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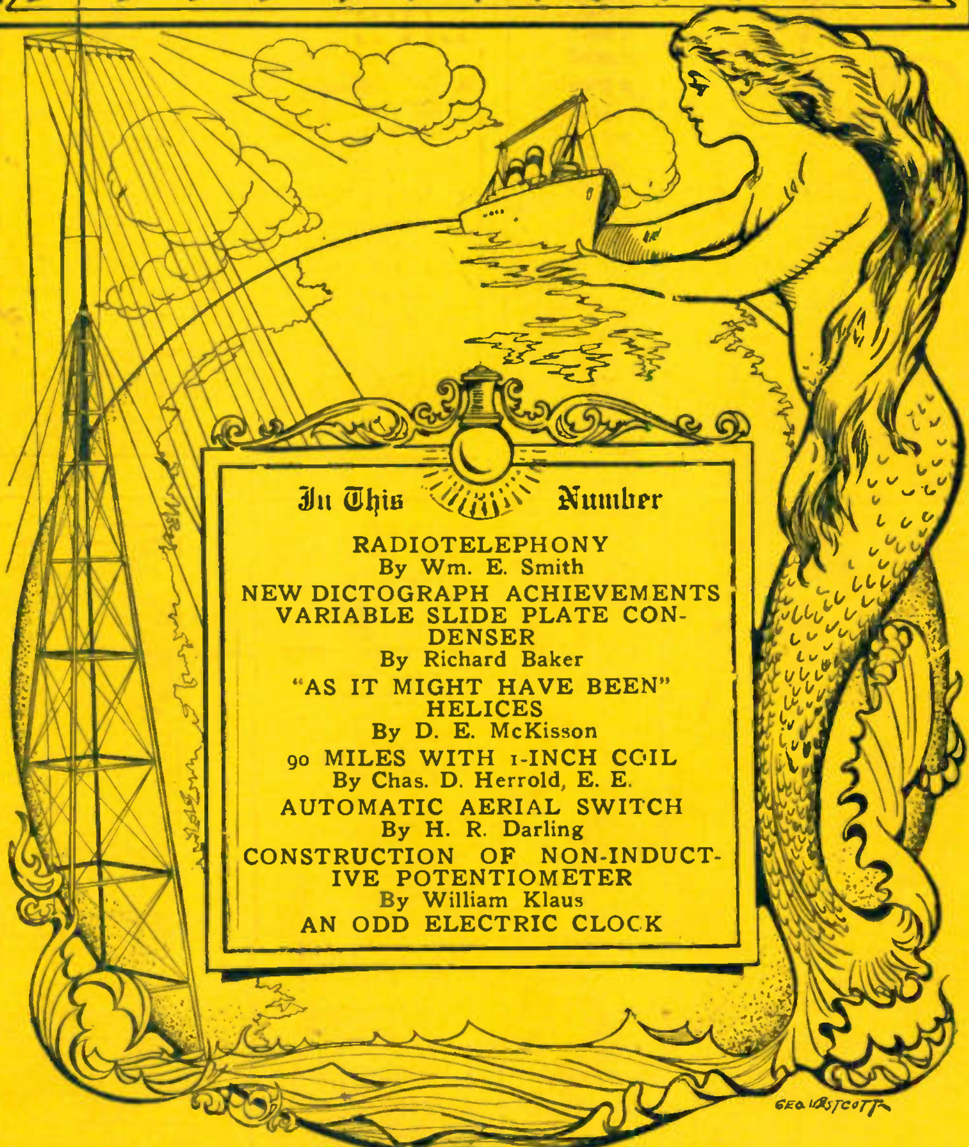
MODERN ELECTRICS



In This Number

THE SPIRIT OF WIRELESS

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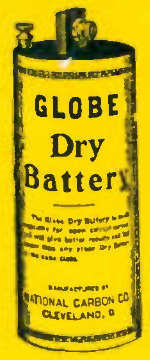

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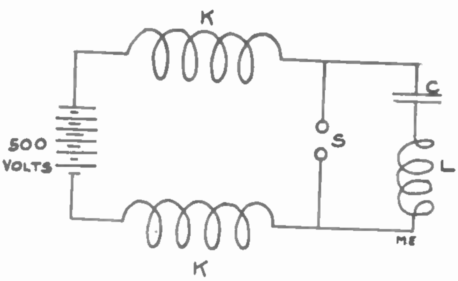
VOL. III. OCTOBER, 1910. No. 7

Radiotelephony

By Wm. E. Smith.

Before the invention of the methods of radiotelephony which will be described in this article, attempts have been made with some degree of success to transmit the sound of articulated speech without the aid of connecting wires over moderate distances.

In addition to a method depending upon the induction of currents and their conduction through the earth, another



-FIG. 1-

has been worked out based upon a peculiar property of selenium of varying its resistance under the action of light, and of the continuous current electric arc of varying the intensity of its light when a periodic current is superimposed upon the continuous one. We shall, however, confine our attention to the details of the method employing electro-magnetic waves, now generally called radiotelephony.

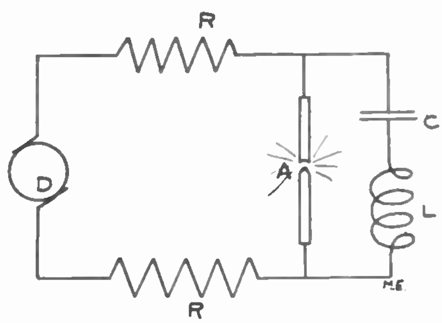
Radiotelephony consists, therefore, in the transmission to a distance of articulated speech through space without wires by means of electromagnetic waves, as distinguished from radiotelegraphy, which is the transmision of intelligence by means of arbitrary signs, whether audible or visible.

It was soon after radiotelegraphy had made a certain progress in reaching points of a distance of 100 miles or more that inventors minds naturally turned to the problem of the transmission of articulated speech by the same method. It very soon, however, became clear that the attainment of any practical success lay in the invention of a transmitter for producing undamped electric radiation, and of a receiver which should be quantitative in its action, that is to say, not merely set in operation by electric oscillations, but produce an effect proportional to the amplitude of the waves incident on the receiving aerial.

The oscillation detector to be used in connection with radiotelephony must be of such character that it is capable of varying the current in a telephonic receiver in exact correspondence with the variations of the transmitting diaphragm due to the speaking voice taking place in proximity to the telephonic transmitter employed at the sending station.

An essential condition of success in the transmission of articulated speech by electromagentic waves is that there shall be no interruptions in the uniform flow of the undamped oscillation, at least not below such a frequency as is equal to the upper limit of the frequency of audible sounds.

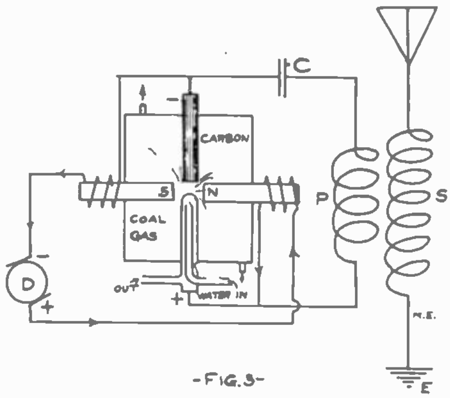
If regular vibrations are set up in the air, these are appreciated as sounds by



-FIG. 2-

the normal ear if they lie in a frequency between 40 and 20,000 per second. Human ears vary, however, a great deal in the value of the highest frequency which can be heard as sound. As regards musical sounds, the highest frequency employed does not exceed 4,000 or 5,000.

If intermittent trains of damped waves were employed, even if the frequency of the trains were as much as 4,000 or 5,000 they would affect the oscillation detector at the receiving station, and hence the telephone in connection with it, and produce in the latter a musical sound of high pitch which would drown



-FIG.3-

out the variations of lesser frequency which constitute the articulated speech.

Therefore, if an alternator producing an alternating current having a frequency of even 10,000 were connected to a radiating aerial, it is probable that most persons would hear a sound in a telephone connected to an electrolytic or crystal oscillation detector in a receiving circuit. If, however, it had a frequency of 20,000, they would not hear any sound.

We might say, therefore, that to be of practical use in radiotelephony a high frequency alternator should give a current having a frequency of not less than 20,000, and preferably higher.

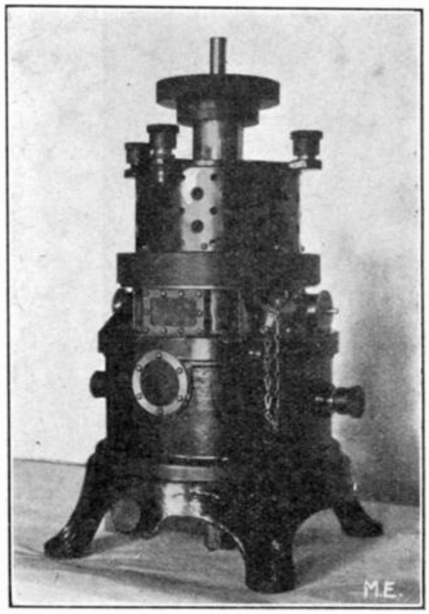
Prof. R. A. Fessenden of the National Electric Signaling Co., has constructed such an alternator of the Mordey type, with fixed armature and a revolving field, having 360 poles. At a speed of 139 revolutions per second it gave a voltage of 65, and an alternating current with a frequency of 50,000, the maximum output at this frequency being 300 watts. The attainment of a speed of 8,000 R.P.M. in any revolving shaft and disc necessitates very perfect balancing, and if used on board ship special devices are necessary to obviate gyrostatic action, which would cause serious wrenching at the bearings as the ship pitched or rolled.

It is not necessary to generate very high voltage, as we can always transform it up by means of an oscillation transformer or by resonance, but it is necessary to have high frequency.

Unfortunately, really practical methods of transforming up frequency have not been perfected, so as to start with a low frequency current. There is no doubt that if a high frequency alternator of satisfactory mechanical design giving a frequency of 50,000 and up can be constructed as a commercial article, it will find a useful field in connection with radiotelephony.

Turning then to the discovery that it is possible to produce undamped electric oscillations from a continuous electric current by means of the electric arc, opens up a wide field of research.

In 1891 Elihu Thomson patented the following method for producing undamped electric oscillations: From the terminals of a direct current generator or storage battery B, having an electromotive force of 500 volts, a circuit is taken which passes through a coil of very high inductance K, and is interrupted by a spark gap S, between two metal balls. These balls are adjustable as to distance, and are also connected by another circuit consisting of a condenser



C and an inductance L in series (Fig. 1.) The operation is as follows: When the spark balls are put in contact a current is drawn from the supply and passes through the large inductance K. If the balls are separated, an electric arc is formed and the condenser becomes charged by the difference of potential between the balls.

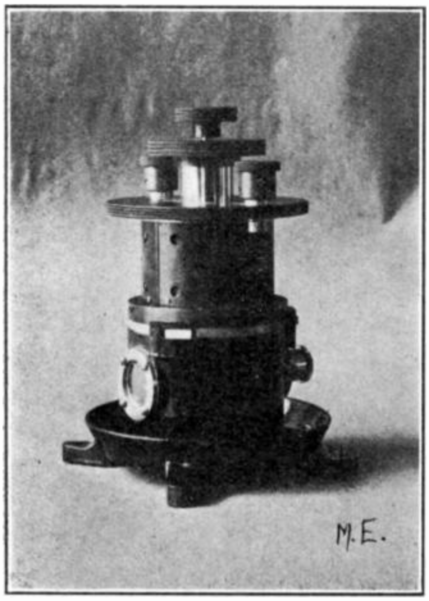


FIG. 5

The formation of the arc between the balls involves, however, the passage of a current through the large inductance, which causes a drop in voltage, so that the potential difference of the balls is decreased.

The inventor stated that the ball distance, inductance and capacity can be so adjusted that the condenser is regularly charged and discharged across the spark gap. The electromotive force in the direct current circuit charges the condenser and then forms an arc across the balls, but the rush of current which then ensues through the large inductance causes an arc between the balls and a drop in their potential difference, and the condenser then discharges back across the gap.

In his specification Elihu Thompson says that he was able to get persistant oscillations in the condenser circuit of 30,000 or 40,000 per second.

In 1900 Walter Duddell discovered some very interesting characteristics on the behavior of an electric arc between solid carbon electrodes when shunted with a condenser and inductance in series, he formed an electric arc A. between solid carbons such as is used in the ordinary arc lamps, but he connected the two arc carbons by an oscillatory circuit consisting of a condenser C and inductance L in series (Fig. 2.) Using carbons ½ inch in diameter, with an arc current of 3.5 amperes and a voltage of 42, and a condenser of 1 to 5 microfarads capacity in series with an inductance of 5 millihenrys, he found that the electric arc gave forth a musical note, the pitch of which depended upon the capacity and the inductance in the oscillatory circuit. Also that in the condenser circuit undamped oscillations were set up.

He showed that the effect could only be well produced with solid carbons, and this only when the capacity in the shunt circuit was of 1 microfarad or more, and that the resistance of that circuit must be small.

He also noticed that to obtain the effect the arc must be supplied with continuous current from some steady supply such as dynamos D or a storage battery, and a resistance R of several ohms must be put in this circuit in series with the arc. The resistance of the indnctance in series with the condenser must, on the other hand, be low, not more than about 1 ohm.

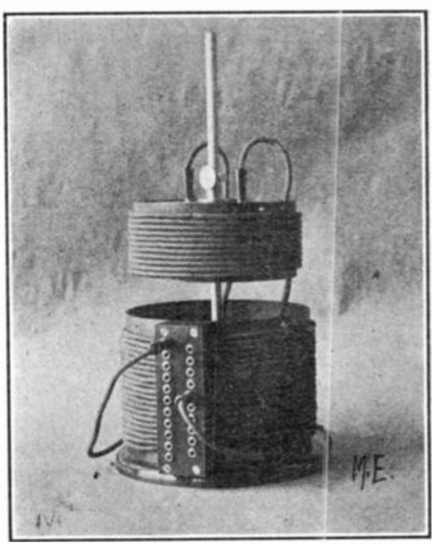


FIG 6.

In 1903 Valdemar Poulsen, of Denmark, discovered important improvements in the arc method of creating electric oscillations which gave fresh importance to the matter. He produced an electric arc between a carbon rod as the negative and a copper rod as the positive terminal, the latter being kept cool by a water circulation within it.

The arc was at the same time surrounded by an atmosphere of hydrogen or hydrocarbon gas or vapor, and crossed transversely by a strong magnetic field. On shunting this arc with an oscillation circuit consisting of a small capacity and a large inductance, he found he obtained in this circuit very powerful undamped or persistent oscillations, the frequency of which, by proper selection of capacity and inductance, could be made to be as high as a million or more, and quite within the range of those required in radiotelephonic work.

Before proceeding to explain the reasons for the increase in frequency ob-

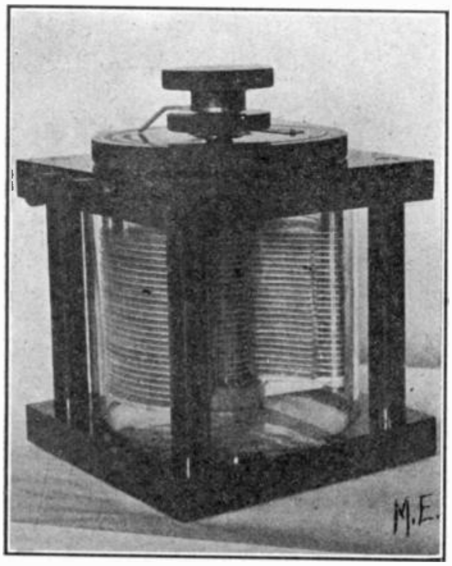


FIG. 7.

tainable by the above means it will be best to describe more in detail the construction of Poulsen's apparatus, and some of the modifications of it which have been suggested.

The electric arc is formed with a direct current voltage of 400 to 600 volts between the end of a solid carbon rod, 1 inch in diameter, and the end of a water cooled copper pole (See Fig. 3).

The later consists of a copper tube, which is closed at both ends and has an inlet and outlet pipe for circulating cold water through it. The end of this tube terminates in a sharp copper nose piece, which is removable and can be renewed when burnt away.

These two electrodes pass through holes in the two marble slabs, which form the ends of the metallic cylinder, as shown in Fig. 3.

By this means the cylinder can be cooled by water to remove the heat created by the electric arc formed between the copper and carbon poles.

Arrangements are made whereby the carbon electrode can be slowly rotated on its axis by a motor, and the arc is "struck" and the length regulated by a screw attached to the copper pole.

In addition to this, the polar ends of powerful electromagnets project into the cylinder gas tight so as to form a powerful magnetic field transversely to the arc. By means of a pipe placed under the arc, coal gas can be admitted to the cylinder, and the gas passes out through an outlet pipe. When the cylinder is full of gas, the arc is formed by means of a 500 volt continuous current dynamo, and the magnetic field excited. The copper pole must be positive and the carbon the negative. If, then, an oscillatory circuit, consisting of a condenser of small capacity in series with an inductance of 215 microhenrys so as to give the oscillatory circuit a natural frequency of 500,000 to 1,000,000, has its ends connected to the copper and carbon electrodes, powerful electric oscillations are set up in the condenser circuit.

The following conditions must be observed to obtain this effect: Choking coils or inductances must be placed in the circuit bringing the continuous current to the arc, so as to prevent the oscillations passing back into the generator. The gas or other hydrocarbon must be supplied freely but not too fast. The magnetic field must be strong, the arc length must be adjusted to it. There is a particular arc length (called the active arc) which gives the best results. The copper electrode must be kept as cool as possible, and the carbon electrode must have edges square and sharp and be kept in slow rotation. When these conditions are fulfilled the oscillations in the condenser circuit are powerful and undamped. While the arc may be formed by current having a potential of 500 volts, some part of this voltage is dropped in the regulating resistance of the arc. The actual potential difference of the arc electrode (copper and carbon) is from 350 to 440 volts continuous, and the arc current from 5 to 10 amp.

The potential difference of the condenser in the shunt circuit is, however, as much as 1,200 to 1,500 volts, and the current in the condenser circuit as much as 5 amperes. Fig. 4 shows the type of 1 K. W. generator for producing undamped electric oscillations.

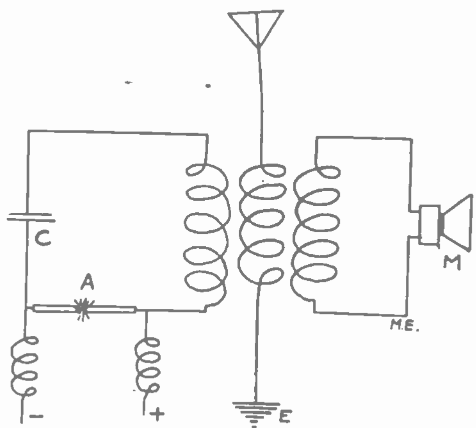
A small arc can also now be employed using 200 or 220 volts D. C. and a current of 1.5 to 2 amperes. It therefore becomes quite easy to operate it off any commercial lighting circuit furnishing ing continuous current at 220 volts and its power consumption is not more than 300 or 400 watts. With this small power consumption troubles do not arise from the deposit of soot in the arc chamber. The current of the arc is regulated by adjusting the distance of the carbon and copper electrodes by a screw which is hand regulated, that is to say, that an assistant keeps the current through the arc constant by watching an ammeter in series with it and adjusting the screw. (Fig. 5 shows this type of generator using 250 to 350 watts and used in radiotelephonic work from 1 to 15 miles.) Connected to the copper and carbon electrodes of the arc is an oscillation circuit, consisting of a variable transmitting transformer of the type shown in Fig. 6 and a condenser of variable capacity consisting of metal plates in oil. The form of condenser preferred is one in which there are a number of semi-circular plates fixed one above the other in a tall cylinder of highly insulating oil (see Fig. 7.) A number of other semi-circular plates are sandwiched in between the first named set and affixed to a long metal rod, so that by turning this rod around, the movable plates are brought more or less in between the fixed set of plates.

The two sets of plates constitute the surfaces of the condenser, and the oil with which the jar is filled, the dielectric. By simply turning a milled head on the top of the cylinder, large variations of capacity can be created.

In constructing the oscillation circuit to be used as a shunt across a continuous current are, it is important that the capacity be kept small and the inductance large. That is to say, that a given oscillation constant for that circuit should be obtained not by the use of a small inductance and a large capacity, but by the use of a large inductance and a small capacity. The oscillation circuit is connected inductively to the aerial by means of the transmitting transformer, Fig. 6, the primary of which forms part of the shunt circuit, the coupling being close, and the aerial circuit syntonised with the condenser circuit by the introduction of suitable inductance, so that the oscillation set up in the condenser circuit induce others of equal frequency and a maximum strength in the aerial circuit.

Generally speaking, the current in the oscillation circuit will be a current of 6 or 8 amperes, and the frequency may be anything between 100,000 and 1,000,000. When the arc is set in operation we have undamped oscillations created in the condenser circuit and undamped waves emitted by the aerial.

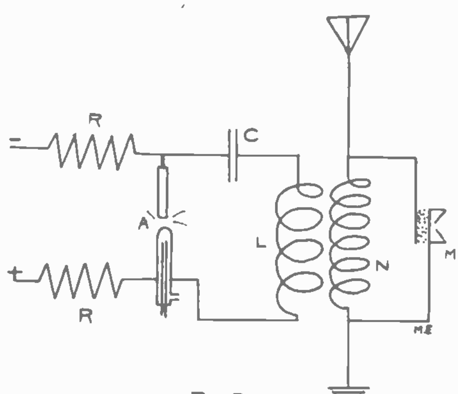
In order to conduct radiotelephony, we have then to control the amplitude of the electric wave emitted by the aerial, so



-FIG. 8-

that this amplitude may vary in exactly the same manner and proportionately to the change of air pressure at any point near the mouth of the person uttering articulated speech. This is best done by inserting a microphone in the condenser shunt circuit. Such a microphone consists of a shallow metal chamber closed by a flexible metal diaphragm, which is insulated from the metal chamber, the space between the diaphragm and the solid back containing carbon granules which are more or less compressed by the vibrations of the diaphragm. Therefore, when speech is directed against the mouthpiece terminating on the diaphragm, the aerial vibrations set up similar vibrations in the diaphragm, and this movement, by compressing the carbon granules more or less, varies the resistance of the carbon included between the diaphragm and the solid back.

