Diagram Supplement With This Issue

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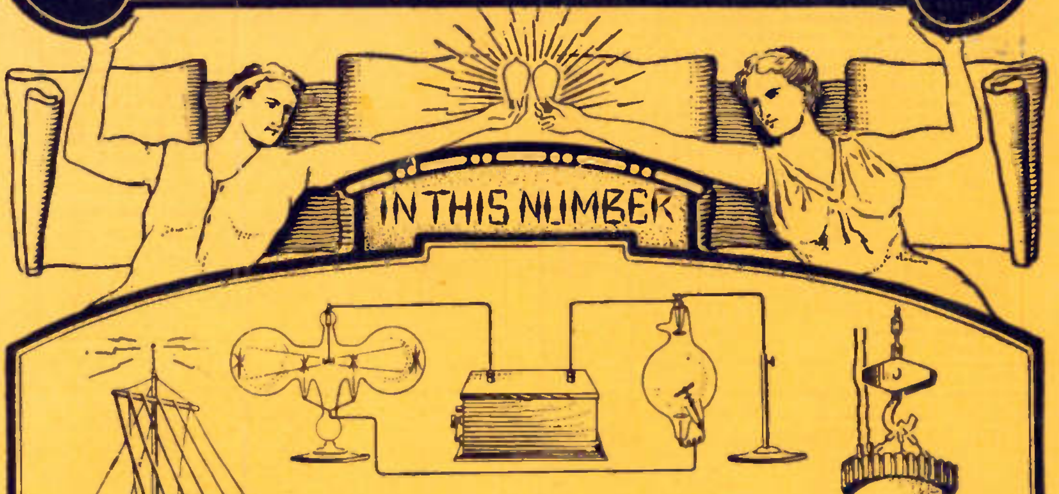
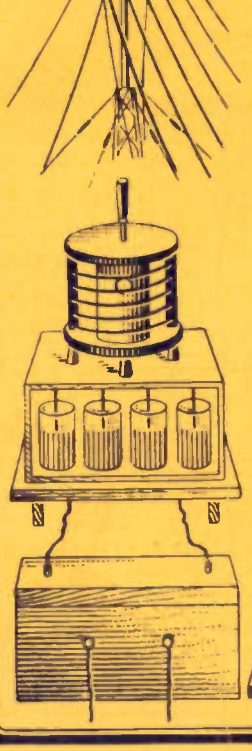
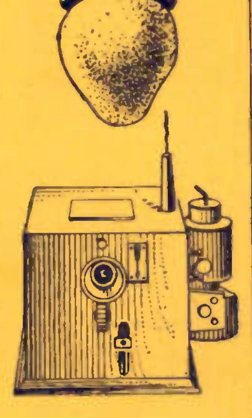
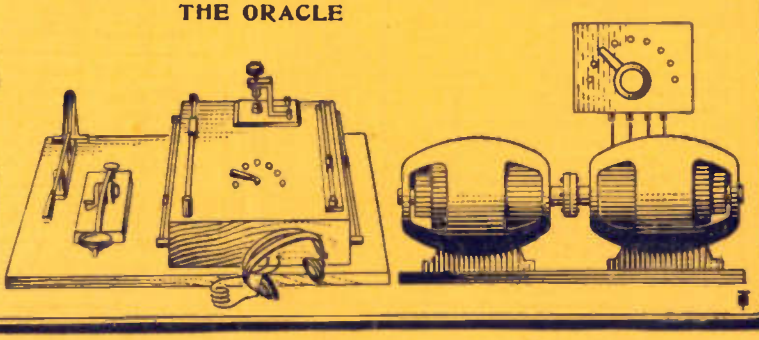
MODERN ELECTRICS

No. 11









"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

N. S. E.

MODERN ELECTRICS

Vol. II. FEBRUARY, 1910. No. 11

Dr. de Forest's New Radio Telephone

Since the opening of the Metropolitan Life Tower Station of the Radio Telephone Company, Dr. Lee de Forest has given out some interesting information concerning the latest type of his radio telephone which is being installed in that station and which will be used in all of the stations of the company and its subsidiaries throughout North America. During the last eighteen months Dr. de-Forest has been developing an entirely new type of wireless telephone transmitter, differing radically from the arc type which has heretofore been used in every form of radio telephony.

The new "Oscillator," as it is called, is operated from a D. C. source of 600 volts, in series with a resistance. Unlike even the best form of automatic arc arrangement the Oscillator requires no attention other than the closing of a switch to start same.

The electrodes are both of metal, constantly renewed, never in contact, perfectly cooled. No hydrogen, or hydrocarbon gas or vapor whatsoever is employed. The consumption of the electrode is so small as to be negligible. A new electrode need be inserted not oftener than once in one or two months, at the cost of a few cents.

The wave length of the oscillation thus set up remains absolutely constant, something which no form of carbon arc could ever accomplish, and without which it was always impossible to be sure that the receiving apparatus would be set at the proper position, during a prolonged conversation.

The electrical and mechanical advantages of this new oscillator are so original and startling that they have been firmly protected by broad claims allowed by the United States Patent Office. In addition to being constant in wave-frequency and free from necessity of adjustment, the oscillator operates even more quietly than the smooth burning arc, so that at a short distance the only sound heard in the receiver is that of the voice itself.

The oscillator mechanism is small and its operation entirely noiseless. A simple water-circulating system is combined with the apparatus, and this is made further use of to keep the two microphones of the transmitter perfectly cooled.

MICROPHONE.

Dr. deForest has also developed a water-cooled microphone which, while allowing exactly as clear and free articulation as the non-cooled type, can still carry 2-4 amperes high frequency current for any length of time without any appreciable rise in temperature. This has, therefore, done away entirely with the bad "packing" and baking of the best non-cooled microphones, and enables one to speak into the transmitter for any length of time desired, without having to stop occasionally to shake up the granules, and with undiminished intensity of voice and clearness of articulation.

The microphones are mounted on a standard adjustable arm to the front of the transmitter box. The condenser is smaller and lighter than previously. The same form of primary and secondary coils that were found so efficient and convenient in tuning, together with the easily adjustable loose-coupling arrangement, are retained, but with many mechanical improvements which have been worked out as a result of the long experience of the Radio Telephone Company. The little index lamp, and handy "listening key" are retained.

Each transmitting instrument can be quickly set to send out any one of six different wave-lengths, covering a wide range, and an additional coil enables practically any wave-length to be obtained, where a greater flexibility is required.

TELEGRAPH ADJUNCT.

Dr. deForest has done away entirely with the original "chopper" device for calling purposes and telegraphing. In place of this, an adjunct is provided having no moving parts whatever and which merely by the throwing of a switch transforms the telephone into a telegraph instrument which gives at the receiving station a beautiful high, clear musical note. (About 1,000 vibrations per second.)

The signals are controlled by a small Morse key, at whose contacts is no appreciable spark. This allows of as high a speed of telegraphing as any operator can attain, while the fine singing quality of the note emitted (coupled with the wonderful tuning qualities of the undamped waves) enables one to read the signals through severe and multiplied interferences. The wave here, the same as when telephoning, is undamped, and the tuning therefore, remarkably sharp, when a "loose-coupler" is employed at the receiver.

RECEIVING APPARATUS.

The same receiving apparatus as is supplied by the Radio Telephone Company, for its new "hy-note" wireless telegraph is employed for the telephone, so that duplicate plants here are not required. Two detectors, the deForest Audion and the Seibt "Radion" are furnished. The former is now universally accepted, here and abroad, as the most satisfactory detector for the radio telephone. This because of maximum sensitiveness, reliability, and freedom from "upset" by strong sparks requiring renewed adjustment. The radion is for use with stronger signals, telephone or telegraph. Telephone head receivers are employed which are the acme of sensitiveness.

The new tuning devices are immense improvements over those originally employed in the system. The variometers and loose-couplings are designed to give minimum of damping losses with maximum inductances, and convenience of manipulation and simplicity. Each conductor is built up of 35 to 84 strands of copper wire, separately insulated, and braided together. Coils are wound on ebonite or seasoned hard wood, dial-indexed, and calibrated. The variable condensers are of the finest possible construction, aluminum semi-circular plates, accurately spaced air dielectric, enclosed in glass or hard wood cases, and carefully calibrated.

Where the radiophone is to be used by laymen and non-experts it is sometimes desirable that the tuning of the receiver shall be more simple and less exact. This allows a listener to hear any station within range, with but little adjustment of the tuner. For such purposes the receiving circuit is modified, so that the listener has only to turn one handle, to cover the entire range of wave-lengths which his instrument will receive.

It is a mistake to suppose that in the new system it is necessary to shout into the transmitter. For distances of 15 to 20 miles, the best results are obtained by speaking into the transmitter in a voice as low as or lower than one employs in ordinary city telephone conversation. The reception under the above conditions is as good and frequently better than with the wire 'phone.

With the new type of transmitter in the Metropolitan station Dr. deForest has succeeded in covering a distance of 500 miles over water. Other improvements in the equipment of the Metropolitan and other stations of the radio system include the multiplex apparatus which combines in one box four distinct receiving sets, each with its own individual tuning apparatus. Between the New York and Philadelphia stations Dr. deForest expects that he will soon be using his machine telegraph, which it is said is capable of transmitting 40,000 words an hour. This device is intended eventually for use between all large centers to facilitate the handling of the tremendous amount of business between such points.

TEXAS WIRELESS ASSOCIATION.

The Texas Wireless Association has been formed here with a membership of 116. The officers are:

Mr. George Mackenzie Douglas, President.

Mr. Roy M. Kinkaid, First Vice-president and General Manager.

Mr. Otto G. Smith, Secretary and Treasurer.

Address, 1212 Prairie Avenue, Houston, Texas.

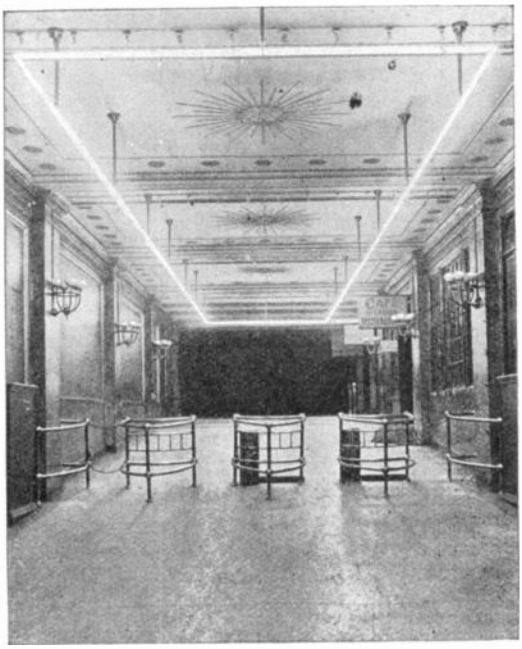
Anyone desiring to become a member of this association can do so by forwarding their name, address, occupation and age, also type of set used, to Mr. Douglas, at 1212 Prairie Avenue, Houston, Texas. We have two stations in the city of Houston that are receiving messages 1,250 to 2,400 miles every night.

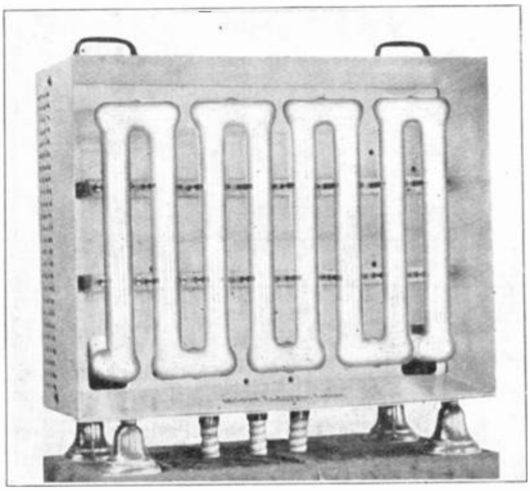
The White Moore Light for Color Matching

Dye houses can now be operated at night and on dark days with maximum efficiency. Until the advent of the white Moore Light in the textile industry, color matching and accurate determination of color values have been extremely troublesome details in the dye houses and sample rooms. There has been no standard, because daylight varies from hour to hour and from season to season. In the winter, especially, it is available but a small fraction of the time.

In many mills it has been the custom, therefore, in order to avoid disputes between the dyers and the weavers to make selections of various shades of goods and tag them in the stock room for use on dark days, but this procedure has been unsatisfactory, inasmuch as often the special shades of goods required by th weaver happened to be out of stock at the moment they should be used. Dye houses have had to shut down on dark days and the problem o operating the dve house at night has been decidedly precarious.

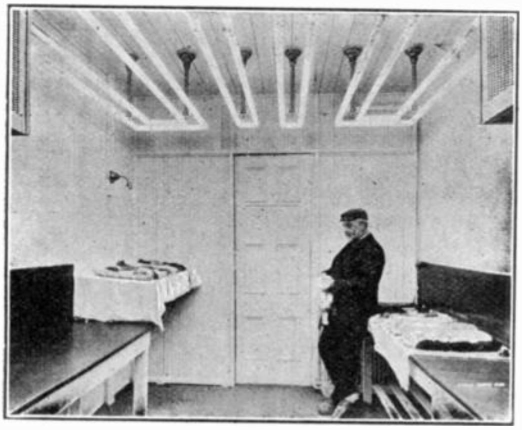
Less than three years ago one of the leaders of the silk dyeing industry took a step forward and investigated the claims of the Moore Light, and had installed in his color-matching-room a white Moore Tube for color matching. As an evidence of its utility this same dyer now has eight installations of the Moore Light in his works. Since this time many of the important silk and textile mills in the vicinity of New York have equipped their dye houses and color-matching-rooms with the white Moore Light. A claim of so great a force as that of the white Moore Light, that it duplicates average daylight, instigated the United States Bureau of Standards at Washington to have installed in their laboratory a standard color-matching Moore Light Tube, and after rigorous tests during the past summer, their official report states that the Moore Light is a perfect duplication of average daylight.


Entrance of Madison Square Garden lighted with Moore light.


Moore Light for Windows

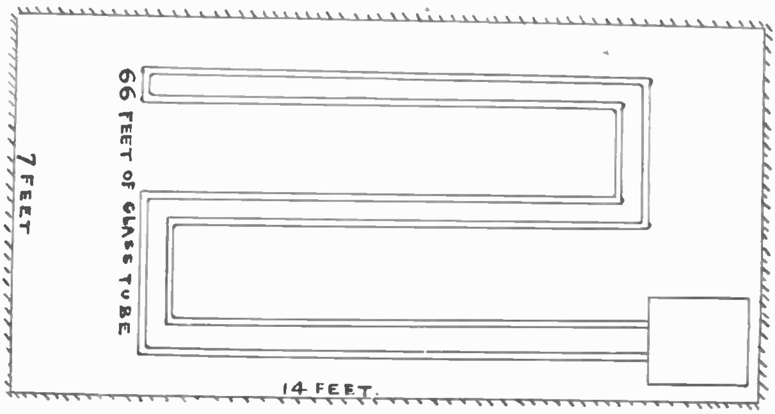
The Moore Light of to-day is the result of seventeen years of untiring investigation bv Mr. D. McFarlan Moore, the pioneer vacuum tube lighting inventor. Up to the time of Mr. Moore's entry in the field of illumination, and in fact, outside of Mr. Moore's efforts to date, the tendency had been to develop a "spot" light—that is to say, each advance both in electrical and gas lighting, has been towards obtaining a more intense illuminant from a concentrated source. For example, we can follow from the torch of the ancient to the tallow tip, to the open gas flame, to the gas mantle, to the carbon filament incandescent lamp to the open and closed arc lamps, and to the more recent tungsten, tantalum and flaming arc lamps.

Mr. Moore started in the other direction—that is, he directed his efforts to



More Light in Color Matching Room.

the duplication of daylight—to develop a light of low intrinsic brilliancy, but of comparatively large area. The result of these efforts is the Moore Light—consisting of a long glass tube ordinarily



Arrangement of Tubes.

1¾ inches in diameter, containing a rarefied gas. The ends of this tube enter a terminal box containing the necessary electrical apparatus, and when electric current flows through the tube it produces a soft and extremely well diffused illumination throughout the tube.

The color of the Light can be varied by changing the character of the rarefied gas. The commercial Moore Light of to-day is of two colors—white and yellow. The white Moore Light is produced by using carbon dioxide within the Tube. The yellow Moore Light is produced by using rarefied nitrogen, obtained from the atmosphere and the illumination is a reproduction of sunlight without glare. The yellow Moore Light is the most efficient form of illumination ever devised and is suitable for lighting large areas, mills, etc., wherever good illumination is desired. Its color makes it suitable for all classes of business now using ordinary incandescent electric lamps. Several large mills are now contemplating the installation of the yellow Moore Light in their large weave rooms.

Since there are no filaments to burn out or carbons to renew the maintenance of the Moore Light is practically nil.

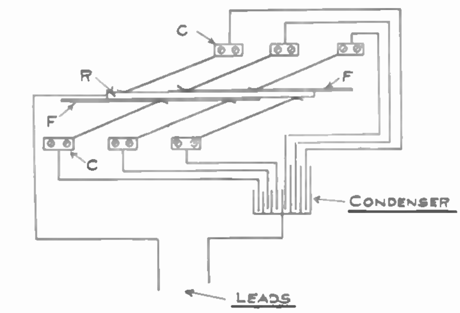
Nearly a mile of the yellow Moore Light Tubing is in constant use in the Registry Division of the United States Post Office at New York. It is being installed also in a large New York bank building and will produce unparalleled artistic lighting effects.

