARRY DEMAVAN, Kansas, writes:

1.—Will you kindly tell me how I can solder the connections on my aerial, which is composed of aluminum wire?

A. 1.—Use aluminum solder, which is especially made for that purpose.

2.—If I cannot solder them, but twist all the connections tight and cover them with tape, could I receive from stations 100 miles or more distant, providing my instruments are O. K.?

A.—Yes.

WIRELESS QUERIES.

(486.) R. W. DUCKWITZ, Pennsylvania, asks:

1.—How far could I receive with the following instruments: Variable condenser, electrolytic detector, fixed condenser, potentiometer, loose coupler, tuning coil, two 1,000-ohm receivers, aerial, two strands of aluminum wire, 3 feet apart, 50 feet high, 50 feet long, water pipe ground?

A. 1.—350 to 500 miles.

2.—What can I add to increase my set, without changing the aerial?

A. 2.—Your set is very good as it is.

3.—Would a silicon detector switched in when the electrolytic did not respond be O. K.?

A. 3.—Yes, if the battery is also cut out.

CERAUNOGRAPH.

(487.) D. WILDE, Minn., asks:

1.—How can I make a choke coil for the ceraunograph described in the July, 1908, issue?

A. 1.—Wind about 40 turns of No. 25 B. S. silk covered wire around a soft iron core 1½ inches long and ¼ inch in diameter.

2.—Please describe and explain use of an anchor gap.

A. 2.—An anchor gap is a minute spark gap generally used with a loop aerial. It serves several purposes but its use in low-powered stations is not recommended since it introduces resistance and cuts down the radiation.

3.—Where can I buy a good low-priced hot wire ammeter, or where can I obtain directions for making one?

A. 3.—We would refer you to the description of a hot wire ammeter in May, 1909, issue, by A. M. Curtis.

POLARIZED RELAY.

(488.) Geo. D. Henderson, Illinois, asks:

1.—Where can I get a permanent magnet of the size used in making the polarized relay described in the August, 1909, issue?

A. 1.—We would advise that you use the permanent magnet of a telephone magneto. You may cut it with a hacksaw into the size you desire.

1 K. W. TRANSFORMER.

(489.) R. B. Harrup, Honolulu, asks:

1.—How far can I send with an aerial of four strands of No. 14 aluminum wire, 195 feet high and 300 feet long, a 1 K. W. transformer, 14 plate condenser 14 by 18 inches, sending helix of No. 10 brass wire, zinc spark gap, using 220 D. C.?

A. 1.—The range of a station using a 1 K. W. transformer and the aerial you describe will be from 200 to 1,000 miles, or over, depending on the accuracy with which inductance and capacity are adjusted in relation to each other and the state of the ether. A transformer will not operate on direct current. Alternating current must be used. We would suggest that you also use much heavier wire or flat ribbon on your tuning helix.

2.—How far can I receive with the same aerial, a pair of 3,000-ohm receivers, potentiometer, double slide tuning coil, variable and fixed condenser, electrolytic detector, carborundum, silicon, perikon?

A. 2.—From 1,000 to 2,000 miles. The electrolytic, perikon, silicon and carborundum detectors rank in the order named.

WIRE SIZES.

(490.) Dana V. Clark, Illinois, writes:

1.—Please tell me the size of the enclosed wire and how much of it would be required for a 1-inch spark coil. Also give the dimensions of a suitable core and primary.

A. 1.—The sample of wire is No. 34 B. S. gauge. One pound and one-half will be required to form the secondary of a 1-inch induction coil. Make the core 7 inches long and ¾ inch in diameter. The primary should be composed of two layers of No. 14 B. S. gauge wire.

2.—Would the enclosed scheme for a condenser switch be successful?

A. 2.—Your idea for a transmitting condenser switch will probably work, but we are afraid that it will be difficult to make the copper plate touch all of the contact points. Also, unless the contact points are widely separated there will be sparking between them.

3.—Is the 1024a receiver of the Electro Importing Co. single or double pole?

A. 3.—Single pole.

MARCONI CYLINDER.

(491.) Freeman Lee, England, asks:

1.—If a Marconi cylinder aerial, 20 feet high and 40 inches in diameter could effectively take the place of an 80 foot aerial.

A. 1.—No, the cylinder arrangement is much less efficient than a wire aerial and cannot be used for long ranges. The cylinders which you cite are badly proportioned and we venture to say that if they were 6 or 8 feet in diameter better work could be done, but the results in either case would not be comparable to an 80-foot aerial.

2.—Is it possible to tune as finely with the cylinders as with a wire aerial?

