Special Wireless Number

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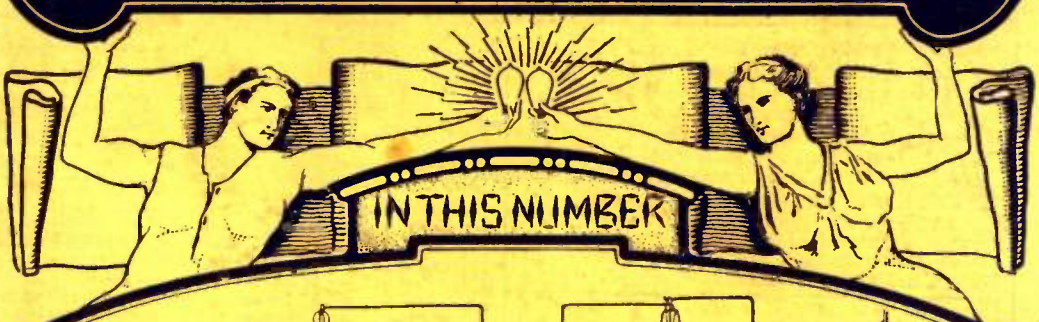

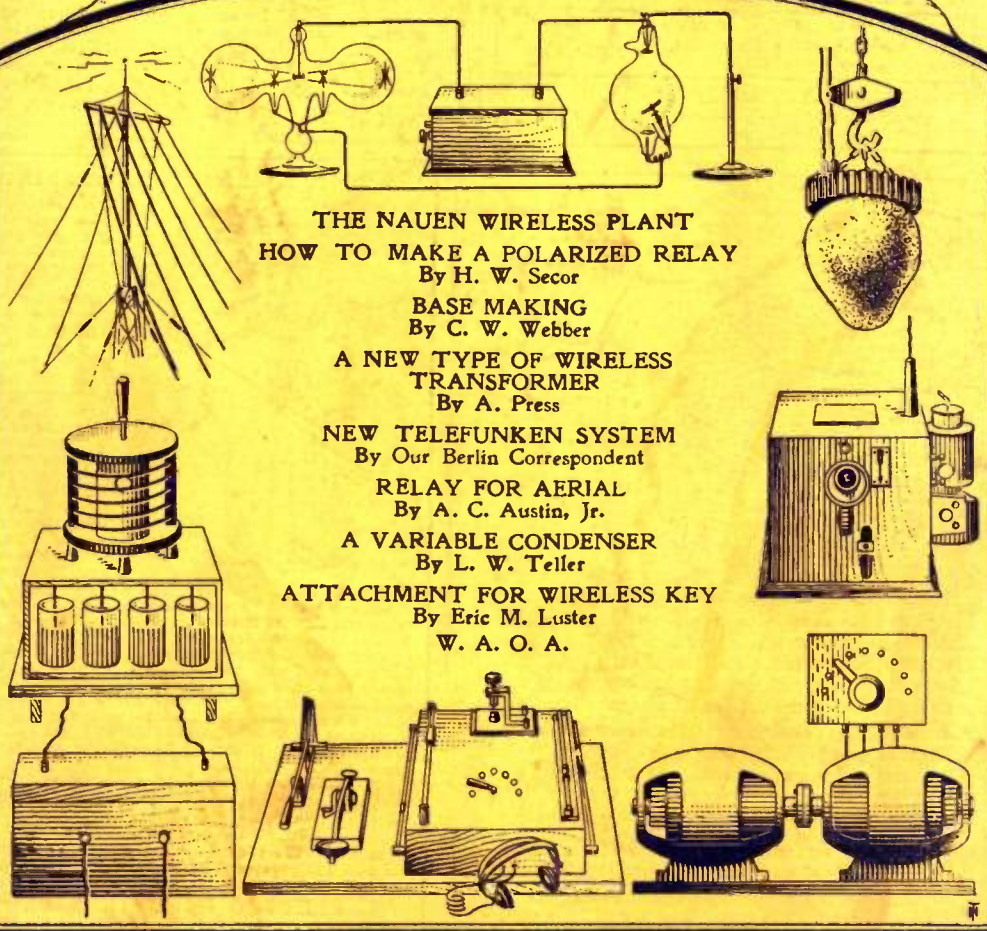

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

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MODERN ELECTRICS

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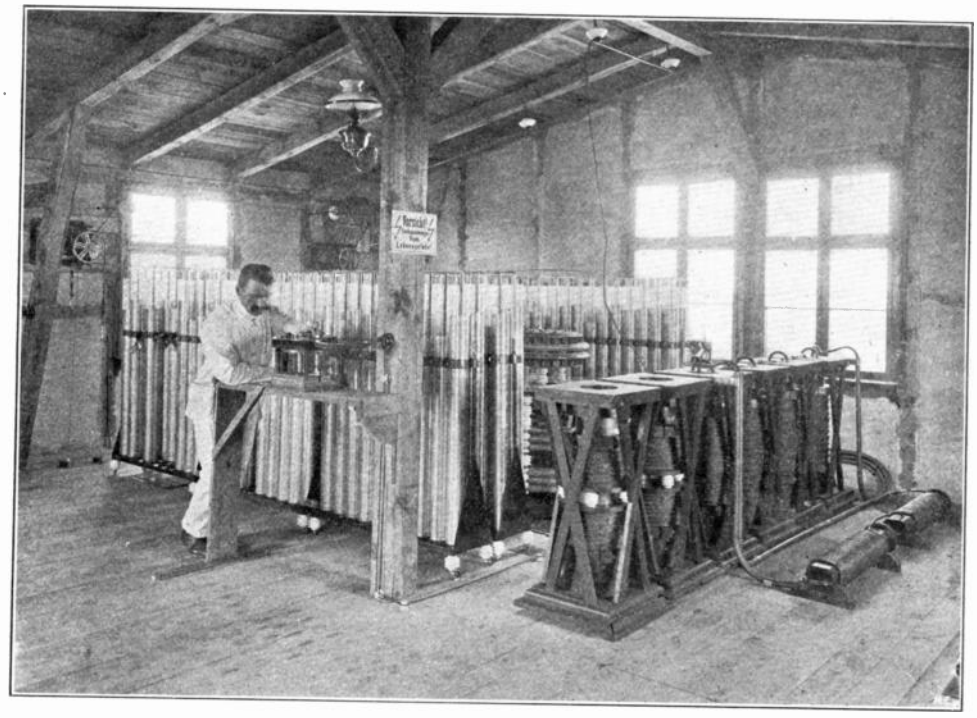
The Nauen Wireless Plant

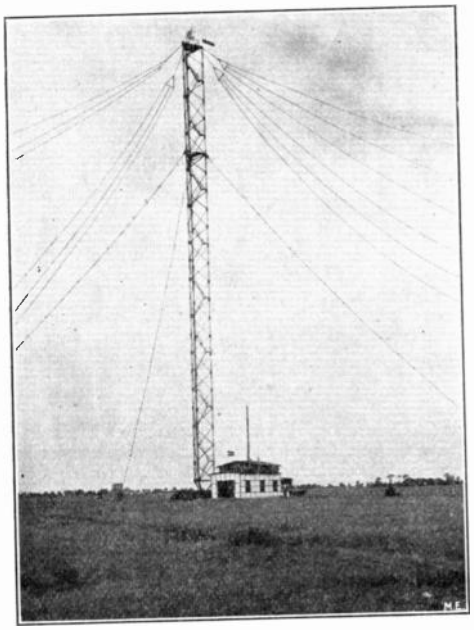


One of the largest of the wireless stations in Europe is the plant which is erected at Nauen, Germany, in the region of Berlin. As it lies in the open country it is very favorably situated, and nothing prevents the spreading of the wires to a considerable distance, and the umbrella form is hence adopted. The plant uses an iron tower 330 feet high and from the top of the tower the aerial wires are brought down to the ground, being equally spaced all around the tower and anchored at some distance from the base. For the tower there is used a triangular section having 13 feet on a side, and the structure is made up of three main vertical beams which are formed of a number of sections about 26 feet in length. The tower is built straight and thus has the same section over the whole height. It is kept in the upright position by a set of guys, and at the bottom the section is narrowed down so that the whole tower tapers to a small surface and at this point rests upon a ball and socket joint. This latter is formed of a cast steel sphere together with a foundation plate. To uphold the tower there is built a concrete foundation of some size. A set of smaller irons are used to brace the tower from top to bottom and thus give a solid and light structure.

The guys, three in number, are fixed to the tower at a height of 248 feet, and they are anchored at the ground in large cubical masses of masonary. To form the guys there are used a series of iron stays which are linked together so as to make the whole flexible. Care is taken to insulate the guys from the metallic mass of the tower and also from the anchoring pillar at the ground, on account of the high tension which is employed in this case. The tower itself serves as part of the aerial system, whence the need of a good insulation, especially as the tension

is represented by a spark of 3 feet length or more. A type of oil insulator is used at the top of the tower, one for each of the three guys. These insulators have been found to stand the high strain very well. At the stone pillars there is used another kind of insulating support. The appearance of the pillars, which lie at 660 feet from the tower, will be noticed to the left and in the rear of the station building, and they are provided with sloping roofs somewhat like a cabin. Owing to the great weight of the stone masses, they are able to support the heavy strain which is given by the tower, seeing that the latter is kept upright by the guys alone.

An iron staircase leads to the first platform where the guys are anchored, and



from there to the main platform near the top of the tower, or at 317 feet height. On top of the tower is a skeleton iron framing on which the aerial wires are supported. A set of pulleys which are worked from the platform serve to raise or lower the aerial wires. The antenna of the umbrella form is made in six general segments and is composed of phosphor bronze cables, using nine of these at the upper anchoring point for each of the six segments of the aerial. At one-quarter the length of the aerial, each of the cables branches out into two others in general, and we thus have a spreading of the antenna towards the bottom where there are 162 cables, giving a total surface of about 70,000 square yards for the whole of the aerial. For anchoring the cables at the bottom there are used channel beam supports driven into the ground, and the cables are attached and insulated by means of ropes and porcelain insulators. A set of cables passes down nside the tower in order to connect the top of the tower with the station building, but as the metallic mass of the tower itself is used as part of the aerial system, these cables are not insulated from the tower. For this purpose there are used 154 cables in all, which are mounted in sets of six and are held upon wood supports. At the bottom, all the cables are connected together and from this point a heavy cable leads into the station.

The conditions of building the tower were very favorable as regards the use of the ground connection, seeing that water is reached when at a depth of only six feet. Corresponding to the antenna there is a ground connection made by using a set of spreading wires. From the central point there are thus spread out 108 iron wires buried in the ground which are then increased by branching out after a certain distance, so as to make a total of 324 wires for the earth when at the outer part of the circle. The area which the whole set of ground wires covers is about 150,000 square yards, or somewhat over the area which is covered by the base of the antenna. From the middle point where the ground wires are brought together, there is a main cable which leads into the station building.

The appearance of the station will be observed here, and it is a 2-story building which covers about 1,200 square feet surface. Our engravings also show the different rooms of the plant. The engine room is placed on the ground floor, and has also a shed at one end of the building, while the upper floor contains the high tension apparatus. On the ground floor are also the telegraph room for sending and receiving the messages, as well as a sleeping room for the operators. The high tension apparatus is placed on the upper floor of the building in order to keep it separate as much as possible from the other parts of the plant, so that the sound of the sparks will not be heard to any great extent. Being removed from the ground, the high tension apparatus is kept dry at the same time.

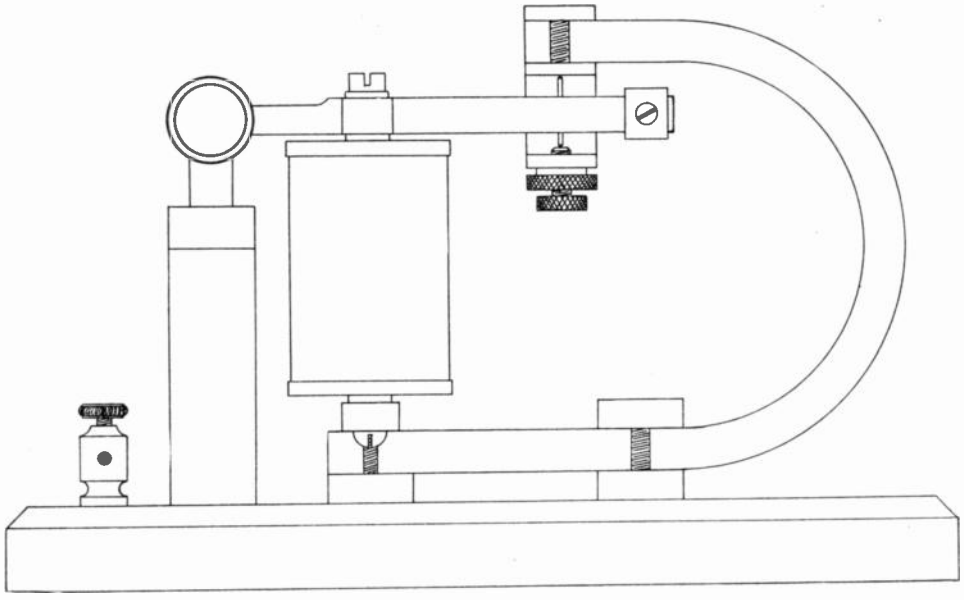
The alternator which gives the current for the plant is of 25 kilowatt size and is operated at 750 revolutions per minute, working at 50 cycles. The current from the machine is taken first into the adjoining telegraph room and from there it passes up into the high tension room on the floor above. On a switchboard in the telegraph room are mounted the different instruments for the circuit of the alternator. An automatic high tension safety cut-out is used to prevent any damage to the alternator which might come from the high tension circuits. Besides this there are mounted on the switchboard a voltmeter and ammeter, a frequency meter and a transmitting relay. From the switchboard the current passes to the high tension room. In the circuit are placed four choke coils which correspond to the four main induction coils of the high tension apparatus. In the view of the high tension room will be noticed the different parts of the apparatus, and in the foreground are the large induction coils which are used to charge the battery of Leyden jars. These latter consist of 360 cylindrical jars of long and narrow form which are contained in a supporting frame and are mounted upon porcelain insulators. With the jars is used a self-induction coil in the shape of a spiral of silver plated copper tube with the needed connections for the exciting circuit and also for the wires leading to the antenna and the ground. The high tension ends of the induction coils are connected to the battery of jars through a set of high tension choke coils. In order to operate the high tension circuits from the telegraph room on the ground floor, there is employed a transmitting relay of a special design. The operator controls the action of the relay by battery current which he sends from a Morse key which is mounted on the main table of the telegraph room. In this way he has full control of the high tension circuit in the second floor without having the high tension wires go below this part of the building. Such an arrangement has proved to work very well in practice, and the powerful high tension circuits can be very easily operated from a distance. Instead of using a break in the circuit in order to cut off the induction coil from the Leyden jar battery, as is the usual practice, it was found best when it came to handling such a large amount of power to use a method of short circuiting the primary end of the induction coils, and the jars are again charged by opening the short circuit.

A wave meter is used to show the length of the wave which is produced. By means of a special switch, we are able to shift from the transmitter to the receiver, so that both the aerial and the ground connection are transferred from one of these circuits to the other, this being carried out by the switch in a single movement. The current from the alternater is also cut off by a switch contact which is operated at the same time with the main contacts, so that no current can pass at the time the receiver is being used. One of the views shows the arrangement of the operators' table in the telegraph room. Messages are taken by the Morse register placed on the right and also by the telephone and electrolytic detector. The table contains also the apparatus for tuning the circuits with the condensers, etc.

It is estimated that within 5 years 25,000 wireless operators will be employed. Bear in mind that to be an operator who can command a high salary it is necessary to know more than the Morse code. The man who knows the philosophy and working of the apparatus is the one eagerly sought by wireless companies.

How to Make a Polarized Relay

By H. W. Secor.



—Fig. 4—

In the following article the writer will endeavor to explain how to make a polarized relay from a pair of electro-magnets and a permanent horseshoe magnet. The permanent magnet should be of about the dimensions of the one shown in Fig. 1. The size may vary, however, the alignment being made between the armature and pole pieces by iron blocking placed between the permanent magnet and the yoke D of the electo-magnets, if the permanent magnet is larger, or if smaller, the armature support may be placed on top of the permanent magnet. To make one magnet leg short, as shown, place in vise and strike a sharp blow with a hammer, which will snap the end off.

The electro-magnet is the next important part, claiming our attention. If the reader has a pair of about the size shown, they will do, but all dimensions are given for making them.

The yoke, cores and pole pieces should be made of soft wrought iron. The pole pieces have slots in them 7/16 inch long and wide enough to easily slip a 10-32 machine screw. The pole pieces are held in place on the core ends by 10-32 iron screws, threaded into the cores, and have an iron washer placed under their heads. The slots in the pole pieces allow them being set in any position.

The bobbin ends of the electro-magnet are made of hard rubber or fibre. Two layers of thin paper are placed around each magnet core, preparatory to winding.

The bobbins of the size shown are wound to a diameter of 1 3/8 inches; and the following gives the resistance for different sizes wire (wound in layers):

No. 40 B. & S. S. S. C. mag. wire—total res. equals 15,000 ohms.

No. 39 B. & S. S. S. C. mag. wire—total res. equals 10,000 ohms.

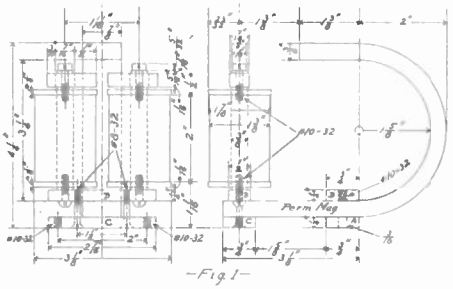
No. 38 B. & S. S. S. C. mag. wire—total res. equals 5,000 ohms.

No. 37 B. & S. S. S. C. mag. wire—total res. equals 3,750 ohms.

No. 34 B. & S. S. S. C. mag. wire—total res. equals 937 ohms.

The 5,000 ohm winding will be found suitable for most work. Two leads

should be brought out from each bobbin, direct to two binding posts, allowing any connections desired to be made. The electro-magnets are usually so connected, that when they are energized the pole pieces will be N. and S. and the coils in series, giving a maximum resistance.

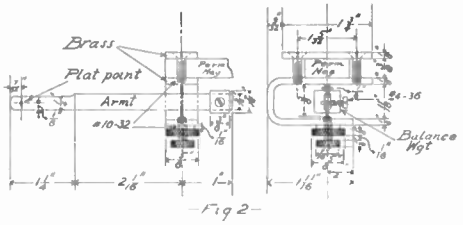


—Fig 1—

Referring to Fig. 1 the electro-magnet is clamped to the larger leg of the permanent magnet by means of the two 8-32 flat-head screws, threaded into the yoke D and passing through the brass piece C.

The relay is clamped to its base by means of four 10-32 screws, passing up through the base into piece C and up through brass piece A, into clamp B. A and B are about 1 1-2 inches long and drilled 1 1/8 inches on centers.