This article deals primarily with the white Moore Light for color-matching purposes in the textile industry. In this field it is practically indispensable—it enables the dyers and finishers to work their entire plant irrespective of daylight, and, therefore, increase their capacity very greatly. Of course, the white Moore Light is of great importance in many other classes of business wherever color values are of importance—in dry goods stores, tailoring establishments, paper manufacturers, diamond houses, etc.

Portable Receiving Set

By Edward Featherstone.

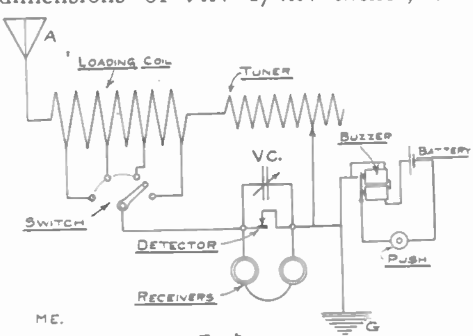
A receiving set comprising a high antenna, 1,200-meter tuning coil, silicon detector, variable condenser, receivers, testing buzzer, battery and ground connection, may, without mistake, be termed "portable," if it can be carried in one hand (and a pocket) on a wheel, and be set up ready for business by one person inside of five minutes.



-Fig. 1-

The antenna for this outfit consists of a single No. 28 wire which is elevated by means of a four-foot "tailless" kite, being either dropped down perpendicularly from the kite or run parallel with the kite string. A spring clip on the end of a flexible cord makes connection with the antenna wire. The kite is made very light and covered with cloth. It is rendered portable by making the curved cross stick removable. As this set is used in all kinds of weather, three different weights of string (seine-twine) are used.

A magneto telephone box with inside dimensions of 7x4 1/4x4 inches, contains the detector, condenser, tuning coil, buzzer and its battery.



-Fig 2-

The tuner has a 2 1/8 inch core 7 inches long wound with 75 meters of No. 28 bare wire. In with this is a loading coil containing 225 meters of No. 32 wire which is "tapped" at intervals of 75 meters, taps leading to a four-point switch. This method of using a loading coil is the only way by which so long a wave length may be obtained within such a limited space. To our definite knowledge this plan has never been used before, at least has not come to our notice.

The detector is held inside the box by a spring fastener when not in use, and when in use is connected to binding posts on the outside of box. The silicon detector is chosen as being least liable to injury or getting out of adjustment, besides ranking close to the electrolytic in sensitivity.

Fig. 3.

The variable condenser is capable of fairly close regulation and may be made of any convenient size. The principle of varying its capacity may be easily ascertained from Fig. 1. R is a metal rod (may be a piece of heavy wire) against which the brass spring clips C press. F is a strip of fibre which may be slid between the clips and rod, thus breaking their connection. The condenser is made up of 20 pieces, 3x4 inches, and 12 pieces

1 inch square, alternate sheets being connected together, while the other sheets are separately connected to the spring clips of the condenser switch. In this case, 10 clips are placed on one side of the rod for the larger pieces of foil, while 6 clips are needed on the other side of rod for the smaller pieces. When completed the condenser is rolled up into a cylinder and fastened to the inside of the box cover with the condenser switch on the outside of the box.

The testing buzzer, which is almost indispensable, is a very small one, and is

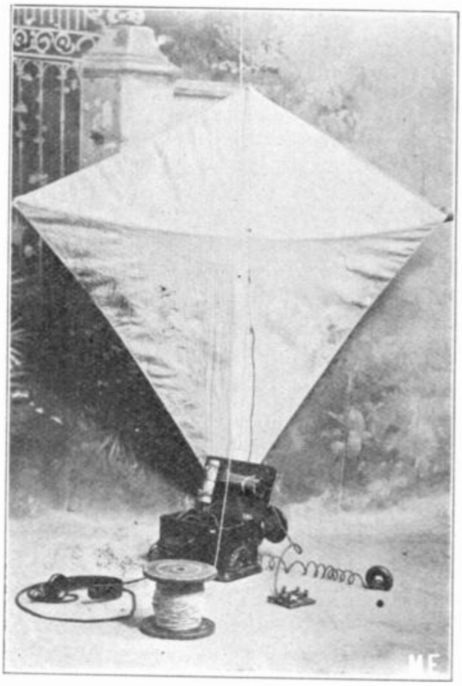


Fig. 4.

connected through a flush type push button to a small flash light battery, fastened also, on the inside of the cover.

The ground consists of an iron rod about 18 inches long, with a ring in the end to facilitate pushing in, and especially pulling out of ground.

The ground and antenna are connected through flexible cords to binding posts on the outside of box.

Double head receivers are almost a necessity, as little can be heard without them on account of wind, etc.

Fig. 2 shows the connections used, while Figs. 3 and 4 are photos of the outfit packed and unpacked.

This set has actually been unpacked, set up, and receiving messages inside of five minutes. It is capable of fine tuning and excellent results have been obtained with it.

In case of damage to the kite, or when there is no wind, fairly good results may be obtained by attaching a stone to the wire and throwing it over a high tree or barn.

MARVELS OF THE TELEPHONE.

At a dinner given in honor of the directors of the Associated Press in New York this month each of the eighty guests found a telephone receiver at his plate. During the evening the guests listened to the singing of Slezak and Caruso of the Metropolitan Opera Company, who sang in their dressing rooms for the pleasure of the banquetters. The singing was perfectly audible. The distance was the ordinary local service of the telephone.

The New York Telephone Co. had arranged a perfect long distance connection between this banquet and another dinner given in Washington, where the National Geographical Society was assembled. Brief addresses were listened to from Commander Peary, Mr. Carnegie, Admiral Chester, and others, 230 miles away. The voices were just as distinct and loud as if they were spoken in the same banquet hall.

TECHNICAL WIRELESS ASSOCIATION OF WASHINGTON, D. C.

The above association was organized on December 28, 1909, by Louis F. Dieterich and Edwin L. Powell. The object of the association is to experiment with wireless telegraphy. The number of members was limited to five people, who are students of the Technical High School of this city. A constitution and a set of by-laws were adopted, while the letters "T W A" were selected for the association call.

The members of the club are as follows:

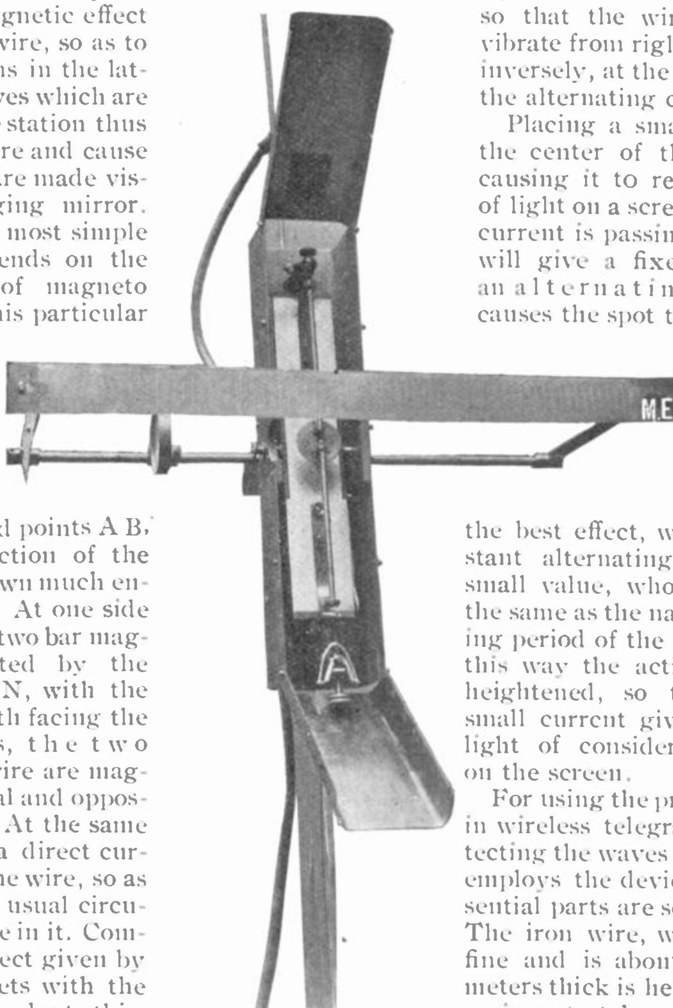
Ralph W. Brown, president.
Edwin L. Powell, secretary-treasurer.
Willis L. Hurd.
Louis F. Dieterich.
Edward B. Thomas.

Address, 1206 E. Capitol st., Washington, D. C.

The New Rossi Detector

By A. C. Marlowe.
Paris Correspondent Modern Electrics.

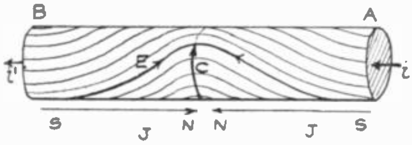
A departure from the principles which are now in use for detectors for wireless work is made by Prof. Rossi, an Italian scientist. He uses the principle of the magnetic effect on a fine iron wire, so as to cause vibrations in the latter, and the waves which are received at the station thus act upon the wire and cause signals which are made visible by a swinging mirror. The device is a most simple one, and depends on the phenomenon of magneto striction. In this particular case, what is known as Wiedemann's effect, is employed. A fine iron wire is stretched between two fixed points A B, fig. 1, the section of the wire being shown much enlarged here. At one side are placed the two bar magnets represented by the arrows, NS, SN, with the north poles both facing the centre. Thus, the two halves of the wire are magnetized in equal and opposite directions. At the same time we send a direct current through the wire, so as to produce the usual circular lines of force in it. Combining the effect given by the bar magnets with the effect at right angles to this, which is caused by the current, we have the resulting magnetization of the wire, which is shown by the screw-thread lines and the arrows. It is known that when a stretched wire is magnetized this has, for effect, to give a very slight lengthening or shortening to it. In the special case which we have here, the effect of the magnetization is to give a torsion to the wire in the direction of the arrow, represented by the horizontal line C. Keeping the bar magnets the same, if we pass the current through the wire the torsion now changes to the other sense; that is, to the right. It follows that when an alternating current is sent through the wire that we have a right and left hand torsion, so that the wire will now vibrate from right to left and inversely, at the same rate as the alternating current.



Placing a small mirror at the center of the wire and causing it to reflect a beam of light on a screen, when no current is passing the beam, will give a fixed spot, but an alternating current causes the spot to spread out into a line whose length depends on the strength of the current. To obtain the best effect, we use a constant alternating current of small value, whose period is the same as the natural swinging period of the wire, and in this way the action is much heightened, so that a very small current gives a line of light of considerable length on the screen.

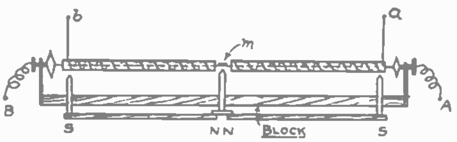
For using the present action in wireless telegraphy for detecting the waves the inventor employs the device whose essential parts are seen in fig. 2. The iron wire, which is very fine and is about 0.02 millimeters thick is held by special spring stretchers at the top and bottom, and the steady alternating current is sent through it by the terminals A B. The bar magnets N S, SN, are mounted at the back of a main insulating plate, which supports the whole. To bring the lines of force into the iron wire there are used the soft iron points seen at the middle and both ends, and these are brought as near as practicable to the wire. A small mirror m is mounted at the middle of the wire. Surrounding the wire along most of its length are two glass tubes of 2 millimeters diameter, leaving a space at the centre for the mirror, and around the tubes is wrapped a spiral of insulated copper wire. This winding is in opposite directions in the upper and lower halves and the spiral is well insulated from the iron wire.

The use of the spiral winding is to receive the waves coming into the station, and the impulses passing in the spiral act so as to give a magnetiziing effect to the iron wire, which is in the direction of its length and so will strengthen or weaken the action already produced by the bar magnets. When no current passes in the spiral, we have the constant effect on the beam, which the steady alternating current and fixed magnets give. The balance is disturbed when waves pass in the spiral, so that we see a distortion of the line of light on the screen.



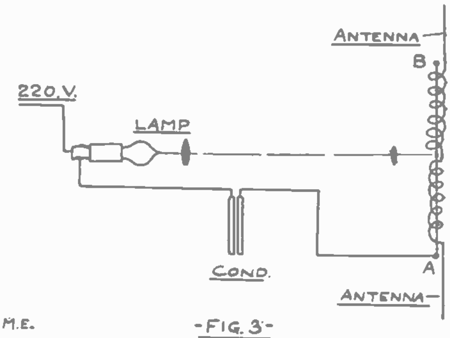
-FIG. 1-

In one experiment the apparatus is mounted for receiving waves in the laboratory, and the spirals are connected to the centre of a pair of vertical antennae, using two vertical wires of 4 feet length, insulated from the ground so as to form a rectilinear resonator. All the above apparatus is well insulated and held at 5 feet above the floor upon glass supports. The mirror is lighted by a Nernst lamp, working on 220 volts alternating current, and a beam is sent on to a scale, placed at 10 inches from the mirror. When the wire is in resonance with the 42 periods of the current, there is an ample and regular vibration of the wire. One end (fig. 3) of the wire A connects to a condenser and thence to the lamp, B being open. The simple charging current is enough to give a good vibration to the iron wire. Bringing the hand near one of the antennae changes the capacity and causes a marked disturbance in the beam, so that we can produce beats of 3 or 4 times a second in it, and by touching the antennae the beam expands violently, sometimes over all the scale.



-FIG. 2-

The experiment can be made differently by placing the alternating current in the spiral and the iron wire upon the outside circuit of the antennae, when the result is of the same kind. In practice, we replace the spiral by a split metal tube, which surrounds the glass tube at the top and bottom halves, and also connect the iron wire in the circuit of the antennae, in which case we have the best arrangement for receiving wireless waves. Seeing that the metal tube has a large capacity, we need only to keep it charged by the alternating current in order to give the same effect as before. Waves received from a distance will always give a disturbing effect on the beam, so that it is easy to read the signals and the device is a most sensitive one. Seeing that the effect is much greater when we work at the same period as that of the steady alternating current, the sending post can send out sets of waves which correspond to, say, 42 per second, and thus we have a method of tuning at low frequency, added to the usual tuning for high frequency. Such a method has been sought in using a tuned telephone or wave selector, but here the method is easier to apply. One point to be noticed is that in the usual detectors with telephone or register there is a double action; first, that of the detector, and second, that of the telephone, etc., while in Prof. Rossi's device the effect of the waves, which are received, is at once transformed into a visible signal and therefore by a simple action. The apparatus is extremely sensitive, and it is expected that signals can be sent with much less power than before. To register the signals a photographic method could be used, or the action of the beam on a selenuim cell in connection with a Morse register.

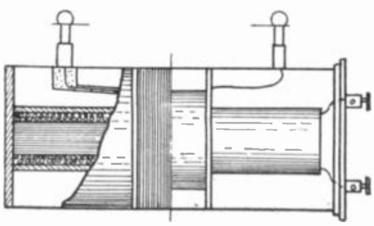


-FIG. 3-

UNIPOLAR TRANSFORMER.

Primary winding consists of two layers of wire wound around soft iron wire core. This is inclosed in an insulating tube. The secondary a shorter length of the thick wire wound in one or two bobbins, and which only occupies a small central part of the length of core.

The wire is so wound that one of its two extremities, namely, that nearer to the core, is at a very low tension, while the other extremity is at an extremely high tension, the entire bobbin is then



M.E.

immersed in a viscid insulator, which is obtained by dissolving paraffin in hot petroleum.

In arranging for sparking by direct application to the antenna and to earth, this latter is connected to that part of the secondary in which the E. M. F. is lowest, thus the length of the spark does not suffer so much by being placed in direct communication with the ground, as in the case of ordinary coils.

Tissot with a unipolar transformer was able to transmit 40 miles, while with an ordinary coil having a spark of equal length, 20 miles was all that could be covered.

POCKET WIRELESS.

By Our Brussels Correspondent.

The Italian Edison, Professor Cerebotani, well known as the inventor of the "telescriptor," (long distance typewriter) has lately perfected his "pocket wireless," which has been tried out successfully by the Italian and French governments. The receiving range is said to be from 30 to 40 kilometers.

The instrument as shown in our illustration is very small, and measures about 2½ inches across. The shape is watchlike. In the inside a small but very sensitive filings coherer and decoherer are arranged. The decoherer also operates a small electro magnet, which in turn operates a watch-like wheel escapement, very similar to the mechanism of our "stock tickers." A small wheel operated through the escapement is connected to a vertical axle, connected in turn to the hand which plays over the dial. This dial is provided with the letters of the alphabet.

By means of an ingenious arrangement, the action of the needle is very fast, and follows the impulses sent out from the far-off station, rapidly.

A small battery consisting of a two-cell flashlight battery supplies the current for the decoherer and the electromagnet.

A walking cane, composed of aluminum piping in telescope fashion can be extended for about twenty feet, forming a good aerial, which does not weigh more than three pounds. This is connected with the post, A, of the instrument.

Post G is connected with the ground, which is obtained best by driving a nail in a tree, or a small aluminum rod in moist earth.

M.E.