A. 2.—Yes.

RECEIVING RADII.

(492.) Frank N. Claus, Pennsylvania, asks:

1.—With a 50-foot aerial, an "Electro" loose coupler, variable condenser, electrolytic detector, fixed condenser, potentiometer, dry batteries, and amateur wireless phones, how far can I receive?

A. 1.—350 to 500 miles.

RECEIVING RADII.

(493.) E. Roland Rodgers, South Carolina, writes:

1.—My tuning coil is wound with 220 feet of No. 22 single silk wire wound on a core 10 inches long and 8½ inches in diameter. What is its wave length?

A. 1.—250 metres.

2.—How far can I receive with the above tuning coil, carborundum, silicon and perikon detectors, fixed condensers, 1,000-ohm receivers, 4-wire aerial 50 feet high at one end, 25 feet at other and 80 feet long?

A. 2.—200 to 300 miles.

3.—The above with a variable condenser and potentiometer?

A. 3.—250 to 350 miles.

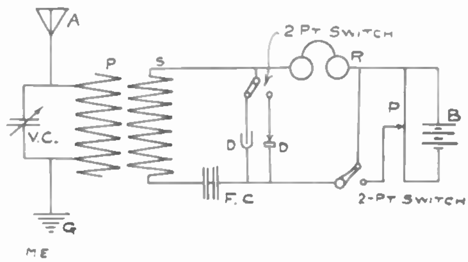
WIRELESS QUERIES.

(494.) C. W. Schwartz, Connecticut, writes:

1.—Will you kindly give me a diagram, in the "Oracle" of your excellent paper, for connecting up the following instruments: Fixed and variable condensers, double slide tuning coil, E. I. Co.'s loose coupler, double slide, E. I. Co.'s bare pt. electrolytic detector, silicon detector, E. I. Co.'s non-inductive potentiometer and a pair of telephone receivers; in making the diagram, use as many switches as you see fit. Can you suggest any instrument that if added to the above set would increase its range? The variable condenser is of the rotary type and the telephone receivers have a joint resistance of 4,000 ohms?

A. 1.—Diagram given below. Your outfit is a good one as it is.

2.—What would be the receiving distance of the above set when used with an aerial 70 feet high, and suspended between supports 100 feet apart, the aerial consists of four strands of No. 14 copper wire on spreaders 18 inches apart and ground on



water pipe?

A. 2.—400 to 800 miles.

TUNING.

(495.) W. F. Ball, New York, writes:

1.—My aerial is 36 feet long, 3 strands No. 14 aluminum wire. It is 35 feet high at the end farthest from the instruments and 40 feet on the other end. Which is better, to drop the high end down even or lower than the other end, or leave it high and tap from the high end?

A. 1.—Leave your aerial the way it is and tap from the center.

2.—With an aerial of 44 meters and a double slide tuner of 620 meters, could I hear a station of 800 or 900 meters wave length?

A. 2.—Yes, by tuning to the quarter wave.

3.—I have an R-1000 receiving set but have been unable to hear the 2 K. W. station at Albany, 2 K. W. New York or the 15 K. W. station at Buffalo, although I am within 200 miles of each. What is the trouble?

A. 3.—Your difficulty is no doubt in the adjustment of your detector and tuning coil if, as you say, the circuits are correct. Examine things carefully and you will probably find that some little detail has escaped your notice. We might cite a little instance that we know of. A well-known wireless expert recently sat in our office waiting to hear signals on a wireless telegraph set for over two hours and wondered meanwhile why nothing came in. At the end of that time he discovered one of his batteries had been disconnected, and as soon as same was connected signals came in O. K.

SILICON.

(496.) P. H. Lattimer, Massachusetts, writes:

1.—Please inform me how to tell the difference between silicon crystals and fused silicon.

A. 1.—Silicon crystals are small needle-like crystals of a dark, glossy color, and are seldom more than ¼ inch long. Fused silicon is a light gray color, bearing an appearance similar to graphite. It comes in lumps and is exceedingly hard, while silicon crystals are easily crushed.

2.—Has the Weather Bureau at Boston, Mass., got a wireless telegraph station? If so, please give call letters.

A. 2.—Not to our knowledge.

3.—Where can I get the following material for use in constructing the storage batteries, described in the July, 1909 issue of

Modern Electrics: Red lead, litharge and sulphate of ammonia? Please give quantity of each for six storage batteries.

A. 3.—From the Electro Importing Co., 86 West Broadway, New York City.

RECEIVING RADII.

(498.) John H. Mahan, New Jersey, writes:

1.—Would a tin roof on the top of a house affect my receiving radius?

