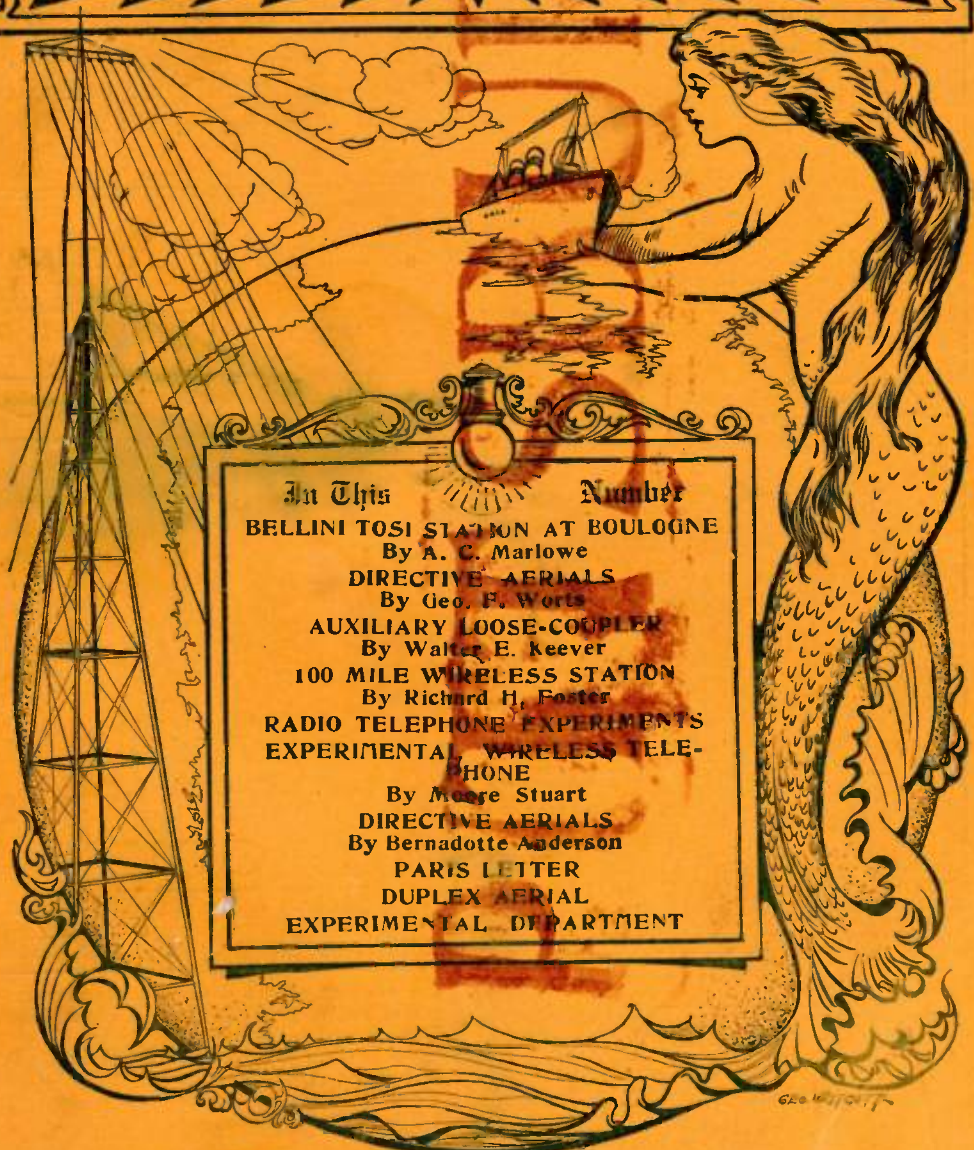
Special Wireless Issue

PRICE 10 CENTS MAY, 1910

Vol. III No. 2

MODERN ELECTRICS



THE SPIRIT OF WIRELESS

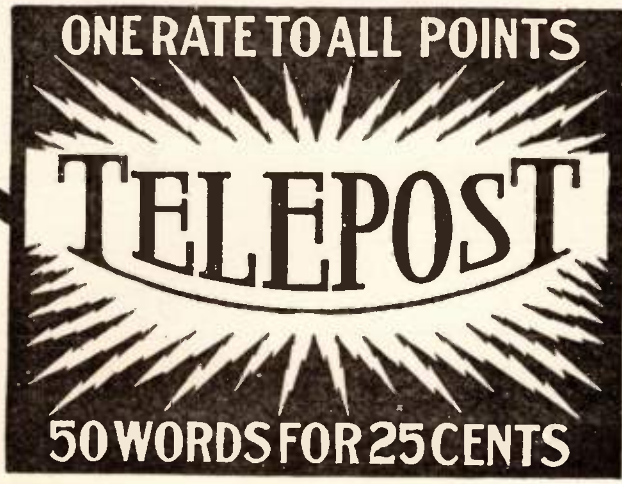
"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

"Modern Electrics" guarantees the reliability of its advertisers.

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 and Sedalia, Mo., St. Louis to Springfield, and Aurora, Ill., St. Louis to Terre Haute, and Indianapolis, Ind., and 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.

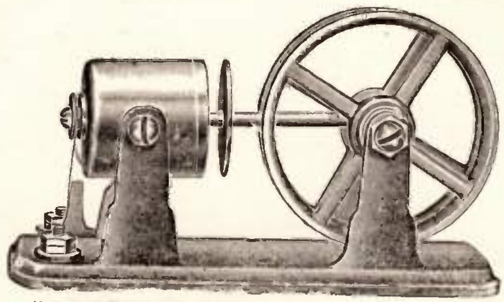
¶ An interesting illustrated booklet has been prepared, describing in detail the invention, its operation, its economy, its rapidity and its accuracy. Mailed without cost to any one asking for Booklet No. 359.

Sterling Debenture Corporation

Brunswick Building, Madison Sq. **New York City**

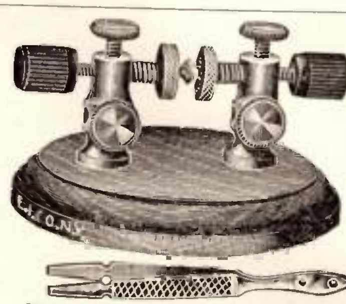
New Premiums

WE have had such good success with our premiums that we are again offering a new assortment to our readers. It is not necessary to be a subscriber to get any of the premiums listed below; anybody can win same. For instance: The article given for one new subscription will be given to anybody who sends in even his own subscription, but you must ask for the premium when you send the subscription. Claims for premiums after subscriptions have been received, cannot be recognized under any circumstances.



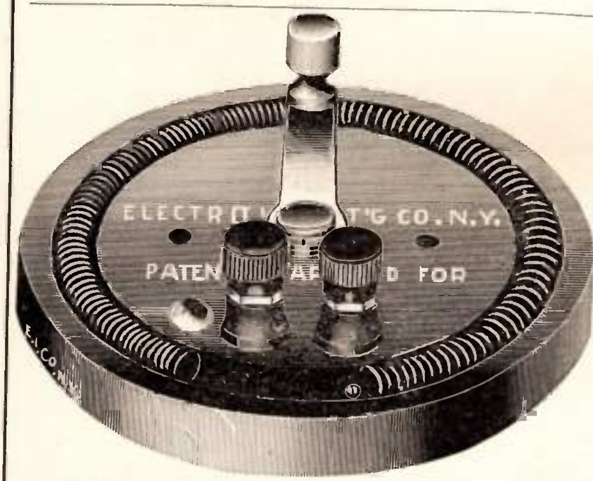
"WIRELESS" ENGINE. The finest made. Runs in both directions on one dry cell. Can't be beat. Postage of 15 cts. must be added. Engine sells for 45 cts.

Given FREE for One Subscription.



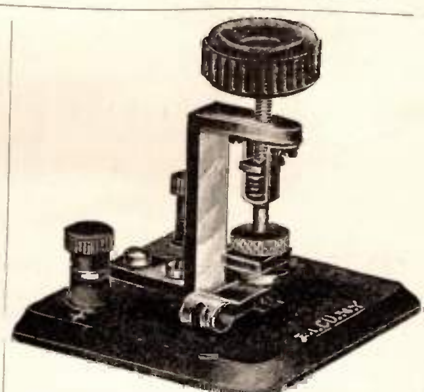
CRYSTAL DETECTOR STAND. Takes any crystal, or any substance. Most sensitive all-around Detector made. Postage of 12 cts. must be added.
Sells for $1.00.

Given FREE for Three Subscriptions



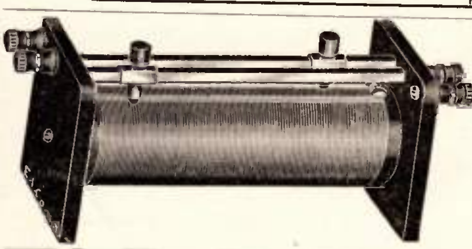
"ELECTRO" RHEOSTAT (Patented Feb. 1, 1910.) The only air cooled rheostat made. Just the thing to dim down lamps, for Wireless, etc., etc. Rheostat sells for 50c.

Given FREE for Two Subscriptions



The Famous Peroxide of Lead DETECTOR. A dry electrolytic. More sensitive than silicon or carborundum. Postage of 12 cents must be added. Detector sells for $1.25.

Given FREE for Four Subscriptions



JUNIOR TUNER with solid hard rubber ends. The finest small tuning coil made. Used in the best wireless stations in the U. S. Rolling ball sliders, (patented Feb. 1, 1910), nickel trimmings, hard rubber posts, etc. Must go by express.
Coil sells for $2.00.

Given FREE for Six Subscriptions

Show this magazine to your friends. If they are interested in electricity, the magazine will talk for itself, and you get the subscription **EVERY TIME**. Try it now, today. Send money orders only, no checks or stamps.

Modern Electrics Publication. 233 Fulton St., New York City.

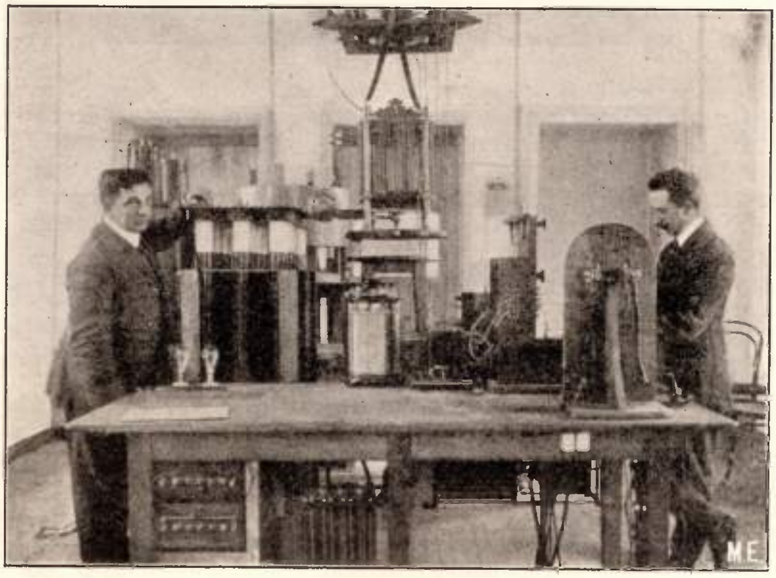
Modern Electrics

VOL. III. MAY, 1910. No. 2

Bellini-Tosi Station at Boulogne

By A. C. Marlowe.

Paris Correspondent, "Modern Electrics"



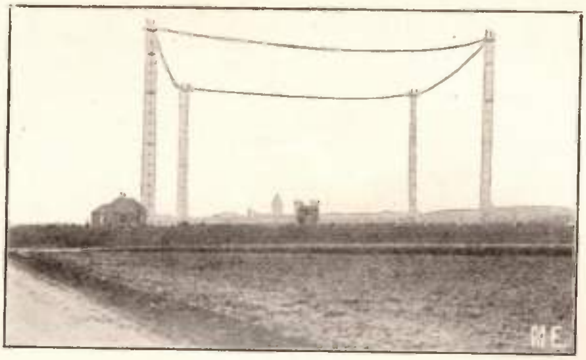
Bellini and Tosi in Their Station.

THE Bellini-Tosi system of directed waves has now entered upon a practical stage. Since our preceding account of this method, the French government has taken up the matter, and this led to the erection of a station at Boulogne, on the Channel Coast. It is now in very successful operation, and proves conclusively that the waves can not only be directed, but also that the new system of aerial will give a better result for a given power than the ordinary aerial.

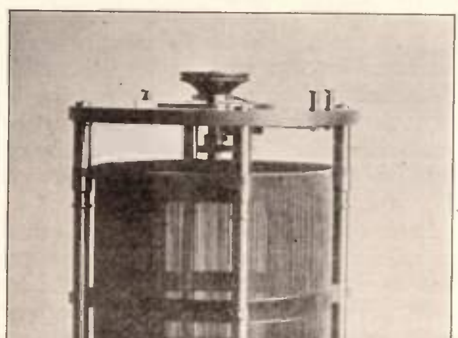
The general appearance of the Boulogne station is shown in one of our engravings, in which will be seen the four structural iron towers and the station buildings. The towers are 152 feet in height, and are placed at the corners of a square having 264 feet on a side. Horizontal cables join the summits of the towers, and from each of the four cables there is hung an aerial which reaches the ground. Each pair of aerials lying on opposite sides of the system is made to form an open triangle, that is, the distance across at the top is about equal to the width of the square, or 267 feet, while at the ground the aerials are spread out considerably, so that here the width is 420 feet. The aerial in each case makes an angle of 32 degrees with the vertical. Such dimensions were determined by calculation as the ones which would give the best results.

Each of the aerials on a side is made up of six copper wires, which run parallel to each other and are spaced 12 feet apart. The lower end of the aerial ends at 24 feet from the ground and the upper end, taking account of the sag of the horizontal cable, is at 145 feet height. The six conductors of each aerial are joined by metallic connection at the lower end, and from here the nearly horizontal wires run to the station building, which is located at the centre of the square. Such aerials have a wave length of 900 meters, but as they are to be used in actual work for 300 meter wavelengths, they are excited according to the third harmonic.

In order to make a series of measure-



ments as to the power sent out from the Boulogne post, there was installed a testing station 1 1/2 miles distant, when the directive power of the plant could also be noted. Owing to the fact that the testing station is located at 10 wavelengths from the Boulogne station, the test instruments are not affected by local influences from the main station, and the results are the same as would be secured at a great distance. The second post had an aerial which was connected to a Duddell thermo-galvanometer, so as to allow of measuring the amount of energy received at this point, and this was especially valuable to show how the Bellini-Tosi method compares with an ordinary aerial. It was supposed that the new method would not work to as long a distance as the usual system with



The Radio Goniometer

single aerial, but the tests show that the contrary is the case, and that the present method is superior. This was proved in two different ways, first by measuring the comparative amounts of energy received by the testing station, and second by actual working at long distances.

When working with the testing station, in one case the inventors employed both aerials to form the directed system, and in another test there was used one of the aerials alone so as to act in the usual way as a single aerial. Measurements showed that the radiation by the Bellini-Tosi system was no less than six times the amount which the single aerial gave, so that we have here a striking difference.

It then remained to show what the Boulogne station would do in the way of long-distance transmission, and in these latter tests the results were also superior to what the straight aerial would give. Connection was made in the first place with the English post of Folkestone, on the other side of the Channel, at 25 miles distance, and then with stations at greater distances, one of these being at Marseilles, and the second at Algiers. Messages were always received at these posts with great clearness and were much better than what the ordinary aerial could send, as these latter signals were considerably weaker. The distance between Boulogne and Algiers, is 960 miles, of which about two-thirds, or 660 miles, is overland. On the other hand, the power used at the station was not more than 500 watts in the primary of the induction coil, and the wave-length is only of 300 meters length. For these reasons the results are very encouraging.

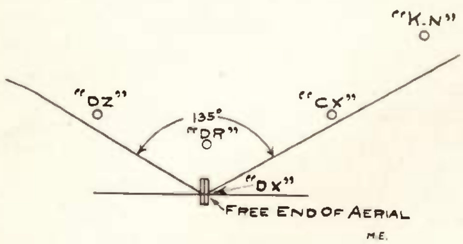
One of our engravings shows the interior of the Boulogne station and the mounting of the instruments. The radio-goniometer will be observed at the

(*Continued on page 71*)

Directive Aerials

By George F. Worts.

A PROPERLY designed directive aerial will prove much more efficient than one of the non-directive type. This point is demonstrated forcibly by the practical application of the former

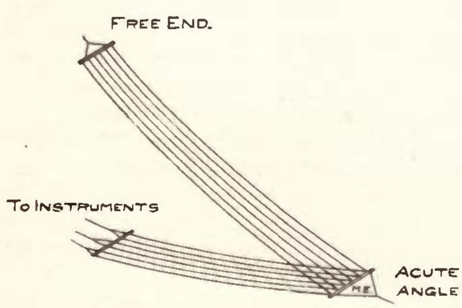


-FIG. 1-

type in many of the United Wireless and in Dr. Deforest's stations.

Wireless sets will be found to work best in the direction opposite to that in which the free end of the aerial points. The United Wireless' station at Toledo, Ohio, has a horizontal or "flat top" aerial of which the end farthest from the instruments or "free end" points almost directly southwest. This arrangement will cause incoming and outgoing waves to be strongest in the arc at the axis of which is the station. The stations with which "DX" holds communication are Lansing and Detroit. Mich.; Cleveland, Ohio and Erie Pa. These stations are embraced in an arc of 135 degrees. This type of directive aerial will influence stations in a 160 degree arc.

The Deforest "Sparkless" system in Toledo, uses a more pronounced type of the directive aerial; parallel lead outs,

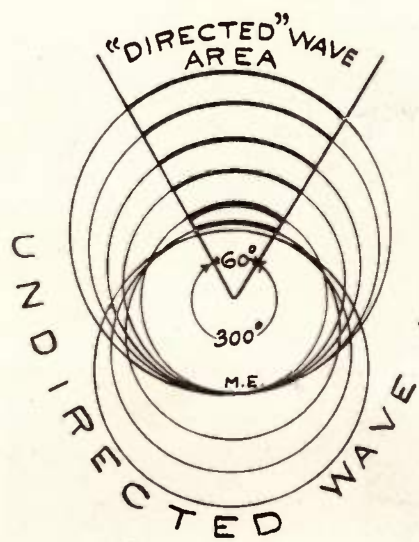


-FIG. 2-

forming the base of a 45 angle, and the aerial proper forming the hypotenuse. This aerial is used in communicating with the company's station at Cleveland which is in a direct line with the base of the angle (Fig. 2).

Theoretically this type of aerial should prove slightly inefficient, owing to leakage that should occur at the sharp angle where the base joins the hypotenuse. Actual tests however have proven this theory groundless.

A directive aerial will of course send in other directions besides that in which it is intended to, but the "directed" waves will be found to be much more intense and penetrating than those em-



-FIG. 3-

braced by the larger arc (Fig. 3).

In constructing an aerial of any type if directiveness is *not* the fundamental objective, the free end or end farthest from the instruments should be the highest from the ground as the voltage is many thousands higher at the end farthest from the transmitter and the discharge is consequently more intense and penetrating at that end.

By a perusal of the foregoing statements the reader will come to the correct conclusion that every aerial is more or less directive. A horizontally swung "T" aerial, however, will produce satis-

(*Continued on page 73*)

Radio Telephone Experiments

A VERY interesting experiment was held on the afternoon of February 24th, by Dr. Lee DeForest in the transmission of music and operatic selections by wireless. The operatic selections were sung by Mme. Mariette Mazarin, the new star of the Manhattan Opera Company, whose first American interpretation of "Elektra" occasioned much comment by the music loving world.

This demonstration holds particular interest as it is the first successful one of its kind ever held and is one more step forward to prove that in the near future we will have "Wireless Music."

The transmitting station was located at the DeForest laboratory, near the Grand Central Station, N. Y. The operatic selections and music were clearly heard at the Metropolitan Life Building over a mile away and at the inventor's Newark, N. J. station, as well as by some hundred or more amateurs within a 20 mile range.

Among those present at the Metropolitan Life Building were the well known inventor Prof. Hudson Maxim, John J. Murphy, the New York Tenement House Commissioner, and a number of singers of the Manhattan Opera Company.

The first song Mme. Mazarin sang was the Aria from "Carmen." The listeners at the Metropolitan Life Building station, not being familiar with the notes as received from the wireless telephone, expressed great surprise at the clearness of the articulation. As is well known, an operatic selection is particularly hard to transmit by other medium than the natural sound striking distance, due to the extreme high and low notes reached by the singer's voice. This point, however, was not noticeable over the wireless telephone. Every intonation of the singer's voice was brought out clearly. The writers noticed the difference between the wire and wireless by first listening over the wire telephone and then over the wireless. Over the wire line the received notes were louder but the wireless brought out the vowel sounds with a "velvety" tone. For the benefit of those interested on the technical side it will be of interest to state that this difference is due to the distorting effect the wire line has to the telephonic voice current; the other, being the natural conducting medium, has no distorting effect on the wave, consequently we get the received tone in all its beauty.

The Prima-donna, when informed by the Metropolitan Station, the Newark Station, and a number of outlying ships, of the success of her first song responded with selections from "Elektra" to the great enjoyment of the distant listeners.