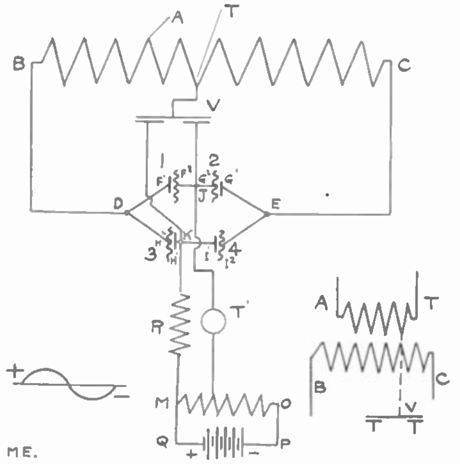
The whole outfit weighs only five pounds.

We wish to buy a number of back issues from April 1908 to January 1909, inclusive. We shall pay a good price for these issues, if in good condition. We would like to hear at once from readers who desire to dispose of above copies.

Paris Letter

ELECTROLYTIC DETECTOR OPERATES RELAY.

A method for making an electrolytic detector operate a relay has been devised by the well-known Paris engineer, O. Rochefort. In the detector we have a metal point and an electrolyte, with a battery connected with the + pole to the



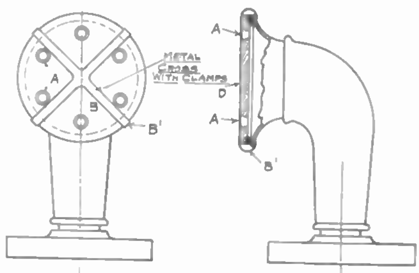
-FIG: A-

metal and the (—) pole to the electrolyte. When we connect the detector to the aerial, the resistance changes under the action of the rapid oscillations, and the dectector acts like an electrolytic valve, letting only one-half the wave to pass, that is, when the metal forms the + pole, it is only the positive half of the current wave which passes and this acts on the telephone. In the diagram we use four detectors, 1, 2, 3, 4, with the metal shown by F', G', etc., and the electrolyte by F2, G2, etc. We connect G1 and I1 together at E and to the end C of the oscillating coil. A is the aerial and T the ground. An Oudin resonator can be used with close coupling. F2 G2 and H, I, are connected at J and K, which are starting points for a supply circuit from Q P, using the potentiometer M O and also a resistance R for modifying the current. At T' is a telephone. When the waves cause oscillations in AT, there are given induced alternating impulses. When we have B + and C (—), the detectors give the valve action and detectors F and I now change their resistance. Detectors G and H act in the same way when C is + and B is (—). Thus at each alternation there is always a change of resistance in the direct current circuit, so that we use all the effect of the waves. This causes an undulatory current in the direct current circuit K R M, O T' J during all the time of the waves. Placing a telephone at T' we can hear the sound, but the main value of the device is in the use of a sensitive relay at T', which can work a Morse register, or else an electric bell for showing the presence of signals, this having been much needed in order to avoid listening continually in the telephone.

We can also use a resonator formed of a Tesla coil with a loose coupling in which the primarv AT is not a shunt on the resonator but is an independent winding from it.

AN ODD EFFECT.

A somewhat unusual device for increasing the effect of sound in a microphone transmitter has been patented in France. In general it is the custom to use a funnel shaped mouthpiece of various forms so as to concentrate the sound of the voice upon the diaphragm, but here the contrary principle is adopted, and a disc perforated with holes is placed across the mouthpiece, as will be noticed at D. It carries the conical holes AA, of which a number can be used, say five or six around a circle. It would seem that placing such a disc over the mouthpiece would act to cut down the sound, but

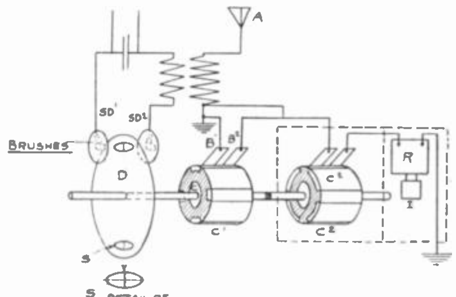


-FIG B-

practice shows that the contrary effect takes place, and that the action of the voice on the diaphragm is increased in a marked degree. The exact reason for this effect is not clear, but we may suppose that it is due to some extent to resonance which occurs in the chamber in front of the diaphragm, as this is now practically closed. The disc A can be made of various materials such as wood, ebonite, or celluloid. A good method is to make it of plaster of Paris, in which is imbedded the metal cross, B. This acts as a stiffening and the projecting ends of the metal B' can be used as clamps to fit the disc over the end of the mouthpiece.

DUPLEX WIRELESS.

The Marconi Company uses the following method for duplex wireless. A gap in the transmitting circuit is bridged at intervals by projections on a rotating disc. A set of commutators are mounted on the same shaft, and these act to connect the aerial directly to ground when the transmitting circuit is bridged. At other times they connect the aerial to ground through the receiving apparatus. The periods during which the receiver is connected to the aerial are much longer than when the transmission takes place. An extra commutator can be added so as to short circuit the receiver during the period of transmitting, and separate aerials can be used for receiving and transmitting. The receiving apparatus is enclosed in a metal case. The disc D and commutators C1, C2, rotate on the same axis, so that when the projections S of the disc act to bridge across the gaps between the discs SD, S' D' in the transmission circuit, the commutator C grounds the aerial A through the brushes B1 B2. During the time between the transmission signals, the aerial is grounded by the brushes of the commutator C2

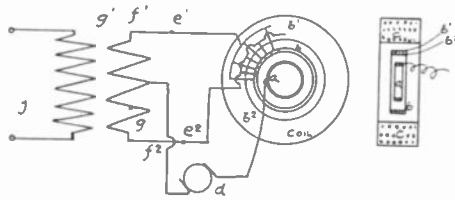


-FIG C-

through the receiver R. The discs at the sending and receiving posts are driven at the same rate by synchronous motors.

NEW HIGH FREQUENCY DEVICE.

Alternating currents of high frequency for use in wireless work are produced by the following device: Two concentric metal rings are placed inside a circular magnetizing coil C and in the position shown with reference to the magnetic field. Ring a is connected directly to one pole of a dynamo, and it is made in one piece. It can be water-cooled if need be. Ring b is formed like a commutator with various segments as seen in the plan view. We connect all the even numbered segments to the same terminal e1 and the odd ones to terminal e2, then join e1 to the end f1 of the primary coil gg' of a transformer without iron, while e2 is joined to the other end, f2. The metal ring a is connected to the other pole of the dynamo. An arc is formed between the two rings a and b, and this arc takes a rapid rotation by the action of the

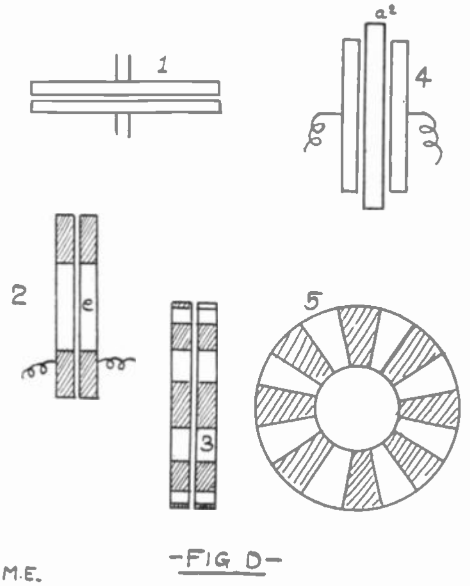


-FIG D-

field. The effect is extremely rapid and comes to some thousands of turns per second if the arc is a strong one. The arc thus passes from b1 to b2 in a very short time, and on account of the connection of these segments with the transformer we have an alternating current in f1 f2 and a succession of current inversions which is extremely rapid, so that we take off a high frequency current from the secondary j.

HIGH FREQUENCY OSCILLATIONS.

The Polyfrequency company gives a more complete account of their method for producing oscillations to which we referred some time ago. The device depends on a somewhat curious phenomenon, and it has the advantage of giving high frequency currents which are quite constant, and any amount of energy can be used with a very good yield. Between two metal plates or other pieces there is a small gap which is filled with a thin layer of a poor conductor such as oil, or glycerine. Gases can also be used. This acts as a condenser placed in parallel with an oscillating circuit, and the layer between the plates is pierced by the high tension. A spark occurs, and this oscillatory spark has the property of reaching a high resistance quickly, when the conditions are favorable, so that the oscillations die out rapidly. Circular discs can be used (1) or annular discs (2) in pairs or in various numbers (3). At (4) is shown a central disc with double gap formed by discs on either side. Either direct or alternating current can be applied to the device. For wireless work the device influences the power used in transmission and thus we hear sounds in the telephone. This can be done by using pulsatory direct current or an intermittent current for feeding, as



-FIG D-

when a wave is cut in two. We choose the number of pulsations for which the telephone is most sensitive. The result can also be obtained by giving the electrodes a movement which causes the spark to travel. The discs are made in sections of conducting and insulating material (5), and a sound is heard in the telephone corresponding to the periodic interruption of the sparks.

FINISHING THE WOODWORK OF WIRELESS APPARATUS.

By George Worts.

Many wireless amateurs have tried with successful results and otherwise to finish the woodwork of their apparatus to correspond with the professional and businesslike appearance of that of the commercial companies. The cause of most of the failures is ignorance in how to go about it.

A short time ago the writer constructed a receiving box of the most elegant pattern, using pure mahogany 5/8 inch thick and nickel trimmings throughout. Neither money, energy or time was spared in its construction. The box, upon assembling, was taken to an old German carpenter for instructions about finishing. He immediately brought forth samples of his skill in the finishing art and offered to finish the box to have the appearance and beauty of an antique. All at a menial cost. But the writer was firm. He desired the experience of finishing the box himself. The carpenter then kindly explained step by step the process involved in making mahogany beautiful. The old fellow produced a jug filled with an odoriferous, red colored fluid which he smeared generously upon all parts of the box. The stain, he explained. His instructions next were rather vague owing to his hopeless entangling of German and Yankee. But the writer followed as best he could.

Upon the stain drying, a coat of filler was applied. Mahogany filler. It is purchased in cans in a thick, soggy condition and is diluted in turpentine as it is used. It has the appearance of rich Arkansas mud, only richer and redder. The filler's function is, as the name suggests, to fill the cracks and pores of the wood that the varnish may dry with an even lustre. It dries fuzzy and should be rubbed off as soon as the first appearance of setting is observed.

Varnish is next applied, thinly, with intervals of two or more days between applications.

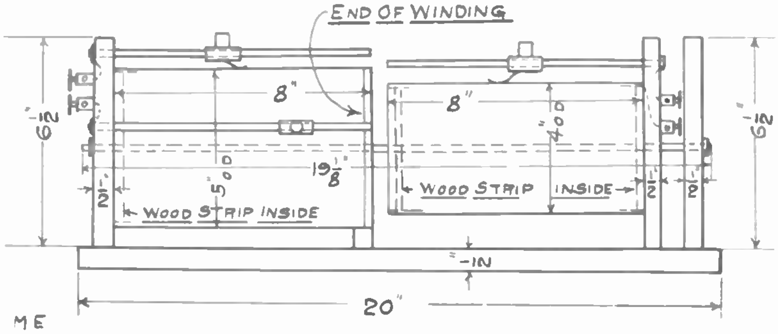
Upon completion the box was a beautiful red—mahogany red—but the grain was entirely obliterated by the thick coat of filler that should have been rubbed off. The next box was finished along similar principles, only the filler was rubbed as it should be. The result was gratifying. About three coats of varnish are sufficient. It may be rubbed with powdered pumice stone with sweet oil and then rotten stone to give it the beautiful hand rubbed finish. The foregoing description is the manner, with slight variations, in which expensive furniture is treated.

Shellac is often used for semi-rough work, such as transformer boxes, helixes, etc. It may be rubbed upon hardening with a jelly-like composition of turpentine and beeswax. This combination is the foundation for floorwax. It imparts a dull velvety finish that is desired by some. Varnish stains are not especially desirable, as they give a rather cheap appearance to apparatus. Nevertheless, they are often used.

(Continued on Page 527)

A Tuning Transformer

By Richard H. Foster.



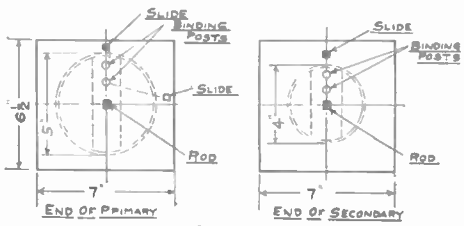
-FIG. 1-

The following transformer can very easily be made by any amateur, and it will be a valuable addition to any wireless station. The expense is not much when compared to the cost of an ordinary tuning coil. Absolute tuning as yet has not been entirely established, but the tuning transformer is a long step toward this end. Great care, however, should be used in building this transformer, as a short circuit would ruin its efficiency.

The base is the first thing to make. This should be 20 inches long and 7 inches wide, of fairly hard wood, about 1/2 inch thick. It should be level and perfectly smooth, so that the transformer will set flat. The primary coil should next be made. The standard to which one end of the coil is to be fastened should be 6 1/2 inches high, and 7 inches long, and 1/2 inch thick. The coil should be fastened to as near the center as possible and when in place should be 1/2 inch above the base. The primary is fastened to the standard as follows: Obtain a piece of wood about 5 inches in length and 1 inch wide, and fit this into the *end* of the coil which is to be fastened to the standard. The piece of wood should fit the diameter of the coil very snugly. It is then nailed to the tube. It should of course be at the end of the tube. Fig. 2 may make this point clearer. A hole is bored through the center of the piece of wood and another right opposite on the standard. A screw is put through and upon screwing up, the tube will be found to fit the standard tightly. The primary tube should be 8 inches long and 5 inches in diameter. It is now wound with No. 22 D. C. C. copper wire. Unless a variable condenser is used both terminals of the coil would be left dead, connections being made by means of the sliders. The tube may be made of stiff cardboard or fibre. A brass rod and slider should be mounted 1/2 inch above the coil. One end of the rod is fastened to the standard but the other end is left free. The slider should be of a spring type as this helps to support the rod. Another slider and rod should be placed half-way down the side of the coil. Wires should connect these two rods with binding posts on the end of the coil. By referring to Fig. 1 all points will be made clear. A small piece of wood can be placed under one end of the primary coil to support it if necessary. The standard should of course be fastened to the base as the primary coil is stationary.

The secondary coil should next be made. The standard is made the same as the primary one and the secondary coil is fastened to it in the manner already described. The secondary coil should be about 8 ins. long and 4 ins. in diameter. This is wound with one layer of No. 29 S. S. C. copper wire. One end of the winding is connected to a binding post on the standard, and the slider is connected in a like manner. The other end of the coil is dead.

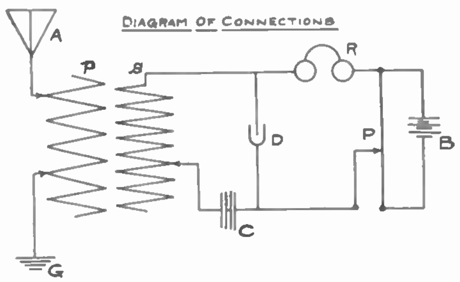
Another standard is then fastened on the end of the base board which is to hold the rod on which the secondary is to slide. The secondary standard is *not* fastened to the base. The rod should be about 20 inches long and should extend from the first standard through the primary and secondary to the last standard. A piece of wood is fitted into the other end of the secondary which holds the coil on the rod. See Fig. III. The secondary should slide into the primary without touching anywhere. The whole thing can be stained and varnished to improve its appearance. By refering to Figs. I and II, all doubtful points will



ME -Fig. 2-

probably be made clear. With two sliders on the primary very fine tuning can be accomplished, and the slider on the secondary will also be of help.

To adjust: Move secondary up to the center of the primary and adjust sliders until signals come in loudest. Then move secondary back and forth, until the best



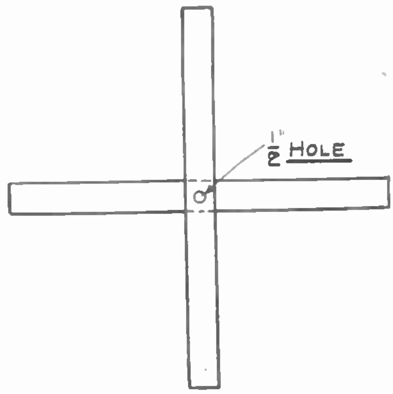
ME. Fig. 3

place is found. The secondary slider may then be moved if necessary. Signals come in very loud with this type of transformer, and distant stations can be heard quite clearly. Without question the efficiency of a station will be much improved with the use of this transformer.

APARTMENT AERIAL POLE.

I believe there are many experimenters who cannot have wireless outfits because they cannot mutilate the roof in erecting aerials. When I fitted up my station I thought of an iron pipe aerial pole that did not harm the roof at all.

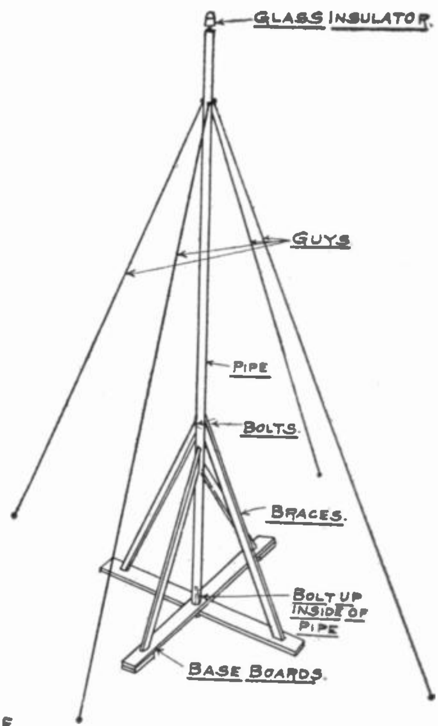
Procure a twenty-foot length of iron pipe, or any length that you desire, and bore two one-quarter inch holes in it, one two and one-half feet from one end of the pipe and the other three feet from the end. The holes must be bored at right angles to each other. Now get two pieces of hard wood three feet long and two inches wide, and about an inch thick. Screw these together at their centers at



M.E. -Fig. 1-

right angles and bore a half-inch hole in the center of the joint (Fig. 1).