A. 1.—Probably slightly.

2.—What is the price of No. 20 enameled wire, and how is the insulation cut off insulated wire in making contact for the slider of a tuning coil?

A. 2.—No. 20 enameled wire, 75 cents per pound. Scraped off with a knife.

3.—What is the receiving range of an E. I. Co. electrolytic detector, double slide tuning coil, variable condenser, potentiometer, 1,000-ohm phone; transmitting range of a ¼-inch spark coil and condenser, the aerial in each case being 35 feet high and 40 feet long?

A. 3.—200 to 300 miles; ¼ to ½ mile.

CONDUCTIVE WIRELESS.

(499.) Jacob Landau, Kansas, asks:

1.—Will the "Conductive Wireless System" described in the August, 1909, issue work over a distance of 1,000 feet?

A. 1.—Yes, if the ground plates are separated a considerable distance.

2.—Will the wireless telephone work over the same distance?

A. 2.—Yes.

3.—Can a coherer and decoherer be used as a signalling device for calling with that system?

A. 3.—Yes, for short distances.

CONDENSER.

(500.) T. W. Huntington, Jr., writes:

1.—How much condenser is needed in connection with the E. I. Co. transformer coil?

A. 1.—15 to 20 glass plates 8 by 10 inches, having tinfoil sheets 5 by 7 inches.

2.—What is the capacity of a condenser to be used in the receiving apparatus of a wireless outfit consisting of 21 square inches on each side of insulating material? Capacity of one containing 42 square inches?

A. 2.—The capacity of a condenser can only be determined experimentally. It depends upon the thickness and nature of the dielectric or insulating material.

3.—Why is it that when the aerial is connected to S. P. D. T. switch, the ground to one side and the instruments to the other, the wireless signals are heard louder when the aerial is grounded than when the switch is off altogether?

A. 3.—We are not aware that this is so, although the action may be the same as the double slide tuner.

DOUGHNUT TUNER.

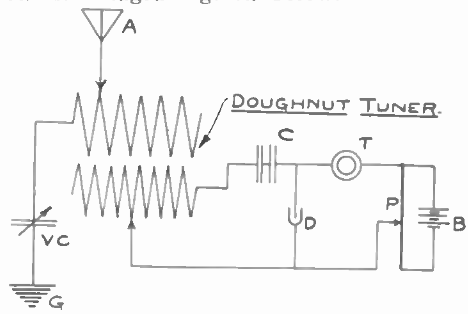
(501.) John L. Coppo, Vermont, asks:

1.—How many square inches of tinfoil must I use to make a .005 microfarad condenser, using enclosed paper as insulation?

A. 1.—It is impossible to state dimensions for building various condensers. They must be built and the capacity determined experimentally afterward.

2.—Please give diagram of connections for a doughnut tuner, electrolytic detector, fixed condenser, variable condenser, 1,000-ohm phone and potentiometer.

A. 2.—Diagram given below.



3.—How far can I receive with the above instruments, and an aerial 30 feet high and 45 feet long?

A. 3.—200 to 300 miles.

RESISTANCE.

(502.) MURRAY S. RICE, JR., Kansas, writes:

1.—When a resistance is introduced into an electric circuit, is it the voltage or amperage, or both, that is diminished?

A. 1.—It depends whether the resistance is placed in series in the circuit or in parallel. In the former case it diminishes the amperage and in the latter the voltage. Examples are a rheostat and a potentiometer, respectively.

2.—What is the required voltage and amperage for a 1-inch coil? A 1½-inch coil?

A. 2.—8 volts, 4 amperes. 10 volts, 4 amperes.

3.—What is a simple method of leading in the aerial wire and leading out the ground wire to protect from lightning?

A. 3.—Bore two holes in the window casing and pass a porcelain tube through each. Lead the wires through the tubes. Connect a double pole double throw switch outside as shown in the diagram.

INDUCTION COIL.

(503.) A. BARRETT, Massachusetts, asks:

1.—How much wire and what size should be used on an induction coil having a core 12 inches long and 1 inch in diameter?

A. 1.—A core of the size you mention is large enough for a 6-inch coil. The primary will require 1½ pounds No. 12 D. C. C. magnet wire wound in 2 layers. The secondary requires 6¼ pounds No. 36 S. S. divided into 100 sections, each 4 inches in diameter.

2.—Would an E. I. Co. electrolytic interrupter be any better for this coil than the one I have sketched?

A. 2.—Decidedly so.

LIGHTS FLICKER.

(504.) J. VAN BRUNT, JR., Missouri, asks:

1.—Is the Government station at Fort Omaha still in operation?