The microphone transmitter or variable resistance is inserted in the condenser shunt circuit of the arc or else in a tertiary circuit closely adjacent to it (see Fig. 8.) When speech is uttered against the microphone it varies the resistance of the microphone circuit, and therefore alters the inductance of the condenser cir-



- FIG 9.-

cuit slightly, and also affects the current in the sending aerial. Words spoken into the mouthpiece, therefore, produce an effect upon the amplitude of the emitted electric waves, and these are, so to speak, moulded into speech form, that is to say, made to vary as to the ordinates of a wave curve representing the change of air pressure taking place in the transmitter.

In some cases the microphone may be inserted in the circuit of the electric arc and operate directly upon the continuous current affecting the arc. In this case, a variation of the condenser current and also of the amplitude of the waves radiated from the aerial takes place in the same manner as the variations in the arc current produced by the changes in resistance of the microphone under the action of the articulated sounds. Or, again, the microphone may be inserted as a shunt to the secondary circuit of the transmitting transformer, so that the current in the aerial is more or less shunted to earth (see Fig. 9.) Finally the microphone may be inserted in earth connection of the transmitting transformer so as to vary the current flowing into the aerial itself, and therefore the intensity of the radiative waves. In any case it should be inserted at the nodal point in the oscillatory circuit.

The picture in Fig. 10 shows the complete arrangement for employing the electric arc in radiotelephonic work, as used by the writer.

Asuming that a transmitting station is sending out undamped waves which are being moulded into speech form by means of a microphone, as has been described, these waves may be absorbed by a properly syntonised receiving aerial tuned to the wave length employed, and by suitable arrangements can be made to affect a telephone, so as to translate back the oscillations of constant frequency and amplitude induced in the receiving aerial into audible and articulated rounds.

For this purpose it is necessary to employ in the receiving circuit an oscillation detector which is quantitative, that is, not merely affected by oscillations, but affected to some extent proportional to their amplitude. For an example, a coherer, or a detector of the imperfect contact type will be of no use, because it is only affected by the first impulse of the wave received.

Such oscillation detectors of the crystal type, electrolytic, peroxide of lead, magnetic and glow lamp are suitable for radiotelephonic work. Thus, for instance, if a receiving circuit be con-

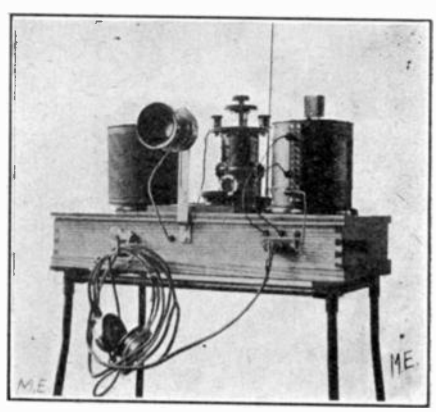


FIG. 10

structed by inductively coupling the aerial to an oscillation circuit consisting of a condenser, an inductance properly syntonised to the aerial circuit and which also includes an electrolytic detector and coupled as already described, to a telephone and a local cell, the oscillations passing through the electrolytic detector will not merely alter its apparent electrical resistance, but alter it in a sense proportionately to their intensity, and if un-

(*Continued on page 384*)

New Dictograph Achievements

In its recent employment for announcing the results of outdoor motor races a new and interesting field has been developed of late for the dictograph. Of all the many useful applications of this unique instrument which makes audible in any part of a building to which it is connected the faintest whisper in a room with which it is equipped, this is probably its most novel use.

Heretofore its field has been largely restricted to furnishing interior communication between the heads of departments in the offices of large corporations and public officials. One conspicuous exception is its use on the grounds of the New York Baseball Club where 35 different stations of the dictograph are maintained, connecting all parts of the grand stand and club house with the office of the management at the entrance. To its wonderful efficiency in this sphere of usefulness its introduction to outdoor service is due.

Its use for work of this kind opens up for the dictograph a new and interesting avenue of revenue, both here and abroad. In connection with motor races, aviation meets and out-door tournaments of every kind, including horse racing, it fills a long felt want which neither the megaphone or any other instrument has ever been able to supply adequately.

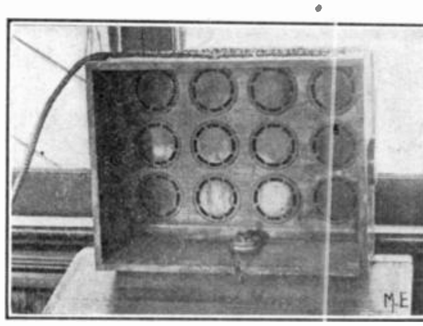
From time immemorial the megaphone has been used by official announcers almost exclusively on the tracks of the United States. In this field its value has been much circumscribed and has lead to many complaints. Only those sitting in the front rows of the grand stand and club house have been able to hear announcements made through it. Patrons in the upper rows rarely if ever understand anything that is said and are obliged to depend for their knowledge of the results upon information passed up to them from the lower rows and upon visual observation. This being susceptible to error, is disconcerting and unsatisfactory alike to public and officials.

Foremost among those seeking to remedy this condition have been the automobile manufacturers in charge of the Brighton Beach (N. Y.) and Indianapolis Motordromes.

In the hope of correcting the trouble and providing patrons with a reliable announcing service the Automobile Association experimentally installed the dictograph at the Brighton Beach Motordrome in July.

At the matinee races on the 23rd of that month and again in August, the sensitive little instrument was tried out and in thoroughness of service exceeded the hopes of those responsible for its introduction to this peculiar field of usefulness.

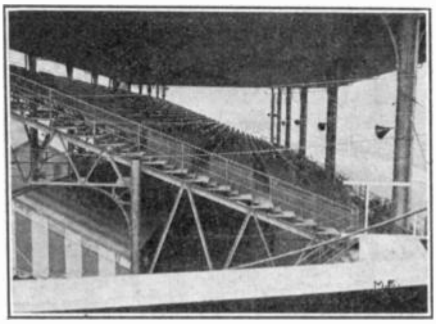
The transmitting box was set up in the judge's stand alongside of the track. In this box were placed a dozen powerful transmitters, adjusted to magnify sound waves fifteen octaves. From the box, wires were strung to nineteen different receiving stations distributed in all parts of the grand stand and club house. The receiving diaphragms, en-



closed in horns, were hung on the steel girders near the roof of the grand stand. Each horn was inclined downward toward the seats so as to project the announcements into the ears of the seated spectators. Sitting in any part of the stand, top or bottom, every word of the announcer could be distinctly heard. For the occasion every part of the stand seemed to bristle with so many human mouthpieces. The effect lent itself to an interesting illusion. As the announcements issued simultaneously from each of the nineteen horns, one would imagine that the conversation was proceeding from the nearest mouthpiece. Moving away from it the voice of the announcer poured out of another horn forty or fifty feet distant, leading you to fancy that it exuded from this opening alone, until you got within the radius of still another horn and found yourself experiencing the same illusive sensation.

Late comers sequestered in the top rows of the stand found that their belated arrival caused them no inconvenience, for they could hear everything as plainly as those who had preceded them and had secured the choicer seats in the first rows.

During the races a strong sea breeze, such as only Brighton can develop on an off day, was blowing through the grand stand, which is but a few hundred feet distant from old Neptune's combers. There was some apprehension that the zephyrs would divert the conversation and interfere with the effectiveness of the experiment. But it availed nothing against the wonderful vitality of the instrument which seemed to gather gear in the teeth of the breeze and defy it to



impair the smoothness of its interesting performance.

In disseminating information the announcer stood about two feet away from the box containing the transmitters and spoke in an ordinary talking voice without any other effort than to make his intonations clear and distinct. This done, the dictograph did the rest.

During the interim between races patrons were entertained through the instrument with operatic solos and duets by members of the quartette stationed in the judge's enclosure. This novelty thrilled the vast assemblage and set it cheering enthusiastically as the melodius notes, filling the air, stirred their fancy. Altogether the whole arrangement exhilarated and had an appeal to the imagination that was infectious.

Enthroned alongside their keys in a room on the upper floor of the club house, the corps of nimble fingered, quick witted telegraphers for the afternoon newspapers were able instantly to flash to their papers every development of the races on the track without once leaving their quarters.

One of the nineteen stations through which the time and other information concerning the races are simultaneously distributed from the judge's stand, was located in this room for the convenience of the afternoon newspapers.

On the balcony outside were two other stations for the benefit of the morning newspaper men assembled there.

K. M. Turner, the inventor of the dictograph, personally directed the demontration and was highly pleased with the results achieved.

The fact that the dictograph is practical for the service here employed, it is predicted, means its early displacement of the megaphone wherever an efficient and trustworthy medium of announcing results is desired.

In commercial life the fame of the dictograph is now worldwide. Secretary of the Treasury MacVeagh, Attorney General Wickersham, Governor Dineen of Illinois, Governor Eberhard of Minnesota, and municipal and state authorities in all parts of the country are using it to facilitate communication between their offices and subordinate officials. Standard Oil, and most of the large railroad, insurance and mercantile corporations, banks, trust companies and business institutions of every kind which have introduced it in their establishments as a time saver, regard it as an invaluable and indispensable auxiliary of their business.

FLUSHING WIRELESS ASSOCIATION.

THE Flushing Wireless Association has organized and elected officers. They are the following: Samuel Christie, president; Louis Hartig, secretary; Melvin McKenna, vice-president; Chas. Simmons, treasurer.

The club has a membership of twenty amateurs around Flushing and its suburbs. Long distance records are held by its members. Any one living near Flushing is invited to attend its meetings which are held every Saturday night in the clubhouse, 24 Madison Avenue.

LOUIS B. HARTIG,
Secretary.

A Powerful Magnet Recovers Cargo of Nails From Sunken Barge

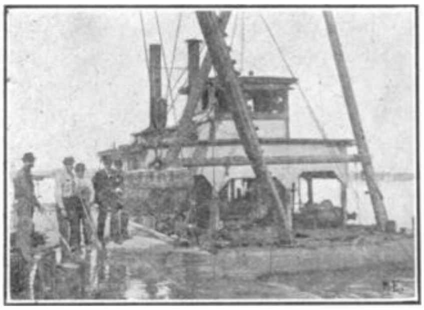
By Frank C. Perkins.

The accompanying illustration shows the novel use of a giant lifting electro magnet rescuing a cargo of nails from a sunken barge in the bed of the Mississippi River.

A barge loaded with kegs of nails of the United States Steel Company, sunk near New Orleans, and the cargo was recovered by the magnet shown in the illustration, weighing 1½ tons, and measuring 3½ feet in diameter.

This powerful lifting magnet was lowered into the stream and five or six kegs of nails raised with each lift after switching the electric current into the magnet coils.

The illustration shows the derrick employed for the purpose of lifting the magnet with its load of nails weighing half a ton or more, each keg weighing about 200 pounds.



The cargo was valued at about $45.00 per ton, and a loss of only about 10% resulted, the kegs being raised intact, and the nails uninjured except for slight rust, while a dredge if used would have broken the kegs open, and much of the cargo injured and lost. It will be noted that a great saving was realized by the use of the lifting electro-magnet instead of a dredge, which would have been difficult to operate, as the kegs of nails were raised from a depth of 70 feet.

The raising of a cargo of cotton ties sunk near Natchez, as well as the recovery of a load of woven wire of the United States Steel Company, sunk near Pittsburg, illustrate the further use of the gigantic lifting magnets of the Cutler-Hammer type designed and constructed at Milwaukee, Wis., for recovering steel cargoes, and indicate an innovation in marine wrecking service.

GLACE BAY WIRELESS NOW.

Announcement was made September 7 that the Marconi wireless station at Glace Bay, N. S., is now open, and the company is sending and receiving messages between that point and the station at Clifden, Ireland. The opening of the high-power station has brought an increase in the commercial business handled in this country, Canada, and Great Britain. Commercial houses in this city and London have found that messages can be flashed across the Atlantic as accurately and as swiftly as by cable and cheaper, and they are now transacting important business by wireless. The rate for Atlantic messages is 17 cents a word, including land tolls.

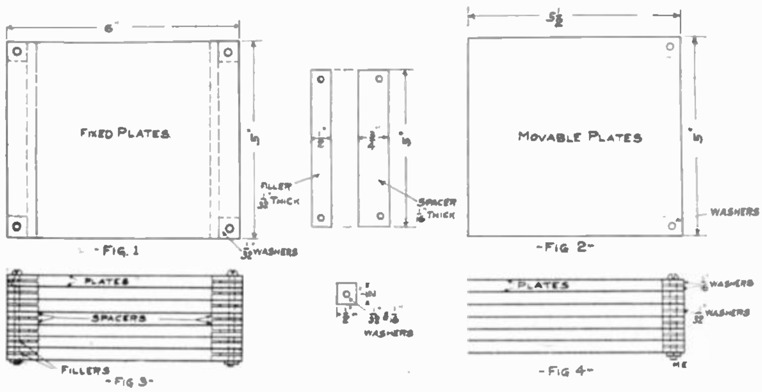
The Glace Bay station covers 150 acres of ground, and the fan-shaped aerial wires are 6,000 feet long and about 1,000 feet wide. These wires are supported by thirty masts each 250 feet high. The instruments are of the most powerful make, having a radius of 3,000 miles. Across this space they can send and receive with surprising distinctiveness, although in communicating with the Clifden station the waves have only 1,700 miles to travel.

In a few months the Marconi Company will be prepared to receive and transmit messages to Continental Europe. Negotiations are under way with several foreign Governments with this end in view.

"The opening of the Glace Bay station has been a great step forward for the Marconi Company," said John Bottomley, Vice-President of the company. "Communication between Nova Scotia and Ireland is now carried on without a break. An increasing commercial business is being done, for business men are coming to appreciate that the service is trustworthy and at a less cost than cable messages."

A Variable Slide-Plate Condenser

By Richard Baker



In the up-to-date receiving station a variable condenser is an absolute necessity. Of the various types, those employing sliding plates, with air as a dielectric, are preferred by many. The difficulty, however, of grooving a frame to receive the plates has deterred many amateurs from constructing a condeser of this type.

This article is intended to show how such a condenser may be built up with strips of insulating material between the plates, instead of a solid frame. The number of plates may vary, but an instrument containing 8 fixed plates and 7 movable plate will be described. The principal requirement are 3 square feet of sheet aluminum or brass, 1/32 inch thick, 25 square inches of hard rubber or fibre sheet 1/32 inch thick, and six ⅛-inch bolts 1½ inches long, with nuts.

The sheet metal should be cut into 8 plates 6 x 6 inches and 7 plates 5 x 5½ inches. Care must be taken to get the plates absolutely flat. The 1/32 inch sheeting should be cut into 7 pieces 5 x ½ inches and 30 washers ½ inch square; the 1/16 inch sheeting into 28 pieces 5 x ¾ inches and 28 washers ½ inch square. Figs. 1 and 2 shows the shape of pieces needed for the fixed and movable sections, respectively.

Drill 3/16 inch holes in the pieces, as in Figs. 1 and 2, the centre of each hole being ¼ inch from the two adjacent sides. This must be carefully done, as the holes must correspond exactly.

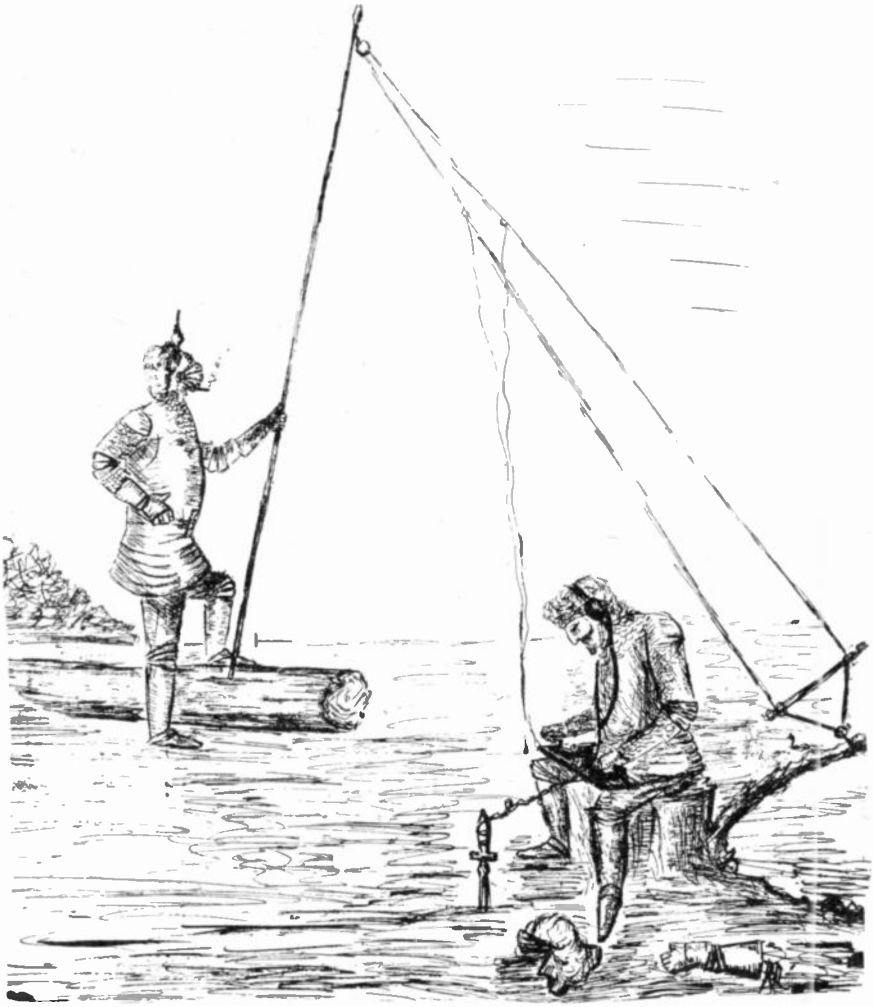
The plates are now ready to be put together. First comes the fixed section which, when built up, should present a solid bottom with grooves ¼ inch deep for the movable plates, and open grooves at the top, spaced by washers. Put four screws through the holes in a fixed plate, and lay it on the table, letting the screws stick up. Next put on, at top and bottom, a 1/16 inch spacer, the sides nearer the holes going on the outside. Next, at the bottom, comes a 1/32 inch filler, and at the top two 1/32 inch washers. Then come two more spacers, one at the top and one at the bottom, and another fixed plate. Continue thus until the eight plates are in position, as shown in Fig. 3, an end view of the section. The nuts may now be put on and tightened sufficiently to hold the pieces together.

The movable plates are similarly put together, but are held at one end only. Put a 1/16 and a 1/32 inch washer on each of the two remaining bolts. then put them through the holes in a movable plate. Two 1/16 inch and one 1/32 inch washers are next put on each, then another plate, and so on, finishing with a 1/16 inch and a 1/32 inch washer outside the seventh plate. The nuts may now be put on and tightened until the plates lie parallel, as in Fig. 4, a top view.

The movable section may now be inserted in the grooves of the fixed section, and should slide easily back and forth on the fillers (Fig. 3), held away from the fixed plates by the spacers at top and bottom. When it is pushed in until the washers between the movable plates

"As It Might Have Been"

No. 1



"When Knights Were Bold"

WIRELESS FROM DIRIGIBLE.

The dirigible Bayard-Clement balloon with a wireless installation on board performed evolutions on September 8th around Compiegne. It communicated freely with the Eiffel Tower.

TOO RASH!

"I heard 'Buddy' Jones bought a 20-inch spark coil and is trying to run it, altho he can't tell the difference between a spark coil and an aeroplane."

"Correct. His funeral is to-morrow!"
—"Fips."

WIRELESS OPERATOR WANTED

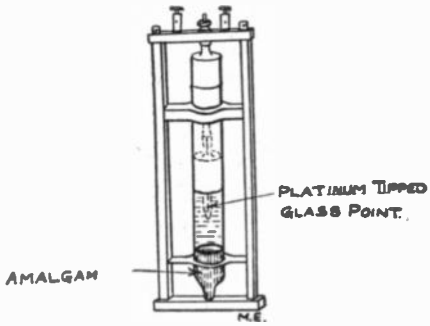
The United States Government wants one wireless telegraph operator for service in the Hawaiian islands. An examination, under the civil service rules to fill the place, will be held all over the United States, October 19. The salary is $1,200 annually. The government also wants an operator for its lighthouse service.

SPECIAL.

Paris Letter.

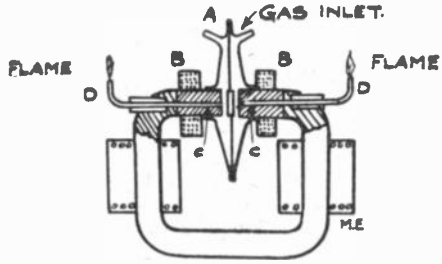
NEW ELECTROLYTIC DETECTOR.

We illustrate a practical form of the new electrolytic detector which was invented by M. Jegou, of Paris. It will be remembered that it differs from the usual detector in that the second elec-



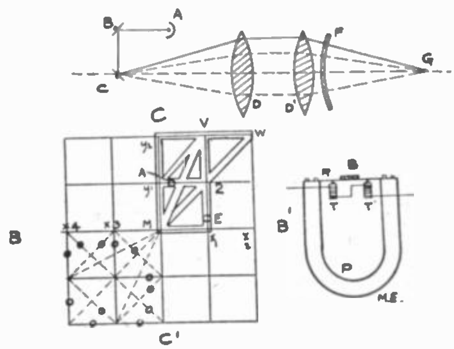
trode consists of a mercury amalgam placed at the bottom of the tube, using a fine wire electrode and a liquid as before. Such a detector works directly upon a telephone without needing a battery, as we already described. The form which we show here is designed to be worn upon the person, as for instance, for military use, in connection with a pair of telephone receivers which are applied to the head in the usual way. Owing to the absence of the battery, such an outfit is reduced to a very simple shape.

SENSITIVE RECEIVER.



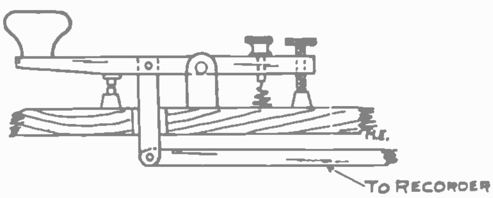
A very sensitive receiver which can be used either for wireless work or for ordinary telegraphy is here represented. The current coming in on the line gives fluctuations in a pair of small flames, corresponding to the signals, so that the latter can be either read off directly or registered on a photographic band. The line is connected to the fine wire coils BB which are mounted on the soft iron cores BB, these latter being placed so as to form the pole-pieces of an electromagnet. In the chamber A surrounding the poles is stretched the diphragm E which carries a disc armature at the middle part. The current from the line thus causes a movement of the diaphragm. The chamber A serves as a gas box and it is fed with gas from the top in order to supply the two small flames DD. Current impulses on the line will thus give corresponding variations in the brightness of the flames, thus forming the signals. In order to work the present device as a relay, it can be used with a selenium cell so that the variations of the flame cause the cell to operate an electromagnet.

