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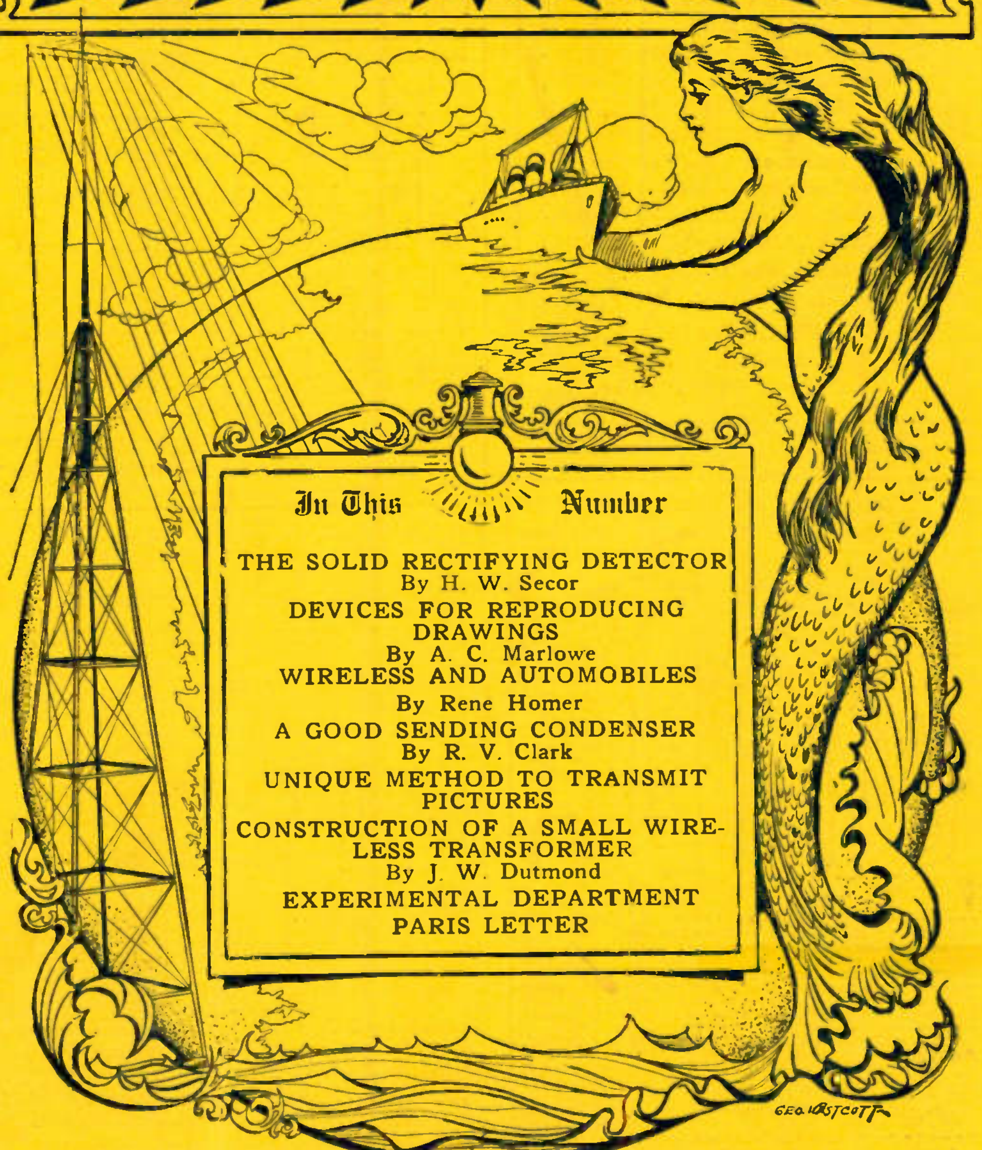

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THE SPIRIT OF WIRELESS

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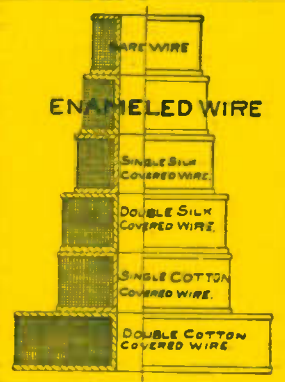

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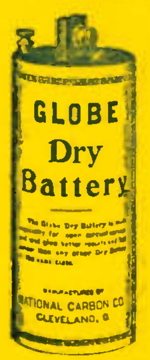

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Modern Electrics

VOL. III. SEPTEMBER, 1910. No. 6

Devices for Reproducing Photographs or Drawings.

By A. C. Marlowe.

(Paris Correspondent Modern Electrics)

The new apparatus invented by M. Edouard Belin, of Paris, is designed to reproduce photographs at the receiving station, and has already proved very successful over a long line. M. Belin uses the slight relief surface of a photograph film in order to produce corres-

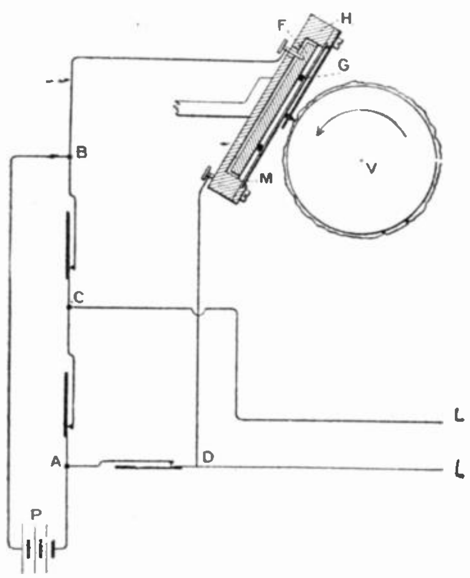


FIG 1

ponding changes in the resistance of the circuit. The film is wrapped about a cylinder which quite resembles a phonograph cylinder, as seen in Fig. 1. The transmitter has a special kind of microphone, using the box H. which contains a carbon disc, F, at the back. Upon the disc is placed a thin insulating disc having three holes of 1-10 inch diameter and a carbon grain is placed in each hole so as to make the microphone contact with the carbon disc. The three grains are mounted so as to form an equilateral triangle and thus give an equal distribution. Upon the grains is placed a vibrating diaphragm of carbon, 0.03 inch thick. To transmit the movement from the photographic film to the microphone there is used a double point mounted on a spring blade. One of the points bears constantly on the film and the other against the microphone, so that the latter receives the differences of pressure due to the varying relief of the film. Connection is made between the metal part of the box on one hand and the carbon plate on the other so as to give the microphone action and the resulting variations of resistance in the line L.L. The present form is found to be the best for obtaining a good variation of current with the pressure, and an important point is that the same pressure always corresponds to the same value of the resistance, and when there is no pressure the value always comes back to zero.

At the receiving end is a similar rotating cylinder carrying a sheet of photographic paper or a film, and the currents are received in a galvanometer device which throws a variable spot of light on the paper. A Blondel oscillograph with a swinging mirror in a strong magnetic field is used here. A strong current thus gives more swing and a weak current a less swing. The beam of light passes first through a short color screen graduated from dark to light. so that

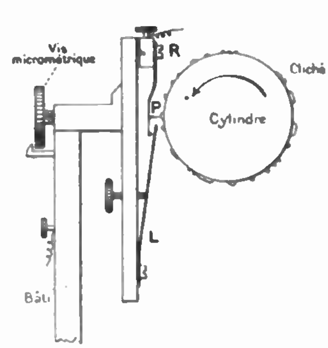
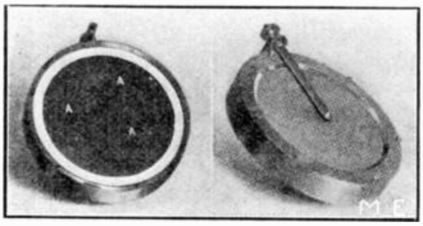


FIG 2

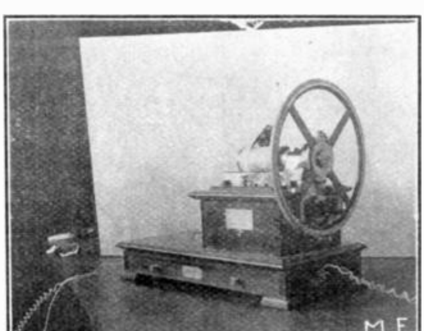
when the beam is at zero it occupies the dark end of the screen. A swing of the beam brings it to the more or less transparent part, and the resulting beam will thus depend in value upon the strength of the current. One of our views shows the complete apparatus, with the transmitter drum and also the receiver which is enclosed in a light-proof box.

As the microphone is very sensitive to pressure, a very slight relief can be used on the film, and this is in fact necessary in the present instrument. Carbon paper



Transmitter of Belin Machine, Open and Closed. A, A, A, Shows Position of Carbon Grains.

prints can be also employed, and in general the relief is hardly perceptible. It is stated that the apparatus has been tested over a 1,200 mile telegraph line with good results. One of our views shows the good detail which can be obtained here. It is of course an easy matter to reproduce line drawings with the apparatus, and in this case the microphone is replaced by a simple contact device, Fig. 2, consisting of a stiff metal piece, L, and a very flexible spring, R. An exploring point, P, runs over the image and where there is a line which gives a relief, the contact is broken between R and L. Such lines are given by photographic processes or by making drawings with special ink. In the receiver the beam passes simply through a



Belin Receiver.

small hole in a screen which covers the rotating paper or film. When no current passes, the beam lies in a position where it does not pass through the hole, but when current passes in the galvanometer the beam is deflected so that it is sent through the hole and thus makes an impression on the paper. However, the reverse of this action can be used, in order to produce a positive or a negative.

The inventor expects to be able to transmit photographs by submarine cable in the near future, and this is not unlikely, owing to the small currents which are employed. The effect of capacity in the cable is a difficulty inherent in this class of work which he expects to overcome.

One of the most recent instruments for reproducing black and white drawings is the Teleautocopist, which has been invented by M. L. Semat, of Paris and constructed at the Ducretet establishment in its present form. What is desired here is not so much the question of novelty as to obtain a good practical instrument for such use. The principle is the one with which we are familiar, that is, a transmitting cylinder is

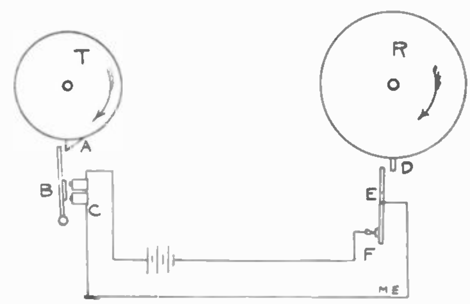
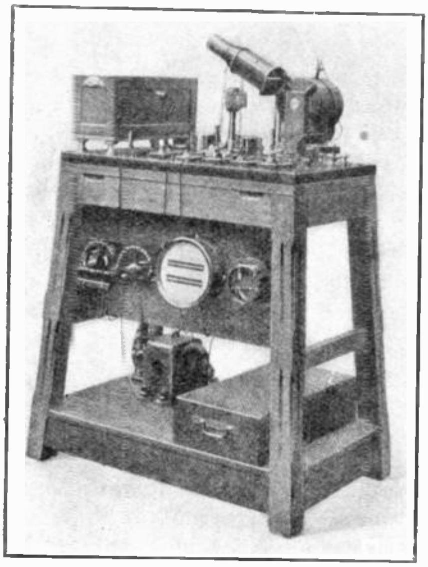


FIG. 5

wrapped with metal foil carrying a drawing in insulating ink. A metal point covers the drawing and there are makes and breaks in the circuit according to the passage of the point over the conducting or non-conducting parts. At the other end is a receiving cylinder with an electro-magnetic tracer which acts according to the impulses of the current. In the present case the tracer has a metal point which bears upon carbon paper, this being wrapped about a sheet of white paper. The pressure of the metal point thus gives the black portions of the drawing upon the paper.

To obtain synchronism between the transmitting and receiving cylinders, M. Semat uses a modification of the method with which we are familiar. In our previous account of Dr. Korn's system we mentioned this method. The transmitting cylinder is kept at the standard speed of say 100 revolutions per minute (as shown by an indicator) while the receiver is worked at a slightly less speed of 99 revolutions. At each revolution, the transmitter reaches the zero point first and is there stopped by a catch device. Very shortly after the receiver reaches the zero point and it makes a contact which releases the transmitter by an electromagnetic device, so that both cylinders start off at the same movement. The synchronism is thus corrected at each revolution. M. Semat prefers to make the receiving cylinder, T, Fig. 5, of 8/7 the circumference of the transmitter and to run each instrument at the same standard speed, while the two cylinders run at the same periphey speed by means of proper gearing, so as to record the image exactly. The projecting point, A, of the transmitter reaches zero before the receiving cylinder, and is there stopped by the electromagnetic device, BC. When the point, D, of the receiver now comes to zero, it works the lever, E, so as to open the contact, EF, for an instant and thus release the transmitting cylinder at A. Both cylinders thus start on the second revolution at the same time. The present apparatus works very well in practice, and has the advantage of a simple construction. The present illustrations show the results which the apparatus gives.



Semat Receiver and Tran•mitter.

Sample of Picture Transmitted with the Semat "Teléautocopiste."

Another Sample of the Semat Machine. Such A Picture Will Greatly Simplify Police Operations to Capture Criminals.

A complete wireless telegraph service for the Philippine Islands is planned by the insular government.

The Solid Rectifying Detector.

By H. W. Secor.

FOR the past three years there have appeared numerous contributions on so-called "thermo-electric and crystal detectors"; the action of which is not thermo-electric at all, as will presently be shown, and which has caused such detectors as the silicon, perikon and pyron to be classed as thermo-electric.

Mr. G. W. Pickard, of Amesbury, Mass., who has developed the solid rectifying detector to its present high efficiency, has made exhaustive tests on them, which conclusively prove that their action is the same as an electrolytic rectifier, (i. e. they allow current to pass through in one direction only) or rectifying, and not thermo-electric, as the earlier investigations of Fleming,* Pierce† and others seemed to show, but whose theories have proven untenantable.

The first important account of the rectifying properties of certain minerals was probably given in an article published in 1874 by Ferdinand Braun[1]. In his experiments, the principal tests were made upon the mineral "tetrahedrite," a compound of antimony, copper and sulphur, with a slight amount of other matter replacing a portion of the copper.

This mineral was connected into a circuit containing a galvanometer and pole-changer, potentiometer and battery. Two silver wires with rounded ends pressing against the crystal, served to conduct current to it. When the direction of current flow in the circuit was reversed by means of the pole-changer, the galvanometer indicated a much larger deflection with one polarity than the other; the ratio of difference being sometimes as high as 3 to 1; as noted by Braun, however, this action could not be attributed to thermo-electric action, as when an impressed E. M. F. of 15 volts, was applied, some minerals have manifested a unilateral conductivity or rectifying action many times greater than can be satisfactorily accounted for by thermo-electric action.

*Cassier's Magazine, Vol. 34, September, 1908, pp. 458-464.

†Physical Review, June, 1907.

1—See "The conduction of a current through sulpho-metals," Poggendorf's annalen, Volume 153, 1874, page 550.

However, Braun's methods of observation were such that concordant results were not obtained and consequently they gave rise to the growth of a false theory, based on crystalline structure; but in many of the present types of the solid rectifying detector the mineral used is not a crystal or even crystalline in character, hence the term "crystal detectors" is best abandoned, as suggested in a recent letter to the writer by Mr. G. W. Pickard.

Mr. Pickard, early in his investigations of this type of detector, ascertained that to obtain the best results it was necessary that one of the terminals of the current rectifying conductors, must not only have a perfect contact but also a large area, as otherwise the second contact, if of small area, will act as an opposing rectifier, which would cause the observable rectifying action to be very much reduced or atlogether absent.

Another vital and interesting feature noted, was that the direction of rectification was always the same for the same conductor; the position of the contact of small area in relation to the crystal faces not making any difference.

It is also worthy of notice that a test upon several "amorphous rectifying conductors," including the non-metallic element silicon, and solid solutions of metallic oxides, (notably zinc oxide,) in readily fusible silicates, disclosed the facts that they possessed verv marked rectifying properties; (the rectification being always in the same diretcion for the same conductor) and furthermore optical and other tests proved the entire absence of regular crystalline structure in their formation.

In some of the early detectors experimented upon by Mr. Pickard, the thermo-electric currents (generated when the detector was connected up as a thermo-couple) were in the same direction as the rectified current tending to support the "thermo-electric theory" of the action, but shortly afterward, a test upon a number of rectifying conductors as for example (impure silicon) brought out the fact that their thermo-electric current was in the opposite direction to the rectified current; thereby proving conclusively that the action could not be "thermo-electric."

This fact was also independently discovered by Austin‡, (the English experimenter); i. e. the opposition of the thermo-electric and rectification action, hence the deep seated theory, that these detectors depend for their operation, upon the presence of heat developed by the incoming electrical oscillations, passing through the junction of two dissimilar conductors should be discarded; since the tests cited, give sufficient proof that it is untenantable.

It is suggested by Mr. Pickard to term the detectors of the mineral type, "solid rectifiers," or "solid rectifying detectors" to distinguish them from the electrolytic and gaseous rectifiers.

There are four of the solid rectifiers, tested by Mr. Pickard which have come into practical use, as efficient wave detectors, viz.: the silicon, zinc oxide (or perikon), molybdenite (molybdenum sulphide), and pyron (iron sulphide); of which the perikon has proved the most sensitive for the reception of wireless signals, besides being very reliable.

Fig. 1 shows the characteristic curves of the three first mentioned detectors, when in their most sensitive condition for wireless work. In the preparation of these curves, the rectifying conductors were in all cases, embedded in fusible metal (such as "woods metal"), so as to give a large and perfect contact for the non-rectifying terminal, while a rounded brass point on the silicon and molybdenite, served for the contact of small area, or rectifying terminal. For the perikon detector a fragment of chalco-pyrite (or copper-iron sulphide) was used as the contact of small area.

The pyron detector,** employs a metal point in contact with the polished face of an iron pyrite crystal, this point being the rectifying terminal. This detector exhibits remarkable electrical stability and can withstand the gunfire on a battleship, without interfering with its adjustment or efficiency. The detector stand is very rugged in design, which was found necessary for the proper working efficiency, besides having a very fine adjusting screw, (60 to 80 threads per inch).

The author has worked with the "Pickard Pyron Detector" and finds its very sensitive, besides requiring only occasional adjustment.

Referring again to the curves in Fig. 1, the in and out conductance of the various detectors, is given in micromhos (the mho being the unit of conductance) or reciprocal megohms; thus the conductance of the perikon detector at zero voltage is forty micromhos corresponding to a resistance of 25,000 ohms, or one-fortieth megohm.

As these curves show, a small E. M. F. was applied to the detector and in these and other tests it was ascertained that their action was greatly enhanced by such application of voltage; the potentiometer

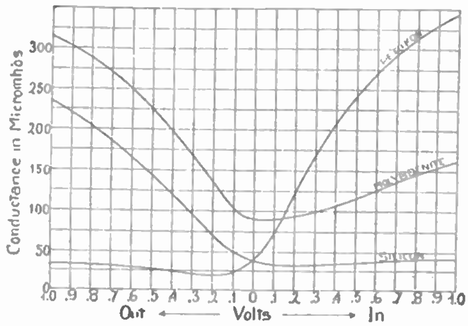


FIG. 1

used being capable of very fine adjustment, and also the proper polarity must be observed in supplying current to them, as the purpose of this current is to bring the conductance of the detector to the steepest part of the curve or the best working value, and to do this the applied current must be so poled as to send current through the rectifier in the same direction as the rectified current. With the perikon detector, the proper value of this applied E. M. F. was found to be about one-tenth volt with the current flowing from the chalco-pyrite into the zincite, or through the terminal of small area.

If the curve for the silicon detector is observed, it will be seen that the best E. M. F. to be applied is about two-tenths volt, in the opposite direction to that employed with perikon; or the current flowing from the silicon, to the brass point. With the molybdenite detector, the best results are obtained when the

‡See, "Wireless Telegraphy, a Hand-book of," by J. Erskine Murray, D. Sc., pp. 140. Second edition.

**See patent No. 933,263, "Oscillation Device," G. W. Pickard.

local applied E. M. F. is .4 to .6 volt, the current flowing from the molybdenite to the brass point.

It is not generally supposed that the solid rectifying detector, is of any particular use, outside of its wireless receiving abilities, but Pickard has shown them to afford the best means of measurement for very weak alternating currents, such as those encountered in wireless receiving circuits energized from remote sources. Using a perikon detector he found that a received oscillation, strong enough to give an appreciable sound in the telephone receiver, would give a measurable deflection on a galvanometer in the same circuit. The galvanometer used was a 2,000-ohm instrument of the D'arsonval type; giving a scale deflection of 1 millimeter, for 2×10^{-9} ampere, at a distance of one meter. A much more sensitive galvanometer may be used on circuits free from interference and extraneous currents, such as exist on wireless receiving circuits. Using such an instrument, signals which will not give the faintest sound in the telephone receiver are capable of being measured.

The galvanometer had a period of 10 seconds; thus its action was accumalative which (remembering that the action of a telephone is practically instantaneous) accounts for the above phenomena.

The question naturally arises, then, why is the galvanometer not resorted to, if it can register signals beyond the range of the best telephone receiver; which is answered by the fact that if the period of the former instrument is shortened, which would be absolutely necessary in practice, the advantage of any accumulative action would be lost.

It may be of interest to note here the amount of electrical energy required to operate various wireless detectors. The following values are based on the "erg," which is equivalent to (one ten-millionth of a watt);

Prof. R. A. Fessenden[2] is responsible for the following data:

The Marconi filings-coherer required 4 erg per dot. The gold-bismuth detector, 1 erg per dot. Solari (carbon-iron-mercury) receiver and other types of carbon-steel, steel-aluminum, and steel-mercury detectors 0.22 erg per dot. Magnetic hysteresis detector 0.1 erg per dot. Hot-wire barretter 0.08 erg per dot. Liquid barretter .007 erg per dot. In these tests, the detectors were adjusted to their maximum operative sensitiveness.

Mr. Pickard ascertained the following values, after much research:

	erg per dot.
Electrolytic detector	.003640-.000400
Silicon	.000430-.000450
Carborundum	.009000-.014000

Wireless detectors were at one time supposed to be the most sensitive intsruments ever used in electrical signalling, and that the received energy at wireless telegraph stations was far lower than ever used previously, but Mr. Pickard has measured the maximum energy of the dots received from a high power wireless station, 90 miles distant, and found it to be .03 ergs per dot. The modern high resistance wireless telephone receiver will respond to an amount of energy as low as one-millionth erg. The electrolytic detector requires one-thousandth to one hundredth erg, to give a signal of equal magnitude, at a frequency of 500,000 cycles. Hence, as noted by Mr. Pickard, the telephone receiver would many times excell the most sensitive detector, if it were not that the former is very inefficient at high frequencies. As will be seen from the foregoing statements, the received energy at wireless receiving stations is hundreds of times greater than that required to operate a telephone receiver; which only goes to prove that the wireless art is young, very young in fact, and what is wanted to make long distance transmission a success, is a detector better than anything we have as yet, and the author prophesies that when this is found, it will be easily possible for the many existing high-power stations to communicate around the world or very near it. Think of a battery made out of silver thimble and an exciting solution giving a visible galvanometer deflection, through two Atlantic cables looped together; and then take a look at one of the present wireless stations, consuming 35, 40 and 50 K. W. of electrical energy to radiate a single little dot 3,000 or 4,000 miles.