After the exhibition Mme. Mazarin and the audience became the guests of the Metropolitan Life Insurance Company and were shown the wonders of the building and allowed to view Manhattan from the tower, some 600 feet above Madison Square. Through the fog and distance could be seen the tower of the station from which the music was transmitted.

The new muffled spark system was explained to the audience by Mr. C. C. Heselton, the tower operator. He demonstrated the actual working utility by getting into immediate communication with Chicago, Washington, and Key West.

Auxiliary Loose-Coupled Tuner

By Walter E. Keever.

OWNERS of single or double-slide tuning coils of the close-coupled

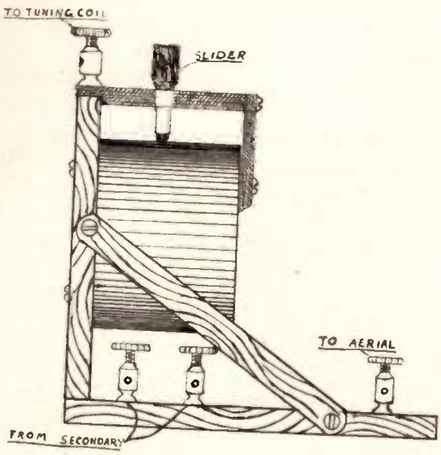


Fig. 1.

type who have come to recognize the merits of the loose-coupled tuner, or receiving transformer, but who do not care to go to the expense of buying one, will no doubt welcome a suggestion by which they can readily convert their close-coupled sets into the more modern kind. The desired change is easily effected by means of the Auxiliary Loose-Coupled Tuner invented by the writer, which is constructed as follows:

Make a core of wood, or some other non-metallic material, about the same diameter as your tuning coil, and three inches long. On this, wind (in same direction as the winding of your tuning coil) one layer of insulated copper wire of any size from No. 34 to No. 30. This is the secondary of the receiving transformer. Bring out the ends of the wire and fasten down temporarily on end of core, leaving 10 or 12 inches protrude for fastening to binding posts. Paint this secondary with shellac, and around it paste a sheet of writing paper.

Now wind on one layer of No. 18 or No. 20 (preferably the latter) annunciator wire, making the turns in same direction as the winding of your tuning coil. This is the primary of the receiving transformer. Fasten the inner end (end that goes next to tuning coil) down permanently with a tack; fasten the outer, or aerial end, temporarily to end of core, leaving 10 or 12 inches protrude to attach to binding post. On top of primary lay bare, by burning or scraping, a strip one-half inch wide, full length of the coil.

Secure the completed coil to an upright board of hardwood (which previously has been warmed and stained with an oil stain) from one-fourth to one-half inch thick and long enough to hold the Auxiliary Loose-Coupled Tuner in line with your tuning coil. With screws or thin casing nails, mount on one end of a stained hardwood base 8 inches long, bracing the resulting L-shaped frame with thin, stained hardwood side-strips. The purpose of the stain is not only to improve appearence but also to exclude moisture. A coat

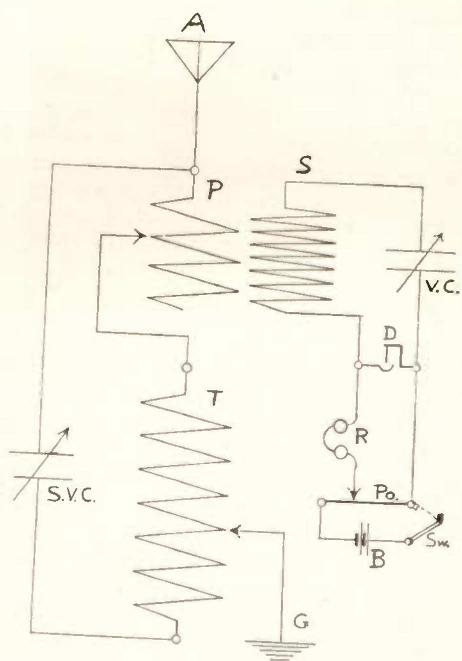


Fig. 2.

or two of shellac would be a further improvement. Beware of paints or varnishes containing lead or lamp-black both of which are fairly good conductors of electricity. Hard rubber or fibre may

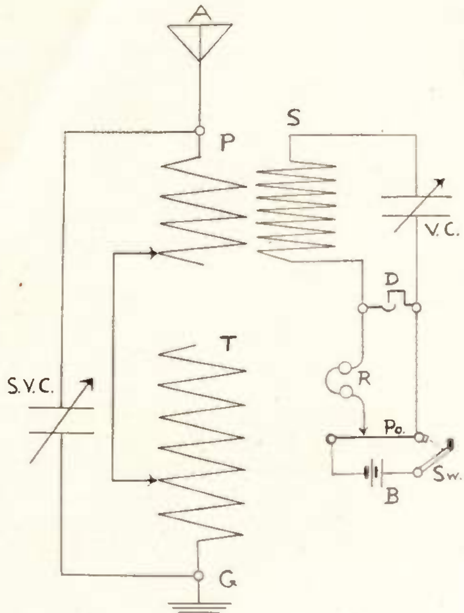


Fig. 3.

be used instead of wood; no stain is then necessary.

In the base set three binding posts, attaching to one the outer end of primary and to the others the two ends of secondary. On top of primary fix a sliding contact, same as on your tuning coil, and connected to a binding post.

Figure 1 shows a side view of completed instrument. The Auxiliary Loose-

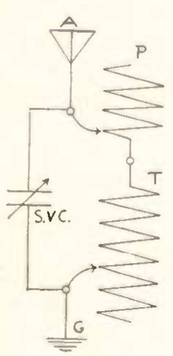


Fig. 4.

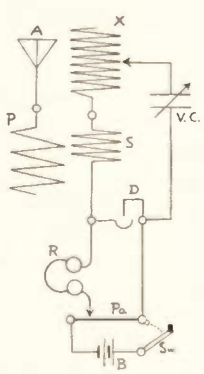


Fig. 5.

Coupled Tuner is designed for use with tuning coils mounted horizontally, the auxiliary simply being set on the table at one end of tuning coil, with space to permit movement.

The following will explain the lettering of all accompanying diagrams:

A—Aerial.
B—Battery.
D—Detector.
G—Ground.
P—Primary of loose-coupler.
Po.—Potentiometer.
R—Recievers.
S—Secondary of loose-coupler.
S. V. C.—Static condenser.
Sw.—Battery Switch.
T—Tuning coil.
V. C.—Variable condenser.
X—Extra tuning coil, to tune secondary.

Figure 2 and 3 show different methods of wiring for use with single-slide tuning coil. Fig. 4 shows another method of connecting primary circuit. In this

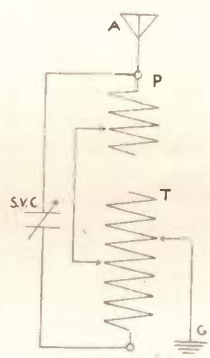


Fig. 6.

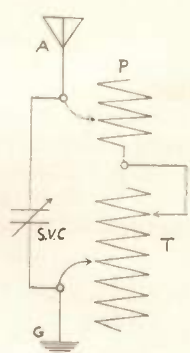


Fig. 7.

case the inner end of primary winding on the Auxiliary must be provided with a binding-post, while aerial is attached to slider. Secondary circuit same as in Figs. 2, 3, 5. Fig. 5 shows secondary rendered tunable, for superfine selectivity and resonance, by coupling on extra tuning coil X, wound in same direction as secondary. In this case the secondary should be wound only about one inch wide. Another method of tuning the secondary is by winding it in short sections, bringing out the ends to the points of a switch. (See "A Tuning Transformer," Modern Electrics, March, 1909; page 438.)

Figures 6, 7, and 8 contain suggestions for primary circuit hook-ups with double-slide tuning coils. Secondary circuit same as in Figs. 2, 3, 5.

Other good arrangements will no doubt occur to the experimenter.

Moving the slider on primary of the Auxiliary in such manner as to cut in

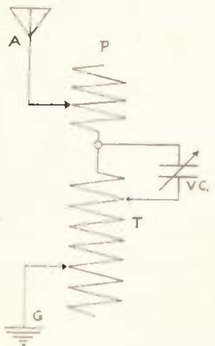


Fig. 8.

more wire, has the same effect as sliding the secondary inside primary in sliding-coil types of receiving transformers —that is, it increases inductance in the secondary. Moving the slider in opposite direction has on opposite effect. When the primary is entirely cut out, the inductance may be further decreased by moving the Auxiliary farther away from tuning coil or tuning it at an angle, or both.

S. V. C. is a varible condenser for suppression of static. Its use is optional.

WIRELESS FOR DISPATCHING TRAINS.

Train dispatching by wireless telegraph is to solve the telegraphic problems of the storm swept reaches of the west for the Union Pacific.

While the official announcement is yet to be forthcoming, it is known that the management of the system is now planning the installation of wireless stations in several divisions in the western territory where through the winter traffic has been much affected by the winter's storms.

This move by the Union Pacific will constitute the first adaptation of the wireless to the purposes of railroad operation in the United States.

The number of stations has not been determined. They are to be placed, according to the present plans, at a distance of about 100 miles apart. Developments in the Omaha experimental station are expected to make these western stations lie readily within reach of headquarters at all times.

The practicability of the project now determined upon has been demonstrated to the satisfaction of the railroad engineers by the operation of the Telefunken plants by the army signal corps at Fort Leavenworth and Fort Riley.

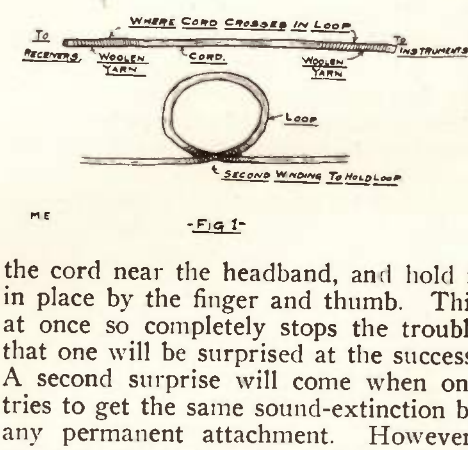
The necessity for the wireless was pointedly brought to the notice of the Union Pacific in the recent storms which cut off all communication to the westward for two days, during which time the operation of trains was rendered slow and dangerous. Snow, sleet and wind cannot mar the efficiency of the ether wave on which the wireless message travels.

TO REDUCE SOUND-CONDUCTION BY THE HEAD-TELEPHONE CORD.

By JOHN M. BLAKE.

The sound produced by the cord rubbing on the clothing is conveyed to the ear so loudly that it is always an annoyance, and it sometimes defeats the reception of important wireless signals.

Prevention is possible. In order to be convinced of this, make a short loop in



-Fig 1-

the cord near the headband, and hold it in place by the finger and thumb. This at once so completely stops the trouble that one will be surprised at the success. A second surprise will come when one tries to get the same sound-extinction by any permanent attachment. However, one can get very good results by simple means as follows:

Wind woolen yarn or worsted rather loosely around the cord where the loop is to come together, and then wind the yarn around the doubled cord loosely several turns, with the first winding between, as shown in Fig. 1. Finish with somewhat tighter turns outside to prevent the loop pulling out. A second similar loop can be put in series with the first, which will still further prevent sound-conduction.

A 100 Mile Wireless Station Using the Duplex Aerial

By Richard H. Foster.

A 100 mile wireless station has probably been long desired by many amateurs, but on account of the expense few have them. Such a station, however, can be constructed by the experienced amateur, and the only expensive thing is the spark coil. The new duplex aerial is used with this outfit so that the short sending wavelength will not trouble commercial stations. If well constructed this outfit will take the place of a small commercial station, and can be used as such.

SENDING APPARATUS.

A 10-inch Spark Coil.

For transmitting the signals 100 miles a 10-inch spark coil must be used. This is to be built and run as an open core transformer. The core should be 17 inches long and 1½ inches in diameter, made up of a bundle of No. 22 soft iron wires. The wires should be packed tightly together. The core should weigh 7½ lbs. A fibre tube is slipped over the core, and the primary coil is wound on this. The primary coil is composed of 2 layers of No. 12 D. C. C. copper wire. Over this a hard rubber tube is slipped. The internal diameter of the tube is 2 inches, the external is 2½ inches. The secondary is composed of 11¼ lbs. of No. 32 S. S. C. copper wire. This should be wound in 48 sections. The average diameter of the secondary sections is 6 inches. The wire should be wound on very carefully, and should be wound through melted paraffine as it is wound on. After the primary and secondary are wound the entire coil is placed on a box large enough to allow a 1 inch margin all around. The ends of the primary and of the secondary are connected to binding posts on the outside of the box. The box is then filled with melted paraffine until the entire coil is immersed in it. The condenser should have 8,000 sq. inches of tin foil.

Sending Condenser.

The sending condenser is next constructed. This is of the glass plate type. There should be 15 glass plates 8 by 10 inches. The tin foil sheets are fastened on both sides of the plates and are 6 by 8 inches in size. Contact is made between the plates by springs. The plates are held in a wooden frame, far enough apart to prevent sparking. If the condenser is too large all unnecessary plates can be cut out.

Spark Gap.

The spark gap should be quite large, as it has to carry a heavy current. The zinc rods should be ½ to ¾ of an inch in diameter, and mounted on hard rubber supports. The zincs may be larger if they heat up too much. The rods should have holes bored in them for connections.

Helix.

The helix used with this outfit is of the copper ribbon type. The ribbon should be ¼ inches wide. It is wound on a hard wooden core 20 inches long and 6 inches wide. The core is provided with hard rubber ends. The turns of ribbon should be spaced about ⅛-inch apart. A rod with a spring slider is mounted on the helix.

The spring slider should make tight contact with the turns of ribbon to prevent sparking. This type of helix is built like a tuning coil, and works very well. The two ends of ribbon are connected to binding posts.

Sending Key.

Telegraph key having heavy platinum contacts is used to break the current to the transformer. If the key sparks too much a condenser should be shunted around it.

The transformer is run by the lighting current in series with an interrupter of some sort. An electrolytic interrupter is a good type to use. The current to the coil is then steady, and much better results are obtained than by using a vibrator and batteries.

The Receiving Apparatus.

Perikon Detector.

The detector used for receiving is of the Pickard perikon type. This type is much easier to use than the electrolytic, and up to 100 miles it gives just as good results. Also no battery or potentiometer is used. The base is 4 inches long, 2 inches wide, and ½ inch thick. At one end a wooden standard

1½ inches high, 1 inch wide, and 1 inch thick is glued. On one side of this, near the top a binding post is mounted. On the other side one of the cups holding the crystals is mounted. Fig. 1 shows these points. The cystals are mounted as follows. Two silver plated brass cups are needed to hold the crystals. The crystals are zincite and copper pyrites. One of the cups is filled with melted solder, and one set of the crystals is pressed down into it. When cooled the solder will hold the crystals in place. The other cup is prepared in the same way. The other cup holding the crystals is next mounted. The cup is fastened to a piece of metal shaped as shown in Fig. 1. This is supported by a binding post on the base. Fig. 1 will make all points clear. A detector of this design can be very finely adjusted, as it is possible, by means of the crooked arm supporting the cup, to bring

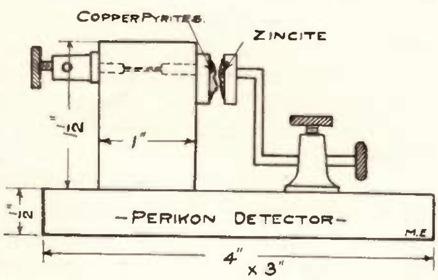


FIG. 1

any part of the crystals in contact with each other.

Tuning Transformer.

For tuning the receiving apparatus the tuning transformer is employed in place of the tuning coil. The transfomer gives much better results when receiving from a long distance as the inductive effect increases the intensity of the signals a good deal.

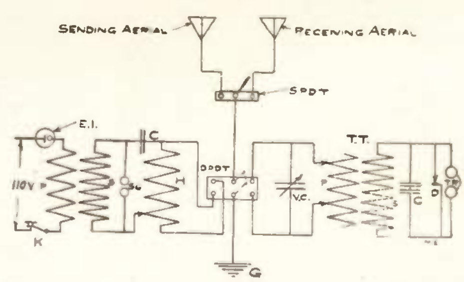
The new duplex aerial is used with this set. This consists of an arrangement of two aerials, a short one for sending and a long one for receiving. the short one keeps the wavelength down in sending, so that the powerful signals will not annoy commercial or government stations. This is a very important factor at present.

For supporting the aerials two 75 ft. poles are needed. These may be of wood or iron pipe, the latter being the better. The poles should be sufficiently guyed to prevent swaying. A high tension insulator should be used to prevent leakage on each guy wire. The sending aerial is 20 ft. long, composed of 4 No. 14 aluminum wires on wooden spreaders. The aerial is supported between the two poles as shown in Fig. 3. Each wire of the aerial is insulated from the spreader by large porcelain cleats, and the spreader is insulated from its support in the same way. The right hand spreader is built as shown in the top of the drawing. This spreader has to carry both the sending and receiving aerials. It is fastened to a pulley on the pole so that it can be hoisted up and down very easily. Four insulators are fastened on one side and six on the other.

The receiving aerial is 50 ft. long, composed of six No. 14 wires. The spreaders are 10 ft. wide. This aerial runs from the pole to the ground. Two large high tension insulators should be placed between the aerial and the place where it is fastened to the ground, so that there will be no danger of leakage. A lead in is taken from each aerial and run to the changing switch.

Operation.

In connecting the sending apparatus, high tension wire should be used to prevent leakage. The spark in the gap should be white and hot, with considerable volume. Condenser and helix should not spark. This set with the described



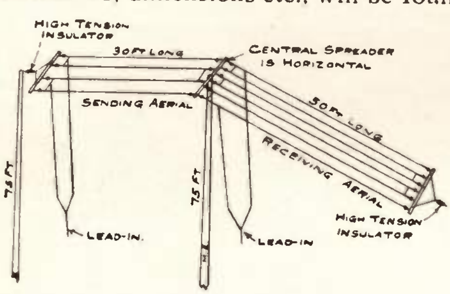
-FIG 2.-

aerial is capable of covering 100 miles.

The transformer consists of a primary and secondary, the secondary sliding into the primary on a brass rod. The primary consists of a cardboard tube 8 inches long and 5 inches in diameter. It is wound with one layer of No. 22 D. C. C. copper wire. The standard supporting the coil is 7 inches by 6½ inches. Two sliders are mounted on this coil, one on top and one on the side. The secondary tube is 8 inches long and 4 inches in diameter, wound with one layer of No. 29 S. S. C. copper wire. The standard is of the same size as the primary one. A brass rod 19⅛ inches long runs through the two coils. The primary is stationary, while the secondary slides on the rod in and out of the primary. The two coils are mounted on a base 20 inches long and 7 inches wide. No slide is used on the secondary, although one can be used in special cases. This type of transformer allows of a very fine range of tuning, and the induction effect brings in distant stations very loud and clear.

VARIABLE CONDENSER.

The variable condenser is next constructed. Any type can of course be used. The type described in the October number of MODERN ELECTRICS is a very good kind to use. On this type there are twenty stationary and nineteen rotary plates. The plates are made of No. 22 B & S. gauge aluminum. If the amateur wishes to construct one of these condensers, dimensions etc., will be found



-Fig 3-

in the October number of MODERN ELECTRICS. However, this type need not be used if any other type is available.

FIXED CONDENSERS.

A small fixed condenser is used with this outfit. This consists of 12 sheets of tin foil 1⅞ inches by 5⅞ inches separated by paraffine paper. The condenser is placed in a small wooden box which is filled with melted paraffine, so as to insulate it thoroughly. This type of fixed condenser has proved very successful in actual use.

TELEPHONE RECEIVERS.

Telephone receivers of high resistance should be used to get the best results. The double head, 2,000 ohm type, are the best to use. Receivers of this resistance always respond, and give much better results than other types.

The receiving apparatus is very easily adjusted. The crystals of the detector are adjusted until the sound from a grounded buzzer is heard loudest. The secondary of the transformer is moved half way into the primary and the slides are adjusted until signals are loudest. The variable condenser is then adjusted. The instruments are connected as shown in Fig. 2.

This entire set will be found to give fine results, and forms a very good model of a small commercial station.

ROSE CITY WIRELESS CLUB.

"The Rose City Wireless Club" of Portland, Ore., has reorganized and elected officers. They are the following:

Adrian Shanafelt .... President
John Storz .... Vice-President
Joyce Kelly .... Secretary
Reginald Savage .... Treasurer
George Wiggers,
Chairman Membership Committee
Jerome Blaisdell,
Chairman Publicity Committee
Jerome Blaisdell,
Chairman Radiophone Committee
Jerome Blaisdell,
Chairman Program Committee

The club has a membership of 40 amateurs around Portland and its suburbs. Long distance records are held by its members. Any one living near Portland is invited to attend its meetings which are held every Friday Evening, 8 P. M. at the Public Library."

GEORGE WIGGERS, Chairman.

NORTH JERSEY WIRELESS ASSOCIATION, PATERSON, N. J.

The association was formed Novemver 19, 1909, and the following officers were elected: L. Spangenberg, presidet; C. Berry, secretary and C. Cruikshank, treasurer.