Next procure a long one-half inch bolt



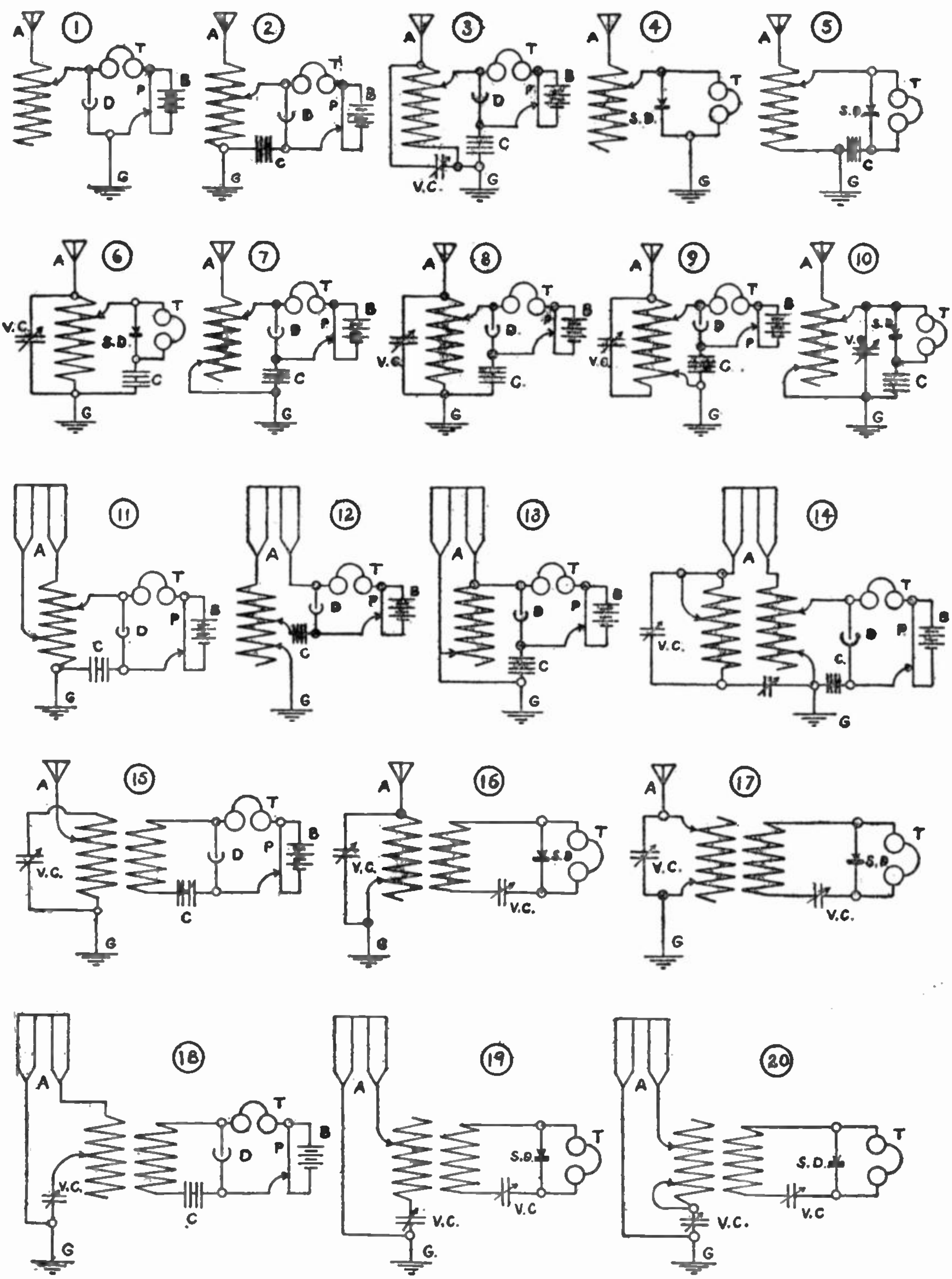
M.E. -Fig. 2-

and place it in the hole, and insert it in the end of the pipe. Now get two pieces of hard wood three feet long and two others three feet six inches long for

(Continued on Page 548)

Standard Wireless Diagrams

Arranged by ALFRED P. MORGAN



KEY

①–⑥ SINGLE SLIDE TUNING COIL STRAIGHTAWAY AERIAL
⑦–⑩ DOUBLE " " " " "
⑪–⑭ CLOSE COUPLED " " LOOP "
⑮–⑰ LOOSE " " " STRAIGHTAWAY "
⑱–⑳ " " " " LOOP "

A = AERIAL
B = BATTERY
C = FIXED CONDENSER
D = DETECTOR
G = GROUND
S.D. = SILICON DETECTOR
T = TELEPHONES
V.C. = VARIABLE CONDENSER

Supplement to MODERN ELECTRICS, February, 1910.

An Efficient Sending Condenser

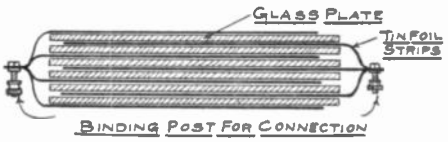
By Maurice Friedman.

In most cases the author of an article on wireless simply states that "for best results in sending, one should have a condenser shunted across the secondary of the induction coil." As to capacity, material required, etc., the average amateur is at a loss to know, especially if he desires to construct.

Following the reader will find the data for a very good condenser. I have made one of this kind, and after experimenting for quite a while as to the number of plates to give the best results, I finally concluded that the following number and size are best for use on a one-inch coil: For other size coils the capacity of the condenser may be proportionately increased or decreased as required.

First, procure six 8 inch by 10 inch clear glass plates cut as even as possible. Photo plates will also do. If the latter are used, they should be washed with hot water and scraped to remove the gelatine. Then get 12 sheets of the best tinfoil, size 6 inches by 8 inches, and coat both sides of each plate with it. Ordinary glue may be used, but shellac is preferable.

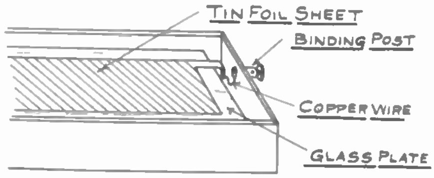
Be sure that you get all the air bubbles out from under the tinfoil. This may be accomplished by using a rubber print roller; if one is not at hand a rolling-pin will do. Also be careful not to scratch the tinfoil.



ME -FIG.-1-

After the tinfoil is glued to the plates, they should be left to set over night.

Next cut 7 pieces of tinfoil 2 inches by 4 inches, and fold over lengthwise so as to make the strips 1 inch by 4 inches. These strips are to be used for connections and are placed alternately between the plates and at opposite ends, when the plates are assembled, as in Fig. 1. These connections should not be glued to the plates, but merely laid between the plates, as directed above, when assembling. They should be laid in so that at least one inch protrudes from the edge of the plates for the purpose of making a connection. Now you will need two small binding posts to make these connections, one at each side or end, which ever you have let the strips protrude from. Assuming it to be the end, you must now punch a hole through the tinfoil strips and fasten each binding post to each stack of tinfoil strips.



ME -FIG. 2-

Now make a box, size 9 inches by 11 inches by 2 inches, to contain the condenser. These are the inside dimensions of the box.

Next get 1 lb. of beeswax and 1 lb. of paraffine and melt the two together. Now pour about 1/4 of an inch in the box and when nearly hard lay the condenser in carefully and pour the rest of the solution in, being careful not to cover the binding post on each end.

To avoid any unnecessary trouble I will suggest that you fasten a wire to each binding post before pouring in the remaining solution.

Now bore a 1/8 inch hole in each end of the box and fasten a binding post in each hole. To each of these binding posts fasten respectively the wires from the two inner binding posts, as in Fig. 2, thus leaving the nut on the outside of the box to make connections when the box is nailed shut.

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Vol. II. FEBRUARY, 1910 No. 11

EDITORIALS.

The Editor is rather gratified with the results obtained so far to block Representative Roberts' wireless resolution, announced in last month's issue.

It will not come as a surprise to our readers to learn that the Editor received up to January 25th, over 9,000 protest letters from experimenters and amateurs all over the United States, in response to his call in the January issue.

This not only proves that MODERN ELECTRICS goes to nearly all interested in wireless, but also that its readers look upon wireless, not as a pastime or plaything, but take it very seriously, because they realize the importance of the new art.

It will undoubtedly be of interest to the readers of this magazine to learn that MODERN ELECTRICS was the first monthly to call attention to Representative Roberts' resolution. None of the competing magazines even knew of the bill, which again, as usual, demonstrates that MODERN ELECTRICS, not only has the news, but gets it first, and more important than that, it looks out for the interests of its readers.

There cannot be a shade of doubt that MODERN ELECTRICS to-day stands first in this country, as far as wireless is concerned, and that it works for the interest of its readers.

The Editor went single handed into the fight to oppose the new resolution, and, due to his efforts, over two hundred newspapers in the United States up to this date have responded, the majority being in favor of the experimenter, as they fully realize and understand the situation.

There are some very interesting comments of the press on the subject, and the Editor regrets that he has not the space to quote all of them.

Some of the most important ones follow below.

The *New York World* says:

"STIFLING THE WIRELESS AMATEUR.

The amateur wireless operators, who protest against Government interference with their free use of the air, appear to have a just grievance. Their action in defense of what they conceive to be their rights has been inspired by the resolution of Congress calling for a system of regulation for all wireless plants, and containing a threat of the restriction of wireless privileges to Government and commercial stations.

It is surprising to learn that there are approximately 60,000 amateur wireless stations in the United States. Their number gives an idea of the avidity with which the American intelligence has seized upon the invention for experimental uses. *Out of such experiments may come valuable improvements and not unlikely the final perfection of the new telegraph. Wireless communication itself is the invention of an amateur."*

Says the *New York Evening World*, editorially:

The atmospheric telegraph operators have no wires to be tapped or to fall down, but at this present moment they are tangled up in prospective litigation which is bound to ensue from the resolution introduced in Congress on December 17, calling for "expert" regulation of all wireless plants.

This movement is directed against the amateur operators, who really comprise a majority of the actual experimenters and potential inventors in this open field of electrical science.

There are at least 1,000 amateur wireless operators in New York City alone. Some of these are schoolboys, and many are self-taught young men employed in some branch of electrical work. They have primitive, often home-made, outfits, costing from $10 up. Yet with such small and inexpensive apparatus these amateurs are doing most of the individual experimenting with the new and tentative wireless appliances. Indeed, many of the important inventions which the commercial wireless companies are trying to monopolize to-day originated with these same amateur experimenters, who are giving up all their spare time to trying this and that novelty in "detectors," "relays," "couplers" and "tuners."

It is not so many years since Guglielmo Marconi himself was a schoolboy amateur sending and catching feeble "sparks" through the atmosphere, a few miles at a time, on the Salisbury Plain in England.

Evidently the amateurs have the better of the argument, and it is doubtful if anything can stop their experiments—at least until the public wireless telephone shall be an accomplished fact."

The *New York American* says:

Eight thousand "wireless" experimenters have drawn up petitions to Congress not to vote the "monopoly of the air" practically designed by the Roberts resolution calling for "a board to govern operation of all wireless plants."

"This legislation would mean," said H. Gernsback, founder of the Wireless Association of America, "the erection of a new trust, and the suppression of developments and improvements in the newest means of communication.

"Our association, which includes almost all the wireless experimenters, will send at once to Washington the petitions we are receiving from all over the country. There are 60,000 experimental and amateur wireless stations in the United States. In New York City 1,000 young men are studying and developing instruments.

"It should be the duty of the Government to encourage, not to throttle, development of this cheap means of transmitting intelligence. We trace the movement toward this most reprehensible, retrogressive, stultifying of monopolies to commercial wireless interests. They have some 700 stations now in operation from coast to coast, and their instruments already are antiquated. It would save them hundreds of thousands not to be required by competition and outside inventions to change their system."

Says the *New York Sun*:

"The amateur wireless operators are preparing to defend what they consider their rights.

"The editor of a publication devoted to the interests of the wireless amateur has received eight thousand letters from amateurs protesting against the restriction of wireless rights to Government and commercial stations, which they fear will be the outcome of the resolution. It is on the ground that the wireless has been largely perfected by amateurs that the latter base their claims to consideration. They say that they are the only ones actively interested in experimenting with new apparatus, because they can do so on a small and inexpensive scale.

"In fact the amateurs twit the professional wireless men with being behind the times, and declare that the much talked of interference with the work of the regulars by amateur senders is very largely a myth. They say that a really good wireless man finds individuality in a spark just as he would in a voice, and that just as a man in a crowd where many are speaking can distinguish and understand the words spoken by the particular voice in which he is interested, so a good wireless man can concentrate his attention upon the particular message which is meant for his ear. A good operator, say the amateurs, has no difficulty in 'reading through' six messages."

In a long article the *Boston Transcript* says:

"GOVERNMENT SOMETIMES OFFENDS.

"The virtue is not all on the side of the Government in this situation, as developed from the records of the Department and the commercial companies as furnished Mr. Roberts. There are instances, and they are not rare, when the Government operators have presumed somewhat on their rights and have held on for an unreasonable time and have seriously crippled the workings of the commercial plants. In some instances these interferences have gone so far as to lead to serious consideration of the proposition to have the Government alone operate all stations in certain sections of the Atlantic seaboard on the understanding that commercial messages could be sent under restrictions and for hire at certain hours."

The *New York Independent* quotes:

In the quarrel between the Government wireless operators and the high school boys who make and work their own amateur appliances we are with the boys. Of course, there may be rules to govern the business, but they should be very liberal. There need be no interference, and these boys are the hope of future invention. It is magnificent that hundreds of them have left football for electricity, and hundreds of others for aviation.

Hundreds of other papers with similar comments have been received, and it would seem from the sentiment expressed in them that America doesn't need just yet a wireless law. In a long letter to the *New York Times,* the Editor of this magazine explains the situation as follows:

"Mr. E. N. Pickerill, chief operator of the wireless station on top of the Waldorf Astoria, in the heart of the greatest wireless district in the world (there are over 1,000 wireless stations in New York City) according to his own statement, is working his set day and night and handles hundreds of messages daily without any interference or trouble whatsoever.

"The truth is that the inefficient operator blames all his shortcomings on the innocent amateur.

"It is always the amateur who is at fault. Nobody has ever heard of a case where commercial or Government operators "interfered" with each other—and their apparatus are about 5,000 times as powerful as those of the average amateur.

"Is it not imposing on the common sense of the public to make it believe that a man who is shouted at from across a river from another man, complains of the buzzing of a fly ten yards distant, his complaint being that the fly makes so much noise that he cannot hear the other man?

"History has never known a useful art, which did not adjust itself to prevailing conditions, and wireless telegraphy and telephony—the cheapest means for communication, especially in a country of such great distances as the U. S., will be the last to let itself choke off by a foolish legislation in order to put a mighty tool in the hands of a coming wireless trust, who could dictate its own terms as to the use of the ether."

So far, it would seem, the chances for the experimenter and amateur are decidedly in their favor, but the fight is only half won as yet.

To win and to defeat the Roberts resolution it will be necessary that you write AT ONCE a letter of protest to your local representative in Washington. If you are not a citizen, have your brother or father write for you, but you must do it at once—to-day—as the time is short.

Remember that in opposing this bill you are working for a just cause, and some day you will be proud to remember that you were one of the pioneers to establish wireless in this country.

When writing to your representative it may be well to state that you are in favor of the Peters wireless bill, which was printed on page 476 of the January issue.

This bill is a just one, and the only one that has any scientific foundation.

As will be recalled, Mr. Peter's bill provides that it will be a punishable offense:—

(a) To originate and transmit a false wireless message, purporting to be official, and (b) to commit and radiate electro magnetic waves of lengths between 375 meters and 425 meters in wireless telegraphy, except when communicating with an official station.

Two mistakes were made in our last month's advertisement. The name of our new book is, "How to Make Wireless instruments." The number of pages is 94—not 64.

The supply is limited—only about 600 out of 3,000 of this edition left. If you have not this excellent book as yet, order it at once.

SIMPLE DEVICE FOR WIRELESS BEGINNERS.

By Ray Page.

The most common device in use for beginners of wireless telegraphy is the buzzer. Although the buzzer will produce a sound something like that which is heard from the wireless instruments, it will not give the exact sound. Consequently, when a student leaves behind him the buzzer, and takes hold of the larger instruments, he finds that there is quite a difference in the sound of the wireless instruments than that produced by his buzzer. Therefore much time is lost in accustoming himself to the new sound.

About the best imitation of the real thing can be obtained by using nothing more than an ordinary twenty (20) ohm relay, and a pair of head phones. Seventy-five ohm receivers will work very well.

First reverse the contact screws on the armature of the relay, which will produce a buzzing sound, instead of the click. You have now converted the relay into a buzzer which, if properly adjusted, can be made to represent the sound of nearly any station's spark desired.