Fig. 2 shows the armature and its support. The armature itself is made out of 1/8 inch soft wrought iron. Its pivot may be an old balance wheel shaft out of a clock; the ends being pointed, or coned. The upper brass plate of the support is as shown, having two 10-32 flat-head brass screws passing through it into the lower U-shaped piece. The upper pivot bearing is coned out of the top side of the U-piece, while the lower one is coned out of the end of the adjusting

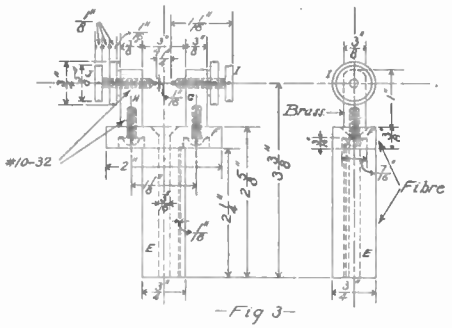


—Fig 2—

screw. The armature should have its weight balanced on either side of its pivot, which is accomplished by means of the soft iron balance weight which slides along the armature and is held in position desired by a 4-36 brass set screw. The contact point is made of 1/4 inch No. 14 platinum wire, passed through the end of the armature and soldered in place.

We now come to an important part of the instrument, viz, the contact and back adjustment screws, which regulate the play of the armature. Fig. 3 shows the vertical standard E and the cross piece F. Fibre may be used for this, although hard rubber gives a better appearance.

The small 1/16 inch hole shown dotted and leading down from contact screw pillar G is to pass the wire down through from this pillar to the base. The 3/16 inch hole in center of standard is for a 10-24 brass screw, which passes through the standard and base, clamping the standard in position by means of a nut under the base. All parts of the standard should be non-magnetic. The contact screw I is tipped with a piece of No. 14 platinum wire and the back screw J is tipped with a piece of No. 14 phosphor bronze wire. To facilitate precision of adjustment, the heads of the adjusting



—Fig 3—

screws I and J should each have 4 1/16 inch holes drilled 1/8 inch deep, 90 degrees apart, around their peripherys. A piece of phosphor bronze wire to fit the holes and 3 inches long serves as a lever which when held by its outer end allows of moving the adjusting screw as small as 1/10,000 of an inch with ease.

Fig. 4 gives a side view of the finished instrument. The base is made of mahogany 8 3/8 by 4 1/2 by 3/4 inches, with 4 rubber feet at the corners. The relay is fitted with 6 binding posts, giving 4 for the 4 magnet coil terminals and 2 for the local circuit. One of the latter leads up through the standard to the pillar G, supporting the contact screw I; the other leads to the frame of the relay.

The armature is set midway between the pole pieces by means of the adjusting screws I and J. The pole pieces are now moved up to within 1/32 inch of

(Continued on Page 229)

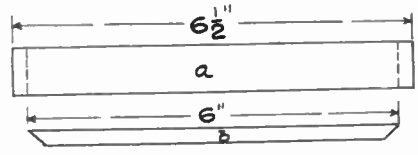
Base Making

By C. W. Webber.

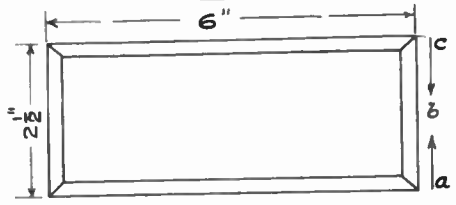
While this paper is headed "Base Making" it does not deal entirely with the making of bases, but rather with all instrument woodwork in general, taking the base as a typical example.

The author has noticed that writers, as a rule, say "Procure a base of the given dimensions," or else "Hard rubber should be used." While hard rubber is the best thing for base making, it is beyond the pocketbook of most amateurs, and even hard wood is expensive.

The writer in his search for an inexpensive material came across one which when used with a little care makes ex-



-FIG 1-



ME. -FIG 2-

cellent bases for light instruments, such as tuners, detectors, etc. This material is cigar-box wood.

Here many will doubtless find fault, but the author has used this wood on all his wireless instruments with great satisfaction and has received many compliments on the neat appearance this wood gives.

Cigar boxes can be obtained from almost any dealer for the asking, and some will even save them for you. Care should be taken in taking the box apart, the bottom being removed first.

This is best done by forcing the blade of a knife in the crack between the bottom and sides and forcing the wood apart a little where it is joined with a nail. Do not try to force it way off in one place, but move the knife to the next nail, forcing it up a little there, and so on around the edge. Then starting over again force the pieces entirely apart. The nails may be saved, as they will be useful sometime, although not used in making bases.

As a means of illustration, I will suppose that a base 6 inches long 2 1/2 inches wide and 3/4 inch thick is being made, it, of course, being understood that these dimensions may be varied at will.

One piece 6 1/4 inches long by 2 3/4 inches wide, 2 pieces 6 1/2 inches long by 3/4 inch wide, and 2 pieces 3 inches long by 3/4 inch wide are cut from the cigar-box wood, being sure that the grain runs the long way of the pieces.

If there is any paper on the wood it should be scraped off with a sharp knife and the 3/4 inch pieces clamped together and planed down smooth on the long edge. Now subtract the thickness of the wood (in most cases 1/8 inch) from 3/4 inch and lay off this width on one of the pieces and plane all down together to this width.

On each of the long pieces lay off 1/4 inch from each end, as Fig. 1a, where the 6 1/2 inch piece shown and by aid of a mitre-box cut the pieces off at 45 degrees on these lines so that they will appear as Fig. 1b (top view). Treat the 3-inch pieces in the same manner. Glue these pieces together in the form of a rectangle, as Fig. 2, and bind with wire or string.

The top piece 6 1/2 inches by 2 3/4 inches is now glued on and when dry planed down flush with the sides. Care should be taken in doing this. As is indicated in Fig. 2 start at "a," plane to "b" in the direction of the arrow; then starting at "c" plane to "b" in the direction of the other arrow. This is so as not to chip the top piece. Next plane both sides flush. Remember always plane the ends first. Bevel slightly by ruling two guide lines 1/8 inch from the edge, both on the top and sides, and planing between these lines at an angle. The base, when complete, will appear as shown in Fig. 3.

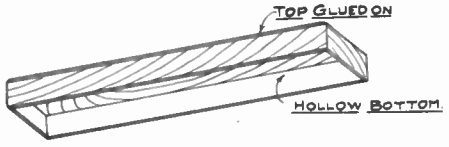
The work is then sand papered and given a coat or two of orange shellac, which aided by the dark color of the wood gives a very pleasing appearance.

This sort of base is light, but as nearly all amateurs screw their instruments to the bench this does not matter.

There are, however, several advantages, some of which are, that short screw binding parts may be used and these are often cheaper than ones with longer screws; that it is cheap, costing nothing, except for the glue and shellac; that condensers, etc., may be put into the bottom when there is lack of bench room; and that connecting is made easy as the wires may be run without cutting grooves.

Most amateurs have little money and plenty of time, and while it is true that solid bases do not cost much, if the amateur can get a base for nothing the money can go toward some instrument he can not make. But not only are there the above advantages, but the maker becomes more skilled in the use of tools, a thing valuable in itself.

Although the first base may not be a success, the second or third will be, and with a little practice they can be made in a very short time. If there are any cracks left after glueing they may be filled with a mixture of sawdust and glue before sandpapering. When all is done



-FIG 3-

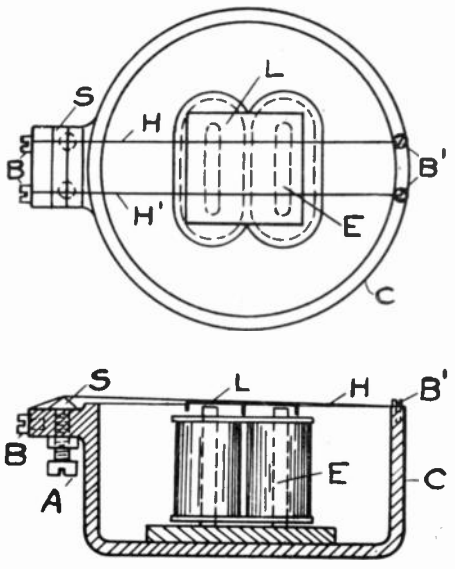
I think I am safe in saying that the amateur will be much pleased with this base.

MUSICAL WIRELESS RECEIVER

A Frenchman, Mr. H. Abraham, has devised a new sensitive telephone receiver which by far exceeds all others in sensitivity. It is furthermore very simple, in fact, any ordinary high grade receiver can be changed to the new type by any experimenter who is handy with tools.

There is no diaphragm to this receiver, but instead two thin steel wires, H andH, go across the electromagnets, E. The wires hold a sheet iron armature, L, somewhat of the shape as shown in illustration. This armature, which is, of course, extremely light, is shaped in such a manner as to hug the wire coils as closely as possible, without, however, touching them.

The steel wires are attached perma-



nently at B1. In order to raise or lower the wires, a set screw, A, is provided which raises or lowers a sharp cornered block S. By means of screws, B, the wires may be "tuned" the same as the strings of a piano.

As will be seen this suspension is very elastic, against the ordinary telephone diaphragm and it is therefore not surprising that the new instrument is incredibly sensitive to weak Herzian waves.

The most interesting part, however, is that the new receiver produces a pure musical note which may be varied through a wide range simply by changing the tension of the steel wires.

It will be seen immediately that the instrument is in a way a "tuner," as it is possible to "tune" the wires to such a degree that they will only respond to a transmitter having a certain frequency.

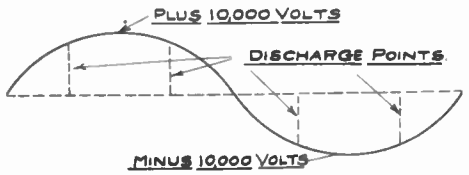
W. A. O. A.

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

A New Type of Wireless Transformer

By A. Press.

The energy supplied to the condenser in the resonant circuit which includes the spark gap in a wireless sending equipment, is the energy that is transformed to radiate ether waves emanating from

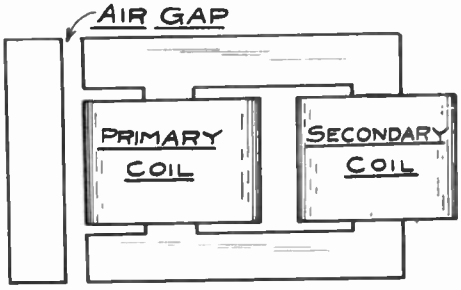


-FIG. 1-

the antenna. The potential—of the order of 10,000 volts—which causes the condenser to be charged, alternates in value from plus 10,000 volts to minus 10,000 volts. The discharge of the condenser takes place through the spark gap and the oscillation transformer or autotransformer. However, as the voltage rises from zero to 10,000 volts, the condenser may discharge and since the voltage is still very close to 10,000 volts maximum it will ordinarily have time to discharge again. The same kind of discharge, but in the opposite sense will occur when the voltage is rising from zero volts and is approaching minus 10,000 volts or the minimum potential. There would then be four (4) discharges per complete cycle of the normal frequency of the main circuit, Fig. 1.

Should it be possible to get more frequent discharges per complete period of the change of potential of the secondary circuit then more and more energy will be transformed into ether waves by way of the antenna. Now, in wireless working the more frequent the discharges in the spark gap the less capacity will actually be required for the same power station. Thus cool spark terminals and an avoidance of arcing increases the frequency of discharge and in consequence the efficiency of the wireless plant.

A condenser ordinarily of .0265 microfarads capacity at 10,000 volts will take from the line at 60 cycles frequency about one kilowatt of energy. However, every half cycle it returns the same energy to the line and is thus rated in 'Apparent Kilowatts' instead of real kilowatts. When, however, the condenser is discharged as in wireless working through the oscillation transformer in series with the spark gap, at least four times per cycle, then four times the ordinary energy of the condensers is taken from the line and delivered to the antenna. Thus a greater and greater charging current is drawn from the line as the greater frequency of discharge takes place. This charging current is said to be a 'leading' current because the instantaneous values of the current do not correspond to the proportionate instantaneous values of the voltage supplying the charging current, but are always larger than the proportionate values of the supplying voltage. It is for this reason that the energy taken to charge is given back to the line every half cycle. However, in order to force the current values of the charging current to correspond from moment to moment with the proportionate line voltage values it is necessary to always supply a 'lagging' current to the



-FIG 2-

same circuit. This is done by means of a reactance. Wherever there is a 'lagging' current of itself the reactance draws energy from the line, but at every half cycle it returns the same to the line. The current values are always *smaller* than should be the case to correspond to the instantaneous line voltage for the same moment, were direct current involved. In the ideal type of wireless transformer the adjustment for leading

currents by means of lagging currents to compensate and give the true or real current can be made to any degree or precision. By properly adjusting the lagging and leading currents the instantaneous values of the current are made to correspond with the proportionate values of the voltage as in direct current circuits. When this is the case there is no apparent energy taken from the line; whatever energy is drawn from the line is not returned, but is delivered to the antenna for radiation. In this manner there is no crippling of the capacity from lack of proper reactance as is always the case when only taps are provided.

In the diagrammatic view shown in Fig. 2, a method adopted by the Transformer Specialty Co. permits of accurate adjusting of the corresponding reactance by varying the size of the air gap shown. In this way nothing need be sacrificed whether in the tuning of the resonant circuit, or, for sake of tuning limiting in any way the capacity of the sending station.

BELIEVE MARCONI HAS A GREAT INVENTION.

Paris.—According to the Paris papers Marconi has invented an apparatus which he calls the "Telephonotypographe," by means of which words spoken through a wireless telephone are transmitted in writing at the receiving station.

The Parisian scientists are greatly interested in the report of this invention, which not only is regarded as feasible, but has long been expected.

Marconi has made no public statement yet, but is said to have admitted privately that the invention is practically completed and entirely successful. He promises a public announcement next week.

It is reported that he has been able to transmit spoken words by his invention over a considerable distance. The receiving instrument takes the message without the aid of an operator.—*N. Y. World*

AMATEURS NOT TO BLAME THIS TIME.

Seattle.—Interruption to the United States Signal Corps system in Alaska by the wireless apparatus of merchant vessels in the Nome fleet was responsible for a large amount of the delay in transmitting cable dispatches from Seattle to Nome. The vessels kept up their intercommunication at all hours, and while this was in progress the Signal Corps plant was powerless to send massages from St. Michael to Nome. Most of the messages sent over the government lines are in cipher and cannot be taken correctly when there are interruptions.

The United States Signal Corps system between Seattle and Alaska is part submarine cable, part land wires, and part wireless. The last was used from St. Michael to Nome.

WIRELESS DIRIGIBLE TORPEDO.

M. Gustave Gabet, the engineer who has built a dirigible torpedo, made a first test of his extraordinary invention in the Seine at Paris the other day. The test was wonderfully successful. This new rotary automatic torpedo is in shape like a submarine. It is nearly ten yards long. At the top of it is a long cylindrical floater with two small masts and two acetylene lamps. The torpedo is divided into compartments, the front division being of 1,980 lbs. of dynamite. This charge is enormous when it is remembered that the present type of torpedo contains only from 130 pounds to 190 pounds. In another compartment is the 200 horse-power motors, accumulators and steering apparatus. M. Gabet hopes that his machine will reach a speed of twenty knots. When the torpedo was placed in the river Mr. Gabet entered a small motor-boat about seventy yards away. In this boat was fitted the wireless apparatus. Amid great enthusiasm from the large crowds on the banks M. Gabet set his wireless directing machinery at work. The propeller of the torpedo at once began to revolve, and for several minutes the torpedo, under the mysterious influence of the electric waves from the machinery in the motor-boat, moved to and fro, to right and left, according to the desire of its inventor. M. Gabet believes that he will be able to direct a torpedo from a distance of eight miles. He could thus remain on land with his wireless apparatus and direct the machine far out at sea. The cost of the torpedo is about $15,000.

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EDITORIALS.

We wish to call particular attention to the new rules adopted, beginning with this issue, in both the Wireless Telegraph and Laboratory Contest, also in connection with THE ORACLE.

It is necessary that the new rules are closely adhered to, else we cannot publish descriptions of stations nor will THE ORACLE answer the questions.

We are naturally anxious to show off all photographs appearing in both contest to as great an advantage as possible, as it is in the interest of every reader to see from the photograph itself how the instruments are made, mode of connection, and other details.

A mistaken idea seems to prevail among some contestants who imagine that we reproduce photographs for *their* special benefit. This is, of course, entirely wrong, as the photographs are only reproduced in order to show other readers how and with which instruments the best results are brought about. When a reader, who as yet has no station, contemplates erecting one, the various photographs published in the contest should be of material assistance to him, as he can easily form an opinion from such study, how to go about it to build his station.

We therefore ask prospective contestants to be very particular to send in nothing but *sharp and clear* prints which should show every detail of the apparatus and instruments. Such a photograph has a much better chance to win the prize than a "hazy" one.

It may be necessary to make two or three exposures before a good picture is obtained, but your efforts will be amply repaid by seeing a good reproduction of your station in the contest and you do not have to feel ashamed when comparing it with the other successful contestants.

A word of advice as to prints: Never send in a print made with "Velox" paper. Use a Solio type which always gives better details and lends itself better for reproduction.

Don't get impatient when you don't see your photograph in the monthly contest for one or two months after you sent it in. All photographs are examined as soon as received and returned immediately when found too poor for reproduction. We constantly have from 10 to 20 photographs on hand and despite the fact that more are entered each month, we have not sufficient space to reproduce them all. Therefore don't grow impatient—your turn will come.

Concerning THE ORACLE, we are in despair. We have constantly from 300 to 400 letters on hand and confess that we find it impossible to either publish or answer them by mail. They pour in on us with such rapidity that we would

need 20 stenographers and a very large technical staff to do all the inquiries justice.

If most contestants would only take the trouble to read through some back issues, it would be found unnecessary to write to THE ORACLE, as a great deal of information can be found in each issue.

The trouble seems to be in the fact that 80 per cent. of the correspondents write the simplest questions—which they could easily answer themselves—with no other object in mind than to see their name in print.

This naturally only keeps back the one who is really looking for information, as we do our best to have each take his turn.

We cannot but appeal most earnestly to correspondents to refrain from asking questions unless information is really needed and cannot be obtained readily by other means.

THE NEW TELEFUNKEN SYSTEM.

BY OUR BERLIN CORRESPONDENT.

As reported in a short note in the June issue, Messrs. Slaby and Arco, the chief engineers of the Telefunken Wireless Telegraph Co., have, after several years' experimentation, developed an entirely new system of wireless telegraphy and telephony which bids fair to revolutionize the present systems.

The main feature of the system is based on the discovery of the "quenched" spark, made several years ago by a German, but little attention was paid to this invention. It had been demonstrated that when the quenched spark was used, the oscillations instantly damp out the primary spark, Fig. 1, and therefore excite the free oscillations in the secondary circuit. This phenomenon is known in German as "Stosserregung," meaning exciting by shock. In consequence of this rapid damping it is possible to employ an alternator having a frequency of 1,000 to 2,000 to create a corresponding number of primary discharge sparks per second, without producing any true arc discharge. The rapid cooling of the discharge surfaces entirely prevents it. The rapid succession of highly damped primary sparks creates then an equally rapid succession of very feebly damped trains of oscillations in the secondary circuit having a very large mean-square value, and therefore possessing many of the properties of undamped oscillations generated without any true-arc effect.

The new spark gap to produce the "quenched" spark consists of 12 circular flanged plates of copper, 5 inches in diameter, the surfaces being turned true and having a groove in them. (Fig. 3.) A mica ring is interposed between each

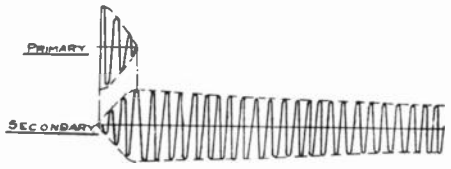


Fig. 1.
Quenched Spark.

pair of copper plates of such size that the mica half covers each groove. This groove is necessary, for without it the discharge spark tends to take place always at the edge of the mica. The mica is of such thickness as to make an air space of not greater than 0.01 inch between the flat copper surfaces. In this discharger there are, therefore, 11 air-gaps, each about 0.01 inch wide and of circular section.