The association requests all amateurs interested in wireless telegraph living in Paterson or vicinity to write to the secretary for membership blanks.

The object of the association is to bring all the amateurs in close touch with one another and exchange ideas, thus enabling members to become more familiar with the art.

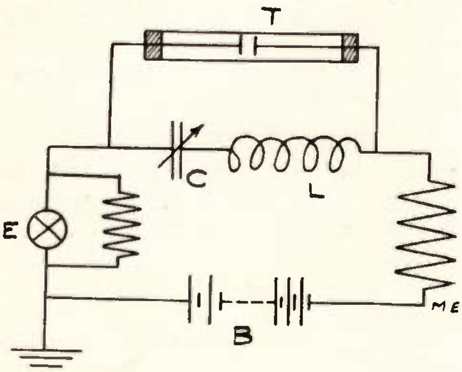
All the members are readers of MODERN ELECTRICS.

C. BERRY, *Secretary*.
Hawthorne, N. J.

Paris Letter.

NEW DETECTOR.

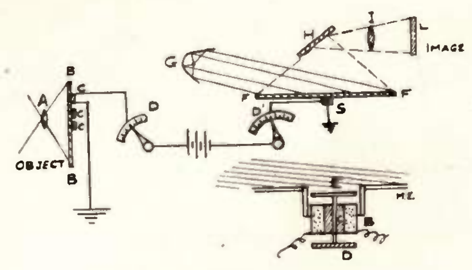
A NEW form of detector has been devised by E. M. Wellisch. It consists of an ionization tube which has two parallel aluminium electrodes placed about an inch apart. When such a tube is connected with a battery of high voltage and a static electrometer, he found that the discharge from an induction coil in the neighborhood made an effect upon it. When the vacuum in the tube and



the electric field are chosen so that the gas is near the point of breaking down, a slight effect from the induction coil is enough to give a large deflection of the galvanometer. Such a tube thus forms a detector, and it can be used in wireless work. To show this, the experimenter used a glass tube, T, 2 inch diameter containing the aluminium electrodes in the shape of two discs of one inch diameter spaced half-an-inch apart. We connect the tube to the mercury pump and use a vacuum gauge, so as to regulate the degree of vacuum used. B is a high voltage battery having one pole grounded, E the electrometer which is shunted by a high resistance, R (of conducting glass). C is a variable condenser and L a variable induction coil. The object of shunting the electrometer by the high resistance is to make it return quickly to zero, so that we can observe successive effects. When electrical oscillations are produced by an outside source, these, no doubt, act upon the electrical field within the tube and cause a discharge which is felt in the electrometer. The author claims that he secures better results with this detector than with a filings coherer of the usual kind.

TRANSMITTING PICTURES.

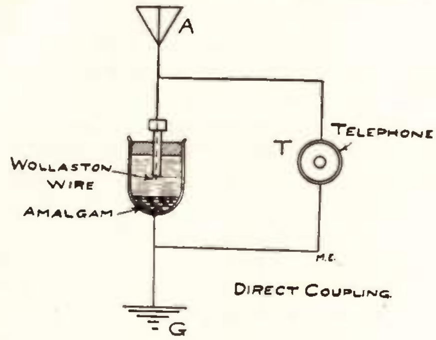
A German inventor brings out the following system for transmitting images. It has not, however, been constructed. For the transmitter we have a large screeen, whose surface is entirely covered with small selenium cells, S, so that each cell corresponds to a point in the image. A synchronizing rotary switch D, works upon the line with a similar switch D', so that each cell is thrown on to a corresponding part of the receiver. This latter consists likewise, of a large screen whose surface is covered with the small elements which represent the points of the image. Each element is made up of an electro-magnet B with core C, in which works a plunger carrying at the lower end a disc armature D. When current passes in the electro-magnet, the armature is attracted up, and it thus raises a white disc, E, which is mounted on the top of the plunger. This disc moves up and down in a surrounding tube, whose top end is flush with the screen surface. We light the whole screen by very oblique rays, so that when the plunger is down, the white disc receives no light, and the point appears in shadow, or black. Raising the white disc to the screen level, causes it to be lighted, and we have a white point. Such



point corresponds to one of the selenium cells of the transmitter, and each cell is thrown in turn upon its corresponding electro-magnet of the receiver. As in all systems involving this principle, the apparatus would be very difficult to construct in practice owing to the great number of selenium cells and magnets which would be needed, and even then it will only give an image in black or white, without shading, such as is needed for portraits, etc.

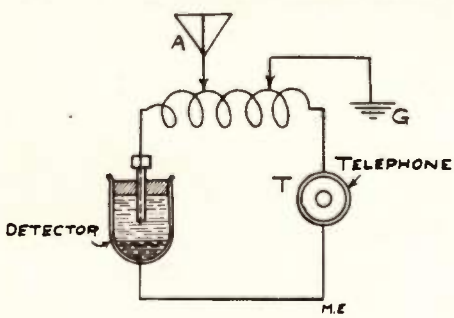
NEW ELECTROLYTIC DETECTOR.

A Paris scientist, M. Paul Jegou, whose previous work we mentioned, has now succeeded in making a detector of the electrolytic type which is used upon the telephone directly and without needing a battery. At the top of the cell he uses a Wollaston wire in the usual way, but the other electrode is placed at the



Direct Coupling.

bottom and consists of an amalgam of mercury and a certain amount of pure tin. Dilute sulphuric acid forms the liquid, and a platinum wire is fused into the bottom of the vessel so as to make contact with the mercury. Such a detector has interesting properties and these are due to the choice of the metals for the amalgam. Lead or tin appear to be the best metals in this case. The telephone is connected direct to the ends



Indirect Coupling.

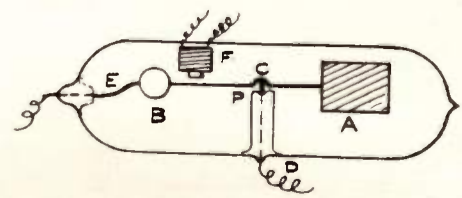
of the detector, and the aerial and ground are connected as here shown, for the direct or the indirect method of mounting. He finds that such a detector is about as sensitive as the ordinary electrolytic detector with battery, and at Paris he could take messages from the Ouessant post, lying on the Channel coast. The absence of battery and potentiometer is of great advantage. Shocks do not appear to hurt the detector, and thus it forms a simple and portable type.

WIRELESS ON AIRSHIP.

The wireless system has been applied very successfully upon the Zeppelin airship. Using an apparatus of moderate power, the airship was able to communicate with the Nauen wireless plant at various distances. At present the experiments have been made at distances of 30 miles and over. Speaking of the Nauen plant, we may mention that it lately carried out a transmission at long distance which is a remarkable performance. The station kept up connection with a steamer of the Wcermann line from Hamburg, as far as Cameroun, Africa, and during the whole trip the steamer was kept supplied with news of the stock exchange. The distance covered is about 4,000 miles.

INGENIOUS FIRE ALARM.

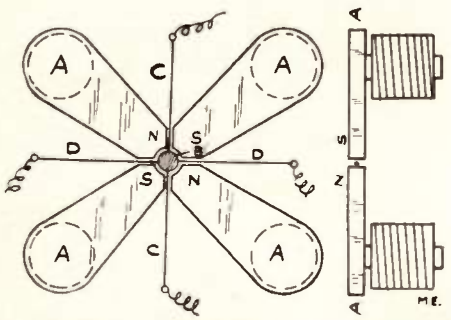
A fire-alarm can be made on the radiometer principle in the following way. The radiometer is mounted in an elong-



ated tube and one of the vanes A can be given a larger surface than usual. The second vane is formed as usual of a disc B. The pivot is replaced by the metal point P so as to make contact between the radiometer arm and the rod D which is fused in the glass. The disc B has a metal contact point which comes against an outside contact piece E, also fused in the glass. When the rays act upon the vane A, the radiometer tends to revolve and we have a contact made between the points B and E so as to allow the passage of current. In practice it is best to provide a rear stop-piece back of the disc B and furthermore to keep the disc held back against the stop by a weak electro-magnet. This latter can be placed outside the tube if desired.

A NEW OSCILLOGRAPH.

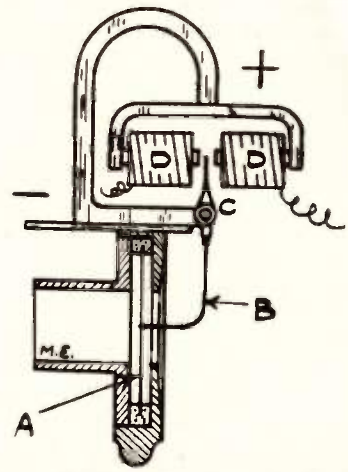
A convenient form of oscillograph for showing the relation between different current waves is made by using two separate vibrating systems, and these are combined so that the effect is produced directly, so that it is more simple than the usual forms of apparatus. The actual shape of the waves is not given, however, but there are produced certain figures on the screen which give the needed indications. The two wires CC. DD, are stretched one above the other and between the poles of the electro-magnets A, as shown. At the crossing point, both wires are joined to a small mirror B, but the two wires are kept insulated from each. When alternating current is passed through the wire CC alone, we have a continuous vibration of the mirror due to this cause, and the movement takes place in one direction. On the contrary, when DD alone carries the current, the mirror swings in a direction which is perpendicular to the former. Passing current through both wires at the same time will cause a swing which is due to their combined effect, and this will vary as the strength and relative phases of the current. A spot of light sent from the mirror on the screen will produce a straight line when no current



(or direct current) is flowing in one of the wires, but with alternating current in both wires we have various curve diagrams such as circle, ellipse or others resembling the optical figures with which we are familiar. We can deduce from these forms the nature and relative values of the current.

NEW TELEPHONE.

The following new device is used by an Italian inventor, to increase the force of the telephone receiver, by giving a magnified action on the telephone diaphragm. In the usual chamber is the diaphragm A which has the pivoted lever B C mounted with it. The upper end of the lever carries a polarized armature C which is mounted at one end of the permanent magnet E. On the upper end of the magnet is mounted a pair of electro-magnets, DD, the whole being arranged on the Siemens principle, so that a current impulse having a given polarity will increase the strength of one electro-magnet and diminish the other, and the armature is attracted alternately to one side or the other. The line current is connected to the magnets D, and therefore the fluctuations of current cause at-



tractions of the armature and give a corresponding effect on the telephone diaphragm, the swing being increased by the use of the lower lever arm.

BELLINI-TOSI STATION.

(*Continued from page 60.*)

centre and in an elevated position. It is the same instrument which we already illustrated in one of our preceding accounts, and which is reproduced here. The two inventors are also here represented.

We have three distinct advantages in the Bellini-Tosi system, as now brought out by practical tests. First, the method gives independence in the communications to a great degree, owing to the use of directed waves, and at the same time, we are able to vary the direction of the waves instantly by simply rotating the instrument, and to work to any desired angle on the horizon. Second, we are able to determine the direction of a post lying in an unknown position, in a very rapid and exact manner. This, it will be remembered, is done by listening to the signals and at the same time rotating the radio-goniometer until the sound is at a maximium, and we then read the direction in degrees on the scale. This can be done with great accuracy, reading to one degree. Third, the range of the new system for a given amount of power is higher than that of the other methods now in use.

Experimental Wireless Telephone

By Moore Stuart.

MOST of these experiments are not new, but there are very few amateurs who know anything of the Duddell singing arc as used to create the undamped waves at present for wireless telephone purposes.

At first we used an electrolytic rectifier to change the commercial 110 volts to so-called direct current at a pressure of almost 100 volts. This was not altogether successful on account of the rectifier heating up considerably when too much current was drawn through it, and the current being not strictly direct in the true sense, but rather pulsating, these pulsations being just one-half of the frequency of the original A. C., or thirty per second. This slow frequency of pulsation could not be entirely eliminated in the arc circuit, and consequently caused a steady roar, as of induction, in the receivers at the receiving station.

This is the only cause to which we could attribute this effect, it being entirely wanting when the strictly direct current was used.

The arc used was a home made affair, one electrode being carbon and the other a water cooled bronze one.

The flame was almost completely blown out by a magnetic blast maintained by a pair of strong electro-magnets in series with one electrode. The arc was not enclosed, but the flame of an alcohol lamp was blown upon it by means of a gas jet, thus hydrogen was supplied. This especial arc was built to carry 10 amperes at 200 volts.

The condenser was of the rotary type, consisting of 15 movable and 16 stationary aluminum plates six inches in diameter, using air as a dielectric, any variable condensers with a sufficient number of plates and high enough insulation may be used. It is well to remember that the smaller the condenser in proportion to the rest of the circuit the higher will be the frequency per second on account of the ability to charge and discharge more rapidly, so that if the condenser capacity is too small, the frequency rate will pass beyond being audible.

The oscillation transformer consisted of the usual primary and secondary, both being adjustable as to self and mutual induction. Any of the standard types of this instrument may be used in these experiments if large enough.

It was found by experiment that a secondary potential of between 800 and 1000 volts in the aerial circuit worked best and farther with our transmitter than if a lower voltage was used and the maximum distance could be covered with arc.

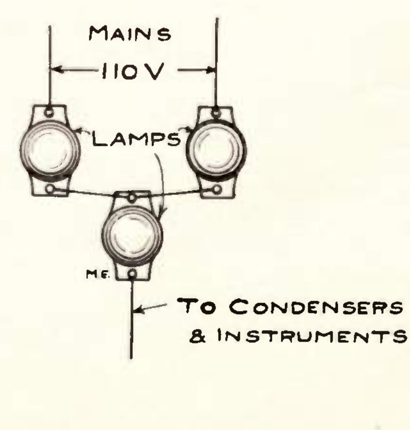
We also used an open helix to tune the length of the aerial circuit proper.

With the electrolytic rectifier we have been able to cover nearly one-half mile, although considerable trouble existed on account of the pulsating current.

With a D. C. generator and a current of 200 volts and 5 amperes we have covered correspondingly longer distances the minimum number of amperes in the with a fundamental wave length of about 5,500 meters. This wave length is almost entirely out of reach of the amateur stations, consequently they can not tune up to us as easily as they would like to.

A word as to how this long wave length was obtained. We used the electric light wires as a long aerial. Of course there was considerable energy wasted, but we were safe from interference and interfering with either the government or commercial stations.

We connected a 110-volt lamp in series with each wire of the lighting circuit and formed a Y, thus:



There was a terriffic amount of induction to be overcome, but this we did by using condensers.

In order to make sure that we were not using a continual wire connecting the two stations, we tested out the circuit for continuity, etc., and found that we had two exceptionally long aerials of the loop type.

With these aerials we were able to telephone with an open arc without gas, although not successfully, the oscillations being unsteady and practically damped at times.

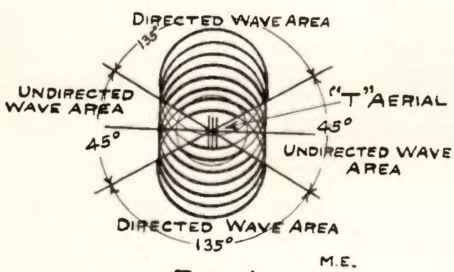
Although this reads like a continual story a great deal of time, and money, too, had to be spent before we accomplished anything, but the results paid. Why should not more amateurs experiment and make their own instruments instead of buying cheap instruments with a blue print showing how to "hook up," setting them up and letting them remain the same till tired of them, and the apparatus is either sold or consigned to the junk heap?

DIRECTIVE AERIALS.

(Continued from page 61)

factory results for non-directive work, but a slight tendency toward directiveness will be noted in the directions parallel with the plane of the aerial (Fig. 4).

Aerials of the umbrella and other forms of the compromise or slanting type present mechanical difficulties in



-FIG.- 4.-

construction but upon erection will produce the same results as a number of directive aerials (Fig. 2) pointing in all directions.

KEY WEST-LOS ANGELES BY WIRELESS.

A new wireless record has been achieved lately. S. C. Ryan, operator of the U. W. T. Co. at Los Angeles one night last month, copied a message sent from the Key West Government station to Colon, Panama, and another one sent to Norfolk, Va. The air distance from Key West to Los Angeles is about 3,500 miles, the greater part over land.

A FURTHER HELP TO TUNING.

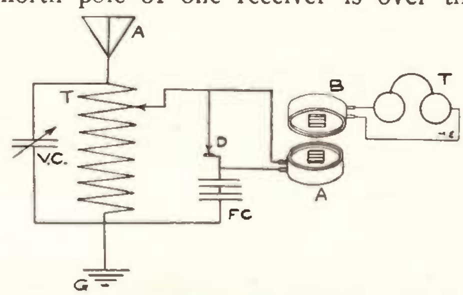
In this experiment the experimenter will need two extra telephone receivers.

The experiment consists of the following:

Have a watch case telephone receiver shunted across the detector. A telephone wound to 500 ohms will do very well. Unscrew the cover, and take off the diaphragm. We will call this receiver Receiver A. Now get another telephone receiver and after taking off the cover and diaphragm place it on top of receiver A, having both sets of magnets windings facing each other.

Connect your head receivers to this last mentioned receiver and you will be ready for business.

The first thing to do is to see that the north pole of one receiver is over the



south pole of the other receiver, for at this position we can get a maximum buzz in the head receivers.

Now, by turning the receiver on top or receiver B, we can control the buzz in the head phones without touching the tuning coil or condensers.

Contributed by MICHAEL J. ENGLISH.

ROCKLAND COUNTY WIRELESS ASSOCIATION.

On April 12th the Rockland County Wireless Association was founded, enrolling six members.

Officers were chosen as follows:

President..............W. F. Crosby.
Vice-President......E. B. Van Houten.
Secretary..............G. C. Tucker.
Corresponding Secretary...V. N. Giles.

The object of the Association is to further the development of Wireless Telegraphy in Rockland County. All communications should be addressed to Vincent N. Giles, South Broadway, Nyack, N. Y.

MODERN ELECTRICS

A Magazine devoted entirely to the Electrical Arts.

Published Monthly by

Modern Electrics Publication
NEW YORK CITY

H. GERNSBACK, EDITOR

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

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

SINGLE COPY, 10 CENTS

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

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

Address all communications to:

MODERN ELECTRICS PUBLICATION
233 Fulton Street, New York, N. Y.
Chicago Office: 112 Dearborn Street
Paris Office: 137 Rue d'Assas
Brussels Office: 23 Rue Henri Maus

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

Vol. III. MAY, 1910 No. 3

EDITORIALS.

There seems to be some misunderstanding concerning the "Duplex Aerial."

The editor is flooded with practical as well as unpractical suggestions, how to build the Duplex Aerial.

From the very nature of the subject it is apparent that not very many combinations are possible or feasible. The most practicable ones were published in the last and in the present issue of this magazine, and it will give the zealous experimenter an idea just how he can go about to build the new aerial.

In the March issue, the Editor stated that he would pay a prize of Three Dollars for the best PICTURE of the Duplex Aerial, meaning of course, a photograph, which will give other readers an idea how to go about it when erecting a Duplex Aerial.

So far no photographs have been received. Who will be the first to start the stone rolling? Who will be the first to win the prize and show his good will towards rehabilitating the amateurs' bad reputation in the ether?

The second official annual blue book goes to press June 1st. New members of the Wireless Association of America should register before May 25th if they desire their names to appear in the new book.

The members whose names appeared in the first annual blue book, will be re-listed again if they so desire. The fixed charge for re-listing is 25 cents.

The new blue book is much improved, and besides having ALL the stations listed in *Alphabetical Order,* has a beautiful chart of the United States, showing location and name of all the commercial as well as government stations. This chart will make a valuable addition to any wireless station, and much information will be gained by same, as distances from far-off stations can be computed easily by means of same.

Price of the new blue book including chart is 15 cents.

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. From time to time 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 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 is in existence M. E. will appoint one) name and address of owner.