INGENIOUS TELEGRAPHIC PRINTER.



The following ingenious method is used in order to print letters upon a photographic band in a telegraph receiver by the action of light. Instead of simply recording the signals upon the band, the letters are actually printed upon the same, so that the message can be read by any person. From the source of light A, a beam is sent upon the two mirrors B and C and the light passes through the large lenses DD, through the screen F and upon the moving photographic band G. The mirrors are moved by the current coming in from the line, so that the beam can take different positions on each side of the center line, but it is always focused upon the band G. At F is a specially designed screen which carries transparent letters, so that the beam passes through any one of the letters according to its position and that letter will therefore be printed upon the band. The method of moving the mirrors is seen in the second diagram, and the mirror B is mounted on a diaphragm R which is placed upon the permanent magnet B. The electromagnets TT working on the line current give the swing to the mirror. By using two strengths of current, or direct and alternating current we can give two standard swings to the mirror, both for forward and back movement. This action is shown in the third diagram, where M is the zero position and BB the line of light which the mirror B alone produces. Using B alone (with mirror C at the zero position) we can obtain the deflection MX1 or MX2 or else the back deflection MX3, MX4, the mirror stopping at points X, etc. In like manner we obtain the movements MY1, MY2, etc., with the mirror C. Combining both mirrors, we can have the movements MZX1, Y1ZM, etc. Each movement depends upon the pair of standard positions which has been chosen beforehand for making the signals. The letter A is placed as shown in the path of the beam MY1ZM, so that when the beam follows this path, only the letter A will be lighted and it will be printed on the photographic band. When the beam follows MZX1M it strikes the letter E and this will be printed. The letter is not placed at the end but in the middle of the course of the beam in order to have a very quick passage of the light such as the moving band requires. At the lower corner are shown the points for placing letters on the above system.

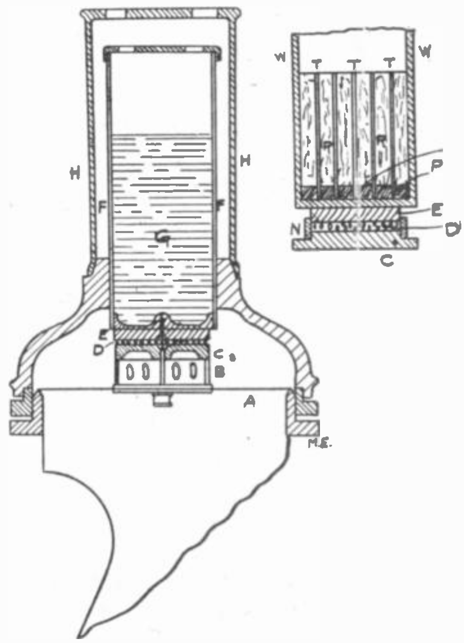
NOVEL WIRELESS RECORDER.



A method has been recently patented for making a record of the wireless signals as they are being sent from the station, and in this way the operator has permanent record of his messages. This is very easily carried out by mounting the sending key along with a Morse register as is shown here. The key is of the usual form and it is connected by a double lever with the recording point of the register. When the key is depressed, the lever action causes the point or pen to make a mark on the paper strip so that the signal, dot or dash is registered. The antenna switch is mounted so that when it is thrown it also causes the release of the clock work which runs the register, so that the latter will only run while the message is being sent.

EGNER HOLMSTROM TRANSMITTER.

It will be remembered that the Swedish inventors, Egner and Holmstrom, were



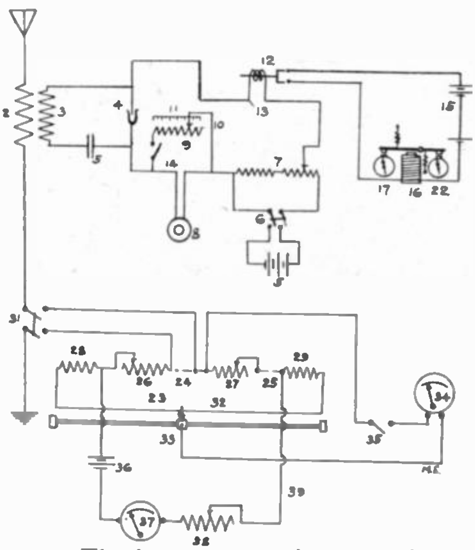
very successful with a long-distance telephone which they devised. It has a light steel box with flat bottom mounted at the center of a large diaphragm. The outer surface of the box bears upon the carbon grains and the working surface is much increased so that a heavy current can be employed. They have now brought out the following form of transmitter in order to avoid heating up of the working parts. In the first form the cooling is carried out by using a water chamber and the water circulates without any mechanical devices. The diaphragm A carries the light metal box B and it presses by means of the metal disc C upon the carbon grains D, using the second metal disc E. A felt ring surrounds the grains so as to keep them from falling out. The disc E is mounted against the bottom of a metal cylinder F containing water or other liquid. Owing to the heat, the water rises and is replaced by cooler water on the usual gravity principle. An outer case H surrounds the whole. The present transmitter has the mouthpiece M mounted at the bottom in order that the cooling device can be placed above the diaphragm. Another method of cooling is by using a cylinder containing paraffine, etc., so that it is melted by the heat. Owing to the well known principle of fusion, the temperature of the mass will not rise as long as there is left any of the matter unmelted. The carbon grains are placed between the discs C and E. In the cooling cylinder W are copper rods TT which are held in place by pouring in melted tin at PP. The heat from the microphone is rapidly conducted up by the copper rods and is thus brought to all the points of the wax so that it is quickly melted. In this way the microphone is constantly cooled while the paraffin is melting, and this action will last longer than the usual conversation in the telephone.

WIRELESS FOR AEROPLANE.

Capt. Ferrie has been making some interesting experiments in wireless work with aeroplanes during the recent maneuvers of the French army. We will give further details about the results in our next account, as these have not yet been made public. There is no doubt that wireless apparatus will be used extensively upon aeroplanes in the future, and at present there is much interest taken in the subject. The war department wishes to secure a type of aeroplane which will be especially adapted for army use, and is preparing to organize a competitive test for the same. Provision will no doubt be made for carrying wireless apparatus in this case. The navy department is also commencing to make tests with aeroplanes, especially for observation uses. In case it were needed to use a mine-destroying boat in order to remove the enemy's submarine mines, such a boat might be worked by wireless control from an aeroplane.

SHIP'S BEARINGS BY WIRELESS.

In a new method brought out in France, a ship's bearings are taken in connection with one or a pair of shore posts. The transmitting post sends out characteristic signals of constant intensity. On the vessel we have the mounting which is here represented. The distance from vessel to shore is estimated by measuring the amount of energy received, and this is approximately found by a telephone 8 and variable shunt 9, then we use a bolometer or Duddell galvanometer to make an exact measure-



ment. The latter connections are shown in the lower part of the diagram 23, etc. In this way a quick reading can be obtained. In order to identify the sending post, the length of the signals is measured, also the interval between the signals. To do this we use a relay 12 in the detector circuit and it controls the action of a chronograph magnet 16 placed in a local circuit. When a signal commences, the relay closes the local circuit and the magnet acts by means of an arm to release the stop watch 17. When the signal stops, the arm is released and operates a second stop watch 22. By reading both watches we have the length of the signals and the intervals between them.

Helices

D. E. McKisson.

The sending radius of a wireless station is dependent almost entirely upon the synchronism of the circuits. To obtain this a variable inductance or transmitting tuning coil is necessary. Recently oscillation, air core transformers have been introduced and are efficient on high powered stations, but not so on low power stations owing to the loss in transformation, which increases as the power decreases. Therefore the auto-transformer which is more commonly known as a helix is still used by the majority of amateurs. The number of turns is optional, as low as four and as high as thirty being used with good results, as a state of resonance cannot exist be-

tween the open and closed circuits if less than four are used. The wire used should be no smaller than No. 12. The following table may be used in the construction of helices of various capacities:

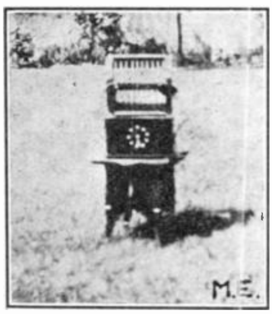
Size of wire, B. & S. gauge.	Capacity.
No. 12......	¼ Kw. trans. or spark coil.
No. 10......	½ Kw trans.
No. 8......	1 Kw trans.
No. 6......	2 Kw Trans.
No. 4......	3 Kw trans.
No. 3......	5 Kw Trans.

Larger sizes may be used in proportion to the capacity of the station. It is a good plan to tune up the helix and send for a time. If the helix wire is too small, for the inductance impressed upon it, the high voltage turns (near the aerial) will become heated in which case larger wire should be substituted. It is better to use copper wire as it may be polished and is a good conductor.

Brass wire may, however, be used, but this is found exceedingly hard to work with. The best and most satisfactory material is aluminum. The helix case should be made up of two discs or cheeks and six standards. They may be assembled as shown in Fig. 1. The discs may be made of hard fibre or well seasoned wood and the standards of rubber or fibre or wood faced with strips of fibre.

It is advisable to use hard rubber in place of fibre when abnormally high voltages are used. The turns should be spaced no less than ¾ inch apart to prevent sparking. They should be spaced a greater distance apart if the voltage is especially high. The wire should be wound tightly around the standards in the form of a spiral.

Proper tuning in a transmitting set will always increase the sending radius to a large extent. It is in most cases a most tedius process to adjust the helix and often takes several hours before the correct adjustments are found. The bottom turn should be connected directly to the ground. A sixteen c. p. light should then be connected between the helix and aerial. One adjustment should be tried and the key pressed. If the



light does not light another adjustment should be tried till the light lights up brightest when the circuits will be tuned to their best state of resonance. A hot wire ammeter may be substituted for the lamp, the latter being the most accurate.

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Vol. III **OCTOBER** **No. 7**

EDITORIAL

This is another editorial about inventions. Since writing the last editorial the writer has received a number of communications from inventors and would-be inventors asking how to go about it to market their inventions.

There is no answer to the question, as each case differs considerably.

If you have made an invention of importance—not an everyday device, 90% of which fill the patent gazette each week—and if you have not a considerable amount of money, there are two ways open to you. One is to sell the patent outright for a certain amount to be agreed upon by both parties. The other plan is to get into communication with some manufacturer of repute, who would be interested to manufacture the device, and to whose advantage it would be to push and market the invention. In such a case you should make a contract with him whereby he would pay you a certain amount before starting to manufacture the article. Thereafter a stipulated amount should be paid for each article that has been sold, accountings to be made once, or perhaps twice, a month. This is the so-called royalty plan. Usually the contract is made out in such a manner that you authorize the manufacturer to make and market your invention for a number of years, to be agreed upon, or even for the full term of the patent, i. e., seventeen years. In such case the patent obviously always remains in your possession, as it is not actually sold.

The writer would always recommend the latter method as it is far more profitable to the inventor in the long run than the former plan. It practically insures an income for a long term of years, providing, of course, that the invention has a real merit and that the concern who markets it is capable of handling it.

It should always be borne in mind that a long established manufacturing concern knows infinitely more about making and marketing a new device than the average inventor, and that if anybody can make a success of the invention such a concern can, on account of its experience and its business connections, already established.

Considering these points, it seems obvious that the royalty plan in the majority of cases is the more advisable.

NEW EXPERIMENTS.

M. Szilard has been making some interesting experiments in wireless work at the Paris University, and he presented his results to the Academy of Sciences not long since. He was able to greatly increase the sensitiveness of a coherer to a small spark in the following way: A coherer and relay are used with a short antenna of 3 foot length. Instead of connecting the other end of the coherer to ground, as usual, he joins it to one pole of an alternating current circuit whose other pole is grounded. Ordinarily the working distance would be less than one inch, but he now increases it to 4 feet by the above method, using a metal rod for the emission and a 0.06 in. spark. The alternating current at 110 volts comes from the city mains. He checked the experiments so as to show that the effect was not due to capacity, etc.

Using the above arrangement, he observed a new phenomena which has not yet been clearly explained. At the sending point is mounted a metal rod in an ebonite support and place at various distances up to 7 feet from the antenna. When the rod is touched with a piece of metal held in the hand, an effect is shown in the coherer. However, the contact must be made very lightly and with a pointed object, for instance, by using a very fine metal wire soldered to the sending rod and touching it with a steel file. The contact is somewhat of the same nature as a microphone contact. The limit distance is different for various metals, and the least is a contact of iron with iron; brass or aluminum give less results. These results are not due to contact electricity nor to air charges or accidental alternating current effects, etc.

He also produces waves by a kind of inductive action. We put the sending antenna inside a small tube surrounded by several layers of fine insulated wire and then touch one of the free ends of this coil with a piece of metal in the above way. At a given distance, this coil alone without the antenna has no action, but with the antenna we produce an effect on the coherer. A metal tube can be used instead of the coil, but the effect is less. The present experiments are being continued with a view of throwing further light upon these effects.

RANGER WIRELESS ASSOCIATION.

THE Ranger Nautical Signal and Wireless Association was formed August 15 by the cadets of the Massachusetts Nautical Training School.

The officers are: William E. Dickens, president and secretary; Jerome W. Hill, vice-president and ch. operator; Chester L. Morse, asst. operator; John W. Thompson, asst. operator; Henry C. Fisher, technical advisor. The above officers also constitute the board of directors.

The object of the association is to promote the study of wireless telegraphy and protest against legislation that does not give proper protection and representation to the amateur and experimenter.

The association gets all the electrical and wireless magazines. It already has an excellent library and is up-to-date in every way.

The association has a fine 1 k. w. set at their disposal and are given frequent talks by the technical advisor, Mr. Henry C. Fisher.

Each new wireless instrument and invention is taken up and thoroughly explained, and where possible is constructed by the members.

There are no dues. Each member purchasing the various magazines, contributing to the library and adding to the equipment. The secretary would be pleased to correspond with other clubs.

Address M. N. T. S. Ranger, State House, Boston, Mass.

PURE RADIUM OBTAINED.

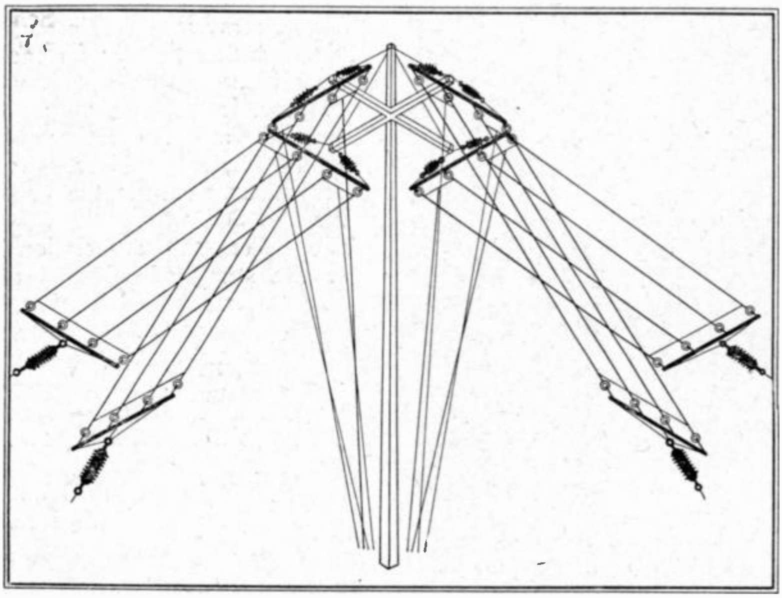
PARIS, Sept. 5.—Mme. Curie, Chief Professor in the Faculty of Sciences of Paris University, announced to-day to the Academy of Sciences that she had succeeded in obtaining pure radium. Hitherto radium had existed only in the form of salts.

Mme, Curie, in conjunction with Prof. de Bierne, treated a decigram of bromide of radium by an electrolytic process, obtaining an amalgam from which was extracted the metallic radium by distillation.

It has the appearance of a white metal, and is capable of adhering strongly to iron. It changes to black on exposure to air, burns paper, and oxidizes in water.

90 Miles With a One-Inch Coil

By Chas. D. Herrold, E. E.



Readers of Modern Electrics will recall that in the "Honorable Mention" Columns for August appeared a picture of the one-inch coil with which Ray Newby, a clever young operator of San Jose, Cal., worked up to 90 miles in broad sunlight.

So many requests have been made for information as to the "Hook Up" used in this record-breaking feat that the writer will endeavor to describe as briefly as possible the system used. The aerial equipment consisted of 20 No. 14 copper wires arranged as shown in the perspective view; 4-400 ft. wires 2 ft. apart, running from tank on 7-story building southeast to a 22-foot pole on top of a 3-story building; 8 375-foot wires running south to 3-story building. These are arranged in 2 sets of 4 wires each, 4 feet between wires, 16 feet between two sets of wires, with a total spread of 40 feet. Also 8 225-foot wires running west to top of 3-story building. These are arranged in 2 sets of 4 wires each, 4 feet between wires, 16 feet between two sets of wires, thus making a toal spread of 40 feet. These three sets can be used as separate loop aerials.

In our transmission tests we had all these leads connected to one side of the coil, and the other side of the coil grounded to the steam radiator system and the frame of the 7-story steel building. It will be seen at a glance that we have an enormous condenser, one side being the antenna and the other the metal roofs of low buildings under it and the steel frame of the 7-story building.

No other condenser was used and no helix, the parallel wires of the antenna system supplying the necesary inductance.

We have tried numerous coils on the system, but this particular coil (one-inch E. I. Co.) is the only one that gave us results.

I wish it understood by readers of Modern Electrics that in making the above statement I have no object other than to bestow credit where it is due. Strange as it may seem, we tried a ¼ K. W. transformer with condenser and helix carefully tuned, and did not get as good result as with the small coil without either condenser or helix. The tension of the little one-inch coil is just right, and its capacity just sufficient to keep the 7,000-foot aerial charged. By putting paper under the vibrator the coil gives out a beautiful high-pitched hum. Operators over fifty miles away tell us that we drown out the commercial stations.

The secret of long-distance transmission seems to lie in large capacity aerial wires; the secret of long-distance reception seems to lie in high, small capacity aerial wires. The best type of aerial, according to the writer's notion, would be a large umbrella for sending, and a high two wire, "hair-pin" loop aerial for receiving. This does away with the unpleasant effects of "static." The writer designed the umbrella aerial shown in the engraving, for the private station of Robert Stull, a clever young amateur operator of San Jose, Cal. This is a four-way loop aerial 125 feet high, 8 leads being brought through plate glass into the station.

Numerous readers of MODERN ELECTRICS have asked as to the "Hook Up" used by us in our wireless phone experiments, with one-inch coil. We used the same connections as in the wireless tests using a tiny spark gap not over 1-64 of an inch and putting an Ericsson Swedish dust telephone transmitter in place of the vibrator of the coil. With this arrangement and the 7,000-foot aerial, phonograph music was easily transmitted from 15 to 20 miles with remarkable distinctness.

A GERMAN ELECTRIC HOT-AIR DOUCHE.

BY FRANK C. PERKINS.

Many German physicians have utilized electric operated devices for providing a hot-air douche for the treatment of

FIG. 1

lumbago, rheumatism, and other similar disorders to great advantage. One form of electric hot-air douche is shown in the accompanying illustrations (Fig. 1), in operation, while (Fig 2) shows the design and construction of one of the devices of Dr. Richard Heilbrun, of Berlin, Germany.

It will be noted that it consists simply of a portable electric fan motor com-

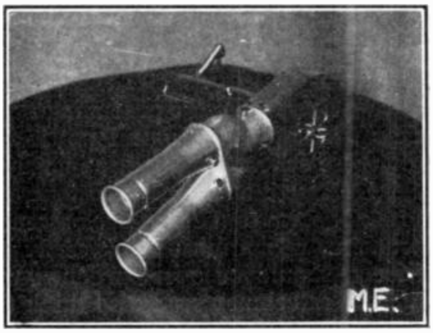


FIG. 2.

bined with an electric heater, so as to provide a blast of hot air of 100 degrees C., or at a higher temperature if desired, and arranged to operate from an ordinary electric lighting socket. The amount of heat is varied according to the speed at which the blower is driven and the current utilized in the heating unit. The motor is very light, and of compact construction, the blast of air entering the device, tending to keep the motor cool, the heated air passing over the resistance conductors and projected in a blast from one or two tubes as desired.

HERALD WIRELESS STATION.

The *New York Herald* which for many years has maintained its own ship news service at the Battery, has now established a wireless telegraph station in connection with it, also at the Battery, using the Fessenden system.

As the station is open during the entire 24 hours of the day, with an operator constantly on hand, it may be called at any time, and masters of all vessels equipped with wireless apparatus are requested to communicate direct with the station on any matters of marine information, which will be promptly reported in the *Herald*.

The apparatus is of 2 K. W. power, its wave length is 945 metres and the call letters of the station are O H X, range 1,000 miles.

The *Herald* is desirous of obtaining all marine information as quickly and accurately as possible, and believes that cooperation on the part of the owners of steamship lines and masters of vessels will result in benefit to all concerned.

Automatic Aerial Switch

BY H. R. DARLING.

Of late I have noticed several appliances, which, when connected up in place of an aerial switch, enables the operator to tell when anyone else is sending at the same time that he is. But I notice that all of these schemes, although ingenious, make the key their point of attack, and it does not seem to me that such a central instrument, which must work easily and precisely, should be over-burdened with numerous attachments. I also think that every station should be equipped with an apparatus of this sort, for it would go a good ways towards eliminating interference of the Government by amateurs, and I know that no amateur wants the Government officials hunting him up. The following instrument, which is easily set up, is my idea of "how it should be done." Notice also that the following contrivance is in itself a magnet operated key.

First, the experimenter must repare to his junk heap, and rescue the outcast telegraph sounder. This, accompanied by an old battery zinc is about all that he will need. Remove the brass piece in which the end of the tapper swings. This is replaced sideways, and again screwed down. (See A, Fig. 1.) Next, obtain a piece of brass rod about ⅜ in. in diameter and 1¼ inches long. This should be tapped on one end to fit a binding post screw, and placed in position directly under the set screw which lies nearest the magnets. (See B, Fig. 1.) A piece of fibre or hard rubber, about the same thickness as the tapper, but slightly wider, is fitted to the end of the tapper by sawing out a portion. (See E, Fig. 1.)