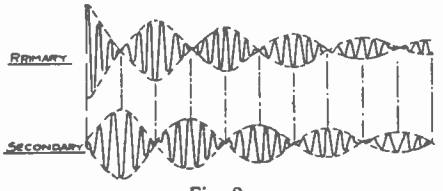


Fig. 2.
Ordinary Spark.

From reports obtained remarkable results have been obtained with the new system. During the preliminary tests upon the completion of the twenty-kilowatt station at Pola on the Adriatic, which is one of three similar stations now being built for the Austrian Government, it was found that the signals were so strong at both the Norddeich (on the

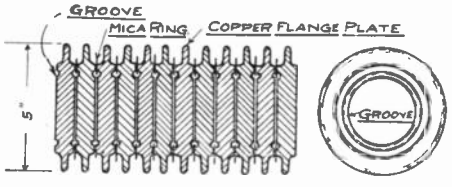


Fig. 3.

North Sea coast) and the Copenhagen station that perfect coherer reception—i. e., signals printed on tape—was possible at both stations. It was also possible to copy everything in Berlin with an ordinary portable set with a twenty-five-me-

(Continued on Page 211.)

Wireless Association of America

Wireless Registry

This department has been started with the idea to bring the wireless amateur in closer touch with commercial land and ship stations. Each month a list of new members will be printed here and once each year an official BLUE BOOK will be issued by MODERN ELECTRICS giving a list of all the members who registered during the year. Each member will receive the Official Blue Book free of charge. The Blue Book will also contain a complete list of commercial and government stations, their call letters, wave length, etc.

To register a station requires: Total length of aerial (from top to spark balls), spark length, call letter, (if none isin existance M. E. will oppoint one) name and address of owner.

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

NAME AND ADDRESS OF OWNER.	CALL LETTER	APPROXIMATE WAVE LENGTH IN METERS.	SPARK LENGTH OF INDUCTION COIL.	
J. G. McCollom, S. Lake City, Utah,	J.G.M.	90	2	ins.
Seward Scharff, Hasbr'k Hts., N. J.,	S.F.M.	65	2	"
Albert Street, E. Haven, Conn.,	A.S.T.	75	2	"
F. Hoerning, Produce Ex., N. Y.,	F.H.M.	400	2½	"
William H. Dodd, Baltimore, Md.,	W.D.M	120	1	"
Harry R. Cheatham, Somerville, Mass.,	B.S.M.	400	1	K. W.
Robert J. Hartshorn, Somerville, Mass.,	B.I.M.	300	½	K. W.
R. A. Sherwood, Auburn, N. Y.	R. A. S.	104	1½	K. W.
B. E. Bassett, New Britain, Conn.,	B.E.B.	100	1	ins.
A. Bockman, Weehawken, N. J.,	A.B.M.	140	2	"
Leslie L. Cate, Fitchburg, Mass.,	L.L.M.	250	¾	"
Robert Watmer, Butte, Mont.,	W. 2	140	½	K. W.
Harrison M. Lang, West Orange, N. J.,	H.L.M.	300	2	ins.
Percy H. Lattime, Medford, Mass.,	L.S.M.	40	2	"
Henry A. Olson, Oakland, Cal.,	H.A.O.	135	1	"
R. B. Searle, New Britain, Conn.,	O.E.B.	100	1	"
Karr Parker, Karthage, Ill.,	K.K.M.	136	¼	K. W.
Roy M. Percy, San Francisco, Cal.,	R.P.M.	100	½	K. W.
Clifford Doudna, Dayton, Ohio,	C.I.D.	170	¼	K. W.
Louis Kuhn, Woodbridge, N. J.	W.W.S.	73	1	ins.
Carl Chupp, E. Lithonia, Ga.,	C.C.M.	135	¼	K. W.
Stanley Manning, Irvington, N. Y.,	J.D.M.	270	1	ins.
A. B. Cole, Montclair, N. J.,	M.A.C.	120	4	"
Geo. T. Strode, Los Angeles, Cal.,	T.S.M.	175	1	"

NOTE: Parties having registered after May 1st are not entitled to the present Blue Book, but to the one to be published May, 1910.

Airship Run By Wireless

As a result of a successful test before representatives of a European Government, in which he sent a small dirigible balloon controlled by wireless electricity out over the ocean near Sandy Hook, a distance of a mile and a quarter, directing the movements of the balloon by means of an ordinary keyboard on the beach, Mark O. Anthony, an electrical engineer, is preparing to go abroad to conduct further trials before officials of one or more foreign governments. He has begun the building of a larger model for the European tests.

Mr. Anthony's test was made when a stiff breeze was blowing. Despite this the little dirigible, with its large propeller, was at all times under the control of the operator on shore, and made good headway. Witnesses said it seemed to be steadier, and to travel faster than larger craft with a pilot on board. It circled about and ascended and descended at the will of the operator. The little balloon carried the weight of 7,000 feet of small cord, which was reeled off from the shore for the purpose of hauling the machine back in case anything went wrong with the apparatus.

Mr. Anthony says his apparatus is for use in the life-saving service. The object is to send a small line out to a ship in distress with which the a ship in distress with which heavier cables can be hauled out from the shore.

Paris Letter

PARIS-AMERICA WIRELESS A FACT.

In our last issue we stated that connection had been made by wireless between the Eiffel Tower and the Glace Bay station in Canada. We since then made a visit to the military wireless headquarters in order to confirm this news, and found that it was true, that the Tower station could take the messages which were being sent from the Canada plant to Ireland. However, there is no official connection made between the Paris station and the Marconi station above mentioned, and it is only by accident that the Tower plant received the messages sent from Canada. As the Paris plant is used strictly for military purposes, it does not make connection with wireless posts in other countries, outside of the African colonies.

45,000 WORDS PER HOUR.

The recent trials which were made with the Pollak-Virag high speed telegraph between Budapest and Pressburg, a distance of 135 miles, and using a line of 1,360 ohm resistance, showed a speed of 45,000 words an hour. Later on, the apparatus was tested between Berlin and Koenigsberg, a distance of 430 miles, and the results were very good. In five minutes there could be sent 2,800 distinctly recorded words.

NEW BATTERY.

A new primary battery recently brought out on the Continent has the negative electrode made of zinc placed in a porous vessel, using as the liquid in this vessel a solution of one part of caustic soda and two parts water. The positive electrode lies on the outside, and is formed of a carbon cylinder, using as a depolarizing liquid a solution of three parts of chromic acid in ten parts of water. A better liquid is obtained by using 150 parts by weight of chromic acid, 300 parts of a 3 per cent. solution of hydroxyl and 150 parts of hydrochloric acid. The battery is said to be very constant and gives a high voltage, and at the same time the internal resistance is low.

WIRELESS TORPEDO.

After the experiments made in the Seine at Chalon with his new wave controlled torpedo, M. Gabet is continuing his trials with this apparatus upon the Seine in the suburbs of Paris. He operates it in the water, and also installs it on shore in order that the working of the different parts, which would otherwise be invisible, can be observed. Mounted a few feet above the main torpedo is a cylinder of smaller diameter, and about the same length, which contains the greater part of the electrical devices. The torpedo is equipped with a 40 horse power gasoline motor. The vertical and horizontal rudders, the helix, etc., are all operated by wave control, using a station which is mounted upon a gasoline launch. Two bamboo poles serve to hold the aerial wires. On the torpedo the aerial is formed of a horizontal wire stretched between two poles which project a few feet above the water. He uses a pair of signal lights mounted on the same poles and below the aerial. When the electric lamps light up, this indicates that the desired effect has been produced. Such signals can be seen from the controlling station.

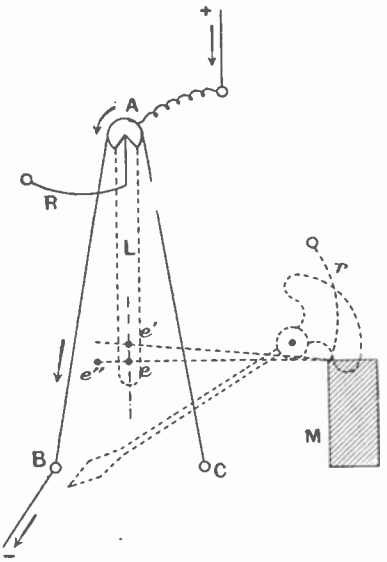
NEW FRENCH WIRELESS LAW.

In France the Government already has the monopoly of all wireless operations, but as the measures which had been taken in this regard were not sufficient, it was decided to adopt some new regulations. The State Wireless Commission, which includes the chiefs of the different departments, is engaged in drawing up a bill to this effect. The legislation which secures the monopoly to the State for all exchange of signals was drawn up many years ago and was designed to apply to the telegraph and telephone, before the days of wireless. It is not sufficient for the control of this latter, and for instance private parties can now set up wireless plants on vessels or on shore, on condition that these are not operated, but this latter would often be difficult to prove. The commission has therefore made additional rules, the principal one of these being that no wireless or aerophone posts can be set up or used for

signals upon French territory or vessels except where authorized by the State, and the penalties for this are provided. While waiting for the judgment, the apparatus will be confiscated. Plants installed upon home or foreign vessels which are situated in French waters are not to be operated unless they do not disturb the messages which are being sent by the Government posts. Penalties are also provided for intercepting wireless messages.

NEW HOT WIRE METERS.

The new hot-wire voltmeters and ammeters brought out by the Carpentier firms of Paris have the following arrangement: The influence of temperature is compensated by a wire which is equal to the expansion wire, but the current does not pass in it. We have the two fine wires AB and AC attached at B and C to fixed points. The current enters the wire AB at A and leaves it at B, while the part AC has no current. The wire runs around a small pulley at A but cannot slide upon it. A spring R acts to keep the two wires always stretched, as the pulley can slide up and down. When there is a change of temperature of the air, both wires AB and AC may lengthen, but as the expansion is the same for each, the spring gives the pulley an upward movement. A lever L carried on the pulley is displaced upward from e to e', but is not rotated. When a current is sent in AB it expands while AC remains as before, so that the pulley is turned about its axis. The lever L is displaced from e to e" and as it is attached to the needle as seen at M, this latter will move over the graduated dial.



WIRLESS WAVES CAN BE SEEN

An instrument has been brought out by a Paris scientist, M. Abraham, by which the wave forms of the electric current are made visible, somewhat as in the oscillograph, but in this case the waves are projected upon a screen and are from one to two feet in height, so that they are more readily observed. He uses a simple device consisting of a galvanometer in which the current is used to produce the swing of a mirror. The beam from the galvanometer is then sent upon a device consisting of a revolving prism and a set of fixed mirrors in such way that the beam which had a horizontal swing is also spread out in the vertical sense, and the combined action causes the wave form of the current to appear on the screen.

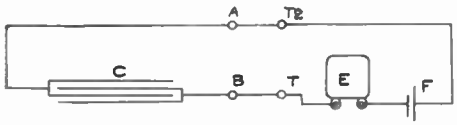
CAN SIGN CHECK BY WIRELESS.

Writing can be transmitted by wireless, according to the new method which is used by two young military telegraphers, Messrs. De Mailly-Chalon and L. Chantelot. In this way the messages are kept secret, seeing that the waves sent out from the apparatus will be unintelligible. To carry this out they use cylinders resembling phonograph cylinders at each post which are driven at practically the same speed by clock work, and the transmitting cylinder is covered with tinfoil having the writing upon it in insulating ink. A metal point bears on the tinfoil and when the point passes over the insulated parts, the waves sent out from the post will be interrupted. At the receiving end, every time there is a stopping of the waves, a pen or pencil is brought to bear ppon paper wrapped about the second cylinder, by means of an electro-magnet. In this way the writing can be received. Accidental waves will also be registered, but these do not appear to interfere to any extent with the writing.

Method of Testing Short Circuited Condensers

By I. Wolff.

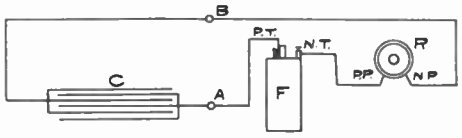
No doubt all wireless experimenters have many troubles with their coils, which is most of the times due to a pierced condenser which has been overcharged with an enormous amount of current, and sometimes due to a prolonged magnetization of the primary core. When the trouble is due to the condenser the following methods can be applied of testing the condenser to see whether it is short circuited or not: The writer would also advise the readers to apply this method not only for testing the primary condenser of an induction coil, but to every other condenser such as may be used either for the transmission or the receiving of the electrical waves. The first method, or the simplest, is by means of a buzzer; the second method is by means of a telephone receiver, since not every wireless experimenter possesses a buzzer, but most every one having a wireless station possesses a telephone receiver.



A+B-Condenser Terminals
T+T2-Buzzer & Battery Circuit Terminals
C-Condenser E-Buzzer F-Battery
M.E.
-Fig. 1-

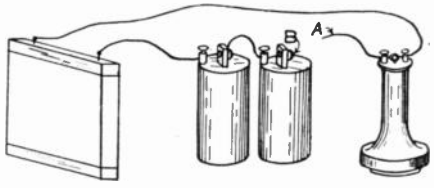
If you are in doubt as to whether any condenser is short circuited you can readily determine by taking the buzzer and connecting it to a dry cell in manner shown in Fig. 1; that is, connect the buzzer to one side of the cell and touch the other two terminals, T and T2, to the condenser terminals, A and B. If the condenser is short circuited the buzzer will operate, otherwise it will not.

The second method of testing a condenser which is very useful at every station when you may not be in the possession of a buzzer is as seen in Fig. 2. By connecting a dry cell to one side of the condenser in series with a telephone receiver. P. T. is the positive terminal of the dry cell connected to one terminal of the condenser C to A, terminal B of the condenser is now connected to the T.R. at its N.P. P.P. which is connected to N.T. of the dry cell. Hence making a complete flow of current which can be detected in the receiver should the condenser be short circuited.



A+B-Condenser Terminals
C-Condenser F-Battery R-Receiver
M.E.
-Fig. 2-

Fig. 3 shows the connection of the receiver to the condenser with the battery circuit before closing or before making the complete circuit. Now, when you connect A to B, as in Fig. 3, you will hear a "click." Then break the connection and make and break it rapidly several times in succession. If your condenser is good the only loud "click" you will hear in the receiver will be when you first make the contact. This is due to electricity flowing into the condenser to charge it to the same difference of potential as exists between the terminals of the battery. Once it is charged, if good, only an unappreciable current, due to what is sometimes called a "soaking in" effect, will flow when contact is subsequently made, completing the circuit.



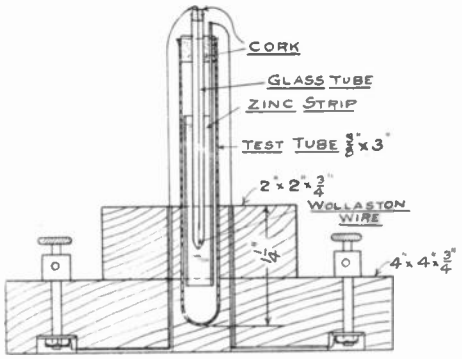
-Fig. 3-
M.E.

If the condenser is poor or short circuited you will hear a succession of loud clicks, one occurring every time the circuit is made due to a direct flow of current through the condenser, which in this event takes place in the same way as through any other closed metallic circuit.

A Novel Detector

BY D. C. SPOONER.

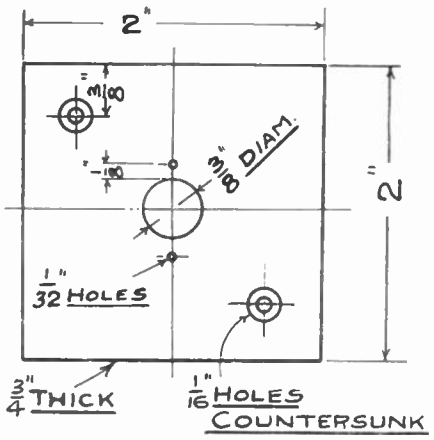
This detector generates its own current by the use of a piece of zinc in the electrolyte, the zinc and the platinum together with the acid forming a small cell.



M.E. -FIG 1-

CONSTRUCTION.

Out of three-quarter-inch wood saw two pieces, one two by two, the other four by four inches. Into the small block drill and countersink two one-sixteenth-inch holes in the position shown in Fig. 2; now place the small block in the center of the large one, so that a one-inch margin exists all around, and secure

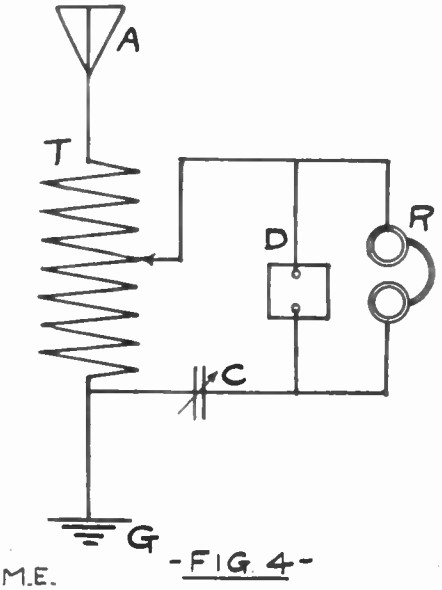


M.E. -FIG. 2-

both in this position with one-inch screws. Drill through the middle of the small block down into the large one for one and one-quarter inches; now get a three by three-eighths-inch test tube and insert it in the hole.

Next obtain a piece of Wollaston wire about one-half inch long and solder it to a number thirty-six copper wire; put these into a thermometer tube and draw out in a flame so as to seal the Wollaston wire in the tube; break the tube at its thinnest point and rub it on an oil-stone until the wire and glass are flush. Cut a piece of sheet zinc in shape shown in Fig. 3 and bend the wide part so it will fit in the test tube.

With an iron wire burn two holes in a cork to fit test tube, one in the middle and the other to one side so that the thermometer tube will fit into the central one and the thin leg of the zinc strip into the other.



M.E. -FIG 4-

Drill two holes through both pieces of wood one-eighth of an inch on each side of the test tube. Solder a piece of fine wire to the zinc and lead it and the wire from the thermometer tube down through the holes through chiseled grooves in base to binding posts.

The solution for use in the test tube is water, four parts; sulphuric acid, one. As some gas is developed a small needle hole should be put in the cork and the liquid kept about one inch from the top of tube; the liquid should be changed about once a week.

To connect this detector the same diagrams as for other detectors can be used with the exception that the potentiometer and battery are to be left out and the circuit closed in their places, as shown in Fig. 4.

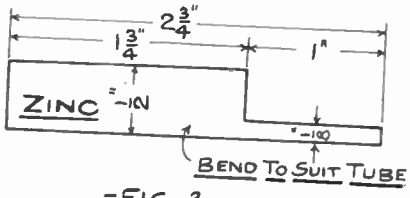
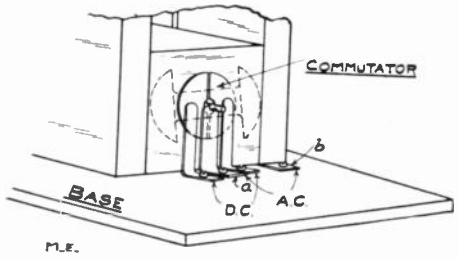


FIG 3.

EXPERIMENTAL MAGNETO-DYNAMO.

A simple manner in which I have made an experimental dynamo, delivering both A. C. and D. C. may be of interest to readers of MODERN ELECTRICS who desire a dynamo but lack funds to buy one.