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

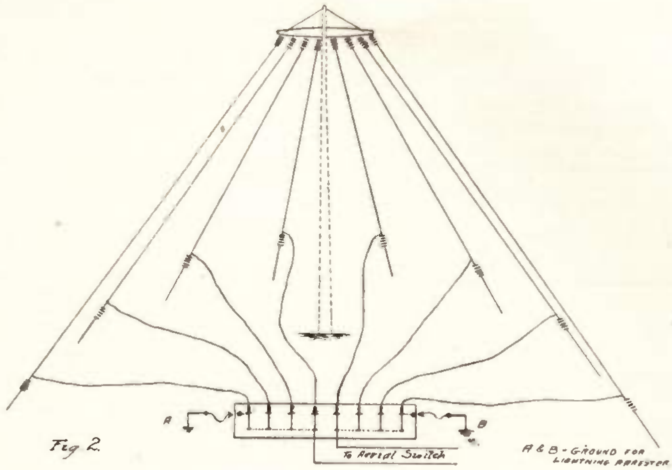
NAME AND ADDRESS OF OWNER.	CALL LETTER	APPROXIMATE WAVE LENGTH IN METERS.	SPARK LENGTH OF INDUCTION COIL OR TRANSFORMER.
*Arton C. Frey, New York City,	A.C.F.	55	
Geo. B. Post, New York City,	T.R.M.	250	¼ K.W.
Chester A. Corney, Boston, Mass.,	C.A.Y.	175	¼ "
M. M. Bonham, Los Angeles, Cal.,	M.M.B	600	¼ "
E. J. McShane, Boston, Mass.,	W.M.M.	100	2 "
Donald Oliphant, New York,	L.6.M.	160	¼ "
*Wm. Jenik, New York City,	W.J.M.	400	
Louis Bunasso, San Francisco, Cal.,	L.K.M.	100	¼ "
L. Brunel, San Francisco, Cal.,	L.C.M.	120	½ "
R. E. Mertens, N. Y. City,	B.X.M.	600	2 ins.
E. H. Bancker, Flatbush, N. Y.,	M.6.M.		2 "
W. Driver, N. Y. City,	W.D.M.	600	2 "
Fred Kitchens, El Paso, Tex.,	F.K.M.	628	1½ "
H. Lubinsky, New Haven, Conn.,	H.L.M.	333	1 "
W. J. Whitice, Jr., Yonkers, N. Y.,	W.S.M.	130	1½ "
Russell May, Brooklyn, N. Y.,	R.7.M.	45	¼ "
L. E. Springer, Auburn, N. Y.,	S.6.M.	240	5 "
*H. H. Wheeler, Barbara, Cal.,	H.W.M.	140	
M. L. Hawann, Omaha, Neb.,	M. L. H.,	83	½ K.W.
*Joslee Hanhauser, Philadelphia, Pa.,	J.H.M.	66	
Austin C. Noble, Yonkers, N. Y.,	N.A.M.	80	1 ins.
*L. F. Smith, Brooklyn, N. Y.,	H.R.M.	74	
*Howard W. Eaton, Somerville, Mass.,	W.S.C.	66	
Lyle De Veaux, St. Louis, Mo.,	L.C.D.	400	2 "
Harrison P. Hood, Houghton, Mich.,	H.H.M.	100	1 "
*Walter D. Cooke, Salem, Mass.,	W.C.M.	100	
Wm. J. Creighton, Chicago, Ill.,	Y.P.M.	300	2 K.W.
*C. R. Collins, Los Angeles, Cal.,	C.R.M.		
*E. C. Vawter, Los Angeles, Cal.,	V.6.M.		
Geo. Mortenson, Seattle, Wash.,	G.M.N.		1 ins.
*Stanton R. Curtiss, Somerville, Mass.,	S.R.C.		
Carl Hansen, Seattle, Wash.,	C.H.N.	105	1 "
Samuel Shaw, Lawrence, L. I.,	S.S.S.	61	2 "
Fred Pelham, Washington, D. C.,	P.M.M.	40	1 "
G. E. Burhard, N. Y. City,	G.E.B.		½ K.W.
Dr. Gustave R. Stein, N. Y. City,	G.R.S.	480	2½ "
Noble and Hardie, Philadelphia, Pa.,	C.N.H.		2 ins.
Robert Muns, Ridgewood, N. J.,	R.W.M.	180	½ K.W.
S. W. Case, Marcellus, N. Y.,	S.W.C.	335	2 "
Edward Freeman, N. Y. City,	C.Y.M.	266	½ "
Frederick Steinmetz, Baltimore, Md.,	R.P.M.	400	2 ins.
S. E. Milligan, Seattle, Wash.,	S.E.M.	300	3½ "
Olen C. Brown, Bar Harbor, Me.,	O.B.M.	250	¼ K.W.
E. L. Colby, Auburn, N. Y.,	C.O.M.	500	2 "
Reginald Johnson, Oakland, Cal.,	C.J.M.	440	½ "
Norman E. Soules, Norwich, Conn.,	S.E.N.	66	2 ins.
Thomas Livingston, Englewood, N. J.,	T.H.M.	504	1 K.W.
Wendell & Prescott Towrsend, Cohasset, Mass.,	W.P.M.	124	½ "
Gifford N. Hartwell, Fitchburg, Mass.,	H.N.G.	160	½ "
John E. Epp, Winnipeg, Can.,	J.C.E.	69	1 ins.

(*Continued on page 109.*)

* Receiving Stations only. NOTE: Parties registered above are not entitled to the present Blue Book, but the one to be published June. 1910.

Directive Aerials

By Bernadotte Anderson.



In this article, the writer will endeavor to outline briefly several aerials, which will allow of a wide range of experiments, as well as prevent interference with other stations to some extent.

Figure 1, shows an umbrella type of aerial, which is the best aerial yet devised, and is non-directional when all wires are used and furthermore, has exhibited the best results both on transmission and receiving. Figure 2, shows

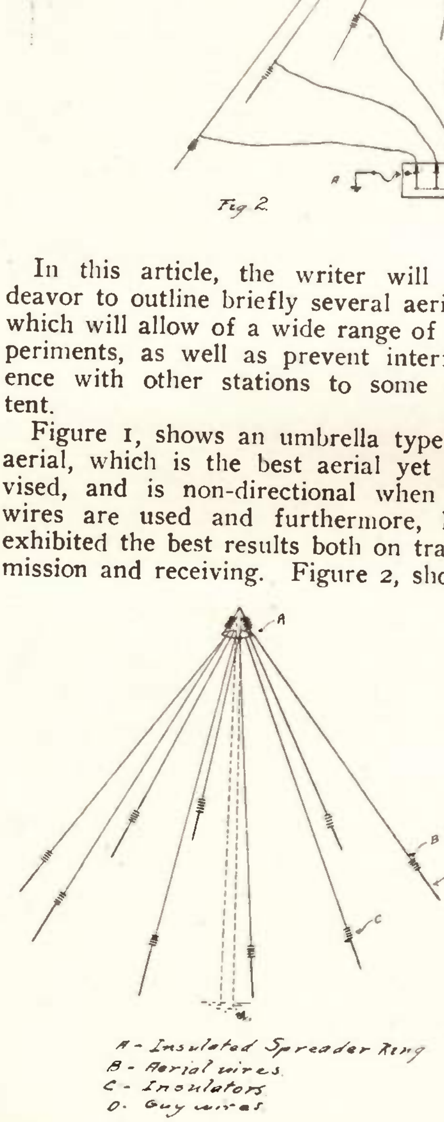


Fig. 1

a type of aerial known as the slanting inverted fan type, the wires at the top being spaced about a foot apart and anywhere from three to ten feet at the bottom. The construction of these aerials requires considerable area. However, they can be constructed proportionally on a smaller scale, which will allow of the experiments, about which I am to outline.

In figure 2, is shown individual D. P. S. T. knife switches for the aerial wires with a grounding attachment. These switches should be mounted on a hard rubber baseboard, or other moisture proof material and connected up as shown. If the umbrella type of aerial is selected, no less than eight wires should be used. The fan type of aerial can be made so that the bottom wires form in a semi-circle, and if preferred only four wires need be used.

The best results are obtained when using this switching device in connection with loop aerials, leaving all wires open at the top. In order to give the aerial as great a capacity as possible, the wires should be spaced at least two feet apart at the nearest point. On this baseboard should be provided two large binding posts where ground wires can be clamped to both loops for lightning protection.

It will be seen from diagrams that the aerials are divided into two parts of four wires each and as the wires are open at the top any number of wires can be cut in on any loop, or number of the four wires on each loop can be used separately. In this way the electro-static capacity of the aerial can easily be varied, thereby changing the inductive relation of each, which in turn varies the wave length. If the umbrella type of aerial is used, in connection with this switching arrangement, it will be possible to secure directional radiation by using any one wire in the circle individually. The maximum directional effect will be in the direction opposite to the top of the aerial wires, or in other words, opposite to the slanting side of the wires, it being assumed that the lead in wires go to the station located inside of the aerial.

In figures 3 and 4 are given circuits using oscillation transformers and by the use of same, it is possible to secure greater sustained oscillations than possible with a straight helix, thereby permitting of sharper tuning at the receiving station. Previous articles on the construction of these oscillation transformers or loose couplers and also various other ways of connecting same. have been given and therefore it is unnecessary to give any data on this particular point. While there may be a slight loss in the transformation of oscillations by this means, the better sustained wave secured from their use, more than compensates for the small loss.

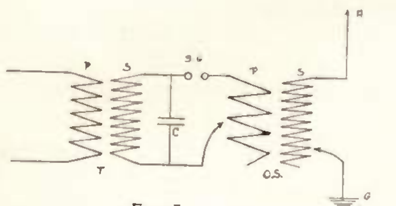


Fig. 3

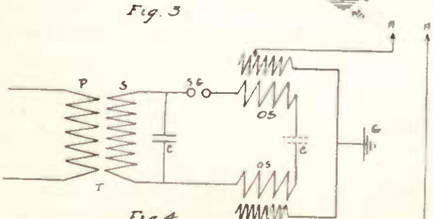


Fig. 4

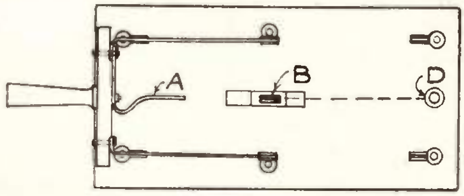
T- Transformer or Induction Coil.
SG- Spark gap. O.S.- Oscillation Transformer.
C.- Condenser. A.- Aerial G- Ground.

WIRELESS LIGHTNING PROTECTOR.

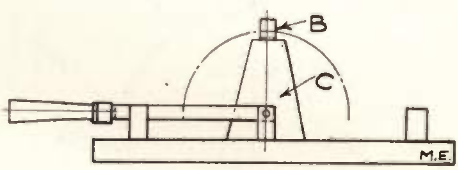
By Warren N. Crane.

As there has been so much said in regard to lightning protection of wireless outfits, I would like to explain to your readers a method which I have installed at my station and which, while it is simple enough for any amateur to make, is, I believe more efficient than a *direct* ground as there is full protection to instruments without causing the aerial to *"attract"* lightning.

The device consists of a D. P. D. T. slate base switch to which has been added a short extra blade (A) and clip (B).



-FIG. 1.-

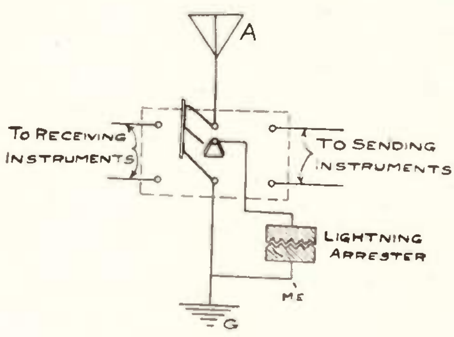


-FIG. 2-

The blade (A) as shown in Fig. 1, is connected to one side blade and clip (B) is to be raised on a block of insulating material such as slate, fibre or hard wood. (C) so as to make contact with blade (A) when handle is pulled up to centre position.

A lead from clip (B) should be carried under base to post (D) and connections made as per diagram.

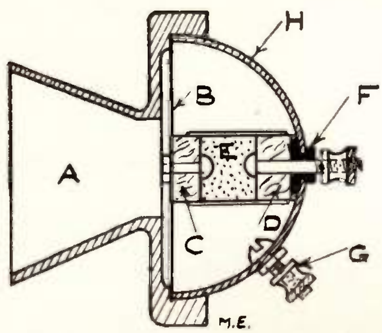
The lightning arrester shown in diagram is hardly worth the time to make



as one can be purchased for about 25cts. which consists of two carbon plates separated by narrow strips of mica and mounted on a porcelain base.

HOW TO MAKE A LONG DISTANCE TRANSMITTER.

The parts for transmitting the sound are encased in a covering H, made from a gong of an old electric bell. A round button D, is turned or filed from the carbon electrode of an old dry battery and a hole drilled through the center to fit the binding post, taken from the same battery cell. This button must be



carefully insulated from the shell, H, by running the binding post through a piece of small rubber tube where it passes through the hole and placing a rubber or paper washer, F, under the carbon button, and an insulating washer under the nut on the outside. This will provide one of the terminals of the instruments. Construct a paper tube having the same diameter as the button and with a length equal to the depth of the bell case, less 1/8 inch. Glue or paste this tube to the button so it will form a paper cup with a carbon button.

The diaphragm, B, which is the essential part of the instrument, should be made as carefully as possible from ferrotype tin, commonly called tintype tin. Cut a circular piece from this metal the exact size of the outside of the shell. A hole is made in the center of the disk a little larger than a binding post that is taken from another old battery cell.

The second electrode, C, is made the same as D, and fastened to the tin diaphragm with the binding post without any insulation. A third binding post, G, is fastened to the shell through a drilled hole to make the other terminal. The mouthpiece, A, may be turned from wood in any shape desired, but have a flange on the back side that will make a tight fit with the outside of the shell.

Fill the paper tube with powdered carbon, E, which can be made by pounding and breaking up pieces of carbon to about the size of pin-heads. Powdered carbon can be purchased, but if you make it be sure to sift out all the very fine particles. Assemble the parts as shown, and the transmitter is ready for use. If speech is not heard distinctly, put in a little more, or remove some of the carbon and try it until you get the instrument working nicely.

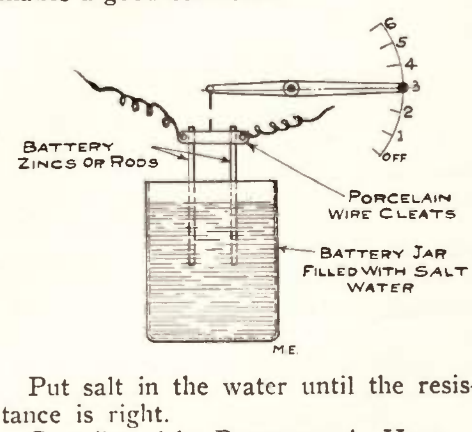
Contributed by

SAM COHEN.

SIMPLE RHEOSTAT.

Description of an adjustible water rheostat for reducing the 110 volt current to suitable voltage for running motors, etc. I have used this in connection with a chemical rectifier on the alternating current with good results.

The lever arranged with a handle makes a good controller.



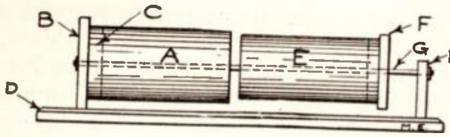
Put salt in the water until the resistance is right.

Contributed by RAYMOND A. HALL.

TUBULAR VARIABLE CONDENSER.

I here describe a simple and efficient variable receiving condenser. The base (D.) is 15 inches long and 5 inches wide.

The stationary tube (A.) is made of brass or aluminum. I prefer aluminum as it is much lighter and does not corrode so quickly. A wooden disc strip (C) should be made to hold the tube on the end block (B). The tube is screwed on the disc or strips (C) and then fastened to the end block. The end block is 3 inches square and the tube is two and one-half inches in diameter,

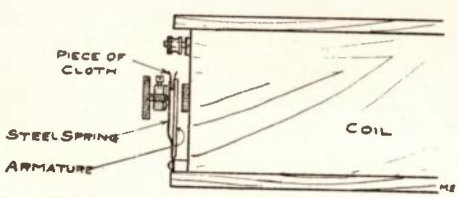


and six inches long. The sliding tube (E.) is six inches long and two and one-quarter-inch in diameter and is fastened to end block the same way as the stationary one is only the end block is round being two and one-half inches in diameter. The rod (G.) is square so as to prevent the tube (E.) from turning. The connections are made one from each tube to binding posts on the front of the base.

Contributed by EARL F. WATTS.

COIL ATTACHMENT.

Knowing that for wireless messages a high pitch of the vibrator is desired, I discovered that by inserting a piece of folded paper or better a piece of folded cloth about an inch by a half inch, between the spring which is riveted to the armature—which holds the platinum,



the pitch of the vibrator is increased to a very high key. The best place to put the folded cloth is as shown in the diagram:

Contributed by
WM. SHELLABERGER, JR.

DUPLEX DETECTOR.

A very good crystal detector can be made by removing the cup from a electrolytic detector. Next solder the same size screw to a penny, and mount on base. Now remove wollaston wire and insert a common brass pin. With this you can get a very fine adjustment.

To change to electrolytic, put back cup and wire.

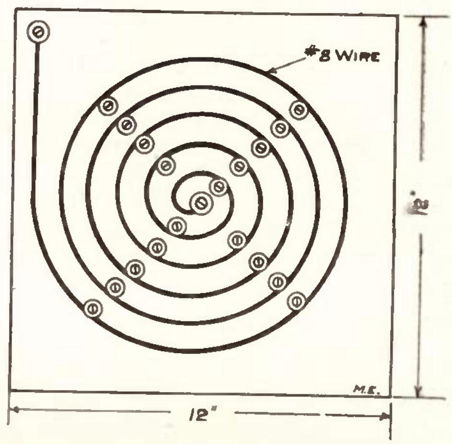
Contributed by J. C. BERCKMAN.

SIMPLE HELIX.

Enclosed you will please find a plan for making a number eight wire sending helix.

First the base must be of any good wood such as oak or cherry. The next thing to procure is 11 feet of number eight aluminum wire. Then you can get 20 small insulators from a telephone company or an electrical supply store.

Two lines must be drawn from corner to corner to get the centre of the board. Then the insulators must be



placed five on a line one inch apart not counting the centre one.

The wire will then fit in the grove in the insulator. When this is done you will find you have as servicable a sendin helix as an amateur would want.

As for the clips you may use photograph clips.

Contributed by EUGENE F. NAEGELE.

UNIVERSAL DETECTOR.

BB. Two pieces of iron 1/4 inch square, 2 inches long.

C. Set screw to hold wheel in place when set.

A. Brass wheel 1 1/2 inch diameter, 1/2 inch thick.

1-2-3-4. Four holes 7/16 inch diameter, 3/8 inch deep.

1. Shaft of wheel 1/8 inch diameter, 1 inch long.

D. Three-eighths inch shaft, 2 1/2

inches long, with 1/4 inch threaded hole 1/2 inch from top.

G. Screw to hold adjustment screw, L K.

L. Fibre head for adjustment screw, 1 inch diameter.

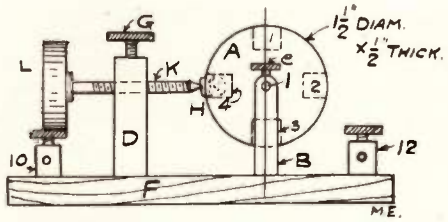
F. Base of fibre, 2 x 4 x 1/2 inch.

10-12. Binding posts.

K. 8/32 screw, 3 inches long, filed sharp on one end.

H. Mineral, as silicon, etc.

The above detector is my own idea and have used it with fair success, and



when used with silicon, carborundum, molybdenite and carbon, makes an excellent detector for distances up to 300 miles. When it is wanted as silicon detector simply turn the wheel A until the hole containing the silicon is opposite the adjustment screw K, and when used as carborundum, carbon and molybdenite the wheel is turned until the crystals are in position. The crystals should be held in the holes by solder, using some good flux.

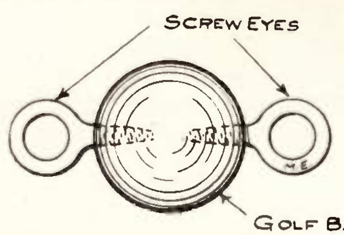
Contributed by

THOS. DURRY,

AERIAL INSULATOR.

Very good aerial insulators may be made if you have a few golf balls, the solid guttapercha being the best.

First it may be well to remove the white paint. This may be done by ap-



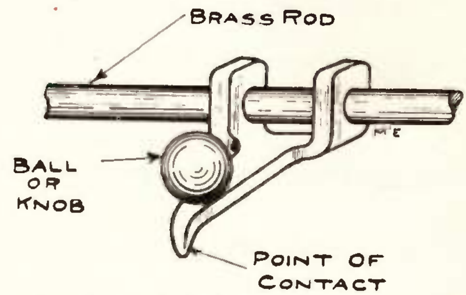
plying a coat of paint remover; this done, take a small drill, and at opposite ends drill holes a short ways in. Now take heavy brass screw eyes and screw them in the holes made, being careful that they do not touch in the middle. By looking at the drawing all points will be made clear. These insulators will be found to be very strong.

Contributed by

LAURENCE HAIGHT.

ANOTHER GOOD SLIDER.

Here is a slider which is very easily made from common materials and works perfectly. Almost any round rod can be used with this slider, a brass curtain rod is excellent. The body of the slider is of thick sheet brass fashioned according to illustration with holes bored to accomodate the rod. A small metal knob is attached either by solder or by a small machine screw to act as a handle also by its weight to make a better contact with the wire wound on the core. The point touching the wire is of course rounded and polished. The whole thing may be filed bright and given a couple of coats of shellac which



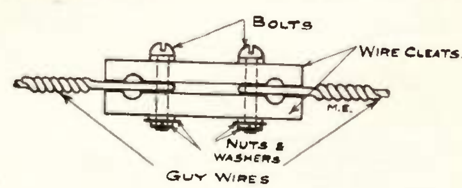
makes a good finish and forms an insulating layer preventing the loss of energy through the fingers.

Contributed by HARRY M. CHATTO.

STRAIN INSULATORS.

Every experimenter who uses bare wire to guy his aerial support should use insulators in series about every 15 to 25 feet.