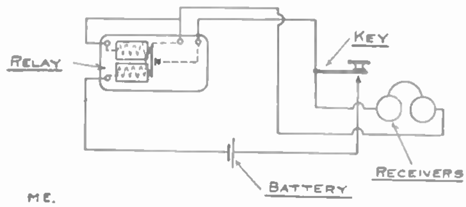
The buzz not being loud enough to be heard distinctly, necessitates the use of the phones.

The student, by studying the diagram, can see just how relay, head phones and Morse key should be wired. Two batteries of the ordinary dry cell type are efficient.

This relay buzzer, if used in the schools teaching wireless telegraphy, will be found to be a great improvement upon the buzzer, which is now being used.

In the class room, one relay buzzer can be connected to several head phones, thus enabling an instructor to give individual instruction.

It also does away with the noise that is produced by a few students practicing

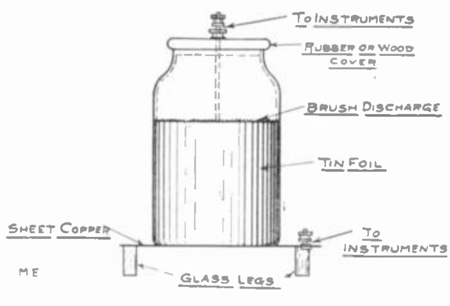


upon the ordinary buzzer. With the relay buzzer students can send and receive in the same room without "interference" to one another.

A NON - HYDROSCOPIC COMPOUND FOR HIGH TENSION CONDENSERS.

By George F. Worts.

Leyden jars are being almost universally discarded by wireless experimenters on account of the very undesirable brush discharge, or "brushing," as it is commonly called. This discharge takes place in the form of an ultra-violet light one-eighth to one-half-inch high around the top of the tinfoil, and is supposed to be very detrimental to the efficiency of an outfit. Plate glass condensers, if properly constructed, will eliminate entirely the brush discharge, besides occupying much less space and allowing of more perfect insulation.



Upon assembling the condenser plates, tinfoil and lead ins, it should be treated with the greatest care. for in the "casting" lies the efficiency of a condenser. A plate glass condenser to produce maximum results should be boiled in a non-hydroscopic solution till all moisture is driven out and air bubbles cease rising. Paraffine is good. A receipe is given below that is much better than plain paraffine. It may be used on all work requiring high grade insulating—as receiving condensers, woodwork for helices, bases, etc.:

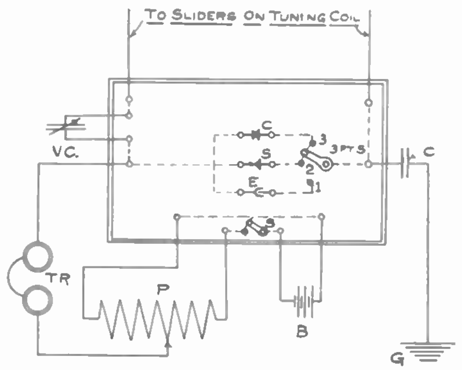
Paraffine	16 oz...
Powered rosin	2 oz.
Beeswax	8 oz.
Sealing wax	4 oz.
Asphaltum	1 oz.

The ingredients should be dissolved, by boiling, in the order given. When hard the compound is a light sepia color.

SELECTIVE DETECTOR BOARD.

By R. Fulton Adams.

The present drawing shows a convenient and quick way of connecting up wireless receiving instruments in different ways, which may be of interest to some of the readers of Modern Electrics.



All the binding posts, switches, etc., are mounted on a board of convenient size (about 12 x 15 inches). The dotted lines show how binding posts are wired on under side of board. In center of board is shown a three-point switch with which either of the three detectors, electro-lytic, silicon or carborundum, may be thrown in circuit.

To use the electro-lytic detector the three-point switch is thrown over to point No. 1, as shown, then close switch between battery and potentiometer and adjust potentiometer until hissing sound just ceases in 'phones. As no potentiometer nor battery is needed for the silison detector, proceed as follows:

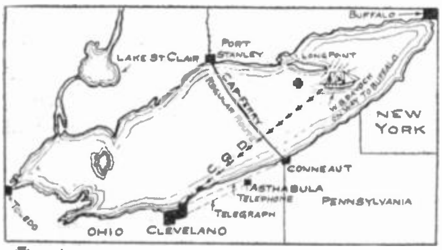
Throw three-point switch to point No. 2, which brings silicon detector in circuit; then open switch between battery and potentiometer, which throws battery out of circuit, then move slider of potentiometer to the left as far as it will go, or, until it rests on last turn of wire (if you are using a wire potentiometer), thus cutting out all resistance. Then adjust detector, tuning coil and variable condenser until signals are loudest.

Of course positions of tuning coil, variable condenser, etc., may be easily changed, as all connections are made by binding posts.

WIRELESS vs. LONG DISTANCE TELEPHONE AND TELEGRAPH.

Cleveland Correspondent
MODERN ELECTRICS.

"C. Q. D." is a combination, which is familiar to us all, but to hear this in the air at an unexpected moment, followed



ME ✱ = WHERE WRECK OCCURED

by a distress message, has a greater meaning than this group of letters appear to have, to the average person.

On the morning of December 10, came this "C. Q. D." from the W. B. Davock, of the Vulcan Steamship Company, bound for Buffalo, and was picked up by a commercial station, located in the Schofield Building, Cleveland, Ohio, which reads as follows:

From the steamer W. B. Davock:

"Davock has been running through light wreckage for about fifteen miles above Long Point. Abreast Long Point passed metallic yawl boat painted green and full of water. Could not make out name. Do you know of any wreck on this vacinity?"

The wreckage was that of the Marquette & Bessemer No. 2 Car Ferry, bound for Port Stanley. Later there came a telegraph message from Ashtabula, saying that the Car Ferry was 60 hours overdue, and this telegram was followed by a long distance telephone message from Conneaut, saying that no doubt the Marquette & Bessemer No. 2 was a wreck. By looking at the map, you will see how it all worked out, wireless received the news first, telegraph next, followed by telephone.

"Fips'" Correspondence

Dear Fips:

I have a silicon detector and it is very sensitive; when my sister talks at the top of her voice she knocks it out of commission, and I would like to have you give me a good remedy for curing this nuisance.

Please answer.

FRANK WM. MANN.

Saratoga, Cal.

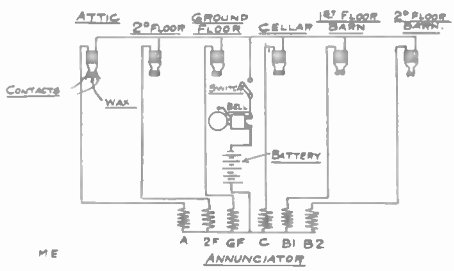
The above seems to be a very acute complication of homo-interference.

I would advise to equip your sister with a "tuner," which would probably *tune* her from the top, to the bottom of her voice. Furthermore, attach a "cut-out" to her. This will surely make her *cut-out* the interference. If she does not own a "switch' already, (?) equip her with one. She'll be "switched" for fair, then, and the nuisance will stop.

A FIRE ALARM SYSTEM.

By GEORGE F. WORTS.

Referring to the January number of MODERN ELECTRICS, experimental department, in which a sketch was given of a fire alarm release; a wiring diagram is given below for a system of fire protection using this release. An annuncia-



tor is needed with as many points as there are alarm contacts. Also a large bell and set of batteries, ordinary annunciator wire may be used for wiring. The heat from a fire will melt the wax and close the circuit of the contacts, affected by the combustion. This will register on the annunciator and ring the bell. The switch may be thrown off while adjusting the contacts, etc. The bell should be placed where it can be heard all over the house and the batteries, switch and annunciator placed near for convenience.

TO USE COMMON TELEPHONE RECEIVER FOR WIRELESS.

By George M. Brown.

I have found that a common telephone receiver with a large permanent magnet is in reality the best for wireless use, as the permanent magnet is stronger and the soft iron poles are larger, giving more winding space than other phones. The reason they are not used universally is that their weight is too much for comfortable use and their bulkiness makes them unhandy. I have largely overcome these faults by balancing a receiver's weight with an iron weight.

Of course I rewound my receiver for a higher resistance, as it was only 75 ohms. I did this, using 1,000 feet of number 50 single silk covered copper wire. I then procured a small pulley, P, Fig. 1, and fastened it securely to the ceiling (C, Fig. 1), directly above my wireless table. I then took a light cord about 12 feet long, or the distance from my table to the pulley, and back one-quarter this distance again (D, Fig. 1), and passed it over the pulley and fastened one end of the weight (W, Fig. 1), which is a lead or iron chunk, weighing one ounce less than the receiver (A, Fig. 1).

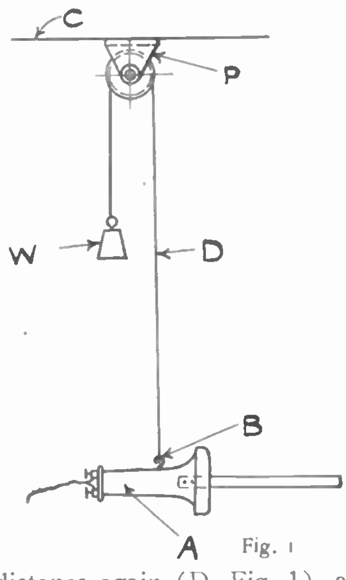


Fig. 1

I then found a point (B, Fig. 1), where the weight of the ends of the receiver balanced and screwed a small screw eye into it, as shown. I now fastened the other end of the cord to the screw eye. The receiver now practically weighed but one ounce. But as it is handier to have a head band and have both hands free, I made one as follows:

I bought a piece of hard strap brass one inch wide and one foot long, and 1/16 of an inch thick. One inch from one end I bent it as in Fig 2, and bored a 1/8 inch hole in each corner of the straight part, shown at B, Fig. 2. I now bored 4 corresponding holes (H, Fig. 3) in the receiver shell just back of the screw cap with a 3/32 inch drill. I now screwed the brass strap to the receiver with four screws, 5/16 inch long. These screws (6-32 or 8-32 thread), are fastened inside with 4 nuts, which makes the head band very secure.

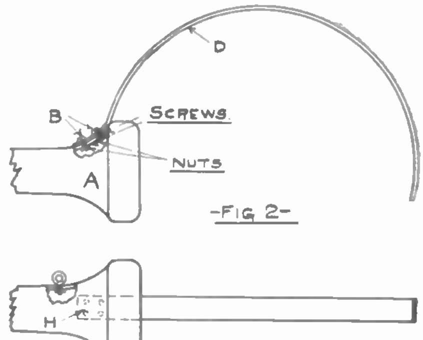


Fig. 2

Bending the rest of the head band to fit my head finished it. I find that the cord that holds the weight of the receiver is not in the way in the least, as the movements of my arms in adjusting the wireless instruments are all below it.

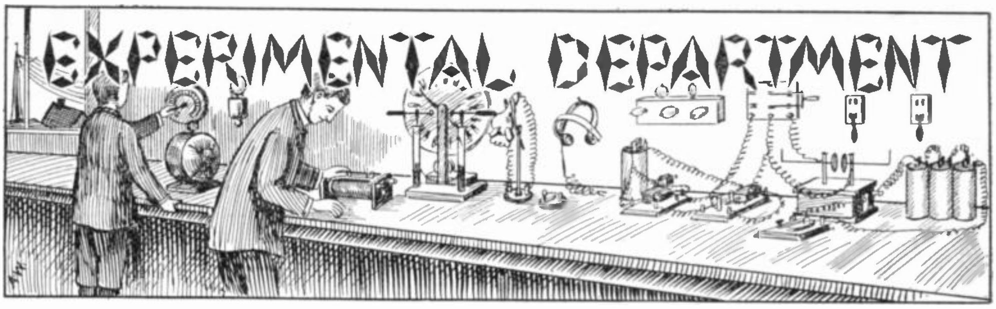
FINISHING THE WOODWORK OF WIRELESS APPARATUS.

(Continued from Page 518)

The mahogany stain mentioned in this article may be made by mixing roselake, dry (purchased at any paint store), with water. The solution should be a heavy one.

The kinds of wood to use are of course dependable upon the desires of the experimenter. The writer, however, would strongly recommend mahogany. Its higher price is a drawback but its adaptability and easy workability make it especially desirable. Besides, its elegant appearance makes it a requisite to any wireless experimenter's table. Oak is often used, as it can be stained any one of a number of colors and still show its grain to good advantage.

Slate, used in bases, switchboards, etc., can be changed from its original color to a rich ebony black be merely rubbing with an oily cloth or waste.



TO SMOOTH GLASS EDGES.

There are several ways to do this. The easiest way is to hold the glass against a fine grindstone and use plenty of water. The glass must be held tight against the stone and keep the edge tilting from side to side.

Another method is to lay the glass on a table and allow the end of the glass to project about two inches over the edge of the table. Hold the glass down with one hand to prevent it from slipping and with the other work down the edge with a whetstone and oil or a piece of carborundum.

BATTERY WAX.

Amateurs making their own batteries have good use for the following:

For the upper edges of glass cells there is nothing better than hot paraffine brushed about the upper edge to prevent the salts from creeping out. The paraffine can be colored with red-lead, green dust, or powders of any colors desired.

For dry batteries the following black wax is used. It is composed of: paraffine, eight parts; pitch, one part; lamp black, one part. Put these ingredients in a pot and stir until well mixed. Apply with a small paint brush while warm.

HARD CEMENT.

A medium hard cement is made of: plaster of Paris, six parts; fine sand, two parts; dextrine, two parts. Mix with water until soft, then work with a trowel.

SOFT CEMENT.

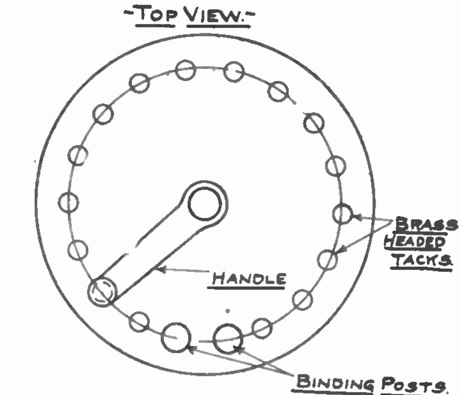
This is commonly known as asbestos cement. It is a heat proof cement and is made of: plaster of Paris, five parts; pulverized asbestos, five parts. Add water enough to make a soft paste and mix with a trowel.

Contributed by A. S. MACDONALD.

HOW TO MAKE A RHEOSTAT.

A very good rheostat which can be used for regulating the speed of motors, etc., and also for wireless work so as to regulate the current of the batteries, can be easily made by following the directions and drawings.

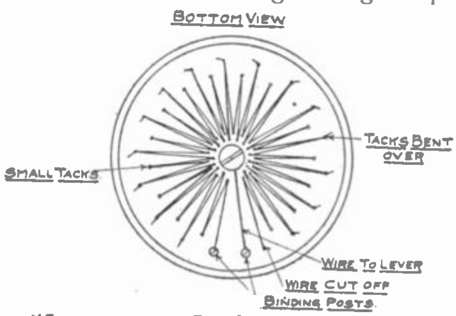
The material necessary for making the rheostat are: a piece of round wood 4 inches in diameter by 1/2 inch thick, cored out as shown in Fig. 2a; a box of



M.E. -Fig. 1-

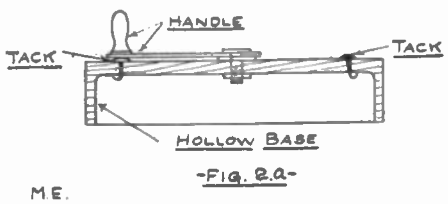
brass-headed tacks, 5 feet No. 20 B. & S. bare German silver wire, a box of small tacks 1/8 of an inch long, 3 binding posts, and a piece of wood 2 1/2 inches long, by 3/8 inch wide, by 1/8 inch thick.

About 3/8 of an inch from the edge of the base make a hole large enough to put



ME -Fig. 2-

one of the binding posts through. About an inch from this make another hole and put another binding post in this hole also. About 3/4 of an inch from this binding post nail one of the brass-headed tacks; these tacks are pretty long and will go through to the other side, but they should be bent over after the wiring has been put on. The wire should be fastened on the board by the little tacks. Before putting the wire on, twist it around one of the binding posts and then put on the wire as shown in Fig. 2. After the wire has been put on as far as the last tack, wind it around the tack and then cut the wire off, and bend the tack over. Then



-FIG. 2.a-

fasten a piece of wire around the other binding post and connect it with the binding post in the center of the board. After this is done make the handle. The handle can be made from a piece of brass 3 inches long and 1/16 inch thick cut as shown in Fig. 1. A rubber post, procured from a supply house, is screwed to the free end of handle. After this is made make a hole about 1/4 of an inch from one end. This hole should be large enough so as to allow the binding post in the center to go through.

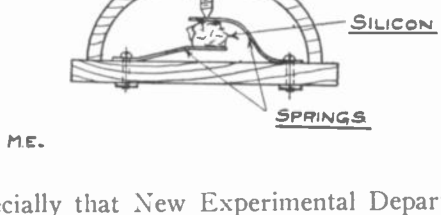
After this is done put the nut on the center binding post, and wind a piece of wire around the part of the screw which projects out of the nut. On top of the wire screw another nut. This will keep it from becoming loose.

Contributed by

WILLIAM DETTMER.

SIMPLE SILICON DETECTOR.

I have just procured a January MODERN ELECTRICS. It is certainly fine, es-



pecially that New Experimental Department. I am very much interested in it.