The naval wireless station at Newport, R. I., was badly damaged by a heavy thunder storm which passed over the city. In addition to crippling the wireless service at the naval station the lightning struck in numerous places.

2—See Maver's Wireless Telegraph and Telephone Hand-book; fourth edition, 1910.

Wireless and Automobiles.

By René Homer.

ONE of the greatest events each year in the automobile world is the famous Glidden Tour, the annually reliability run of the American Automobile Association. There have been six previous contests, the winners of which have all been awarded the Glidden Trophy, a perpetual challenge prize presented by Mr. Charles J. Glidden, after whom the event takes its name. Mr. Glidden has been an ardent devotee of motoring since its very beginning, having travelled in his automobile throughout every country of the civilized world.

The route this year extends 3,000 miles through the South, Southwest and Middle West, starting at Cincinnati and returning to Chicago.

The Chalmers "30" was chosen by the contest board as official pathfinder for the tour, so that two of these cars will serve as pilot cars for the run, besides the two "30's" entered as contestants for the trophy.

The company has been quietly carrying on, in New York and New Jersey, exhaustive tests of the new DeForest "sparkless" wireless apparatus with uniform success.

These tests have included both the wireless telegraph and wireless telephone, and while it is planned to eventually supercede the wireless telegraph with the wireless telephone, doing away with the necessity of carrying an operator, every chauffeur operating his own aparatus by merely speaking into the transmitter, the wireless telephone tests have not yet been sufficiently exhaustive to guarantee its use during this next tour, although very satisfactory results have been obtained in communication from a moving car a distance of four miles. The Chalmers Company is still carrying on these tests.

In the district selected for the annaul tour this year ordinary telegraph communication will be very difficult and at times impossible. In 1909, although the tour was through a comparatively well settled country, the whereabouts of several of the contestants was not infrequently not known for hours. One car, for instance, failed to report at the night control and no one knew what had happened until the next morning. On another occasion a passenger was injured in an accident and nothing was known of the matter until reported by a belated tourist at the night checking-in, and many minor difficulties were responsible for considerable delay that could have been prevented if the cars had been in communication with the last control.

In the early part of March, successful "radiotone" telegraph tests were made between a Chalmers car in Central Park, New York, and the old Terminal Building at Park Avenue and 42nd Street,

where Dr. DeForest maintains his experimental laboratory. The distance involved varied from one and one-half to three miles in the trial from a moving car, while the experiments with the portable field stations showed that this type of apparatus at least would be able to carry on certain communication up to 50 miles, as the field station was able to keep in communication without any trouble with the Metropolitan and Manhattan Life Towers and Dr. DeForest's factory station at Newark, N. J., and later on from the New Jersey highways near Trenton to the "sparkless" wireless station on the Land Title Building at Philadelphia, over 30 miles away. The complete equipment weighed less than 200 pounds and was similar in design to those used at the Metropolitan and Manhattan Life stations, only considerably smaller.

Field stations which can be put up in five minutes can be operated more successfully, and the same apparatus used

in the automobile, by stopping the machine and securing proper ground, has a range of about ten miles.

The field sending station uses a 100-foot "aerial" secured at one end to a spreader attached to a 48-foot bamboo

telescope mast and leading down diagonally to the top of a 12-foot mast about 90 feet away and thence back to the wireless apparatus about midway between the two poles.

In the latest sets all the apparatus is carried in the automobile and there is no necessity for setting up the apparatus on the ground.

WIRELESS IN HAT.

O. P. GULDEMEISTER, in charge of the electrical department of the Portland, Ore, School of Trades, has invented a wireless telegraph instrument that may be carried in an ordinary derby hat. With the Guldemeister apparatus it is possible to stop almost anywhere, stick a metal cane, which is a part of the device, into the ground, and catch wireless messages. The apparatus has been perfected after two years of experimenting and Guldemeister will install the first complete outfit for practical use on Mount Hood. The sending station will be at Government Camp, and three guides, who have learned the wireless code, will be equipped with the pocket receiver, necessary hat and cane. Thus they will be prepared to keep in touch with Government Camp while they pilot parties up the precipitous slopes to the white-capped summit.

Guldemeister and Lieutenant R. C. Wygant, chief signal officer of the Oregon National Guard, have been experimenting with the instruments for several months, and all tests have given satisfactory results. Lieutenant Wygant has reported the success of the new wireless apparatus to the War Department in Washington, D. C., and has received instructions to continue the experiments, build a powerful sending station at the Armory and perfect the new system as nearly as possible at the expense of the Government. Guldemeister and Wygant will also take the machines to American Lake shortly for demonstrating purposes during the army maneuvers.

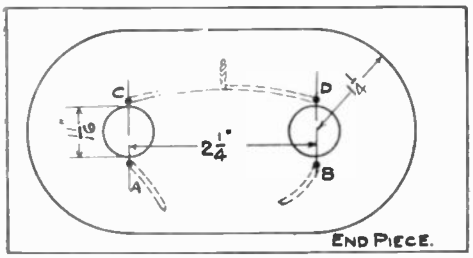
One of the most surprising and successful experiments with the little instrument was made by Guldemeister and Lieutenant Wygant this summer, while aboard an Oregon City electric car on their way to the Clackamas target range. The car stopped for a while because of an accident. While they were waiting Guldemeister attached the cane to the brake of the car, which made a ground connection through the wheels. Lieutenant Wygant was wearing the hat and caught a message passing from Portland to St. Helens.

The Construction of A Small Wireless Transformer.

By J. W. Dutmond.

THERE is hardly a single owner of a wireless coil nowadays who does not wish a transformer, and who does not secretly envy his more fortunate friend who owns one.

The transformer about to be described is designed for the experimenter who wishes to gain experience with trans-



- FIG. 1 -

M.E.

formers without a great outlay of money. After the principles have been learned and some experience gained in the proper use of this instrument a larger and a more powerful one will be in order.

The materials needed are:

4 secondary coils; 1 lb. of No. 20 enameled copper wire; 2 lbs. of soft Norway iron wire, No. 22; 1 lb. of paraffine; ½ yard of Empire cloth.

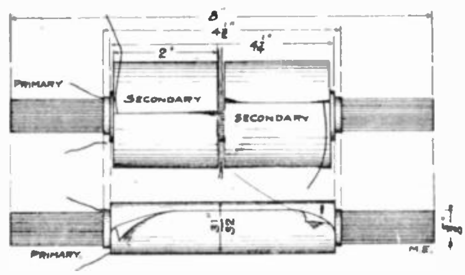
Beside this some thin, strong wood such as cigar-box wood, or, better still, some ⅛-inch fibre is required.

The secondary coils are such as those used in the ½ and 1-inch spark coils and may be obtained from a New York firm who manufactures them. Two pair are required. The iron core wire should be in 8-inch lengths and should be well annealed.

First make a round wooden cylinder exactly ⅝ inch in diameter. Upon this wind 5 or 6 turns of paper, securing the turns with shellac. The paper tube thus formed should be exactly 4½ inches long. Start ⅛ inch from one end of the tube and wind the No. 20 enameled wire smoothly and closely to within ⅛-inch of the other end. Wind three more layers in the same way on top of this, securing each with shellac. Then wind this in turn with a strip of Empire cloth. About three turns of Empire cloth should be put on. The whole is then dipped in melted paraffine and removed from the wooden form. If desired this removal may be facilitated by having the form cut so as to form two wedges. Another tube and winding is now made in exactly the same way. This completes the primary. If the wire was wound closely there should be about 120-125 turns in each layer and as there are eight layers this makes 960-1,000 turns. This offers sufficient impedence so that it may be connected directly to the 110 volt lighting circuit.

Now fill the tubes as full as possible with the iron core wire, allowing the wire to project equally from either end. The more wire you can get into the two tubes the better. There will probably, however, be some left, as 2 lbs. are more than required.

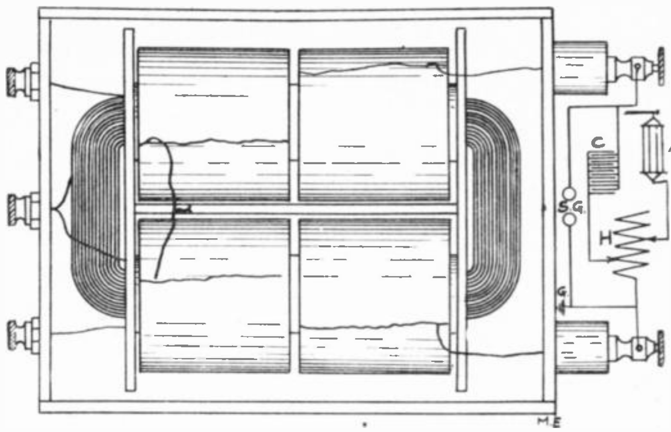
Next cut out two pieces from the ⅛-inch fibre or wood, as shown in Fig. 1. Also cut four square separators of Empire cloth 2½ inches square with a round hole in the center which will fit closely over the tubes.



- FIG. 2 -

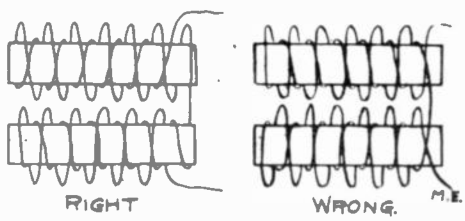
Now slip two of the secondary coils over one of the tubes with two of the Empire cloth separators between. The ends of the secondaries which have the leads coming from the inside should be adjacent. Solder these two leads together and push the two coils within ⅛ inch of each other, pulling the slack of the two leads up between the two Empire cloth separators. Do the same with the other two secondaries, putting them upon the other tube. Fig. 2 shows the appearance of the tubes before and after placing the secondaries.

Now place the two legs, as they are called, parallel and slip the end pieces over the projecting core wires so that they fit over the projecting ends of the paper tubes. Fit a piece of wood or



-FIG 3-

fibre lengthwise between the two end pieces so as to separate the two legs and fasten to the end pieces with fine nails or screws. Connect the outside secondary leads at one end of the transformer together. The other two are connected to binding posts on the hard rubber pillars as shown in Fig. 3. Bring the primary leads out through the small holes in one of the end pieces as shown at A B C and D, Fig. 1. Care must be taken that the leads are connected so that the current would run in the same direction in both coils if they were placed end for end. Fig. 4 shows diagramacally the right and wrong way to connect these coils.



-FIG. 4.-

Now bind the projecting ends of the core wires at both ends of the transformer down one by one against the end pieces so that the ends of the two cores intermesh with each other neatly and bind in place with stiff wire. This completes the magnetic circuit. It is now only necessary to mount the whole in a neat box, in paraffine if desired, connect the primary and secondary leads to their respective binding posts and the transformer is complete.

Fig. 3 shows the appearance of the transformer just before filling the box with paraffine.

The spark of this instrument owing to the large number of turns in the primary is very short—about 1/8-1/16 inch with condenser shunted across gap—but this is not, however, a detriment since the sending capacity depends largely upon the amperage or fatness of the spark.

It would be advisable to use very large spark terminals as the spark is so hot that an arc would otherwise be formed. The writer has found that a couple of parallel steel rods about 1/4 inch diameter and 3 inches long arranged to be brought very close and kept exactly equidistant at all points, is very suitable. A horizontal or slanting aerial about 100 feet long and 50 feet high composed of four strands has been found to be very successful with this instrument.

It is, of course, unnecessary to state that no resistance or interrupter of any sort is used. The primary is simply connected directly to the 110 volt alternating lighting circuit. The connections for the secondary to a wireless outfit are shown in Fig. 3. If desired the two connected terminals of the primary may be attached to a third binding post on the box as shown in Fig. 3. This allows of connecting the legs in parallel which greatly increases the sending capacity, but in this case it might be advisable to use some form of resistance, as the increased current might unduly heat the transformer.

When the sending helix and condenser are properly balanced this transformer should send from 15 to 20 miles quite successfully. It may be rated at about 150 to 175 watts.

It is understood that this transformer cannot be used on direct current, only on alternating current of not over 110 volts.

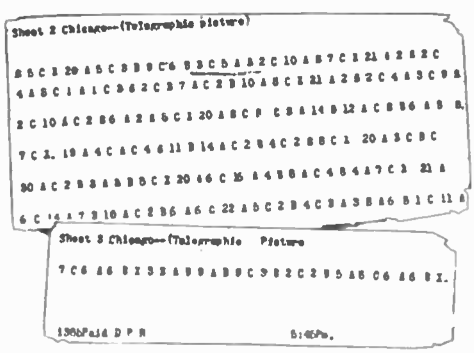
A Unique Method To Transmit Pictures.

A NEW method of transmitting photographs by telephone, telegraph or by any other means of communication for newspaper or magazine reproduction has been originated by Dr. F. Stolfi and Augustus Bissiri, of South Framingham, Mass.

A test of the process was made last month when a photograph of John D. Rockefeller was telegraphed from the Chicago Examiner to the New York American, where it was reproduced. The general likeness, allowing for natural errors in transmission, was fairly good.

The system differs from any tried heretofore. It is not necessary to have a direct wire and no special instruments are actually required, although the inventors have designed two devices to increase the speed of sending and reproducing. One of the machines is, in fact, a modified typewriter.

The principal feature of the process is its simplicity. For transmitting a picture a code of numerals and letters of the alphabet are used. They indicate what parts of the picture are dark or light. For illustration, A means white, B shaded, C black, and so on. When it is between shades two letters are combined, as AB or BC. Any number of



The Telegram of the Picture.

letters may be used, depending upon how delicate the shading of the picture may be.

These figures and letters are obtained in this matter: A transparent piece of celluloid, on which small squares are printed, is placed over a given picture. A scale of the squares is printed along the top of the celluloid. If a white space appears under the first twenty squares on the top line of squares, the operator tabulates A 20, meaning twenty white squares. If the picture under the succeeding squares is black, the fact is registered by giving the letter C and the number of squares which show up black.

John D. Rockefeller—Telegraphed.

An X is placed at the end of each line of squares. The picture is transmitted line by line, the letter X showing the end of each line. The letters and figures are then sent as an ordinary telegram, or could be sent in a letter or by any other means. The first part of the Rockefeller picture, as received from Chicago, read as follows:

B 5 C X 20 A 5 C 3 B 9 C 6 B 3 C 5 A B 2 C 10 A B 7 C X 21 A 2 B 2 C 4 A 8 C 1 B 3 B 2 C B 7 A C 2 B 10 A 8 C X.

There were numerous errors in transmission, in some instances the X having been forgotten at the end of a line, so that in interpreting the dispatch the picture was made too wide at some points and necessarily slightly shorter than it should have been.

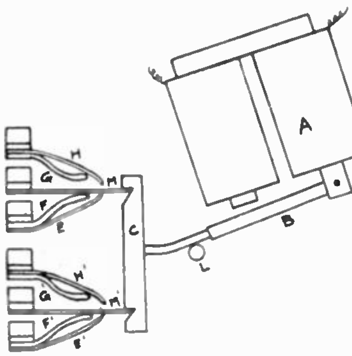
There are two methods of working out a picture from a dispatch. One is by using transparent paper placed on top of celluloid on which are printed the same number of squares as were used in transmission. The other, which was the method employed when the picture reached New York in cipher is to work out the picture on a machine devised for that purpose. In this instance the machine

(*Continued on page 334*)

Paris Letter.

NEW RELAY.

A CONVENIENT form of relay for making or breaking different contacts at the same time is illustrated here. The electromagnet, A, has a pivoted armature, B, which carries at one end a piece of insulating material, C. A stop, L, limits the movement of the armature. In the present case the object is to make and break the contacts between the spring pieces, M M¹ and the tongues, H, E, H¹ E¹. The spring pieces, M M¹ are held in suitable supports and work in notches in the insulating piece, C. Each of the fixed contacts consists of a spring piece, H, which is clamped in a support together with a stiff metal piece, G, the latter acting as a stop in order to limit the movement of the spring. The other sets, FE,



F¹ E¹, etc., are made in the same way. When no current is passing in the electromagnet, the weight of the armature with its insulating block is sufficient to keep it dropped in the sketched position, so that now the tongues, M and M¹, are pressed against the springs, E, E¹, respectively, and we have contact at these two points, while the contact is broken between the tongues and the upper springs, H and H¹. Sending current into the coils, we bring up the armature, so that the tongues, M, M¹, are brought against the upper springs and contact is broken with the lower springs. In practice, the tongues can be set so as to normally make contact with the upper springs, and they are driven down when the armature falls.

CONDENSER RADIOPHONE.

A condenser telephone is used in the following way for radiophony by the inventor, Burstyn, of Berlin. The telephone diaphragm, E, is mounted so as to form a condenser with the two fixed discs, A B. When the microphone trans-

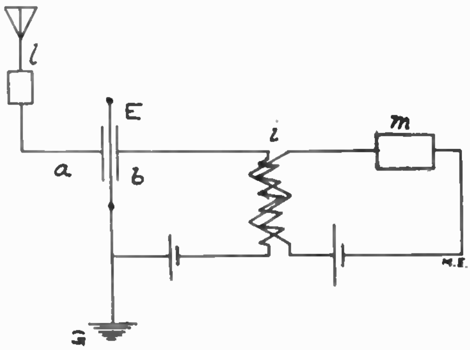


FIG. 1.

mitter, M, varies the potential acting upon the portion, B E, of the condenser the diaphragm, E, is caused to vibrate

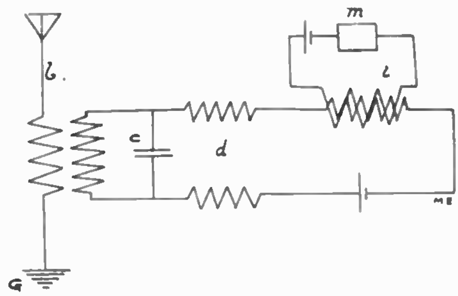


FIG. 2.

and it thus produces changes in the capacity of the aerial system, L. In a second form, the condenser telephone, C, having fixed discs and one or two diaphragms is connected through the choke

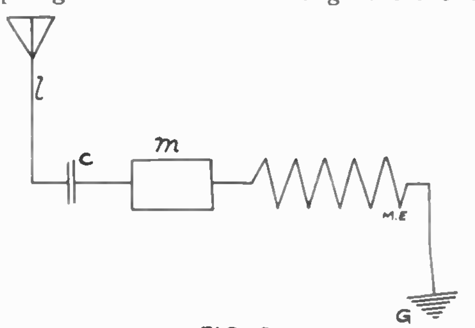
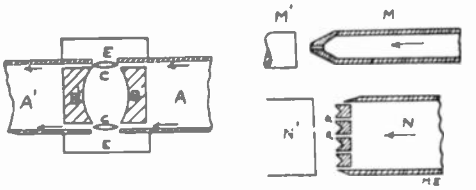


FIG. 3.

coils, D, and the transformer, l, to the microphone transmitter. The fluctuations of the microphone current are reproduced by the condenser, C, and this latter will vary the wave-length of the radiations emitted by the aerial, L. Another arrangement can be used (III) in which the condenser telephone is mounted directly in the circuit of the aerial. The condenser, which can be made in whole or in part of wire gauze, can be enclosed in a vacuum chamber or in a light gas such as hydrogen. A multiple device may be formed by using a number of diaphragms and fixed plates separated by insulating rings, with the various elements of the condenser connected in parallel.

NEW RADIOPHONE ARC.

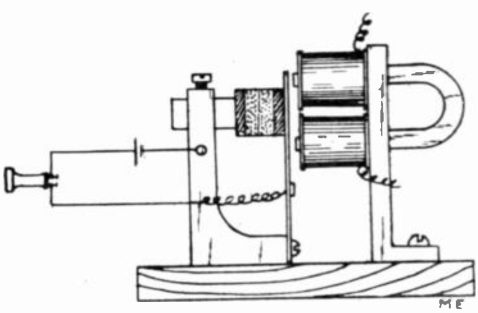
An Italian inventor, Jaciovello, brings out a new method for arcs for use in radiophony. It differs from the Poulsen arc in the fact that a much higher voltage can be used, and also the magnetic blowing is replaced by a stream of gas which is sent in the direction of the arc. Referring to the diagram, the arc is formed between the ends of the metal



tubes, A A', and they are enclosed here in a box, E, of refractory and insulating material. Inside the tubes are the blocks, B, which can contain conducting material and are concave on the inside part. A stream of gas is sent through the tubes as shown by the arrows. The tube, A, is cooled by the gas stream alone, while the tube, A', is provided with a suitable water cooling device. We form the stream by compressing the gas in one tube and rarefying it in the other. The arc is formed between the ends of the tube at C. For radiophone work, the arc is connected as usual so as to obtain the waves, for instance with one terminal to the aerial and the other to ground. A second form of the apparatus is seen at M. One electrode has the form of a tube, M, whose end is drawn out to give a small opening. The arc takes place between the end of the tube and a second electrode, M', having a flat surface. Gas is sent in the tube and it escapes through the opening, following the arc in its path. Another method is to use a number of holes instead of a single one, as in the end of the tube, N. The part around the hole in each case is strengthened so as to form a nozzle, as seen at A.

METAL-GRAIN MICROPHONE

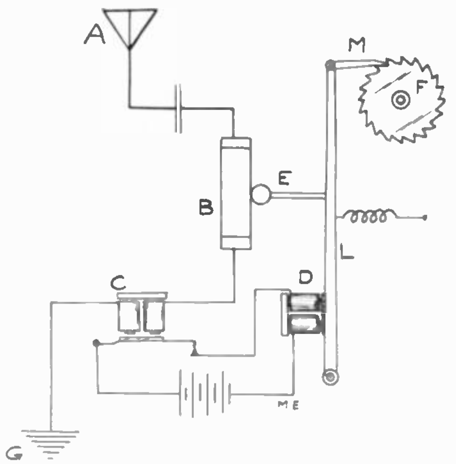
As the result of many experiments, the conclusion has been reached that carbon is the only suitable substance for use in microphone transmitters and metals have therefore been discarded. Contrary to the usual idea, Mr. Brown, an English scientist, finds that superior results can be obtained by using the hard metals, provided that they are employed as he here indicates. Grains of the metal are held between two pressure surfaces, according to the same principle as we find in the carbon microphone. The grains must, however, be suitably prepared. He finds that the best to use is alloy of osmium and iridium which is found in a natural state in the form of grains. An osmium and ruthenium alloy can be also used, but not the commercial powder, and the grains must be obtained by crushing a globule of the metal. This latter appears to be necessary in all cases where the alloy is not found in the natural state. Such grains are extremely hard, and do not become oxydized. For the two pressure surfaces he prefers to use metallic iridium such as is obtained currently in the form of sheets for commercial use. Although



not suitable for the granules as it is softer than the above metals, it answers very well for the surfaces. In practice, the cell is formed by granules held between two pressure surfaces, and the grains are kept in place as usual by a rubber ring. The ohmic resistance of the whole circuit should be the same with respect to the resistance of the microphone cell as we find for the carbon microphone. A low voltage is preferred, and for a multiple contact using granules, it is 1½ to 2 volts. In the case of a simple contact it is only ½ volt. Such a microphone is claimed to give better results than the carbon type. It can also be used for a telephone relay, as illustrated here.