Such insulators, which will stand a considerable strain, may be made by connecting the screw holes in porcelain in-



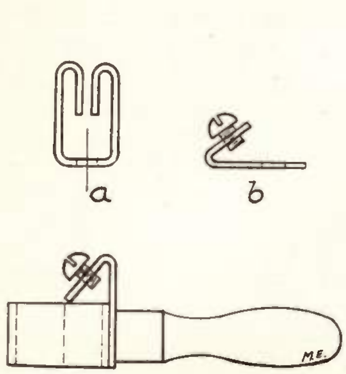
sulator cleats with short bolts. To these bolts are connected the wires as per drawing.

Contributed by

W. H. HALE.

HELIX CLIP.

The following is a description of a helix clip which I made and which I think is one of the neatest that I have seen. I took the spring clip from an



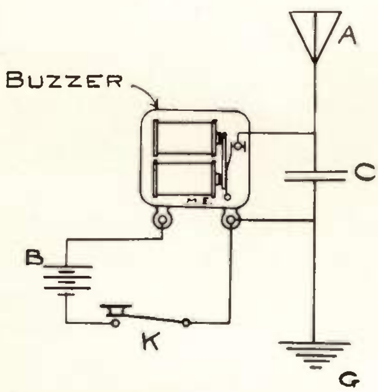
CLIP COMPLETE

old knife switch (A) and also the piece to which the wires are fastened, (B). By substituting a handle to the simple bolt and nut which held it in the base, I found a very handy clip.

Contributed by R. B. SEARLE.

LABORATORY SENDER.

Those wishing to experiment with wireless detectors, but unable to do so, because they have no induction coil, may find it of interest to know that a common



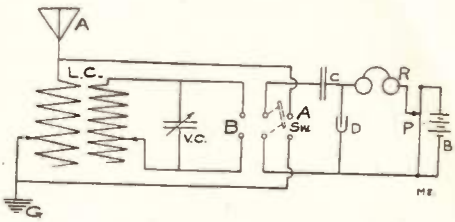
electric buzzer may take the place of the more expensive instrument for laboratory work. Enclosed is the diagram.

A helix or tuner may be inserted between the vibrator and the aerial.

Contributed by HAROLD S. NASH.

NEW RECEIVING CIRCUIT.

Owners of loose-couplers may be interested in this new 'hook-up,' by which "listening in" through the primary core can be accomplished, a throwover bringing into use the secondary and variable condenser. This makes tuning very simple, as, when double throw double pole switch is on the 'A' position the primary of the tuning transformers is used as a single slide tuning coil.

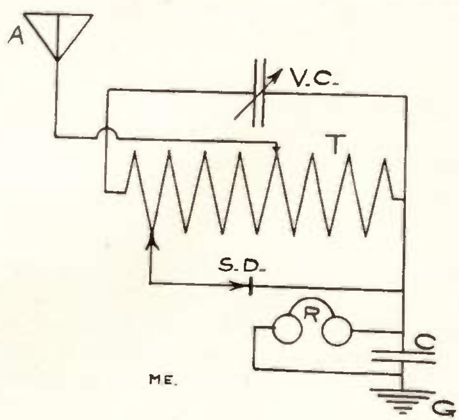


For more exact tuning switch over to 'B' and adjust secondary and variable condenser.

Contributed by MILTON GOODMAN.

CUTS OUT POWER DISTURBANCE.

Thinking that this will be of interest



to your readers, I send the following diagram which completely cuts out an electric light line running near my aerial.

Contributed by I. OLIVER ASHTON.

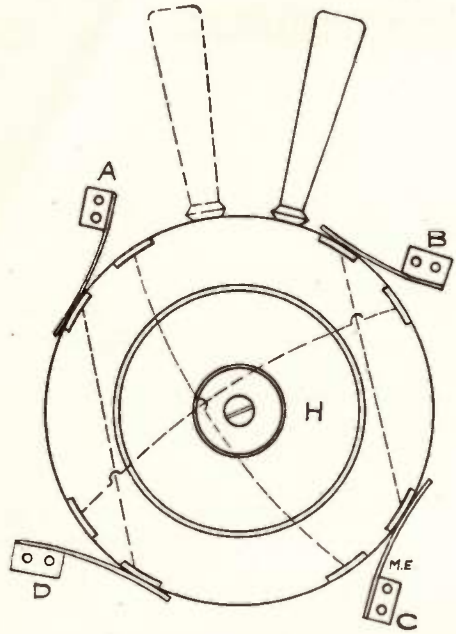
ROTARY SWITCHES.

A ROTARY switch is easy to construct, has a neat appearance, and changes the connections by a short throw. It is an excellent switch for a portable wireless, as it does not take up much room and can be built any size desired while at the same time is equally well adapted for a stationary wireless.

Rotary switches may be designed for many purposes, and can be best designed by the amateur to suit his own particular needs, but I shall describe two switches.

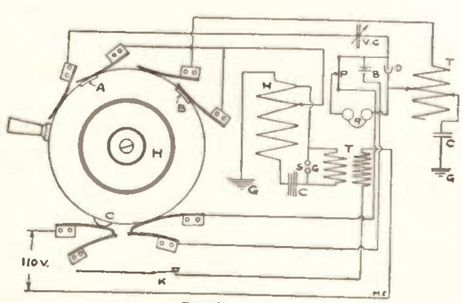
a reversing switch and a wireless switch.

The main part of the switch is made preferably of fibre or hard rubber from 3-16 to ½ inch in thickness, but may



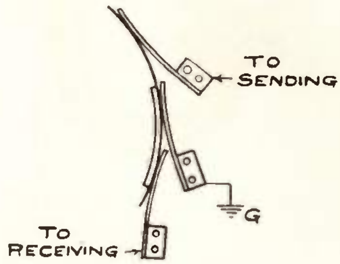
-FIG-1-

be made of wood. If you have access to a lathe, a very neat switch may be made by turning out the disc and handle as shown in the illustration, the part H being turned slightly deeper than the rest. The handle is fitted into a hole bored into the edge of the disc, while the copper contacts are inlaid in the edge at their proper places. The other contacts are cut from sheet copper or spring brass, and folded on the dotted line as shown in Fig. 4.



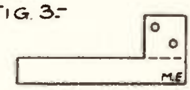
-FIG. 2-

Fig. 1 shows the connections for a reversing switch, the current entering at A and B and leaving at C and D. Fig. 2 shows the connections for a wireless switch. A and B are the binding posts to which the two wires from the loop aerial are connected. The current is turned into the key and detector by the brass headed tack C which presses the copper strips together, or can be made by the method shown in Fig. 5. If you desire to change the ground connections



-FIG. 3-

-FIG. 5-



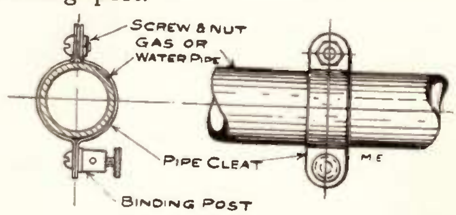
-FIG. 4-

also, three more contact strips are added as shown in Fig. 3. From the descriptions given I think any amateur will be able to work out connections for a straightaway aerial or a loose-couple system or his special connections, for it would take a page or two of diagrams to show all the connections for the different systems.

WALDO E. BEMIS,
Covina, Cal.

SIMPLE GROUND.

A very simple ground is made from 2 pipe cleats. Procure two pipe cleats (size to fit pipe) and fasten one end with nut and screw the other end with binding post.



This simple ground gave very satisfactory results.

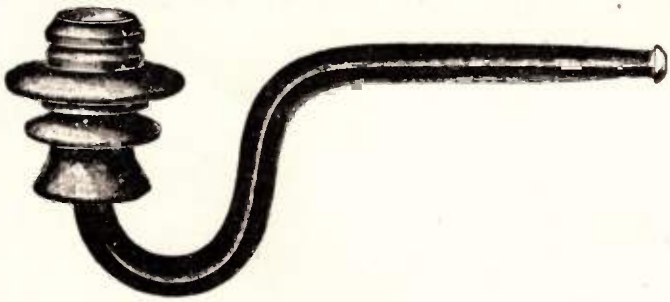
Contributed by FRED. BESSERER.

AERIAL SUPPORT ON ROOF.

By W. H. HALE.

MANY experimenters who live in crowded portions of a city, or other inconvenient places to raise a suitable aerial, will find that an aerial support

What Is It?



No, you guessed wrong. It is *not* an insulator on a bracket. It is a —— pipe! A real pipe which you can smoke to your heart's delight, providing you don't smoke cigars or cigarettes.

It is a new article of German manufacture, the bowl being white, the stem black, giving the pipe the appearance of a high tension insulator.

It is claimed that nearly all German electricians now "insulate" their faces with this novel pipe!

---

made as per following directions may be easily and cheaply constructed.

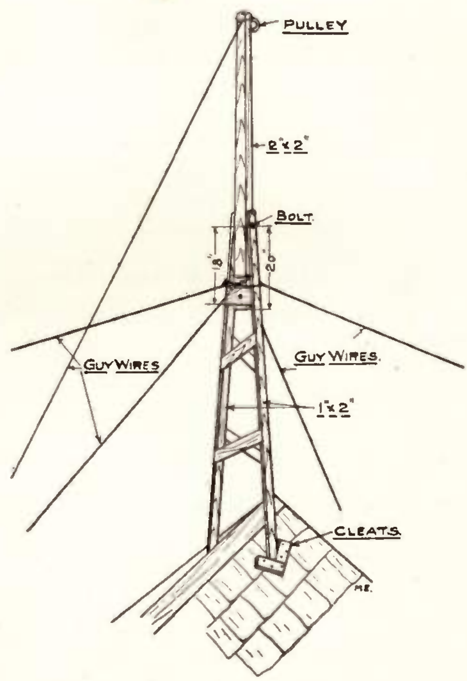
For each pole secure two 2x1-inch straight grained strips of hard pine, of the greatest length obtainable. I used 20 foot strips. Also get a pole 2x2 inches and if possible taper it slightly. This pole should be about 8 feet long.

Place the long strips on some convenient, flat surface with the 2-inch sides facing. Spread two of the ends 20 inches apart and nail on a small temporary cross strip to hold in place. Bore a ⅜-inch hole through both of the other ends 2 inches from the end. Also bore a ⅜-inch hole in the 2x2 inch strip 2 feet from one end. Place this end between the two ends which have been bored, and run a 4-inch bolt through the three holes and fasten up the nut tight so that the 2x2 inch strip will be clamped firmly. Screw a wide ½-inch piece on each side of the long strips 18 inches from the bolt to keep the square pole from turning on the bolt.

Fasten a 2-inch pulley at the upper end of the pole and run through it a sufficient length of tarred or paraffined rope to hoist the aerial wires. Then fasten cross strips on the long pieces to strengthen it, and place guy wires of No. 14 galvanized iron at the points shown in drawing.

Now nail two cleats on each side of the ridge pole of the roof, so as to form a V rest for the feet of the aerial pole. Place the feet of the support in these cleats and thus securing a leverage the pole can easily be raised to position by means of the guy wires.

If two poles are erected on a roof a horizontal aerial can be used. Otherwise



using one pole it can either support a vertical or compromise aerial.

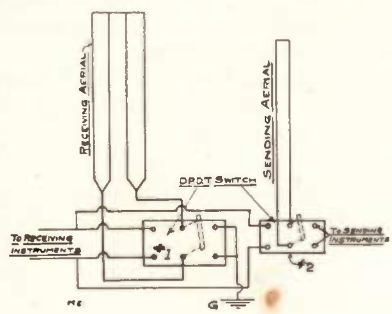
The writer uses one of these poles to support a 100-foot aerial and finds that although made of light material it has

(*Continued on page 107.*)

The Duplex Aerial.

RANKIN DUPLEX AERIAL.

Herein find a diagram of my idea of a good duplex aerial. The larger receiving aerial is mounted above the smaller sending aerial. Two D. P. D. T. switches are used as per diagram. when ordinarily receiving, switch 1 is thrown to the left, and to increase your capacity, you have on'y to throw switch



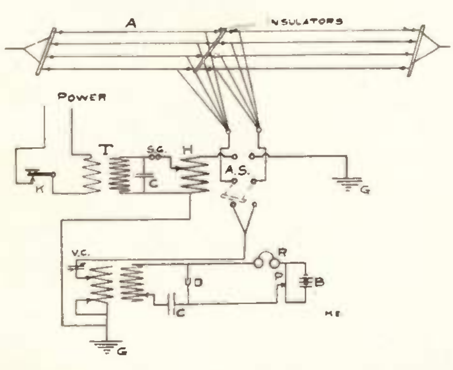
2 to the left to cut in the sending aerial. Before sending turn switch 2 to the right and open switch 1 to protect receiving instruments. During storms both aerials may be grounded by throwing switch 1 to the right and switch 2 to the left.

RUSSEL RANKIN,

WATTS DUPLEX AERIAL.

I herewith inclose a diagram of a "Duplex Aerial."

Any aerial may be made into one, by



dividing the aerial into two parts by putting insulators on each wire and a cross-piece in the center to stop the wires from pulling together.

The leads from the aerial are connected to a D. P. D. T. switch. By throwing the knife one way connects one half the aerial to the sending apparatus and the other way connects the two leads together for the receiving, givin benefit for all the aerial.

EARL F. WATTS.

A SIMPLE SENDING CONDENSER.

As I was in need of a sending condenser I devised the following: First I procured four Welsbach chimneys, the cylindrical kind, and also about a half pound of heavy tin-foil. I then put the tin-foil inside the chimney, first coating the interior with glue. After the inside layer had dried, and firmly adhered to the glass, I proceeded in the same way with the outside. I then cut out a piece of hard wood in the form of a square (7 by 7) and tacked a piece of thin wood around the edge. Then I placed the four chimneys on the board, each one about one-half inch from their respective corners. After this I poured paraffine around their bases, the narrow strip of wood keeping the paraffine from running off, and as soon as it hardened the strips were removed leaving a margin of about one-quarter inch around the edge of the board.

The tin-foil from the interior should have a narrow strip left, running out from the bottom, and this should partly be hardened in the paraffine; however, allow enough of it to remain free that it may be connected with the next jar.

The outside connection is made by winding wire around each one and then connecting them together with wire.

To insulate them further I filled up the inside of each one with hot paraffine. I also made a mold of plaster of Paris and into this poured paraffine to make covers for each jar.

This little hint may prove of value to some of your readers and if it is made carefully will prove itself a condenser of very little leakage and high efficiency.

Contributed by

WM. F. CROSBY.

LIGHTNING A MYSTERY.

By Moore Stuart.

In a general way we understand the theory of thunderstorms. As a matter of fact, there is no phenomenon of nature, not excepting even earthquakes, of which we know so little.

Man-made lightning—that is, electricity of a high potential, which we can artificially produce—will act according to certain known laws. It will, for instance, travel along a conductor of metal.

But a flash of lightning will frequently leap from a well defined metallic path and launch itself through the air on some adjacent object which is an infinitely poorer conductor.

This may be due to the almost inconceivable force of a flash of lightning, says a writer in Pearson's Weekly. It is estimated that a flash of lightning a mile long represents a pressure of discharge equal to 3,000,000,000 volts.

As such a flash lasts only about the thousandth part of a second the energy dissipated by the discharge is equal to 300,000 horse power.

Lightning is, as we know, usually accompanied by a peal of thunder, which is louder the nearer the hearer is to the point of discharge, but this is not an invariable rule. There are cases on record where most distructive lightning flashes were unaccompanied by sound.

Such a phenomenon occurred at Bradford some years ago. What is described as a "silent thunderbolt" fell in a graveyard, destroying one monument and smashing to atoms nearly seventy glass cases containing wreaths and flowers.

In the same summer Swanscombe, in Kent, was terrified by a freak of lightning. All of a sudden "a great mass of blue fire" swept along the street, and the next moment it was seen that the fine old parish church, built nearly 700 years ago, had been struck.

The building, with all its fine old carved oak, was soon a roaring furnace, only a part of the chancel was saved.

Scientists are still hopelessly at sea as to the cause of that peculiar phenomenon known as globe lightning. At Coventry some years ago during a violent thunderstorm it passed along a street like a soap bubble of blue fire and drifted into a shed, where it exploded, blowing the roof off the place.

At Rheims, in France, a similar fire ball came into a cobbler's shop through the open window. The solitary occupant of the place sat perfectly still, paralyzed with terror, while his fearful visitant hovered for several seconds overhead. Then it moved toward the fireplace and passed up the chimney.

Next moment there was a terrific explosion and the upper part of chimney came crashing down.

Not long ago a Count, G. Hamilton, made a record of a similar freak of electricity. He was sitting at dinner at a house on Lake Wener, in Sweden, when just after a vivid flash of lightning a brilliant white ball appeared, and after hanging poised over the table for a few seconds, went off with a loud bang.

Fortunately it did no harm to any one, although it was quite close to several people.

In November, 1902, Sydney, Australia, was visited by a terrific dust storm, in the midst of which a perfect rain of electric fire balls began to fall. These set fire to a number of houses, and a most appalling panic set in.

The most amazing and terrifying displays of the power of lightning are seen on the mountains. In 1890 a party was on the top of a mountain in the Caucasus when a huge violet ball, surrounded by vivid rays, struck a rock near by, and, exploding like a bomb, burst into atoms. One of the party was badly hurt.

"BUZZER-TEST."

A "buzzer test" is necessary to any up-to-date wireless outfit, but it is rather a nuisance sometimes to keep in order. Instead of the push, buzzer, and battery, etc., a lamp of suitable c. p. and voltage and a push may be used. Connect the lamp and push button in series with the electric light house current, and when the button is pressed and released the small spark so formed will—if the detector and other instruments are in order—make a noise or click in the phones. The nearer the push to the detector the louder the sounds.

However, it is advisable not to have it too close, because of possible induction—two or three feet being about right.

Contributed by

R. C. Bodie.

Wireless Telegraph Contest

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

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

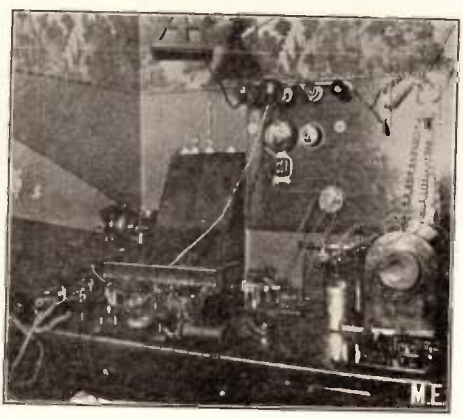
It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

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 photo of my wireless equipment.

At the left of the picture is my receiving set. This consists of single-slide tuning coil, battery, potentiometer, two telephone receivers having 1075 ohms resistance and three detectors, namely: silicon with condenser, electrolytic, and Auto-coherer. These are all mounted on one base and each may be thrown in instantly by the three point switch. The entire receiving outfit was made by myself with the exception of the E. I. Co. electrolytic detector and telephone receivers.



At the right is my sender. In the back and just under the small rheostat on the switchboard is an E. I. Co. one inch spark coil on the top of which is a zinc spark gap. This coil is used in conjunction with coherer, relay and sounder for indoor experimenting. Connected with the ground and aerial is a five inch induction coil of my own construction. The zinc spark gap is placed on two one pint leyden jars. My battery power is derived from six home-made storage batteries.

My aerial is about 40 feet high and is composed of 3 *strands of galvanized* iron wire.

WILLIAM HUSBY.
North St. Paul, Minn.

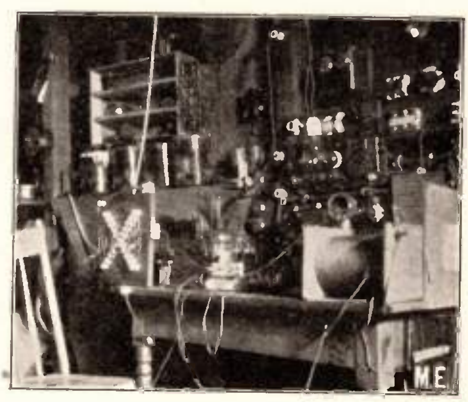
HONORABLE MENTION.

Enclosed please find photo of my wireless, and switchboard.

My sending consists of E. I. Co.'s 1 inch coil, a sending helix, eight 6½ by 8½ glass plates, with tin rail on both sides for the variable sending condensers, this can be seen beyond the helix. I also use a gallon Leyden jar. I have a three bar strap key to break the circuit, which is close to the spark gap of the coil. I use 110 V. A. C. and 200 volt electrolytic interrupter for operating the coil.

The receiving is a watch case receiver wound to the resistance of three hundred ohms by me. The tuning coil in the foreground is a single slide and 500 meters.

The detectors are behind the tuning coil, I use a copper pyrite, silicon, coherer set, molybenite, acid, carborundum detectors, all the detectors are made by me. The fixed condenser is



seen at the side of the table. I have 3 sounders, 2 relays, a desk phone 4 plugs, which are seen hanging under the table, two pair extension bells and many other such things, that are operated by the switchboard. The cables leading to the switchboard are plainly seen. I have a ¼ K. W. transformer which is now under construction.

This is not a very good place for an amateur, as the closest station is 90 miles from here at Butte, Mont. MODERN ELECTRICS', good hints aided me in making this apparatus.

EUGENE F. NAEGELE.
Helena, Mont.

HONORABLE MENTION.

You will find enclosed a photograph of my wireless station, which I made, except the spark coil and receivers.