A. 1.—Yes.

2.—Could I hear signals sent by them with the following instruments: 3-slide tuner, pair of 1,000-ohm receivers, E. I. Co. electrolytic detector, potentiometer and 80-foot aerial?

A. 2.—Yes.

3.—Why do all the lights flicker when using a ½ K. W. coil and a Gernsback interrupter?

A. 3.—Because it causes a drop in the voltage of the circuit. Use an impedence coil in series with the coil and it will remedy your trouble.

SHOCK.

(505.) W. Scott Libby, Jr., Maine, asks:

1.—From how large a transformer and how large a spark coil can a full shock be taken without fatal results?

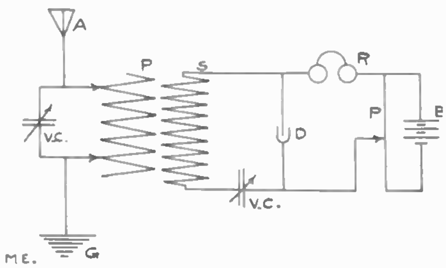
A. 1.—This is a question which it is almost impossible to answer. Fatal shocks are usually accidents in which conditions such as the strength and nervous constitution of the person, the voltage and amperage of the current and the portions of the body through which it passes can not always be determined.

2.—How much and what size of wire should be used on the primary and secondary of a loosely coupled receiving tuner?

A. 2.—Make a hollow primary bobbin 4 inches in diameter and 6 inches long. Wind on it a single layer of No. 22 enameled wire 5 inches long. Make the other bobbin, which is to act as the secondary, 3½ inches in diameter and 5 inches long. Wind it with one layer of No. 28.

3.—Where is the best place in a receiving circuit for a variable condenser?

A. 3.—The diagram below shows two



good positions for a variable condenser.

RECEIVING CIRCUITS.

(506.) J. B. Kendlehart, Pennsylvania, asks:

1.—How far can I receive under average conditions, with the following: Electrolytic detector, one 1,000-ohm receiver, aerial being 8-wire horizontal 30 feet long and 40 feet high?

A. 1.—150 to 200 miles.

2.—Will making my aerial 4-wire and 60 feet long improve it?

A. 2.—Somewhat.

EDISON BATTERY.

(507.) R. P. Glover, North Carolina, writes:

1.—How may I construct an Edison primary battery of 150 ampere hours capacity; i. e., how to construct the copper oxide and zinc plates?

A. 1.—We would advise that in place of making the electrodes that you buy them and not only save time and expense but also in the end have a better battery. The copper oxide plates are formed under hydraulic pressure which results in a solid mass having a low electrical resistance.

2.—Where may I obtain the chemicals?

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

INDUCTION COIL.

(508.) J. VINCENT MURRAY, Illinois, asks:

1.—If a 2-inch induction coil could be used in wireless, and at what distance?

A. 1.—A 2-inch coil will have a range of 10 to 15 miles if used with an aerial 40 to 50 feet high, a sending helix, zinc spark gap and condenser.

2.—Could you refer me to some good works on experimental electricity and wireless construction?

A. 2.—We would recommend "How to Make Wireless Instruments," postpaid, 25 cents, and "Wireless Telegraph Construction for Amateurs," by Alfred P. Morgan, price, $1.50. The latter book is in press. Both are obtainable from MODERN ELECTRICS Publication.

WIRELESS QUERIES.

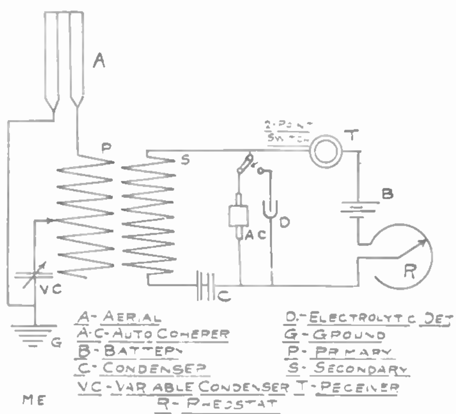
(509.) A. I. DEAN, Indiana, writes:

1.—Does an independent vibrator or interrupter have to be used on the E. I. Co.'s ½ K. W. transformer coil if 110 v. 60 cycle A. C. is used?

A. 1.—Yes; otherwise the secondary voltage is too low.

2.—Please give a diagram for connecting a loop antenna, a tuning transformer, an electrolytic detector, an auto coherer, rheostat, battery and 75-ohm receiver.

A. 2.—Diagram given below.



3.—How far could I receive with the above instruments?