WIRELESS IN WATCH.

It is proposed to make a wireless receiver in the form of a watch in the following way. The aerial, A, has mounted with it the usual coherer, B, relay, C, and ground wire, G. The relay serves to make contact for a second circuit including a battery and electromagnet, D, and this latter operates the lever, L, and pawl, M, so as to cause the ratchet wheel, F, to advance by one tooth each time the electromagnet receives current. A tapper is mounted at E, for the coherer. Around the wheel are placed the letters of the alphabet, so that any one of them appears through a window according to the position of the wheel. When the sending station sends one impulse, we see the letter A, and for two impulses the letter B appears, and so on.



In practice, the device can be worked about as we find in the Breguet telegraph. A hand lever at the transmitting end moves around a dial containing letters and numbers in such way that we make one contact when we stop at the letter A, five contacts when the lever reaches the letter E and so on, then returning to zero. The ratchet wheel at the second station will also follow this movement, and it can be stopped at any desired letter, being afterwards brought around to zero in order to make a fresh start so as to indicate a second letter.

WASHINGTON WIRELESS STATION.

Instead of building a gigantic wireless telegraph tower in Washington higher than the Washington Monument, the Navy Department has decided to construct four towers between 400 and 500 feet in height on the highest available point in the District of Columbia. Permission was asked of the War Department to erect these towers in the grounds of the National Soldiers' Home, Washington, which has an elevation of about 250 feet above the spot on which the Washington Monument stands. The towers will be of steel, of light and graceful design, and may be copied after the wireless masts on the big battleships.

The purpose of the towers will be to afford the Navy Department the best opportunity possible for communicating without interruption with its ships far out at sea, and with the land stations far removed. Tests recently made by the Navy Department lead to the belief that communication with ships in the day-time 1,500 miles away and at night 3,000 miles distant will be possible.

WESTCHESTER WIRELESS ASSOCIATION.

The Westchester Wireless Association has been formed in Westchester Co., N. Y., and is just entering on its second year with every success. At a recent election the following officers were chosen: Stanley R. Maning, President, and Ernest B. Moorhouse, Secretary and Treasurer. Any amateur having a successfully working station and residing in Westchester County is eligible for membership. For further particulars apply to

Ernest B. Moorhouse,
Secretary.
37 W. Main St., Tarrytown, N. Y.

WIRELESS IN THE FAR EAST.

Consul General James T. DuBois writes from Singapore that wireless telegraphy is coming slowly but surely to the Far East. Soon the Peninsular and Oriental Company will have at least fifteen of its vessels equipped with wireless apparatus, and the China Mail steamers will follow suit. The German Lloyd is preparing to equip its Imperial East Asiatic Line.

An Expensive Experience of Edison.

MR. E. J. EDWARDS, writing recently, tells the following story of Thomas A. Edison's sale of his patents of the carbon telephone transmitter. In reply to the question as to whether he did not receive a large amount of money for his patent which made the modern telephone possible, Mr. Edison said:

"I suppose I got paid in large part for that in experience. I had a good many things to learn about business in those days.

"You may remember that the Western Union Telegraph Company, after the telephone was demonstrated to be a practical invention—that was about 1876—planned adding a telephone system to its telegraph lines. To everyone it seemed certain that there was to be severe competition between the Western Union and the original telephone company for the telephonic business of the country. I don't remember much of the detail of this threatened competition, but I do know that at the time the transmitting apparatus of the telephone was by no means perfect, so I set to work to make a perfected telephone in this respect, a vital matter for the future of the invention. Well, after a good deal of hard work, I got what I was after. There it is,"—and Mr. Edison pointed to the telephone which stood on his desk, says Telegraph and Telephone Age.

"With my carbon transmitter ready for a demonstration I went to the offices of the Western Union; I had previously sold that company my stock ticker invention and my quadruplex system of telegraphy, and quite naturally, I suppose, I gravitated to it with the transmitter. I saw the general manager and one or two other gentlemen, showed them the transmitter, and told them that I was pretty sure that, with my apparatus in their possession, they would have the bulge on the Bell instrument. I tell you, they were an interested lot of men, and as soon as I gave them a chance they asked for some kind of an option on the invention, and I gave it to them without further ado.

"It was only a little while later that they sent for me and made me a proposition to buy my apparatus outright. They said they were willing to pay me about a hundred thousand dollars in annual installments covering a rather lengthy period. I thought that was a lot of money, and how nice it would be to count with perfect certainty upon an income of several thousand dollars a year for quite a number of years, and, do you know, I let them have that invention on their own terms?"

"A few weeks later," he continued, "I heard that the Western Union had sold my improved transmitter to the Bell people for $800,000, simply by proving to the latter that it had the bulge on them.

"But I have never regretted the deal I made with the Western Union people, or rather, the deal they made with me. I gained a lot of experience in that transaction, and it was worth all it cost. I have never let anybody get the better of me since, and I am certain that the experience I got then has made me far more money than I lost through inexperience when I didn't dicker back and forth between the Western Union and the Bell people with my transmitter."

WIRELESS ACQUAINTANCE.

Captain Kaempff of the Deutschland, while walking near the Battery in New York one day, was introduced by a mutual friend to the captain of one of the Cunarders. The friend felt elated at bringing the two prominent navigators together, but was surprised when Captain Kaempff said, "I am glad to shake your hand, captain, but we hardly need an introduction, do we?"

Although they had never met personally until that moment, the two mariners had been talking to each other for four years at sea by wireless.

WIRELESS FOR DEPARTMENT STORE.

The Wanamaker stores in New York and Philadelphia are about to be placed in connection with ocean steamships by wireless telegraphy. Official Marconi stations are now being installed in each of the Wanamaker stores, so that passengers on transatlantic steamers will be enabled to place their orders as readily as by mail or by telephone. The Wanamaker wireless stations will also conduct a regular commercial business.

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Vol. III **SEPTEMBER** **No. 6**

EDITORIAL

The Editor frequently receives communications from readers of this Magazine pertaining to "New Ideas" and as to their patentability.

Frequently the inventor goes as far as to submit his ideas to the writer and the latter always tries to tell the inventor just how to proceed.

The best advice to any inventor before spending a lot of time, efforts and money is to ask himself the most vital question, before proceeding, which so many inventors loose sight of in these days, namely: Is the article better than some existing device? Can it be manufactured cheaper than similar articles or would it be of any practical use whatever? In this the entire success of a patent centers.

A Patent Attorney can usually get a patent on almost any device as long as it has some originality, but the important question is, how good is the patent and of how much benefit will it be to the patentee.

Most inventors think that as long as an article is patented it must be good, but the statistics of the United States Patent Office shows that out of 10,000 patents at least 9,000 are worthless. Another point of high importance to be considered and which almost as often is lost sight of, is the impatience with which inventors desire to patent new ideas. Make it a rule to wait at least a full month before patenting a new idea. By that time the device or article often will have been improved to such an extent that very little of the original idea is left. Not only that but by thinking over the matter very calmly, it will be found very often that it would be much better not to patent the device at all, or at least to wait long enough until the article or device is perfected in such a way as to make the manufacturing and marketing sure.

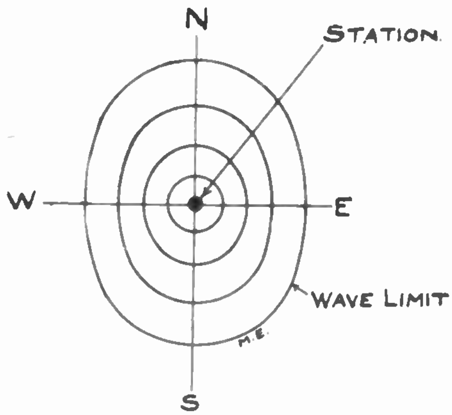
The Editor will come back to this subject frequently.

Why Do Wireless Waves Travel Farther By Night than by Day?

By George F. Worts.

THERE have been many plausible theories advanced in answer to this very puzzling query, and every short while an entirely new one is originated. Ever since the days when coherer-decoherer systems were in vogue the higher minds sought a solution to this question. Probably the first one advanced and one that has still many believers is the one of "violet ray absorbtion", that the sun tends to absorb the ultra-violet ray of a wireless wave and therefore lessen its radiative qualities.

Electrician W. N. Fanning, of the U.



S. Navy has advanced a very plausible theory in comparing the earth to the armature of a motor with the sun as a field. He says: "In the day time, sending a wireless wave over the earth is like trying to send a wireless wave between the armature and pole piece of an excited motor or generator. At night," he continues, "the earth short circuits the sun's magnetic field and we have a space somewhat less than half the earth's surface where there would be ideal conditions for wireless communication." If this theory is accurate it might account for the fact that wireless waves travel in a longitudinal direction far easier than in a latitudinal one, because of the lines of magnetic force running in a practically north and south direction, which is a perfectly satisfactory reason for the phenomonom. We might illustrate the actual wave of a station when it has reached its limit by an oval.

Two stations of the same strength on the extreme edge of each others waves, can be conversing if the sun has not yet risen, but when it suddenly appears above the horizon the communication is immediately cut off. This has occurred several times.

Now that wireless has been reduced to a commercial basis, it gives the scientist an opportunity to inquire more closely into the mysterious side. Before long a theory will probably be propounded wherein will lay a practical solution to the mystery and a satisfactory answer to the question.

NOTABLE ACHIEVEMENTS OF WIRELESS.

JAN 23, 1909—White Star liner Republic rammed off Nantucket by Italian liner Florida. One thousand persons saved by Baltic, following "C. Q. D." wireless call by Jack Binns.

June 10, 1909—Cunard liner Slavonia wrecked off the Azores. Two steamers received her "S. O. S," the international call that succeeded "C. Q. D." and went to her rescue.

June, 1909—Goodrich liner City of Racine disabled off Waukegan, in Lake Michigan. Steamers Chicago and Christopher Columbus took off 200 passengers.

Aug. 17, 1909—Steamer Ohio foundered off Alaskan coast. One hundred and fifty passengers and most of the crew saved. Wireless operator died at his post.

Feb. 4, 1910—Steamer Kentucky bound for San Francisco, sinking off Cape Hatteras. Wireless brought Mallory liner Alamo just as vessel went down. All saved.

April 18, 1910—Atlantic transport liner Minnehaha grounded near Bishop's rock, Sicily Island. Wireless brought aid. All saved.

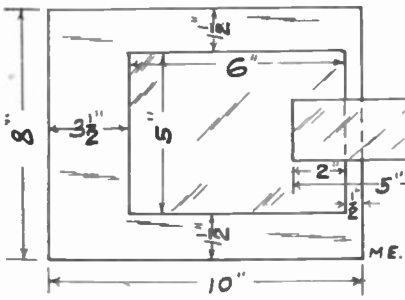
July 23, 1910—Southern Pacific liner Momus on fire off Florida coast. Comus of the same line takes off passengers, assists in putting out fire and then returns passengers.

July 31, 1910—The wireless most dramatic feat—Capture of Dr. Crippen and Miss Le Neve off Father Point, Que.

A Good Sending Condenser.

By Richard U. Clark.

THE construction of a good sending condenser is not easy, and consequently a number of amateurs either have a poor imitation of one, or else they have none at all. By following the directions given below and by using a little care, a

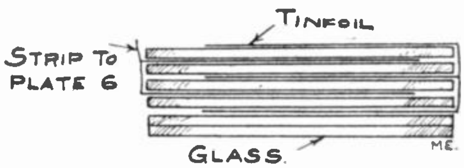


-Fig. 1-

very efficient condenser can be made, which will work well with a one-inch coil. (For table giving sizes of conlensers for larger coils see end of this article.)

First procure twelve used glass plates (measuring 8 x 10 in.) from a photographer, and remove all foreign substance from them by washing them in hot water.

Next cut nine pieces of tinfoil 5 x 6 in., also nine pieces 2 x 5 in., the latter serve as connecting strips between the tinfoil plates.

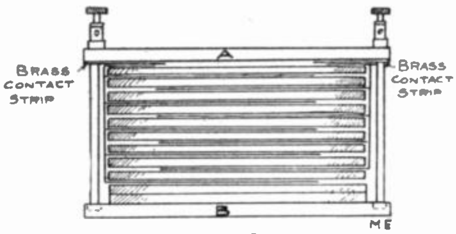


-Fig- 2-

We are now ready to assemble the condenser. For the sake of good insulation, we will place two glass plates on each side of the condenser. After the first two glass plates are ready, place on the top one a piece of 5 x 6 in. tinfoil, and also a 2 x 5 in. piece, leaving all margins as in Fig. 1. Then put on another piece of glass and two more pieces of tinfoil; this time however, the margins are reversed, that is, the half inch margin is on the same end that the three and one-half inch margin is on the first plate, and the 2 x 5 in. piece of tinfoil protrudes from the opposite end of the glass plates.

When the third tinfoil plate is laid on, the 2 x 5 in. piece protruding from plate one is lapped over so as to come in contact with three and then the 2 x 5 in. piece for plate three is laid on, (see Fig. 2.) In the same way lay on plates 4, 5, 6, 7, 8 and 9, then lay on the two remaining glass plates and allow the two 2 x 5 in. pieces of tinfoil which are left to lap over the top plate of glass.

Now saw out of any kind of half-inch wood, two pieces about 8 x 12 in. (A. and B. Fig. 3) and bore two holes in each ⅝-inch from the ends and 4 inches



-Fig. 3-

from either side (the holes in one of these boards should be countersunk as bolts are to pass through them) and placing the board with the countersunk holes (after first putting a 2-inch brass bolt in each hole) on a bench or table, lay the condenser on it.

To finish the condenser, cut out two pieces of sheet brass (or any other sheet metal) about 3 x 1 in. and drill a hole the size of the bolt in each, about 3-16 in. from one end. Then slide one piece down on each bolt until it rests on the top pieces of tinfoil. Lastly put on the top board and put a nut on each bolt, screwing it down until the plates are held tightly between the boards.

If one wishes he can make sides and ends for the condenser, but this is not necessary. (For finished condenser see Fig. 3.)

Table of condensers:

Size of coil	No. of sheets of tinfoil.
2-inch	16
3-inch	24
4-inch	30
6-inch	40
¼-K. W. Transformer	55

THE TELEPHONE RECEIVER.

By Granley Hyde.

NEXT to the detector, the telephone is the most important piece of apparatus. It is not an easy matter to get a good telephone. Their sensitiveness is usually quoted in ohms, but it must be remembered that the resistance is a detriment to a telephone rather than a help.

It is not the resistance that makes the telephone sensitive, but the number of turns around the magnets. It is the number of ampere turns around the poles of the permanent magnets of the telephones that does the work. One turn of wire carrying one ampere is an ampere turn One turn of wire carrying two amperes is two ampere turns. Ten turns of wire carrying one-tenth ampere is one ampere turn.

Since the telephone has to do with very weak currents, a great many turns, the more the better, must be put around the poles in order that the weak current may set up the lines of force necessary to influence the diaphragm of the telephone. As the number of turns increases, the resistance increases and this resistance weakens the current.

To begin with, the ampere turns increase in their effect faster than the effect due to increase in resistance. But as the turns are laid on, the wire in one turn becomes longer and hence each turn has more resistance. Finally a time is reached where the effect due to resistance is greater than the effect due to the ampere turns, and it does no good to add any more turns of wire. Furthermore, as the turns are put on they are further away from the core of the pole, and for this reason their effect is less for each turn.

Thus it is seen that as the turns are put on, the resistance begins to rapidly increase and the effect of the ampere turns to decrease. Because a receiver is a 2,000 ohm receiver and costs from $7.00 to $12.00 is no sign that it is a good receiver for wireless.

The thinness of the diaphragm and the air gap between it and the poles of the magnet are also factors in its sensitiveness. For long distance work the diaphragm should be very close to the poles of the magnet, but not near enough to touch them. The thinner the diaphragm the greater the magnetic reluctance, but this is offset by its greater sensitiveness due to its thinness. If the magnets are too strong, the iron of the diaphragm becomes saturated and the telephone is less sensitive. The strength of the magnets is a great factor in making phones. It is difficult to make magnets that will stay permanent. A great many lose their magnetism quickly and then they are useless.

The telephones are quoted in terms of their resistance, because that is the easiest way to quote them.

WIRELESS FOR AIRSHIPS.

Now that aerial navigation is coming to be considered seriously, new problems are arising, such as the question of navigation on starless nights or over fog-bound land, when the aeronaut will be unable to find his bearings. It has been proposed by a German inventor, that a network of wireless stations be established over the land, each automatically sending out a predetermined signal at regular intervals, which would be received by the air craft, and enable the aeronaut to determine his course. The airships would not be required to carry transmitting apparatus, as a small receiving apparatus would suffice to enable them to avail themselves of this proposed system, and the weight of the receiving device could easily be kept down to a few pounds.

W. A. O. A.

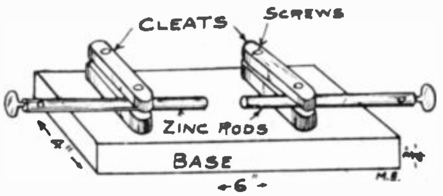
The Wireless Association of America, headed by America's foremost wireless men, has only one purpose: the advancement of "wireless." If you are not a member as yet, do not fail to read the announcement in this issue. *No fees to be paid.*

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.

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

A SIMPLE ZINC SPARK GAP.

Procure a base of some good wood, size 6 x 4 x ¾ inches, and give it several



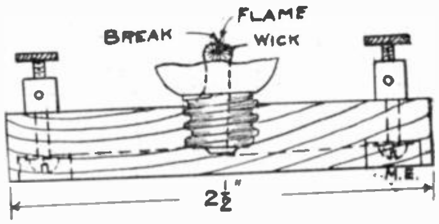
coats of shellac. Next procure four porcelain cleats of the two-wire kind used in electric wiring and place a pair on each end of the board, as shown, about 1 inch from the edge. Fasten the cleats to the board, on one end, by using two-inch wood screws. Next, procure two round battery zincs and cut off the lower end. Place the zincs between the end of the cleats, opposite to the end in which the screw is placed. Adjust the zincs to the right distance and tighten the screws. Connections may be made to the binding posts on the ends of the zinc rods. This makes a very efficient, yet cheap, spark gap.

Contributed by

A. L. ROSSITER.

A FLAME DETECTOR.

The material required for building the detector about to be described is: A



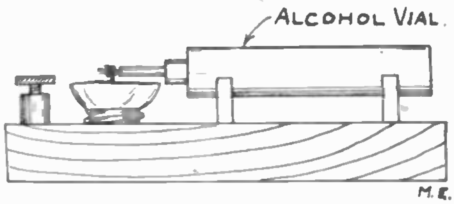
—FIG. 1—

burnt-out miniature lamp; an alcohol torch; two binding posts, and a base.

The bulb of the lamp is first cut as shown in Fig. 1. This can be done with a triangular file by running it around the glass three or four times so as to make a good mark, then tap it a light, sharp tap and it will drop off.

Mount it in a socket or if a socket is not at hand, mount it as shown in Fig. 1. The base can be of any material, and cut to the following size: 4½ in. long; 2½ in. wide; ¾ in. thick; the base is cut long so as to allow a stand for the alcohol lamp.

The alcohol lamp can be made from a glass vial about 3 in. long, a hole is made in the cork of the vial so as to al-



—FIG. 2—

low the passage of a ⅛-inch coherer tubing about 1 inch long which is allowed to project about ½ inch. A small wick is then inserted and the vial filled with alcohol; it is then mounted as shown in Fig. 2.

The detector should now be connected up with one cell of battery (a potential of less than 1.5 volts will not work very well) and the two sides of the filament moved in so as to nearly make contact, a little experimenting will be required to get the right distance. The alcohol torch is now placed so that the flame envelopes the filament or until a low roar is heard in the phones.

The torch plays a very important part in the working of the detector it forms a bridge of partially conducting vapor between the two electrodes and the conductivity of the detector can be varied by moving the torch one way or the other.

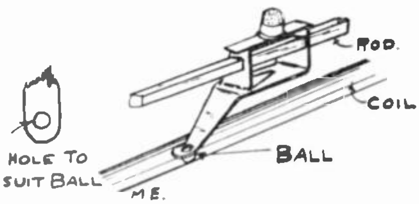
The spark from a ½-inch induction coil at a distance of 20 feet reduces the resistance from hundreds of ohms to, it appears to me, a very few ohms.

Contributed by

PETER J. EMERY.

IMPROVED SLIDER.

Reading the August issue of your magazine, I noticed an article, "A Simple Slider," by Charles E. Keck which I



made with a slight improvement. The improvement is shown below and needs no comment.

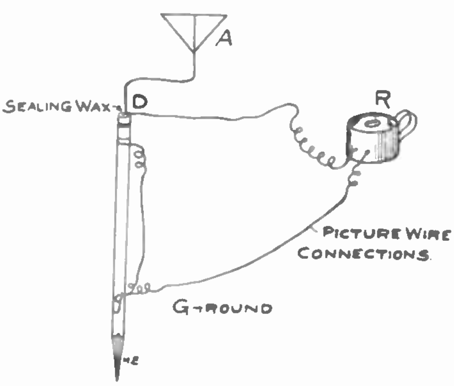
Contributed by

FRED BESSERER.

BEATEN AT LAST!

One evening in August I desired to talk with a friend about five miles away, but as we were not connected by telephone, I decided to try wireless telegraph.

I had read in MODERN ELECTRICS that



four things were necessary for communication by this means; 1st. An aerial; 2nd. A detector; 3rd. Phones; and lastly a ground. I took ten feet of baling wire and ran a line from my window to the clothes line outside, thus forming my aerial. Next I took my pencil and removed the eraser from the end. This formed mv detector stand and by looking about the house I found some sealing wax which I placed in this cup in place of silicon. In order to make a ground for the station I carefully scratched a letter "G" on my pencil and as the pencil happened to be round, you may easily see it formed a g-round. (O mother. Help! ("Fips.") The receiver puzzled me for a long time but at last I procured an old tin cup, a piece of tin the same size, some black and some white paper. I made two holes in the side of the cup for the connecting wires. Next I cut a round hole in the tin plate and covered it on one side with black paper. After that I filled the cup with white paper and put in a disk with the black paper on the inside. The handle served to hold the receiver by. I connected all these together with picture wire according to MODERN ELECTRICS' diagrams. I placed the receiver to my ear and the pencil in my pocket and listened to the people talking in the next room. After this experiment I have been a constant reader of MODERN ELECTRICS. And give it all the credit for my wonderful success in this line.