The sending consists of a 1½ inch spark coil made by the E. I. Co. A plate condenser made of oak, containing 13 plates 8 by 10 inches. A circular helix made of oak, 10 inches in diameter and 12 inches long, wound with No. 8 brass wire, with the spark gap inside, and an anchor gap 2 by 3 inches with two screws for contacts.

The receiving set, contains, a loose-coupler, a Massie point and cup, a pair of Murdocks 3,000 ohm double head receivers. These parts are all stained mahogany.

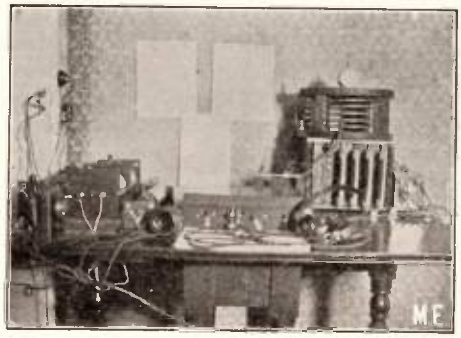
My aerial is made of No. 12 bare copper wire. It is 39 ft. 9 inches long and 5 ft. wide, and about 60 ft high.

With these instruments I get very goods results. I can send and receive about 10 miles. I use the Massie System.

WM. LINDSAY,
Butte, Montana.

HONORABLE MENTION.

Enclosed you will find a picture of my wireless set, I have been experimenting with it for about a year and a half. It now consists of the following: to the extreme left the aerial switch with short circuiting switch on the back of it, then a double slide tuner, a loose-coupler, a tubular, variable condenser, detector box with "Electrolytic," silicon, perikon and carborundum, also a potentiometer single and double head phones and test buzzer. The transmitting set is as follows: E. I. Co.'s one inch coil which uses less current than any coil I have seen, one set of five dry batteries have lasted me over *three months*, plate, condenser, helix a key and gap (zinc).



My aerials consist of two four wire spans each about thirty feet long, and about sixty feet high. I have made nearly all my own apparatus from my own designs.

EDWIN M. HALL,
East Orange, N. J.

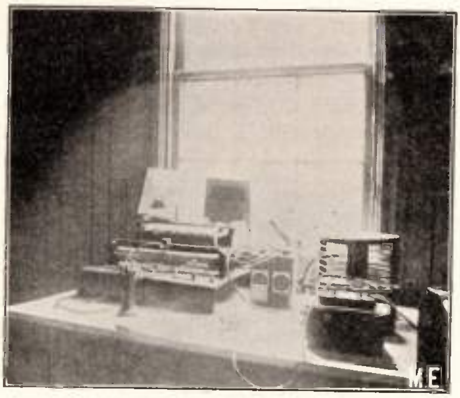
HONORABLE MENTION.

Please find enclosed photo of our wireless station which is all home made excepting telephone receiver and spark coil.

On the left of the picture is the receiver which consists of silicon detector. We also have two other detectors not shown, carbon and electrolytic, a 500 ohm potentiometer with No. 38 climax resistance wire wound on a porcelain tube two inches by fifteen inches, double slide tuning coil 300 meters, one 1,000 ohm receiver.

At the right of the picture will be seen the sending station consisting of a one-half inch spark coil operated on a number of batteries one brass spark gap and wireless key; a sending helix having ten turns of number eight copper wire, and a glass plate condenser.

The aerial is made up of four strands of No. 14 aluminum wire, one foot apart and 50 feet high at one end and 30 feet at the other. Ground connections are made from the water pipe with No. 10 wire.



Modern Electrics is a great help to any one experimenting with wireless.

E. L. Hayward,

E. Jorden.
Detroit, Mich.

HONORABLE MENTION.

Enclosed please find a photo of my wireless station.

My aerial is of the loop type and consists of four aluminum wires placed two feet apart, sixty feet long suspended from iron pipe masts fifty feet from the ground.

The transmitting instruments are a one inch spark coil, home made helix and

spark gap, and E. I. Co.'s key. I use two quart leyden jar condensers in connection with the coil, which gives a thick white spark about one quarter of an inch long and about the same thickness.

The receiving instruments are as follows: E. I. Co.'s double slide tuner, a pair of one thousand ohmphones, electrolytic, carborundum, and silicon detector, and a fixed condenser.

Everything is controlled from the switchboard. The coil is grounded in a driven well in the back yard.

Although these instruments give very good results, I intend to enlarge and strengthen them.

I think Modern Electrics is the best wireless magazine published.

Fritz Henry,

Indiana.

HONORABLE MENTION.

Inclosed please find photo of my wireless station, at my home.

The main idea of having my instruments mounted on one box, was for compactness.

My aerial consists of two aluminum wires each 200 feet long, and 8 feet apart, suspended between a flag pole, ten stories high, and an eight story building.

My receiving instruments consist of a

double slide tuning coil, polished silicon, galena and electrolytic detectors, 2,000 ohm phones, fixed condenser, and a variable condenser.

The tuning coil and fixed condenser are inside of the box.

My outfit takes up very little room and is also portable, weighing about eight pounds.

I used to have transmitting instruments but when the interference by amateurs question arose, I for one stopped sending, and have just as much fun listening to the "liners" and other distant commercial stations.

Homer Black,

New York City, N. Y.

A POLARITY INDICATOR.

A neat and inexpensive polarity indicator may be made from a burned-out incandescent electric bulb and a lamp receptacle. The bulb is first filled with water; this being accomplished by gently rapping the tip, which should be immersed below the surface of the water, with a jacknife until it breaks off. Whereupon the water will immediately fill the globe. When the lamp, which is now screwed into the receptacle, is connected up in series with a good electric bulb or any other piece of electrical apparatus, bubbles will be seen to rise from the two ends of the wires which are broken off close to the bottom of the bulb, there being, however, more from one wire than from the other. The one which has the most bubbles rising from it is negative wire. If the current is weak it is difficult to tell which wire is negative and which positive. A drop or two of acid, or a few grains of salt put into the water at the hole in the top will strengthen the action.

To test out the wires to see which is which on the outside of the receptacle, one wire leading into the receptacle may be connected with one main wire in the above series, and the other main wire may be thrust into the water through the hole in the top of the bulb. Of course the terminal inside the bulb giving off no bubbles leads to the wire at the outside of the receptacle which is not connected up. This wire may be marked in some way, or it can be remembered that the right or left terminal, just as it happens, leads to the marked wire.

The polarity indicator being now ready for work, it may be connected up, and since the wires inside the bulb have been traced out, it is an easy matter to determine which is the negative wire by means of the terminal giving off the greatest amount of bubbles.

Contributed by

ELLWOOD N. HENNESSY.

WIRELESS WITH A STATIC MACHINE.

By MOORE STUART.

Although it is not probable that a static machine will ever be used as a means of creating high frequency oscillations for wireless communication, yet this is the age of progress and the following experiment may not be out of place.

Using a static machine capable of giving about a three-inch fat spark, an oscillation transformer and several Leyden jars, we were able to transmit messages over one-half mile with a sensitive set of receiving instruments.

At first there was considerable trouble with terrible amount of leakage due to the exceedingly high voltage of the static machine. This was partly overcome by stepping down the voltage with the oscillation transformer and entering the leads from the aerial through the large pane of glass in the window. The static machine was run by a small A. C. motor, being driven at almost 200 R. P. M., thus the plates could be very rapidly charged.

The usual key could not, of course, be used, so a system of levers was arranged so as to raise and lower the balls of the spark gap, so that when the gap was almost closed, a continuous spark would fill the gap and when open it was beyond the sparking distance. Naturally quite a leverage was required for this action, and consequently the code could not be sent very fast. The only trouble with this arrangement was that when the gap was beyond the sparking distance considerable energy was wasted by the "brush" discharge at all points.

Now for the receiving instruments:

Without the use of the oscillation transformer on the static machine and without a tuning coil we were able to receive something less than 50 feet, without an aerial at either station.

With a small aerial at either end the distance was increased about 100 per cent., but the sounds became inaudible at a little over 100 feet.

Then we moved the aerial and receiving instruments about 100 feet farther away, used the oscillation transformer and a tuning coil and condensers and the call came in quite loudly. The aerial used in this case being of the loop construction about 35 feet long and about 30 feet high. The limit of this aerial and a tuning coil of about 100 meters was about one-quarter mile.

It may be well to describe the action of the various detectors in these tests.

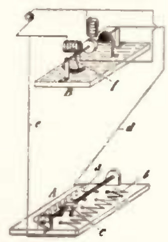
The coherer of the auto type and a pair of 75-ohm receivers beat the electrolytic detector for the short distances. The blue carborundum came in next best, even ahead of the silicon. The

(*Continued on page 107.*)

Electrical Patents for the Month

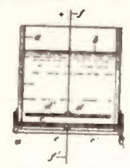
953,701 ALTERNATING-CURRENT TELEGRAPH SYSTEM. Carl Meyer, Charlottenburg, Germany Filed Oct 18, 1907 Serial No. 397,974.

In a needle telegraph for alternating currents in combination a generator for alternating currents, a plurality of electric circuits electrically connected with said generator and being joined in parallel, one coil in each of said circuits and said coils being arranged at an angle to each other and having adjacent their poles a turnable keeper with a needle, an inductive resistance and a resistance being free of induction intercalated in one of the said circuits, the one end of one of said resistances being con-



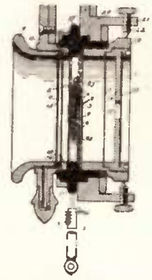
nector interwoven about the pins of the two series and of the other of said resistances being connected with the other pole of said one circuit in which they are both intercalated, both resistances having opposite contacts and a slidable contact member connecting both resistances regulatably.

956,246 DEHYDRATING MILK. Thomas L. White and Alfred P Elten, New York, N Y Filed Aug 9, 1909 Serial No 512,039



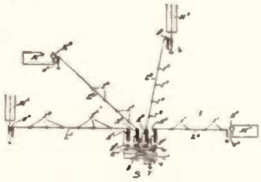
1 The method of de hydrating milk, which consists in expelling water out of the milk by means of electrical endosmosis.

956,728 LONG-DISTANCE-TELEPHONIC APPARATUS. Victorien Tardieu Arles, France Filed Nov 5, 1904 Serial No 231 601



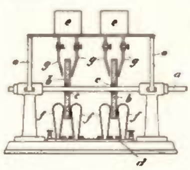
1 A telephone system having the transmitter and receiver provided with hollow bodies or chambers arranged close to each other and harmonically proportioned one to the other.

956,165 ELECTRICAL SPACE COMMUNICATION Greenleaf W Pickard, Amesbury Mass Filed Sept. 3 1907 Serial No 391,081



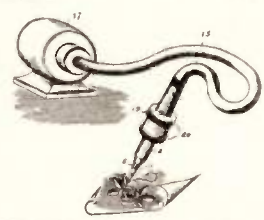
1 Means for conveying intelligence communicated by electromagnetic waves, which comprises a local station, a plurality of conductor-stations separated from the local station by various and substantial distances, and so located with respect to a distant transmitting station or stations as to operate effectively simultaneously with the wave-fronts line conductors of correspondingly various lengths connecting the local station with the variously-distant conductor-stations oscillation-transformers connecting the ends of the line conductors with the apparatus at the local and conductor-stations, and load coils in the line-conductors to reduce transmission losses and transmit all the oscillating currents in phase.

955,101 SPARK-GAP APPARATUS Wilhelm Peukert, Brunswick, Germany Filed May 14 1909 Serial No 496,055



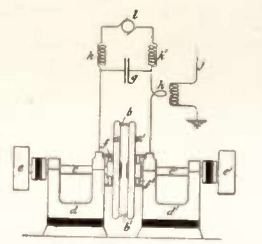
1 A spark gap apparatus comprising an electric circuit, terminals in the circuit forming a gap and being arranged so close to one another that the gap only has an extremely small width, a thin layer of a di-electric liquid between the terminals of the gap, means to produce a relative movement between the di-electrical substance and one of the terminals of the gap, and an oscillatory shunt circuit arranged parallel to the gap

953,856 PAPER-TRIMMER Roscoe Pierce and William U Colthar, Springfield, Ohio; said Colthar assignor to said Pierce. Filed Feb 8, 1909 Serial No 476,840



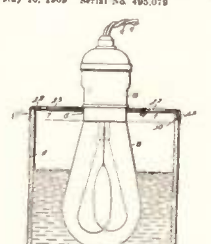
1 In an implement for cutting irregular outlines in paper or similar material, the combination with an actuating motor and a flexible drive shaft, of a housing, a revoluble actuating head within said housing, having a central bore, and a cam groove in the inner periphery of said bore, a reciprocating plunger extending within said bore, a lateral projection on said plunger engaging said cam groove whereby the revoluble movement of said actuating head will cause a reciprocatory movement of the plunger, a stylus carried by said plunger and adapted to perforate the stock material in predetermined lines traced by said stylus, substantially as specified.

954,640 APPARATUS FOR WIRELESS TELEGRAPHY Guglielmo Marconi London England, assignor to Marconi Wireless Telegraph Company of America, New York, N Y a Corporation of New Jersey Filed Mar 31, 1909 Serial No 487,067



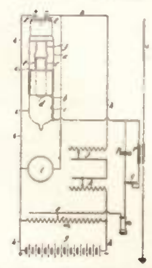
1 In a wireless telegraph transmitter the combination of two parallel disks, means for rapidly rotating the disks in opposite directions, studs equally spaced around the adjacent faces of the disks and an oscillation circuit connected to the disks

953,841 HUMIDOR Lazar Kahn Shreveport La Filed May 10, 1909 Serial No. 495,079



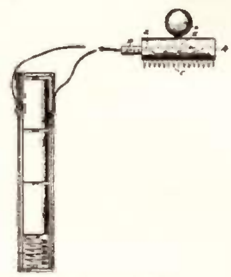
1 An improved humidor comprising a transparent liquid receptacle, an incandescent electric lamp mounted in the said receptacle, and a perforated closure for said receptacle, substantially as described

954,619. INSTRUMENT FOR DETECTING ELECTRIC OSCILLATIONS John A. Fleming, London, England, assignor to Marconi Wireless Telegraph Company of America, New York, N. Y., a Corporation of New Jersey Filed Jan. 2, 1909 Serial No. 470,484



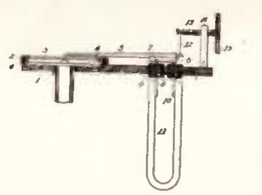
1 A rectifier or valve for electric oscillations, having one electrode composed of tungsten.

954,083 MASSAGE APPARATUS Richard H. Gay, Conesville, Iowa. Filed Aug. 7, 1909. Serial No. 511,757



1 A device of the character described, comprising a body portion of insulated material, a pair of plates embedded in said body portion and having projecting from the edges thereof a plurality of flexible engaging members of conducting material, the outer edges of which are adapted for engagement with the scalp of the user, said plates being provided with inwardly extending sockets in the ends thereof, a block of insulated material, and a pair of terminal pins carried by said block and adapted to detachably engage the sockets in the ends of said plates

954,931 RECEIVER FOR SOUND-TRANSMITTING INSTRUMENTS John J Combs, Santa Monica, Cal., assignor to George R Webb Baltimore Md Filed Mar 4 1907 Serial No 360 479



4 A receiver comprising a diaphragm and means for amplifying the received vibrations, said means comprising a lever having one end connected with the diaphragm to move it back and forth and supported to relieve the diaphragm of its weight in the normal position of the lever and amplify the received vibrations by amplifying the movement of the diaphragm, electrically actuated means for actuating said lever, and means to relieve the diaphragm of magnetic strain transmitted through said lever when in normal position, substantially as described

955,078 TRICK ELECTRIC POCKET LAMP Aaron Jedel, New York, N Y Filed Oct 7 1909 Serial No 521,434

1 An imitation pocket electric lamp, comprising a casing a cover normally closing one end of said casing, a head within the casing and terminating adjacent said cover a glass bulb upon the outer surface of said cover and having a stem extending through the cover into said head to secure the bulb, cover and head together, a coil spring within the casing and attached to said head and normally tending to project the latter outwardly from the casing, and a spring catch carried by the head and having a portion normally extending into an opening in the wall of the casing, to hold the first mentioned spring under compression

Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending May 4

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.

SIX-INCH COIL.

(540.) Walter Martelock, Ohio, writes:

1.—Will you please give dimensions of a coil giving a heavy 6-inch spark, and made of enameled wire throughout?

A. 1.—The core should be 14¾ inches long by 1½ inches in diameter. Primary of 2 layers No. 12 B. & S. S. C. C. wire. Sec. of 10 lb. No. 33 B. & S. enameled wire, wound in 80 sections ⅛ inch thick, and 5 inches in diameter. Condenser composed of 200 sheets of tinfoil 9 by 9 inches. Primary voltage 16.

2.—Where can I get a good vibrator for the above coil?

A. 2.—Write to the Electro Importing Co., 233 Fulton Street, New York City.

3.—What is the best insulator for the condenser of above coil?

A. 3.—Use paraffined paper, about .006 thick, and 1 inch larger all around than foil leaves.

MAGNETS.

(541.) Thomas A. Goley, Minn., asks:

1.—Is the E. I. Co.'s new magneto power generator wound for only one voltage, or several?

A. 1.—The voltage will vary with the speed.

2.—Is it possible to run the magneto generator by a water motor, and if so, how much H. P. will it require?

A. 2.—Yes, any source of power may be used. It will require about 1-6 H. P. to drive it.

3.—How does the Tungsten mercury detector rank with the silicon detector?

A. 3.—Silicon detector, Tungsten mercury detector, in the order named.

TRANSFORMER COIL.

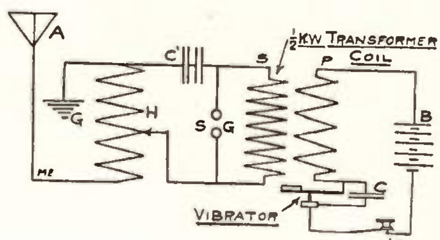
(542.) L. Bernardin, Mass., writes:

1.—Show how to connect ½ K. W. transformer coil with electrolytic interrupter onto 110 volts A. C. mains.

A. 1.—See answer to query No. 523.

2.—Show connections of same coil, using vibrator, on batteries.

A. 2.—Diagram given below.



HELIX.

(543.) B. A. Weil, Pa., inquires:

1.—Would the power received by a very sensitive receiving station, from a ½ K. W. or fairly strong transmitting station, be sufficient to light up a miniature lamp inserted in ground wire?

A. 1.—No. When this can be accomplished over any appreciable distance; we will have the wireless transmission of energy.

2.—Could I use a helix, whose maximum capacity is ½ K. W., with an outfit of less power; say, a spark coil giving a 2-inch spark?

A. 2.—Yes, by using just enough inductance for the coil used.

3.—With 110 volts A. C., ½ K. W. helix, anchor gap, Morse key and adjustable condenser, how far could I send, with the ½ K. W. transformer coil of the E. I. Co.'s make?

A. 3.—You can cover 100 miles, if sufficiently high aerial is used.

TRANSFORMER.

(544.) Raymond Hall, Cal., wishes to know:

1.—Can a step-down transformer be constructed, of the open core type, with secondary over primary?

A. 1.—Yes.

2.—If so, what would be the size of core and amount and size of wire on same to have an output of 35 volts and 7 amperes?

A. 2.—We refer you to any good book on transformers.

3.—Is wireless equipment more efficient if located near the aerial, or near the ground?

A. 3.—It is best to have the instruments as near the ground as possible.

ONE-HALF K. W. CONDENSER.

(545.) F. M. SHAW, N. Y., asks:

1.—Can an E. I. Co.'s ½ K. W. transformer coil be used on 110 volt A. C. 60 cycles in series with lamps, but without the electrolytic interrupter?

A. 1.—No. The frequency of the current is not high enough.

2.—How many pint Leyden jars (with tinfoil on outside and salt water solution on inside) should be used on above coil?

A. 2.—32 pint jars of the type you mention.

3.—How far ought I be able to transmit with above coil, electrolytic interrupter, condenser of sufficient capacity, helix of 30 feet No. 10 bare copper wire wound on core 6 inches in diameter, and aerial 50 feet long, 70 feet high?

A. 3.—You could probably send from 40 to 50 miles with this set.

DETECTOR ACTION.

(546.) E. G. THOMAS, Mass., inquires:

1.—Is the amount of current which flows through any form of detector, (whether electrolytic, silicon, or carborundum) governed in any way by the strength of the wave received by the aerial?

A. 1.—Yes, directly. Whatever the action in the particular detector is, this action, whether chemical or thermic, is intensified or diminished by the strength of the incoming wave or oscillation.

2.—How could I vary the current flowing through the detector?

A. 2.—By varying the power at the transmitting station.

3.—How is a selenium cell made?

A. 3.—We refer you to the May, 1908, issue of MODERN ELECTRICS, in which you will find a description of a selenium cell.

CONDENSER.

(547.) HOWARD ERNST, N. Y., writes:

1.—Please tell me how many square inches of tinfoil should be used in a condenser for the E. I. Co.'s ½ K. W. transformer coil.

A. 1.—It is impossible to state what area of tinfoil will be required for the condenser you mention, as you do not give thickness or kind of dialectric you intend using. However, the condenser should have a capacity of .0095 microfarads.

2.—Which is better for such a condenser, large Leyden jars, or glass plates?