A. 3.—100 to 300 miles with the electrolytic detector and 25 to 40 miles with the auto coherer.

CODES.

(510.) CHAS. F. LOLSTEIN, writes:

1.—I have an aerial 50 feet from the ground. How could I receive messages from parties having an aerial 25 or 30 feet from the ground?

A. 1.—A difference in the height above ground of two aerials does not materially affect their ability to interchange messages.

2.—What code is mostly used in commercial stations?

A. 2.—Continental and Morse.

3.—Do some of the commercial stations use numbers instead of call letters?

A. 3.—Not to our knowledge.

DIFFICULTY.

(511.) C. E. WOOD, Michigan, writes:

1.—I cannot receive from any of the following named stations: Grand Rapids, Holland, Kalamazoo and South Haven, although my station is within 35 miles of them. My apparatus consists of a single-slide tuning coil, a variable tuning transformer, carborundum and microphone detectors, one 400-ohm receiver and one 75-ohm receiver on head band and a German silver wire potentiometer. What can be the trouble?

A. 1.—It is probably in the adjustment and arrangement of your instruments. One of the first changes we would recommend is to use either two 75-ohm phones or two 400-ohm. Two different resistances so far apart can not work well together.

2.—Give diagram of a "compromise" aerial.

A. 2.—A "compromise" aerial is one which is neither horizontal nor vertical, but slopes.

AERIAL.

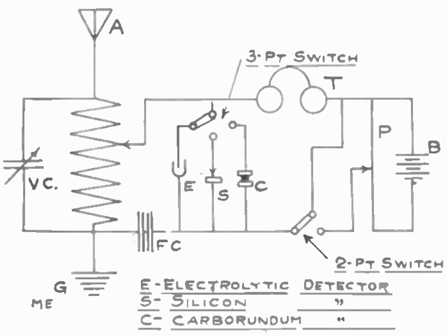
(512.) CARL CROPP, Illinois, asks:

1.—How far could I receive with a 5-wire aerial 50 feet high and 79 feet long, double slide tuning coil, pair of 2,000-ohm receivers, fixed condenser, variable condenser, potentiometer, silicon carborundum and electrolytic detectors?

1.—350 to 500 miles.

2.—Give diagram of connections for above instruments.

A. 2.—Diagram given below.



3.—Does it make any difference how many wires you have in an aerial, whether 4, 5 or 6?

A. 3.—Yes, increasing the number of wires increases the capacity and also the efficiency of an aerial.

CLASSIFIED ADVERTISEMENTS.

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

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

Advertisements for the April issue must be in our hands by March 25.

ELECTRICAL APPARATUS.

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

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LIMITED INVESTMENT OPPORTUNITY in a Telephone Manufacturing Plant, established, flourishing business. Particulars, Manufacturer, care Modern Electrics.

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ELECTRICAL BOOKS, BLUEPRINTS, ETC.

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

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FOR SALE.—Practically new set Cyclopedia of Applied Electricity in five volumes, well bound in half morocco leather. Treats of dynamos, motors, storage batteries, current measurements, wiring, telegraph, telephony, exchange, lighting, railways, power stations, alternating current, power transmission, etc. Cost $19.00—will sell for $8.00. Address, Henry Ward, 124 East 52nd street, Chicago, Ill.

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WAVE LENGTH figured mathematically by the only right formula. 2 vVLC 35c. For further particulars write Crockford, Bristol, R. I.

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HOW TO RENEW EXHAUSTED DRY BATTERIES at cost of one cent each. Formula and complete directions, 25 cents (stamps). Acme Publishing Co., Newburgh, N. Y. A.P.

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DRY BATTERIES EXHAUSTED can be renewed for one cent each; simple, scientific instructions, 25 cents. Satisfaction guaranteed. Dirigo Sales Co., Bath, Maine.

When writing please mention "Modern Electrics."

COMPLETE FORMULAS for calculating condenser capacity, helix inductance, and exact wave length; with table of inductivities of dielectrics, 25c. No stamps. H. W. Secor, 14 Barbara street, Trenton, N. J.

When writing please mention "Modern Electrics."

WE HAVE A NUMBER OF EXCELLENT photos of amateur wireless installations, aerials, etc. You can get excellent ideas from these pictures, which show how the other fellows construct and arrange their instruments. Many are suitable for framing and will add greatly to the appearance of your own station. We are offering a limited number at 10c. each. Speak quick. First come, first served. Modern Electrics Publication, 84 West Broadway, N. Y. City.

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WIRELESS

WIRELESS FIENDS!