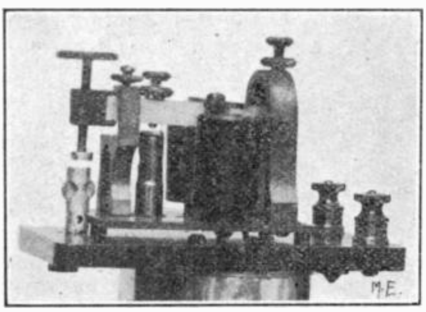
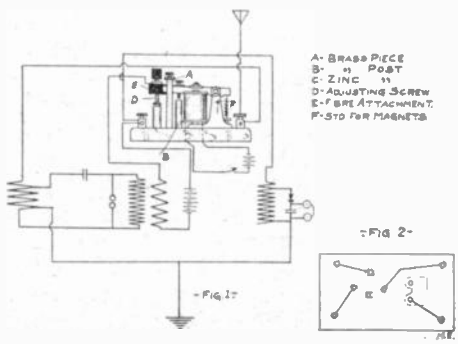


FIG. 2

This piece is now bored and tapped for a 14-20 thread and a piece of brass rod threaded to fit. (See D, Fig. 1.) A suitable knob is fitted to one end of this rod for adjusting, and on the reverse end a section of battery zinc about ⅛ inch thick is fastened, this being about ¾ inch long. (See C, Fig. 1.) Two sets of binding posts must now be secured to the base, one set at each end, and connected to the different parts, as in Fig. 2. The action of this device is self-evident, from the figure, and the connections are also shown, but of course these connections may be changed to suit the experimenter's fancy. The instrument must be



adjusted carefully, and care should be used in seeing that the contacts on E and F come together at precisely the same time. If your telegraph happens to be one of the giant sounder type in which the parts are screwed to an upraised brass platform, you do not have to discard the brass base, but of course each part must be insulated from it.

If the amateur has followed these instructions carefully, I think that he will have an instrument that will be a grateful addition to his wireless set.

WIRELESS TELEPHONING.

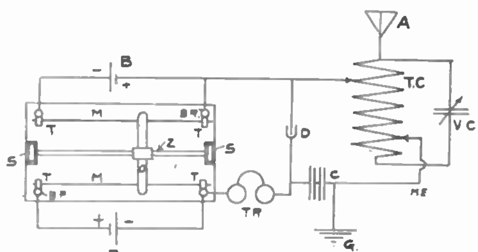
Wireless telephoning from a moving railroad train has been successfully accomplished in England. Traveling by a fast train a railway official spoke to an inspector in a signal box clearly and easily. The system can be installed for $50 a mile.

How to Construct a Non-Inductive Potentiometer

By William Klaus.

In experimenting with some detectors it is necessary to use a battery and therefore a potentiometer is very desirable to regulate the current.

There are two kinds of potentiometers, the inductive and the non-inductive. The



-FIG. 1-

best kind for wireless work is the non-inductive type.

Many a time have amateur wireless experimenters attempted to construct a non-inductive potentiometer and most of them have failed. The hardest part, for the boy without the machine shop, to construct, is the slider on the square sliding rod with the rolling ball contact. Another hard part is to mount the square sliding rod on metal supports to make electrical connection.

The following kind of potentiometer is a little different from the ordinary kind, although the working principle is the same. This kind is also easier to construct because there does not have to be electrical connection between the slider and sliding rod, hence the slider and sliding rod supports can be made of hard wood or hard rubber.

It will be made plain how this potentiometer works by referring to diagram 1.

M.M. are resistance rods. T.T.T. and T. are pieces of brass or copper spring on the ends of the rods to make connection S. and S. are supports of hard wood or hard rubber to hold the sliding rod. O. is a brass or copper spring attached across the bottom of the slider to make connection with the two résistance rods. B. and B. are dry cells. (Notice how these are connected to the resistance rods.) B.P., B.P., B.P. and B.P. are binding posts. Z. is the sliding rod. This rod is round.

D. is the detector T.R. is the receivers. V.C. is the variable condenser T.C. is the tuning coil. C. is a fixed condenser. A. is the aerial and G. is the ground.

When the spring is making connection with the left hand end of the resistance rods, the full current of the two cells minus the current which the resistance rods takes away is sent through the detector. When the spring is making connection with the right hand end of the rods no current is sent through the detector. Between the two ends of the rods different variations of current may be obtained. It will be noticed that this is the same principle as in the one rod potentiometer.

The following dimensions will be found to be in good proportion for this potentiometer although they may be varied to suit the constructer.

The base is made of hard wood 9 x 4 x ⅜ inch. The supports for the sliding

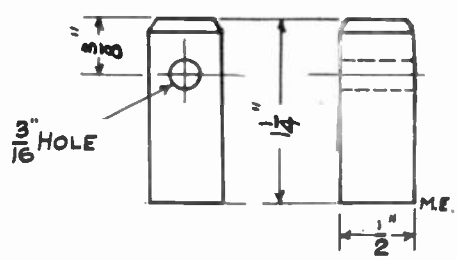


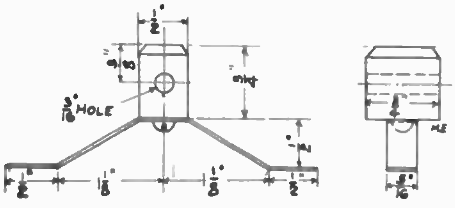
Fig. 2.

rod are also made of hard wood ½ x ½ x 1¼ inch. A hole 3/16 inch in diameter, to fit the sliding rod, should be bored with its center ⅜ inch down from the top of each support and ¼ inch in from each side. A small bevel can be cut around the top of each suport. The sliding rod supports are shown complete in diagram 2.

A round brass rod 3/16 inch in diameter and 9 inches long can be used for the sliding rod. The slider is made of hard wood ½ x ¾ x 1 inch. A 3/16 inch hole should be bored through the long way. The center of this hole is ⅜ inch down and ¼ inch in from each side, Fig. 2.

A piece of brass or copper spring 5/16 wide and 3½ inches long is fastened across the bottom of the slider and bent into the position shown in Fig. 3.

A small bevel can be cut around the top of the slider to give it a neat appearance.



-FIG. 3-

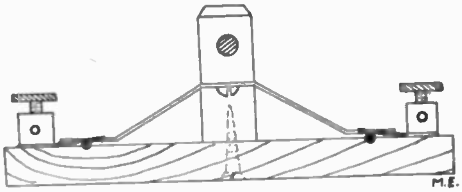
The slider should be put on the sliding rod and then the ends should be put into the supports. The supports are held down to the base by countersunk screws passed up through the bottom.

Grooves should be cut in the base to hold the resistance rods. These grooves should be cut so that the end of the slider spring will bear upon them.

The resistance rod can be bought. The springs to make connection with the resistance rods should be put in place, and binding posts passed up through the base should be connected to them.

Diagram 4 shows a cross section of the two resistance rods potentiometer.

The writer has tested this potentiometer and found that it works much better than the one resistance rod potentiometer.



-FIG. 4-

WIRELESS FROM AEROPLANE.

Wireless communication was maintained in London, England, last month between an aeroplane in flight and a land station.

The experiment was carried out by Robert Loraine from a biplane. The wireless apparatus weighed only fourteen pounds. The transmitter was attached to the passenger's seat and aerial wires stretched along the length and breadth of the biplane. A Morse key was placed at the airman's right hand.

The receiving station on the ground consisted of improvised masts with aerial wires stretched in diferent directions. A Marconi magnetic detector, with the head telephones used to pick up signals, was linked up with two sets of aerials, one pair of which could always present itself broadside on to the aeroplane.

Wireless communication was thus maintained with the airman up to a distance of a quarter of a mile. Valuable data were obtained with a view to improvements for longer distance messages.

RADIOTELEPHONY.

(Continued from page 368)

damped waves are impinging upon the aerial of constant wave length but varying amplitude, a variation in the apparent resistance of the electrolytic detector will take place, which follows and imitates the variation of wave amplitude.

Accordingly, the current sent through the telephone by the local cell varies in the same manner, and the telephone diaphragm emits a sound which corresponds with the amplitude of the incident electromagnetic waves, and therefore reproduces speech being directed against the diaphragm of the transmitting microphone.

A VARIABLE SLIDE-PLATE CONDENSER.

(Continued from page 372)

strike the fixed plates, the maximum capacity is obtained.

The instrument may be enclosed in a case or mounted on a base. A good way to mount it is to set it on four hard rubber legs about ¼ x ½ x 1 inch. The bottom bolts of the fixed section are taken two inches long, and two legs put on before the first plate, the other two after the last plate. A handle may be attached to the movable section. Connections are best made by laying a wire across the edges of each set of plates and putting a drop of solder where each edge touches the wire.

WIRELESS BY AMATEUR TO ROOSEVELT.

The proudest boy in Cincinnati is young William Heilig, the amateur wireless telegraph devotee of Walnut Hills. Young Heilig sent a wireless telegram to Col. Theodore Roosevelt while the latter was in Cincinnati, and Col. Roosevelt sent him a reply, which was also transmitted by wireless.

Heilig's instruments, at his home on Woodburn avenue, have been in communication with the navy wireless apparatus in the Government exhibit at the exposition.

"Will you take a message for Col. Roosevelt?" asked Heilig.

"Certainly," replied the navy man.

"Congratulations and a safe return. William Heilig," flashed young Heilig.

The operator at the exposition took it down on a regular navy wireless telegraph blank and sent it down to Col. Roosevelt, to whom it was delivered at the close of the second act.

"Who is Heilig?" asked the colonel.

A reporter was able to explain that Heilig was a very live boy and very much interested in wireless.

"By George, I'll have to send him an answer. Can they do it from here?" asked the colonel. On learning that it could be done, he dictated the following reply:

"Your message received with much pleasure.

"THEODORE ROOSEVELT."

The colonel's message was taken up to the Government exhibit, and the navy man called Heilig. The communication was perfect, and the message was quickly flashed to Walnut Hills. It is hard to tell whether young Heilig or Holzbaur and Bristol, the navy electricians, are the most pleased over their "stunt."

"AMATEURS."

That the word "amateur" is terribly abused these days may come as a surprise to many.

The fact, however, remains that out of ten manuscripts received by the editor of this publication, six spell the simple word wrong.

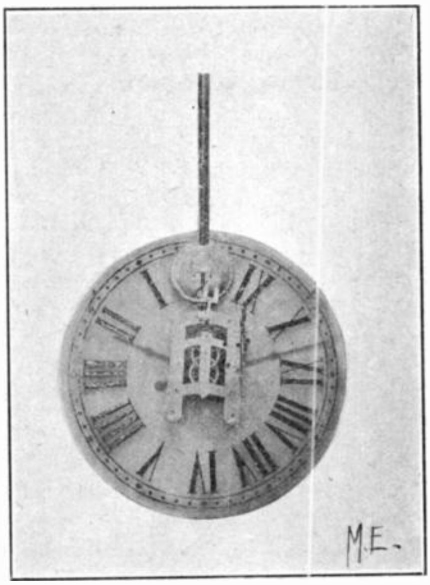
The usual version is *amatuer*. Next in line is *armatuer*, or else *armature*.

All the following ones were actually collected within three months: *Armiteur, armeteur, amature, armeteure, ameteur, amiture, amituer, amature.*

AN ODD ELECTRIC CLOCK.

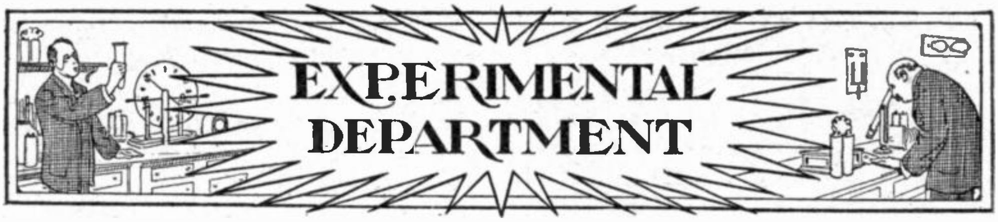
An ingenious clock has just been completed by the students of the St. Louis Watchmaking School.

This clock is a new type of an electrical clock which, odd enough, has a pendulum which swings from a point above the clock. An ordinary clock is used and the pendulum is impelled by an electro-magnetically operated armature of the oscillating type. The armature in its partial approach toward the energizing coil, closes the circuit by which the coil is equipped. Under the attractive



influence of the coil the armature is impelled against the pendulum, driving it forward, after which the circuit is broken, leaving the armature free to be returned to its original position under the momentum of the pendulum in its return swing. The swinging pendulum also operates the escapement lever by which the clock mechanism is advanced so no weights or springs are necessary.

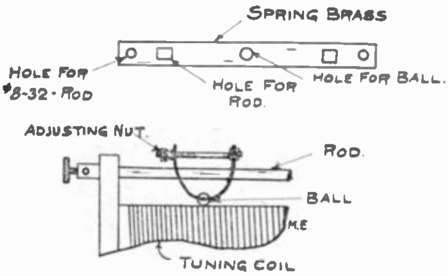
The picture shows a back view of the clock and mechanism.



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.

ADJUSTABLE SLIDER.

I enclose description of a simple, adjustable slider that is quite efficient. First, procure a piece of fairly stiff spring sheet brass. In it cut five holes as per diagram. Next, get a piece of 8-32 threaded brass rod about 2 inches long, two nuts and one thumb-screw



from old dry batteries, and an old ball-bearing of suitable size.

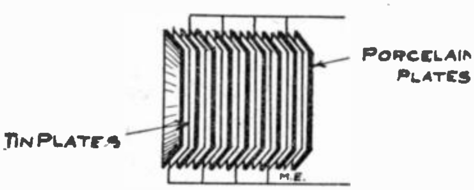
Assemble as in diagram. Pressure on wires may be varied by turning thumb-screw.

Contributed by

E. R. ANSCHUTZ.

UNIQUE CONDENSER.

The condenser on my transmitting set



broke. I used tin pie plates and porcelain plates for the dielectrics.

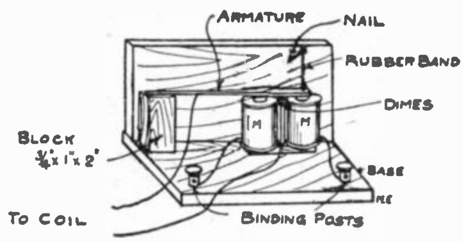
Contributed by

EUGENE WULFF.

AUTOMATIC KEY.

I made an automatic key the other day that worked so well that I want everyone else to have one. I used two boards, 6x4, one block ¾x1x2, a strip of soft iron 6x¾ inches, two dimes, two binding posts, a short rubber band, and an electromagnet which I took from an old bell.

The diagram is self-explanatory. The two boards are nailed together, the magnets are fastened to the upright board, the block, on which the armature is supported, is screwed on. The armature is attached to the block, a nail is driven in just above the armature to regulate its play, another nail is put near the top of the board, the rubber is fastened to the armature and the other end is fastened to the nail, and the ends of the magnet wires are brought out and fastened to



the binding posts. Then connect the wires from your key to the dimes and use your key to work this instrument. It works well on three dry batteries.

Contributed by

J. DALLAS WISE.

MUFFLED SPARK GAP.

Material:

One ivory round pasteboard salt box, or any other round box.

Four porcelain telephone insulators, with screws.

Two pieces hard wood for ends, 5 x 5 inches square.

One hard rubber handle, ⅜ x 2 inches.

One piece of glass about 2 x 2 inches.

One piece round brass rod 6 x 3/16 in.

One piece of fibre or hard hubber 2 x 2 x ⅛ in.

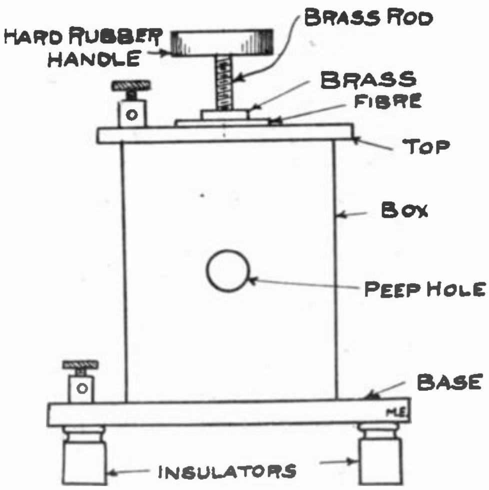
One piece of brass 1 x 1 x ⅛ in. or 1/16 in.

One dozen ¼ in. brass screws.

One common dry battery screw.

Two nickle plated binding posts.

Construction: First take the hard wood or rubber ends and sandpaper them smooth. In one bore a 3/16 inch hole in the center and from the other cut a 1 inch square hole. Now take the piece of brass and bore and tap it so that a common battery screw will fit it. Bore



a 3/16 inch hole in the center of the fibre and screw the brass to the fibre, the fibre to one *end* and that in turn to the cover of the box.

Now paste some linen paper all around the box covering up all printing, etc. Next punch a hole in the bottom of the box and push the battery screw from the bottom of the base up through the bottom of the box. Take the two battery zincs and file them off at about three inches from the top.

The little thumb screw on top may be taken off now and one of the zincs screwed down to the bottom of the box by the battery screw which was formerly pushed up from the bottom of the base. Make a connection from that screw and lead it to the binding post on the back part of the base.

Now thread the brass rod so as to screw into the brass piece on the top. Screw it down through the top and screw the other zinc up tight.

Next cut a round hole about 1½ inches in diameter in the box on the same level with the place where the spark jumps between the zincs, and fasten the glass in back of the hole. If the glass is flat there will be an opening at the top and bottom of the glass which should be packed with cotton.

Then bore the hard rubber handle about half way through to fit the brass rod so that when the handle is turned the rod will turn also.

Now fasten the four insulators to the bottom of the base. Then paint or stain the whole with a *dead* black color.

The gap can be used up to ½ k. w., but by substituting larger zincs it can be used up to 5 k. w.

Below are the different sizes:

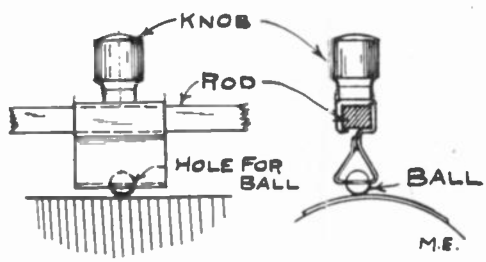
½ inch diameter up to 1 k. w.
⅝ inch diameter up to 2 k. w.
¾ inch diameter up to 3 k. w.
⅞ inch diameter up to 4 k. w.
1 inch diameter up to 5 k. w.

Contributed by
CHARLES L. WHITNEY.

SLIDER.

Being in need of a slider I devised the following:

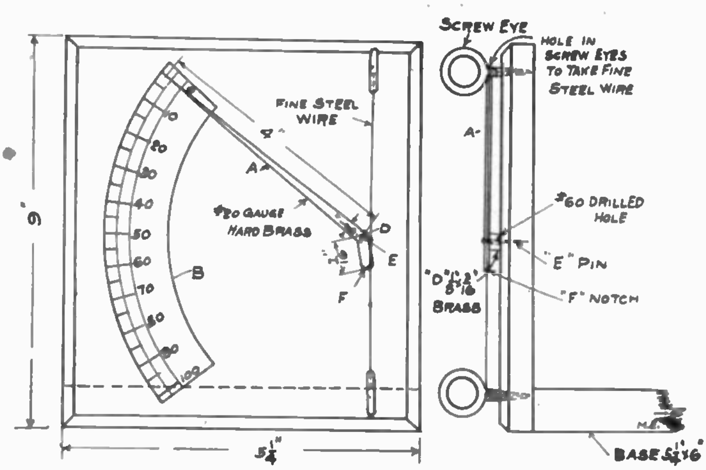
Taking a piece of spring brass I bent it in the form shown in diagram. I then made a hole slightly smaller than the ball. After putting on the knob I



mounted it as shown. All parts will probably be made clear by looking at the diagram.

Contributed by
G. F. QUAYLE.

CONSTRUCTION OF A HOT WIRE AMMETER.



This ammeter, a description of which is given in the following, is the simplest that I have seen or read of, and is quite as efficient as a more complex instrument. The expanding and contracting of the fine wire acting directly on the pointer eliminates all springs and threads. The material required is:

One piece aluminum ½ inch by 5 inches, No. 20 gauge.

One brass rod ⅛ x 3/16 inch.

Two screw eyes.

Two No. 8 flat head screws 1¼ inches long.

One piece fine steel wire about 8 inches long.

One common pin.

One piece card board 2½ x 5 inches.

1½ feet of 1 x 6 inch dry pine or mahogany.

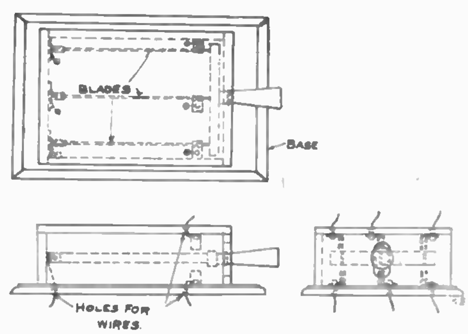
Cut out and finish two pieces of your 1 x 6 to the sizes given in the drawing, for base and upright. Give them a coat of shellac to keep them from getting dirty while you are working on them. From the piece of spring brass cut a pointer (a) the exact size and shape as given. At E solder on the small piece of brass rod. With a No. 60 drill make a hole through the pointer and rod for the pin that is to act as axis to go through. Next a notch should be filed around the small end of the pointer for the fine wire to slide in (F). The scale made from the cardboard is next attached, but not calibrated. The method of putting on the pointer is clearly shown in the drawing. The two screw eyes may have a hole drilled through them or the fine wire may be soldered on. They should be located so that when the wire between is taut the short end of the pointer will lie nearly, but not quite, parallel with the wire. The scale may now be divided, making the spot where the pointer rests 0. When the pointer fails to come all the way back to 0, the wire should be adjusted by turning the screw eye. Now screw the base on and the ammeter is ready to put into your aerial circuit. Attach the wires to the eyes and adjust your condenser and helix until the pointer drops lowest.

Contributed by

DONALD R. JOHNSON.

ENCLOSED AERIAL SWITCH.

Remove the blades and contact pieces from a D. P. D. T. switch and enclose them in a box. An opening should be



made in one end for the handle to emerge from.