Contributed by

"CHARLES STEVER.

"FIPS" BEATS THEM ALL!

It has pained and grieved me beyond imagination how some correspondents have tried to devise a simple means to catch wireless messages. For the last year I have had a very efficient receiving set which is so simple and so efficient that I at last decided to present it to MODERN ELECTRICS' wireless fiends, who I know will never forget this great sacrifice of mine.

Looking around for a good detector one night, I happened to see my image in the mirror. Like a flash the idea occurred to me that I myself would make a good receiving outfit and I immediately proceeded as follows:

I went to my brass bed and connected a No. 30 wire to same. The end of the wire I connected to my *gold tooth*, by wrapping the bare wire around it a few times. The "lead-in" was my mouth.

The ground was made by touching the nearby chandelier with the little toe of my foot, which toe, to make better contact, I had capped with a metal thimble.

As that particular tooth of mine is extremely "sensitive," to cold, heat or other manifestations of the ether, I had little trouble to "feel" the messages "come in." Dots "came in" as small short pains, dashes as long pains, which pains, however, were not severe by any means, but quite pleasant.

Tuning was easily accomplished by attaching the "ground" on a shorter or longer toe, which of course, gave a shorter or longer wave length.

All was well for months. One night, however (I had gone to sleep with the aerial connected to my tooth, and my bare foot on the radiator) in the midst of a rosy dream I was awakened by a shock as terrible as if a thunderbolt had hit my gold tooth. The pain was so frightful that I jumped clear to the ceiling.

This was a fortunate "move," because it disconnected me from "aerial" and "ground" and the pain stopped immediately. What had happened?

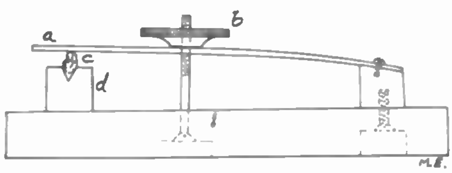
Some young fool NEXT DOOR was testing out his new 20 K. W. transmitting outfit!

Contributed by

"FIPS."

NEW DETECTOR STAND.

Almost every month I have noticed articles describing mineral detectors in which a metal point is placed in contact with the mineral. I have made a detector which is somewhat different from



those I have seen in your magazine, and have had good results with it.

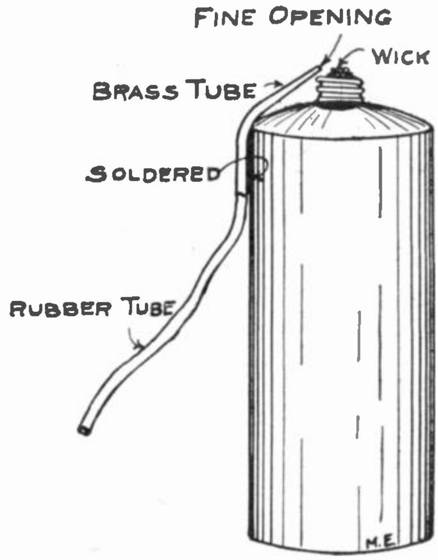
As will be seen from the drawing, instead of a point I use a flat surface. The brass strip (a) is in contact with silicon (or other mineral) (c) being adjusted by thumb-screw (b). By this arrangement different points of the mineral can be brought into contact without difficulty and the most sensitive part of the mineral found. The holder (d) of the mineral is made of brass and a wedge is cut for holding the mineral. This allows a quick change of minerals. The detector is simple to make and may be adjusted quickly.

Contributed by

L. H. HALE.

A SOLDERING TORCH.

Many amateurs are in a predicament when it comes to providing the heat required for soldering the numerous connections about the instruments and aerial. The following is a description of a simple alcohol blow-torch:



Procure a half-pint turpentine can and after washing out thoroughly, fasten to the side with twine or solder a piece of brass tubing bent at right angles. Squeeze the tube together by means of pliers at top, so as to leave a small opening; then join a piece of rubber tubing of convenient length to the end next to the can. Now fill it with wood alcohol and wedge a short length of lamp wick in the neck, after having soaked it in alcohol. To operate, blow through rubber tube. This will give a very hot flame. When not in use keep top screwed on tightly.

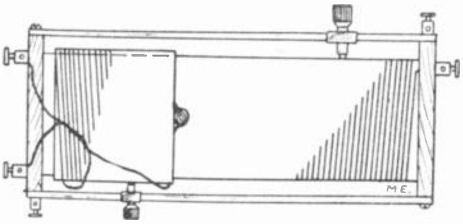
Contributed by

L. C. DE VEAUX.

TO CONVERT TUNER TO LOOSE COUPLER.

The following is a very easy way to directly convert your tuning coil into a loose coupler.

Cut out a piece of cardboard about an inch longer than the circumference of your tuning coil and cut its width to be about one-fourth the length of the tuning coil. Then bend the cardboard strip around the coil and fasten it securely together with glue just allowing the tube to be loose enough so that it will slip along the coil without any difficulty. The tube should then be given a coat of shellac. The secondary can then be wound with any size wire from No. 29 to 34; and it should be wound in the same direction as the winding of the primary or the tuning coil. The two ends of the wire should then be fastened to a length



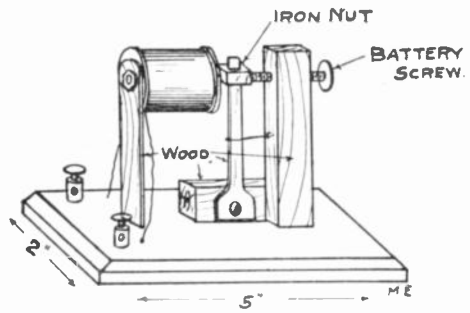
of flexible cord wire which should be as long as the tuning coil. This will allow the secondary to be moved from one end to the other. Two extra binding posts will have to be put on the coil for the secondary, and another rod and slider to vary the number of turns of wire used on the secondary. The wire can be very easily bared by running a red hot soldering iron over it. A knob can be fastened to the cardboard tube so that it can be drawn along easily. If the rolling ball slider with a spring is used on the primary, there will not be much difficulty experienced in moving the secondary from place to place, as this type of slider will run over the secondary wtih very little trouble.

Contributed by

EARL G. HENDERSON.

SIMPLE SOUNDER.

I saw a description in the July number of MODERN ELECTRICS on making a telegraph set.



Having previously made one myself I think my sounder is easier and more simple to make and it works fully as well if not better.

The diagram does not need much explanation. F͵r the core of the magnet use a common machine bolt. Wind enough No. 22 magnet wire on it to make it one inch in diameter. Old dry battery binding posts are used.

For fastening the rubber band to the standard, drive a short pin in it till about one sixteenth projects out. Bend this in the shape of a small hook over which the band is to be looped. By twisting the band more or less its tensión may be varied.

Make the wooden parts from hardwood and fasten all the joints firmly.

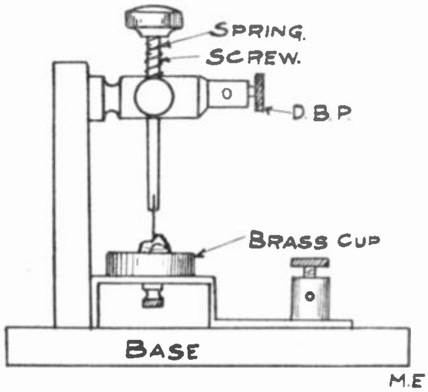
This sounder will give a very loud click on one cell of dry battery.

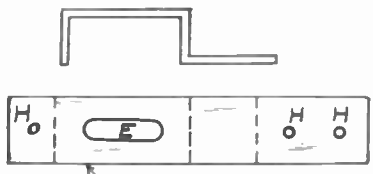
Contributed by

JAMES LEROY HODGES.

IMPROVED DETECTOR.

The detector described in the July issue of MODERN ELECTRICS on page 200 can be improved by taking a piece of sheet-brass 1-16 inch thick by ½ inch





BRASS STANDARD.

wide, by 2⅝ inches long; three holes are drilled at H H H, and the slot E is cut ⅛-inch wide by ½ inch long; this piece is bent as shown at dotted lines, and screwed to the base and standard. The cup for holding the crystal is made from the top of an old Ever-ready dry cell, and is fastened to the brass standard by passing the screw through the slot E, and screwing on the nut. In this way the detector can be used either as a mineral or electrolytic detector.

An impedance coil for regulating the speed of small battery motors on A. C. can be made by winding ½ lb. of No. 18 B. & S. gauge D. C. C. copper wire on a hard rubber or fibre tube ½ inch in diameter and six inches long; a core is made of annealed soft iron wire 6½ inches long by ⅜-inch in diameter; the speed is regulated by sliding the core in and out of the tube. When the core is fully within the tube the motor will run quite slow, but when it is pulled out the motor will run at full speed.

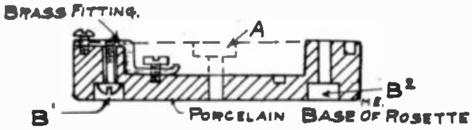
Contributed by

Jos. Wurm.

SIMPLE SPARK GAP.

Please find enclosed drawings for making a spark gap, made by me which I find to be very efficient.

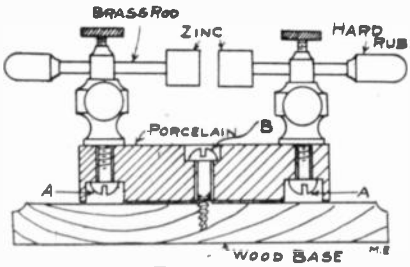
The base is an old porcelain base of a Bryant Rosette. Remove all brass fit-



-Fig. 1-

tings and mount two double binding posts over holes marked A, Fig. 1, with countersunk ends down so that one binding post is opposite the other as shown in Fig. 2.

Obtain two small brass rods about ⅛-



- Fig. 2 -

inch diameter and 1⅝ inch long and threaded at both ends for a distance of ¼ inch and on each, screw a piece of ⅜-inch zinc rod, ⅜-inch long, then fit rods in binding posts and screw on a rubber knob as shown in Fig. 2. The whole gap may be mounted on a wood base by screws through holes B^1 and B^2.

I trust this will be of interest to readers of Modern Electrics.

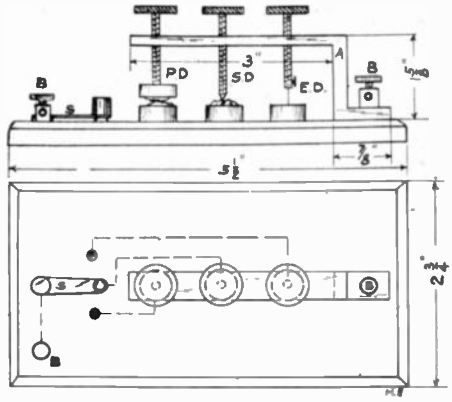
Contributed by

Raymond H. Campbell.

TRIPLE DETECTOR.

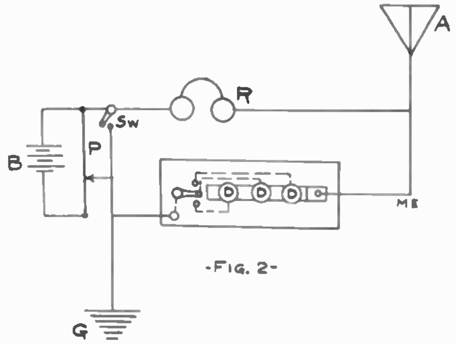
Here is a diagram of a detector with which I have had very good results. It is a Perikon silicon and electrolytic detector. I think the illustration will speak for itself.

The materials needed are: A piece of



-Fig. 1-

brass 3-16 inch thick by ½ inch wide by 7 inches long. Base is 7 x 3 x ½. Three brass screws 2 inches long by ⅛ inch thick with hard rubber of fibre heads. Brass cups taken from "Ever-ready" bat-



-Fig. 2-

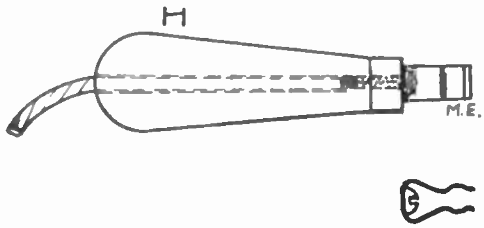
teries. One of the cups of the Perikon detector is soldered to the screw, while the other is screwed to the base. The silicon cup is fixed to the base. The minerals are soldered in.

The electrolytic cup is taken from the battery with the carbon left in. Then the carbon is cut off within ⅛-inch of the top of the cup and a ¼-inch hole bored in. This is to contain the sulphuric acid. One inch of wollaston wire is then soldered into the screw. This can be bought at some mineral or electrical store. A 3-point switch is connected on the base so that you can use any detector you like.

Contributed by Frank Koch.

HELIX CLIP.

For a clip, get an ordinary knife switch handle H. Next get a piece of brass or copper ¾ x ½ inch and shape as shown in sketch. Drill a hole in H. the size of the wire to be used. Push wire through the hole and fasten brass



with screw as shown in sketch.

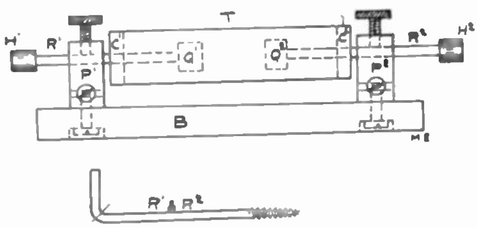
Contributed by

F. BEAUCHAMP.

A MUFFLED SPARK GAP.

B—Base 5 x 3 x ½ inch.
P^1P^2—Binding Posts.
R^1R^2—Brass Hooks.
H^1H^2—Taped Handles.
C^1C^2—Cork Ends.
Q^1Q^2—Old Battery Zinc Ends.
T—Test Tube.

Base to be made of hard rubber. Wood



boiled in paraffine makes a good substitute. The binding posts should be about one inch high and placed about one-half inch from each end. The brass hooks should be about three inches long. Saw or file off the end. Saw off about one-half inch of the end of two worn out wet battery zincs. File the face of each smooth and screw on the ends of the brass hooks in place of the copper thumb-screws. Take test tube of about three-quarters inch in diameter and about three and three-quarters inches from open end, commence to file around the tube, using the sharp corner of the file. Press lightly and you will get about one-third around when the tube will break. It will be fairly round. Fit a piece of cork one-quarter inch thick in each end of tube. The corks should have a hole in the center of each, through which the brass hooks should pass. The ends should be taped to make insulating handles. If the people in your house object to the noise made by the spark, the above description will allow you to overcome the objection at a slight cost.

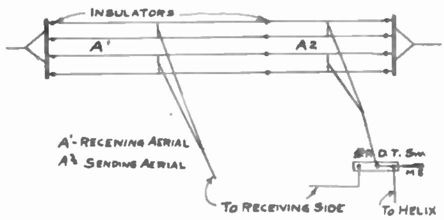
Contributed by

SAMUEL N. MEAD, JR.

DUPLEX AERIAL.

Enclosed please find a plan for a duplex aerial. The aerial is especially meant for a place where there is only one place to suspend it from, or no place to put two aerials.

The large part of the aerial is not used when sending and the single pole, double



throw switch is thrown to the helix side, and when receiving thrown to the opposite side.

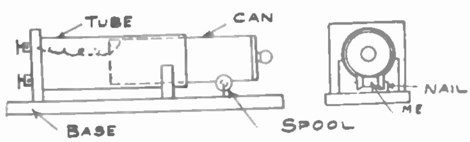
Two leads can be used for receiving or they can be spliced after the switch is passed.

Contributed by

E. E. BEATTIE.

A SIMPLE VARIABLE CONDENSER.

Procure an ordinary tin can, of any shape or size, but perfectly round and free from dents. Make a tube of thin cardboard to fit over the can (an old calendar will do), loose enough so the



can can slide. Coat the tube with tinfoil and dip in melted paraffine wax. Use the cardboard tube for the stationary tube.

Get a piece of hardwood 1 inch thick or soft wood boiled in paraffine wax. The board must be about 3 inches longer than the combined length of both tubes.

Make a small upright of wood about

1 inch square and 1 inch higher than the tube. Cut two grooves in it with a saw deep enough to fit the end of the tube in. Fasten tube in grooves with glue, paraffine or sealing wax. Glue the upright to the board. Place a small piece of wood in under the other end. Glue to board and to tube. Punch a hole in end of can and fasten on a common knob like those used as handles for pot covers. The can should slide on a spool mounted on a bent nail.

I find this construction much simpler and easier than those using brass tubes which are expensive and hard to get.

Contributed by

E. R. WAGNER.

ZINC SPARK GAP.

Procure two old dry cells with binding posts on zinc. Take them off and file the solder on the bottoms off. Then sandpaper them to give them a

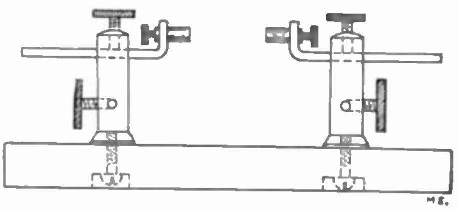


FIG. 3

good appearance. Next secure two double binding posts Fig. 3, and a piece of wood for a base. Fasten the double binding posts to the base about two and a half inches apart, Fig. 3.

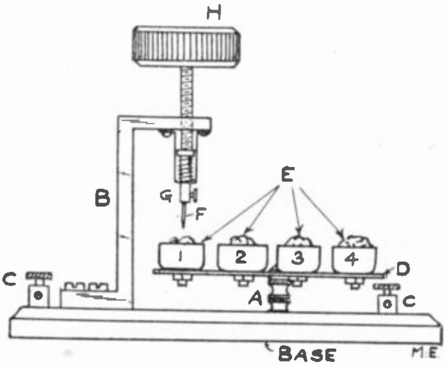
Then secure two pieces of copper wire (any thickness) four inches long and bend it up one inch from the end to an angle of 90 degrees. Next fasten the zinc binding post to the copper wire. Do the same to the other piece of copper wire. Fasten the zinc binding posts so that both flat ends are facing each other and then fasten the copper wires in the top hole of the double binding posts. This, if constructed according to directions, will prove to be a good spark gap.

Contributed by

ABRAHAM EDELMAN.
AND
MILTON BEREL.

UNIVERSAL DETECTOR.

If the reader happens to have a spare electrolytic detector, remove the bracket B, and secure a base 3½ x 2½ x ½ inch thick, also a brass disc, D, or any metal 2 inches in diameter. Take off the carbon caps of some old dry cells. Then bore 4 holes the same distance apart and arrange as per sketch; solder in four mineral caps and put a brass point, F, in the slider, G. Turn the disc, D, to whatever mineral desired and regulate the brass point, F, by the thumb-screw, H.



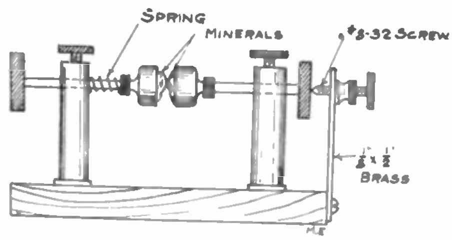
As the disc turns the minerals level there is no possibility of the minerals falling out.

Contributed by

ARTHUR ERICSON.

ADJUSTING DEVICE.

In detectors, (Perikon or universal) of the type shown, adjustment cannot be made as accurately as with de-



tectors having a screw adjustment. However, with the addition of the adjusting device shown the adjustment is easily obtained.

Contributed by

L. C. MUMFORD.

TO TEST DETECTOR.

If you have an electric gas fixture in your home or wireless room, you may test your detector as follows:

Set your detector and pull the chain of the gas fixture and if the detector is adjusted right you will hear a loud click in receiver when spark is made.

Contributed by

FRED FINCH.

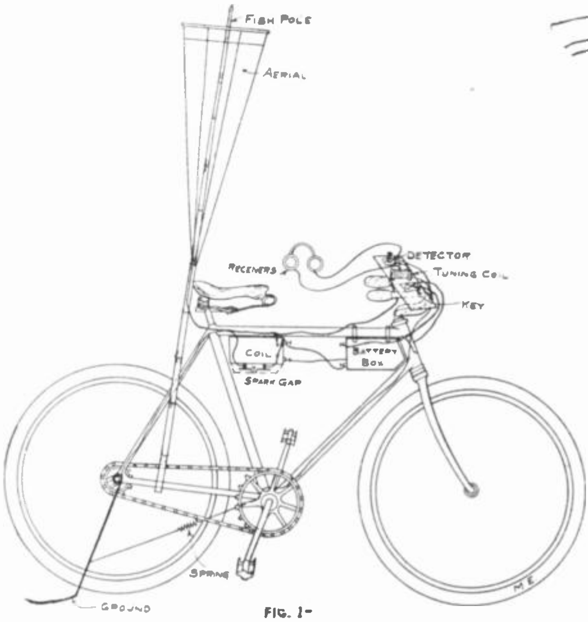
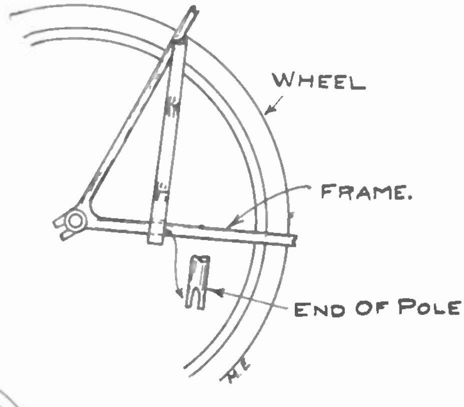
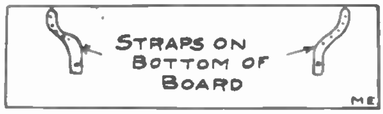


FIG. 1-



-FIG. 2-



-FIG.4-

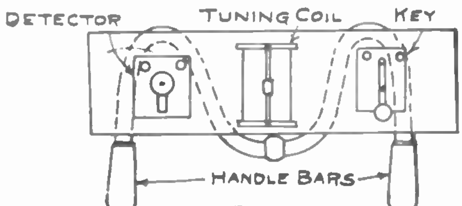
HOW TO MAKE A BICYCLE WIRELESS OUTFIT.

Many amateur wireless operators who have bicycles and go out for a long ride with their friends, can attach their wireless outfit on their bicycle and carry on communication between each other.

To attach their wireless outfit to their bicycle, it should first be fastened on a board, about 8 inches by 2 feet. Before fastening the apparatus to the board small straps should be fastened on the bottom side of the board so as to keep the board on the handle bars. Only the receiving apparatus should be fastened to the board, as the sending apparatus can be fastened to another part of the bicycle. The spark gap should be fastened on top of the coil and the latter suspended upside down. A small box should be put over the spark gap so as to protect the rider from a shock. The coil and gap should then be fastened on the bar just below the seat. The batteries should be fastened on the bar below the handle bars. The coil and batteries should be fastened very tight so as to prevent them from shaking. The ground wire can be made as follows: Get a long piece of galvanized iron wire about 22 inches long by ¼ inch thick, about 6 inches from one end bend it as shown in the diagram. The other end should be bent into a small hook and should be fastened under the nut of the back wheel.