I noticed in the January issue an article on a simple detector which is quite clever. I would like to add one thing to same, and it will, I am sure, make the detector still more efficient. By looking at the diagram you may see that instead of removing the cover for good just take out the small push button and insert or imbed therein a nut of the binding post of a battery. Next take a post of the battery and after filing it to a point screw in the nut. Then bend the largest spring up quite high and set the piece of silicon on lower spring. Now place cover on and screw the post down so that the spring makes a contact with the silicon. By means of this little addition the efficiency of the detector is increased, for after connecting it up you may adjust it through a wide range.

Contributed by

MAX MILLER.

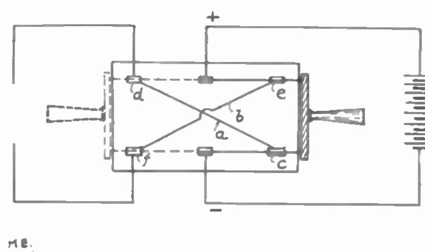
REVERSING SWITCH.

First obtain a double pole double throw switch.

To wire the switch cross connect the wires as shown.

Run wire a from pole c to pole d and wire b from pole e to pole f.

When the switch is in the position as



shown, the current will flow in in one direction, and if it is thrown over the current flows in the opposite direction.

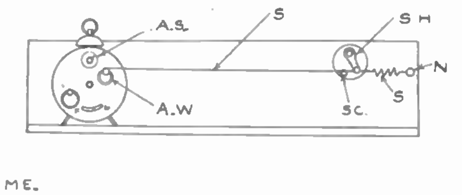
Contributed by

DEAN REYNOLDS.

AN ELECTRIC TIME SWITCH.

An electric time switch can be made very easily that will open or close a circuit at any desired time by the following arrangements:

Take an alarm clock, a dollar clock will do, and put a strong string or cord around the winder of the alarm, so that when the alarm goes off it will wind up the cord. Then take a switch of the base type and fasten to a suitable support so that the clock can stand parallel with it. Put a loop in the other end of the string that is fastened on the clock and slip over the switch handle. The clock must also be fastened so that it will not tip over, the alarm wound and the string drawn taut. Another string must also be fastened to the handle or a nail put in the

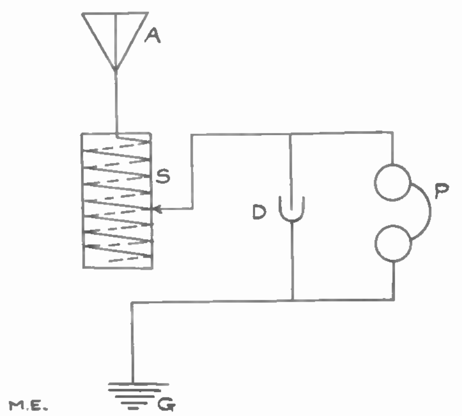


wood so that the switch can not be pulled over the contact point. When you wish the circuit to be closed, turn the pointer of the alarm to the desired time. When the alarm goes off at the time indicated, the string will wind up and pull the switch on the contact. If the circuit is to be opened instead of closed, the string or nail must be removed so that the switch can be off the contact. The string is the handiest as it can be adjusted so that the switch will come on the contact or over it. The arrangement of the articles are shown in the illustration.

Contributed by ROYAL E. TERHUNE.

NOVEL TUNER.

As I wished to try a new detector and had no tuning coil I thought of a substitute. I took a secondary of a small coil which was wound with bare wire and scraped off the paraffined paper. Using



a small copper wire as a slide and connecting one end of the layer of brass wire to the aerial this simple tuning coil worked with great efficiency. With only a small indoor aerial and a 75-ohm phone it received a distance of about twenty miles.

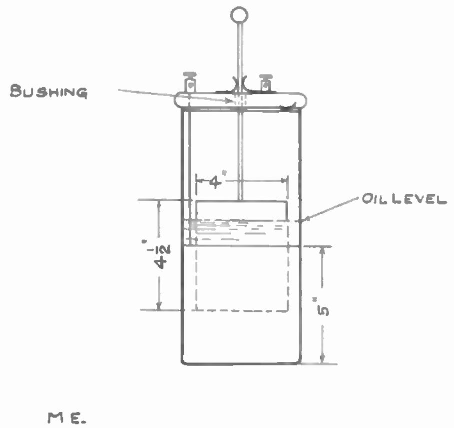
Contributed by T. McC.

A VARIABLE SENDING CONDENSER.

By FRED WADSWORTH.

The price of an adjustable sending condenser of the Leyden jar type generally prohibits its use in the amateur station, and it shall be the purpose of this article to describe such a condenser that will stand the discharge of a large induction coil or transformer up to one-half K. W. capacity, and yet be within the means of the average amateur.

First procure a glass jar five by eleven inches, one strip of spring brass (or even tin) about No. 22 gauge, five inches wide and sixteen inches long, another piece four and a half inches wide and about

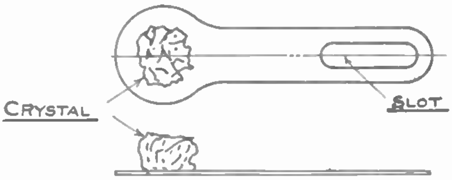


twelve inches long. Fit the longer piece on the inside of the jar touching the inner surface at all points, solder a small rubber-covered wire to this plate and bring the wire up through a hard rubber or paraffine-soaked wood cover, as one terminal. Make the other plate into a cylinder one-half or three-quarters of an inch smaller in diameter than the other plate and fasten a square or round brass tube to the exact center of the cylinder, this rod is to form the other terminal and to pass through a well-fitted brass bushing as shown in the sketch. This rod is provided with a hard rubber handle to lift the inner cylinder up or down and so vary the capacity by varying the intermeshing surfaces. Two small springs pressing against the rod will keep same from moving of its own accord. When the inner cylinder is correctly centered and the opposite surfaces are the same distance apart all the way round, the jar is filled with paraffine oil or boiled linseed oil, to such a height that the oil is higher than the outer plate by one inch.

The condenser is now ready for use. When more than one is to be used, the adjusting rods are connected together by a hard rubber strip and thus the capacity of each jar is increased or decreased in the same ratio at the same time. With the aid of this form of condenser very accurate tuning of the sending apparatus may be obtained as will be shown if a hot-wire ammeter be placed in the aerial circuit. Another fact of importance in connection with the above condenser, is that the dielectric is self-healing and when the insulation is broken down at any place between the plates, new oil immediately fills the place where the rupture has occurred. If made carefully this condenser can not fail to give satisfaction.

IMPROVED SILICON DETECTOR.

The accompanying sketch shows an



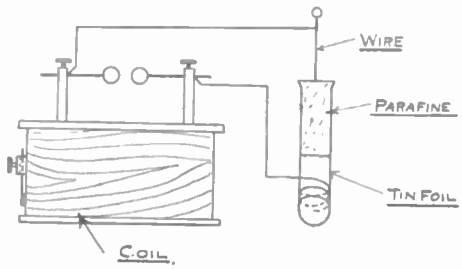
improvement on the silicon detector described in the December issue. Instead of just a hole in the arm carrying the crystal, a slot is used, and this allows more points on the silicon to be brought under the brass point.

Contributed by

ROY WARNER.

AN INEXPENSIVE LEYDEN JAR.

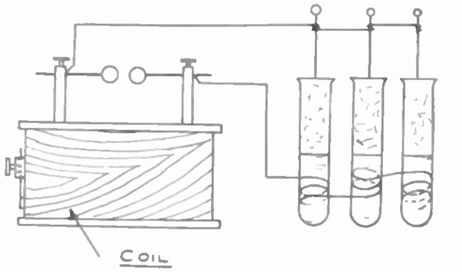
Procure a six-inch test tube, which



-FIG. 1-

M.E.

may be had at any supply house for a few cents. Cut a piece of tinfoil 4 inches long and wide enough to fit around the tube with a lap of about 1/4 inch. Shellac the tube on the outside to within 2 1/2 inches of the top. Wait a few seconds until it begins to harden, then apply the foil smoothly on the glass tube. The foil should extend 1/2 inch past the tube and then bent inward so as to cover the bottom. Make a saturated solution of ordinary salt in water and fill the tube



ME -FIG-2-

till the liquid is on a level with the outer coating of foil. Cut a piece of stout copper wire about an eighth of an inch thick and 6 1/4 inches long. Solder a metal ball on one end which may be taken from the end of a brass curtain pole, and is 1/2 inch in diameter, or make the wire 6 3/4 inches long and turn about 1/2 inch of the end over a pencil or other round implement. I would advise the use of the metal ball, as it increases the efficiency and looks of the apparatus.

Hold the tube so that it will stand straight and hold the wire so it will touch the bottom of the tube and be in the center of the tube. Then pour melted paraffine into the tube up to the top. Hold the wire until the paraffine has hardened. If paraffine can not be obtained candle wax would do. Connect the Leyden jar as in Fig. 1 and a crackling blue spark will jump the gap. The spark gap must be about 1/4 inch on a 1 inch coil, as the Leyden jar increases the thickness and decreases the length of the spark. I have made several of these jars to work with a 1-inch coil and have found that they worked so well that I have discarded my glass plate condenser in favor of the jars. More than one jar may be connected, as in Fig 2, with increased efficiency.

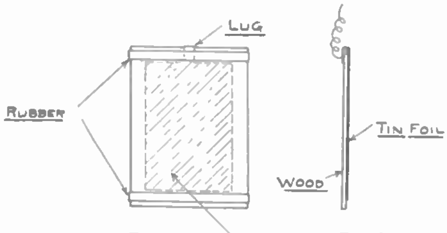
Contributed by

E. DESSIOR.

A HOME-MADE VARIABLE CONDENSER.

Get two boards 1/4 to 1/2 inch in thickness and about 6 inches by 8 inches. They must be smooth and perfectly flat.

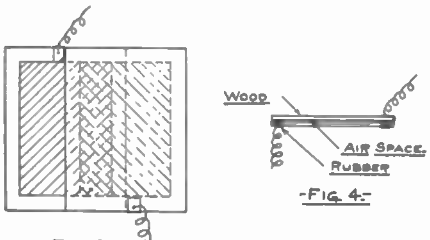
Give each a coat of shellac and, leaving a half-inch margin, cover one side of each with tinfoil, bringing a strip out for connections. Around one board place two rubber bands or strips of tape (Fig. 1). The connection with the tinfoil should be made by folding the lugs



-Fig. 1- -Fig. 2-

M.E.

around the edge of the board and fastening the wires leading from them to each board, so that connection will not tear (Fig. 2). The condenser is completed by



-Fig. 3- -Fig. 4-

M.E.

placing the other board on the rubber bands so that the tinfoil surfaces will be toward each other. The capacity is regulated by sliding upper board to right or left (Fig. 3). A side view of condenser is shown in Fig. 4. To get more capacity make three or four of these units and connect in multiple.

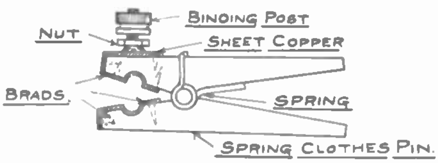
Any of the diagrams shown in M. E. may be used.

Contributed by

H. H. Hammerly.

A HELIX CLIP.

An efficient helix clip may be made



M.E.

-Fig. 1-

from an ordinary spring clothes pin. Fasten a thin piece of sheet copper on the inside of each jaw of the pin, using small brads, and let one piece lap back, on the outside of the pin, for about half an inch. Solder a flat head 8-32 machine schew (Fig. 1) on to the over-lap and screw a nut from a "dead" dry cell on this to form a binding post. This clip may be used on small wire by putting an extra thickness of copper on each jaw.

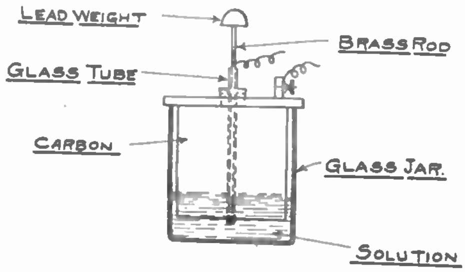
Contributed by

Lee Graves.

SIMPLE WEHNELT INTERRUPTER.

By D. Adams.

This interrupter is very simple and

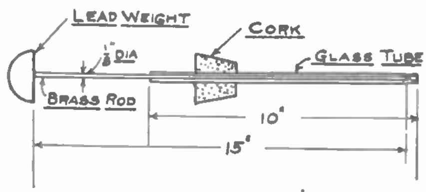


M.E. -Fig. 1-

easy to make, but it will give as good results as those which are a lot harder to make.

First procure an old battery jar and the carbon to fit it. This must be of the design shown in Fig. 1.

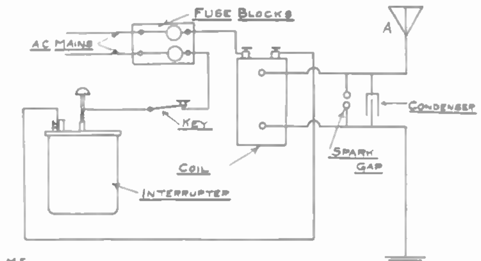
Next procure a brass rod, preferably 1/8 of an inch in diameter and about 15



M.E.

-Fig 1a.

inches long, and a piece of glass tubing having an inside diameter just large enough to admit the rod and about 10 inches long. Close the end of it by heating the end in a flame in such a way so that the brass rod cannot project past that end of the tube. Then get a cork large enough to fit into the hole in the top of the carbon. Bore a hole in the cork just large enough to admit the glass tubing. Make this as snug a fit as possible so that the elevation of the tube in the jar may be adjusted. On top of the rod solder a lead weight. This automatically feeds the brass rod down as it is eaten away. The solution consists of 9 parts water and 1 part sulphuric acid. Place enough of this in the jar to cover about one inch of the end of the carbon. Assemble the parts as shown in Fig. 1. You may make your spark stronger by raising the tube in the jar, but it is best

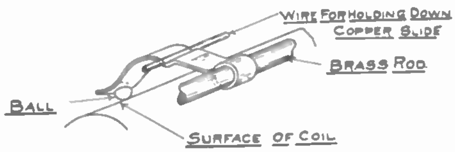


M.E. -Fig 2-

to keep it about one inch from the bottom. Keep the electrodes in your gap about 1/8 an inch apart and you will get the best results. Connect up your set as shown in Fig. 2, winding the wire from the key about the brass rod (Fig. 2), and connect the wire from the primary of the coil to the screw on top of the carbon. It it always best to use a fuse block as shown to prevent accidents to the interrupter. This interrupter will do very satisfactory work on from 110 V. A. C. Be sure to screw the vibrator down tight before using coil.

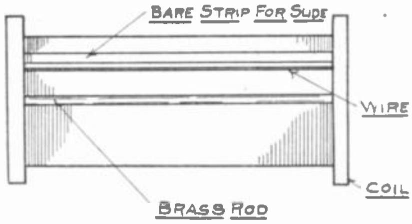
TO CONSTRUCT A TUNING COIL SLIDER.

If no square rod can be procured in



M E -Fig- 1-

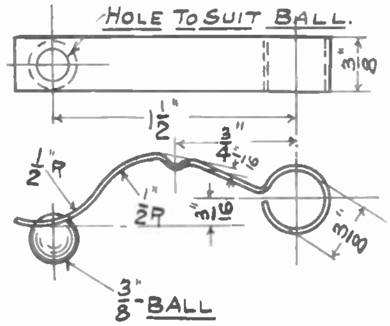
your city, the following is a good way to proceed:



M E. -Fig 2-

Materials—Round brass rod of any length, and about ⅜-in. diam.; one piece sheet copper 3.5x½-in. of sufficient springiness to suit; one steel ball about ⅜-in. diam. Instructions—First hammer the copper to make it springy, then bend it around the brass rod (see Fig. 1).

Fasten a wire along the length of the coil to keep the slider on to the polished surface of the wire as shown in Fig. 2. Bore a hole in the copper at one end (see Fig. 3) a little smaller than the ball, so that the ball will revolve without slipping through. I have made one of these,

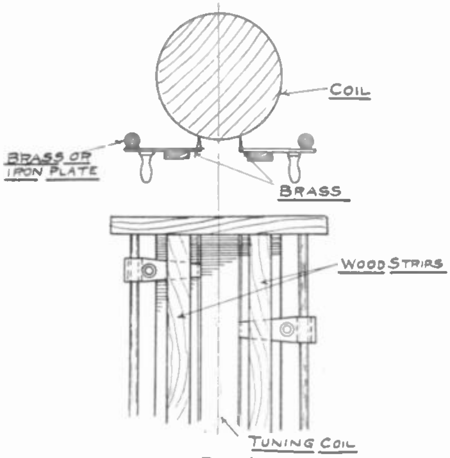


M.E. -Fig. 3-

and it works very well; sliding very evenly and easily. Contributed by
A. Todd.

A GOOD TUNING COIL SLIDER.

The illustrations show a very good



M E -Fig- 1-

slider, making positive contact at all times.

As the illustrations are clear, no explanation is necessary.

Contributed by
Ralph Staehli.

Wireless Telegraph Contest

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

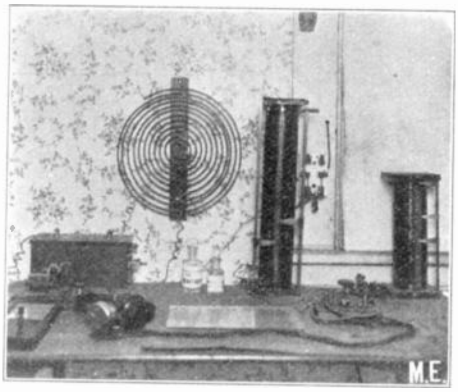
PLEASE NOTE THAT THE DESCRIPTION OF STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED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

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

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

FIRST PRIZE. THREE DOLLARS

Enclosed please find flashlight of my wireless equipment with which I have been able to transmit messages for a dis-



tance of four to five miles, and to receive for a distance of thirty miles.