This switch is easily operated and very safe.

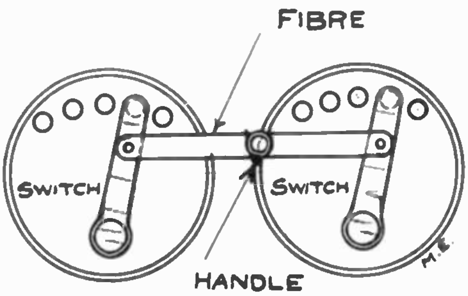
Contributed by

ROY N. DRUMM.

IMPROVED DETECTOR SWITCH.

In the August issue, Mr. Pfleegor suggests a simple detector switch for testing detectors. I would like to suggest the following improvement:

Mount the switches about a half-inch apart with the handles parallel when



they both rest on the same point. Now unscrew the knobs on the handles and place a strip of fibre a half-inch wide across the handles, fastening it loosely with machine screws where the knobs were.

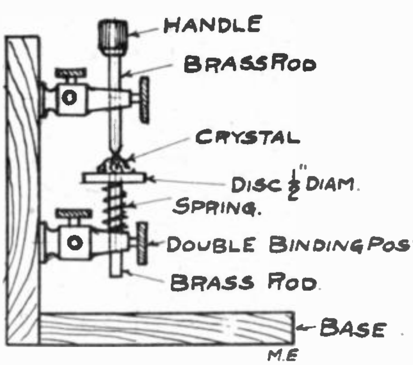
Then mount one of the knobs in the centre of the fibre, and by moving it both switches work in unison.

Contributed by

H. D. HUKILL.

SIMPLE DETECTOR.

Enclosed is a rough sketch of a detector that I have used successfully. Not much description is necessary, except that the disk (5) is soldered on to the



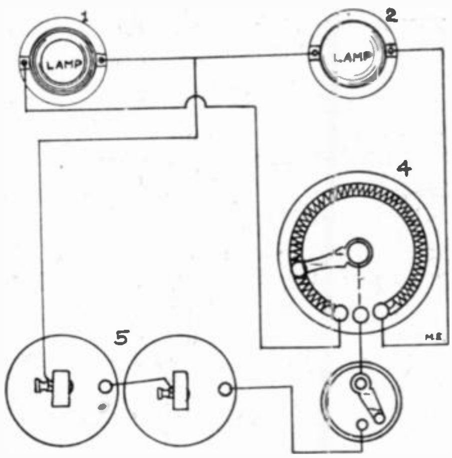
brass rod. The spring (6) presses this upward and as the crystal (7) is placed on this disk a firm pressure is maintained on the crystal by the pointed upper electrode. The upper electrode can be moved up or down, thus varying the pressure on the crystal.

Contributed by

WM. R. HELME.

DIM-BRIGHT ARRANGEMENT

Enclosed you will find a diagram showing how I connected two miniature electric lamps, a rheostat and battery so that one light gradually gets dim while the other grows brighter. As the lever on the rheostat (No. 3) is moved from left to right, light No. 1 grows dim and No. 2 grows bright. When the lever is reversed the lamps work vise versa. I connected the swith (No. 4) to turn off the current from the batteries (No. 5) when not in use. This outfit is very convenient for operating miniature illu-



sions and magic boxes in which one thing changes to another.

As there are only two binding posts on a rheostat, one connected to the lever and the other to one end of the resistance coil, it is necessary to connect one wire to the other end of the coil.

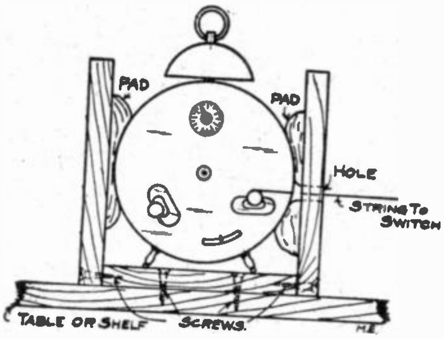
Contributed by

HENRY C. GRAY.

AUTOMATIC SWITCH.

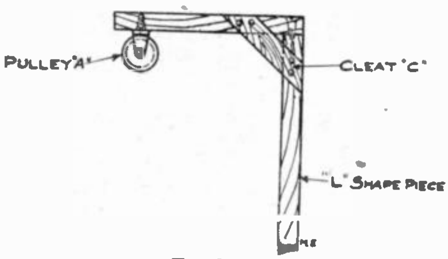
In looking over the February, 1910, number again I chanced to notice the description of how to close a flat-based rotary switch automatically, which reminds me of a way I know to open or close a knife switch automatically, that might interest some of your readers who own knife switches.

First of all, procure an alarm clock; then the switch, which may be of the single, double or triple throw variety. Next secure a stout string or cord a little longer than the distance between the clock and the switch to allow for its passing over the pulleys. Wind it a few times around the winder of the alarm, to prevent its slipping. Now secure the alarm, so that it will not pull itself over instead of the switch. The best way to do this is to make a tight frame (Fig.



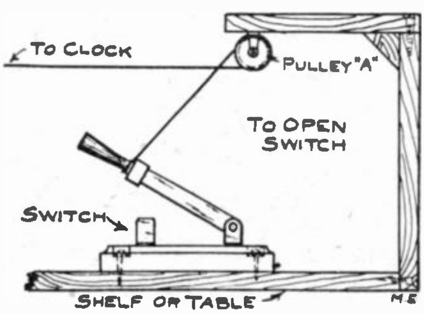
-FIG. 1-

1), of wide boards—minus one side—this opening being at the top, the bottom being secured to the table, shelf or floor, as the case may be, with the alarm clock



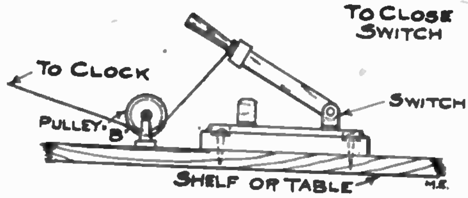
-FIG. 2-

resting on it. Force pads (Fig. 1) between the clock and the sides of the frame if it does not fit snugly enough.



-FIG. 3-

Bore a fair-sized hole opposite the alarm winder—on the side where the switch is—for the cord to pass through. Next make an "L" of scantlings with a cleat for sureness. At the small side of the



-FIG. 4-

"L" screw a pulley ("A" Fig. 2) and secure the "L" to the table or shelf, so that the pulley is about over the hinge part of the switch, allowing it free play, however. In some cases, as where the switch is located on the wall, the pulley may be screwed into the ceiling. For closing the switch a pulley ("B" Fig. 4) is screwed into the table or shelf in front of the switch. Now stretch the cord taut over the pulley in the "L" if you wish to have the switch opened (Fig. 3) but under (Fig. 4) pulley "B" if you wish it closed. Set the alarm at the desired time and clock will wind up the string at the right time, which, passing over or under pulleys will open or close switch.

Contributed by

B. W. PELTON.

NOVEL WAY TO SAVE BATTERIES.

Please print the following contribution in your valuable paper, MODERN ELECTRICS, in the hope that it may be of benefit to some of its many readers.

Some time ago I had in my possession, three ordinary dry cells which were so weak that any one of them would not ring a buzzer. So I started experimenting and this is what I did.

I connected up the three cells in series and then connected them to the buzzer. They then rang the buzzer fairly well, but not good enough for me, so, between the armature and its point of contact, I connected a condenser. (This condenser came from a one-inch spark coil). As above connected the three dry cells rang the buzzer for one week and one day without once stopping. By connecting up the condenser it thereby reduced the sparking at the contacts and thus lengthened the life of the cells.

If any of your readers have a call bell rigged up in their home they will find it a great saving to their batteries if they will connect them up with the condenser as above stated.

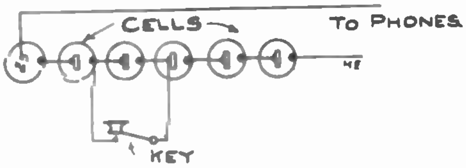
Contributed by

GEORGE GARRISON.

A SIMPLE AUDIPHONE.

A simple audiphone may be easily constructed as follows:

Secure about four or six old dry cells from a garage or some establishment where old cells are thrown away. Con-



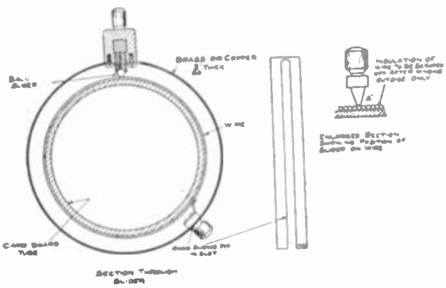
nect the cells in series; connect the complete teminals to a telephone receiver. From three or four of the cells connect the terminals to an ordinary key. The sound in the receivers is the same as in the wireless 'phones. The idea may be easily understood from the following diagram.

Contributed by

ERNEST NEILL.

A TUNING COIL SLIDER.

A simple slider may be made as follows: First obtain a piece of hard brass strip 6 inches long, ¼ inch wide and 1/64 inch thick. Shape it as shown at C in drawing. Next a piece of the same strip 1⅛ inches long is cut and formed into a square tube as A. Then cut another piece of the strip ½ inch long and



shape it as B. Drill or punch ⅛ inch hole in top as shown.

The knob should be made by imbedding the battery screw in sealing wax as described by Mr. Uphoff in August number. About 3/32 inch of the screw should project out of the knob.

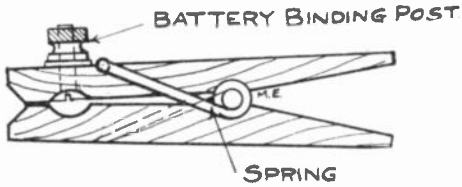
The knob is then fastened to B by means of the hexagonal nut from the battery screw. B is then soldered to the upper side of A, and C is soldered to the lower side as shown. The seam in A should be on the lower side. This slider works very well on ¼ inch square brass rod and makes good contact at all times with the wire of the coil.

Contributed by

AUG. P. GOWPF.

HELIX CLIP.

I noticed in the August number of your excellent magazine, a description of a helix clip made from a clothes-pin, and would like to submit the following description of one which I have found to be quick and certain in gripping the wire. It may be made by drilling a hole in the upper jaw of a spring clothes-pin large enough to admit a screw of the same



size as a battery binding-post, but with a flat head. This screw should be put through the hole with the flat head inside the jaw and a battery nut and binding post should be screwed on the other side of the jaw. Thus this will serve as a binding post and a contact at the same time. This clip being of wood should be shellacked or taped to prevent the operator being shocked.

Contributed by

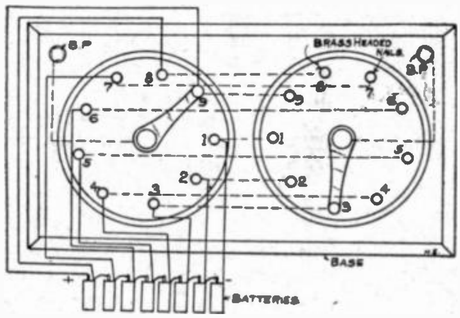
HAROLD GREIDER.

A SIMPLE BATTERY SWITCH WITH REVERSE.

A switch to control batteries with a reverse switch will come in very handy to the average experimenter. Below I will describe such a switch:

First, secure a base about five times as long as the switch handle to be used, and make it about half as wide as it is long.

Next, get two switch handles and about 1½ dozen brass-headed nails or tacks, such as are used on chairs. Divide the base into two parts and put a switch in the middle of each part, then put 9 of the tacks in one part and 9 in the other as shown so that the end of the handle comes in contact with each tack separately. Then put two binding posts in the corners, as shown. Connect it up as the dotted lines show, bringing wires under the base and the whole ones leading to the eight batteries. This switch should be made large if it is to be used with storage batteries or in small lighting plants.



For testing storage batteries, connect a voltmeter or ammeter with the two binding posts. This saves a lot of bother of going around to find the condition of each battery by testing, or it may be used as a control.

To reverse, for instance, if one hand is on 5 and the other on 8, just put the first handle on 8 and the other on 5.

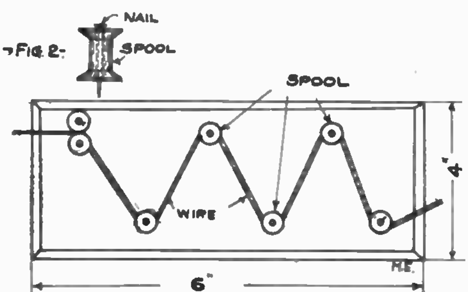
Contributed by

CARROLL M. PFLEEGOR.

WIRE STRAIGHTENER.

Many experimenters would find use for a wire straightener with which to straighten insulated wire.

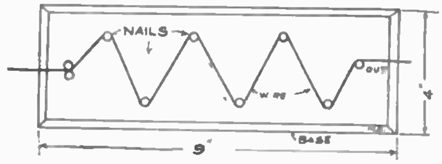
-Fig 2-



-Fig 1-

I will describe two; one for insulated wire, and the other for bare wire.

First take a board 6 inches by 3 inches for the base; get 6 spools from which the thread has been taken; also get 6 nails and put these inside the spools as shown



-Fig 3-

in Fig. 2, and fasten to the base as in Fig. 1.

When finished, pull the wire through and you will straighten it thus.

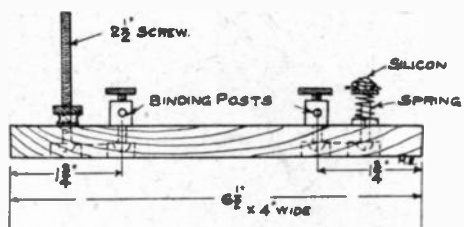
One can be made for bare wire by just hammering nails into a base a little bigger than base No. 1. Arrange the nails as shown in Fig. 3. This will be of use to persons having to wire burglar alarms or electric bells.

Contributed by

CARROLL M. PFLEEGOR.

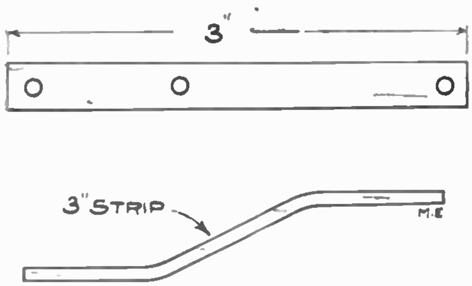
SENSITIVE DETECTOR STAND.

The following detector, if made according to directions, is probably the most sensitive mineral detector made. The material needed costs very little and consists of the following parts: Base



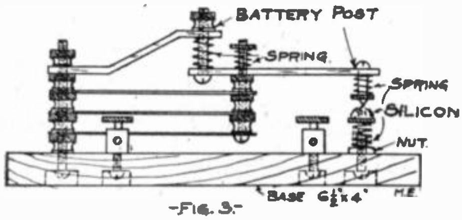
-Fig 1-

of hard wood, six inches long, four inches wide, and three-fourths of an inch thick. Three strips of brass, three and one-half inches long, one-fourth of an inch wide, and about one-twenty-fourth of an inch thick; and two strips three inches long and of the same width and thickness as the longer strips. Bore a hole through each end of the five strips, one-fourth of an inch from each end. A hole is bored through one of the three-inch strips, just one inch from one of the holes at one end of strip. (See Fig. 2, No. 2.) All holes bored through strips must be large enough for a binding post of any dry battery, to slip through easily. After this has been done, bore a hole through ends of base one inch from each end and in the middle of base. Also bore two noles one and three-fourths of an inch from each end and three-fourths of an inch from



-FIG.-2-

side of base. These latter holes are for binding or connection posts. (See Fig. 1.) Procure one screw two and one-half inches long and another two inches long. Also procure four springs, and nine nuts off of dry batteries, and assemble detec-



-FIG. 3-

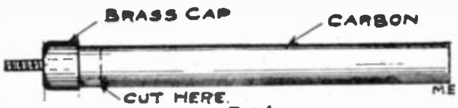
tor as shown in diagrams. I have experimented with all kinds of mineral detectors and have found this type the most sensitive of all.

Contributed by

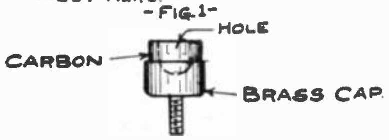
PERCY B. SMITH.

CARBON CUP.

If you are making an electrolytic detector. you will need a carbon cup and a brass cup to hold it.



-FIG.1-



-FIG. 2-

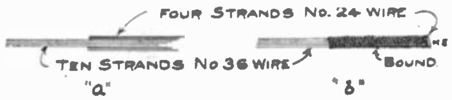
Hunt about until you find an old dry battery having a round carbon and the binding post on top, such as the Ever Ready battery has. Now proceed to take the carbon out, being careful not to injure the brass cap or the thread. With a hack saw cut the carbon about ¼ inch fromthe cap, as in Fig. 1. Now, with a ¼-inch drill, drill a hole about ⅜ inch deep, as in Fig. 2. You now have your carbon cup complete.

Contributed by

B. F. DASHIEL.

A TEMPORARY RECEIVER CORD

Being in need of a good temporary receiver cord, I set to work and made one as follows:



First, I secured 120 feet of No. 36 silk covered copper wire which I cut into 20 6-foot lengths. Then I took about 10 pieces of thread (about the size of No. 36 wire) and placing it with the wire, I bound a piece of string around the wire and thread about 6 inches from one end, and taking care first to tag one set of ten wires at both ends, I twisted everything together to within about 10 inches of the other end. Then I tied each set of ten 10 inches from the other.

Next, I secured the four free ends and taking a little No. 24 bare copper wire, I made four pieces about 1½ inches long and laid them alongside one end of one set of ten wires, as shown in Fig. 1 (a). Then I bound the whole with another short piece of No. 24 bare copper wire as shown in Fig. 1 (b), and after doing this to the other three ends of the cord, I had completed a serviceable single phone cord.

Contributed by

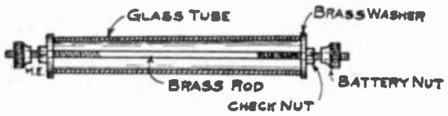
RICHARD N. CLARK.

A GOOD LEAD IN INSULATOR.

A good lead in insulator can be made cheaply and efficiently in the following manner:

Secure a glass tube ½-inch or more in diameter and as long as desired, to go through the wall. Thread a brass rod which is 1½ inch longer than the glass tube with an 8-32 die to fit a dry battery nut. Slip the threaded rod through the glass tube and slip on a brass washer, same diameter as tube. Over this washer screw a dry battery check nut, as shown in diagram. Of course, this is done on both ends, and screw it up till the rod is held tightly in place in middle of tube. The space in the tube can be filled with rosin or parraffine. Now screw on the battery nut and the insulator is finished. It is not necessary to fill the space with rosin if not desired.

A porcelain tube can be used in the same way but is not so neat.



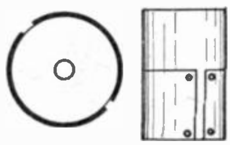
Louis Aldrich used a wire and two binding posts for same purpose. I improved it by the rod and washers.

Contributed by

STANLEY HYDE.

SIMPLE REVERSE SWITCH.

First secure a common thread spool and cut off the flanges. Second, secure



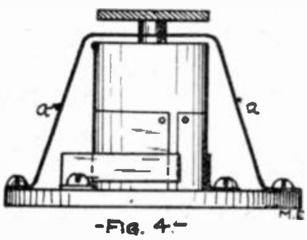
-FIG. 1-

-FIG. 2-

-FIG. 3-

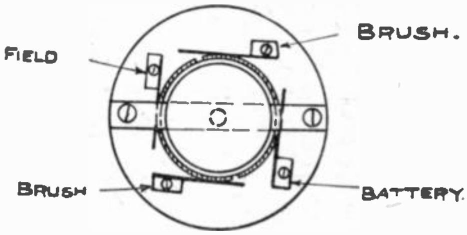
some thin copper, such as used for brushes on small motors. Cut pieces as shown and tack two pieces (No. 2) on the spool, as shown.

Now cut four pieces, as shown in Fig. 3, and screw them to the base (Fig. 5),



-FIG. 4-

in the center of which a hole has been bored to insert the axle for the spool. Get a steel or brass strip and bend it as shown at *a* Fig. 4. Make a handle by boring a hole the same size as the axle in a small strip of wood. Put on the



-FIG. 5-

handle and the reverse switch is complete. Make connections as shown and you will have a reverse switch as good as any.

Contributed by

HENRY C. GRAY.

TO MAKE A MICROMETER THUMB SCREW.

Secure an ink bottle cork and remove the cork and lettering from around composition top. Now secure a brass bolt, one from an old dry cell makes a very good one, and place the head of it in the center of the composition top where the cork has been removed and pour melted pitch around it until even with the sides of the top. The pitch can be secured from the top of an old dry cell. A micrometer screw of this design can easily be adjusted to 1-10,000 of an inch and it improves the looks of an apparatus where a thumb screw is used.

Contributed by

L. C. YOUNG.

GAS RANGE LIGHTER.

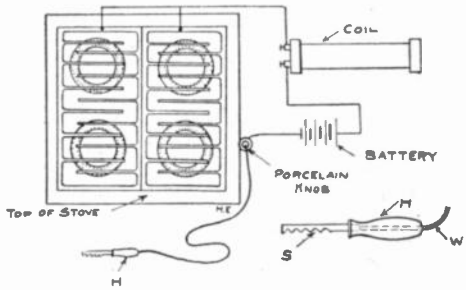
The following is a description of an electric gas range lighter which it not only very convenient, but effects a great saving of matches.

All the material necessary is a gas-light coil, a battery of 4 cells, a piece of No. 00 copper wire or rod, a suitable handle (h) and the required amount of flexible wire (w).

The lighter itself is made by inserting the notched copper rod or heavy wire (s) in the handle (h). A socket handle may be used for this and adds to the appearance. A flexible wire is run through the handle and soldered to S.

A wire is fastened to each of the two grates at (C) by twisting and soldering with high melting solder. Be sure and file the grates good before connecting.

When connections are made as per diagram, the spark caused by scratching the



grate over the burner with the notched lighter will be sufficient to ignite the gas when turned on. Where electric gas lights are already used this may be worked from the same coil.

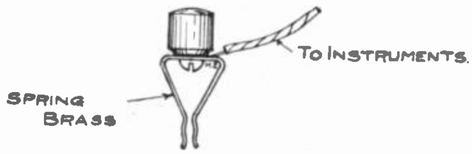
Contributed by

WM. MORSE KISPAUGH.

HELIX CLIP.