Phosphor Bronze Aerial Wire as used by Government, the best yet. Just imported 25,000 feet. 1½ ct. per foot. Bornite and Zincite, the most sensitive combination, 50 cts per set. Zincite and Copper Pyrites, 50 cts. per set. Silver plated brass cup for mounting crystals. 10 cts. each. Sliders (for square rod ¼-in. x ¼-in.) with ball and spring. 15 cts. complete. Black Asphaltum, Black and White Shellac, liquid ready to use, large bottle, 25 cts. Electrolyctic Detector, 1909 style, 75 cts. each. Spool containing 1000 Ohms No. 50 Copper Wire, 60 cts. Silicon or Molybdenite, large piece 15 cts. Send postage stamp for 128 page Catalog.

Electro Importing Co., 86-2 West B'way, New York.

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YOU BET

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

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WIRELESS APPARATUS set up reasonably and neatly. Medium amount expense. Age 16. Write for prices. Ray P. Wilson, Highland avenue, Metuchen, N. J.

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VARIABLE CONDENSERS; solid mahogany, 25 aluminum plates 3 by 4 inches. Size over all, 8 by 3 1-2 inches. Complete, by mail, $2.75. 300 feet No. 28, 125 feet No. 24 enameled wire, 25 cents. Cardboard tubes, 5 inch to 2 inch. Middlesex Wireless Supply Company, 94 Antrim street, Cambridge, Mass.

When writing please mention "Modern Electrics."

THREE-SECTION TWENTY-FOUR FOOT iron aerial mast, complete with reducers and socket for base. Upper sections drilled for guy wires; with cap on top to prevent grounding caused by water collecting in pipes. Pulley attachment for raising or lowering antenna. Bottom section 2 inch, upper, 1 inch. Threaded, ready to put up. Just the thing for amateurs. Price, complete, $4.50. Pittsburgh Wireless Mfg. Co. 1522 Center avenue, Pittsburgh, Pa.

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SPECIAL PRICES. 1,000-ohm wireless receiver, double pole, special thin diaphragm, hard rubber case, wound with copper wire, $1.75. Leather covered head band, double, $1.00; single, 0.60. "National" receiving condenser, $.30. Waterhouse Bros., Bourne, Mass.

When writing please mention "Modern Electrics."

LATEST IN WIRELESS. Miller's Low Voltage Miniature Batteries, stand short circuit 1,000 hours. O. K. how to regulate to millionth of volt, with battery, 30c. A. H. Miller, 382 Brooklyn, Detroit, Mich.

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FOR SALE.

FOR SALE, 8-inch spark coil, almost new, $50. H. C. Mummert, Alliance, O.

FOR SALE. 1 K. W. wireless outfit. Outfit was made to order. Fine workmanship. For particulars apply to "H. D. D.," 4 Brentford Hall, Cambridge, Mass.

FOR SALE. A 250 Watt 10,000 volt transformer, with condenser and helix, for $26.00 Mark Davids, 958 Grand View street, Los Angeles, Cal.

FOR SALE, Wireless Receiving Outfit, complete. Fine condition; bargain. N. H. King, 36 Webster street. New Haven, Conn.

FOR EXCHANGE. $15.00 magneto, worth $8.00, will exchange for a good induction coil. Harold Beverage, North Haven, Mass.

SALE OR EXCHANGE. 6 volt storage battery, telephone, telegraph instruments, other electrical goods. A1 condition. Want cornet, or cheap for cash. Write for description. Frank R. Burkhardt, Milbank, S. D.

When writing please mention "Modern Electrics."

SPARK TELEGRAPHY VS. WAVE TELEGRAPHY.

(Continued from Page 322)

tion, that can be said to have a wave-length somewhere near that of the etheric wave, some of its energy is absorbed and transmitted to the ground. This wave being of the "damped" variety has no other wave back of it to push it forward, consequently is not nearly as efficient as one of the undamped variety, but of the same power, other conditions being the same. So that undamped waves will transmit much farther over land than can be done at present with the same power with the spark method; these waves come to the tree or obstruction the same as the damped waves, but they have other waves of the same length, power, etc., behind them to push them forward.

Another point in favor of the arc system is its ability to use more power than is possible with the transformer method, supposing a transformer were made of 100 K. W. capacity, what would it cost in the first place? How could they handle the secondary discharge? How much of a condenser would they need? Yet it is entirely feasible and practical to use an arc of this capacity. It would be almost noiseless in its action, not dangerous in operation and first cost nothing, compared to that of the transformer, and last of all more efficient in the long run.