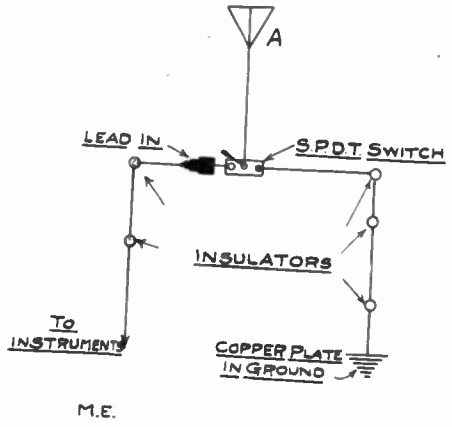
I bought a second-hand telephone generator, dismantled it, taking off the crank, gearing and bearings, and removed the armature. Next I unwound the thin wire from the armature and rewound it with some No. 23 D. C. C. wire. Any size, however, will do, the thinner the wire the higher the voltage. No. 23 wire gives about 16 volts and 2 1/2 amperes. The armature was then replaced and the next step was to make the brushes. The manner of making the brushes may easily be understood from the diagram. For A. C. current one brush (a) which rests upon the pin and the brush (b) which is clamped under the machine must be used. For D. C. it is necessary to have a commutator. This can be made by glueing two semicircles of brass or copper on a piece of red fibre, and cementing the whole firmly upon the pin. One-half of the commutator should be connected with pin and the other half with the shaft. The arrangement of the D. C. brushes can best be seen from the diagram. The dynamo can be run quite satisfactorily with the crank and gearing, although it is better to replace it with a grooved pulley and run it with a belt. The dynamo gives about forty watts.



WIRELESS LIGHTNING PROTECTOR.

The writer having noted that many owners of delicate instruments are in mortal fear of harm to them from high tension lines in their vicinity or from lightning, and finding that next to lowering the aerial—a very tiring process—he refers to connections as in the inclosed diagram which will answer the purpose admirably.

With the switch located in some handy place, just outside the lead-in, it may be thrown to left for receiving and sending, and to right for direct ground, thus obviating necessity for lowering aerial. The switch should be at least 3 1/2 inches between the contacts, and the wiring well insulated.



Contributed by

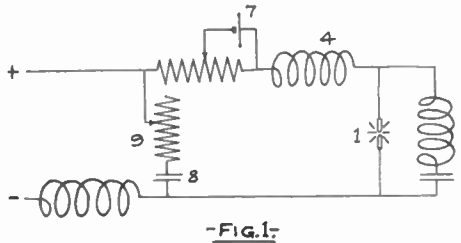
DOUGLAS HILLYER, "W. A. O.A."

CORRECTION.

Referring to article, "The Construction of a Static Machine," in the July issue, it should be stated that in the construction of this machine there should be placed between the plates a 1/16 inch thick vulcanite or fibre washer, 1 inch in diameter for the purpose of keeping the plates from rubbing or striking each other.

London Correspondence

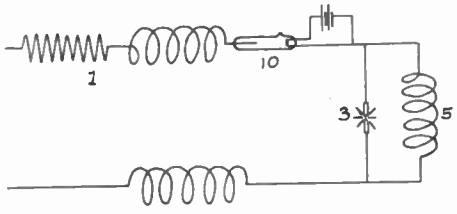
A new type of loud-speaking telephone uses a number of receivers mounted near together, three, for instance, on a panel support. Each receiver consists of a



-FIG.1-

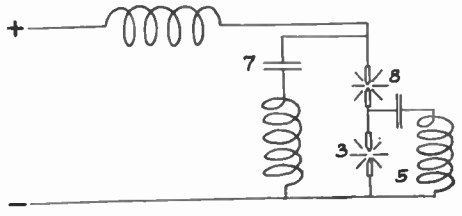
M.E.

pair of circular diaphragms placed close together with a small air space between them. All the air spaces are connected by tubing with a common ear-piece, and compressed air or dense gas is supplied to the spaces by an air pump having a rubber cylinder which acts as a pressure equalizer. The electro-magnets of each diaphragm are connected in the same circuit.



M.E. -FIG 2-

In a system of aerophony patented by G. Seibt, he provides a closed path for the telephone current which is other than that through the generator which supplies current to a Duddell arc. He uses a condenser and a resistance connected across the mains. The current from the microphone (Fig. 1) is superposed on the current which feeds the arc 1, and we have a closed circuit through the

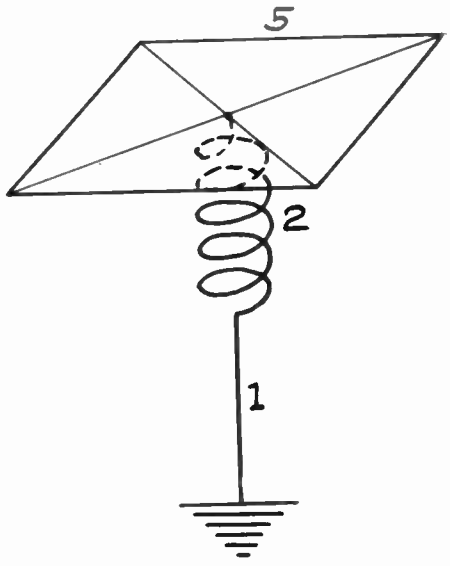


-FIG 2a-

M.E.

microphone, the arc, the condenser 8 and the resistance 9. This latter is placed with the condenser so as to suppress the interfering waves that could otherwise be set up in the condenser circuit. The choke-coils 4 and 5 shut off the oscillations from the feeding wires.

A recent patent relates to a method of increasing the amplitude of the oscillations in the aerophone arc method. A variable resistance is used which increases as the current lessens, such as an arc, a mercury vapor lamp or Wehnelt valve tube, this being placed in one of the supply leads so as to reinforce the fluctuations of current through the arc (Fig. 2). The Wehnelt tube 10 is placed in the lead 1 of the arc 3 which is shunted by the usual vibratory circuit 5. In Fig. 2a we have the added arc 8



M.E. -FIG 3-

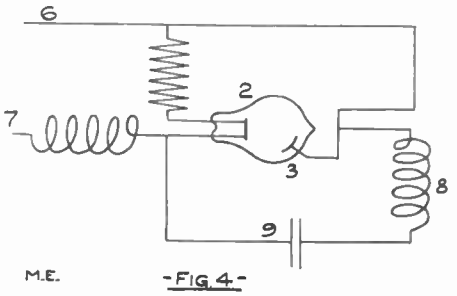
which is best tuned to the same period as that of the vibration circuit 5, or to an overtone. Two or more variable resistances and an additional vibration circuit are used, as shown.

A new company for wireless operations, the Pacific Islands Radio-Telegraph Company, has been incorporated at London, with a capital of $1,200,000. It is to begin erecting posts in the Pacific region.

The Admiralty is taking measures to erect a wireless station on the height overlooking the naval headquarters of Rosyth, and it is expected to have it operating within a year.

A new method for aerials is to use a self-induction coil (2) and a large capacity (5) placed at the top of the aerial (1), so as to increase the wave length to which the aerial corresponds. The capacity prevents a loss of energy from brush-discharge.

To set up oscillations, an inventor uses a Wehnelt tube which has as the anode an iron wire (3) and as the cathode the platinum foil (2) coated with oxides and heated by the current. The cathode (2)



M.E. -FIG. 4-

is connected through an inductance to one feed wire (7) and can receive the heating current through a resistance coil from the other feeder (6), to which the anode is also connected. The inductance (8) and condenser (9), forming an oscillating circuit, are also connected to the electrodes.

ACID IN ELECTROLYTIC DETECTOR.

The electrolytic detector—although it is the most widely used type to-day, and unquestionably the most sensitive one—is not quite understood by most owners of same.

Most of them seem to think that it is necessary to drain off the acid when through with experimenting, but this is not necessarily the case.

We have had a detector in use for several months during which period the acid was never renewed. Neither did it evaporate.

The trick is simplicity itself. When the acid is first poured in the cup, pour a thin film of common kerosene oil on top of the acid. This will keep the acid from evaporating and seems to make the detector somewhat more sensitive.

As the acid cannot evaporate, tedious adjustments of the detector become a thing of the past, as once the adjustment is found it can be left for hours and days till the Wollaston wire wears down a little.

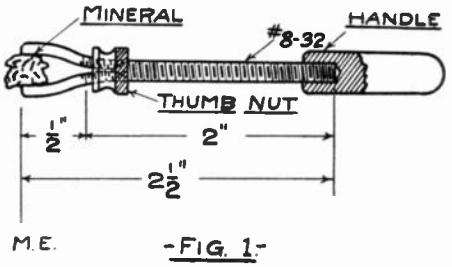
DETECTOR CONSTRUCTION.

BY L. SPANGENBERG.

In making a Perikon detector, or any other kind using minerals, you will note that by soldering the minerals into a brass cup or other kind of holder, the heating of the minerals in soldering will take the sensitiveness away to a certain extent, more so in some minerals than in others.

To prove this the experimenter may take the holders already constructed, having the minerals soldered into place, and make some tests by tuning for a certain station, say a distance that can just be heard, and note how loud it is heard, and then take the loose minerals and hold them between two brass springs and note the difference in the signals coming from the same station.

There are several ways of holding loose materials, but the writer finds the method shown in Fig. 1 the simplest and the best for quick adjustment. Take two pieces of brass rod 2 1/2 inches lond and 5/32 inch diameter and thread them with a No. 8-32 die. The threads should extend from one end to within 1/2 inch from the other end. Now with a fine hack saw cut in the center of the rod at the end not threaded 3/4 inch



M.E. -FIG. 1-

deep. These two sides can be spread apart to suit any small size of minerals, such as are used in the average detector, and by using a thumb screw from an old dry battery the minerals may be held in place quite firmly.

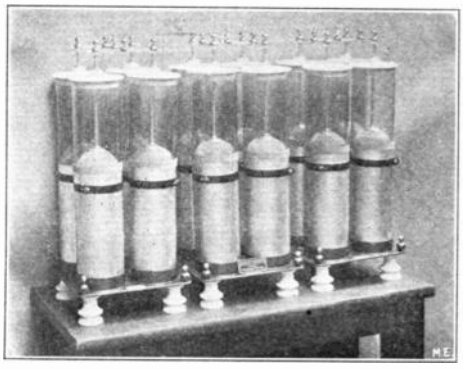
These two rods placed into any detector having two vertical standards will be found to be quite efficient. To hard rubber handles may be mounted at each end of the rods, as touching the brass parts when adjusting grounds the signals.

Wireless Department

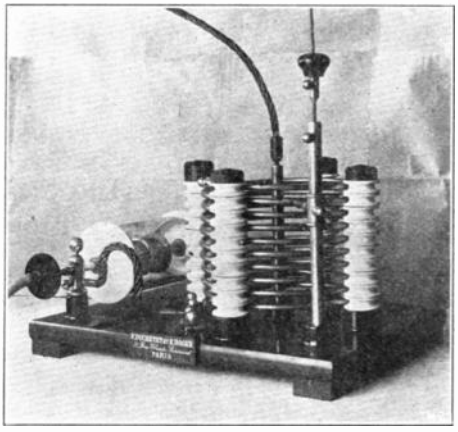
New French Wireless Apparatus

By A. C. MARLOWE, Paris Correspondent MODERN ELECTRICS.

We illustrate the various types of apparatus which are constructed by the Ducretet firm, of Paris. One of the engravings shows a general view of a station with all the apparatus needed for the purpose, and there are two receivers, one for use with coherer and a second for receiving by telephone and electrolytic detector. A detailed view of the new Leyden jars is also to be seen. They use a wire gauze covering on the inside which is made in a hemispherical form at the top. Another view shows the new form of spark gap for high power, and it uses a pair of heavy aluminum discs which are



Leyden Jar Battery



Helix and Enclosed Spark Gap

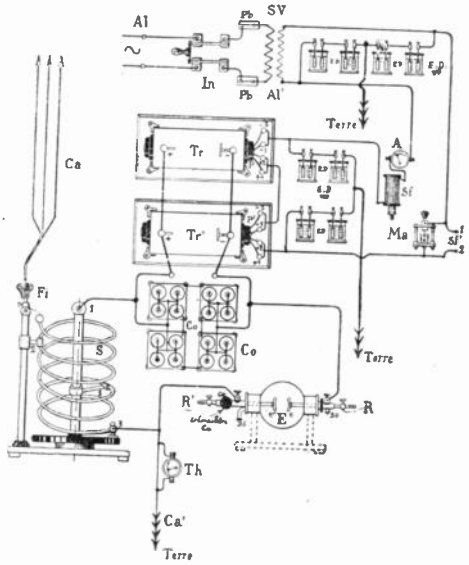
mounted inside a glass cylinder, with the end caps of porcelain. A small air fan driven by electric motor sends a current of air through the cylinder, so that all the

Coherer and Decoherer Set

gases from the spark are driven out by an opening in the other end, and there is but little noise and cylinder is kept cool and clean. The tuning coil (see S in the diagram), is designed on Capt. Peri's principle, the aerial being coupled at the top and the ground wire at the bottom. In the ground wire is placed a hot-wire ammeter, Th, and the best tuning point is obtained when the deflection is the highest. A small incandescent lamp can also be used here. We also show

Electrolytic Receiver Set

the detail view of the two receiving posts, one for the coherer, and the other with Capt. Ferrie's electrolytic detector. A new tuning device consists of two flat coils which are mounted facing each other and form two distinct circuits acting by induction. Each of the coils is subdivided by a circular switch so as to vary the number of turns in the circuit (seen at A in the diagram). The first coil is mounted in the aerial and the second or induced circuit is connected to the detector and an adjustable condenser. By sliding the outer coil, we can separate it from the inner fixed coil by a rack and pinion device, so as to vary the effect. The same device can be used for aerophone work, and at the Ducretet establishment they were able to hear the conversation exchanged between the Eiffel Tower plant and Melun when Dr. De-



Forest was making his trials and also during the more recent experiments made by the officers.

NEW TELEFUNKEN SYSTEM

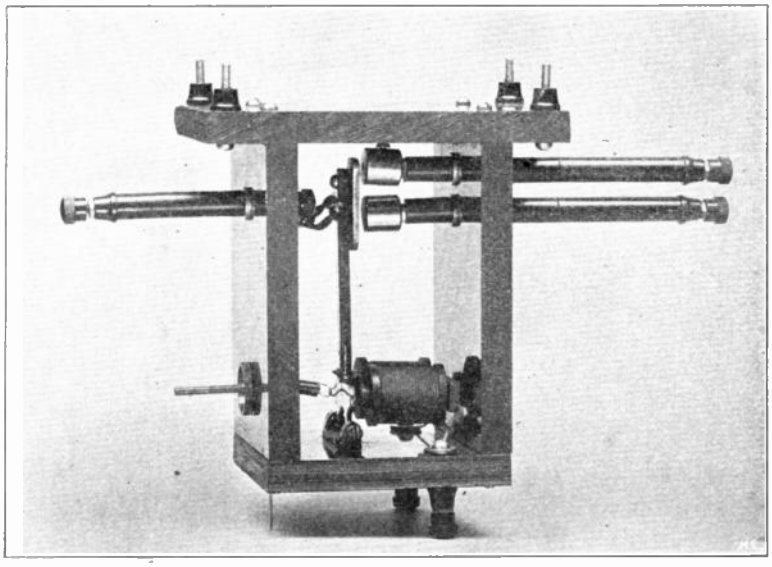
(Continued from Page 201.)

ter mast. Even better results were obtained with an eight-kilowatt set installed on the Austrian battleship "Erzherzog Karl." The tests with this set were made with the vessel at anchor at Pola and in this case everything sent was copied at Kiel. Very interesting results showing the immunity from atmospheric interference with this system were also obtained with three vessels of the Black Sea fleet. These vessels were equipped with two-kilowatt sets, and while one vessel remained at anchor at Sebastopol the other two steamed out to sea. The transmitters of all three sets were adjusted for the same wave-length, but for different tones,

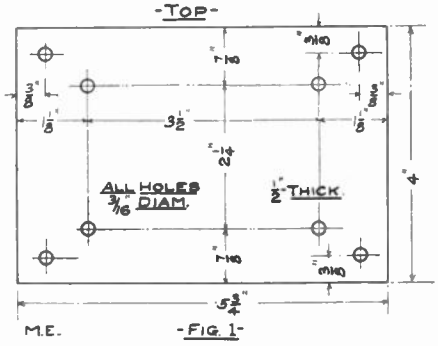
(Continued on Page 220.)

The Construction of a Relay for Converting Loop Antenna to Straightaway.

By A. C. Austin, Jr.



Our readers will probably remember that the writer made mention in his last



-FIG. 1-

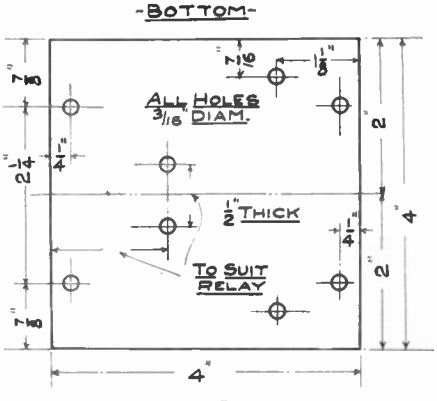
article of a relay used by the Government to obviate the use of an anchor gap, which, as before mentioned, is conceded to be a detriment to distance work, particularly in stations of low power.

The following description of such a relay is taken from one which the writer designed and which has given perfect satisfaction:

A friend of the writer had an aerial switch somewhat after the design of the old DeForest type, and not wishing to make a new switch, yet desiring to use the loop system for receiving and straightaway for transmitting, asked the writer to help him out.

The cut shows the instrument quite plainly, and diagram of connections is very simple, so that any of our readers who wish to make one of these instruments should have no trouble, either in the making or connecting up. Following are the particulars of construction:

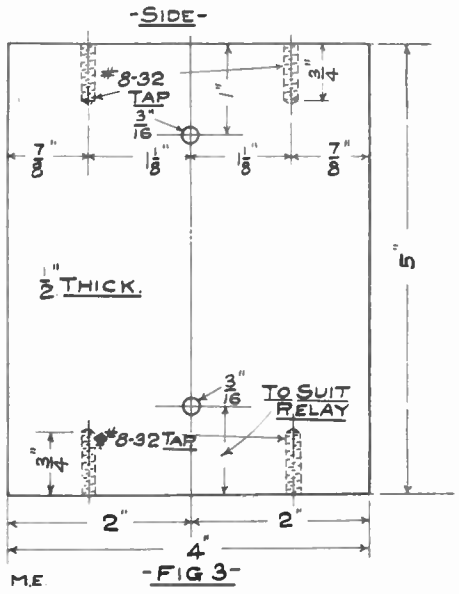
Enough hard rubber sheet 1/2 inch in thickness is required to cut one piece 4 x 5 3/4 inches, one 4 x 4 inches, and



-FIG. 2-

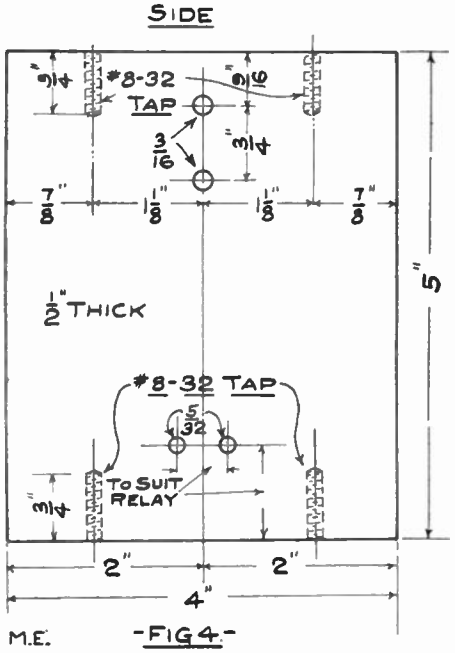
two 4 x 5 inches. Holes are bored in the four pieces as per figures 1, 2, 3, and 4. Brass rod to take 8-32 thread is cut as follows: Two pieces 5 1/2 inches long, and 3 3/4 inches long. Over these are used hard rubber tubes 1/2 inch outside diameter, cut as per Fig. 5. On one

end of the long rods is put a brass piece 1/2 inch in diameter for the armature to



close against. Hard rubber binding posts were used at terminals, but of course, it is possible to use any convenient post, although rubber has a neater appearance.