The transmitter consists of an E. I. Co.'s 2-inch coil, sending helix and a set of their very excellent adjustable condensers. The current required to run the coil is obtained from a storage battery of twelve volt, sixty ampere hour capacity.

The receiving instruments consist of a double slide tuning coil of 350 meters capacity. Electro-lytic and silicon detectors being used in preference to all others. A pair of receivers of 1,500 ohms resistance and a fixed and adjustable condenser complete the outfit.

The aerial is composed of two phosphor bronze wires running from the bridge of the house to pole located thirty-five feet from the ground at a distance of eighty feet from house.

Without the help of MODERN ELECTRICS I doubt if I should have been able to obtain such very excellent results.

New Jersey. ARTHUR HANSON.

HONORABLE MENTION.

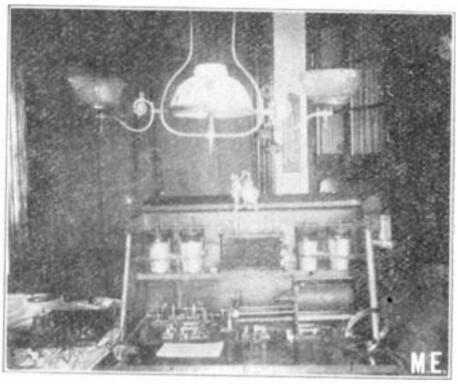
Enclosed you will find a photograph of my wireless apparatus, which I have in my home in Brooklyn, which consists of receiving and sending.

For the receiving I have three detectors (on the left of picture), one selective tuner (on the right of picture); one potentiometer (in back of tuner). The small switch on left of picture is for cutting out receiving battery; a little more to right is the antennae switch for receiving and sending; (in the center) is the switch for detectors (carborundum, silicon aand perikon). I use one pair of 3,000, one pair 1,500 and one pair of 75 ohm receivers.

For sending I have a heavy wireless key (to the right of picture), twelve two-volt storage batteries, which are in bottom of cabinet.

One switch to throw off battery current (left of key).

I have an antennae of eight strands, each 100 feet long and 4 feet apart, and



75 feet from ground to top of pole. My wires run horizontal.

I have my instruments in a mission cabinet.

One four-inch Rhumkorff jump spark coil, which I have put in place of one shown in picture, which is a three-inch box pattern. Eight one-quart Leyden jars. One E. I. Co. spark gap.

I also have a telegraph line attached to my instruments.

Get very good results from carborundum, such as (A. X., D. U., and Pabst's Brewery, Milwaukee).

Brooklyn, N. Y. ARTHUR CHANDLER.

HONORABLE MENTION.

Enclosed please find photo of my wireless station.

For receiving I use two 1,000 ohm receivers. At right hand corner is my double slide tuner of 1,000 meters; beside it is row of detectors, electrolytic, carborundum, molybdenite and ironpyrites. In front of detectors the potentiometer, rheostat, variable condenser and switch to connect on any of the detectors. Above detectors on the wall is the fixed condenser; beside it is the Wireless Association of America's blue book, of which I am a member.

For sending I have a 1/4 K. W. transformer, 10,000 volt on secondary, which is in porcelain jar placed in oil. A water rheostat connected with same. Condenser of four plates 12 x 12 inches,

on top is the helix of twelve turns of No. 8 brass wire, inside is the zinc spark gap with muffler. My hand is on key operating transformer, spark can be seen through hole in muffler.

My antenna is made of four aluminum wires, No. 14, 50 feet long, ten inches apart, stretched from a pole fifty feet high, connected in looped system with two leads running down to a three-point anchor gap and D. P. D. T. switch.

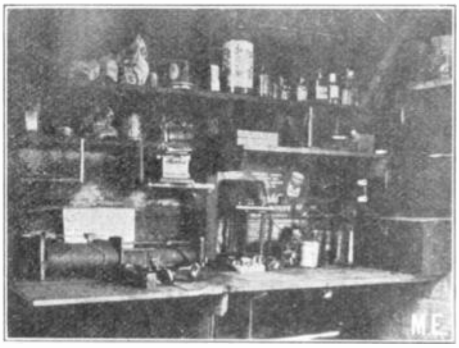
For ground I use the gas and water pipes.

With these instruments I can send 25 miles and receive 500 miles.

California. MELVIN M. BONHAM.

HONORABLE MENTION.

Enclosed please find a photo of my wireless. I have been experimenting in wireless for nearly a year. My aerial is suspended between two poles, the highest of which is fifty feet from the ground. The distance between the poles is about sixty feet. My receiving set may be seen to the right of the picture. One single tuner and a double tuner are in the back. In front of these are the head phones, silicon detector, and potentiometer. The sending apparatus may be seen to the left of the picture. On top of the helix



is the zinc spark gap and a condenser. On the side of the helix is the spark coil, Leyden jars and batteries. In front of these may be seen the key and switch. I get good results from these instruments, most of which I made myself. MODERN ELECTRICS is a fine magazine and I would be at a loss without it.

RALPH D. MAGANN.

New Orleans, La.

HONORABLE MENTION.

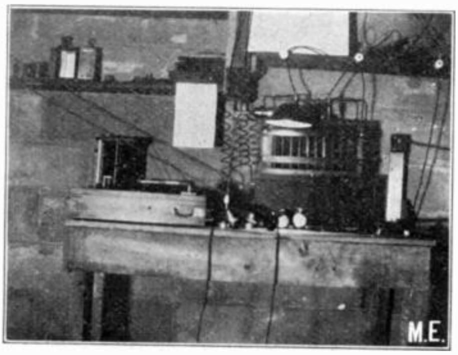
Enclosed please find photo of my wireless instruments. Most of them were made by myself. The photo shows the bench on which my apparatus is placed.

My sending, open core transformer, of about 3/4 K. W. capacity on full load, is enclosed in a box containing transformer oil, which helps to insulate the core, primary, and secondary very much. On this box is the glass plate condenser, being variable by sliding in or out the different plates. Above this is the spark gap which is easily adjusted.

Receiving Instruments.—In and on the receiving box are the "Electro"-lytic detector, potentiometer, fixed and variable condensers, batteries and battery switch, also a plug to connect the phones, wound to 1,500 ohms. Besides this is a double slide tuning coil and a tuning transformer. The tuning transformer is very helpful in long distance work, for bringing up distant stations so you can read them, which otherwise could not be heard at all.

My aerial consists of six No. 14 bare copper wires, 30 feet long and only 50 feet from the ground.

I can hear most all of the stations and boats along the lakes and a few stations



in the East. I get very good results considering the small aerial I have.

MODERN ELECTRICS to my estimation is the best of magazines on wireless.

Detroit, Mich. CHAS. E. BARTON.

HONORABLE MENTION.

Recently we had a picture of our wireless outfit taken which is enclosed. We have communicated with a steamship twenty-five miles out on Lake Michigan. The receiving radius is seventy-five to one hundred miles. All the instruments are home made with the exception of the receivers, spark coil, spark gap, key, and detector.

The sending outfit consists of Electro Importing Co.'s spark coil, key, helix,

spark gap, and a glass plate condenser, having 8 x 10 inch plates.

The receiving outfit consists of a tuning coil, variable condenser, electrolytic and carborundum detectors, potentiometer, and 2,000-ohm receivers. The potentiometer and receivers are not shown. We use a double point double throw switch for connecting the aerial and ground with the sending and receiving instruments. The ground switch is a single point throw switch.

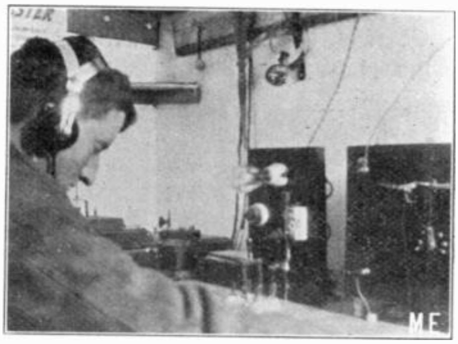
The aerial consists of four number 14 aluminum wires, ninety feet long and one foot apart. It is strung between a church steeple fifty feet high and a house thirty feet high. The set is grounded by a heavily insulated wire which runs to a water pipe. This city is a fine place for a wireless station as from here one may keep in touch with steamers and government stations on Lake Michigan.

FLOYD ATCHISON.
Michigan. PAUL HARSHA.

HONORABLE MENTION.

Enclosed please find photographs of my wireless outfit.

The receiving set consists of the following: A double slide tuning coil, using ball bearing sliders for contact. No. 22 bare copper wire wrapped on a rolling



pin with thread between is used. A small fixed condenser is also used. I use iron pyrites with a phosphor bronze point for contact, for my detector. My phones are two thousand ohms.

The sending set consists of a 1/4 K. W. transformer built by me. Leyden jars are used for a condenser. I use aluminum rods (or wire) for spark gaps. My helix consists of seven turns of No. 6 brass wire wrapped on a wooden frame (not seen in picture). My sending key is an old style Western Union. It has *two silver dimes for contact,* instead of platinum. A D. P. D. T. switch is used for throwing from sending to receiving. My aerial is horizontal. It has four No. 14 copper wires separated by spreaders. It is only forty feet long, but I get good results from it. I hope to have a longer and higher one soon.

Your magazine is a great help to me.

Los Angeles, Cal. ASHLEY PETTEY.

HONORABLE MENTION.

Enclosed please find flashlight photo of my laboratory, which is situated in the back of our yard.

At the right of the picture is my scroll saw, which I use for cutting out different shaped pieces of wood.

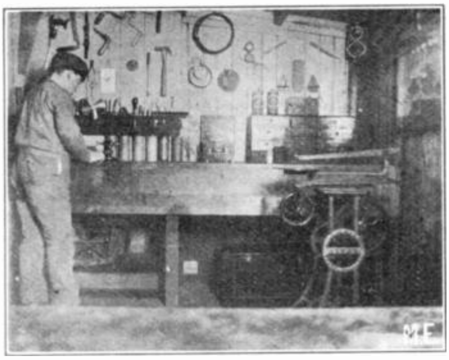
Under the work-bench is a tool chest that I made, which contains electrical supplies and tools. On the bench at the right is a cabinet, which I made, and contains nails, tools, and fixtures, and above the cabinet is a pyrographic or wood-burning outfit.

In the middle of the photo is a medical shocking machine, which I constructed, and I often take it to different places, and have an endless amount of fun with it.

In the right-hand corner is a cabinet which contains chemicals, and above the work-bench are the tools, including a set of chisels.

The other apparatus shown: an electric fan, a bell, small electric lights, coils, magnets, wire, and about eighteen coils of different sizes and shapes.

The photo shows me experimenting with a small dynamo, which will light about ten 3 C. P. lights.



I have been experimenting with electricity for some time, and have just started constructing a wireless, and when I have completed, I shall join the Wireless Association of America.

I think your paper a great success, and recommend it to all my friends.

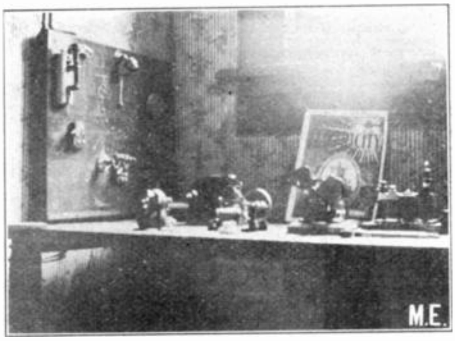
RUSSELL C. TEN EYCK.

New Jersey.

HONORABLE MENTION.

Enclosed please find picture of my laboratory. At the left is seen my switchboard which controls the motors, lights, etc. I have one dynamo, two Ajax motors, one electric engine, one telegraph key and sounder, two flashlights, one small motor, one electric fan motor (not shown in picture), one telephone receiver, four battery lamps and receptacles. I have a storage battery which furnishes the power.

I am 13 years old and have been ex-



perimenting with electricity for about a year.

DONALD HUGHES.

Illinois.

HONORABLE MENTION.

Laboratory of Mr. H. C. Briggs, Berwyn, Ill.

W. A. O. A.

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

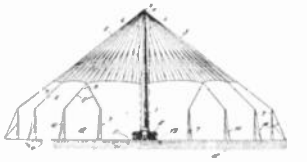
Send today for free membership card. Join the Association. It is the most powerful wireless organization in the U. S. It will guard your interest when occasion arises.

Electrical Patents for the Month

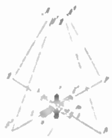
945,475 AERIAL FOR THE TRANSMISSION AND RECEPTION OF ELECTROMAGNETIC WAVE ENERGY. RICHARD PFUND, New York, N Y Filed Feb 10 1909 Serial No 477,132

1 An aerial for the transmission and reception of electromagnetic wave energy consisting of a hollow structure of poorly conducting material with the necessary energizing machinery located in or around the base and the aerial proper supported symmetrically from the top of said structure and the earth connections symmetrically disposed around the base of the said structure.

2 An aerial for the transmission and reception of electromagnetic wave energy consisting of a hollow cylindrical structure of poorly conducting material with the neces

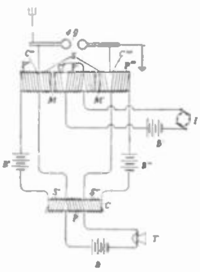


945,440 SYSTEM OF DIRECTED RECEPTION FOR WIRELESS TELEGRAPHY STATIONS. ETTORE BELLINI and ALESSANDRO TOSI, Paris, France Original application filed Oct 1, 1907, Serial No 395,366 Divided and this application filed June 16, 1908 Serial No 438,775



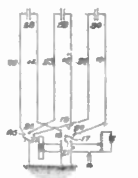
A system of directed reception for wireless telegraphy stations comprising for the aerial part of the receiving station several dirigible aerials in a fixed position, combined with fixed windings inserted in the conducting part of the aerials, with a wave detector, and with a rotary device connected to the detector and influenced by the currents which traverse the fixed windings substantially as described and for the purpose set forth

948,156 SYSTEM FOR THE TRANSMISSION OF ELECTROMAGNETIC WAVES WITH SOUND REGULATED FREQUENCIES WALTER H BATHRICK, Somerville, Mass Filed Apr 3 1908 Serial No 424,921



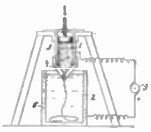
1 In a system for the transmission of sound controlled electro radiant energy a pair of secondaries of a sound controlled primary, a pair of primaries connected with the said secondaries, a primary generator of high frequency currents, a secondary connected with the conductors of electrical oscillations all substantially as set forth

948,068 WIRELESS TELEGRAPHY REGINALD A FESSENDEN, Washington, D C assignor to The National Electric Signaling Company Pittsburg, Pa, a Corporation of New Jersey Original application filed July 27, 1903, Serial No 167,242. Divided and this application filed July 16, 1905 Serial No. 269,880



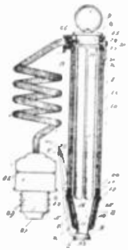
1 In wireless signaling, the method of tuning an antenna by varying the electrostatic inductive relation between said antenna and another conductor substantially as described

947,162. PROCESS OF PRODUCING BARS, BANDS, TUBES, WIRES, FIBERS, AND THE LIKE OF METAL OTTO SCHALLER, Steglitz, near Berlin, Germany Filed May 3, 1909 Serial No. 493,678.



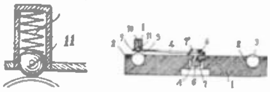
1. A process of producing bars, tubes, bands, wires, fibers and the like of metal, which consists in that a mass containing more or less finely divided metal is contacted with a current conducting liquid, the said liquid being connected to the positive pole and the mass to the negative pole of a source of electricity

945,822. ELECTRICAL APPARATUS FOR MELTING SEALING-WAX. WILLIAM T. VON TILLOW, San Francisco, Cal Filed Dec 14 1908 Serial No 467,547



1 An electric sealing wax melting apparatus consisting of a tube having a tapered end and a restricted opening, an exteriorly mounted pivoted gate adapted to close said opening; an outer casing concentrically spaced from said tube; a heating device consisting of an electro thermal resistance encompassing said tube adjacent the said restricted opening; an insulator for said resistance, suitable electric connections between said electro-thermal resistance and the source of energy; and a suitable switch interposed in the electric circuit.

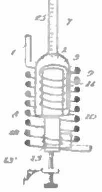
948,275. ELECTRORHEOSTAT REGULATOR HUGO GERNSBACK, New York, N Y. Filed Sept 1, 1908 Serial No 451,136.



As a new article of manufacture, a rheostat comprising a one piece base of insulating material and having an uninterrupted annular undercut retaining groove with an opening at the top thereof of a predetermined diameter, a hollow resistance coil of greater diameter than the predetermined diameter of the opening of said retaining groove and composed of a series of convolutions, said resistance coil being adapted to be sprung lengthwise into place in said groove and held in position by the walls and undercut edges of said groove, a movable contact arm mounted in the center of the base and provided at its outer end with a hollow knob containing a coiled spring fastened at the inner end of said knob, a metal or carbon ball abutting the free end of said coiled spring, said ball being adapted to engage one convolution of said resistance coil at a time for obtaining an almost imperceptible variation in electric current strength.