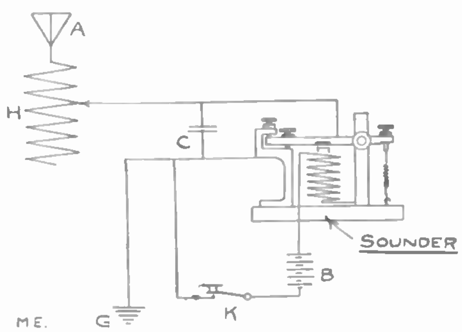
And yet another point in favor of the arc method of creating waves, it may be used as a wireless telephone. This being almost, if not, impossible by means of the transformer.

The only thing against the arc as a means of creating undamped waves at present is the fact that Valdemar Poulsen has the world at his mercy as far as the basic patents are concerned on his arc. His patent papers say: "An arc enclosed in an atmosphere of hydrogen or any hydrogeneous vapor."

So far investigators in this country have been unable to find an efficient method of utilizing the arc which does not infringe on these patents.

CORRECTION.

Please note that diagram sent with my article, "Sending Wireless Messages with a Telegraph," in the Experimental Department of your magazine, was incorrect. It should have been connected



as shown here. The armature should be connected so as to buzz or vibrate when key is pressed.

RAY HUTCHINS.

Spring

ANNOUNCEMENT

The accompanying cut (actual size) shows our new hard rubber ball-bearing slider (Patented Feb. 1, 1910). It is the acme of perfection and surpasses in efficiency, quality, accuracy, any slider ever placed on the market.

As it is non-metallic, it slides over the rod with astonishing ease. **NO MICROPHONE CONTACTS** possible with this slider, no jars in the telephone. The ball is pressed evenly on the tuning coil wire, while the spring (which makes contact with the rod) presses firmly on the ball ensuring perfect contact at all times.

The construction of the slider is so perfect, that it can never stick, but responds at once and quickly, with astonishing ease. **ALL OUR INSTRUMENTS ARE EQUIPPED WITH OUR NEW PATENT SLIDER**, beginning March 10th, **WITHOUT EXTRA CHARGE.**

NOVEL FEATURE:. While our standard slider is black hard rubber, we have devised the same slider in **BRIGHT RED** composition, for the Aerial slide and therefore equip all our double slide tuners, couplers, etc., with one black and one red slider. This original feature, is a distinctive departure. We lead as usual.

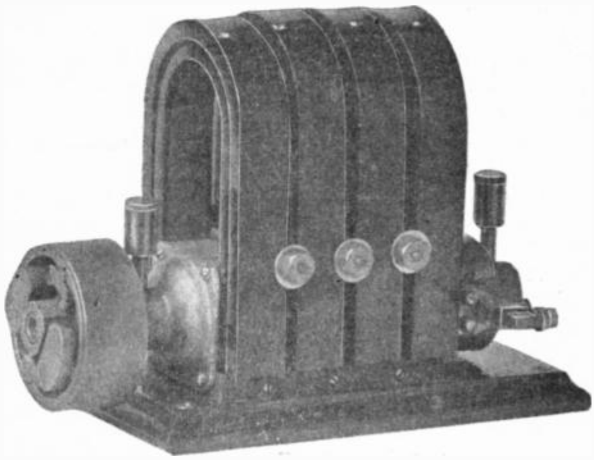
Our new slider fits any ¼-inch rod.

Hard Rubber Slider, complete with ball and spring, by mail

20 CENTS

Red composition slider, complete, same price.

MAGNETO POWER GENERATOR, 12 Volts, 20 Amperes.



At last the machine par excellence! It took a long while to perfect it, but we have it at last.

This machine is the acme of perfection and for the money, unquestionably the greatest bargain ever offered.

The machine has been designed for practical work, **TO LIGHT UP A HOUSE WITH 20 12-VOLT 16 C. P. TUNGSTEN LAMPS,** to run large spark coils for wireless, etc., etc..

Runs from any engine or other motive power. Requires but 1-6 horse-power.

The armature is 8 inches long and a masterpiece in every respect. It runs in heavy bronze bearings, which were designed to stand a continuous 12 hour run. Two large self-feeding oil cups provided. Machine is furnished with automatic patent speed regulator as shown in cut.

Four large, double laminated magnets, with amazing power, are provided. We furnish either friction or belt pulley. Price is the same.

Heavy oak base with 4 metal studded holes to fasten machine is furnished.

Size of machine. 11 inches by 6 inches by 4 inches.

Weight 12 pounds.

GUARANTEED FOR ONE YEAR.

PRICE 12 DOLLARS

Extra!