About 5 inches from the bottom of the wire a rope should be fastened. This rope should have a spring attached to it as shown in the diagram. The other end of the rope should be fastened near the sprocket. The rope with the spring on it keeps the ground wire dragging along the ground so as to make contact with it.

For the aerial, a large fish pole about 15 feet long will do. On the bottom end of the pole a notch should be cut so as to fit in the bar near the back wheel as shown in the diagram. The pole should then be tied near the seat with some rope.



-FIG. 3-

The aerial wires can be fastened as shown in the sketch. No. 14 wire, rubber covered or Pirelli cable should be used in all the wiring. The key of the sending station should also be fastened on the board over the handle bars. A lot of fun can be had with an outfit like this, as one rider can ride ahead of the rest and can still carry on a conversation.

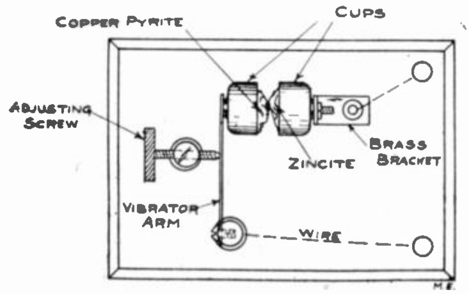
Contributed by

WILLIAM DETTMER.

A VERY EFFICIENT PERIKON DETECTOR.

In order to make this detector, the experimenter should procure a vibrator from a Rhumkorff coil, two brass cups, which may be pocured from the carbon poles of dry cells, a crystal of zincite and one of copper pyrite or bornite, a small piece of solder, a strip of brass about 3 inches long and 3/8 inch wide of 22 B. and S. gauge, two binding posts and a base of hard rubber 4 x 3 x 1/2 inches. A 1/8-inch chisel may be used to bore all the holes.

The assembling of the instrument depends a good deal upon the size of the vibrator. In my detector, I use the vibrator of a 2-inch coil, the platinum contacts of which have been burned off by



heavy currents. A 1/8inch hole is first bored in both ends of the piece of brass, one end of said strip for about 3/4 inch being turned so as to form a right angle with the rest of the strip. A cup, in which a piece of zincite is soldered, is secured in the hole at the end of the long arm by means of the usual battery screw. This is mounted on the base of the instrument, as shown in the sketch, by means of a battery binding post passing through the hole in the short arm of the brass strip. The cup, in which a piece of copper pyrite is soldered, is screwed onto the vibrator arm and the vibrator mounted in position which can thus be found by experiment. The set screw of the vibrator is also mounted and is used as an adjusting screw. The instrument is wired, as shown in the sketch.

The zincite used should be a flat piece of good size and care must be taken to have the surface exposed as nearly all red as possible. The copper pyrite should be a chip 1/2 inch long, thin and pointed and should be the color of old gold. When the detector is mounted, as above, and connected in a receiving circuit (with or without battery and potentiometer), move the pointed piece of copper pyrite about until the best adjustment is found by testing with a buzzer, then screw up the adjusting screw to hold in place and you are ready to receive.

I have used this detector in a sensitive receiving circuit and it has a proven range of 900 miles over land, i. e., from Key West to Washington, D. C.

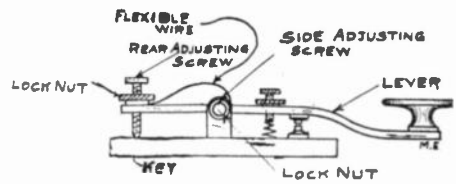
As will be seen, this detector, if made carefully, is very efficient and permanent of adjustment and for these reasons, is especially efficient for portable wireless outfits.

Contributed by

H. A. LAKE.

KEY ATTACHMENT.

Recently I had some trouble with my coil in not giving the proper spark. Looking over my battery circuit I found the bearings of the key became heated and caused a resistance in the path of the current. I devised the following scheme to remedy the trouble. I got a short length of flexible wire about three inches long, I then fastened one end of it under the lock-nut of the adjusting screw on one side of the key and the other end under the lock-nut of the adjusting screw on the lever at the rear. This wire



then relieved the bearings from carrying the current. See the accompanying sketch for connections.

Contributed by

B. FRANCIS DASHIELL.

HANDY DETECTOR.

Recently I made a detector which proved so successful that others may easily copy.

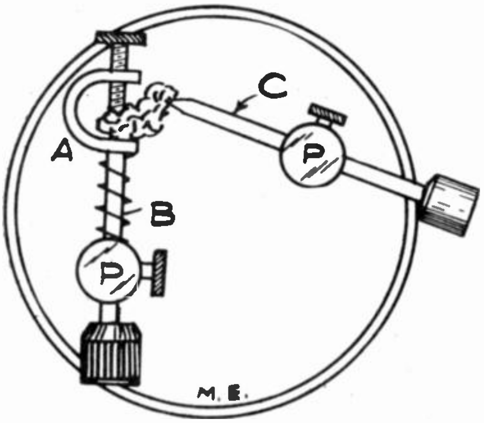
I first procured a standard "Universal detector" and removed the end and put in its place a piece of copper about No. 14 1/4 x 2 inches in its place. This should be bent as shown in figure, and tapped for a screw to hold the crystal in place.

I next removed the other side of the detector and threaded the inside of the hole to carry the rod C., the end of which I threaded to hold the insulating handle.

Any crystal may be used and the rod C. made of any suitable metal.

To adjust, the cup A. may be turned in any direction, and the rod, B., may be shortened or lengthened so that any part of the crystal may be touched, and the most sensitive part found.

The detector is easy to make and costs

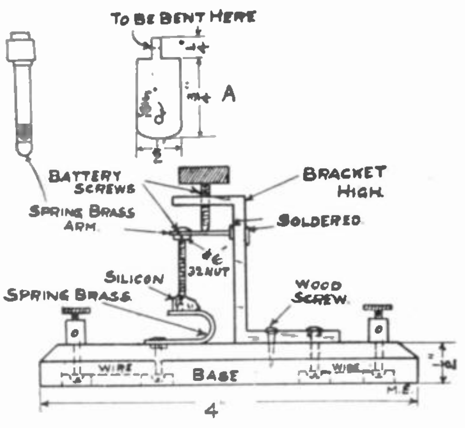


very little. Connections are made at the posts P. P.

Contributed by A. T. ANDERSON.

A SIMPLE DETECTOR.

I herewith enclose a drawing of a simple, yet very efficient detector. Any mineral may be used, although I prefer silicon. This detector works very good

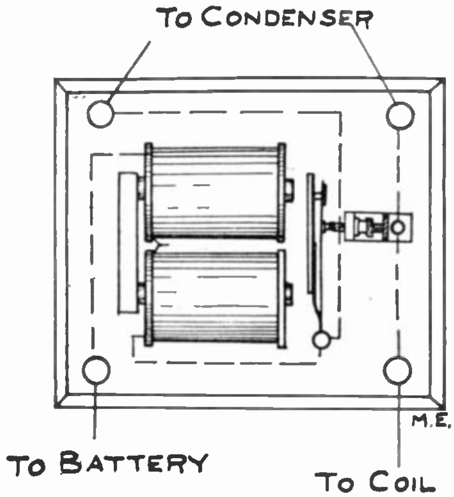


up to 150-200 miles. No description is needed to show how to put it together as the drawing shows everything. By using the spring arm a very fine adjustment may be had. This detector materially increases the good appearance of your station. Any amateur will appreciate this, both in simpleness and sensitiveness.

Contributed by IRVING LOOSEN.

INDEPENDENT VIBRATOR.

I constructed a vibrator which works fine. I thought that the readers of MODERN ELECTRICS might like to construct one similar to it.



The base is hard wood $3\frac{1}{2}$ x $3\frac{1}{2}$ x 1. Procure a magnet, that is the core and fibre ends, about 2 inches long. Wind this full of No. 14 S. C. C. magnet wire. Now procure a vibrator from an induction coil.

Fasten to base and make connections as shown in diagram. A condenser should be shunted across the contact points.

Contributed by GEORGE WALDEN.

NEW ELECTROLYTIC DETECTOR.

A Frenchman recently patented a new electrolytic detector which does not need potentiometer nor battery..

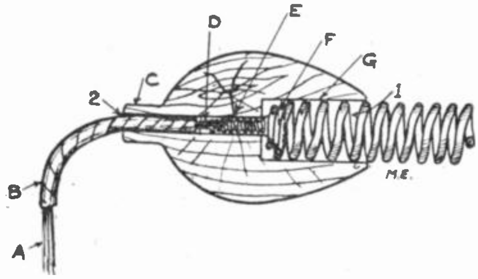
A standard electrolytic detector with carbon cup is partly filled with an amalgam made of 6 parts mercury and one part tin. The electrolyte consists of 8-10 parts water and one part sulphuric acid.

This detector generates its own current.

AN IMPROVED HELIX CLIP.

A simple helix clip may be made by turning out of a piece of wood a pear-shaped handle, C., in Fig. Drill a hole

G, half way through it, and large enough to take the spiral spring 1, made out of several turns of No. 10 spring brass wire. The spring is held in place by the wood screw E, the end turn of the spring being made smaller, as at F. A flexible conductor, B, is led through the small



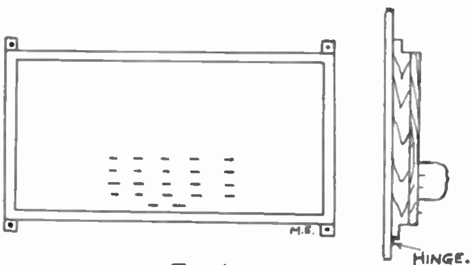
drilled hole 2, and joined to the wood screw at D by soldering.

Contributed by

W. HASTINGS HUTTER.

PLUGGING BOARD.

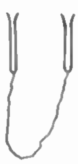
Knowing that a good many amateurs lack right means for making quick connection with the various circuits and



- FIG. 1 -

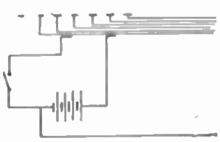
that some have their installations not at all flexible, I am sending you a description of a simple plugging arrangement, which I have been using and have found highly satisfactory.

Cut out a piece of sheet copper, which must be fairly stiff, as many pieces



- FIG. 2 -

- FIG. 3 -



- FIG. 4 -

shown in Fig. 3 as you want circuits; they should be about 3/8 in. wide and 1½ in. long; these should be placed through the switchboard so that the pointed end will project on the back and the square end remain out about ½ in. on the front; the circuits are soldered to the point of these on the back of the switchboard.

The construction of the jack is shown clearly in Fig. 2; it consists in a piece of sheet copper 1¾ inches long and ½ inch wide, bent in the centre so that the two ends will come together, or, I might say, that the piece is doubled, the two sides at the end are flanged out to facilitate connecting with the switchboard. About 8 of these will be required, making 4 pairs, each pair being connected together by a piece of flexible conducting cord soldered to them.

Fig. 4 shows one way of connecting, the batteries being connected to the two bottom lugs; one wire of each circuit can be connected to a common point leading to one terminal of the batteries, the other wire going to a lug on the switchboard.

When a certain instrument is to be operated, all you have to do is to plug it in, also any number of circuits can be connected easily either in series or parallel.

Contributed by

PETER J. EMERY.

WIRELESS FOR BALLOONS.

Active experiments are being made at the Vienna arsenal on the feasibility of fitting up dirigible balloons with wireless telegraphy. It is necessary to combine small weight and a wide range in the apparatus, so that it may be carried without serious interference with the mobility of the balloon. A few weeks ago some important experiments were made with a captive spherical balloon. It appears that Lieutenant Franz Budda has designed a system in which the apparatus is so small as not to offer any sensible resistance to the air or to overweight the balloon. The results achieved were, it is said, highly satisfactory, in spite of unfavorable weather.

A Break-In Key.

By M. H. Hammerly.

AERIAL switches of any type are antiquated and are being dispensed with in favor of some type of break-in key. The one described below, although the simplest I have seen yet, does its work well.

On the sending key, a special contact is placed (Fig. 1). This is made of a

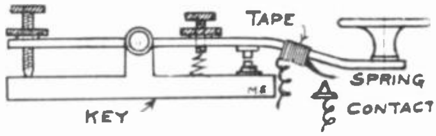


FIG. 1

small piece of thin spring brass and is insulated from the key lever by tape. The under contact may be a flat-headed brass screw. When the key is set up, this contact must close before the regular ones. This is important as otherwise, the system will not work.

The rest of the apparatus consists of an ordinary pony relay, preferably of low resistance and a couple of dry cells or other type of battery. For connections, see Fig. II and Fig. III. In Fig. III, the clip on secondary of oscillation transformer must make good contact. Other connections are the same as straight helix.

The following is the way it operates: When key is depressed the special con-

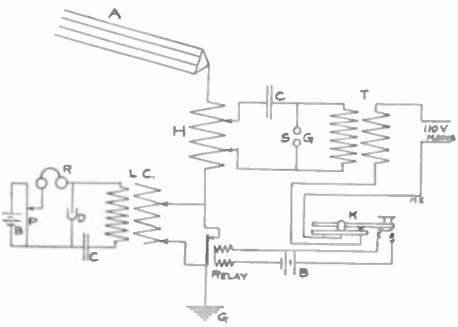


FIG. 2

tacts make contact, first closing relay and putting sending instruments directly through to ground. As the key goes farther down the regular contacts operate transformer or coil.

It will be seen that receiving is done through helix or oscillation transformer secondary. This does not reduce nor increase the strength of signals.

Some may object to the system, saying that on the failure of the relay to work, the receiving set will be destroyed. The contrary was recently demonstrated to me by a friend with a 2 K. W. set. He purposely opened the relay and sent through his receiving side without the least harm, except that the detector got out of adjustment.

There are numerous advantages to be obtained by the use of this key. If you are sending to someone and interference that he cannot work you through starts,

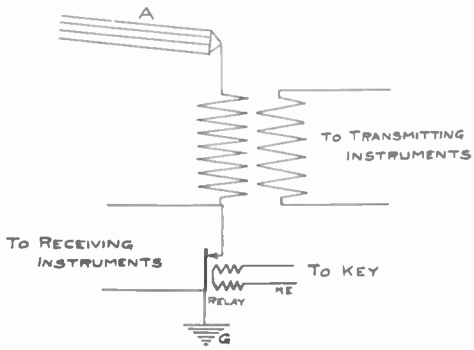


FIG. 3

you can stop until the interference stops. The person you are talking to can also break in on you, when he misses something and ask you to r r. It will also stop conflicts between amateurs and commercial stations as the amateur will hear the commercial station start and can wait.

BALLOON WILL HAVE WIRELESS TO CROSS OCEAN.

Atlantic City, N. J.—A serious attempt to fly across the Atlantic Ocean will be made from this city within the next few weeks. The public has hardly realized the seriousness of this atempt and the elaborateness of the preparations are a revelation to all who see them. Walter Wellman is at the head of the enterprise and has associated with him Mr. Vaniman, a skillful engineer of high repute, and a corps of assistant engineers, mechanicians, etc. The news of the flight is to be sent by wireless from the airship to the New York Times, the London Daily Telegraph and the Chicago Record-Herald.

Wireless Telegraph Contest

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

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

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

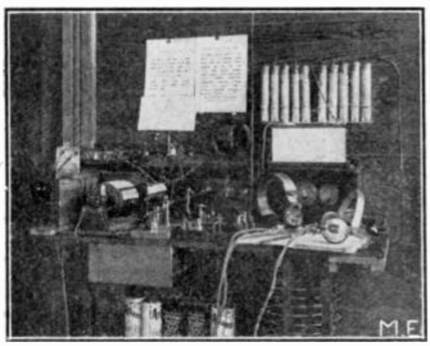
This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE THREE DOLLARS.

ENCLOSED please find a photo of my wireless station.

This outfit comprises the following:

Receiving set, E. I. Co's. 2,000 ohm amateur phones and potentiometer, my own make receiving transformer, E. I. Co. variable condenser, fixed condenser, variometer and extra inductance in series with phones. One five point switch for connecting the following detectors, Perikon, Electrolytic, Silicon, Carborundum



and Molybdenite. One two point switch for cutting out battery and potentiometer. One extra pair of 75-ohm phones with double head band. One T. P. D. T. switch for connecting ground and antenna with the instruments.

Transmitting set E. I. Co's. 1½-inch coil and Morse key. My own make brass wire helix and adjustable test tube condenser. Using one 6-volt storage and 3 dry cells for power.

To the wireless amateurs wishing to construct their own instruments I can assure them that MODERN ELECTRICS gives some very helpful hints.

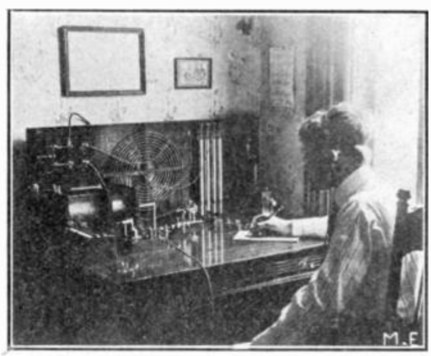
WALTER W. STEIN.
Albany, N. Y.

HONORABLE MENTION.

Enclosed please find photograph of my wireless telegraph station. All of the apparatus was built by me at home. About a year ago I became interested in wireless and since that time have gradually improved my station until now I have the set shown.

All of the instruments are finished in polished black walnut and hard rubber. My aerial consists of four number twelve copper wires stretched horizontally sixty feet and coming down at an angle of 45 degrees for thirty feet more to where it enters my station; the height of the aerial is forty-five feet. It is well insulated with porcelain insulators. My ground is a wire soldered to the pipes of the city water system.

The sending outfit consists of a two-inch E. I. Co. coil running on a six-volt storage battery, zinc spark gap, four Leyden jars (78 square inches of foil per jar), helix of twenty feet of half-inch brass ribbon on hard rubber cross bars, key, battery and aerial switches. Most of these instruments are mounted on the back of the table. With this set I am



able to send about eight miles under ordinary conditions, being able to work with amateurs all over the city and for a considerable distance outside.

The receiving outfit consists of two sets, one a tuning transformer, perikon detector and condenser; the other a double-slide tuner, detector and stand and condenser. I have a pair of two thousand-ohm Schmidt-Wilckes receivers which I use with either set.

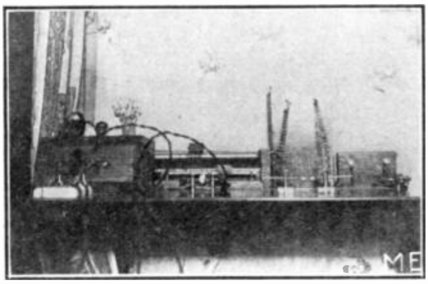
With these instruments I have copied Key West and Pensacola, Fla., Cleveland, Ohio; Buffalo, New York; Cape Cod, Mass.; Brant Rock, Mass.; Metropolitan Tower, New York and many ships of the navy in Hampton Roads.

I have been a subscriber to MODERN ELECTRICS about a year and consider it the best magazine published on this subject. LESLIE W. TELLER.
Washington, D. C.

HONORABLE MENTION.

Enclosed you will find photo of my wireless telegraph station.

My sending set is on the right. The spark coil, which gives an inch spark, is in the further corner and beside it is a



glass plate condenser shunted across the spark gap. My key is a Morse with heavy platinum points. I use 9 batteries on my coil.

My receiving instruments are a detector, graphite rod potentiometer, tuning coil, variable condenser and battery. My detector is an E. I. Co's. universal type. I have had very good success with it using silicon, carborundum, chalcopyrite and zincite, iron pyrite, molybdenite and galena. My other instruments were made by myself with the ever present aid of MODERN ELECTRICS which I consider the best wireless magazine.

I use a double pole double throw switch for my aerial which consists of four strands of No. 14 copper wire stretched 40 feet from the ground.

I use a large folding table for my instruments and do all wiring under the table. ALLYN T. ANDERSON.
Wilmette, Ill.

HONORABLE MENTION.

I enclose photo of my portable wireless set. The containing box is of half-inch oak stained black. It measures 9 x 6 x 15 inches outside. At home I use an aerial consisting of 6 strands of No. 10 copper wire, 86 feet long, suspended 100 feet from the ground at one end and 50 feet at the other. The box contains a tuning coil, variable and fixed condensers, electrolytic detector, graphite rod potentiometer, a pair of 1,000-ohm receivers with metal head-band, two dry cells, a test buzzer, push and flashlight battery, a miniature snap switch for the batteries and a set of tools and supplies. The tuning coil is 14 inches long and 3 inches in diameter and is wound with ½-lb. of No. 24 enameled wire. The detector is an E. I. Co's. as are the reecivers. The set is equipped throughout with spring binding posts and the E. I. Co's. latest ball-bearing sliders. The dry cells are placed inside the tuner. When using the set as a portable one I use an aerial consisting of one No. 18 aluminum wire with a kite or tied to a tree by an insulator. The receivers, snap switch and tools which are shown in the picture are kept

in the two compartments at the side of the box. For ground I use the water pipes or when afield an iron rod driven into the earth. VERGIL A. DAVISON.
College Campus, Pa.

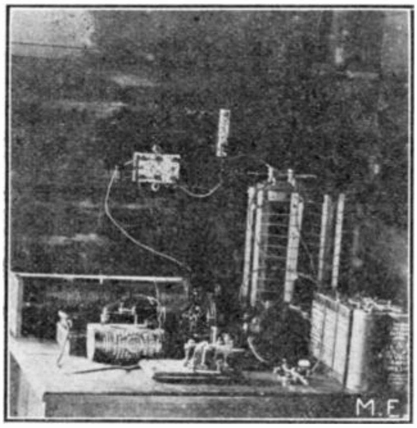
HONORABLE MENTION.

Enclosed please find photo of my wireless station.

At the left is my receiving set. This consists of single slide tuning coil with primary and secondary winding, silicon detector, potentiometer, fixed and variable condensers, one 1,000-ohm receiver, and battery.

At the right is my sender which consists of E. I. Co's. 1-inch coils, sending helix, zinc spark gap placed on top of helix, battery and key.

In the middle of the table you will notice an electric motor whose function is to de-cohere the iron filings coherer used for indoor experiments. This outfit consists of iron filings coherer, relay, sounder and motor. On the wall you will see my lightning arrester and D. P. D. T. switch.



My aerial consists of 4 strands of copper wire 1 foot apart, 40 feet long, and fifty feet high. All of my apparatus was made by myself with the exception of the coil, motor and sounder.

GUY M. BERGEN.
Grand Rapids, Wis.

HONORABLE MENTION.

The pole of my station, 40 feet long, is composed of three sections joined by means of bolts and iron rings. The pole is on the house which in itself is 80 feet above ground, and 320 feet above sea level which gives a total of 440 feet above sea level for my aerial.