Here is a helix clip, neat in appearance, providing good contact and easy and inexpensive to make.

Take a piece of spring brass about 2¼ inches long and ⅜ inch wide. Drill



a 3/16 inch hole in the center and then bend into the shape shown. Just back of the place where it is to grip the helix wire a drop of solder may be placed to stiffen the spring. Now insert a short 8/32 machine screw through the hole to hold an electrose knob to serve as binding post and insulating handle.

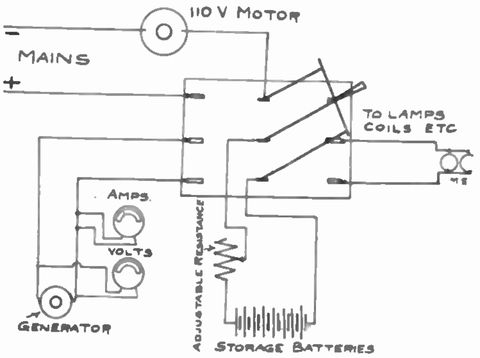
Contributed by

HORACE A. LANEY.

TO CHARGE STORAGE BATTERIES.

The following switch arrangement is one which I had an occasion to use. When switch is thrown to left the battery is being charged. The amount of current being varied by the adustable resistance. The ammeter indicating the number of amperes the battery is being charged with. When the switch is thrown to the right the load is taken from storage batteries, the resistance being then cut out entirely.

I originally planned this for a friend of mine who lives in a small town where current is only available at night, the



power house being shut down in the daytime.

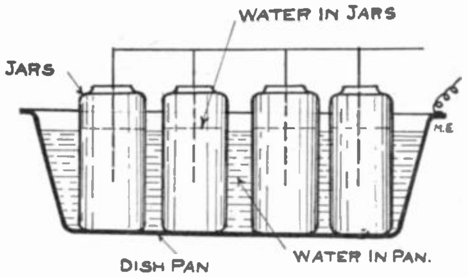
Contributed by

FRANK X. KEILING, JR.

EMERGENCY SENDING

A good condenser can be made out of fruit jars and a dishpan and some good salt water.

Place the jars in the dishpan and fill the pan with water up to two-thirds the height of a jar. Fill each jar with water. Connect a wire on the dishpan and place a wire in each jar and connect the wires from the jar all together, so the



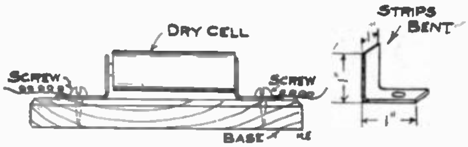
condenser will be connected in multiple.

Contributed by

RALPH WEDDELL.

A POTENTIOMETER BATTERY.

A convenient method of using a battery with a rheostat or potentiometer is to take one cell from a pocket flashlight battery. Procure two pieces of thin brass 2 x 1 inches and bend them as shown in Fig. 1. Fasten the brass strips to a base board the same distance apart as the length of your cell. Insert your battery between the strips of brass and you will find that perfect connection is made. To reverse the polarity simply turn the battery upside down, make connections at



-FIG. 1-

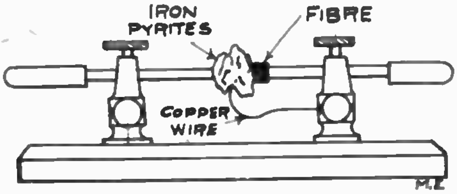
the screws which hold the brass strips in place.

Contributed by

RICHARD PICARD.

SPARK GAP DETECTOR.

Having an old spark gap laying idle the writer decided to make a detecter. A piece of iron pyrites was obtained. One of the rods was polished while other had a piece of fibre put on end.



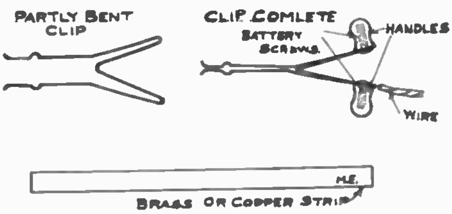
A piece of copper wire was put on binding post that held the latter rod. Other end of wire touched the mineral and detector was found to work as well as high priced detecters.

Contributed by

H. A. WEDDELL.

HELIX CLIP.

Enclosed find drawings of a helix clip that I made and which may interest amateurs needing such a clip.



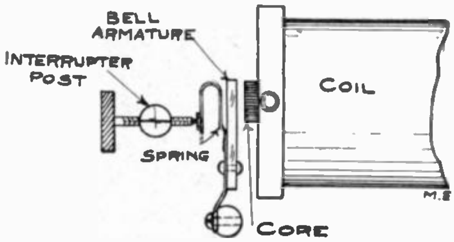
One like that shown in the sketch can be made of a strip of spring brass or copper bent into the shape shown in the drawing. Two battery screws are next procured, and are put in two 3/16 inch holes drilled in the clips. The handles which fit on to the battery screws are made of wood or rubber. All doubtful points will be cleared by referring to the sketch.

Contributed by

WILSON AULL, JR.

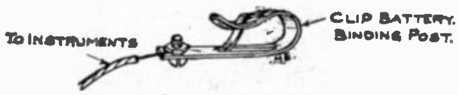
HINTS FOR EXPERIMENTERS.

The interrupter on my coil broke down recently and I contrived to make a very efficient one out of an old bell armature



by merely bending the copper contact, which bears the platinum, around to come in contact with the thumb screw bearing the other contact, as per drawing.

I also made a helix clip of an "electro" spring binding post by bending the



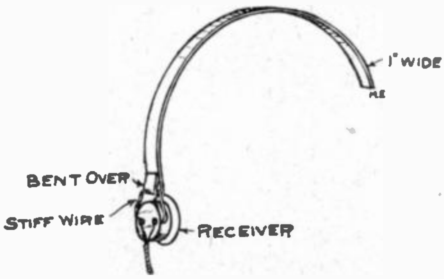
stationary part up and putting a machine bolt and nut on as per drawing.

Contributed by

AL. NEWMAN.

SIMPLE HEADBAND.

A good headband is made by taking



some stiff 1-inch brass long enough to go over the head and 2 inches to spare.

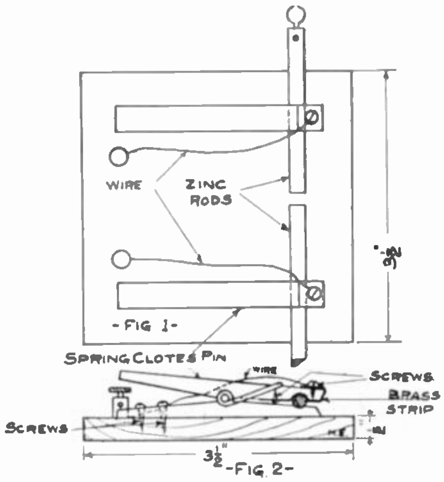
Bend over about 1 inch on each end and pass a stiff wire through where it is bent. Now wrap clear across with tape. Now bore two holes in each receiver on opposite sides and place wire in them. When bent to fit the head, the headband is complete.

Contributed by

RUSSELL BRANT.

A SIMPLE SPARK GAP.

Make a base 3½x3½ inches. Get 2 spring clothes-pins and line inside of the upper jaw on both of them with brass as illustrated, and screw them on each side of base. Lead a wire from brass on



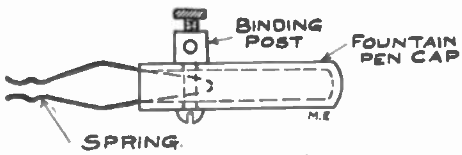
clothes-pins to posts in middle of base. Place zinc rods in the jaws and your spark gap is complete.

Contributed by

HAROLD BEVERAGE.

HELIX CLIP.

The handle is made from a fountain pen cap with a hole drilled through it for the binding post. A piece of spring brass is bent in the manner shown and a couple of holes drilled in it for the



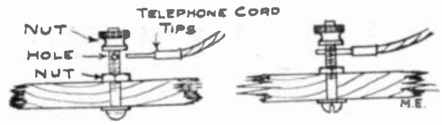
binding post screw to pass through. The rubber handle is a fine insulator so there is no danger of a shock.

Contributed by

FRANK TYREE, JR.

TELEPHONE TIP CONNECTOR.

Not having a good binding post at



-FIG.1- -FIG.2-

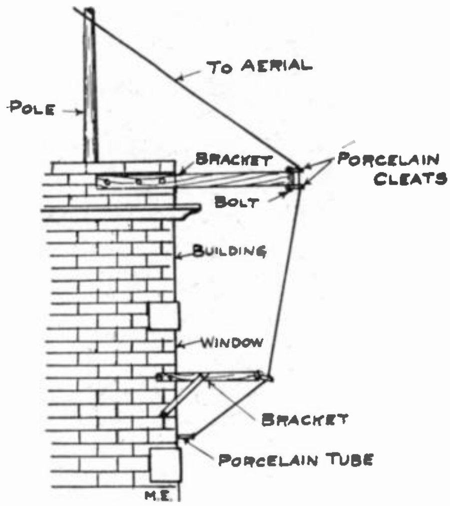
hand for my telephone cords I took a large brass screw and drilled a hole in it as in Figs. 1 and 2, after which I put on a nut to tighten it and found it to work all right.

Contributed by

EDMUND MOLLER.

WIRELESS LEAD IN.

We have used this idea to a great advantage.



Contributed by

ED. COLNE.
JOS. SMITH.

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.*

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.

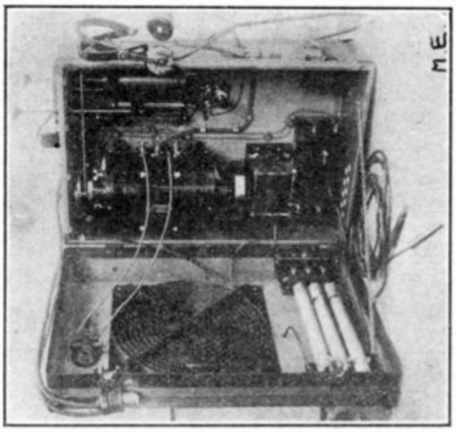
It it also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

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—3 DOLLARS.

The accompanying illustration shows a portable wireless telegraph outfit made by the writer that can be used wherever a current of 110 volts is available.

It was designed with the purpose of avoiding the use of a storage battery and spark coil. In place of these a small motor-generator and transformer are used which greatly reduce the weight



and enhance the sending power. The complete outfit can easily be carried by one man.

E. H. Stobbe.

Washington, D. C.

HONORABLE MENTION.

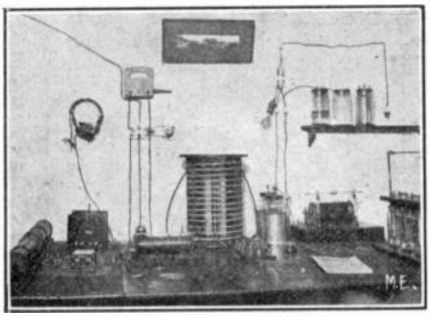
Enclosed please find flashlight photograph of my wireless telegraph station.

On the right side are the transmitting instruments which consist of the following: A 1-inch induction coil which can be operated by the 5-cell bichromate plunge battery or by the alternating current by running it through the aluminum lead rectifier; two leyden jars sending helix, a key for transmitting or receiving without an aerial switch, on the wall to the left of the helix is a hot wire ammeter and a D. P. D. T. switch for throwing in the instruments or grounding the aerial through the lightning arrester. On the left side are the following receiving instruments: Two variable condensers, four detectors, electrolytic, perikon, silicon and carbon. Doughnut transformer, battery, potentiometer, 4-point switch for detectors, and two point switch for battery and a pair of Holtzer Cabot 2,000-ohm receivers.

The push button seen on the table is connected in series with the light and is used for a detector test.

The aerial is made of four strands of aluminum wire 100 feet long and 50 feet high at both ends.

I am a member of the Wireless Association of America and have made all of



the instruments except the receiver and the D. P. D. T. switch, and find the study of wireless very interesting and instructive. My call letter is H. U.

H. C. Hutteball.

Idaho.

HONORABLE MENTION.

Enclosed find a picture of my shop.

My aerial is 54 ft. high at one end and 60 at the other. It is 120 feet long, 4 No. 12 aluminum wires 10 inches apart.

My sending set consists of a ½ K. W.

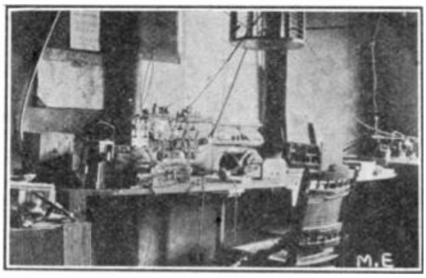
closed core transformer, helix of 18 turns No. 8 copper wire (on ceiling of shop) and key.

My receiving set was all home-made except the receivers and consists of 2 loose coupler tuners, one single slide tuner, variometer, fixed and variable condensers, 2 silicon detectors, all made from directions given in MODERN ELECTRICS. My phones are 2,000-ohm E. I. Co. make. With this outfit I have picked up and talked to ships about 75 miles out and have heard most of the stations from Boston down to Charlestown.

I have my detectors on the window-sill so they are not jared out of adjustment when I send.

I use a home-made make and break key as described in MODERN ELECTRICS for April 1910, and it works perfectly.

In back of my table are 2 switchboards with necessary switches, fuses and test bulbs.



On the right is a portable receiving set in a box 7x6x10 inches, with loose coupler, fixed condenser, silicon detector and 2,000-ohm receivers.

On top of this is a copy of MODERN ELECTRICS, without which I think my wireless would have been a failure.

ROBERT MUNS.

New Jersey.

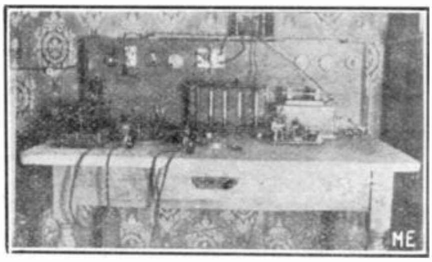
HONORABLE MENTION.

Enclosed please find flashlight photo of my wireless station.

The aerial is 46 feet high and 40 feet long and is composed of 4 wires spaced 18 inches apart.

The sending instruments are as follows: One-inch "Electro" spark coil, home-made zinc spark gap, home-made sending helix, home-made adjustable condenser, telegraph key and batteries.

The receiving instruments consist of a double slide tuning coil, silicon, molybdenite detectors and precision coherer and de-coherer, Gernsback relay, home-made fixed condenser, one 1,000-ohm receiver, and one 75ohm receiver. By means of the switches shown in the photo, I am able to use any one of the detectors, either with or without a battery. The push button and buzzer are used for testing the detectors. The S. P. S. T. switch in the left of the picture is used for grounding the aerial when not in use. I also have a telegraph which is shown in the photo, which I use for



practising and which is connected with a friend's house.

I am a constant reader of MODERN ELECTRICS and think it is a fine magazine.

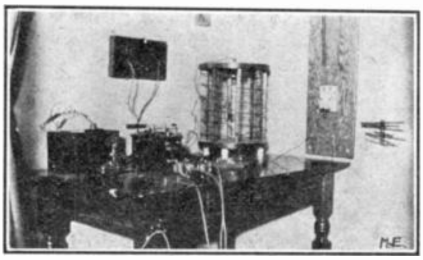
ADOLPH ROSSITER.

Pittsburg, Pa.

HONORABLE MENTION.

I herewith enclose photograph of my instruments.

My set comprises the following:



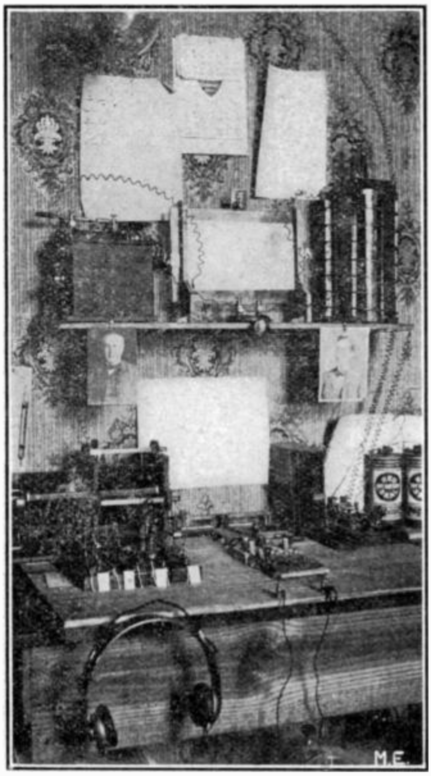
Transmitting, aerial 2 wires, 2 feet apart, 25 feet long, 40 feet high at one end, 30 feet high at the other. Sending helix, glass plate condenser, 1-inch spark coil, spark gap, and key. Receiving, single slide tuner, silicon detector, condenser, and 2 2,000-ohm phones on a headband. With this station I am able to receive 100 to 150 miles and transmit 3 to 6 miles.

HASTINGS HUTTER.

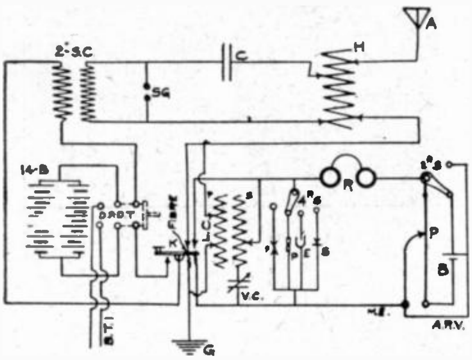
Pennylvania.

HONORABLE MENTION.

Please find enclosed photo and circuit of my wireless station.



All the instruments are made by my self, except the phones. The sending set consists of 2 inch spark coil, spark gap, helix and one glass plate condenser, and 14-cell battery.



The receiving set consists of one tuning transformer, variable condenser, silicon, ferron, perikon and electrolytic detectors, 2 1,000-ohm phones, and a potentiometer.

The D. P. D. T. is used for testing and to put in circuit the battery. My aerial is of the horizontal type 100 feet high, consists of 4 No. 12 silicon bronze wires, spread 3 feet apart and 75 feet long. The 'hook-up" is of my own idea, having a tuning transformer in circuit and I can send and receive at the same time without the aid of switches.

Great merit for my improvements is due to MODERN ELECTRICS magazine.

Call letter A. R. 5.

A. R. VALLI.

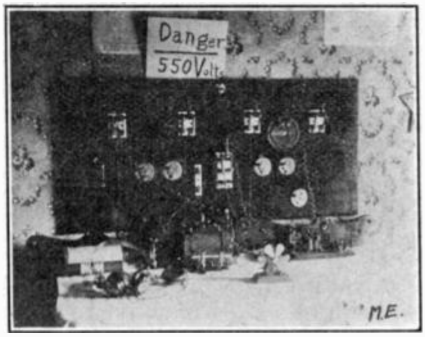
Brooklyn, N. Y.

HONORABLE MENTION.

Please find photograph of my "Wireless Telegraph Station."

On the right is the transmitting apparatus, which consists of the "Electro" one-fourth inch spark coil, zinc spark gap, and strap key behind motor. Also use the telegraph instrument as a magnetic key. The condenser is not visible in photo, but consists of 6 clear 4x5-inch photograph plates, on which is 6 sheets of tinfoil 3x4 inches. I can obtain heavy blue spark with it.

On the left is the receiving apparatus, which consists of E. I. Co.'s Electrolytic



bare-point detector, 1 pair of 75-ohm receivers, and battery. Also a fusible cut-out near D. S. D. T. switch.

My aerial is 44 feet high at one end, and about 20 feet on the other end. It is about 30 feet long, composed of 3 copper wires strung 1½ feet apart. I can receive about 30 miles and send about 1 mile.

The above switches are to control batteries which operate my spark coil, telegraph, lights and motors. Am a constant reader of MODERN ELECTRICS.

WILLIAM LIPPERT,
New York.

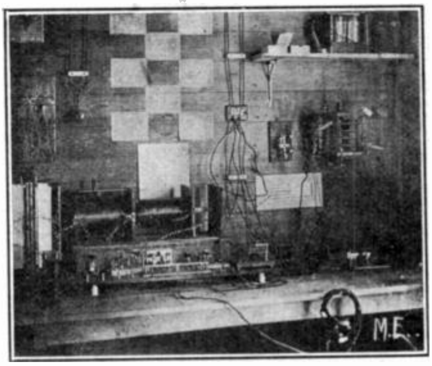
HONORABLE MENTION.

Please find enclosed a photograph of my wireless outfit.

At the right of the picture are the transmitting instruments, consisting of a 2-inch spark coil, helix, key, condensers, etc.

At the right is the receiving outfit, consisting of a tuning transformer, double slide tuning coil, variable condenser, potentiometer, phones, fixed condenser, and three kinds of detectors, the ferron, electrolytic and silicon.

My aerial is sixty-five feet high at one end, fifty at the other and two hundred and twenty feet long, composed of four No. 14 aluminum wires. I get very good results from this outfit, most of which I made myself, and have received many



suggestions from MODERN ELECTRICS. I would like to get in touch with some of the amateurs in my vicinity and would be pleased to hear from any of them.

M. L. JONES.

Madison, South Dakota.

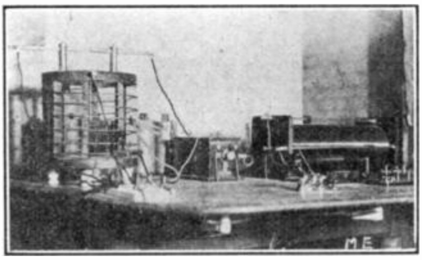
HONORABLE MENTION.

Among my many other corners I have a "Wireless" corner, of which I enclose a photograph.

The helix and spark gap I made myself. The coil is an E. I. Co. 1-inch coil, and is run by six dry cells, which may be seen in the background. The variable condenser I made myself.

In the receiving set I have a large tuner equipped with a pair of E. I. Co. sliders, which work excellently. Just in front of tuner is a "Mesco" variable condenser, also a "Long Distance" fixed condenser, and a "Mesco" detector. My Holtzer Cabot receivers are hanging up to the right and cannot be seen in the plate.

This set gives excellent results, and I am in constant communication with a



friend who lives about a mile from here both night and day.

Respectfully,

H. J. TRUEBLOOD,
Indiana.

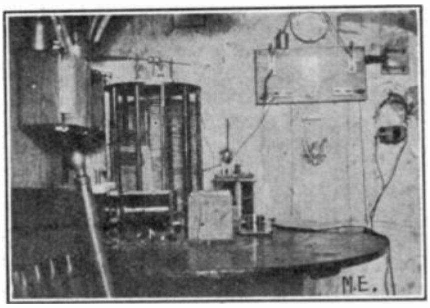
HONORABLE MENTION.