Now take the magnets from an old low resistance pony relay as well as the armature and armature bearing. Cut



off the contact points on the armature and file tongue until it is thin enough to put in slot made in a piece of rubber 1/4 x 3/16 inches; then rivet it. The length of this rubber must be so that the brass piece at the top will just cover the two terminals of the aerial when relay is closed. Completed armature is shown in Fig. 6. No fixed length is given for the reason that different makes of relays have different size armatures and coils.

Any method of armature spring adjustment may be used, that shown in

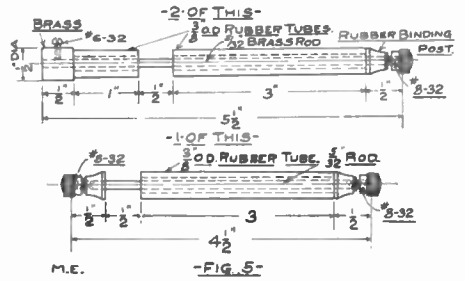
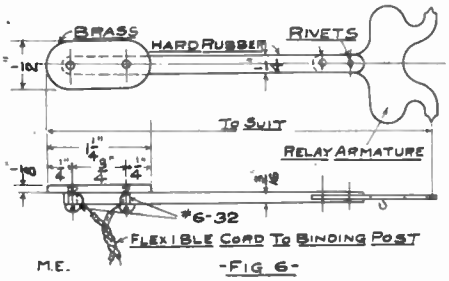
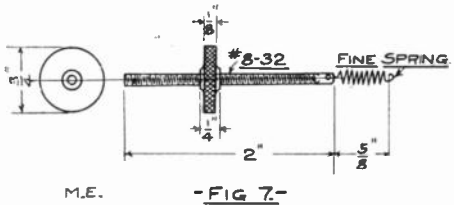


Fig. 7 being the one which the writer used.

After the instrument is all assembled



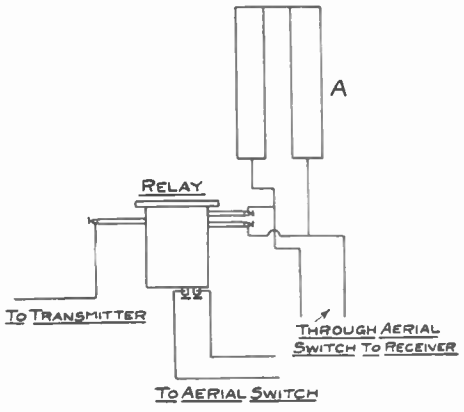
connect the one lead by a flexible wire to the armature, fastening the wire between the rubber and the piece of brass. This completes the instrument, and we are now ready to connect. Of course it



is understood that it is better to have aerial switch control relay, although a separate switch may be used. Diagram of connections is shown in Fig. 8.

Now all that remains to be done is to fasten the relay to the ceiling of your operating room and "hook up." When switch is set for receiving relay is open,

and two aerial leads come down to loop tuner, but when switch is set for sending relay circuit (including a battery of about 6 volts) is closed and armature is brought tight against ends of two lead wires, thus connecting the sending instruments directly to the straightaway



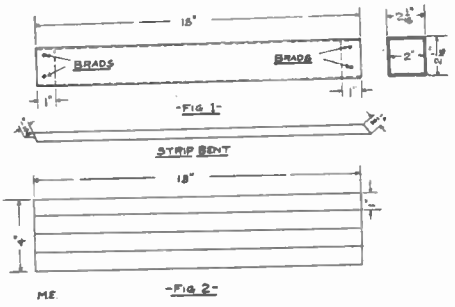
-FIG. 8-

aerial and dispensing entirely with the anchor gap.

A VARIABLE CONDENSER.

By L. W. Teller.

This is an instrument most essential for tuning out "static" and unwanted stations. The type described below is known as the sliding tube type and can be highly recommended.



First procure at a supply house the following materials:

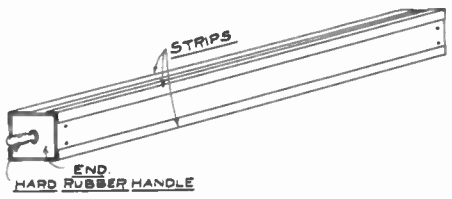
1. Eighteen inches of square, hard drawn brass tube, the inside diameter of which is 2 1/8 inches.

2. Eighteen inches of square, hard drawn brass tube, the outside measurement of which is 2 1/16 inches.

3. Eight inches of 1/16 inch strap brass 5/8 inch wide.

The tubing should be 1/16-inch thick and seamless.

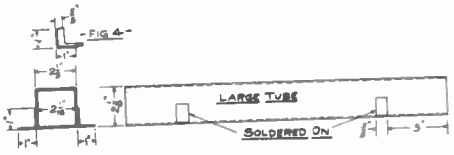
Take the smaller tube and fit it with two wooden ends 1 inch thick, held in place by small brads driven through the tube as shown at Fig. 1. Next procure



ME. -FIG 3-

a piece of drawing cardboard 4 inches by 18 inches by 1/32 inch. Cut this into four strips, each strip being 18 inches by 1 inch, and fold each strip down the middle lengthwise as shown at Fig. 2. Then shellac each strip to an edge of the smaller tube so that the tube when completed will appear as at Fig. 3.

Next take the larger tube and fit (in one end only) a piece of wood 2 1/8 inches by 2 1/8 inches by 1/4 inch. Then cut the strap of brass into four equal pieces and bend each piece exactly in the middle so that one half is at right angles with the other half. This is shown at Fig. 4. One-half inch from the end of

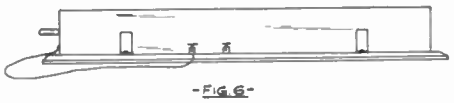


-FIG 5-

one arm of each piece drill a 1/8-inch hole.

The next operation is probably the most difficult, but with reasonable care it can be accomplished. The arm of each brace in which no hole has been drilled has to be soldered to the outside of the larger tube. These arms or braces should be soldered to the outside tube on opposite sides (two on a side) at a distance of three inches from each end. This is clearly shown at Fig. 5.

All that now remains to be done is to solder one end of a short flexible cord



-FIG 6-

ME.

to one end of the smaller tube, also fastening a small rubber handle to the same end (on the wood). Slip this into the larger tube, mount the whole on a suit-

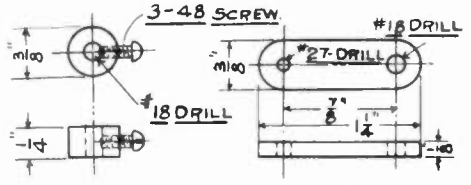
(Continued on Page 223)

Attachment for Wireless Key

BY ERIC M. LUSTER.

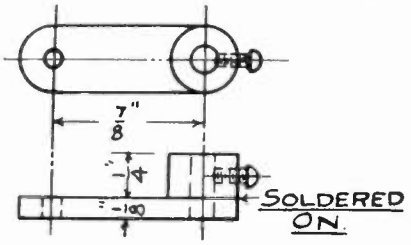
The writer's experiense with ordinary telegraph keys when they are used for wireless transmitting has been quite extensive, and he has found that this type of key is unsuitable for this work, especially when used with the lighting current, due to small contacts. For this reason the attachment about to be described was made. This attachment when used with ordinary key greatly facilitates transmitting, because it does not "stick."

The materials necessary for the construction of the whole key, are 2½ inches of ⅜-inch round brass rod, a piece of brass 1⅜ inches long 7/16 inches wide and ⅛ inch thick, a piece of 5/32 inch round brass rod 1¾ inches long, a small length of round hard rubber rod ⅜ inch in diameter and ½ inch long, a few screws and a key in which the contact points are wired.



M.E. -FIG. 1- -FIG 2-

From the ⅜-inch brass rod cut two round pieces, one ⅛-inch thick and the other ¼-inch thick. In the center of the ⅛-inch piece put an 8/32 thread, and in the ¼-inch piece drill a hole with No. 18 drill and midway between bases tap it with a 3-48 thread, so that when a 3-48 screw is placed in this hole it may be screwed part way into the hole passing through the center. See Fig. 1. The remainder of the rod should be trimmed down to a length of 2 inches. This should be done with a file, as the ends must be perfectly flat. After filing bore a hole in the center of each end and tap with 6-32 tap. An arm is next made of the brass piece 1⅜ x 7/16 x ⅛ inch. This should be finished off to 1¼ x ⅜ x ⅛ inch, the ends being rounded. Three-sixteenth inch from each end bore a hole in one end with a No. 27 drill (this is for the 6-32 screw which holds the arm to the standard), and in the other end bore a hole with a No. 18 drill. Fig. 2 shows arm with holes. Now take brass collar (Fig. 1) and solder it on to the arm so that the hole in the collar comes directly over the hole in the arm which was made

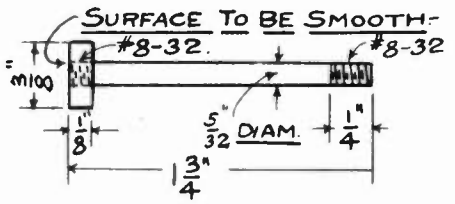


M.E. -FIG. 3-

with No. 18 drill. The tightening screw of the collar should point toward the nearer end of the standard (Fig. 3).

Next take the 5/32-inch brass rod, tap one end for ¼ inch and the other end a *trifle* over ⅛ inch. On the end tapped for ⅛-inch screw the small piece of brass cut from the ⅜-inch brass rod should be screwed on tight.

Now file off any of the 5/32-inch rod which projects beyond its face; this will make the surface of the piece perfectly flat. Fig. 4 shows piece screwed on. Take the piece of hard rubber, tap it for ¼ inch of its length with an 8/32 thread, and after passing the rod (Fig. 4) through the hole in arm and collar (Fig. 3) screw the rubber handle on the end of the rod which is tapped ¼ inch. The

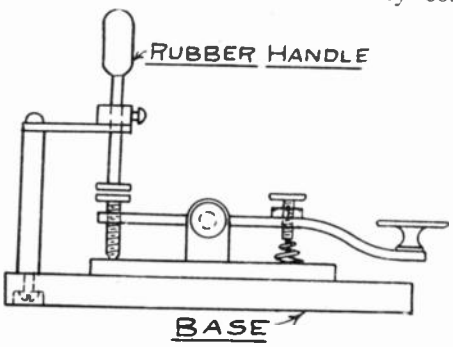


M.E. -FIG. 4-

attachment is now finished. All that remains to be done is to remove the contacts from the key and arrange attachment as shown in Fig. 5. As keys differ in dimensions, no set distance can be given for placing the leg of the standard from the frame of the key, but it should be so arranged that the small brass disk comes directly above the top of the adjusting screw of the key, which should

be filed off flat; then by moving the disk up or down by means of rubber handle the movement of the key may be regulated to suit the operator. The attachment should be finished off the same as the key, and mounted in some way on a base.

As for connections, one wire comes from the standard and the other from the frame work of the key, and is connected in series with source of current and the transmitter. In order to keep the key from sparking, a large condenser should be shunted across the key contacts. This key is used by several experimenters, all of whom find it perfectly satisfactory.

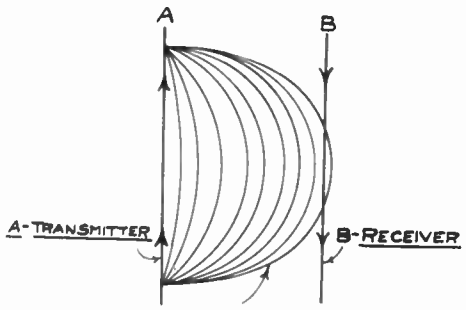


M.E. -FIG 5-

A CONDUCTIVE WIRELESS SYSTEM.

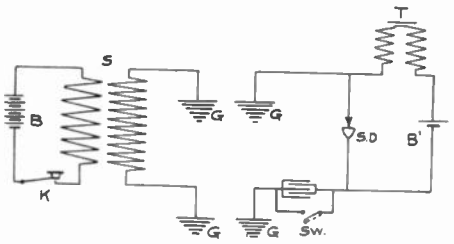
By E. E. Gourley.

In a wireless system operating on the principle of conductivity, two ground plates are necessary; the second plate taking the place of the antennae in the electro-magnetic wave system.



M.E. -FIG 1-

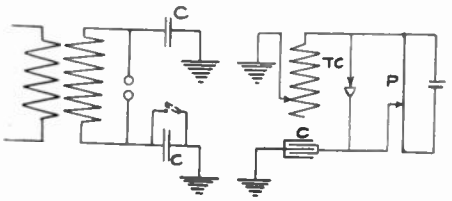
The electric waves from the transmitter spread outward like the ripples on a pond when a stone has been thrown into the water. (Fig. 1.) They grow larger and larger, becoming in consequence, weaker and weaker, thus limiting the range of transmission.



B & B'-DRY BATTERY
G-GROUND
C-CONDENSER
K-KEY
S-INDUCTION COIL
T-TELEPHONE RECEIVER
S-D-SILICON DETECTOR
S-W-SWITCH

M.E. -FIG 2-

By placing two plates on the wave front, parallel to those of the transmitter, the waves may be detected if a sensitive detector and telephone receiver are used. (Fig. 2.) The range may be increased if the distance between the plates at both the sending and receiving station is lengthened, or if tuning apparatus is added. (Fig. 3.)

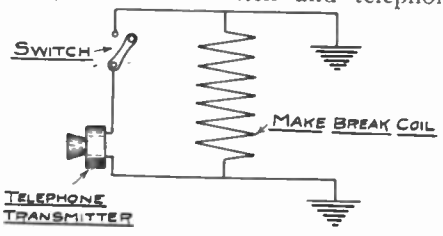


C-CONDENSER
TC-TUNING COIL
P-NON-INDUCTIVE POTENTIOMETER

M.E. -FIG 3-

In cities the gas and water pipes make excellent grounds, provided they are not metallically connected, as in a water heater.

For short distances a make and break coil may be used if connected, as in figure 4, and if a switch and telephone transmitter is substituted for the telegraph key you may telephone wirelessly for a short distance. (Fig. 4.) If the make and break coil is used for wireless telegraphy a vibrator or independent interrupter must be used.



M.E. -FIG 4-

Wireless Telegraph Contest

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

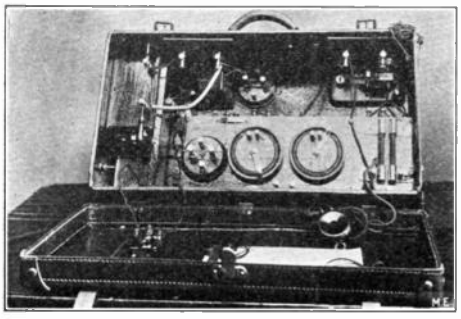
PLEASE NOTE THAT THE DESCRIPTION OF STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED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

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

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

FIRST PRIZE, THREE DOLLARS

Enclosed please find photograph of wireless outfit which was built by myself. It is a portable outfit having three receiver sets; this with the transmitter is placed in a dress suit case which also holds the batteries. A portable aerial 25 feet high built in sections of 5 feet each, and antenna 20 feet long is strapped on the outside. I have had very good results with this outfit. I also have a



small working model of a wireless. I have worked same for a distance of one-half mile, and find that it works very good. Size of receiver 1 1/2 inches long, 1 inch high and 1 1/4 inches wide. I am building a small telephone receiver which when finished will be about the size of a twenty-five cent piece.

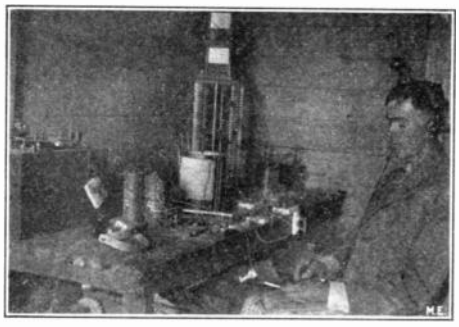
C. RAYMOND MILLER.

HONORABLE MENTION.

Enclosed is a picture of my receiving and sending station, which are only divided by E. I. Co. double pole double throw switch. I may say to begin with, that I have gotten most all my supplies from Electro Importing Co., of New York.

My sending instruments consist of a two-inch coil, a hot-wire meter, spark balls, a Morse key and 12 batteries connected 4 dry cells in series and 3 rows in multiple. This will give about 45 amperes on new dry cells and 6 volts. I send to a friend of mine, who lives in Vacaville a mile east of my station, and to another friend who lives in the country also, 3 1/2 miles north of my station. The signals come in at both places very plainly. I prefer an aerial about 60 to 80 feet high and an antenna consisting of eight No. 14 aluminum wires about 240 feet long, and wires should be 1 foot apart, all connected at the end and connected in fours just before leading into the instruments. In this way if you want a straightaway aerial just connect the two leading-in wires, and if you want a looped aerial leave them apart. I prefer a horizontal aerial. The aerial wires should be well insulated from spreaders or cross-arms on poles with knob insulators.

My receiving instruments consist of double pole double throw switch, which allows throwing from one detector to another an "Electro"-lytic and a carborundum detector, a potentiometer, two



dry cells, 2,000-ohm receivers, tuning coil and a small glass plate condenser.

I can receive quite a ways up and down the Pacific Coast. Sacramento and Mare Island are the closest stations, and they are 30 miles away. I might add that I live in Vaca Valley (cow valley), which is surrounded by the foot-hills of the

Coast Range Mountains. I believe these hills help instead of hindering me from receiving and sending. Land stations, ships and warships are sending from every two to fifteen minutes. At least I hear them that often night or day. The stations that come in the loudest come in order as follows: Russian Hill P. H. San Francisco, S. F. San Francisco, Mare Island T. G., Sacramento D. G., and Santa Barbara D. F., all in California. Some of the ships and most of the warships come in louder than some of the land stations; but none of them come in as loud as the land stations named above.

On the extreme left hand side of picture is a Marconi wireless telegraph set that I made myself. It is extremely sensitive; the turning on or off of an electric lamp (16 c. p., 125 volts) 200 feet away will operate it.

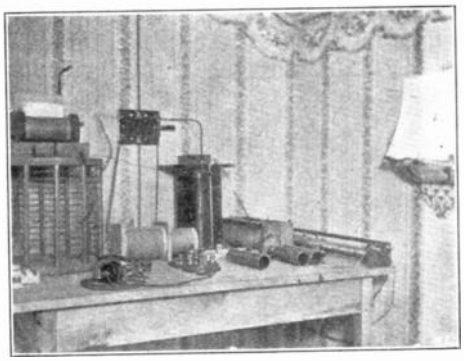
California. NEAT M. TATE.

HONORABLE MENTION.

Enclosed find photo of my wireless station.

The receiving set consists of "Electrolytic" detectors, potentiometers, variable condensers, tuning coils, weeding out coils, and a head receiver.

The transmitter consists of one 1/4 inch and one 2-inch induction coils with



secondary condensers, key, electrolytic interrupter, and a secondary helix composed of 60 feet of No. 8 B. & S. gauge copper wire.