My aerial consists of 2 bamboo spreaders 8 feet long, well insulated by means of 4 hard rubber insulators which I have found gives me great freedom in intercepting messages. On the spreaders are placed four No. 14 bare copper wires, set at an angle of 75°, each being 104 feet in length.

The receiving set you can see consists of 1 inductive tuner, 1 variable condenser, 1 silicon and 1 perikon detector, and 2 receivers wound to 1,600 ohms resistance. Excepting the receivers and head-band, all of these instruments are home made.

My transmitting outfit consists of 1 ¼ K.W. closed core transformer, 1 al-

uminum wire helix, 1 glass plate condenser, 1 zinc spark gap and 1 anchor gap; these instruments were made during my spare time.

I have intercepted many messages including some sent to the various newspapers and hotels in this city. I am also able at noon of each day to receive the daily weather reports and standard time sent from Washington, D. C. On several occasions I have received messages from stations that were in excess of 150 miles from my own.

EDWARD K. HENRY.
Baltimore, Md.

HONORABLE MENTION.

Power.—I have six dry cells for sending and four for receiving.

Sending.—I have a 1-inch E. I. Co. spark coil, a Morse telegraph key, with

platinum contacts. I use heavy wire to carry the secondary current. I also have and use an E. I. Co. zinc spark gap, helix and 4 pint Leyden jars.

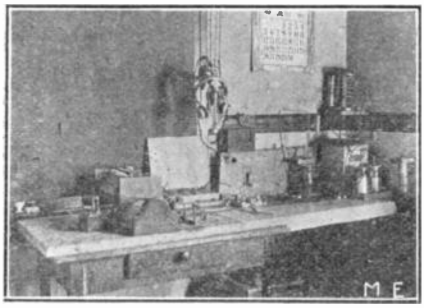
Receiving.—I use an E. I. Co. electrolytic detector (with which I get excellent results) a 941 meter wave length tuning coil, a variable condenser and a fixed condenser, a potentiometer and 4 dry cells. I have a 1,000-ohm receiver in use.

In General.—I use a D. P. D. T. switch to change from sending to receiving. My aerial consists of 4 aluminum wires, 71 feet long on 4 ft. spreaders, on a pole 42 feet above the ground and run to the cupola of a barn which is about 45 feet high. I have my instruments protected by fuses and ground for lightning. MODERN ELECTRICS is the best wireless magazine printed for the amateur. I dislike to think where I would be without it. RAYMOND H. SHAW.
Rutland, Vt.

HONORABLE MENTION.

Enclosed please find photo of my wireless station.

To the right is the sending set which consists of a 2-inch coil, 2 1-pint Leyden jars, spark gap, helix of 8 turns of No.



8 brass wire wound on a wooden frame, 6 inches diameter, and 6¾ inches high, electrolytic interrupter and key. The coil is run on 110- v. alternating current.

To the left is the receiving set consisting of a tuning transformer, improved silicon detector, one fixed and one variable condenser, pair of 2,000-ohm phones and potentiometer. The phones may be seen hanging from the electric light bracket.

In the center of the table is a double pole double throw switch used for changing the receiver to the sender.

My aerial consists of four No. 16 phosphor bronze wires on eight foot spreader phor bronze wires on 8-foot spreaders, 2½ feet apart; one end 50 feet high and the other thirty feet.

At first I started with a small tuner silicon detector and 100-ohm phones, but have gradually constructed larger instruments, (which are seen in the picture) and now am able to do good long distance work.

All my instruments are home made except phones, key and switches.

I am a constant reader of three electrical magazines, but find MODERN ELECTRICS the most instructive.
Alameda, California. ALVIN ASTER.

AN EFFICIENT WIRELESS INSULATOR.

When constructing wireless telegraph stations, one of the main necessities for successful operation is the thorough insulation of the aerial and leading-in wire.

One great reason why so many amateurs fail to get the results from their instruments, that they should, is because of poor insulation; and the weakest spot is very often at the point where the lead-in wire enters the building or room containing the apparatus. The task of boring a hole through a brick or stone wall and constructing an insulator capable of carrying the discharge without loss, is by no means a small one. Many amateurs do not make their insulators any more durable than is absolutely necassary to hold the discharge before they are put in place, where they will be called upon to withstand several unexpected conditions which the builders never stop to think about. For instance: Many amateurs have their operating rooms in the basements of their homes which necessitates bringing the antennae through the wall down near the ground, where, in many cases, the wall is damp which causes the slim insulator to lose its insulating qualities.

A very easy way of overcoming this difficulty is to run the wire through the centre of a window pane. Procure an ordinary poreclain glazed insulating tube about six (6) inches in length and with a diamond or some other glass-cutting material, cut a round hole, the size of the tube through the centre of the window pane. Insert the tube through the glass until it is about half way, fasten it there with putty or sealing wax. It is advisable to fill the space between the wire and interior of the tube with sealing wax or paraffine as it will improve the efficiency.

This will make a very efficient insulator and will be within range of any amateur both financially and otherwise.

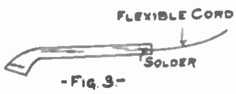
Contributed by
RUSSELL L. HOWLAND.

A Simple Wheatstone Bridge.

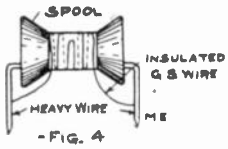
WM. M. HOWE.

It is often desirable to know the resistance of a piece of apparatus or of a piece of wire. An instrument for measuring resistance can be easily constructed by following these instructions. Secure

-FIG. 1

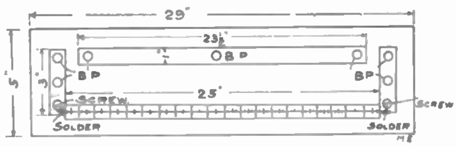


-FIG. 3-



-FIG. 4

a piece of wood 29 x 5 inches and of any convenient thickness; secure also, 3 copper strips, 1 inch wide, two of them 3 inches long, and the other 23½ inches long. Seven binding posts of the pattern shown in Fig. 1, should be procured from some supply house and also a piece of German-silver bare wire ,about 30 gauge (26 inches long). These materials should be assembled as in Fig. 2. The wire is soldered to the 3-inch pieces and underneath it a strip of paper pasted down with a scale marked on it to enable a quick reading. A slider should next be made, a piece of copper filed as in Fig. 3, with a piece of flexible cord attached will answer very well. A galvanometer is used in connection with this instrument; one like that de-



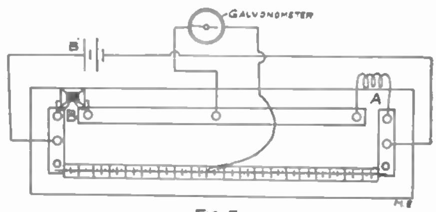
-FIG. 2-

scribed in the March number of MODERN ELECTRICS will do very well.

Resistance spools are also needed. They can be made as in Fig. 4. The correct resistance can be determined by the use of tables or by measurement with another "bridge".

A ½ ohm, a 1 ohm, a 2-ohm, a 5-ohm, and a 10 ohm will be all that will be required. The instrument is wired up as in Fig. 5, the unknown resistance being connected at A, and the known at B. The slider is then touched to different places on the wire until a position is found where the galvanometer is not affected by the current. This position is noted by the scale. The unknown resistance is in the same ratio to the known as the length of the wire from the slider to the end adjacent to the unknown resistance is to the length adjacent to the known resistance. In order to calculate the unknown resistance, multiply the known resistance by the length of wire adjacent to the unknown resistance and divide by the length adjacent to the known resistance, the result is the unknown resistance.

It is always advisable to use a known



-FIG. 5-

resistance as near equal to the unknown as possible so as to keep the slider in the center of the wire.

UNIQUE METHOD TO TRANSMIT PICTURES.

(Continued from page 309.)

was made from a typewriter. The letters and figures had been removed from the machine and on some of the arms small outline squares, made by dots, were attached in their place. There were three different kinds of squares.

The first of the squares were of delicate outline, and were used for the white parts of the picture. The next squares were heavier, and made the medium darker parts, and the last made the black portions. Three sheets of paper, one of them a carbon, were placed for use in the machine. The ribbon of the machine had been removed. The keys made but slight impression on the first sheet, but the sheet beneath the carbon received the portrait.

In following the outline of the telegram, the operator of the machine made the first line, which was the top part of Rockefeller's hat, and at each X began a new line, until the picture was completed. Had there been no errors in transmission, say the inventors, it would have been impossible to have produced anything but a perfect picture. There was no doubt that it was a picture of Rockefeller, but it looked as if it had been passed to the paper through a coarse screen.

"We have originated a special code for the purpose of saving time and cutting down the telegraph tolls," said Dr. Stolfi, "but for the purpose of this experiment we used what we call the unabridged code. Under ordinary conditions it would be too expensive for use and would be prohibitive for cable use.

Book Review.

"ELECTRIC WIRING" by Joseph G. Branch, B. S. M. E. Branch Publishing Co., 1910, 288 pages, 98 illustrations, cloth, Price, $2.00.

The author of "Electric Wiring," seems to have filled a long felt want, among practical electricians, in the manner in which he has handled the subject. As stated in the preface, the aim of the book is to elucidate the theory and underlying principles, of electrical circuits and the manner in which the wiring should be done in order to ensure the best efficiency and concordance with the Fire Underwriter's Rules.

The first few chapters deal with the nature of the electric current, ohm's law, batteries, dynamic electricity, connection of dynamos in series and in multiple, etc.

The layout of various circuits is next taken up, and the manner of calculating the size wires to be used, with the aid of simple rules and tables. The method of distributing the load both, in 2 wire and 3 wire systems, is thoroughly discussed. Many valuable construction hints are given, showing the method of applying modern wiring appliances.

Over 40 pages are devoted to the explanation of alternating currents from a practical view-point, and the author has treated this somewhat difficult subject in very admirable style, and one which cannot fail to be understood by the layman. Any one who is foggy on this matter would do well to peruse this section of the book. The principles of alternating current and their generation is well explained also the meaning and use of the Power Factor; Inductance and capacity; the skin effect; Wattless currents, etc.

The book closes with several chapters covering annunciator, telegraph and telephone work, wireless telegraphy and a number of valuable tables especially prepared for this work.

WIRING CALCULATIONS.

By H. S. Brubaker.

THE specific resistance of copper wire is 10.8, but in practical wiring calculations we use 11 R. as the constant to allow for the increase in resistance of connections; this is the resistance of one mil-foot of copper wire at 75° Fahr.

D = distance of circuit one way.
E = volts lost in transmission.
I = amperes in line.
C. M. = circular mils cross-section.

Now the formula is:

$$\frac{11 \mathrm{x} 2 \mathrm{x} D \mathrm{x} I}{E} = \text{C. M. or } \frac{22 \mathrm{x} D \mathrm{x} I}{E} = \text{C. M.}$$

Problem 1: Require size of wire to deliver 100 ½-Amp., 100 E. lamps, 500 feet from generator with a line loss of 5% two wire system.

100 × ½ Amp. = 50 Amp.
5% of 100 E = 5 E lost.

$$\frac{22 \times 500\,D \times 50\,I}{5\,E} = 110{,}000 \text{ C. M. size}$$

Problem 2: Required size, same problem on Edison 3-wire system.

1 Amp. now lights four lamps.
100 ÷ 4 = 25 I.
5% of 200 E = 10 E lost, because in Edison system the voltage between either outside wire and neutral is 100 volts, and between outside wires 200 volts.

$$\frac{22 \times 500\,D \times 25\,I}{10\,E} = 27500 \text{ C. M. for outside wires.}$$

$$\frac{27500}{2} = 13750 \text{ C. M. for neutral wire, being ½ size of outside wires.}$$

Now it happens that 1,000 feet of wire of 1,000 C. M. weighs 3 lbs., so if we multiply numerator by 3 and divide by 1,000, it will give us the weight per 1,000 feet. The formula would then be:

$$\frac{D \times 22 \times 3 \times I}{1000 \times E} = \text{lbs. per 1,000 feet.}$$

You man avoid the necessity of dividing by 1,000 thus:

DM = distance one way in 1,000 of feet.
The formula is then:

$$\frac{DM \times 66 \times I}{E} = \text{pounds per 1,000 feet.}$$

and

$$\frac{DM \times 132 \times I}{E} = \text{total weight of circuit in lbs.}$$

Constant table formula:

$$\frac{I \times D}{E} = K \text{ and } \frac{K}{16} = \text{lbs. per 1,000 feet.}$$

I = amperes.
D = distance one way.
E volts lost.
16 a fixed constant.
K = constant (refer to table).

Size B. & S.	Constant.
0000	16400
000	8000
00	6400
0	5200
1	4000
2	3200
3	2600
4	2000
5	1600
6	1300
7	1000
8	800
9	750
10	650
11	400
12	375
13	325
14	200

By remembering size 3-4-5—2600, 2000, 1600 respectively, the table is easily remembered, as every third size is double, as, size 14 wire is 200; now counting up 3 places to 11 wire, it is found to be 400 double the cross-section of 14 wire. Example:

A motor is taking 12 Amp., 220 E., and is 1,500 feet from generator voltage 230 E.

230E — 220E = 10E lost in line.

$$\frac{12\ I \times 1500\ D}{10\ E} = 1800\ K = \text{No. 4 wire.}$$

As there is no 1,800, we use next higher size or 2,000 = No. 4,

$$\frac{K\ 2000}{16} = 125 \text{ lbs. per 1,000 feet.}$$

1500 D × 2 = 3,000 feet × 125 lbs. per M feet = 375 lbs..

Formula for aluminum wire is

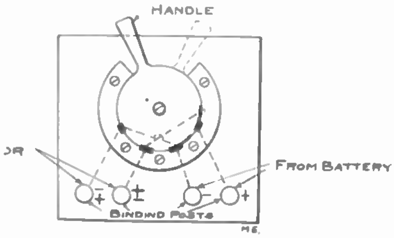
$$\frac{I \times D \times 35}{E} = C.\ M.$$

C. M. × .0009 = pounds per 1,000 feet.

REVERSING SWITCH.

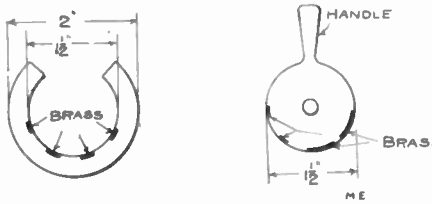
It is often very hard for the amateur and experimenter to procure a satisfactory reversing switch. But, I hope, the one which I will endeavor to describe will answer every requirement.

First, procure a piece of hard rubber, size 2¼ inches by 3 ft. 3 inches. Then cut two pieces (A and B, Fig. 2) of ¼



- FIG. 1 -

inch rubber. Where the black spots are (Fig. 2) cut out part of the rubber and insert sheet brass therein. Be sure to let the brass protrude a very little beyond the rubber in order to form a perfect contact, i. e.; if you use No. 15 B. & S. brass, cut an opening just so No. 14 will fit snug in it.



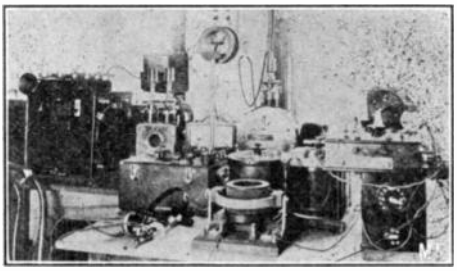
- FIG. 2 -

Screw A and B to the rubber base and connect wire as shown in Fig. 1.

Wood may be substituted for the rubber *base only*.

Contributed by

J. BEARSLEY FOLEY.



New Radio-Telephone Station on the Metropolitan Tower, New York.

FIRST WIRELESS FROM AEROPLANE.

Flying at the rate of 60 miles an hour 600 feet above the crowd, L. J. A. McCurdy, the young aviator, sent the first wireless message ever transmitted from an aeroplane while over the Sheepshead Bay racetrack, near New York, which is being used as an aviation field, on August 27th. When he sent a message to H. M. Horton, who was located on top of the grandstand, a mile away, he proved to the world that messages can be transmitted through the air from an aeroplane while in motion. One of the results of the achievement by Mr. McCurdy will probably be the appropriation of a sum of $2,000,000 by Congress for experimental work.

For the past few weeks McCurdy has been trying in vain to attain the desired result, and it was a source of great satisfaction to him and also to Mr. Horton that the experiment was so successful.

After a run of about fifty feet, McCurdy rose gracefully into the air. Upon alighting, after flying for about a mile, he was followed by Ely, who made a circular flight at a height of about 100 feet above the ground. Ely followed this flight with another one, attaining an altitude of about 200 feet.

With a wireless transmitter rigged on his machine, McCurdy took the air smoothly and rose to a height of about 500 feet, but did not attempt to send any message on this flight. After descending, he communicated with Mr. Horton, who said that everything was favorable for sending. Getting into his machine once more, McCurdy ascended to about the same altitude. Mr. Horton, standing on the roof of the grandstand with the wireless receiver announced that a message had been received.

After receiving the message, Mr. Horton wrote it out and handed it to the newspapermen. The message came slowly but surely. Written upon the papers which Horton handed to the reporters were the words: "Another chapter in aerial achievement is recorded in the sending of a wireless message from an aeroplane."

To send the message, McCurdy did not move from his seat, as the transmitter was attached to the steering gear. All he was obliged to do was to operate the transmitter. This he did with ease, as he is an experienced wireless operator, having learned the code several years ago. To make sure that his message had been received, he repeated it twice and both times it traveled correctly to Mr. Horton.

JAPANESE INSPECT WIRELESS 'PHONE.

Oakland, Cal.—Wireless telephones, invented by John McCarthy, of No. 682 Thirty-sixth street, this city, may be installed on Japanese war ships in the near future. Two representatives of the Mikado's navy, Baron Iwan Kowajuchi and Baron Menjiro Togono, came here the other day and tested the apparatus. They made a later test of a wireless telephone plant located on the roof of the St. Mark Hotel, which is operated by McCarthy and two fellow inventors, Kendall Douglas and E. P. Herrguth.

After the naval men had boarded the Mongolia in the bay, preparatory to leaving for home, Kelly caused a phonograph to be played into the transmitter of the wireless telephone. The barons heard the selection distinctly on the steamer, according to a wireless telegram received by Kelly. The wireless plant on the Mongolia could receive the wireless telephone message, but is not equipped to send such a message.

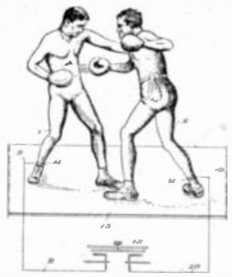
McCarthy says he has talked with the telephone as far as Santa Cruz and Stockton.

WIRELESS STORM SIGNAL FOR LAKE.

All vessels equipped with wireless apparatus will be hereafter forewarned of the coming storms while on Lake Superior by the United Wireless Company, which has agreed to transmit daily to vessels on the lake forecast and warning signals in time to allow the boats to make port should the storm be a heavy one. The messages will be sent through the Duluth branch. A storm warning station has been established at Grand Marais harbor, Minn. The signals are displayed from a steel tower fifty feet high, surmounted by a flagstaff the top of which is 125 feet above the lake level. The day signals are made with flags located 800 feet from the harbor front, hoisted on the staff and the night signals by means of oil burning lights displayed from the tower. The forecast and warning signals are sent from Duluth to Grand Marais every morning by wireless.

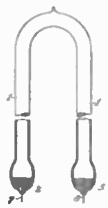
Electrical Patents for the Month.

966,996. THEATRICAL DEVICE. George A. Byrns, Washington, D. C. Filed Jan. 3, 1910. Serial No. 535,934



1. A theatrical apparatus, comprising conducting garments adapted to be worn upon the hands and body of separate individuals, and a source of electricity connected to said garments, the said garments on said individuals constituting the terminals of said source of electricity and creating a disruptive discharge when the hands of one individual are brought into proximity to the body of the other individual

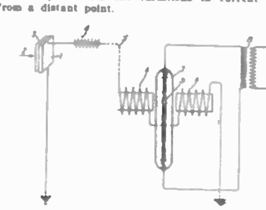
968,900. ELECTRODE FOR VAPOR-LAMPS. Peter Cooper Hewitt, New York, N. Y., assignor to Cooper Hewitt Electric Company, New York, N. Y., a Corporation of New York. Filed Apr. 16, 1904. Serial No. 203,435.



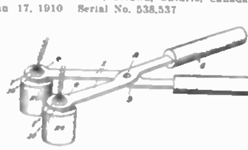
An electrode for mercury vapor apparatus, consisting of an amalgam formed of lead, tin and mercury in approximately the proportions of one part lead, one part tin, and four parts mercury.

968,464. TELEPHOTOGRAPHY. Osias Otto Kruh, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. Filed Nov. 19, 1907. Serial No. 402,787.

1. In a telephotographic system, a luminous tube having a light transmitting window, and electromagnetic means for varying the intensity of light at said window to correspond with the variations in current received from a distant point.

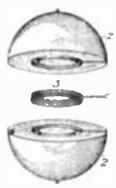


966,040. GARMENT CREASER. Roy K. Arbuthnot and George W. Langdon, Ottawa, Ontario, Canada. Filed Jan 17, 1910. Serial No. 538,537



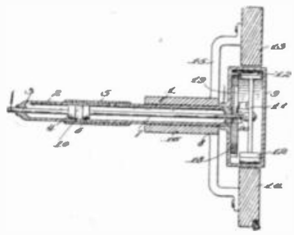
1. In garment creasers, a pair of arms pivotally joined intermediate of their length, tubes extending from said arms at their outer ends and rigidly held thereto and forming bearings, resistance coils rigidly secured to said tubes between said bearings, wires extending from said resistance coils through said tubes and adapted to connect said coils to an electric current supply, and drums journaled on said tubes and forming rotary ironing members and inclosing said resistance coils and heated thereby

968,304. INDUCTION-LAMP. Peter Cooper Hewitt, New York, N. Y., assignor to Cooper Hewitt Electric Company, New York, N. Y., a Corporation of New York. Filed July 20, 1904. Serial No. 217,305.



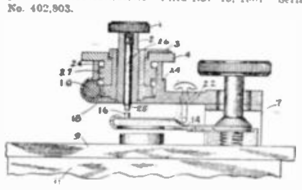
1. The method of producing light in a rarefied gas or vapor within a chamber, which method consists in exciting the gas to luminosity by passing rapidly varying currents through a primary within a body thereof, said currents being of such quantity and such rate of variation as to electromagnetically induce in said vapor currents whose electromotive force is above a critical minimum, said minimum being the lowest voltage at which the gas is enabled to become a true conductor of electricity.

968,007. COHERER FOR WIRELESS-TELEGRAPH SYSTEMS. Charles Walker, Knoxville, Tenn. Filed May 5, 1909. Serial No. 494,003.



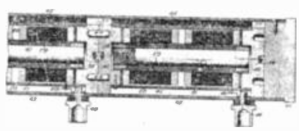
1. A coherer or receiver comprising a tube, terminals or electrodes hermetically inclosed therein, and a screw adjustment connecting the terminals, a part of said adjustment being capable of manipulation from the exterior of the tube and a magnetically controlled device for maintaining such adjustments.