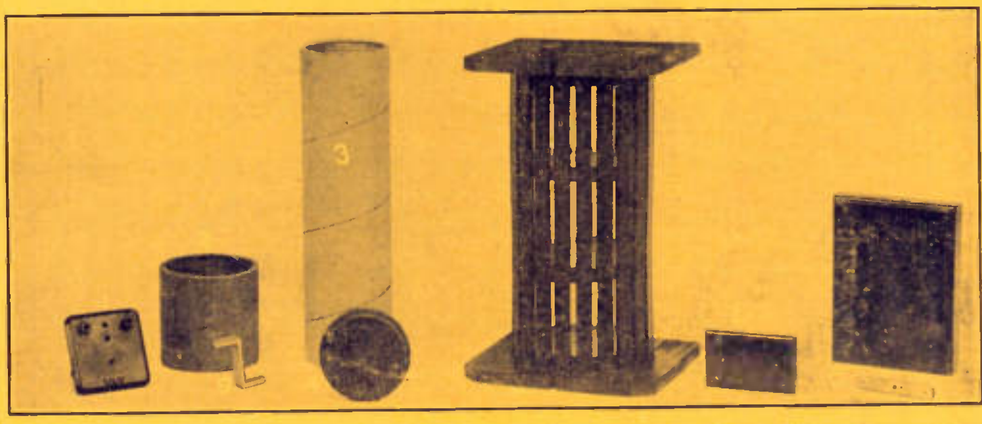
DURING THIS MONTH ONLY

Enameled wire, unquestionably the very best for tuners and loose couplers, spark coils, etc. Used on all wireless instruments.

No. 20 B. & S., regular price per lb. .... $ .88 cts.; NOW 65 cts.
No. 24 B. & S., regular price per lb. .... $1.02 cts.; NOW 70 etc.
No. 28 B. & S., regular price per lb. .... $1.38 cts.; NOW 95 cts.

Comes wound on handy tin spools, wound evenly.

Bargains



PARTS! PARTS!! PARTS!!!

We have had a great demand for above parts and we finally decided to sell them separate to our friends. All parts are well finished and the same as used on our instruments.

No. 1. Electrolytic detector base, hard rubber, 3x3x¼ inches, each ....20 cents. By mail 5 cents extra.

No. 2. Cardboard tube for loose coupler, 3¾ inches long, I. D. 3½ inches, ¼ inch thick, each 15 cents. By mail extra 8 cents.

No. 3. Cardboard tube for tuners, 12 inches long, I. D. 3⅛ inches, ¼ inch thick, each......25 cents. By mail extra 12 cents.

No. 4. Oak detector base, polished, 3½ inches diameter, ½ inch thick, each ....15 cents. By mail extra 4 cents.

No. 5. Large tuner frame (No. 8486) for single or double slide, finished in oak. Diameter of drum 6 inches; length, 11½ inches; ends, 7½x6½ inches;, with holes and grooves, each $1.00.

No. 6. Oak detector base, polished, square, 2½x3½x½ inches, each ....15 cents. By mail extra 4 cents.

No. 7. Fixed condenser box, in polished quartered oak, with holes and slide bottom, 8½x6½x1 inch, each ....35 cents. By mail extra 12 cents.

No. 8. Aluminum bridge, as used on our No. 9220a zinc gap, 3x½x¼ inch, with holes, by mail, each ....18 cents.

No. 9. Aluminum detector bracket, as used on our No. 9002 detector, 2 inches high, ½ inch wide, with all holes, each ....25 cents. By mail extra 4 cents.

ALUMINUM PLATES

Cut to size, any thickness from 1-32-inch up.
90 CENTS PER POUND.

Standard size sheets, 24 inches by 24 inches.
65 CENTS PER POUND.

Figure as follows:

1-32-inch weighs 8 ounces per square foot.
1-16-inch weighs 16 ounces per square foot.
1-8 -inch weighs 32 ounces per square foot.
1-2 -inch weighs 138 ounces per square foot.
1 -inch weighs 276 ounces per square foot.
Between sizes in proportion.

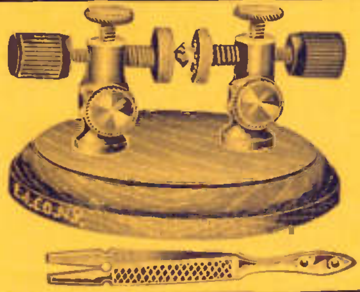
UNIVERSAL DETECTOR STAND

The best for the experimenter. Can be used with any substance. Is equipped with a pair of tweezers to put small pieces to be used in experimenting, in place.

As we are discontinuing this article for patent reasons, we offer it while supply lasts, for

65 CENTS

By mail extra 12 cents.



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