This set gives excellent results. With it I am able to hear the Clark stations at Port Huron, Detroit, Toledo, Cleveland, Buffalo, and several of the passenger boats on the lakes.

Much of my success is due to MODERN ELECTRICS.

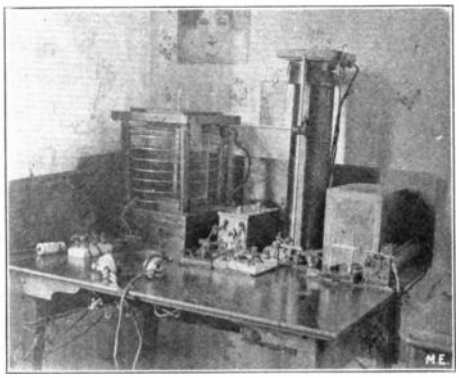
Michigan. HARCOURT C. DRAKE.

HONORABLE MENTION.

Enclosed please find a photograph of my wireless station.

On the left is my sending helix, at the bottom of which is the sending condenser. The sending helix encloses my spark gap which is of zinc and muffled by glass plates. This whole piece of apparatus is connected by means of three binding posts to the aerial switch and the induction coil, thus keeping all the sending apparatus complete and easy to handle. My induction coil gives about an inch spark when not connected to the outfit. I use a storage battery giving 8 volts for the sending current. I can send about 10 miles with it.

My tuning coil is shown next to the induction coil. It contains a secondary,



but switches are so provided that I may either use a receiving system involving the secondary or an auto-transformer system. The primary of the coil is wound with bell wire, while the secondary is wound with silk-covered copper wire No. 30. To the right of the coil is my receiving condenser. It is contained inside the box, being composed of tinfoil and mica.

I use two detectors which may be easily put in or taken out of the receiving circuit by switches. These are shown in front of the tuning coil and the condenser. The former is the "perikon." while the latter is the electrolytic detector. I find that in general these detectors are about equal in sensitiveness, though in special cases a certain one is preferred. The two switches by the key are used for short circuiting the detector on sending and for controlling the current going to the key. The switches are so arranged that it is impossible to send until the detectors are short circuited. When the switches are fixed for receiving, the send-

ing is cut off from the key and in its place a weaker current is supplied the key for the purpose of operating my testing buzzer. I use 2,000-ohm receivers and get very good results. I have heard almost all the stations on the coast, besides, of course, the stations in and about Washington. I have heard as far north as Cape Cod and as far south as Key West.

My aerial is only about 80 to 90 feet long. I have two poles on top of the house, one about 30 feet tall and the other about 32 feet tall. I use 4 wires and my spreads are 10 feet in width. I attribute my success with such a short aerial to its good insulation and to the insulation of all the apparatus.

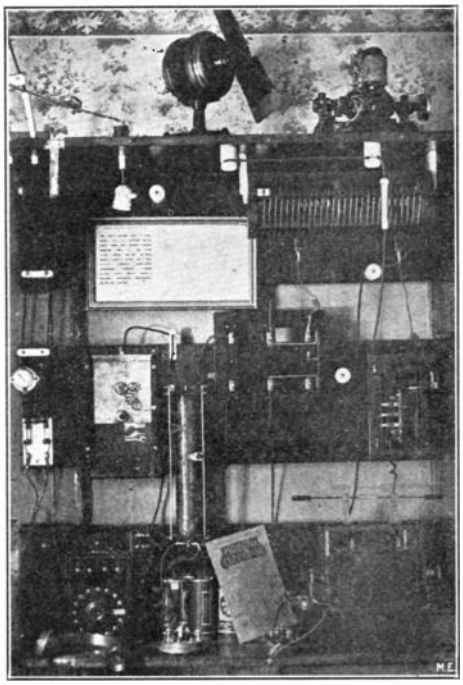
I am very much interested in MODERN ELECTRICS, which is especially fine for wireless experimenters.

Washington, D. C. HARRY W. GAUSS.

HONORABLE MENTION.

Please find enclosed a photograph of my wireless telegraph station, which is mounted in a cabinet 4 x 4 feet.

To the right of photo is seen my sending apparatus, which consists of a 2-inch spark coil, which is operated by 220 volts alternating current, with a frequency of



133 cycles per second, and is cut down to the proper value by a water rheostat.

There is also an adjustable inductance 6 inches in diameter, and 20 inches long, wound with 30 turns of No. 11 copper wire. Also a condenser made of glass plates and tinfoil which is adjustable. I use a telegraph key for sending. The receiving apparatus consists of the following: An 80 meter double slide tuning coil, adjustable condenser, non-inductive potentiometer, "Electro"-lytic detector, 1,000-ohm head-band receiver, and three dry cells for receiving. In center of photo is seen a large double pole double throw switch which is for changing from receiving to sending.

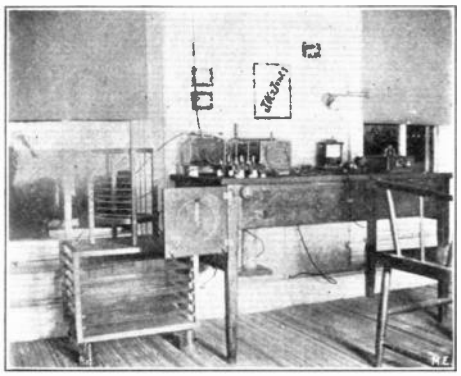
The frame contains the code and list of stations. My aerial is 135 feet long and 60 feet high.

I receive great help and much information from MODERN ELECTRICS, to which I am a subscriber.

Ohio. J. S. WELTER.

HONORABLE MENTION.

Enclosed please find flashlight of my wireless apparatus. The transmitter



consists of a Morse key, 2-inch E. I. Co. induction coil, and E. I. Co. zinc spark gap, helix and variable condenser. Helix and condenser were made by myself. The condenser consists of six glass plates 18 x 14 inches, having a sheet of tinfoil 11 x 15 inches on both sides and having a condenser surface of 1,980 square inches; contact with the foil is made with small springs.

The receiver is made up of an "Electro"-lytic detector, a one thousand ohm E. I. Co. receiver, and a tuning coil having a wavelength of four hundred and twenty meters. It is wound with No. 22 cotton covered wire, made by myself.

The detector, which can be seen at right of the picture, is an E. I. Co. "Electro"-lytic, mounted on box containing a condenser and a switch to turn

same on and off. Connections for receptors are made on center of the table at the back. To the left of the table and in front of the receiving tuner, may be seen a small tubular condenser, constructed by myself just before I made the picture. It is made from an old hydrochinon tube coated on the inside and outside with tinfoil, the inside plate being connected to one post and the outside to another. The meter at the right is used to read the voltage of my bichromate cells used in transmitting.

The switch at the left is used to change from transmitter to receiver.

The central knife switch is used for turning on the cells used on each side.

My aerial is made up of six aluminum wires, fifteen feet in length, suspended between two poles on top of the roof; it has a height of sixty feet from ground.

My ground may be seen under the table; it is connected to a wire clamped on the water pipe in the cellar.

My station is used in communicating with a friend who lives half a mile away.

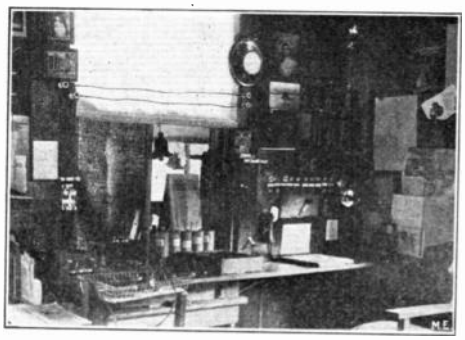
JESSE K. JONES.

Pennsylvania.

HONORABLE MENTION.

Enclosed please find photo of my wireless telegraph station.

I am 15 years old, and have been ex-



perimenting with wireless for about a year. And thanks to the helpful diagrams and instructions that I have found in MODERN ELECTRICS, which is the finest magazine on the subject in the country to-day, I have been able to construct my present station.

Aerial: My aerial is suspended from a 20-foot pole on the roof of my station to the roof. It consists of four hard drawn copper wires, 35 feet long, and the wires are about a foot apart.

On top of the switchboard is a large 2-inch induction coil and two dry cells, which are used for the telephone; to the right of the dry cells are three 1-quart Leyden jars connected to the secondary of the spark coil; below the condensers to the right of the switchboard is the helix using three connections, and the ground, as seen in the diagram. In the center of the table is a large wireless key. At present I run my coil on dry cells, in a box under the table. I have a condenser on my key and interrupter to reduce the sparking at contact points; one of them is under the key and the other at the extreme right of the photo.

The telephone transmitter can be connected by switches to the primary of the spark coil, in series, with an interrupter of my own invention, the details of which I do not wish to publish at present, and speech can be transmitted wirelessly to a distance of 300 feet or so. For a receiver I use the portable receiving set shown at the left of the photo. It is two pieces of carbon with a steel needle across them to make a loose contact and two dry cells and the head phones seen in the wire tray in front of the box on the left of the table.

My wireless telegraph sending set has a range of about 10 miles, and I can communicate with a friend of mine in St. Louis very satisfactorily.

Receiving instruments: At the left of the picture is seen a coherer and decoherer combined, and a 500-ohm relay of my own construction that works a call bell seen on the switchboard. When the call bell rings I cut it out and cut in the carbon detector or the "Electro"-lytic detector in connection with the tuning coil seen at the left of the switchboard and the 2,000-ohm head phones, and a rheostat and condenser. With this set I can hear stations 300 to 500 miles distant and some of the steamers on the Mississippi River equipped with the United Wireless Company's system. The dry cells in front of the window are used for the various receiving sets.

MARVIN B. FERRELL.

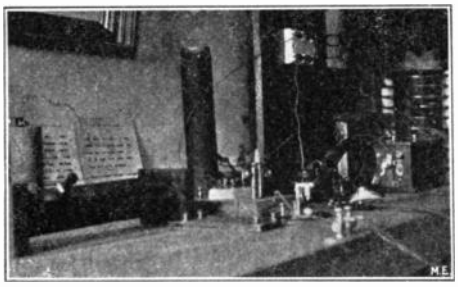
Missouri.

HONORABLE MENTION.

Enclosed please find a photograph of my wireless station which is fitted up in one corner of my room.

My transmitting apparatus consists of an E. I. Co. one-inch coil, a glass plate condenser, an inductance coil, zinc spark gap, and Morse key, the coil is run by dry cells at present.

The receiving apparatus consists of two detectors, carborundum and an



"Electro"-lytic. Two single slide tuning coils, and a variable condenser, a one-hundred ohm head phone is used in connection with same. The antenna is sixty feet long and only forty feet high at the highest point; it is supported by a windmill tower. With this short antenna I have had good success in receiving from different ship stations on the Great Lakes.

The table and switchboard, also most of the instruments on them, were made by myself. The tuning coils have a capacity of 300 meters each. They are made of wood cores 2 1/2 inches by 13 inches, wound with No. 20 annunciator wire.

The carborundum detector is what I consider my best piece of work. It can be seen directly behind the "Electro"-lytic" detector. It works quite satisfactorily, but think that for the best work there is none to beat the "Electro"-lytic. The variable condenser is of the sliding plate type. There are 3 sliding and four stationary plates, covered with cloth and shellac.

The transmitting apparatus was all made by myself with the exception of the spark coil. The sending helix is ten inches in diameter by ten inches high, wound with No. 6 copper wire. The glass plate condenser is made of 4 glass plates 10 x 12, with tinfoil 7 x 9 inches.

On the switchboard can be seen the double pole double throw switch that is used to disconnect the aerial and ground connections. Above it is an automatic switch in an unfinished state. On the wall is a frame containing the call letters of the stations of the United States, below it are the Morse and Continental codes.

I have gained many helpful hints from MODERN ELECTRICS, and I have had occasion for being thankful that I received the magazine from the first. It is the best ever. CLARENCE J. WITHERS.

Michigan.

HONORABLE MENTION.

Enclosed find photo and description of my wireless telephone and telegraph station.

On the right side of the table may be seen the transmitting apparatus which include Morse key, E. I. Co. 1-inch coil, run by dry batteries.

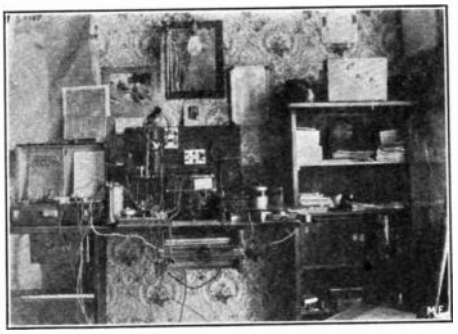
Above the coil is a zinc spark gap enclosed in a hard rubber tube.

One of the condensers in the middle of the table is connected around the key, while the other is connected to the ground. Four Leyden jars are connected around the spark gap. The helix is not shown in the photo. With this arrangement I am able to send about three miles, but not farther, because I am in the heart of the city.

To the left end of the board are receiving instruments. All the instruments, which include a tuning coil, variable condensers, four point switch, a 1,500-ohm and 1,000-ohm E. I. Co. receiver, condensers in shunt with the receiver.

Also "Electro"-lytic detector, microphone, auto-coherer and other types of detectors, potentiometer, etc.

All these instruments except the tun-



ing coal and variable condensers, are placed on or in the suit case which I have arranged for them. In this way it is made very compact and portable.

The tuning coil of double side type, with a capacity of 620 meters wavelength, can be seen under the table.

The variable condenser, like the tun-

ing coil, was also constructed by myself. It may be seen at the right end of the table next to the cupboard, also of my design. The condenser is made of 5 glass plates, covered with tinfoil on both sides, with 4 other ones sliding between them, 1/16 inch apart.

With the above receiving instrument I am able to receive about 250 miles.

To the right of the suit case is the auxiliary set which consists of a 1,000-ohm relay, 20-ohm sounder, coherer, decoherer and bell, all of which are placed on a single base with necessary switches.

On the switchboard above may be seen the switches for throwing in the different instruments, also the switches connecting the loop, aerial and ground, and one for grounding apparatus during thunder storm.

My aerial is composed of 4 aluminum wires 50 feet long and 18 inches apart, supported between two 50-foot poles.

The codes and call letters may be seen above the switches.

I have added much to my equipment since this picture was taken, but I will send another picture later. I am a boy seventeen years of age, and have experimented in wireless telegraphy and telephony for about a year, and I owe much of my success to your most instructive and unequaled magazine, MODERN ELECTRICS.

ROSWELL J. WOLFE.

Rochester, N. Y.

HONORABLE MENTION.

Enclosed please find photograph of my Wireless receiving station. It consists

of a tuning coil, variable condenser, silicon detector, which consists of a fuse plug and receptacle, a piece of silicon, or carborundum is placed in the receptacle and the plug screwed down on top of it. This is a simple but good detector. I have also an electrolytic detector (shown in front of the dry cell). The telephone receiver (775 ohms) shown suspended in front, is the only thing which I did not make myself. In front of the tuning coil is a wet battery in connection with a testing buzzer. With this outfit I am able to receive at a distance of two hundred miles. I have been interested in wireless for about eight months, and I obtained much of my knowledge from MODERN ELECTRICS. I also joined the W. A. O. A.

WILLIAM E. O'CONNOR.

San Francisco, Cal.

HONORABLE MENTION.

Enclosed find photograph of my wireless station. At the left of the picture is

the tuner, on which I wound by hand 500 feet of 18 magnet wire. With this and my metallic contact detector just in front I can tune in stations for a radius of about 800 miles.

I can hear P. R. very plain. I have heard M. L. M. two days after she has left New York.

I use 1,500 ohm head phones. To the right is my transmitting outfit. I use a Connecticut automobile coil. A fishing boat 5 miles out has heard me clear enough to read.

My aerial consists of two wires suspended from the top of a tree, 80 feet high, to the house. It contains about 75 feet of wire. I anxiously await MODERN ELECTRICS each month; it is such a fine paper.

A. HAYWARD CARR.

Newport, R. I.

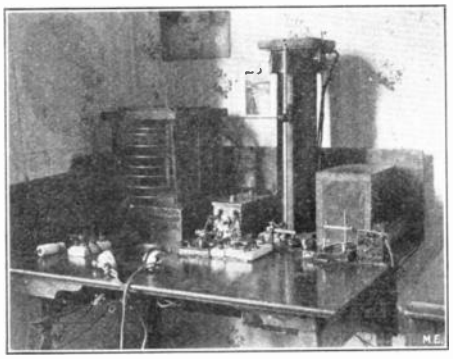
HONORABLE MENTION.

Enclosed please find a photograph of my wireless station.

On the left of the picture is my send-

ing helix at the bottom of which is the sending condenser. The sending helix encloses my spark gap, which is of zinc and muffled by glass plates. This whole piece of apparatus is compact and easy to handle. My induction coil gives an inch and one-fourth spark when not connected to the outfit. I use a storage battery giving 8 volts for the sending current. I can send about 10 miles on good nights.

My tuning coil is shown next to the induction coil. It contains a secondary, but switches are so provided that I may either use a receiving system involving the secondary or an auto-transformer



system. To the right of the coil is my receiving condenser. It is contained inside of the box, being composed of tinfoil and mica, which is imbedded in wax in a small box. To the right of the condenser is my potentiometer.

I use two detectors which may easily be put in or taken out of the receiving circuit by switches. These are shown in front of the tuning coal and condenser. The former is the new copper-pyrites-zincite-detector, while the latter is the electrolytic detector. I find that in general these detectors are about equal in sensitiveness, though in special cases a certain one is preferred.

The two switches near the key are used for short circuiting the detector during sending and for controlling the current going to the key. The switches are so arranged that it is impossible to send until the detectors are short circuited. When the switches are fixed for receiving, the sending current is cut off from the key and in its place a weaker current is supplied the key for the purpose of operating my testing buzzer. I use 2,000 ohm receivers and with them can hear all the coast stations from Cape Cod down to Key West. Also can hear the United States scouts Salem and Birmingham when anchored near Newport, R. I.

My aerial is only 80 to 90 feet long. I have two poles on top of the house, one about 30 feet tall and the other about 32 feet tall. I use four wires and my spreads are 10 feet in width.

I attribute my success with such a short aerial to its good insulation and to the insulation of all the apparatus. I made all instruments except induction coil and switches.

I am very much interested in MODERN ELECTRICS, which is handy for the wireless operator. My age is seventeen years. HARRY W. GAUSS.

Washington, D. C.

HOW TO MAKE A POLARIZED RELAY.

(Continued from Page 195.)

the armature, on either side. Now move out the back screw J just a little, so that the armature does not make contact with the screw I. Now supposing that the pole pieces are polarized N by the permanent magnet. If a current passes through the magnet coils now in the proper direction to change the left-hand pole piece to S the armature will fly over against the contact screw I, closing the local circuit. If the relay does not operate when adjusted as above, reverse the main leads feeding the electo-magnets. The maximum sensitivity is attained by having the pole pieces adjusted close to the armature and regulating the adjusting screws I and J so as to give the armature very little play.

A VARIABLE CONDENSER.

(Continued from Page 214.)

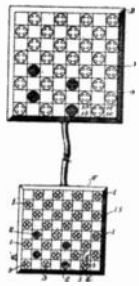
able base board and connect the two tubes to two small binding posts, located on the base. The completed instrument should appear as in Fig. 6.

This condenser can be made of round tubing, but some prefer it square. It is an instrument of high efficiency and of neat appearance and it makes a useful as well as ornamental addition to any wireless outfit.