A. 2.—A properly constructed glass plate condenser is preferable, as there is not so much leakage, due to brush discharges, and it takes up much less room.

3.—With above transformer coil and condenser, E. I. Co.'s adjustable zinc spark gap, helix wound with 20 feet of brass ribbon, 3-strand compromise aerial, 100 feet high at its highest point, Gernsback interrupter, used on 110 volts D. C. supply, and

"Massie" connections, what distance should I be able to transmit over?

A. 3.—From 80 to 100 miles.

RECEIVING RADII.

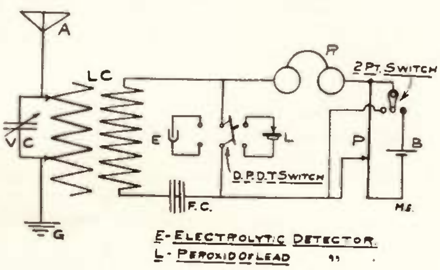
(548.) LESLIE SCOTT, Nevada, wants to know:

1.—How far can I receive with an outfit consisting of an E. I. Co.'s double-slide loose coupler, electrolytic and peroxide of lead detectors, 500-ohm potentiometer, E. I. Co.'s 2000-ohm amateur phones, home made variable condenser made of 9 sheets of brass 4 by 5 inches, 5 stationary and 4 moving, aerial composed of 6 iron wires spaced 7 inches apart, 40 feet high at one end and 30 feet at the other?

A. 1.—We think you could receive up to 100 miles, if you made your aerial of aluminum wire. Iron wire is not good for aerials. Also aerial wires should be spaced not less than 2 or 3 feet apart.

2.—Please give diagram of connections for above set of instruments.

A. 2.—Diagram given below.



3.—Could I receive as far in mountainous country as in a flat, or level, country?

A. 3.—No. Your receiving range would possibly be cut down 10 or 15 per cent., according to the altitude of the peaks, etc.

LOW TONE SPARK.

(549.) A. C. GRAVEL, Mass., writes:

1.—I have a ¾ K. W. open core transformer, which I use for transmitting with. The tone of the spark is harsh and low, although it fills my zinc spark gap ⅜ of an inch in diameter and ¼ of an inch long with solid fire. My helix is composed of 13 turns No. 6 copper wire 12 inches in diameter. How can I raise the tone of my spark?

A. 1.—We would advise you to try adjusting your capacity and inductance (condenser and helix) to each other in better proportion.

2.—Is steel, copper clad wire suitable for an aerial?

A. 2.—No. Any wire having steel or iron in it presents a high impedence to the oscillations.

CHOKE COIL.

(550.) CHAS. NEIPORT, Pa., asks:

1.—Please tell me what a choking coil is used for on a potentiometer.

A. 1.—A choking coil is sometimes used on potentiometers to prevent the oscillations from the aerial being shunted through the potentiometer to the ground, thus preventing the detector from getting the full value of the wave. If high resistance potentiometer and receivers are used, choke coils are not required.

2.—What is the resistance of a potentiometer having 3 pieces of No. 32 German silver wire, 18 per cent., each piece 12 inches long, connected in series?

A. 2.—About 9 ohms.

3.—How is a choke coil made for a potentiometer?

A. 3.—On an iron core 3 inches long by ⅛ of an inch in diameter, wind 3 layers of No. 24 B. & S. S. C. C. magnet wire. Place one choke coil in each lead from the detector to the potentiometer.

TWO-INCH COIL CONDENSER.

(551.) H. MacCaulley, Pa., wants to know:

1.—The size and number of sheets of tinfoil and paper for a condenser to be used on primary of a 2-inch spark coil.

A. 1.—Use 100 sheets of tinfoil 9 by 7 inches separated by 100 sheets of paraffined paper 10 by 8 inches and .006 of an inch thick.

2.—Will a 6 volt 6 amperes K. & D. dynamo magnetize small articles, such as pins, needles, etc.

A. 2.—Yes. Pass the current from the dynamo through a small coil of magnet wire, or solenoid, and insert the articles to be magnetized therein.

TELEPHONE CONNECTIONS.

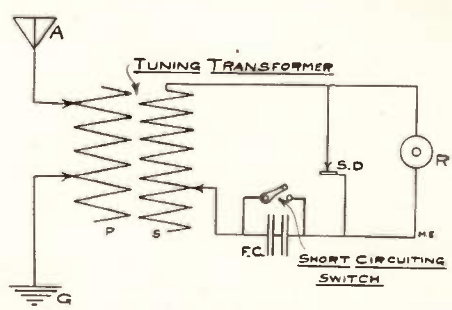
(552.) Harold J. Fanae, Pa., inquires:

1.—Where can I get a telephone transmitter?

A. 1.—We refer you to our advertising columns.

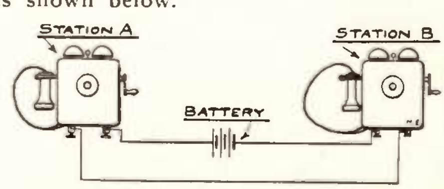
2.—How far can I receive with the following set, and how should it be connected: Aerial of 2 No. 14 aluminum wires 6 feet apart, 132 feet long and 50 feet above the ground, water pipe ground, silicon detector, fixed condenser, tuning transformer as described in February issue of Modern Electrics, and 75-ohm receiver?

A. 2.—From 75 to 200 miles. Diagram of connections below.



3.—Where are the batteries put in the telephone circuit shown?

A. 3.—Your telephones are evidently series instruments. Place battery in line as shown below.



THREE-QUARTER-INCH COIL.

(553.) WARD ROARK, North Carolina, writes:

1.—Can a jump spark coil be made from a coil having a core 6⅜ inches long by 1¼ inches in diameter? If so, how much and what size wire is to be used on it, and what size spark would it give?

A. 1.—Yes. Use 2 layers No. 16 D. C. C. magnet wire for primary, secondary 1 lb. No. 36 S. S. C. magnet wire. The spark obtained will be about ¾ of an inch with good vibrator.

CODES.

(554.) EDWARD R. CULLEN, Brooklyn, N. Y., asks:

1.—What code is used by the United Wireless Co., Morse or Continental?

A. 1.—Morse code.

2.—Which code do amateurs use the most?

A. 2.—Continental, as it has no spaces in any of its letters, which makes it easier to learn.

3.—How far can I receive with the following: Double slide tuning coil, silicon detector, pair 1000-ohm receivers, variable condenser, and aerial 50 feet long, 50 feet high?

A. 3.—About 200 to 250 miles, under favorable conditions.

LONG DISTANCE RECEIVING.

(555.) ALPHA M. KOESTER, Oregon, asks:

1.—What instruments would it require to receive 2,100 miles?

A. 1.—It would be very difficult to maintain uninterrupted communication for 2,100 miles. A very sensitive receptor would be necessary to receive this distance and would consist of an electrolytic detector, two variable condensers, loosely coupled tuning coil, potentiometer, and a pair of 2000-ohm phones, with an aerial 150 feet high.

2.—I do not want to use storage or Edison batteries. Which are the next best to use on E. I. Co.'s ½ K. W. transformer coil with vibrator and condenser, to send 22 miles?

A. 2.—Bichromate cells.

3.—Where can I get the call letters and wave lengths of Pacific Coast stations?

A. 3.—From the Blue Book of the W. A. O. A. Price, 10 cents.

HOT WIRE METER.

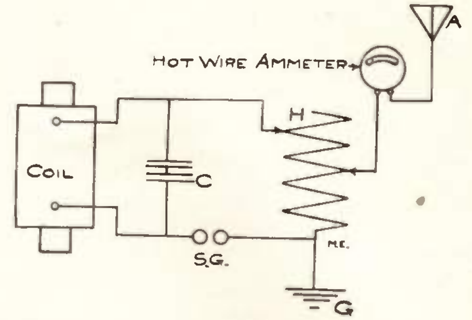
(556.) —— ———, Maryland, writes:

1.—Give data for building a ¼ K. W. closed core transformer.

A. 1.—Core 11 by 6½ inches. Cross section 1⅜ by 1⅜ inches. Primary 6 layers of No. 15 B. S. gauge, each layer consisting of 110 turns. Secondary wound in 18 sections and consisting of 5½ lbs. of No. 34 enameled wire.

2.—How is the hot wire ammeter described in January issue operated?

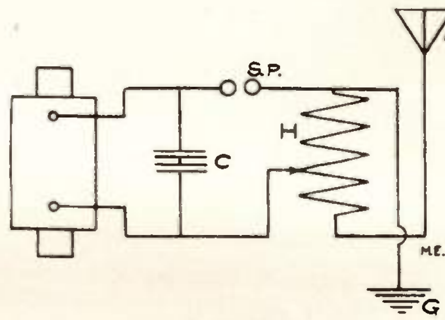
A. 2.—It is connected as in the diagram



below. The connections on the helix and the spark gap are adjusted until the meter shows a maximum reading. The transmitter is then in tune.

3.—Give diagram for connecting a ¼ K. W. transformer, condenser gap and helix to secure best results.

A. 3.—Diagram given below. We would



advise that you obtain "Wireless Telegraph Construction for Amateurs," by Alfred P. Morgan. The book is now in press but will be obtainable shortly from the Electro Importing Co., 233 Fulton Street, New York City. All of these questions are very fully explained therein.

SPARK COIL.

(557.) D. West, Rhode Island, writes:

1.—Please tell me how long a spark I should get from the following coil: The core is 10 inches long and 1 inch in diameter: primary consists of 4 layers of No. 20 B. & S. gauge double cotton covered copper wire, with paper and shellac between each layer, secondary consists of 1½ lbs. No. 30 B. & S. gauge double cotton covered wire, with paper and shellac between each layer.

A. 1.—You will only get a spark about ¼ of an inch long. Your coil has not very good proportions.

2.—How far could I receive with the following: An aerial made of two aluminum wires 2 feet apart, 27 feet high and 50 feet long, a home made silicon detector, and a 75-ohm receiver?

A. 2.—25 to 50 miles.

COIL BATTERY.

(558.) Harry Chatto, Maine, asks:

1.—How many No. 1006 Edison primary

cells should be used with an E. I. Co. 2-inch coil to send the maximum distance?

A. 1.—Ten.

2.—If 12 such cells are not too many, how should they be connected to secure best results in connection with the above coil?

A. 2.—All placed in series.

3.—Could the E. I. Co.'s 6-volt, 60 A. H. storage battery No. 555 be charged with these cells?

A. 3.—Yes.

LIGHTNING.

(559) Wesley Lees, Ohio, writes:

1.—I have my antenna inside the house (in attic). Is there danger of lightning; if so, how avoided?

A. 1.—There is no more danger with it there than without. It is advisable, however, to ground any aerial during thunderstorms.

ONE-HALF K. W. TRANSFORMER.

(560.) Newell R. Fiske and William S. Higbie, New Jersey, write:

1.—Kindly give specifications on a small magnet capable of running on 110 volts A. C.

A. 1.—We cannot give you such data without knowing what you wish to use the magnet for.

2.—Also specifications for a 500-watt transformer like the one described in the April, 1909, number of Modern Electrics.

A. 2.—Core 14 by 7, cross section of core 1⅜ by 1⅜, primary 4 layers of No. 13 B. S. double cotton covered, secondary 25 coils each made up of 5 ozs. of 34 D. C. covered wire.

LOOSE COUPLER.

(561.) Chas. W. Schaffer, writes:

1.—How much and what size secondary can be used on a loose coupler, the primary being 1 lb. No. 20 enameled wire?

A. 1.—No. 28 wire. We can not tell you how much without knowing more about the dimensions of the loose coupler.

2.—Would a 6-volt 6-ampere K. & D. dynamo run a 2-inch Electro Importing Co. coil? If not, what size would?

A. 2.—Not so that it gives the full spark. Nine to 10 volts and 6 amperes are required to do this.

3.—Are these two new stations, and where are they located: D. X. & D. R.?

A. 3.—We do not know of any.

VARIABLE CONDENSER.

(562.) Wm. Whittaker, New York, writes:

1.—Will you please give me directions for the construction of a variable condenser (for receiving) of the slide-plate type; also let me know which has the greatest capacity, the "Electro" fixed condenser, or an .002 Microfarad fixed condenser?

A. 1.—Such a description would be too long to give in these columns. We hope to publish later such an article. The "Electro" fixed condenser has a capacity greater than .002 Microfarad.

SENDING RANGE.

(563.) Fred Uhl, Cal., asks:

1.—How far can I send with a 1-inch coil, 6 adjustable condensers, 1-quart Leyden jar, and a Gernsback interrupter, aerial 40 feet high?

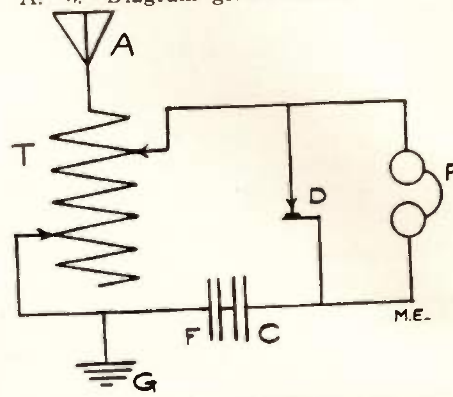
A. 1.—1 to 3 miles.

2.—Can No. 10 or No. 18 copper wire be used as an aerial for work up to about a mile?

A. 2.—Yes.

3.—Please give diagram for silicon detector, 1000-ohm receiver and tuner.

A. 3.—Diagram given below.



SPARK GAP.

564.) Robt. Winstanley, Mass., writes:

1.—Can you please tell me if a spark gap could be used with a buzzer, helix and key and 10 batteries?

A. 1.—No.

2.—What ought my sending distance be with above outfit and an aerial of 8 strands of No. 14 copper wire 75 feet long and 65 feet high? How much wave length has this tuner got: 15 inches long and 3½ inches wide, wound with No. 20 bare copper wire, double slide?

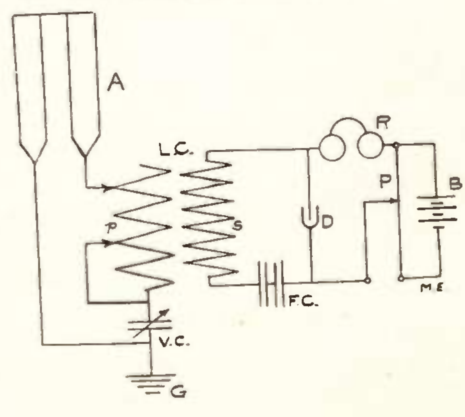
A. 2.—500 feet. It is impossible to calculate the wave length of the tuning coil without knowing how far apart the wires are spaced.

INSTRUMENTS DON'T WORK.

(565.) Raymond Nevelle, New York, writes:

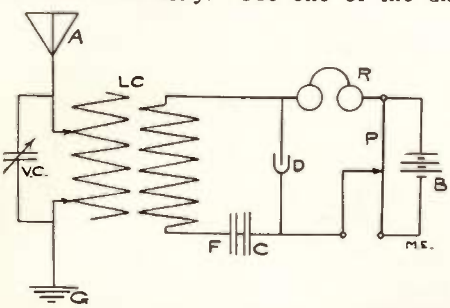
1.—Kindly give a diagram of my receiving station, consisting of loose coupler coil having 2 slides, electrolytic detector, variable condenser (having .003 M. F.) 500-ohm potentiometer and receivers of 2000-ohm resistance.

A. 1.—Diagram given below.



2.—I cannot get results if I use 2 slides on the coil, but I can pick up signals using only 1 slide. Please state my error. I use aerial wire of No. 14 B. & S. aluminum, 80 feet high, 30 feet long, having 4 wires. Also give a diagram of a straight away and loop aerial, and how each may be connected with these instruments, and which is best.

A. 2.—Your instruments are probably not wired correctly. Use one of the dia-



grams given herewith. The looped aerial is considered the best, where there is much interference to be eliminated.

OSCILLATION TRANSFORMER.

(566.) JACK TUTTLE, Ohio, asks:

1.—Please tell me where I can buy supplies for making wireless instruments, such as copper washers, aluminum for condensers, cores for tuning coils, etc.

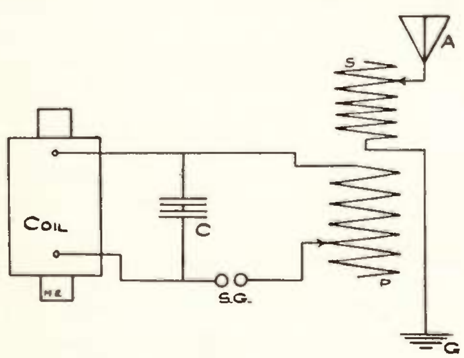
A. 1.—We would refer you to our advertising columns.

2.—Which is the best for wireless, a head set of two phones wound to 1000 ohms each, or two phones wound to 2000 ohms each?

A. 2.—We prefer those wound to 1000 ohms each.

3.—Please tell me how to make an oscillation transformer for sending, stating the use of primary and secondary, and how to connect up with a ½ K. W. transformer coil.

A. 3.—Make the primary of 15 turns of No. 6 B. S. gauge bare copper wire 15 inches in diameter. The secondary should be composed of 40 to 50 turns of No. 12 B. S. gauge bare copper wire 12 inches in diameter. Diagram given below.



TRANSMITTING DIAGRAM.

(567.) MIKE KILFOYLE, New York, asks:

1.—Kindly publish in your next issue the

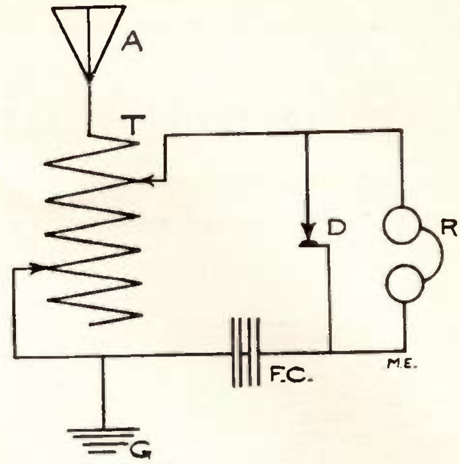
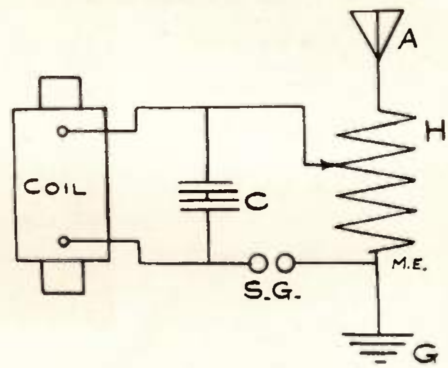


diagram of connection of one E. I. Co. double slide tuner, silicon detector, 2 E. I. Co. 1000-ohm receivers, one 1-inch spark coil, zinc spark gap, Morse telegraph key, sending helix and 1 fixed condenser.

A. 1.—Diagram given below.



2.—What would be the sending and receiving distance of above instruments with an iron pipe aerial 30 feet high, using 4 strands of No. 14 bare copper wire 18 inches apart?

A. 2.—Receiving, 150 to 300 miles; sending, 1 to 3 miles.

U. W. TELEGRAPH CO. WIRING DIAGRAM.

(568.) Chas. Morse, Connecticut, writes:

1.—Will you kindly give me the wiring diagram used by the United Wireless Co.?

A. 1.—Diagram is given in No. 556.

2.—How can I connect 4 ¼-inch coils together to get one large spark?

A. 2.—Connect the primaries in series and use only one interrupter. Connect the secondaries in series, taking care that the current flows through all in the same direction.

3.—Are instruments that are described in Modern Electrics such as the muffled spark gap in the January issue, covered by patents?

A. 3.—No.

Bound Volumes No. 2

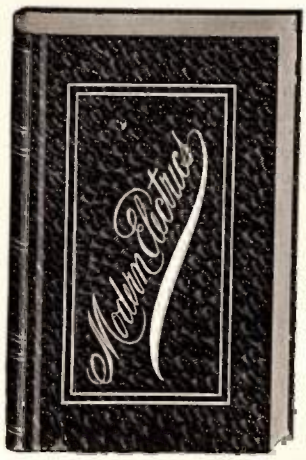
On account of a great demand of our readers, we have prepared a few hundred complete bound Volumes No. 2, of this magazine (April, 1909, to March, 1910).

There are 600 pages, and over 800 illustrations. Over 650 different articles.

There cannot be a shade of doubt, that these 12 issues of MODERN ELECTRICS do not contain more original and interesting matter than could be found in a $50.00 encyclopedia. As a reference book, nothing can come near, or within reach of this Volume No. 11.

For the Experimenter
For the Layman
For the School
For the Laboratory

NEWS



For the Wireless Student
For the Scientist
For the Home
For the Shop

FACTS

Bound in dark black or blue canvas, stamped with Gold lettering.

If it is new,—electric,—wireless,—you will positively find it in Volume No. 2.

If a question puzzles your mind—the answer will be found among the 350 "Oracle" answers.

If a diagram—a "hook-up," you will positively find it in the "Oracle."

NOTHING LIKE IT UNDER THE SUN.

As the edition is limited—on account of the great demand for back numbers,—order at once.

Plenty volumes on hand. We can ship the same day as order is received. NO DELAY.