The accompanying picture is of my wireless equipment on which I have been experimenting for a number of years with the excellent help of MODERN ELECTRICS.

The sending set consists of a 2-inch coil wound with heavy wire, giving an excellent spark for wireless.

The helix is made of No. 12 wire. Condenser is of the plate style. I use zinc balls for a spark gap in preference to the other makes.

The receiving set contains a tuning transformer, fixed and variable condens-



ers (under table and operated from above), electrolytic and silicon detectors with 3,000-ohm phones.

The antenna is 100 feet high, compromise type.

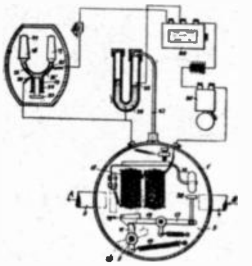
RUSSELL BLANCHARD.

Mass.

Mental short circuits are necessary when you wish to produce something new and original.

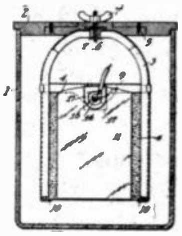
Electrical Patents for the Month

970,222. AUTOMATIC GAS CUT-OFF. Ludwig Schmidt and Hubert Schmidt, Kaiserswerth, near Dusseldorf, Germany. Filed Feb. 2, 1910. Serial No. 541,638.



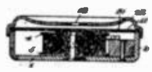
1. A device of the character described, comprising a gas service pipe, a catalytic substance adapted to be subjected to the action of gas escaping therefrom, means controlled by the catalytic substance for closing an electric circuit, and means actuated by said circuit for closing the gas service pipe.

969,949. PRIMARY BATTERY. Eben G. Dodge, Maplewood, N. J., assignor to Edison Manufacturing Company, West Orange, N. J., a Corporation of New Jersey. Filed June 12, 1909. Serial No. 501,821.



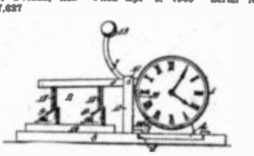
1. In a voltaic battery, the combination of a negative electrode plate, a positive electrode plate, insulating means separating said plates, means securing said parts together, said positive plate being so formed as to protect the part thereof contacted by said securing means against electrolytic action, substantially as described.

969,937. TELEPHONE APPARATUS. Garrison Babcock, Rochester, N. Y., assignor to Simplex Telephone Equipment Company, Rochester, N. Y., a Corporation of New York. Filed July 11, 1907. Serial No. 383,174.



1. In a telephone receiver, the combination with a suitable magnet and a coil for modifying the magnetic influence thereof, of a diaphragm arranged in coöperative relation with said magnet comprising flexible concavo-convex members arranged with their convex sides in engagement, said plates being compressed to form a laminated diaphragm.

970,082. AUTOMATIC TIME-SWITCH. Harry C. Calvin, Dothan, Ala. Filed Apr. 3, 1909. Serial No. 487,627.

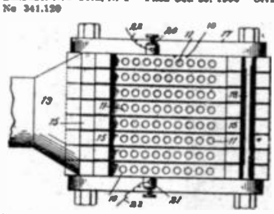


1. In a switch of the type set forth, in combination, a base plate, a clock supported at one end thereof, contacts provided at the other end thereof, an upstanding post arranged between the clock and the contacts, a switch arm pivoted between its ends to the post and having one end provided with means to engage the contacts and having a free end portion disposed adjacent the clock, a momentum element pivoted coincidently with the switch arm and having a depending portion projecting beyond its pivot, and a cam secured to a shaft of the clock and arranged to engage the depending portion and to produce thereby an operative movement of the momentum element, the latter in turn engaging the free end portion of the switch arm and producing an operative movement thereof.

970,488. MEANS FOR HEATING METALS. Edward F. Gehrkens, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. Filed July 6, 1908. Serial No. 442,150.

1. In combination, a magnetic core having a winding thereon, and a piece of metal a portion of which is in the magnetic circuit of said core, and a portion or portions to be heated in inductive relation to said winding.

971,244. APPARATUS FOR OZONIFYING. Charles S. Bradley, New York, N. Y. Filed Oct. 29, 1906. Serial No. 341,120.



1. An ozonifier comprising a plurality of electrodes and dielectrics spaced between them, said dielectrics being twice as thick as the width of the spaces between them and the electrodes.

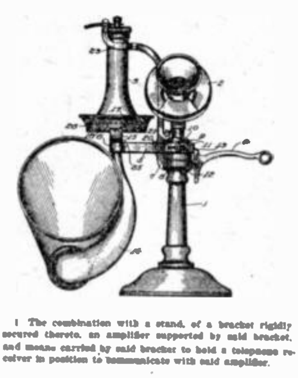
2. An ozonifier comprising a plurality of electrodes, dielectrics spaced between them, said dielectrics being as thick as or thicker than the width of the space between them and the electrodes, and means for maintaining the pressure in the space below atmospheric pressure.

3. An ozonifier comprising a plurality of electrodes, dielectrics between said electrodes, means for maintaining spaces between said dielectrics and electrodes as small as or smaller than the thickness of said dielectrics and means for maintaining the pressure in said spaces below atmospheric pressure.

970,067. BINDING DEVICE FOR CIRCUIT-CONDUCTORS. Thomas E. Murray, New York, N. Y. Filed Mar. 16, 1910. Serial No. 549,909.

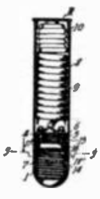
1. A binding device for electric conductors comprising two plates having hook-shaped edges, seated one within the other, and having inwardly turned mutually overlapping flanges opposite to said hooks, and a clamping screw passing through both of said flanges to engage a conductor seated in the inner hook.

971,237. TELEPHONE. Joshua W. Atlee, Riverton, N. J. Filed June 4, 1909. Serial No. 496,567.



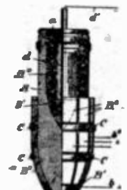
1. The combination with a stand, of a bracket rigidly secured thereto, an amplifier supported by said bracket, and means carried by said bracket to hold a telephone receiver in position to communicate with said amplifier.

969,649. PORTABLE ELECTRIC HEATER. Frank J. Dyer, Montclair, N. J. Filed May 25, 1909. Serial No. 498,380.



1. In a portable heater, the combination of a heater, a heating coil within said heater, a plug and connections between and joined to the same and said coil, and a chamber for inclosing said plug and connections when not in use integral with said heater, substantially as described.

970,428. MANUFACTURE OF HARDENED-STEEL PROJECTILES. Cleland Davis, U. S. Navy, assignor, by mesne assignments, to Carnegie Steel Company, Pittsburg, Pa., a Corporation of New Jersey. Filed Apr. 22, 1902. Serial No. 104,281.



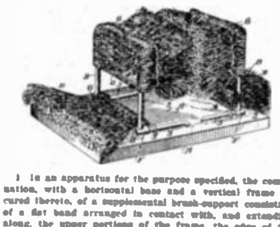
1. In the method of hardening hollow projectiles of steel, that step which consists in placing an electrode exterior of the nose of the projectile and another electrode in the cavity in said projectile and passing a heavy current between said electrodes, substantially as described.

970,830. APPARATUS FOR REPRODUCING PICTURES OR CHARACTERS. Gustav E. Hoglund, Chicago, Ill., assignor to William N. Selig, Chicago, Ill. Filed Sept. 16, 1909. Serial No. 517,978.

1. In a device of the class described, the combination of an instrument for transmitting impulses when passed over a roughened surface, said impulses varying in strength according to the varying degrees of roughness of the surface, an instrument comprising a light for making a visual record of such impulses on a sensitized plate, said light being energized from a local circuit, a main transmission line from the transmitting instrument, and a connection between the main line and local circuit, whereby the impulses created by the transmission instrument and conveyed over the main line affect the strength of the local circuit, whereby the varying strength of the impulses created by the transmitting instrument produces a variation in the degree of brilliancy of said light, substantially as described.

2. In a device of the class described, the combination of an instrument for transmitting impulses when passed over the roughened surface of a plate, said impulses varying in strength according to the varying degrees of rough-

970,332. APPARATUS FOR USE IN EXERCISING AND DEVELOPING AND APPLYING STATIC ELECTRICITY. Marcellus Munson Hitt, Luray, Va., assignor to D. L. Kauffman, Luray, Va. Filed Dec. 21, 1909. Serial No. 534,361.



1. In an apparatus for the purpose specified, the combination, with a horizontal base and a vertical frame secured thereto, of a supplemental brush-support consisting of a flat band arranged in contact with, and extending along, the upper portions of the frame, the edge of the band projecting beyond the frame, as and for the purpose specified.

Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending Sep. 27

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.

2 K. W. TRANSFORMER DESIGN.

(715.) W. G. WHITTAKER, Mo., asks:

Q. 1.—Kindly publish specifications of a 2 K. W. closed core transformer to be used on a 110-volt 60-cycle A. C. circuit, giving the weight of copper necessary for the primary and secondary windings, and the number of sections advisable.

A. 1.—Core 17½x8¾x2¼ inches, outside dimensions. Cross-sectional area core (laminated), 2¼x2¼ inches. Primary of 244 turns No. 8 B. & S. D. C. C. magnet wire, or 13½ pounds. Bring out leads from second and third layers. Secondary of 21-pound No. 28 B. & S. D. C. C. magnet wire, wound in 30 pies of 920 turns each; each pie ¼ inch thick.

Q. 2.—How many volts will the secondary of this coil give? What spark length can be obtained?

A. 2.—12,440 volts with primary coil all cut in. ½ to ¾ spark.

Q. 3.—With an aerial 100 feet long and 80 feet high, how many miles can this transformer send?

A. 3.—200 to 400 miles.

2 K. W. TRANSFORMER EFFICIENCY.

(716.) FRANK MCVEIGH, Tenn., writes:

Q. 1.—What is the efficiency of a 2-K. W. closed core 15,000 volt, wireless transformer?

A. 1.—95.7 per cent. efficiency.

Q. 2.—How many amperes should it take on 110 volts A. C. 60 cycle?

A. 2.—18.2 amperes in primary at full load.

Q. 3.—How many pounds and what size of wire should be used in the secondary? How many pies?

A. 3.—21 pounds No. 28 D. C. C. magnet wire, wound in 30 pies of 920 turns each.

CONDENSER CAPACITY.

(717.) EDWIN WETHERAL, Iowa, writes:

Q. 1.—I have a variable condenser which I made from two test tubes, the larger being ⅞ inch in diameter and 6 inches long, and the smaller being ¾ inches in diameter and 6 inches long. They are coated with tinfoil on the outside and one slips into the other. The tinfoil comes clear to the ends and the glass is about 1-16 inch thick. What is the capacity?

A. 1.—.0002 plus M. F.

Q. 2.—I am going to put my aerial in the attic, and the 110-volt A. C. wires run about 18 inches below it. Will this have any effect and if it will, can I tune it out with the variable condenser of question No. 1?

A. 2.—Possibly if you place the aerial at right angles to the power wires.

OPERATING RADIUS.

(718.) B. G. SPLITHOFF, Ill., inquires:

Q. 1.—How far can I send with ¾-inch spark coil, spark gap, sending key, 8 batteries and aerial 30 feet high and 20 feet long, four strands?

A. 1.—1½ to 3 miles.

Q. 2.—What is the receiving range with same aerial and double slide tuning coil, silicon detector, fixed condenser, 500-ohm receiver and one battery?

A. 2.—100 to 150 miles.

3 K.W. OSCILLATION TRANSFORMER

(719.) JAMES MUNROE, Pa., says:

Q. 1.—Please give me the dimensions of an oscillation transformer, to be used with a 3 K. W. transformer?

A. 1.—Make the primary of 20 turns No. 2-0 aluminum wire; spacing the turns 1¼ inch apart on a wood drum 25 inches in diameter and 26 inches long. The secondary is composed of 60 turns No. 6 aluminum wire, turns spaced ½ inch apart on a wood cylinder 19 inches in diameter and 32 inches long.

Q. 2.—How should it be connected?

A. 2.—See diagram, answer to query No. 566, May, 1910, MODERN ELECTRICS.

Q. 3.—What should be the voltage of a 3 K. W. transformer, closed core type?

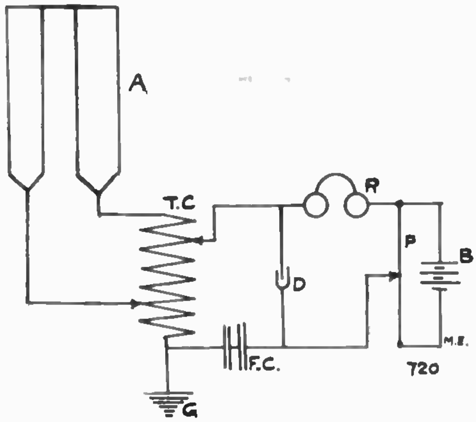
A. 3.—12,000 to 15,000 volts on secondary.

DOUBLE SLIDE TUNING COIL.

(720.) F. X. KEILING, New Jersey asks:

Q. 1.—As I have always used a single slide tuning coil, I am not familiar with the double slide coil; will you tell me how to use it in connection with a looped aerial. Give a diagram?

A. 1.—Connect as shown below.



Q. 2.—How can I tell when the silicon, perikon and carborundum detectors are at their most sensitive points?

A. 2.—By means of a test buzzer.

Q. 3.—What voltage and amperage do electric pleasure vehicles consume. How are the motors wound? Do they cost less to operate than gasolene autos?

A. 3.—45 to 60 amperes at 80 volts pressure. Motors are usually series wound. They compare very favorably with gasolene autos in operating cost.

RECEIVING DISTANCE.

(721.) L. W. Darby, Ill., writes:

Q. 1.—With a 4-wire aerial, 120 feet long, and 40 feet high at highest point; loose coupled tuner, 2 variable condensers (rotary type) fixed condenser, 2,000-ohm receivers, silicon detector, potentiometer, how far can I receive?

A. 1.—300 to 400 miles.

Q. 2.—Using same aerial with electrolytic interrupter, ½ K. W. transformer coil, zinc spark gap, glass plate condenser (12 plates 12 x16 inches tinfoil 8x12 inches) helix and key, how far can I send?

A. 2.—60 to 75 miles.

Q. 3.—Is it necessary that each aerial wire be of one piece? that is not made up of 2 or 3 pieces soldered together?

A. 3.—If the joints are well made, several pieces of wire are as good as one piece of wire.

AERIAL.

(723.) A. G. Klein, Cal., asks:

Q. 1.—Will you give me a diagram showing how to connect the following instruments, and kindly mention what instruments are necessary to make the set as delicate as possible?

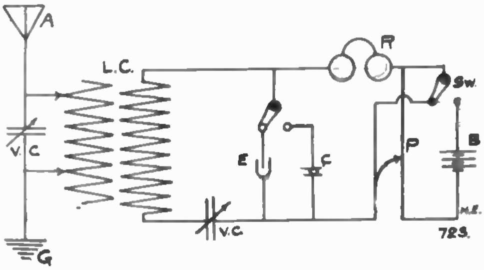
One potentiometer, 400-ohm resistance, 1 double head phone, 1,000-ohm resistance, 1 ferron detector, 1 electrolytic detector, 1 two-point switch, 1 receiving transformer, 2 adjustable condensers, one 400 square inches, other is 1,050 square inches.

A. 1.—Diagram given below. Set very good as it is.

Q. 2.—Please give description of the best aerial for this set?

A. 2.—Height 60 feet. Use a 4-wire

straightaway aerial connecting all the wires on multiple.



Q. 3.—How far can I receive with this set?
A. 3.—300 to 500 miles.

FIXED CONDENSER.

(724.) JOSEPH E. DALZELL, Kenosha, Wis., inquires:

Q. 1.—About how far could I receive with an aerial 45 feet high at one end and 35 feet at the other and 70 feet long. 4 wires, each being 3½ feet apart. Instruments used being a Murdock receiving transformer, variable condenser, Clapp Eastham ferron detector, fixed condenser, and 2,000-ohm phones, one thousand ohms in each? This is the diagram of aerial used, is it all right?

A. 1.—400 miles; yes.

Q. 2.—Could I make any use of two tele phone coils, and a telephone condenser?

A. 2.—You may use the condenser for a fixed.

OPERATING RADII.

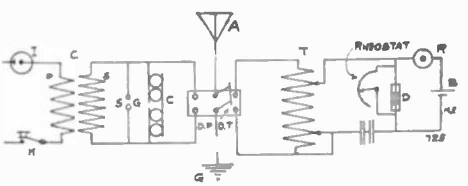
(725.) WILLARD BALL, Martins Ferry, Ohio, asks:

Q. 1.—What will be the sending and receiving range of the following outfit: Aerial 30 feet high, 40 feet long (2-wire, 2 feet apart) with gas pipe ground, E. I. Co's. ½ K. W. transformer coil, zinc spark gap, adjustable condenser, and electrolytic interrupter with 110 volt A. C.; receiving; electro Jr., tuner, carbon detector, fixed condenser, and 75-ohm receiver?

A. 1.—Sending 40 miles; receiving 40 to 60 miles.

Q. 2.—Give diagram of connections for both.

A. 2.—Diagram given here.



Q. 3.—What would be the range if I used 2 1,000-ohm receivers and an electrolytic detector.

A. 3.—60 to 90 miles.

ENAMELED WIRE DATA.

(726.) HENRY D'ORMOND, Ohio, writes:

Q. 1.—Can you tell me the number of turns per square inch of winding of No. 26 enameled wire?

A. 1.—3,460 turns per square inch.

Q. 2.—What is the resistance of this size wire per pound, and how many feet to the pound?

A. 2.—52.4 ohms per pound; 1,286 feet per pound.

Q. 3.—How many turns per square inch of winding of No. 26 single cotton covered wire?

A. 3.—2,500 turns per square inch, with a 4 mil cotton covering.

STORAGE BATTERY CHARGING.

(727.) WILLIAM DOERING, Cleveland, O., inquires:

Q. 1.—Is a 6-volt, 4-ampere dynamo all right for charging a 4-volt, 10 A. H. storage battery, and if so, how long should the storage battery be charged, after being run down?

A. 1.—Yes; for 2½ hours.

Q. 2.—Is it necessary to remove the lead peroxide pellet and the silicon from detectors, the same as it is necessary to remove the platinum wire from the electrolytic detector, when not in use?

A. 2.—No.

Q. 3.—What is the approximate receiving distance with each of the following detectors: Electrolytic and silicon, the other instruments being a double-slide tuning coil, fixed condenser, batteries and potentiometer and 2,000-ohm phones, the aerial being 75 feet long and 50 feet high?

A. 3.—400 miles; 350 miles.

SILICA-CARBIDE DETECTOR.

(728.) JAMES L. HODGES, Miss., asks:

Q. 1.—What principle does the new silica-carbide detector work on, and how is it made and what of?

A. 1.—On the rectifying principle; a piece of carborundum placed between two flat springs.

Q. 2.—How can I make a peroxide of lead detector?

A. 2.—See the June, 1910, M. E.

Q. 3.—Is there any difference in connecting 2 condensers in series and in parallel?

A. 3.—Yes. If two condensers are connected in multiple, the joint capacity is equal to C^1+C^2 where C^1 and C^2 equals the capacity of each condenser, etc., when connected in series the joint capacity equals:

$$\frac{1}{\frac{1}{C^1}+\frac{1}{C^2}+\frac{1}{C^3}\text{ Etc.,}}$$

WATER RHEOSTAT.

(729.) JACK STARRET, Wis., writes:

Q. 1.—Please give me directions on how to make a water rheostat that will reduce 110 D. C. down for the use of running small motors, lighting lamps, etc.

A. 1.—In a small wooden tub or keg, place a copper plate in the bottom and connected by a rubber covered wire to one side of the circuit. Fill the receptacle full with salt water. Now lower another plate into the solution to the depth giving the desired current, this plate being connected to the other side of the apparatus.

GAS PIPE GROUND.

(730.) M. A. POLSTER, Baltimore, Md., says

Q. 1.—Is number 16 soft iron wire too

large to use for a core in an induction coil?

A. 1.—Yes.

Q. 2.—A gas pipe is used for a ground, the pipe being on the third floor. If lightning struck the aerial, would there be any danger of the house catching fire as the charge goes through the pipe to the ground?

A. 2.—There is a chance of danger with a gas pipe ground; but if it is used the ground wire should be connected onto it on the street side of the meter.

Q. 3.—How many amperes can number 16 copper wire carry safely?

A. 3.—10 amperes.

LOOP AERIAL HOOK-UP.

(731.) H. A. L., Washington, D. C. writes:

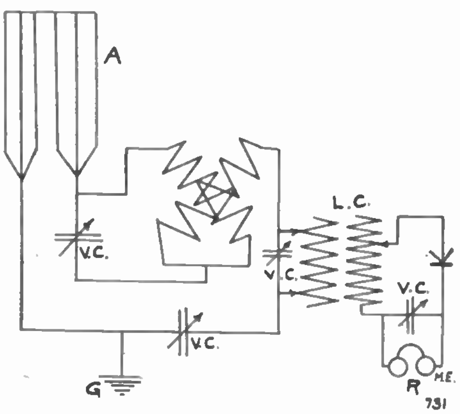
Q. 1.—Please answer the following in the "Oracle":

Receiving range of these instruments with an aerial 100 feet high and 100 feet long composed of 6 strands No. 14 aluminum wire spaced 3 feet apart; variometer, extremely sensitive perikon detector, 2,000-meter double slide loose coupler, two rotary and two tubular variable condensers, and a pair of 2,000-ohm head receivers.

A. 1.—1,000 miles to 1,200 miles.

Q. 2.—Please give a diagram of most efficient connection of this set using looped aerial.

A. 2.—Diagram given below.



¼ K. W. TRANSFORMER.

(732.) Harry Frost, Buffalo, N. Y. says:

Q. 1.—What size plates and how many will make a good condenser for a ¼ K. W. transformer?

A. 1.—5 glass plates 12x14 inches, with foil 8x10 inches connected in multiple.

Q. 2.—What amperage is a ¼ K. W. transformer supposed to take on 110 V. A. C.?

A. 2.—3.7 amperes.

Q. 3.—How far apart should the spark gap be, when working right?

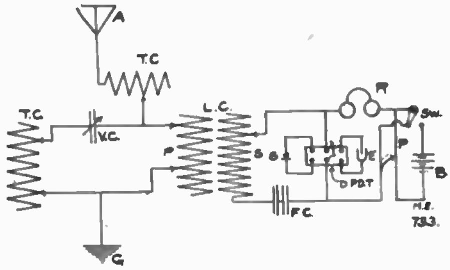
A. 3.—About ¼ inch.