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

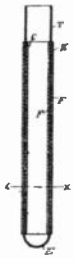
Electrical Patents for the Month

927,583. ANNUNCIATOR FOR CHECKERS OR SIMILAR GAMES. Anthony Nelson, St. Paul, Minn. Filed Sept. 16, 1907. Serial No. 393,059.



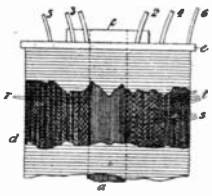
1. In a device of the class described, a checker board in combination with an electrical annunciator having squares arranged to correspond with those upon the checker board, each square of the annunciator being provided with a plurality of electric lamps of different colors, the squares of said checker board being provided with main and branch terminals, electrical connections between said lamps and terminals, and checkers having radial strips of electrical conductor adapted to bridge said main and branch terminals.

928,224. ELECTRICAL CONDENSER AND PROCESS OF MAKING SAME. Harry Shoemaker and Frederick W. Midgley, Jersey City, N. J. Original application filed Jan. 8, 1900, Serial No. 471,229. Divided and this application filed May 4, 1909. Serial No. 493,885.



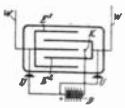
1. An electrical condenser comprising glass or vitreous material having a roughened surface, and a coating on the roughened surface consisting of conducting coating material in intimate and firm engagement with said surface.

928,136. CONSTRUCTION OF ELECTROMAGNETS. Howard Lacy, Carshalton, England. Filed Aug. 31, 1906. Serial No. 332,845.



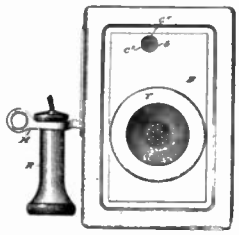
1. An electro magnet comprising a core, groups of even numbers of layers of wire disposed thereon, the diameter of the wire composing each successive group diminishing progressively and the number of layers in each successive group increasing in direct arithmetical progression, and insulating material between the core and its adjacent winding and between successive layers of the series, whereby the resistance of the winding increases in definite proportions through the electro magnet.

926,128. ELECTROLYTE-CONDENSER. Ignacy Moscicki, Gambach, near Fribourg, Switzerland. Filed Oct. 29, 1907. Serial No. 399,771.



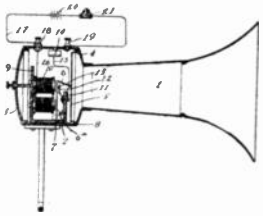
1. In an electrolyte condenser, the combination, with aluminum electrodes immersed in an electrolyte, and an alternating current working circuit in which said electrodes are included, of means for causing a flow of unidirectional current through the aluminum electrodes as anodes.

928,115. TELEPHONE METERING SYSTEM. Richard M. Eaton, Niagara Falls, N. Y., assignor to The Dean Electric Company, Elyria, Ohio, a corporation of Ohio. Filed Jan. 10, 1907. Serial No. 351,715.



1. In combination, a plate, a time measuring mechanism and a receiver hook carried by the plate, said receiver hook controlling said time measuring mechanism and a cabinet distinct from the plate for supporting such plate and containing the parts carried thereby.

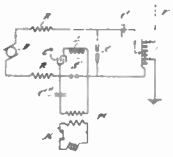
926,284. ELECTRICAL APPARATUS FOR PRODUCING SOUND-SIGNALS. Charles H. O'Brien, Augusta, Me. Filed Dec. 17, 1903. Serial No. 291,233.



1. In an apparatus of this character, the combination of a sound producing body, a diaphragm, a vibrating armature connected centrally of the diaphragm, said armature being provided with contacts, an electro-magnet for vibrating the armature, an electrical source of energy, and means for adjusting the electro-magnet with relation to the armature.

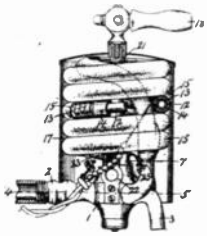
2. In an apparatus of this character, the combination of an electro-magnet, a sound producing vibrating body capable of being vibrated, an armature actuated by the electro-magnet and connected to the diaphragm, a source of electrical energy, means for causing electricity to flow from the source, and means for adjusting the electro-magnet with relation to the armature.

926,936. SPACE TELEGRAPHY. Lee de Forest, New York, N. Y., assignor to De Forest Radio Telephone Co., a Corporation of New York. Filed June 20, 1907. Serial No. 379,921.



1. In a space telegraph system, a source of practically-continuous high-frequency electrical oscillations, a radiating conductor associated therewith, an oscillation circuit associated with said source and arranged to control the same, a source of vibratory electrical energy associated with said oscillation circuit and means for controlling said source of vibratory electrical energy.

927,755. ELECTRICALLY-HEATED WATER-FAUCET. Frank A. Robinson, Pittsfield, Mass., assignor to Robinson Electric Faucet Company, Cohoes, N. Y., a Corporation of New York. Filed May 29, 1907. Serial No. 376,413.

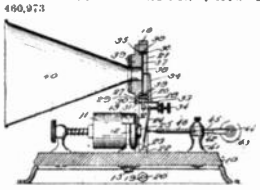


1. In an electric water-heating faucet, a valve casing having an inlet and an outlet and an extended passage leading from the valve chamber to the outlet, electric means for heating said extended passage and a valve for controlling communication between the inlet and said extended passage.

926,933. WIRELESS TELEGRAPHY. Lee de Forest, New York, N. Y., assignor, by mesne assignments, to De Forest Radio Telephone Co., a Corporation of New York. Filed Mar. 22, 1905. Serial No. 251,365.

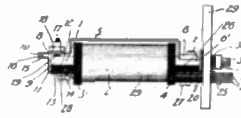
1. A spark gap device for wireless telegraph transmitting apparatus including a substantially straight vacuum tube containing a liquid electrode in the bottom and a trailing propelling member or thrust arm having its upper forward end portion pivotally connected with the vehicle and having its lower rear end portion connected with the traction propelling wheel; tension spring means supported upon the body portion and flexible power transmitting connection arranged to extend from the tension spring means forwardly to a bearing point on the vehicle and thence rearwardly to the lower portion of the trailing propelling.

928,589. INTENSIFIER FOR TELEGRAPH-SOUNDERS. Ralph W. Crawford, Jr., Ralph H. Beck, and Lewis W. Davies, Lamar, Colo. Filed Nov. 3, 1908. Serial No. 460,973.



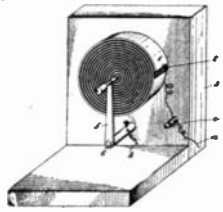
1. A device of the class described comprising a relay, a bracket disposed on said relay, a sound box carried by said bracket, a plate carried by said sound box, ears on said plate, a second plate, ears on said second plate, set screws positioned through said ears for securing said plates adjustably together, a stylus arm disposed on said first plate engaged with the diaphragm in said sound box, a bracket carried by said second plate, a set screw disposed through said bracket for engagement with the armature of said relay and an abutment depended from said second plate for engagement with said armature.

927,739. RELAY. Ray H. Manson, Elyria, Ohio, assignor to Dean Electric Company, Elyria, Ohio, a Corporation of Ohio. Filed Aug. 23, 1907. Serial No. 390,815.



1. In a relay, the combination of a core, an energizing winding on said core, an armature rigidly supported on said core, a contact rigidly secured to the armature and an insulated contact supported on the core and secured directly to the core by suitable fastening means, such contact adapted to cooperate with the contact on the armature.

926,934. WIRELESS-TELEGRAPH TUNING DEVICE. Lee de Forest, New York, N. Y., assignor, by mesne assignments, to De Forest Radio Telephone Co., a Corporation of New York. Filed Jan. 29, 1906. Serial No. 296,931.



1. A wireless telegraph tuning device consisting of a spiral of metallic ribbon and a contact operating transversely across said spiral whereby the capacity and inductance thereof may be varied in a continuous manner.

2. A wireless telegraph tuning device comprising a tightly wound spiral of conducting ribbon, and a movable contact member arranged to move transversely with respect to said spirally wound ribbon for varying the number of effective spires thereof.

Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending July 20th.

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

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

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

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

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

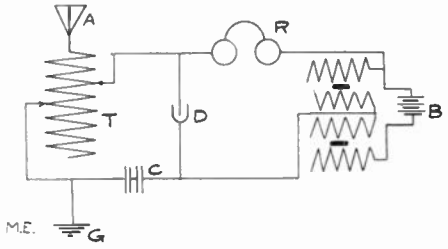
If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

POTENTIOMETER.

(276.) FRED KANTENWEIN. New York City, writes:

1.—Kindly give a diagram of connections of potentiometer described in your May issue, for batteries, detector, etc.

A. 1.—Diagram given below. Third connection was omitted in our May issue.



INTERRUPTER AND ½-INCH COIL.

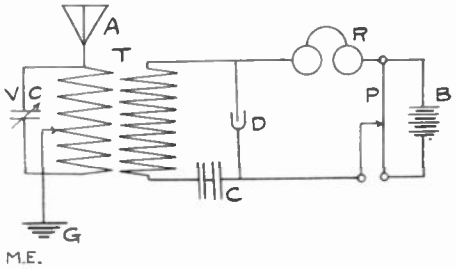
(277.) HOWARD COOPER, New York, asks:

1.—Is a tuning transformer as good in the receiving set as a common tuning coil?

A. 1.—Yes, better in some cases.

2.—Please give a diagram for connecting the following: Tuning transformer, variable condenser, fixed condenser, electrolytic detector, telephone receiver and potentiometer.

A. 2.—Diagram given below.



3.—What ought my sending radius be with a ½-inch spark coil equipped with the city current, and an electrolytic interrupter, a zinc spark gap and a helix?

A. 3.—3 to 5 miles.

POTENTIOMETER.

(278.) ELMER J. HANSEN, Illinois, says:

1.—How is a shunt coil for wireless telegraphy made? Size of wire and core, also kind of wire?

A. 1.—We presume you mean the potentiometer, one form of which was described in the May issue.

2.—How is the above coil connected in tuned system for wireless telegraph?

A. 2.—We refer you to query No. 277.

3.—What is the purpose of this shunt coil?

A. 3.—The purpose of a potentiometer is to vary the potential *or voltage* impressed upon the detector, at the same time interposing as little actual resistance as possible in the circuit.

TESTING BUZZER.

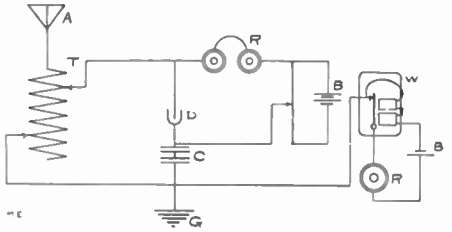
(279.) ALVIN KOLB, Ohio, asks:

1.—Will nearby trees tend to ground waves from antenna?

A. 1.—Yes. Particularly in wet weather.

2.—How is testing done with a buzzer?

A. 2.—Diagram for proper connection of buzzer testing outfit is given below. Operating is as follows: When adjusting the detector with one hand keep pressing the push button in circuit with the buzzer, and when a good loud buzz is heard in the telephones the detector is adjusted at the most sensitive point.



SELECTIVE TUNER.

(280) EDWARD CARLSON, Brooklyn, N. Y., writes:

1.—How much enameled wire (No. 20) would I need on a tuning coil 3 inches in diameter and 20 inches long?

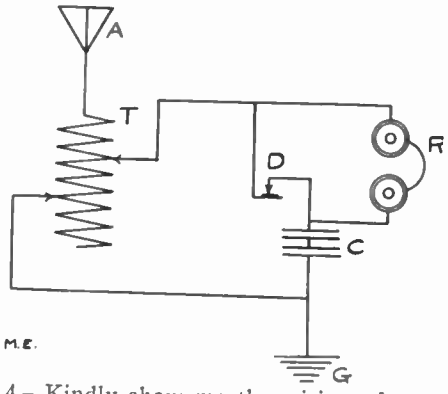
A. 1.—About 1 pound.

2.—Give me an explanation and drawing of a selective tuner.

A. 2.—We refer you to the March issue of MODERN ELECTRICS, article by Charles Cheever.

3.—Give a correct drawing or diagram of a silicon wireless system.

A. 3.—Diagram given below.



4.—Kindly show me the wiring of a tuning coil with two slides.

A. 4.—Diagram shown in answer to question 3 gives correct wiring plan for use with the double slide tuning coil.

¼ K. W. TRANSFORMER.

(281.) LEE ROLLINS, Illinois, writes:

1.—How far can I send under favorable conditions with an E. I. Co. ¼ K. W. transformer?

A. 1.—Probably about 50 to 75 miles.

2.—Will I need a different apparatus to send at night than in the day time? If so, please state changes necessary.

A. 2.—It is not necessary to make any change in the apparatus.

TUNING TRANSFORMER.

(282.) H. E. ADAMS, Connecticut, writes:

1.—Would this be a good tuning coil: A round wooden core 15 inches by 4½ inches wound with one layer No. 18 annunciator wire for primary, on which is a sliding contact. The secondary for tuning coil is a single layer of No. 32 cotton-covered copper wire wound around a ring of cardboard about 5 inches in diameter and 2 inches wide.

A. 1.—We believe that a tuning coil constructed in this manner would give very fair results.

2.—Which is best for an aerial, aluminum or No. 18 bare copper wire?

A. 2.—We have always found the No. 14 bare aluminum wire superior to copper wire—not for electrical, but for mechanical reasons. First, it is very much lighter than copper, consequently does not sag as much; second, it does not corrode like copper and on account of it being so light, storms have little or no effect on it.

3.—Could you make a potentiometer with a pencil lead, provided with sliding contact?

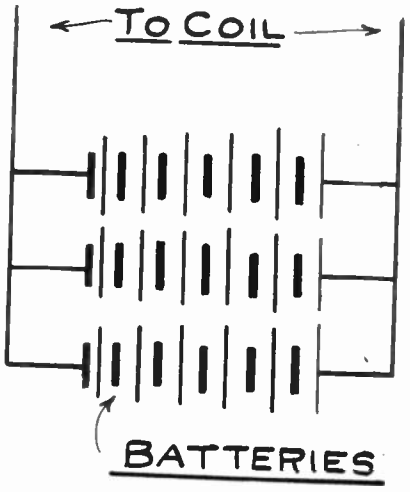
A. 3.—No. A pencil lead has not enough resistance, at the utmost 30 ohms, while a potentiometer should at least have 300 ohms.

CARBON BATTERIES.

(283.) EDGAR W. PAUSCH, Illinois, asks:

1.—Having six carbon batteries connected with a 1-inch induction coil (believing six sufficient), I find coil will not operate longer than one minute at a time. What remedy, if any, can I find to have coil in operation for a longer duration?

A. 1.—We do not think you are using enough carbon batteries to operate a 1-inch coil. We would suggest that you use batteries as per diagram below, which will



give you probably enough ampereage to operate the coil a longer time. These batteries are not suitable for coil work. Use Bichromate of pottash cells, or Edison primary batteries.

2.—Please give discription for construction of a tuning coil, my aerial being 40 feet high.

A. 2.—We refer you to query No. 240.

VOLTAGE OF ¼ K. W. TRANSFORMER.

(284.) RALPH ADAMS, Washington, asks:

1.—What is the secondary voltage of the ¼ K. W. transformer described in the April issue?

A. 1.—About 10,000 volts.

2.—What is the wave length of my station if my antenna is strung between a pole on top of our house and a shed in which my instruments are situated? It being about 95 feet from the spark gap to top of net and the net makes an angle of about 60 degrees with the earth.

A. 2.—We should figure your wave length as being probably about 125 meters.

3.—What would be the dimensions of glass and tinfoil for a condenser of the plate type for wireless work, to be charged by the ¼ K. W. transformer mentioned above, and the number of plates?

A. 3.—We would suggest that you use about five plates of glass 14x20, ⅛ inch thick, the tinfoil on both sides of same 10x16 inches.

AUTO-COIL.

(285.) J. J. Vey, Massachusetts, asks:

1.—Would you please state what the required voltage is to run a small automobile coil and the most it would stand without injury?

A. 1.—We do not know what size automobile coil you have, but would suggest that you use six volts on same. Not more than eight volts at any rate.

AERIAL FOR COHERER.

(286.) Leland W. Davis, New Hampshire, writes:

1.—What do you consider the best aerial to use with a filing coherer?

A. 1.—We believe the flat top or "T" aerial to be the best for use with the filings coherer.

2.—My station is on the second floor. Does the ground wire need to be insulated on the way to the ground?

A. 2.—No.

3.—How far will an E. I. Co. 1-inch coil send with a filings coherer at the receiving end, tuned circuits at both ends, and a sending condenser?

A. 3.—About one mile and a half to two miles.

TO RECHARGE OLD DRY CELLS.

(287.) Albert A. Rall, Missouri, asks:

1.—Can dry cells be recharged? If so, state several methods.

A. 1.—The only way in which a dry cell may be recharged to be any good at all is as follows: Drill several holes through the zinc cover of the cell and drill almost into the carbon with an ⅛-inch drill, cleaning out the holes thoroughly. Procure a solution of 10 parts of water and 5 parts of chloride of zinc. After well heating this solution, though not allowing it to boil, place the cells in same and let it soak up all of the liquid possible. This will require about 20 minutes to one-half hour. Now take the cell out and roll it on the floor so as to get rid of the surplus liquid. Battery is now ready for use and will register in most cases eight to twelve amperes and 1.3 volts. For further particulars, see April, 1908, issue.

2.—How can I receive with the following apparatus: 1000 ohm receiver, "auto-coherer," potentiometer and condenser?

A. 2.—About 300 to 500 miles.

DATA ON ¼-INCH SPARK COIL.

(288.) Richard H. Foster, Rhode Island, asks:

1.—I am making a ¼-inch spark coil of bare wire. Will bare wire be all right to use, and is No. 30 small enough for the secondary?

A. 1.—Yes, but if you have no winding machine, don't attempt to wind a bare wire coil.

2.—Please give data on ¼-inch spark coil.

A. 2.—Core 5 inches long by 9/16-inch diameter. Wound with 5 ounces of No. 16 wire. Secondary wound two sections with 1 pound of No. 30 wire. Thirty sheets of tinfoil 3x1¼. Use 4 volts and 2 to 4 amperes.

3.—Will Leyden jars increase the spark of a 1-inch coil? If so, how many should be used and what would be the size of the spark?

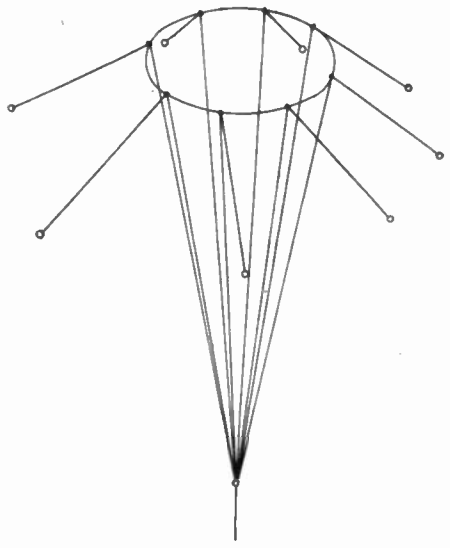
A. 3.—Leyden jars increase the efficiency of a coil, not the spark length. In fact, they reduce the spark length 90 per cent. but make it a great deal fatter.

UMBRELLA AERIAL.

(289.) Sidney Allen, Alabama, asks:

1.—Please tell me how to wire an umbrella aerial.

A. 1.—Diagram given below.



WIRELESS BOOKS.

(290.) John E. House, Canada, writes:

1.—Can you give me a list of books, the study of which would help me to obtain an advanced position in the wireless field?

A. 1.—We would recommend the following books for your purpose: "The Principles of Electric Wave Telegraph," by J. A. Fleming; "Wireless Telegraphy," by W. Maver, Jr.