PRICE $2.00

MONEY ORDER, DRAFT OR CASH. NO STAMPS

Modern Electrics Publication

233 Fulton Street -:- -:- New York

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 blue prints not listed under "Wireless," 2 cents a word.

Advertisements for the June issue must be in our hands by May 25.

ELECTRICAL APPARATUS.

STUDY ELECTRICITY AT HOME. A complete electrical course at home, containing 30-page detail book, 220-page text-book, 200-page 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, BLUE PRINTS, Etc.

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

PACIFIC COAST commercial and government wireless stations. List of 200, with calls, for ten cents. C. F. King, 163 Belvedere st., San Francisco, Cal.

SEND 25C. COIN, full information how to make a simple learners' set for wireless beginners, can be made to sound like near or distant stations, perfect imitation of wireless signals. B. L. Davies, 206 W. 23rd st., N. Y. City.

HANDY LEAFLETS for the wireless amateur, in a set of seven. Tells you how to make loose coupler, universal detector, variable condenser, induction coils, ¼ K. W. transformer, sending condenser, and helix and spark gap. Each subject is treated by itself in neat leaflet form with diagrams, ten cents each. Edetric Supply Co., 4836 Champlain ave., Chicago, Ill.

INTERESTED IN WIRELESS? Send 25c. for "How to Make a Portable Wireless Telegraph Outfit." Twelve chapters telling how to make every instrument. Applicable for portable or stationary work. Profusely illustrated. Has other wireless books beat a mile. Send stamp for list of constructional drawings, diagrams, etc. Oak Ridge Wireless Specialty Co., 5310 Indiana ave., Chicago.

MR. OPERATOR, know your wave-length; complete formulae for finding capacity, inductance, and exact wave-length; with table of dielectric inductivities, 25c. coin. H. W. Secor, 206 W. 23rd st., New York City.

"WIRELESS WORLD" magazine, one year, for 25 cents in coin. 21B Glendale st., Dorchester, Mass.

AMATEURS, you are aware that Fairs, Picture Houses, etc, urgently need novelties this season, why not get that dough for the apparatus you are longing for by offering my big mystery—producing people, articles, animated heads in space absolutely without aid of mirrors, wires, traps! Huge sensation, profitable and inexpensive. Complete, $1. House Theatre, Wallingford, Conn.

When writing, please mention "Modern Electrics."

WIRELESS.

WIRELESS FIENDS.

Phosphor Bronze Aerial Wire as used by Government, the best yet. Just imported 25,000 feet. 1½ cts. per foot. Bornite and Zincite, the most sensitive combination, 50 cts. per set. Zincite and Copper Pyrites, 50 cts. per set. Silver plated brass cup for mounting crystals, 10 cts. each. Sliders (for square rod ¼-in.x¼-in.) with ball and spring, 20 cts. complete. Black Asphaltum, Black and White Shellac, liquid ready to use, large bottle, 25 cts. Electrolytic Detector, 1909 style, 60 cts. each. Spool containing 1000 Ohms No. 50 Copper Wire, 60 cts. Silicon or Molybdenite, large piece, 15 cts. Send postage stamp for 128 page Catalog.
Electro Importing Co., 233-Z Fulton st., New York.

SOUTHARD-DODD WIRELESS CO., 421 N. Fulton ave., Baltimore, Maryland. See advertisement in March issue. Special prices still hold good. Extra, ¼ K. W. transformers, $16.50. Send 2-cent stamp for catalogue.

SPECIAL PRICES.—1,000-ohm wireless receiver, double pole, special thin diaphragm, hard rubber case, wound with copper wire, $1.75. Leather covered head-band, double, $1; single, $.60. "National" receiving condenser, $.30. Waterhouse Bros., Bourne, Mass.

When writing, please mention "Modern Electrics."

FOR SALE.

FOR SALE.—10 lbs. No. 30 S. C. C. Magnet wire, $7. J. N. du Treil, 518 Eleonore, New Orleans.

WIRELESS OUTFIT for sale, at reasonable price. Address, Chas. Horn, 3152 Park ave., Bronx, N. Y.

FOR SALE.—6-20 A. H. storage batteries, $3.00; electrolytic interrupter, $1.75; volt meter, 0-110, $7.00; 1-inch spark coil, with leg key, $4.75; auto-coherer, 65c. Eureka Telegraph Set, 90c. A. R. Kraemer, 563 7th ave., College Point, L. I.

FOR SALE.—Wireless outfit. Receiving distance, 75-100 miles; sending, 10-15; a bargain. Address, J. W. Dwight, Monmouth Court, Brookline, Mass.

FOR SALE.—Fused silicon, 25 cts. per ounce; piece, 5 cts. Both prices include postage. Address, P. H. Daniels, 276 S. Main st., Brockton, Mass.

FOR SALE.—One new set, 6 volums, "Applied Cyclopedia of Eletcricity," $16, prepaid. Orval La-France, Brock, Nebr.

110-Volt electric fan, ½ K.W. wireless transformer, potentiometer, and spark gap, for best offer of motorcycle or solid tire runabout. R. Westervelt, Elmira, N. Y.

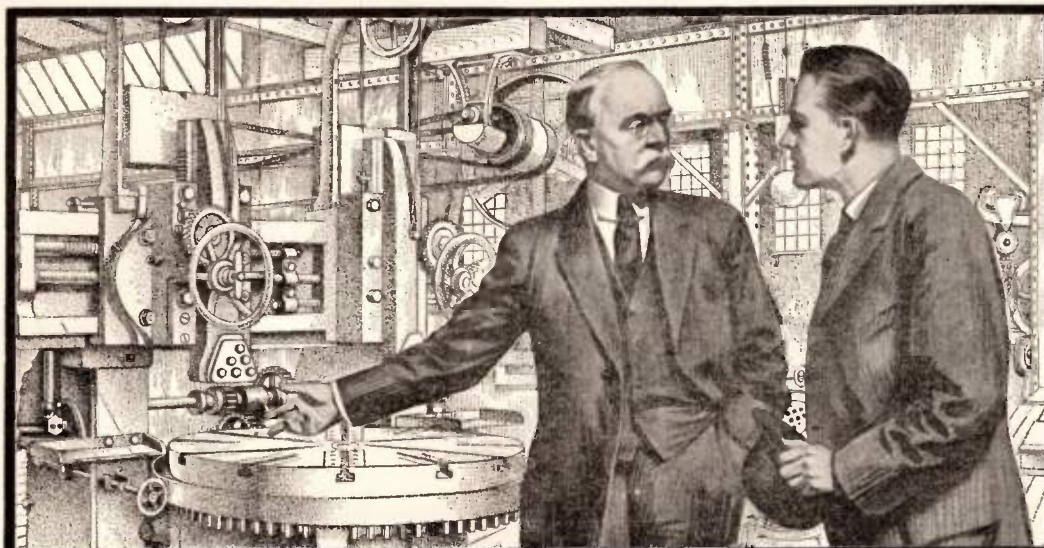
FOR SALE.—A 62-volt, 10-amp. Lr. storage battery, $20.00; consists of 31 sets of elements in as many hard rubber jars. Also one 6-volt, 60-amp. Lr. battery, $10.00. All plates and jars in good condition. Robert C. Denny, 505 Norton ave., Kansas City, Missouri.

FOR SALE.—Electro half K. W. transformer. New. H. K. Cherry, Univ. Bookstore, Minneapolis.

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

New $11.00, 20-ohm telegraph pole changer, $4.00. H. W. Secor, 206 W. 23rd st., New York City.

When writing, please mention "Modern Electrics."



"Here's the Job— Now PRODUCE"!

The last man at this job was a fine chap, but he couldn't 'make good,' so we had to let him go. As I said before, the position calls for a TRAINED man. Now it's 'UP TO YOU.'"

Suppose it were up to you—could you "make good?" Don't you know perfectly well that your failure to get ahead is owing not to lack of brains—but to lack of training? What is the great difference between you and the fellow able to "produce" as a foreman or superintendent or manager? Training—that's all. A thousand jobs await the man able to "produce." Employers want him—are always eager to secure his services. The world has no patience with drones—no pity for failures; it says to every man, "get ready to 'produce.'"

Every month there are received at the I. C. S. upwards of 300 voluntary letters from men that spare time study has qualified to "produce." Those letters prove conclusively that there is a way for every man—for you—to get ready to "produce." The I. C. S. will give to you the same training that has qualified tens of thousands to rise to higher and better paid positions. The I. C. S. can help you. Are you willing to help yourself?

To find out all about how you can learn to "produce," mark and mail the coupon. Doing so will cost you only postage and will place you under absolutely no obligation.

Send the Coupon NOW!

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 992, SCRANTON, PA.

Please explain, without further obligation on my part, how I can qualify for a higher salary and advancement to the position before which I have marked X.

Electrical Engineer	Machine Designer	Concrete Engineer
Elec.-Lighting Supt.	Mechanical Drafts.	Architect
Elec.-Railway Supt.	Foreman Machinist	Architectural Draft.
Electrician	Foreman Toolmaker	Advertising Man
Telephone Engineer	Foreman Molder	Window Dresser
Civil Engineer	Foreman Blacksmith	Chemist
Bridge Engineer	Marine Engineer	Ornamental Design.
Mechanical Engineer	Sheet-Metal Draft.	Textile Designer
Stationary Engineer	Municipal Engineer	Bookkeeper
Gas Engineer	R. R. Construc. Eng.	Stenographer
Refrigeration Eng.	Surveyor	Civil Service Exams.
Sanitary Engineer	Mining Engineer	Automobile Operator

Name ________________

St. and No. ________________

City __________ *State* __________

The Greatest Magazine Bargains

We Save You As Much As 40 Per Cent. On Your Subscriptions

		Our Price
MODERN ELECTRICS	$1.00	$3.00
COSMOPOLITAN, (or American, or Good Housekeeping)	1.50	
REVIEW OF REVIEWS	3.00	
Regular Price -	$5.50	

		Our Price
Modern Electrics	**$1.00**	$4.05
World's Work	**3.00**	
Everybody's	**1.50**	
Delineator	**1.00**	
Regular Price -	**$6.50**	

		Our Price
Modern Electrics	**$1.00**	$5.40
Pearson's	**1.50**	
Leslie's Weekly	**5.00**	
Regular Price -	**$7.50**	

		Our Price
Modern Electrics	**$1.00**	$4.25
Good Housekeeping	**1.00**	
The Outlook	**3.00**	
Regular Price -	**$5.00**	

		Our Price
Modern Electrics	**$1.00**	$4.20
Review of Reviews	**3.00**	
McClure's Magazine	**1.50**	
Woman's Home Companion	**1.50**	
Regular Price -	**$7.00**	

		Our Price
Modern Electrics	**$1.00**	$2.15
Pictorial Review	**1.00**	
Cosmopolitan, (or American or Good Housekeeping)	**1.50**	
Regular Price -	**$3.50**	

		Our Price
Modern Electrics	**$1.00**	$2.40
The World Today	**1.50**	
Pearson's	**1.50**	
Regular Price -	**$4.00**	

MODERN ELECTRICS IN CONNECTION

	Regular Price	Our Price
With Ainslee's	$2 80	**$1.80**
" American Boy	2.00	**1.45**
" The Book-keeper	2.00	**1.45**
" Cosmopolitan	2.50	**1.50**
" Cycle & Aut'bile Trade Journal	3.00	**1.80**
" Farm Journal	2.00	**1.45**
" Fruit Grower	2.00	**1.35**
" Good Housekeeping	2.00	**1.50**
" Gunter's Magazine	2.50	**2.00**
" Harper's Magazine or Weekly	5 00	**4.30**
" " Bazar	2 00	**1.50**
" Judge's Weekly	6.00	**5.00**
" The Ladies World	1 50	**1.10**
" Leslie's Weekly	6.00	**5.00**
" Lippincott's	3.50	**2.50**
" McClure's Magazine	2.50	**1.80**
" Metropolitan	2.50	**1.75**
" Modern Priscilla	1.75	**1.30**

	Regular Price	Our Price
With Motor Boat	8 00	**$2.30**
" The Musician	2.50	**1.80**
" North American Review	5.00	**4.30**
" The Outlook	4.00	**3.50**
" Pacific	2.50	**1.80**
" Pearson's	2.50	**1.50**
" Pictorial Review	2 00	**1.50**
" Popular Magazine	4.00	**3.00**
" Recreation	4.00	**3.00**
" Review of Reviews	4.00	**2.30**
" Scientific American	4 00	**3.30**
" Telephony	4.00	**2.30**
" Suburban Life	4.00	**3.05**
" Success	2.00	**1.50**
" Sunset	2.50	**1.80**
" Travel	2.50	**1.80**
" Women's Home Companion	2.25	**1.70**
" The World Today	2.00	**1.40**

Canadian and Foreign Postage to be added to above prices.
We will gladly quote on any Magazine combination not listed above
Prompt and careful service assured.
It is impossible to get the Magazines quoted in our list cheaper elsewhere.

MAIL ALL ORDERS TO

Modern Electrics Publication

233 FULTON STREET NEW YORK

AERIAL SUPPORT.

(Continued from page 83.)

sufficient strength to resist strong wind storms.

The photograph shows the aerial support mounted on my residence; the aerial

was being raised to position when the photograph was taken.

WIRELESS WITH STATIC MACHINE.

(Continued from page 89.)

call also came in pretty well with iron pyrites.

Up to and over distances of a half mile, a detector of the "Audion" type and a pair of 2,000-ohm receivers were absolutely necessary, along with the tuning coil and a variable condenser, to even hear the faintest signals, all the connections had to be tight and all joints soldered, the sliding contacts of the tuning coil even being detrimental to the loudness of the sound, in the receivers. At one time, on a foggy night, the call came in fully 50 per cent. better than any results we had obtained in the daytime so far.

Also there was a decided difference in the sound in the receivers than when the ordinary transformer was used. The waves emitted by a static machine sounded more like a puff, puff than the distinct buzz of the transformer, whether this was caused by a freak of coincidence in the action of the detectors, or not, we have not been able to determine.

HOW TO MAKE AN OIL-IMMERSED TRANSFORMER COIL.

The object of this article is to open a way by which the amateur experimenter can construct an efficient and reliable transformer or induction coil suitable in every way for wireless work and also which can be connected up and used as a Tesla disruptive coil, which it somewhat resembles.

A highly satisfactory coil can be made at a slight cost and with but little trouble, in the following manner:

First, make a core of soft iron wire, No. 22, B. W. G., 10 inches in length and exactly 1 inch thick. Wrap this with rubber and wind on two layers of No. 14 B. & S. gauge cotton covered copper wire. Insert this primary into a glass insulating tube so that the coil fits snugly and the tube extends one inch beyond the ends of the core.

The secondary is simply a hard rubber spool containing a single winding of small wire, but it is very important that this secondary should be made in a certain way, as follows:

The spool should be made of hard rubber and its length should not exceed 4 inches. The hole through center of this spool should be at least one inch longer in diameter than the primary cover.

Now, wind on one (1) pound of No. 36 cotton covered wire and slip the primary into the secondary, which must be held suspended in place by blocks of wood in such a manner that the spool does not touch the primary or its cover, thus leaving a space of one-half inch between the inside of the spool and the primary cover.

The whole outfit is now immersed in an earthenware or glass vessel filled with pure boiled linseed oil. Paraffine will not do in this case, but of course any pure vegetable oil will do.

If it is desired to operate this coil as a Tesla disruptive coil (which the amateur may or may not be familiar with), it will be found necessary to remove both the core and the independent interrupter. Otherwise use 110 volts, A. C. or D. C., with a Wehnelt interrupter in series, with suitable resistance.

Contributed by

DONALD M. MELLETTE.

WIRELESS ASSOC. OF AMERICA.

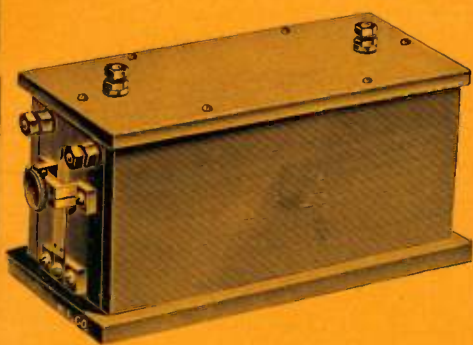
(Continued from page 75.)

Henry Kalning & Olive Heartberg, N. Y. City,	O.H.K.	73	2	"
A. S. Hect, N. Y. City,	G.W.M.	146	1	"
F. H. Johnston, Ft. Wayne, Ind.,	L.M.M.	146	½	K.W.
J. W. Reynolds, Hagerstown, Md.,	J.R.W.	180	1	ins.
Fred A. Calkin, Somerville, Mass.,	F.C.M.	84	1	"
H. M. Klienhaus, San Jose, Cal.,	H.M.K.	135	¾	"
Wm. K. McKittrick, St. Louis, Mo.,	C.W.K.	150	¼	K.W.
H. Seabrooke Schanck, Keeport, N. J.,	U.Q.M.	100	½	"
Ed. T. Jorgensen, San Francisco, Cal.,	T.J.M	[illegible]	[illegible]	ins.

Sale

OUR NEW 5 STORY BUILDING

1¾-2 INCH COILS



Spark length, fully guaranteed or MONEY BACK. This is a similar sale like the one we had last year. Many of our customers will remember the bargains and if you need a GOOD coil, speak now—QUICK. If coil is not up to your expectations—return it to us.

Now $7.50

Regular price, $9

2½ IN. COILS

These fine coils, which really are more 3-inch than 2-inch coils are of an incredible power. If used on an 8 volt storage battery they will work up to **20 miles** guaranteed.

Now $10.00

Regular price, - $13.50

ODD SIZE GEISSLER TUBES

Through an error of the manufacturer an odd size lot of tubes were imported, not catalogued by us.
It is the same quality tube as our famous tubes. Only odd length. Each tube guaranteed.
4 Inch Plain Tube . . . . $0.30; by mail extra, $0.07
3 Inch Liquid Tube (all colors) . 0.40; by mail extra, 0.10
As long as limited supply lasts.

STORAGE BATTERY PLATES

If you desire to build your own storage battery—here is your chance. These plates are ready formed and are new in every respect. The best money can buy.

Size R. E. Positive Plate . . . . . 4 1-2-inch x 5 1-2-inch

Now 35 cents

Regular price, - - - - - - - 50 cents

Size R. E. Negative Plate . . . . . 4 1-2-inch x 5 1-2-inch

Now 28 cents

Regular price, - - - - - - - 45 cents

TUNER Jr.

Since introducing our new Junior Tuner, with solid hard rubber ends, we have left over a few of the old style ones, with wooden ends. As these are not regularly catalogued, and as we discontinued them, we offer them at cost. Anybody who wants a first-class GUARANTEED Tuning Coil should get this bargain. First come first served. We reserve right to return your money when these coils are all sold out.

Now $1.25

Regular price, - - - - - - - . $2.00

Have you a copy of our famous **ELECTRICAL CYCLOPEDIA NO. 7**, containing 128 pages of apparatus and instruments; **WIRELESS CODES**, over **50 WIRELESS DIAGRAMS**; and the most complete assortment of experimental electric goods in the U. S.? It's chuck full of all kinds of information only found in $5.00 books.

The Cyclopedia will be mailed to you on receipt of 2 cent stamp for postage. Address all communications to

The Electro Importing Co.

"EVERYTHING FOR THE EXPERIMENTER"

233-Z FULTON STREET **NEW YORK CITY**

Retail Store: 69 West Broadway, N. Y.

Will You Give a Home Test to Johnson's Under-Lac at our Expense?

WE WANT you to know Johnson's Under-Lac by actual proof and real test. *One* trial will convince you how far superior it is to shellac or varnish.

How much simpler, more economical, easier and more satisfactory to apply.

Let us send you a bottle free and prepaid, and our illustrated booklet, Edition M. E. 2, "The Proper Treatment of Floors, Woodwork and Furniture," which answers every question on the care, preservation and beautifying of every wood surface—is full of valuable hints and helps on home decoration.

Johnson's Under-Lac

Imparts a beautiful, brilliant and lasting finish to floors, woodwork and furniture—over surfaces being dressed for the first time, over dye stains, filler or the bare wood; over an old finish of any kind.

You know the fault of varnish. It is thick, sticky—dries slowly in a mottled way.

Under-Lac dries evenly and quickly—but not too quickly, like shellac which laps and crawls and dries before it is well on. Under-Lac is thin, elastic—dries hard in half-an-hour. Use it for any purpose for which you would use shellac or varnish.

Johnson's Under-Lac produces a splendid *permanent* finish.

For Linoleum and Oil Cloth

It brings out the pattern to best advantage, giving a finish as glossy as new; protects from wear and makes cleaning easy.

The most economical because it goes farthest and lasts longest. Gallon cans, $2.50. Smaller cans down to half pints. Write to day for the samples and our book of Home-Beautifying Suggestions. Edition M. E. 6. Clip coupon or take down address now.

S. C. Johnson & Son

Racine, Wis.

"The Wood Finishing Authorities"

PLEASE USE THIS COUPON—CUT ON THE LINE

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

I accept your offer of a sample of Johnson's Under-Lac, better than varnish or shellac; also Booklet, Edition M.E. 6. I agree to test the sample and report results to my paint dealer.

Name ....

Address ....

....