968,358. ADJUSTMENT-MICROMETER FOR SPARK-COILS. Edward D. Jacobson, Pittsfield, Mass., assignor to Jacobson Brandow Company, Pittsfield, Mass., a Corporation of Massachusetts. Filed Nov. 19, 1907. Serial No. 402,803.



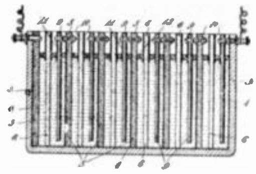
1. In induction-coil apparatus, an adjustable contact-point, a movable member supporting the contact point and adapted to be removed therewith and replaced without requiring readjustment, and means for measuring the extent of movement of the contact-point.

968,173. SPARK-COIL. August R. Laschka, Chicago, Ill., assignor to Western Electric Company, Chicago, Ill., a Corporation of Illinois. Filed Dec. 11, 1907. Serial No. 406,001.



1. An induction coil consisting of a spool provided with a primary and a secondary winding, each end of said spool being provided with a plurality of channels in its periphery, each spool end being further provided with a radial channel communicating with one of said other channels, terminal clips for the primary connections arranged in said radial channels, and a secondary terminal plate carried by said spool.

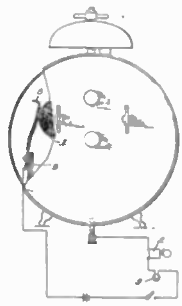
968,154. PRIMARY BATTERY. Charles E. Hite, Burlington, N. J. Filed Aug. 16, 1906. Serial No. 330,773.



1. In a primary battery, the combination of a receptacle divided into a plurality of separate cells by carbon plates suitably coated on one side with impervious material, each cell provided with a porous plate.

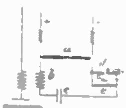
967,766. ELECTRIC ALARM. Harry D. Hanson, East Boston, Mass. Filed Apr. 24, 1909. Serial No. 491,900.

In combination, a clock embodying a metal case and an alarm mechanism actuated by means of a coil spring, an electric circuit including a switch, a lamp and a bell, and having the clock case and said coil spring included therein as a part, a spring arm also included in the electric circuit and forming a terminal thereof and in contact with said coil spring and adapted to be actuated thereby, a dielectric support for the spring arm secured to the clock



case, and a sleeve of insulating material slipped upon said spring arm

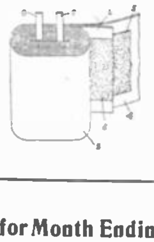
966,705. SIGNALING BY WIRELESS TELEGRAPHY. Valdemar Poulsen, Copenhagen, Denmark. Filed Mar. 8, 1907. Serial No. 361,280.



1. A wireless signaling apparatus including an electric arc, a circuit from said electric arc including inductance and capacity, an oscillation damping device, and means for putting such damping device into and out of the circuit to absorb the energy thereof in the form of heat

965,992. ELECTRICAL CONDENSER. William W. Dean, Elyria, Ohio, assignor to The Dean Electric Company, Elyria, Ohio, a Corporation of Ohio. Filed Jan. 28, 1909. Serial No. 474,772.

1. In an electrical condenser, the combination of a strip of paper coated on one side with finely divided conducting material, said strip of paper adapted to act as an insulator at low voltages but adapted to be punctured at high voltages, said finely divided conducting material adapted to be dissipated at the puncture to isolate said puncture from the remaining finely divided conducting material and a strip of low resistance metallic foil all wound together in the form of a roll, the strip of paper being interposed between the layer of finely divided material and the foil and terminals connected one to the metallic foil and one to the finely divided conducting material



Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending Aug. 30

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

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

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

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

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

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

½-K. W. CONDENSER.

(669.) C. R., Camden, N. J., says:

1.—What are the most sensitive detectors for long distance wireless work?

A. 1.—The electrolytic and perikon.

2.—Can 75-ohm receivers be used successfully in connection with either electrolytic or silicon detectors?

A. 2.—Yes; for short distance work.

3.—Which is best for a condenser for a half K. W. transformer; leyden jars or a glass plate condenser?

A. 3.—Glass plate.

AERIAL.

(670.) W. C. Poole, N. Y., writes:

1.—How would I wire a four stranded aerial for the E. I. Co's. R 1,000 and S 20 sets using No. 14 B. & S. aluminum wire?

A. 1.—Use a straight-away aerial connected to a D. P. D. T. knife switch, as shown in answer to query No. 454, February, 1910, number.

2.—What is the capacity of the E. I. Co. adjustable condenser?

A. 2.—.0009 + M. F.

3.—How to mix the electrolyte for an electrolytic detector using .004 or .005 inch platinum wire?

A. 3.—Four parts water to 1 of pure nitric or sulphuric acid.

10-INCH INDUCTION COIL.

(671.) R. Clarkson, Ocala, Fla., asks:

1.—Please tell me as soon as possible what is wrong with the following induction coil, (home made), as it will only make a spark ⅛ inch long and ⅝ to ¾ inches thick with a fifteen glass plate condenser 16 x 10 inches. Core 24 inches long, 3 inches diameter, made of No. 22 core wire, primary 2 layers No. 12 D. C. C. wire, hard rubber insulator 3/16 inch thick; secondary made up of 10 lbs. of No. 28 D. C. C. magnet wire wound in 31 sections 7¾ inches in diameter and ⅛ inch thick; each section boiled in paraffine; with 12 sheets of paraffined paper between each section; then the whole secondary was sealed in with paraffine; coil run on 110 volt A. C. with Gernsback interrupter. Will you please tell me how to connect this and the size spark it should give?

A. 1.—This coil may be rebuilt as follows; and should give a heavy 10-inch spark; primary of 3 layers No. 8 B. & S. D. C. C. magnet wire. Insulating tube same length as core, but with ⅜-inch wall. Secondary wound in 150 sections each 9 inches in diameter of 20 lb. No. 32 S. S. C. wire.

2.—With an antenna 100 feet long, composed of 6 strands of No. 14 aluminum wire, 2 feet apart, 105 feet high, and with the following instruments, how far can I receive: Silicon and electrolytic detectors, one fixed and one variable condenser, tuning coil with secondary, potentiometer and one pair 3,000-ohm receivers?

A. 2.—800 to 1,200 miles.

3.—How far could I send with above coil and aerial?

A. 3.—100 to 300 miles, under proper conditions.

RECEIVING RADIUS.

(672.) Vernon G. Cox, Arkansas, inquires:

1.—What would the receiving radius of the following instruments be, if connected as in the accompanying diagram? One Electro Importing Co's. potentiometer, two 75-ohm receivers, one Electro Importing Co's. electrolytic detector, one carborundum detector, one Electro Importing Co's. variable condenser and one fixed condenser, single slide tuning coil, with an aerial 60 feet long, 45 feet high; consisting of 4 strands of aluminum wire (No. 14) placed 18 inches apart. A water-pipe ground is used.

A. 1.—75 to 100 miles.

2.—How do you find the wave length of a tuning coil?

A. 2.—Multiply the length of wire on coil (in meters) by 4.

3.—Where is the nearest high power Wireless Station to Hot Springs, Ark?

A. 3.—Ft. Riley, Kansas.

LOOSE COUPLER.

(673.) M. Leitch, Jr., New Jersey, says:

1.—Having a double slide tuner, wound on a cardboard tube, 16 inches long, and 4 inches diameter, with ½-inch wall, No. 20 enameled wire, I would like to change same to a loose coupler type. Will you kindly give me the length of secondary, and size of wire to use?

A. 1.—Make primary 8 inches long, and a secondary of the same length, small enough to allow a 1/16-inch clearance between it and primary. Wind the secondary form with a layer of No. 30 B. & S., S. S. C. or enamel wire.

RECEIVING RADIUS.

(674.) R. Chedester, Colo., writes:

1.—How far should I be able to receive with the following equipment? Double slide tuning transformer, fixed and variable condensers, carborundum and sealed-in point electrolytic detector, two 75-ohm head phones, non-inductive potentiometer, with an aluminum four wire aerial, 60 feet high and 90 feet long?

A. 1.—Up to 150 miles.

2.—How far with 1,000-ohm phones?

A. 2.—350 to 450 miles.

3.—Please give diagram of best arrangement for sending; using a 1 K. W. transformer; and also what is the proper capacity for a 1 K. W. transformer condenser?

A. 3.—See answer to query No. 556 in May, 1910, issue; a capacity of .019 Microfarad.

SENDING RANGE.

(675.) E. E. Beattie, Alaska, writes:

1.—How far could I send with an E. I. Co's. ½ K. W. transformer coil, 1 set condenser jars, "Electro zinc spark gap," helix made of No. 6 B. & S. aluminum wire, one pound, a good key, and a Gernsback electrolytic interrupter, and the aerial first described?

A. 1.—50 to 60 miles.

2.—How far could I receive with a silicon detector, (stand home made), a tuning coil 2 inches in diameter, 14 inches long, seventy-five-ohm single pole receiver, aerial 42 feet long, 4 wires aluminum; each wire 2 feet apart, highest point of pole 55 feet, lowest 25?

A. 2.—150 to 200 miles.

3.—Where could receivers wound to 300 ohms or thereabouts be procured?

A. 3.—Consult our advertising columns.

WAVE LENGTH.

(676.) E. E. Ely, Benton Harbor, Mich., asks:

1.—Which aerial is better for long distance receiving; a 4 wire vertical aerial, 200 feet long, lead-in from the lower end; or a 2 wire horizontal aerial 300 feet long, 70 feet high at one end and 50 feet at the other, lead-in from the middle? Would the first aerial be better with only 2 wires?

A. 1.—The 4 wire aerial. No.

2.—In calculating wave length, does the

length or height of an aerial refer to (a) the height of aerial above instruments, (b) the length of the aerial, or (c) the total length of wire in the aerial? I find the terms "length" and "height" are often used synonymously.

A. 2.—The length of the multiple aerial, and the lead-in from instruments to aerial.

3.—What would my receiving radius be with the best of the above aerials, E. I. Co. electrolytic detector, variable and fixed condensers, double slide loose coupler, E. I. Co. No. 1306 receivers, battery and potentiometer?

A. 3.—300 to 400 miles.

GROUND WIRE.

(677.) C. D., Ohio, writes:

1.—I have a ground for receiving composed of No. 12 water-proof copper wire, running on glass insulators on the outside of the house and porcelain insulators on the inside; connected to a water-pipe in the basement. Ought I to improve on the insulating of this when used with the instruments in question 2?

A. 1.—No; providing you run it without any sharp bends and in as straight a line as possible.

2.—What is my receiving distance with the following: Aerial composed of 2 strands of No. 12 aluminum wire stretched 450 feet from the top of a city water tower 150 feet high down to my instruments, E. I. Co's. large double slide tuner, variable condenser, potentiometer, electrolytic detector, and their set 1,000-ohm receivers; fixed condenser same as described in Oracle of the May issue?

A. 2.—1,000 miles.

3.—In what way can I improve upon this outfit?

A. 3.—Use a loose coupler and a variometer, with an additional variable condenser.

¼ K. W. OPEN CORE TRANSFORMER.

(678.) H. Sortwell, Ind., says:

1.—Please give dimensions of ¼ K. W. open core transformer to run on 110 volts A. C. 60 cycle, without any interrupter?

A. 1.—Core 1½ x 12 inches; primary of 2 layers No. 14 D. C. C. magnet wire. Secondary wound in 36 sections, ¼ inch thick, and 4½ inches in diameter, of No. 33 S. S. C. wire.

WAVE LENGTH.

(679.) Geo. Cox, N. C., asks:

1.—How many meters wave length would an aerial have, if it was 150 feet long, 6 wires, one end 60 feet high and the other end 30 feet high with a tuning coil 3 inches in diameter and 20 inches long, containing about a pound of No. 24 enameled wire in series with it?

A. 1.—About 1,120 meters wave length.

2.—Would a wire 30 feet long, No. 12 iron (as that is the shortest distance I can get) be all right for a ground wire, or would it have too much resistance and be too long, being connected to the water-pipe?

A. 2.—It would do; but you should use at least No. 10 copper wire.

¼ K. W. TRANSFORMER.

(680.) W. J. KLEIN, N. Y., writes:

1.—What is the best wire to use on a tuning coil, and how many inches will it take for 1 meter?

A. 1.—No. 22 or No. 24. It will take 39.7 inches wound on the coil to every 4 meters wave length capacity wanted.

2.—How can I make a ¼ K. W. transformer, the size and quantity of wire to use and what power will it need?

A. 2.—See "A 250 watt closed core transformer" by Carleton Haigis, in April, 1909, issue, where complete directions are given for the construction, etc. 250 watts will be required to operate it.

REDUCING VOLTAGE.

(681.) EDWIN BAXTER, Ill., inquires:

1.—How can 220 A. C. be reduced to 110 A. C. for the Electro Importing Co's. 110 A. C. or D. C. ½ K W. transformer coil, using a Gernsback interrupter?

A. 1.—It is not necessary to reduce the voltage for the Gernsback interrupter.

2.—How far could I receive with an aerial 115 feet high, 50 feet long with 8 strands 4 inches apart, with an electrolytic detector, pair 1,000-ohm receivers, potentiometer, loose coupler, variable condenser and fixed condenser and also Ferron and silicon detectors; and please state which detector is best?

A. 2.—800 to 1,200 miles. Space 4 aerial wires 3 to 4 feet apart. Silicon detector.

3.—How far could I transmit with ½ K. W. transformer coil, electrolytic interrupter, and No. 9212 Wireless Key?

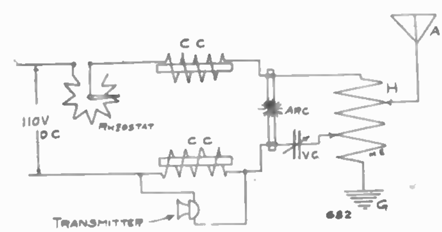
A. 3.—Fully 100 miles.

WIRELESS TELEPHONY.

(682) R. L. GEORGE, Minneapolis, Minn., says:

Q. 1.—I am interested in wireless telephones. Please print a diagram of a set that will work from 500 to 800 feet, using one of the arc lamps that was advertised in the March, 1910, issue, by the E. I. Co.

A. 1.—See diagram below.



MOTOR.

(683.) ROBT. YUEL, Mo., writes:

Q. 1.—How can I run a 110-vt. D. C. 3-ampere motor on a 220-volt D. C. circuit, with lamps as a resistence?

A. 1.—Use a bank of 3-32 C. P. 110-vt. lamps (connected up on multiple), in series with the motor.

Q. 2.—Is there any sort of an automatic hydrometer, which will automatically measure the specific gravity of the electrolyte in storage batteries and keep it at the proper value?

A. 2.—Yes; write to the Electric Storage Battery Co., Philadelphia, Pa.

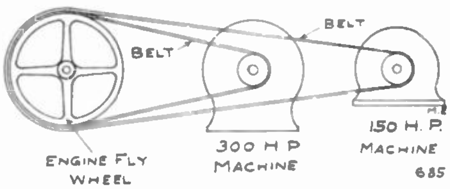
Q. 3.—Which is the best for aerials, large or small wire?
A. 3.—Large; as the exterior surface only is traversed by the high frequency currents.

1,000-OHM POTENTIOMETER.

(684.) B. RILEY, Kan., says:
Q. 1.—I have an E. I. Co.'s double slide loose coupler, and a T type aerial, 80 feet high, lead-in 60 feet long. What is my maximum wave length?
A. 1.—900 meters.
Q. 2.—Give me dimensions, etc., for a 1,000-ohm potentiometer.
A. 2.—See article "A Non-Inductive Potentiometer," in the August issue.
Q. 3.—What is the highest resistence receiver made?
A. 3.—3,000-ohm.

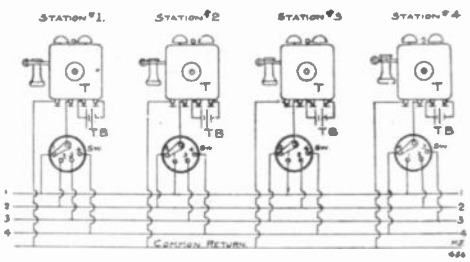
BELT DRIVE.

(685.) E. EARL, Mass., Inquires:
Q. 1.—What causes static electricity in belts, and how may the cause be overcome?
A. 1.—Slippage of the belt; it may be oftentimes remedied by applying some preparation (of which there are several on the market) to the face of the pulley. Also covering the pulley face with leather is a good expedient.
Q. 2.—How can I drive a 150 H. P. arc light machine and a 300 H. P. dynamo from the 1 wheel of a 500 H. P. steam engine using belts, but no counter shafts?
A. 2.—See plan below. One belt passes over the other, on the same engine flywheel.



TELEPHONES.

(686.) F. CHARLES, Conn., asks:
Q. 1.—Can I use four ordinary battery telephones on an intercommunicating system? If so, please give diagram.
A. 1.—Yes. Connect them as shown below, using a 4-point switch at every phone.



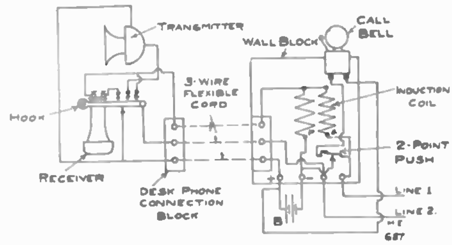
When through using phone, always replace switch lever on the home, No. point.
Q. 2.—How many dry cells should be connected to each telephone?
A. 2.—2 to 3 cells.
Q. 3.—What size annunciator wire is necessary for a line 600 feet long?
A. 3.—Use No. 18 B. & S. gauge.

TELEPHONE CONNECTION.

(687.) J. H. VAWTER, Cal., Says:

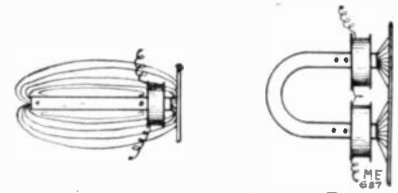
Q. 1.—Please give wiring diagram for a desk phone with a 3-wire cable, connecting it to wall block, containing an induction coil, call bell, and 2-point push button?

A. 1.—See diagram given below.



Q. 2.—Which isthe best, a double pole or single pole receiver, and why?

A. 2.—The double pole type, as the magnetic circuit is complete excepting 2 small air gaps at the pole pieces of the magnet, 1-32 inch long, whereas in the single pole type the magnetic flux must complete its circuit through the air as shown in figure.



SINGLE POLE TYPE   DOUBLE POLE TYPE.

Q. 3.—I wish to know how to ring 6 bells in series on 2 wires; using 1 battery and 1 push button.

A. 3.—Make all the bells single stroke, but one; allowing its vibrator to interrupt the current for all the other bells.

PERIKON DETECTOR.

(688.) FRANCIS PAXTON, Md., writes:

Q. 1.—Is it advantageous to use a battery with a Perikon Detector, and how should it be connected to it?

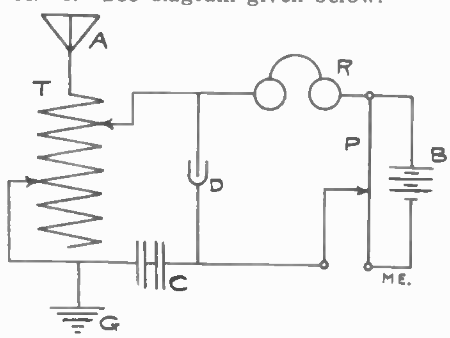
A. 1.—Yes, for long distance. Conect the positive pole to the copper pyrites.

CONNECTIONS.

(689.) W. POOLE, Pa., asks:

Q. 1.—How should I connect the following instruments to get the best results? Double slide tuning coil, fixed condenser, electrolytic detector, phones, potentiometer, and battery.

A. 1.—See diagram given below.

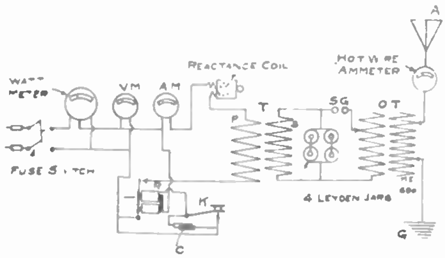


TRANSMITTING CONNECTIONS.

(690.) C. BEALE, Miss., writes:

Q. 1.—Please give diagram for connection of the instruments named below (supply 110 volts, 60 cycle): Fuses, D. P. S. T. switch, direct reading wattmeter, voltmeter, ammeter, adjustable reactance coil, primary relay, Morse key and condenser, 1 K. W. open core transformer, large copper-coated Leyden jars, oscillation transformer, hot-wire ammeter, and special muffled spark gap.

A. 1.—Diagram given below.



WIRE QUESTIONS.

(691.) — — —

Q. 2.—How many feet to the lb. of Nos. 20, 22, 24 and 28 enameled wire?

A. 2.—320, 509, 810, 2,042 feet, respectively.

Q. 3.—What size wire should I use for my ground?

A. 3.—No. 4 B. & S. gauge copper, D. B. R. C. to pass the underwriters' inspection.

WIRELESS CALLS.

(692.) R. WALLACE, Ga., writes:

Q. 1.—Please give me the name, call letter, and power of the nearest station to Atlanta, Ga.

A. 1.—Mobile, Ala., Call "M. B." Power 2 K. W.

Q. 2.—State a good size of wire to lead from above aerial to instruments.

A. 2.—The same size as the aerial conductor.

RECEIVING RADIUS.

(693.) K. NOBLE, Yonkers, N. Y., asks:

Q. 1.—How far could I receive with the following instruments: Loose coupler, Perikon detector, fixed condenser, and 2,000-ohm receivers?

A. 1.—Up to 600 miles, with an aerial 60 feet high.

Q. 2.—Could you name instruments and give diagram of a wireless telephone set that will work up to 1/4 mile or so and not connected to any form of electric socket, as ordinary house (110 volts) current, as in most sets?

A. 2.—Consult our "Wireless Telephone Hand Book;" price 25c., postpaid.

FERRON DETECTOR.

(694.) J. COOK, Tampa, Fla., writes:

Q. 1.—Could sulphuric acid batteries be used in wireless?

A. 1.—If you mean storage batteries, yes.

Q. 2.—What range would a tuning coil 6 inches in diameter, 3 feet long and wound with No. 20 copper wire have? And can the "Ferron" Detector be used in connection with this coil?

A. 2.—2,824 meters. Yes.

Q. 3.—Is aluminum or phosphor bronze wire better for aerial work than copper?

A. 3.—Phosphor bronze is considered the best (if stranded).

BUZZER TESTER.

(695.) L. BENNETT, Everett, Mass., writes:

Q. 1.—Please tell me my receiving distance with the following instruments: Aerial of the inverted "L" type 40 feet high and 80 feet long of No. 14 bare copper wire, double slide tuner 12 inches long, 2½ inches in diameter, wound with No. 22 bare copper wire spaced about 1-16 inch apart, fixed condenser, silicon detector, and pair of 75-ohm receivers.