2.—In taking up this art, which code and system do you think it advisable to study?

A. 2.—Morse code is most generally used in wireless in this country, although the knowledge of the continental code also would be a great help to any wireless operator.

3.—Can you recommend the American Wireless Institute as a good instructor in the art of wireless?

A. 3.—Most assuredly.

SENDING DISTANCE OF ONE-INCH COIL.

(291.) Eustice Bernhard, California, writes:

1.—As I am thinking of getting a wireless outfit, I would like very much to know how far I could receive wireless messages with an aerial composed of six strands of No. 14 aluminum wire 50 feet high and 60 feet long? Wires to be 8 inches apart. My instruments consisting of the E. I. Co.'s bare point "Electro"-lytic detector, the Electro potentiometer, the large Electro tuner of 600 meters wave length and 2 receivers, each wound to 2,000 ohms.

A. 1.—Probably 500 to 800 miles.

2.—What is the greatest distance a good 1-inch spark coil will send under best conditions over water at night if the receiving

(292.) FRANK MERRITT, New Jersey, asks: station is very sensitive?

A. 2.—About 5 to 7 miles.

DEFINITION OF TUNER.

1.—How far will a ¼ K. W. transformer send?

A. 1.—50 to 75 miles.

2.—How far will a ½ K. W. transformer send?

A. 2.—100 to 125 miles.

3.—Describe the construction of a tuning coil.

A. 3.—A tuning coil is simply a coil of wire wound inductively (one layer of wire) and unmagnetically (no metal core used). Variable contacts are provided to slide over a bared portion of the winding to vary amount of inductance.

WIRELESS QUERIES.

(293.) R. A. SHERWOOD, New York, says:

1.—With an equipment consisting of a 1½-inch coil, condenser, zinc spark gap and aerial nearly 40 feet above the ground, how far should I be able to send?

A. 1.—Three to five miles.

2.—If one-half the distance is over water?

A. 2.—Probably the distance over which you could transmit would be increased to 7 or 8 miles.

3.—With above-named aerial, how far could I receive with a tuning coil, condenser, potentiometer, electrolytic detector and 1,000 ohm receiver?

A. 3.—Probably about 300 miles.

ADJUSTING SENDING HELIX.

(294.) WILLIAM C. CLARK, New York, writes:

1.—How may a person be able to tell when sending whether he is tunning, with a sending Helix, to suit the person he is sending to?

A. 1.—By asking the other fellow how his (the sender's) spark sounds and adjusting until it sounds good and clear.

2.—Can the "Electro"-lytic detector work without batteries?

A. 2.—Yes.

3.—I wish to hoist an aerial up on poles, but when the rope gets wet in rainy weather the rope shrinks, thus tightening the aerial in wet weather and leaving the aerial very loose in dry weather. How may this be overcome?

A. 3.—By using paraffined rope.

4.—How many 2 volts 5 amperes storage batteries will be required to work a 1½-inch spark coil 8 miles?

A. 4.—You would probably require about eight of these batteries, as the ampere hour capacity is not very high. Connect four in series and four in multiple. You really need a 6 volt 60 A. H. battery to transmit over said distance.

5.—How long could I send with these batteries without having them re-charged?

A. 5.—Probably 4 to 6 hours.

5.—Would five fixed condensers used with switches so 1 2 3 4 5 condensers could be cut in, to suit operator, form an adjustable condenser for sending?

A. 5.—Yes.

CHARGING STORAGE CELLS.

(295.) LOUIS Q. ROSEN, New York, writes:

1.—If the ground of a telephone is used for wireless telegraph would it effect the telephone?

A. 1.—Probably, by so-called "stray currents."

2.—Is a medical coil on the same principle as a spark coal?

A. 2.—Yes, on a smaller scale.

3.—Could it send a message a very short distance?

A. 3.—Yes, provided you can get a jump spark from same at the secondary.

4.—Does a Perikon detector require batteries?

A. 4.—No. Although under certain circumstances batteries may be used.

5.—Can wireless telegraph messages be caught with five No. 14 copper wires to a water pipe and no aerial?

A. 5.—Yes, but only for a short distance.

5A.—Why does silicon have to have sharp edges and always have to be adjusted just so to get best results?

A. 5A.—Silicon does not have to have sharp edges when used as a wireless detector. In fact, the original patent on the silicon detector shows a flat, highly polished surface used with a brass point resting on same.

6.—How can 118 volts be used to charge storage batteries without using any kind of an apparatus, but electric lights?

A. 6.—By using incandescent lamps connected in series and multiple.

6A.—Would it make any difference how many cells are charged at the same time, if so what difference? My cells are 2 volts and 5 amperes each.

A. 6A.—No, except that you must use more lights in multiple to allow more ampereage to flow through the circuit.

NOVEL STATIC MACHINE PLATE.

(296.) ROBERT F. ADAMS, Texas, asks:

1.—Has the April number (1908) of MODERN ELECTRICS ever been reprinted?

A. 1.—No.

2.—Can 10-inch worn-out disc graphophone records be used instead of glass plates in a Wimshurst static machine?

A. 2.—We should think so, although the spark will be small.

3.—Have made a tuning coil frame like the one described by A. C. Austin in the June (1908) issue. If I should wind same with No. 18 enameled wire would there be any liability of the wire getting loose in dry weather?

A. 3.—Possibly yes. We would suggest that you shellac the wire to the frame.

LIGHTNING QUERIES.

(297.) ERNEST PITMAN, Ohio, asks:

1.—How should an aerial be grounded in case of lightning?

A. 1.—We refer you to query No. 219 in the May issue. This shows the aerial directly grounded outside of the operating-room to take care of danger from lightning.

2.—Would it be dangerous to ground aerials for lightning to pipes that run to the interior of a house?

A. 2.—Yes. Ground should be made outside of the house.

3.—Which is best, copper or aluminum wire for aerials?

A. 3.—We have always found aluminum wire to give very good results when used for aerials. See query 283.

THE NEW TELEFUNKEN SYSTEM.

(Continued from Page 211.)

and although static — which is always troublesome on the Black Sea—was particularly strong, perfect communication both ways was maintained up to a distance of 600 kilometers. It was also possible to receive two messages *simultaneously* from the moving vessels on the stationary one at Sebastopol and over the entire range and on one and the same receiver and detector, but with two differently adjusted telephone receivers. In this connection it is also interesting to note the remarkable fact that the signals from an old type fifteen-kilowatt station near Sebastopol, which was used in this test, became absolutely unintelligible on board the moving vessels on account of static long before the extreme effective range of the new type two-kilowatt sets had been reached.

CLASSIFIED ADVERTISEMENTS.

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

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

Advertisements for the Sept. issue must be in our hands by Aug. 25.

ELECTRICAL APPARATUS.

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

When writing please mention "Modern Electrics."

ELECTRICAL BOOKS, BLUEPRINTS, ETC.

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

When writing please mention "Modern Electrics."

DRY BATTERIES RENEWED cheaply, last long as new. Correct scientific method. Send 25 cents for instructions. Fairmount Telephone Co., Leighton's Corners, N. H.

When writing please mention "Modern Electrics."

RADIANT ELECTRICITY.—Every experimenter should become interested in Ra-del, a new invention. Write for particulars or arrange for a demonstration. Paul W. Fractas, 1590 Amsterdam avenue, New York.

When writing please mention "Modern Electrics."

HOW TO BUILD A WIRELESS TELEGRAPH. Directions and blueprints, 25 cents. Miller Electric Co., Wireless Dept.

When writing please mention "Modern Electrics."

SILVER PLATING! Gold plating! Copper plating! without battery, or mercury; and to Plate Metals with Melted Tin. Four Formulas, 25c. George Cook, Silver Hill, Milford, Mass.

When writing please mention "Modern Electrics."

PROCESS OF METALIZING Flowers "Free" to anybody, telling me what formulas they want and encloses stamp. My formula collection contains formulas for everybody. Write me your wants. George L. Cook, Formula Specialist, Milford, Mass.

When writing please mention "Modern Electrics."

BLUE PRINTS. ¼ K. W. 10,000 V. and ½ K. W. 15,000 V. step up transformer. Clear print showing Morse, Inter., and Navy Codes. All sent postpaid, 50c. H. J. Callaghan, Box 567, Livermore, Cal.

When writing please mention "Modern Electrics."

METALIZE FLOWERS, grasses, insects, etc. Big money selling same as jewelry; latest novelty. Everybody buys. Two sure formulas and full instructions for 50c. A. P. Benson, Stewartville, Minn.

When writing please mention "Modern Electrics."

THREE THOUSAND FORMULAS. My 368-page volume of recipes and trade secrets, cloth bound, only 75c. prepaid. Worth dollars. Satisfaction guaranteed. Wiley Sanderson, Dept. M, Ypsilanti, Mich.

When writing please mention "Modern Electrics."

DRY BATTERIES RENEWED cheaply, last long as new, correct scientific method. Send 25c. for instructions. Fairmont Telephone Co., Leightons Corners, N. H.

When writing please mention "Modern Electrics."

? WIRELESS ?

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

When writing please mention "Modern Electrics."

A CHOICE STOCK and the finest assortment of Wireless Telegraph supplies for the experimenter and the amateur in Philadelphia. We can save you money on all these goods and shall be only too pleased to demonstrate and explain you the philosophy and working of the apparatus' tuners, detectors, condensers, high resistance phones, coherers, etc. J. Elliott Shaw, 632 Arch St., Philadelphia, Pa.

When writing please mention "Modern Electrics."

WIRELESS. New England wireless amateurs can obtain high grade wireless goods from me. All supplies kept in stock. All material guaranteed. Send 2-cent stamp for printed matter on New Detector. Springfield Wireless & Morse Institute, Room 81, 476 Main street, Walker Building, Springfield, Mass.

When writing please mention "Modern Electrics."

YOU BET

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

When writing please mention "Modern Electrics."

SPECIAL PRICES—1,000-ohm wireless receiver, double pole, special diaphragm, $1.75. Leather-covered headband, single, 60c.; double, $1.00. "Sealed-in Point" electrolytic detector, $2.00. "Eclipse" double slide tuning coil, $3.00. Sending helix, 450 meters, $2.75. "National" receiving condenser, 30c. Wireless Telephone transmitter, $1.25. Waterhouse Bros., Bourne, Mass.

When writing please mention "Modern Electrics."

FOR INTRODUCTION. Our Wireless receiver set No. 6101, complete, $4.00. Send 2 cents for catalogue. Miller Electric Co., Dept. R.

When writing please mention "Modern Electrics."

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

When writing please mention "Modern Electrics."

FOR SALE.

MASSIE WIRELESS TELEGRAPH APPARATUS. Amateurs will find it to their advantage to communicate with Charles W. Oberm, No. 4 Market Square, Providence, R. I.

When writing please mention "Modern Electrics."

HIGH GRADE transmitting apparatus, with 3-in. coil, helix, gap, condenser, and key; price $12, cost $24. Also fine, large slate switchboard, with all instruments and switches necessary, price $8, cost $12. C. S. Williams, Mansfield, Ohio.

When writing please mention "Modern Electrics."

WANTED.—The first three issues of "Modern Electrics." Also sending helix. Sidney Allen, 630 Graymont, Birmingham, Ala.

When writing please mention "Modern Electrics."

ONE MIDGET DYNAMO and 16 of the latest electrical books for a low-reading Pignolet volt-ammeter or $8 cash. August Krieger, Luckenbach, Texas.

When writing please mention "Modern Electrics."

FOR SALE.—Complete wireless outfit, sending and receiving, switches, etc., cheap. Write Geo. Lamont, 48 So. Washington street, Denver, Colo.

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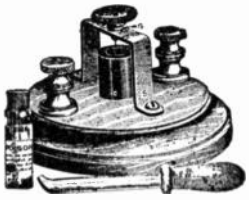
Mid-Summer

THE "Electro"-Lytic Detector



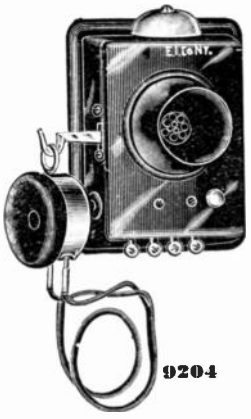
For two years this Detector has been the standard. We are closing out this style, as we are building a new type. Only 50 of the old type left. As efficient as the *new type*, and just as sensitive. The list price is $2.00. The 50 as long as they last, each

75 CENTS

By mail extra 15 cents

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

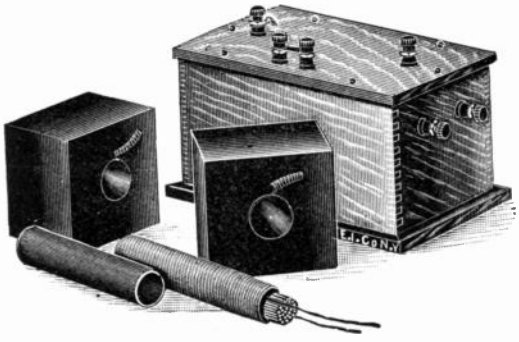
The Famous "Telimphone"



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

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

$3.00 9204



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

(100 Mile Wireless Coil)

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

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

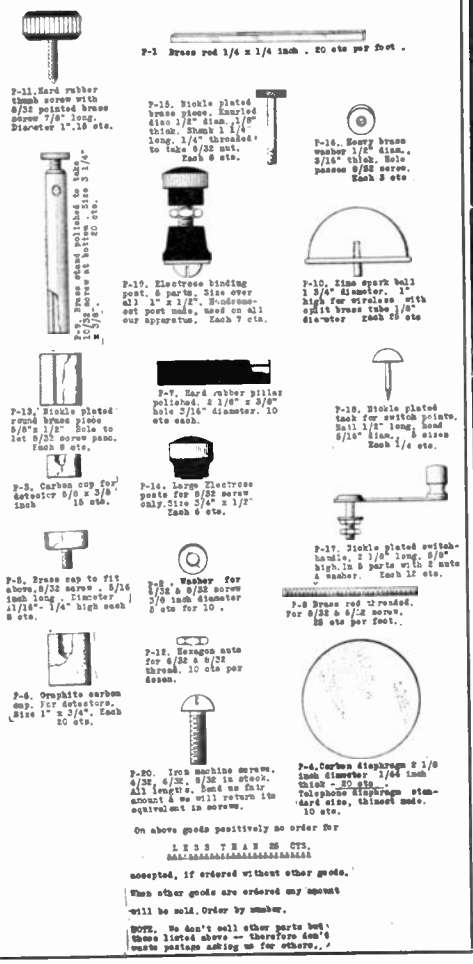
As there is no vibrator nor condenser to this coil, it must of course be used with an electrolytic interrupter or independent vibrator or running it from 110-120 Alternating current. The spark obtained is from 1½ to 2 inches long, but ¼ inch THICK. For wireless work it is the fat spark that counts, not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

PRICE OF COIL $7.50

Sent for inspection and trial on receipt of $1.00

EXPERIMENTER'S GOODS—A NEW LINE

Hard to Read—But Worth While!



P-11. Hard rubber thumb screw with 8/32 pointed brass screw 7/8" long. Diameter 1". 10 cts.

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

P-15. Nickle plated brass piece. Knurled disc 1/2" diam. 1/8" thick. Shank 1 1/4 long. 1/4" threaded to take 8/32 nut. Each 6 cts.

P-16. Heavy brass washer 1/2" diam., 3/16" thick. Hole passes 8/32 screw. Each 5 cts

P-19. Electrose binding post. 2 parts. Size over all 1" x 1/2". Hendersonset post made, used on all our apparatus. Each 7 cts.

P-10. Zinc spark ball 1 3/4" diameter. 1" high for wireless with split brass tube 1/8" diameter each 25 cts

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

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

P-18. Nickle plated tank for switch points. Rail 1/2" long, head 5/16" diam. 5 cuts Each 1/4 cts.

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

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

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

P-5. Brass cap to fit above. 8/32 screw . 5/16 inch long . Diameter 11/16". 1/4" high each 5 cts.

P-8. Washer for 6/32 & 8/32 screw 3/8 inch diameter 5 cts for 10 .

P-9 Brass rod 12 rounded. For 8/32 & 6/32 screw. 25 cts per foot.

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

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

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

P-6. Carbon diaphragm 2 1/8 inch diameter 1/64 inch thick - 20 cts. Telephone diaphragm standard size, thinest made. 10 cts.

On above goods positively no order for

LESS THAN 25 CTS.

accepted, if ordered without other goods.

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

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

Bargains

1088

Our Stock on 1 inch Spark Coils

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

No. 1088 one inch Coil, $5.00, now

$4.50

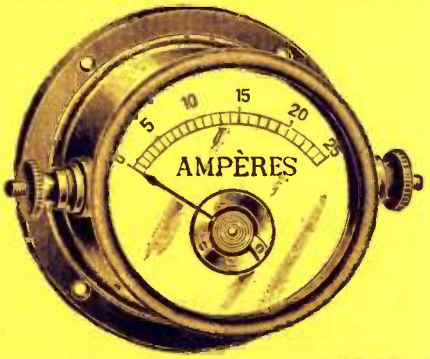
IMPORTED VOLT AND AMMETERS FOR SWITCHBOARDS

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

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

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

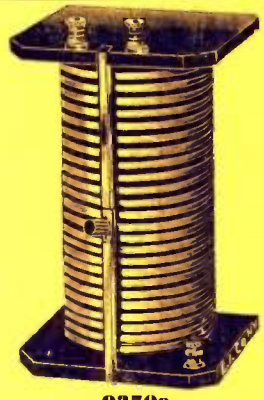
NOW **$3.00** By mail extra 8 cents



Fixed Condenser

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

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



9270a

"ELECTRO" SPECIAL SENDING HELIX

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

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

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

Three large binding posts are provided. Size of frame 7 x 7½ x 18 inches. Weight 4 lbs. No. **9270a** "Electro" Special Sending Helix, as described,

$5.00

Our new **ELECTRICAL CYCLOPEDIA CATALOG No. 6,** containing 120 pages, valuable information, wireless diagrams, WIRELESS CODES, electrical photographs and the most complete assortment of wireless goods, apparatus, novelties, etc. etc., will be sent to you on receipt of 2 cents postage to cover cost of mailing. **2nd EDITION 1909**

¶ *"Everything for the Experimenter"*

Electro Importing Co., 86-z West Broadway, New York

FOUR KINDS OF SERVICE

The charge ranging from one cent to one-quarter of a cent a word to the general public makes communication by telegraph an economic convenience for every one. You can send

25-word TELEGRAMS, any distance for 25c.
50-word TELEPOSTS, any distance for 25c.
100-word TELETAPES, any distance for 25c.
10-word TELECARDS, any distance for 10c.

A THOUSAND WORDS PER MINUTE over a single wire, when the older Telegraph Companies average only fifteen words per minute, makes possible the above-named rates and other startling innovations in telegraph service that are sure to interest every progressive American.

¶ After some months successful operation commercially in the East the Telepost first Western section has been opened up. Offices are now open for business between St. Louis, Mo., Terre Haute, Ind., Springfield, Ill., and Aurora, Ill. Messages are transmitted at above rates.

¶ Line construction is being pushed in many widely separated sections, and additional cities are to be connected in rapid succession until every city in the United States is given the Telepost's quick and accurate service, at rates so low that all can afford to carry on their more important correspondence by wire.

¶ You ought to know all about it.

¶ An interesting illustrated booklet has been prepared, describing in detail the invention, its operation, its economy, its rapidity and its accuracy. Mailed without cost to any one asking for Booklet "No. 359"

Sterling Debenture Corporation

Madison Square **New York City**