CONNECTIONS

(733.) H. Melling, Mass., says:

Q. 1.—Show the most efficient way to connect up the following instruments: 600 metre tuning coil, 1,800 metre tuning coil, tuning transformer, (2 slides primary, 1 on secondary) variable condenser, fixed condenser, silicon and electrolytic detectors, potentiometer and as many batteries as you advise, D. P. D. T. switch, S. P. D .T. switch, 2,000-ohm head set, loop aerial?

A. 1.—See diagram below.



WIRELESS TELEPHONE ARC.

(734.) JOHN UPTON, Delaware, inquires:

Q. 1.—In an arc used for wireless telephony, should the carbons be solid or cored?

A. 1.—They should be solid.

Q. 2.—What is the form of arc used by Poulson?

A. 2.—The positive electrode is hollow, of copper, and has cold water circulated through it, to cool it. The other electrode is a solid carbon. The arc is burned in a chamber, into which alcohol is dropped at the rate of one to two drops per second per K. W.

Q. 3.—What is the frequency per second of the oscillations obtained with the Poulson arc?

A. 3.—From 500,000 to 1,000,000 cycles.

CONNECTIONS.

(735.) WILLIAM MURPHY, New York City, writes:

Q. 1.—Please describe the best way to connect the following instruments: Electro Importing Co.'s double slide tuning coil, variable condenser, fixed condenser, U. W. Co.'s silicon detector, 1,050-ohm head phones.

A. 1.—See June, 1910, number, query No. 589.

Q. 2.—I am situated in a four-story house and the houses around me are six stories, and my aerial is not higher than the surrounding houses, does that interfere with my receiving radius?

A. 2.—The aerial should be as high, at least, as the six-story buildings to obtain good results.

Q. 3.—How far can I receive with aerial composed of 4 strands of aluminum wire, 16 feet high one end and 75 feet at the other, 200 feet long?

A. 3.—300 to 400 miles.

LIGHTNING DANGER.

(736.) H. X. M., New York, asks:

Q. 1.—If an aerial is struck by lightning and it is grounded on a water pipe, will it do any damage to the house?

A. 1.—No.

Q. 2.—Is a horizontal aerial composed of four wires, each a yard apart, better than a vertical aerial composed of the same number of wires a yard apart?

A. 2.—Yes.
Q. 3.—How far can a ½-inch spark coil send?
A. 3.—½ to 1 mile.

RECEIVING RADIUS.

(737.) C. E. TIPPING, Toronto, Ont., Can., inquires:

Q. 1.—How far ought I be able to receive from all Electro Importing Co.'s goods: Jr. tuner, 75-ohm receivers, 2 fixed condensers, silicon detector, and peroxide of lead detector, aerial pole 27 feet on the top of a house 23 feet high, 4 wires, 60 feet long, running down to a 12-foot pole?
A. 1.—80 to 105 miles.
Q. 2.—How far can I send with Electro Importing Co.'s 1¾ to 2-in. spark coil, on batteries, home-made helix, key and same aerial as above, receiving end, having fairly sensitive instruments?
A. 2.—5 to 8 miles.
Q. 3.—I have the aerial grounded to three 3-foot pipes, driven in the ground, by a No. 10 B. & S. R. C. wire; is this safe?
A. 3.—Yes.

DIAGRAM.

(738.) M. GRUBMAN, Louisiana, asks:

Q. 1.—Would you kindly show in MODERN ELECTRICS how to wire up a loose coupler receiving transformer, 2 variable condensers, 2 fixed condensers, 1 silicon detector, one molybdenite detector and a pair of 75-ohm receivers?
A. 1.—See diagram answer to query 427, Jan., 1910, No., and put 1 variable across the secondary.

ELECTROLYTIC INTERRUPTER ON BATTERIES.

(739.) ALBERT JENSEN, New York, inquires:

Q. 1.—Could a Gernsback electrolytic interrupter connected up to a two-inch spark coil, be operated with a storage battery? If so, how large a battery?
A. 1.—Yes; 40 volts at least or 20 cells.
Q. 2.—What is my sending range: 2-inch spark coil, helix wound with 10 turns of No. 8 copper wire, wound on a frame 10 inches in diameter and 12 inches high, glass plate condenser, telegraph key, brass ball, spark gap, run on 6-volt, 60-ampere hour storage battery, ground connection on city water pipe.
A. 2.—6 to 8 miles.

¼ K. W. CONDENSER.

(740.) EARL G. HENDERSON, Bellevue, Pa., writes:

Q. 1.—How many glass plates, 4 x 5 inches, coated with tinfoil measuring 3 x 4 inches on both sides, will it take to make up a condenser for a ¼ K. W. transformer?
A. 1.—33 plates in multiple.
Q. 2.—I wish to make a helix as described in the May issue of MODERN ELECTRICS. How many feet of No. 8 brass wire will be required for use with a ¼ K. W. transformer?
A. 2.—16 turns 8 in. in diameter and 1 in. apart.
Q. 3.—What would be my transmitting and receiving range with the following: Aerial, composed of 4 aluminum wires, spaced three feet apart, insulated with electrose insulators, and being seventy-five feet long, and 50 feet high at both ends?
Sending Key, ¼ K. W. transformer, zinc

gap, condensers and helix. The receiving set being composed of the following: Electro Importing Co.'s instruments; loose coupler, variable condenser, fixed condenser, electrolytic detector, 2,000-ohm phones, potentiometer and batteries?

A. 3.—Sending range 40 to 50 miles; receiving range, 300 to 400 miles.

TESLA COIL.

(741.) EDMUND KUSER, Pottstown, Pa., asks:

Q. 1.—In your next issue of MODERN ELECTRICS kindly give data for making a Tesla coil to be operated by a 2-in. spark coil.

A. 1.—See the September, 1908, issue of MODERN ELECTRICS, or March, 1909, issue.

2-INCH WIRELESS COIL.

(742). LOUIS BETZOLD, Palo Alto, Cal., says:

Q. 1.—Please advise me how to make a 2-in. spark coil, using No. 32 enameled wire on secondary, and size of core, sections, etc.? I have three pounds of No. 32 enameled wire.

A. 1.—Make the core of No. 22 soft iron wire; primary of 2 layers of No. 14 B. & S. D. C. C.; secondary of 3½-lb. No. 32 enameled wire, wound in 8 sections.

Q. 2.—What primary voltage must be used?

A. 2.—12 volts.

Q. 3.—What size condenser is necessary?

A. 3.—120 sheets tinfoil, 9 x 7 inches.

TUNING COIL.

(743.) M. FRITZLER, Herington, Kan., writes:

Q. 1.—I am making a tuning coil and winding it on a cardboard tube 6 inches long and 4½ inches in diameter with the size wire enclosed. Are the dimensions of the coil good or is the wire too small?

A. 1.—Very good.

Q. 2.—What good is a hot wire ammeter and how do you connect it up?

A. 2.—It shows the energy being radiated in amperes. Connect it in series with the aerial lead.

Q. 3.—In making an auto-coherer, is it necessary to have mercury in with the carbon grains?

A. 3.—No.

20 MILE COIL.

(744.) A. W. DEUSEN, Evanston, Ill., inquires:

Q. 1.—What is the smallest coil which can be used to send 20 miles under ordinary conditions, in connection with a helix wound with 15 feet of No. 0 copper wire, glass plate condenser, spark gap and key?

A. 1.—3-in. spark coil.

Q. 2.—Give dimensions of the coil required. Also dimensions of condenser for coil.

A. 2.—Core, 11¾ x 1¼ inches; primary, 2 layers No. 14 D. C. C. wire; secondary of 8 lb. No. 32 S. S. C. magnet wire, wound in 16 sections; condenser, 220 sheets tinfoil 9 x 9 inches; primary voltage, 16.

Q. 3.—How far could the above coil send at night over water?

A. 3.—35 to 40 miles.

WILL 110 VOLTS KILL?

(745.) C. COLBURN. Scottdale, Pa., writes:

Q. 1.—Please give the dimensions of a ½-

in. spark coil, and how far will it send?

A. 1.—Core, 6 in. x ½ in.; primary, 2 layers No. 19; secondary of 1 lb. No. 34 S. S. C. wire up to 1 mile.

Q. 2.—Will 110 volts A. C. kill?

A. 2.—Not usually, but there have been exceptional cases, where 110 volts A. C. has proved fatal.

Q. 3.—What instruments are needed to send and receive 75 to 100 miles?

A. 3.—To transmit: use an Electro Importing Co.'s ½ K. W. transformer coil, helix, condenser, spark gap and a 6-wire aerial, 75 feet high. Receiving same aerial, double slide loose coupler, fixed and variable condensers, electrolytic or perikon detector, and 2,000-ohm phones.

STATIC COIL.

(746.) C. C. Keller, New York City, asks:

Q. 1.—What is the receiving distance, in miles, of the following set: aerial 35 feet from the ground. Detectors, silicon, perikon and galena. Receiving condensers, double slide tuning coil, loose coupler made according to instructions in "How to Make Wireless Instruments." 80-ohm double pole receiver.

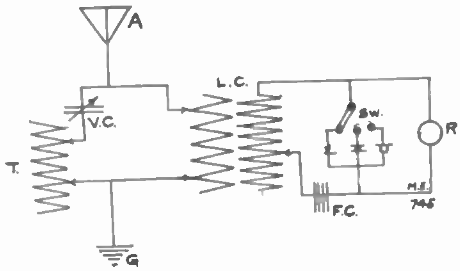
A. 1.—70 to 80 miles.

Q. 2.—Does using the tuning coil with the loose coupler make much difference?

A. 2.—Yes; properly connected it serves to cut out static.

Q. 3.—Please give diagram for best connection of the above.

A. 3.—Diagram below.



ZINCITE-BORNITE DETECTOR.

(747.) Geo. B. Curtis, Pittsford, Vt., writes:

Q. 1.—Will you please tell me how the zincite-bornite detector is made?

A. 1.—The zincite-bornite detector is made the same as a perikon detector, only the copper pyrites are replaced by the bornite.

Q. 2.—What henrys and farads are?

A. 2.—The henry is the unit of inductance, and is that inductance value existing, when, the current in a circuit changing at the rate of 1 ampere per second, induces in that circuit and E. M. F. of 1 volt.

The farad is the unit of capacity and is that capacity existing when one coulomb (1 ampere per second), is required to raise its potential from zero to 1 volt.

Q. 3.—How to calculate farads in the condenser?

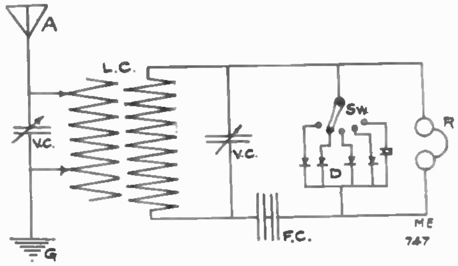
A. 3.—See the April number of Modern Electrics, where methods and formulæ are given.

DIAGRAM.

(748.) M. GRUBMANN, Louisiana, asks:

Q. 1.—Show me how to wire up a loose coupled receiving transformer, two variable condensers, two fixed condensers, four silicon detectors, one molybdenite detector, and two 75-ohm receivers?

A. 1.—Diagram given below.



SMALLEST BATTERY.

By A. C. Lescarboura.

PROCURE an empty copper cartridge. Though this article could be easily procured west of the Mississippi River, it is possible to obtain a blank cartridge shell here in the east. The shell is filled with water and a very few small crystals of copper sulphate (blue stone) placed on the bottom. A small piece of zinc wire or rod is suspended on top of solution. This battery is practically a modified gravity cell.

Considering the size of this cell, the average experimenter would not expect it to furnish a reasonably strong current. However, such a battery has recently been tested in Europe and the current from the cell sent through both the Atlantic cables which were connected at the American side. Thus the current from the cell had to travel to this end of the cable and return again through the other one. On placing a galvanometer in the circuit a deflection was obtained. About 6,000 *miles with such a cell and enough current left to deflect a galvanometer!* This statement should appeal to every one interested in electricity as a wonderful achievement.

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FOR SALE. Dynamo and motor combined. 10 volts, 2 amperes. Never been used. Will sell for $10. Apply to F. J. Morrow, The Johns Hopkins University, 4th floor, McCoy Hall, Baltimore, Md., U. S. A.

FOR SALE. Four secondary coils (½-in. spark), 50c. each. Also one 20-cell plunge battery. Complete in walnut case, new zincs. Price, $5.00. Will give 40 volts, 10 amperes. Also a 2-cell plunge battery, giving 4 volts, 40 amperes. Price, $1.50. L. W. Holbrook, Westford, Mass.

HIGH-GRADE WIRELESS RECEIVING OUTFIT for sale, good as new. Write for particulars. Wireless, Box 61, Stirling, N. J.

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A GREEN WRAPPER

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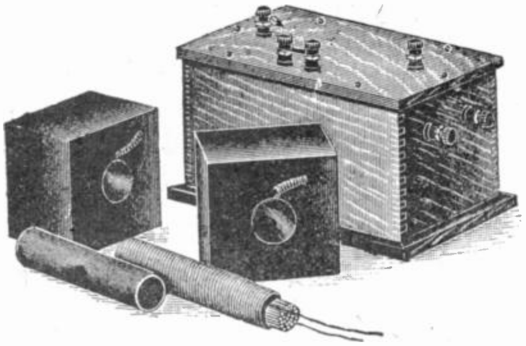

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Wireless Association of America

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." Beautiful solid gold button, $2.00.

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 to market 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.

SEND TO-DAY FOR FREE APPLICATION CARD

SPECIAL.—As seen above, the Association Button is sold for 20 cts. usually. Up to November 15th we will accept 15 cts., coin or stamps, for this beautiful button. This is a special offer, and will not be made again.

Up to October 1st, 1910, The Association Numbered **9015 Members** The Greatest Wireless Association in the World.

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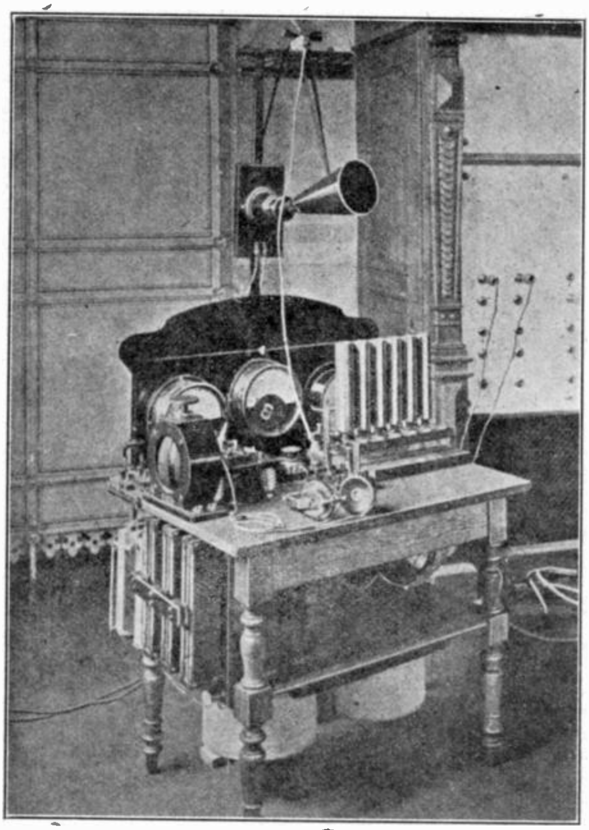

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It not alone describes the most important systems, but treats the subject from the experimenter's standpoint, in such a manner that even the less advanced student will have little trouble to clearly grasp the matter.

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This book is an absolute necessity to the rising wireless experimenter, who desires to keep abreast with the progress of the new art, that will within five years, revolutionnize telephone communication.

This book also contains direct ons for building small wireless telephone stations at a cost under five dollars for short distances up to one mile.

It had been our intention to sell this book for $1.00 on account of its great value, but we believe that the demand will be so great for Mr. Gernsback's book that the low price at which it is sold, will repay us in time.

As we expect several thousand orders, it will be wise to order at once, so you will not be delayed.

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WIRELESS ON CURTISS' DIRIGIBLE.

The Cleveland Wireless Institute, 2351 Woodhill avenue, has made an offer to Glenn Curtiss, who is to make a trip in his aeroplane between Euclid Beach and Cedar Point, through Secretary Charles H. Watkins, to equip the aeroplane with wireless telegraphy apparatus and to give the services of T. Z. Hall, wireless engineer and operator of the institute, for the trip.

YOUTH'S WIRELESS GETS VESSEL AID.

PORTLAND.—The steamer Roanoke of the North Pacific Steamship Company, bound to California ports, was disabled in the Columbia River, August 26, and is back in port. Owing to the thick smoke, Pilot Sullivan decided to anchor. After the engines stopped the stern swung in shore, breaking the rudder couplings. The wireless call flashed out was picked up by the apparatus of a boy in East Portland, who notified the port authorities and a tow boat was sent to the Roanoke's assistance.

WIRELESS TELEGRAPHY.

Wireless telegraphy has received the attention of the man who finds profit in providing mild excitement for others at a dime a thrill.

On a steamboat a uniformed officer carrying a package of numbered slips canvassed the passengers the other day. "Take a chance?" he asked each person whom he approached.

"What's the idea?" asked a New York man.

"Buy a number for 10 cents; if you get the right number you can send a wireless message free."

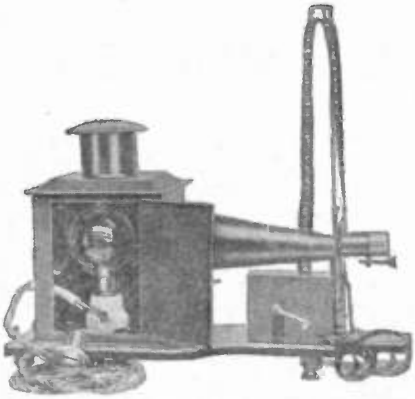
POSITIVE ELECTRIC IONS.

LONDON, Sept. 1.—At to-day's meeting of the British Association at Sheffield, Sir W. W. Thomson, the eminent Cambridge physicist, read a paper in which he suggested the probable discovery of positive ions of electricity.

With negative ions, usually called electrons, the scientific world was familiar, but practically nothing was known of positive ions, Sir W. W. Thomson said. He added that he could scarcely announce that he had discovered positive ions, but he gave the impression that he was within reach of that discovery.

Wireless Supplies and Electrical Novelties

CHICAGO AND WESTERN HEADQUARTERS



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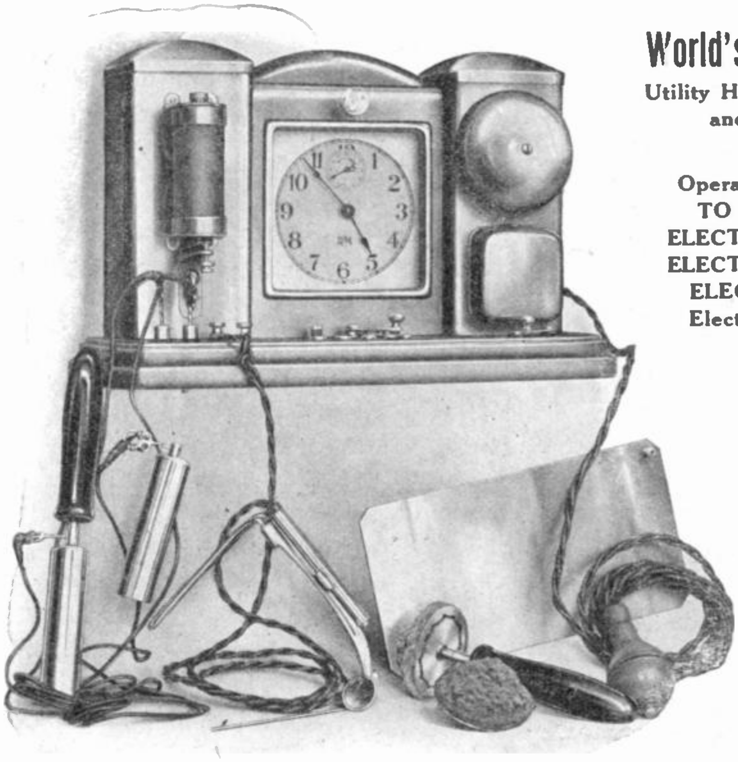

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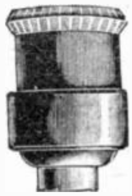

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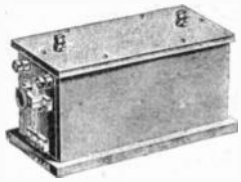

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This is our new potentiometer. There are several unique features incorporated in our new instrument which before all takes up a minimum of space being only 4 in. diameter, the thickness of the main body being only ⅜ in.

As in our No. 9250 straight potentiometer, we use in our new instrument a high resistance, carbon graphite rod and the resistance of this instrument is the same as that of our No. 9250, namely 300 ohms. Inasmuch as experience has taught us that for wireless use only about one hundred to two hundred ohms are generally used, we do not furnish extra rods with this new instrument as 300 ohms will cover all the wants of the operator and experimenter. The most important part is that the movement is rotary and not straight on a long rod, as used in our other instrument.

All the insulating parts of the instrument are made of moulded hard rubber which makes it the most attractive apparatus of this sort ever placed on the market. Size over all, 4 x 1½ in.; weight four ounces.

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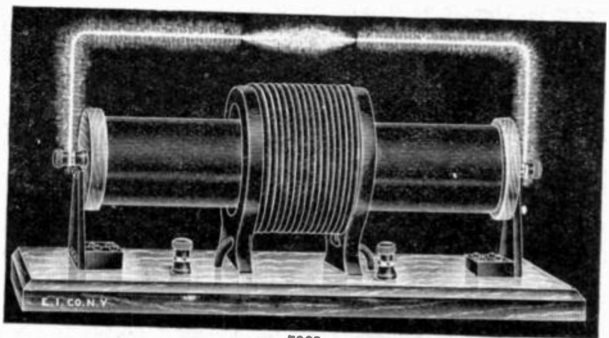

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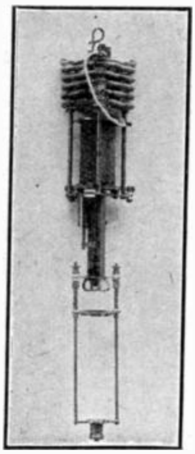

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