A. 1.—60 to 90 miles.

Q. 2.—About how many meters are in my tuning coil?

A. 2.—160 meters.

Q. 3.—Please give me a diagram for buzzer-testing outfit?

A. 3.—See answer to query No. 622 in July number.

CONNECTIONS.

(696.) FRED UHL, JR., Visalia, Cal., writes:

Q. 1.—Please give me my wave length, using the following: Aerial, four aluminum wires each 2 feet apart, 80 feet long, and a lead-in 80 feet long at one end. It is 45 feet high at one end, and 35 feet high at the other. It has an in and out connection.

A. 1.—192 meters.

Q. 2.—Please show a better diagram, if possible, than the one I have enclosed, and how far can I receive with the instruments shown and above aerial?

A. 2.—600 to 800 miles. See diagram in query No. 516, April number.

Q. 3.—Is it the length of the wire, or the number of turns on a tuning coil, which makes the greater wave length?

A. 3.—The length of wire on tuning coil.

VARIABLE CONDENSER.

(697.) S. B. BEEBEE, New London, Conn., asks:

Q. 1.—What is my receiving range with single slide tuning coil, fixed condenser, electrolytic detector, pair 75-ohm telephone receivers, potentiometer, and aerial 70 feet high, 3 strands, No. 14 aluminum wire?

A. 1.—75 to 100 miles.

Q. 2.—What is my sending range with a 1-inch spark coil, 3 1-pint Leyden jars, Helix 20 feet No. 10 copper wire and spark gap?

A. 2.—3 to 5 miles.

Q. 3.—What would be the dimensions of a variable condenser for the above receiving set?

A. 3.—Use 2 brass tubes 8 inches long. One 2 inches in diameter, the other 2⅞ inches in diameter. Glue a piece of heavy paper around the smaller tube and slide it within the large tube, sliding it in and out, to vary the capacity.

RECEIVING CONNECTIONS.

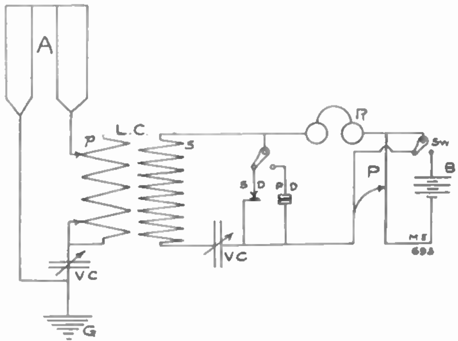
(698.) F. LUDWIG BEHM, Baltimore, Md., Inquires:

Q. 1.—Kindly advise the receiving radius of the following aerial and instruments: Looped aerial 80 feet long, the highest point from the ground 85 feet, and the lowest point 20 feet. Instruments: Large inductive tuner, Perikon and silicon detectors, two large variable condensers, 2,000-ohm phones and potentiometer.

A. 1.—500 to 800 miles.

Q. 2.—Kindly give diagram of the best and selective hook-up, using the above instruments.

A. 2.—See diagram below.



Q. 3.—How far is Brant Rock from Baltimore?

A. 3.—325 miles by air line.

TUNING COIL.

(699.) JOHN EVANS, Wilmington, Del, requests:

Q. 1.—What is the receiving range of an aerial consisting of 2 aluminum wires, 50 feet high at one end, 35 at the other, lead-in from the lower end. Instruments consisting of double slide tuner, fixed condenser, silicon, perikon, molybdenite and carborundum detectors, and 75-ohm telephone receiver?

A. 1.—75 to 100 miles.

Q. 2.—The aerial is to be made of 8 wires soon. What are the best improvements and range?

A. 2.—Space wires, if possible, 3 feet apart; take lead-in from the centre of aerial.

Q. 3.—What is the meter's wave length of a double slide tuner wound with 288 turns No. 22 bare wire on 3-inch tube?

A. 3.—276 meters.

FIXED CONDENSER.

(700.) J. B. NELSON, Woodland, Cal., writes:

Q. 1.—Could tinfoil be used in a variable condenser?

A. 1.—Yes.

Q. 2.—What is the fixed condenser put between the ground and detector for?

A. 2.—To increase strength of signals, as the resultant effect on the receiver is not so instantaneous.

Q. 3.—Does one have to use a battery for receiving with molybdenite?

A. 3.—No, but it may be used.

RECTIFIER.

(701.) J. D. NUNN, N. Y., requests:

Q. 1.—Please give a simple way of making an alternating current rectifier to change 110 A. C. to D. C.?

A. 1.—Write to Electro Importing Co., 233 Fulton St., New York City, who make a simple and cheap type.

Q. 2.—Could a telephone magneto be changed into a direct current dynamo, and, if so, how?

A. 2.—Yes; by putting a 2-segement commutator on the shaft and connecting the armature terminals to it.

SENDING RANGE.

(702.) ROBT. MCLOUGHLIN, Rutherford, N. J., says:

Q. 1.—Please state greatest possible receiving distance with high power stations at the sending end and instruments below: The aerial is 60 feet high at one end and 35 at the other. It is 90 feet long, and is composed of 4 wires (aluminum) 2 feet apart. It is of the looped type. 2,000-ohm receivers, loose coupler, electrolytic detector, potentiometer, 2 fixed condensers, and 2 variable condensers

A. 1.—600 miles.

Q. 2.—The range with double slide tuner in place of loose coupler.

A. 2.—500 miles.

Q. 3.—Sending range with 1-inch coil, adjustable condenser, interrupter, Helix, on 110-volt current.

A. 3.—3 to 5 miles.

RECEIVING RANGE.

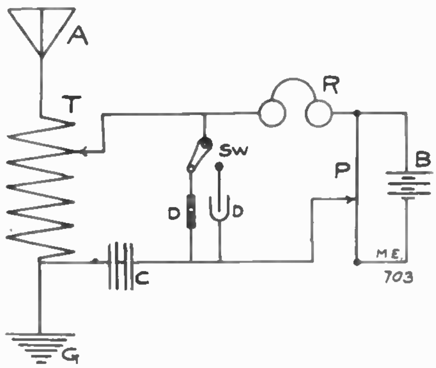
(703.) J. ANTENNER, Lawrence, Mass. asks:

Q. 1.—What is the receiving range of the following: E. I. Co.'s single slide tuner, auto-coherer, electrolytic detector, fixed condenser, and 75-ohm receivers, with an aerial of 4 strands of No. 14 B. & S. aluminum wire, 40 feet long, 18 inches apart, and 80 feet high?

A. 1.—100 to 150 miles.

Q. 2.—Give complete diagram for connecting same (including battery, if necessary).

A. 2.—See diagram below.



Q. 3.—If the range of an outfit is 200 miles, is it considered being from 1 mile to 200 miles?

A. 3.—Yes.

SENDING AND RECEIVING RADIUS.

(704.) JOSEPH HOVEY, Syracuse, N. Y. asks:

Q. 1.—What would be my sending distance with the following: Two wire aerial 50 feet long, stretched 10 feet above the roof, on a building 100 feet high, 1½-inch coil and zinc gap?

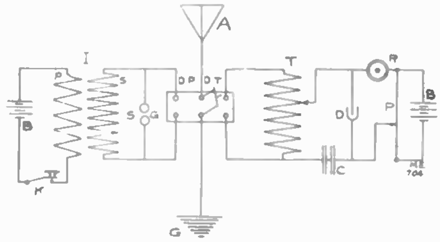
A. 1.—5 to 10 miles.

Q. 2.—My receiving range, with 75-ohm pony telephone, electrolytic detector, National receiving condenser, same aerial?

A. 2.—80 to 125 miles.

Q. 3.—Please give diagrams showing the best way to connect these instruments up for all-around work?

A. 3.—See diagram below.



RECEIVING TRANSFORMER.

(705.) L. A. GARDENER, Vermont, writes:

Q. 1.—Is there any advantage in using a receiving transformer in connection with a tuning coil?

A. 1.—Yes.

Q. 2.—I usually hear the station at Brant Rock, Mass., sending two or three times a day, but have not done so for the past three weeks. Can you tell me if that station is still in operation or not?

A. 2.—Yes.

Q. 3.—If I should rewind the primary of a ½ K. W. transformer coil with enameled wire instead of cotton cover wire, would the output of the secondary be greater without rewinding the secondary?

A. 3.—Yes; the voltage would be increased.

SILICON DETECTOR.

(706.) L. E. PLUMB, Oaklawn, Ill., says:

Q. 1.—I have a Wireless Telegraph receiving set, which consists of the following: Aerial made of a piece of 5-foot woven wire fence 18 feet long, stretched 45 feet high, silicon detector, which I made myself, 2 75-ohm receivers, ground connections made to a piece of zinc 3 feet by 4 feet, buried 4 feet under ground. Can you tell me why at some times I can hear messages very plain, but at others I can only hear a cracking in the receivers? I have received very loud messages from Chicago, 18 miles.

A. 1.—You may have a loose connection somewhere; also you should use a tuning coil and a variable condenser.

Q. 2.—Does it make receiving any better to have ground plate very deep under ground (such as well pipe)?

A. 2.—Yes. The nearer wet earth you go the better.

Q. 3.—What is the best way to make a point of silicon detector—should it be pointed or rounded off?

A. 3.—Pointed, but not sharp. Gold gives good results for this purpose.

INSTRUMENTS DON'T WORK.

(707.) JOHN C. RECTOR, Ill., writes:

Q. 1.—I have used up over 2 feet of wire in my electrolytic detector, and have not heard a thing. I have a two-slide loose coupler, tuning coil, 2,000-ohm phones, fixed and variable condensers, electrolytic detector, potentiometer and I use one old dry battery; pease give diagram connections for these instruments, so they will give best results.

A. 1.—Try connections given in diagram, query No. 565 in May number.

Q. 2.—Please give a diagram for connections for the following instruments: ½ K. W. transformer coil, spark gap, Helix, condenser, interrupter, key and 110-vt. A. C.

A. 2.—See answer to query No. 607 July M. E.

Q. 3.—How far should I send and receive with the above instruments with an aerial 125 feet high, 110 feet long, 6 strands 1 foot apart?

A. 3.—Sending range 80 to 100 miles; receiving radius 800 to 1.200 miles.

TUNING.

(708.) F. Sayford Bacon, Newton, Mass., says:

Q. 1.—I have a loose coupler tuner and can get large stations very well, but when I try to get anybody with a smaller aerial than my own (which has 200 meters wave length) I can't get them, or else they are so weak I can't read them. If possible, kindly tell me my trouble. I use the diagram given in question No. 565 No. 2 May M. E.

A. 1.—Your smallest tuning wave length is possibly too great. Use a tuning coil for nearby stations having a shorter wave length, or use one half your present aerial length.

2-INCH COIL HELIX.

(709.) J. G. Pringle, New York City, Inquires:

Q. 1.—The material needed to construct a cylindrical helix, for my 2-inch coil? I intend to have the spark gap inside it.

A. 1.—Wind 12 turns of No. 8 aluminum wire on a form 8 inches in diameter, and space turns 1 inch apart.

DETECTOR TROUBLE.

(710.) — — —

Q. 2.—How to wire sending set with testing buzzer?

A. 2.—See page No. 81, May number, 1910.

Q. 3.—For receiving I use a universal detector stand with a steel machine needle and a piece of silicon; my other instruments consist of E. I. Co.'s double slide tuner, 1,000-ohm double head-band receivers, and fixed condenser. My aerial is 27 feet long and is made of 4 copper wires 6 inches apart; height of aerial is about 35 feet. With this set I can hear some nearby stations very loud, but all other stations that I catch, sound faintly. No changing or moving of the silicon or needle will remedy this. Please tell what to do? The aerial cannot be extended lengthwise.

A. 3.—Space your 4 aerial wires at least 2 feet apart, and 3 or 4 feet, if possible. Use hook-up given in answer to query No. 563 in May issue. Also use a brass or gold point, instead of steel, in your detector.

COIL TROUBLE.

(711.) Everett Eckenbeck, Appleton, Minn., writes:

Q. 1.—Some time ago I bought an E. I. Co.'s 2-inch induction coil. For a couple of months it worked all right in connction with a Gernsback interrupter. A short time ago it suddenly refused to work altogether. I tested the primary with batteries and it buzzed all right. I then tested the secondary, using 110-vt. D. C. in series with a 4 C. P. lamp. I got a tiny spark through the secondary, but not enough current went through to light the lamp. I then put a 1-inch coil in series with it,, connecting the primaries in series and the secondaries in series, using a Gernsback interrupter, the spark of the 1-inch coil was neither increased nor diminished, the current went through both primaries. Can you tell me what the trouble is?

A. 1.—The condenser across the vibrator on the 2-inch coil is probably broken down. Replace it by another, which may be made from data given in answer to query No. 615 July number.

Q. 2.—Can a 2-inch coil work 25 miles? Could I receive 25 miles (using a 2-inch coil at sending station) at night with the following: Aerial 100 feet long, 40 feet high, 600-meter tuning coil, silicon detector and 75-ohm receiver? The country is level, and there are no forests.

A. 2.—A 2-inch coil has transmitted 25 miles under very favorable conditions; to receive from it you would require 2,000- ohm phones, with an aerial 75 feet high, also fixed and variable condensers.

Q. 3.—Please give me the dimensions for a sending helix for use with a 2½-inch coil.

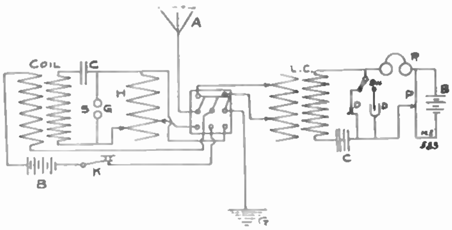
A. 3.—15 turns No. 8 aluminum wire, wound on a form 8 inches in diameter, with turns spaced 1 inch apart.

CONNECTIONS.

(712.) C. MURRAY JONES, N. Y., asks:

1.—Kindly show me how to connect the instruments below, to obtain the best results: 1-inch spark coil, helix, spark gap, key, fixed condenser, battery, triple pole, double throw, Electro Importing Co.'s antennae switch, loose coupler, fixed condenser, 2 detectors, phones, potentiometer, batteries.

A. 1.—Diagram given below.



HOT WIRE AMMETER.

(713.) L. I. DENNISON, Mich., inquires:

1.—I do not get a shock when I put my hand on the aerial and ground wires. Is this a sign of wrong connection?

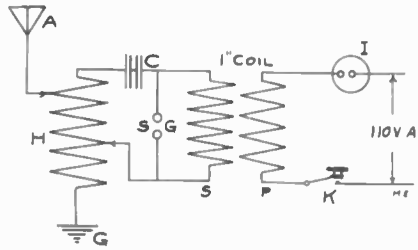
A. 1.—Yes. You evidently have a leak somewhere, or else the coil is not connected right on the high potential side.

2.—Should a hot wire ammeter be left in circuit all the time?

A. 2.—It may be, if desired; but is usually switched into circuit when tuning only.

3.—How shall I connect 1-inch induction coil and electrolytic interrupter to 110-volt A. C. mains, and how many 16 C. P. lamps are required?

A. 3.—No lamps are required. Connect as shown below.



SENDING RADII.

(714.) CHAS. WARD, JR., N. J., asks:

1.—What is the receiving radius of my set, consisting of silicon detector, electro tuner, Junior, double, slide, pair of 75-ohm receivers, double-pole type, aerial made of 4 strands of aluminum No. 14 gauge, 16 inches apart, 30 feet long and 30 feet high?

A. 1.—Your receiving radius will be from 50 to 75 miles.

2.—How far can I send with above aerial and 1½-inch spark coil?

A. 2.—From 6 to 8 miles, if you use tuned circuit.

3.—Would a transmitting helix improve my set any? If so, how much?

A. 3.—Yes. If you use transmitting helix, condenser and zinc spark gap, your sending efficiency will be increased about 50 per cent.

A GREEN WRAPPER

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Wireless Association of America

THE Wireless Association of America has been founded with the sole object of furthering the interests of wireless telegraphy and telephony in America.

We are now on the threshold of the wireless era, and just beginning to rub our intellectual eyes, as it were. Sometimes we look over the wall of our barred knowledge in amazement, wondering what lays beyond the wall, as yet covered with a dense haze.

However, young America, up to the occasion, is wide awake as usual.

Foreign wireless experts, invariably exclaim in wonder when viewing the photographs appearing each month in the "Wireless Contest" of MODERN ELECTRICS. They cannot grasp the idea that boys 14 years old actually operate wireless stations successfully every day in the year under all conditions, but they are all of the undivided opinion that Young America leads the rest of the world wirelessly.

So far America has led in the race. The next thing is to stay in the front and let others follow. In fact he would be a bold prophet who would even dare hint at the wonders to come during the next decade. The boy experimenting in an attic to-day may be an authority to-morrow.

As stated before the Wireless Association's sole aim is to further the interests of experimental wireless telegraphy and telephony in this country.

Headed by America's foremost wireless men, it is not a money-making institution. There are no membership fees, and no contributions required to become a member.

There are two conditions only. Each member of the Association must be an American citizen and MUST OWN A WIRELESS STATION, either for sending or for receiving or both.

The Association furnishes a membership button as per our illustration. This button is sold at actual cost. Price 20 cents (no stamps nor checks).

This button is made of bronze, triple silver-plated. The flashes from the wireless pole are laid in hard red enamel, which makes the button quite distinctive. The button furthermore has the usual screw back making it easy to fasten to buttonhole. The lettering itself is laid in black hard enamel. Size exactly as cut.

On account of the heavy plating it will last for years and is guaranteed not to wear "brassy."

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Its diameter is 3-4 inch. This is a trifle larger than usual, the purpose being to show the button off so that it can be readily seen from a distance. The reason is obvious. Suppose you are a wireless experimenter and you live in a fairly large town. If you see a stranger with the Association button, you, of course, would not be backward talking to the wearer and in this manner become acquainted with those having a common object in mind, which is the successful development of "wireless."

The Association furthermore wishes to be of assistance to experimenters and inventors of wireless appliances and apparatus, if the owners are not capable tomarket or work out their inventions. Such information and advice will be given free. Somebody suggested that Wireless Clubs should be formed in various towns, and while this idea is of course feasible in the larger towns, it is fallacious in smaller towns where at best only two or three wireless experimenters can be found.

Most experimenters would rather spend their money in maintaining and enlarging their wireless stations, instead of contributing fees to maintain clubs or meeting rooms, etc., etc

The Board of Directors of this Association earnestly request every wireless experimenter and owner of a station to apply for membership in the Association by submitting his name, address, location, instruments used, etc., etc., to the business manager. There is no charge or fee whatever connected with this.

Each member will be recorded and all members will be classified by town and State.

Members are at liberty to inquire from the Association if other wireless experimenters within their locality have registered. Such information will be furnished free if stamped return envelope is forwarded with inquiry.

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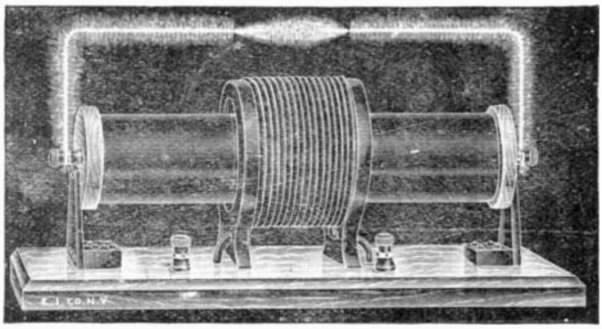
The "Electro" Tesla Transformer

(Patent applied for)



No. 7000

The pressing demand of our customers for an efficient Tesla Transformer has prompted us to add this wonderful piece of apparatus to our now extensive list of experimental goods. We hardly need mention that the Tesla Transformer is the most marvelous piece of apparatus ever invented and there are so many thousands of experiments and demonstrations that can be performed with this apparatus, that it is not used merely as a pastime but its fascination will never cease to attract its owner.

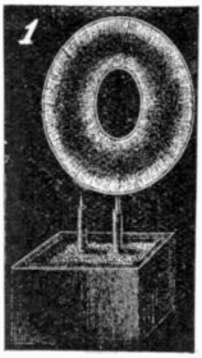
We have had this transformer under consideration for the last two years and we had to build dozens of different models before a perfect apparatus was produced. We do not hesitate to say that for the price we are asking, this apparatus is the greatest bargain ever offered by us. Although it is now the lowest priced Tesla Transformer in this country it does not mean that it is less efficient than one costing $50 but as we are manufacturing the transformer in very large quantities it is possible to greatly reduce the cost. Naturally the manufacturer who only builds one or two at a time must ask a great deal more than we, making two and three hundred at a time.

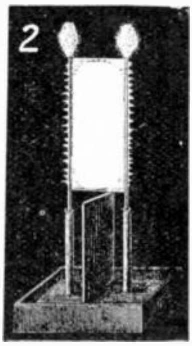
The construction of this transformer has been simplified to such an extent that it is not only absolutely "fool proof" but we guarantee that it will do anything and everything any standard Tesla transformer ever did, or will do.

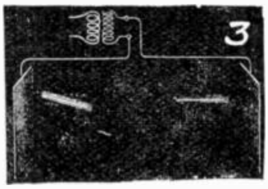
The primary is wound with the best imported Pirelli cable and the secondary with the best DOUBLE INSULATED enameled wire. The secondary is insulated by solid hard rubber brackets as shown in cut. It is also provided with two well finished coil ends. The insulation is absolutely perfect, the base is heavy quartered oak. Our usual hard rubber binding posts are attached as shown.

In operating the secondary emitts a blue brush and any piece of wire connected to the end terminals will also give a big brush as shown in illustration. The spark obtained between wire points is 3 3½ inches long, if a 2 inch coil is used. Although the voltage on the secondary runs into millions it is not harmful to take hold of any of the secondary terminals, in fact sparks about 2 inches long can be drawn from the secondary with the bare hand without any harm.

We show below a few cuts of some experiments that can be done with this transformer. There are hundred of different others equally astonishing and interesting. One of our 1 inch coils is sufficient to operate the transformer but we would always recommend to get a 2 inch coil with which the best results are to be had. Or else our ½ K.W. transformer coil in connection with our Electrolytic interrupter will still give more wonderful effects. Two of our 1½ pint leyden jars No. 9222 or any other sending condenser of the RIGHT CAPACITY can be used in connection with this transformer. A simple spark gap completes the entire outfit. IT MUST BE UNDERSTOOD THAT THE TESLA TRANSFORMER CANNOT BE USED WITHOUT THE ABOVE MENTIONED ACCESSORIES.







We have prepared a handsome pamphlet describing this transformer also giving a list of the more important experiments and demonstrations that can be performed with this apparatus. We shall be pleased to mail it to you at once.

"Electro" Tesla Transformer as illustrated and as described WITHOUT ACCESSORIES.

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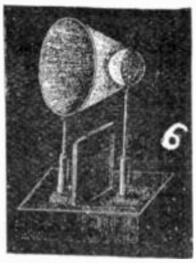

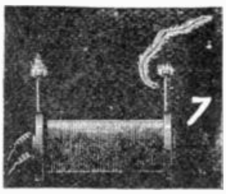

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