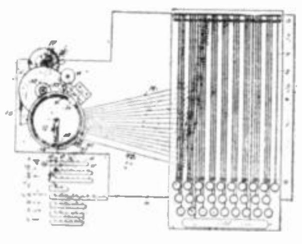
947,092 INDUCTION METER CLIFFORD D BABCOCK, Jersey City, N J, assignor to United Wireless Telegraph Company, New York, N Y, a Corporation of Maine Filed Apr 28, 1909 Serial No. 492,787

1 In a meter for varying currents, the combination of a primary coil, a secondary coil in inductive relation to said primary coil adapted to be heated by currents generated by said primary coil; and means to indicate the heating effects in said secondary coil, substantially as described



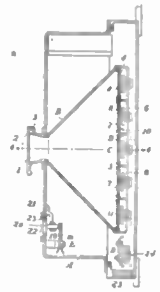
2 In a meter for varying currents, the combination of a primary coil adapted to receive such currents, a closed secondary coil in inductive relation to said primary coil; a fluid in which said secondary coil is immersed, and means to measure the heating effects transmitted to said fluid, substantially as described.

946,372. KEYBOARD TELEGRAPHIC TRANSMITTER EDWARD E. KLEINSCHMIDT, New York, N Y Filed Feb 7, 1905 Serial No. 244,585.



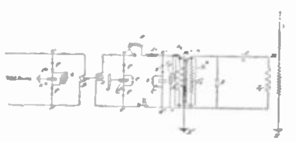
1 In a telegraphic transmitter the combination with a series of key bars, of a series of selective bars provided with lugs corresponding in arrangement with telegraphic symbols of characters on the keyboard, a series of wires extending transversely of said selective bars in proximity to and adapted to be moved by said lugs when a key bar is manually operated, the arrangement being such that one lug represents a dot and two or more represent dashes, the wires moved being separated by idle wires to represent a space between the parts of a symbol

945,069. MULTIPLE TELEPHONE TRANSMITTER. FRANK W WOOD, Newport News, Va, assignor to Charles Cory and John M Cory, New York, N Y Filed July 16, 1906 Serial No 326,350.



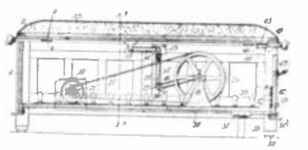
1. The combination with a transmitting apparatus comprising a casing, a plurality of transmitters therein, and a common funnel shaped mouth piece for said transmitters, the smaller end of said mouth piece projecting through a wall of the casing and the large end embracing said transmitters, of a plurality of receivers, and an independent circuit connecting each of said transmitters with one of the receivers.

946,166 SPACE TELEGRAPHY. JOHN S STONE, Cambridge, Mass Filed Feb 27, 1906. Serial No 303,213.



1 In a space telegraph system, a power circuit including a generator, a sonorous circuit operatively associated with said generator, a radiating system related to said sonorous circuit, a circuit connected across the terminals of said generator and including a condenser, and a metallic connection from one armature of said condenser to the frame of said generator

944,673 ELECTROVIBRATORY COUCH WALTER A. CHURCH, Los Angeles, Cal, assignor to Electro Vibrating Couch Company, Los Angeles, Cal, a Corporation of California Filed Dec 21, 1908 Serial No 468,677



1 A vibratory couch comprising a bottom member, a top member mounted to reciprocate horizontally on said bottom member, a motor and a crank operated thereby and connected to the top member to impart thereto a smooth vibratory horizontal motion

Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending February 1st.

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.

CONDENSER ON KEY.

(449.) E. C. Estes, Minnesota, asks:

1.—What is the receiving distance and transmitting distance of the following apparatus under the best conditions with a 60-foot iron pipe aerial having cross-arm at top 4 feet long holding eight No. 16 copper wires, and the wires tapering to eight feet at the bottom—at 60 degrees—60 feet long? Bare point electrolytic detector, telephones, 1,000 ohm receivers, potentiometer 500 ohms, tuning coil double slide, variable condenser, fixed condenser, zinc spark gap, E. I. Co.'s 1-inch spark coil, Gernsback interrupter, run on 110 volts A. C., telegraph key, helix, ground on water pipe.

A. 1.—Receiving 250 to 300 miles. Transmitting 6 to 8 miles.

2.—Should there be a condenser bridged across the key where a Gernsback interrupter is used?

A. 2.—The use of a condenser across the points of the key aids materially in cutting down the spark.

SENDING RADII.

(450.) J. C., Los Angeles, Cal., writes:

1.—What will be my sending range of the following instruments: Aerial 65 feet high, 90 feet long, 10-inch coil giving a spark ¼ inch thick, condenser of suitable capacity, helix wound with 54 feet of No. 10 brass wire, coil operated on 110 volts, using an electrolytic interrupter?

A. 1.—About 75 miles.

2.—What will be my range substituting a ½ K. W. transformer in place of the spark coil?

A. 2.—Probably about the same.

BOOKS.

(451.) David Donahue, New York City, writes:

1.—Will you kindly publish in the "Oracle" in the February issue of your valuable publication books treating on the "Carborundum detector," and the working of "De Forest system of Wireless Telegraphy?"

A. 1.—As far as we are able to ascertain there are no special books on the subject mentioned. However, almost any of the books mentioned treat to some extent on the subject. Maver's Wireless Telegraphy & Telephony, Radio Telegraph, by C. C. F. Monckton and Wireless Telegraphy, by Sewall, and especially our new 25-cent book, "How To Make Wireless Apparatus."

HELIX.

(452.) Harry Stearns, Wisconsin, writes:

1.—What are the reasons for placing a spark gap within a sending helix?

A. 1.—No reason except to save room.

2.—What size wire is most appropriate for a sending helix, and how far apart should the turns occur?

A. 2.—About No. 8 for use on 1-inch coil. Turns should be spaced about 1 inch apart.

3.—What length of wire should be wound on a helix to form a helix usefully adapted to work with an inch and a half coil and a 35-40-foot antenna?

A. 3.—About 20 feet wound on a coil 10 inches in diameter.

WIRELESS QUERIES.

(453.) Raymond H. Shaw, Vermont, asks:

1.—With instruments in accompanying diagram, about how far can I send and receive?

A. 1.—Receiving 75 to 100 miles. Transmitting 2 to 3 miles.

2.—How many dry cells should be used with a 1-inch spark coil?

A. 2—Two sets of 6 dry cells connected in series multiple.

3.—Is a rheostat in series with detector or telephone receiver?

A. 3—The rheostat is generally used in series with the telephone receiver and battery.

SENDING AND RECEIVING RADII.

(454.) Eustice Bernhard, California, writes:

1.—Will you please tell me how far I can receive with the following instruments: The E. I. Co.'s electrolytic detector, double slide tuning coil of 600 meters wave-length, variable condenser, potentiometer, fixed condenser, and two 1000-ohm receivers? My aerial consists of 8 strands of aluminum wire 8 inches apart, 70 feet long and 50 feet high.

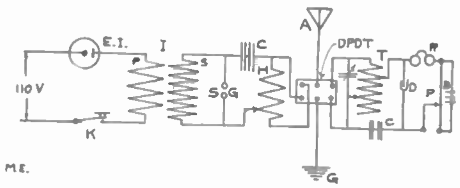
A. 1.—250 to 400 miles.

2.—What is my sending radius, using the above named aerial with the following instruments: The E. I. Co.'s ½ K. W. transformer coil run with an electrolytic interrupter, special sending helix, and an adjustable condenser?

A. 2.—50 to 75 miles.

3.—Kindly give a diagram showing me how I can connect the above named instruments (both sending and receiving) to obtain the best results?

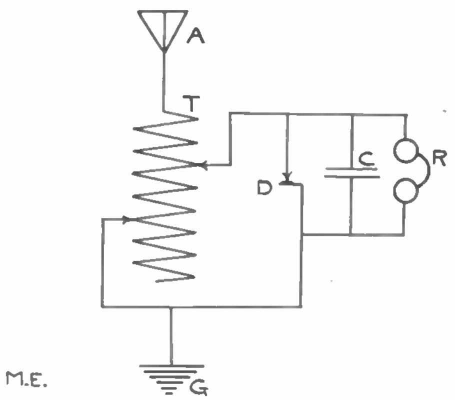
A. 3.—Diagram given below.



DETECTOR IN HOUSE.

(455.) Richard Hill, Illinois, writes:

1.—Would you please tell me why my apparatus does not work? I use a silicon detector, tuning coil, 1000-ohm receiver and condenser made of 15 sheets of tinfoil, 2 by 2 inches. Is this the right amount of



tinfoil? I operate this only through the house.

A. 3.—You do not tell us what aerial you are using, but we would suggest a small aerial 10 feet long, composed of 4 wires. If a ground cannot be had, two such aerials —one above the other and about 5 feet apart should be used. One would then be the aerial proper, the other the "ground." See airship aerials, page 409, December, 1909, issue.

2,800 MILES?

(456.) Wilstant F. Conberger, Pennsylvania, writes:

1.—One clear cold night a short time ago, as I sat "listening in" at my instruments, I heard, very faintly, a message which was signed off "SO" (the call letter of the 20 K. W. station at Sitka, Alaska). Could I possibly have heard this distance (2.800 miles) even though the conditions were most favorable, with the following instruments: "Electro"-loose coupler, fixed and variable condenser, 3000-ohm phones, two electrolvtic detectors (connected in parallel), potentiometer and battery. Aerial consisting of 10 wires, on 18-foot spreaders, stretched between two smoke stacks 200 feet apart and 175 feet high?

A. 1.—We do not think it probable that you should have heard a message over this distance, but it is barely possible that you should be correct. We would suggest if you copied sufficient of the message, that you write the station at Sitka, Alaska, and ask for verification. This is the usual method of procedure when a long-distance message is picked up. If you actually did receive such a message we believe it to be quite a record for over-land transmission.

½ K. W. COIL.

(457) Edward Palmer, Michigan, writes:
1.—Would you please tell me how far I can receive with my outfit? It is composed of two 2000 meter tuners, E. I. Co.'s variable condenser, electrolytic detector, silicon improved type and a pair of 2000-ohm Holtzer-Cabot receivers with ear cushions. I also have a potentiometer, non-inductive type, two dry batteries. My aerial is 50 feet high, 45 feet long, composed of 7 wires 1 foot apart, except in the middle, where it is 1½ feet.

A. 1.—300 to 500 miles.

2.—How far can I send with an E. I. Co.'s ½ K. W. transformer coil? The Lake Superior is within five miles of me on the west, ten miles on the east and 30 miles on the north. We are 600 feet above lake level.

A. 2.—50 to 75 miles.

½ K. W. TRANSFORMER.

(458.) F. M. Atkinson, Massachusetts, writes:
1.—How far can I send with the following instruments: 4-strand aerial 50 ft. high and 30 ft. long, helix, condenser, and a Ritchie one-quarter-inch spark coil?

A. 1.—One-fourth to one-half mile.

2.—With the same aerial, double slide tuning coil, condenser, perikon detector and a pair of 1,000-ohm receivers, how far can I receive?

A. 2.—250 to 400 miles.

3.—Will you please tell me which is the best to buy, the E. I. Co. ½ K. W. transformer coil or the 1½-inch spark coil, both being the same price.

A. 3.—The ½ K. W. transformer coil will send the farthest if this is what you desire.

WIRELESS QUERIES.

(459.) James S. Curry, New York City, asks:
1.—How far can I receive with a 3-wire aerial, 80 ft. long and 60 ft. high, a silicon detector, tuning coil, potentiometer and 75-ohm phones?

A. 1.—75 to 150 miles. As a general rule potentiometer and battery are not needed with a silicon detector.

2.—How far with the above outfit and E. I. Co.'s No. 8070, 2,000-ohm receivers in place of those having a resistance of 75 ohms?

A. 2.—500 to 800 miles.

3.—How far can I send with the same aerial, 1-inch spark coil, No. 9270 helix and zinc spark gap?

A. 3.—1 to 3 miles.

INDUCTANCE.

(460.) ROBT. F. ADAMS, Texas, asks:

1.—If the wireless station at Galveston, Texas, is still in operation; if so, what time of night they send?

A. 1.—The station at Galveston, Texas, is open from 9 to 11.30 a. m., 2 to 5 p. m.; Friday and Wednesday also 7.30 to 11 p. m.

2.—What is the wave length of my tuning coil, which is wound with 440 turns of No. 18 B. S. enamaled wire on a frame 12½ inches in diameter?

A. 2.—To find the actual inductance of a tuning coil involves a very lengthy calculation if accuracy is desired. We give you below a formula which is a good method for approximate work.

$$\frac{(5\,D\,T)^2}{A} = L \text{ inductance in C. M.}$$

where D is the diameter, T the total number of turns and A the length. This holds good only for coils which are cylindrical or long in proportion to their diameter.

FERRON DETECTOR.

(461.) THOS. A. GOLEY, Minnesota, asks:

1.—What size are the enclosed wires, and are they the right size for a loose coupled tuner?

A. 1.—The enclosed samples are No. 28 B. S. and 26 B. S. We prefer Nos. 22 and 28 B. S. gauge for the primary and secondary respectively of a loose coupled tuner.

2.—What is a Ferron detector?

A. 2.—Ferron is the name given to a crystal of iron pyrites by the Clapp-Eastham Co.

3.—How far could I receive with sensitive instruments and an aerial 40 ft. high and 30 ft. long?

A. 3.—250 to 400 miles.

4.—How far could I send with one block secondary of a ½ K. W. coil with battery and vibrator and same aerial?

A. 4.—About 10 miles.

LOOSE COUPLER.

(462.) M. BROWN, New York, writes:

1.—Can an E. I. Co. large single slide tuning coil be changed into a loose coupler by removing one end and adding a secondary?

A. 1.—Yes. But we would advise instead of making the change that you purchase a loose coupler, the parts of which have been designed in proportion to each other.

2.—Please state size of enclosed wires and if same would be suitable for the secondary of a loose coupler.

A. 2.—The samples of wire are Nos. 34 and 36 B. S. gauge. No. 28 B. S. gauge is the best size for the secondary.

3.—Are two different detectors connected in series any better than one?

A. 3.—Two electrolytic detectors may

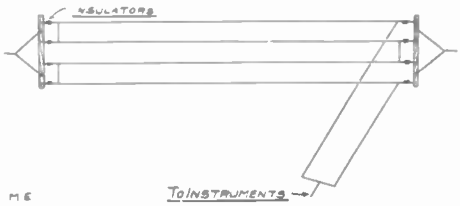
be placed in series and used with good results.

AERIAL.

(463.) R. H. Berkheimer, Washington, writes:

1.—Give diagram illustrating what is meant by "in" and "out" connection on aerials.

A. 1.—Diagram given below.



2.—In a silicon detector which contact needle is the best, steel or brass?

A. 2.—Brass.

3.—Using carbon and zinc elements and the solution described under patent 940,734 in the December issue, what would the voltage and amperage be?

A. 3.—Two volts. The amperage will depend upon the size of the zinc and carbon elements and the distance they are separated.

4.—Will this solution polarize as quickly as the ordinary solution in a bichromate battery.

A. 4.—No. They are both the same.

WIRELESS QUERIES.

(464.) Harold Schoeplin, New York, asks:

1.—How far should I receive with an aerial 58 ft. high and 40 ft. long, oscillation transformer, variable condenser, fixed condenser, electrolytic (sealed point) detector, potentiometer and 2,000-ohm head set?

A. 1.—300 to 500 miles.

2.—What would be the approximate number of square inches of tinfoil 8 by 6 inches on 8 by 10 glass window panes to form correct capacity for secondary for "Electro" ½ K. W. transformer coil?

A. 2.—Use 15 to 20 plates of the size you mention.

3.—Will the above coil transmit farther with secondaries in series or parallel?

A. 3.—In series.

STORAGE CELLS.

(465.) Jas. S. Cowan, Galt, asks:

1.—What is the most current in amperes that can be taken from an E. I. Co. type R. E. storage cell without injury?

A. 1.—Two amperes.

2.—What current should an E. I. Co. 2-inch coil take on twelve volts?

A. 2.—Seven amperes.

DETECTOR.

(466.) Emery Patterson, Illinois, writes:

1.—Please tell me how to regulate an electrolytic detector.

A. 1.—Lower the point until you hear a sharp click in the telephone receivers. Then raise the point slightly and adjust the potentiometer until the hissing noise just disappears.

2.—How far should I be able to receive with a 4-wire aerial 175 ft. long and 75 ft. high, pair 1,500-ohm receivers, adjustable condenser, E. I. Co. fixed condenser, double slide tuning coil, E. I. Co. potentiometer?

A. 2.—It is impossible to say unless you mention the type of detector you use.

3.—How far apart should the aerial wires be?

A. 3.—Preferably 4 or 5 feet.

RESONANCE.

(467.) FREEMAN LEE, Burnley, England, writes:

1.—Given a receiving station with an aerial having a wave length of 61 meters, can I receive from a station having a wave length of 40 meters by moving my ground slider and inserting the necessary 21 meters?

A. 1.—The best way to secure resonance under the conditions you mention would be to have an adjustable condenser in your circuit. Capacity and inductance are opposite in their effects and the addition of capacity to a circuit increases its period and shortens the natural wave length. Another method of tuning in this case would be to add enough inductance to produce a natural wave length of 80 meters in the aerial and circuits of the receiving station. This would be a multiple of the wave from the transmitting station and would produce resonance.

2.—Will you please give me the size and number of sheets of tinfoil in each part of this condenser?

A. 2.—We are unable to give you the dimensions of an E. I. Co. condenser. Even if we could, you would find it impossible to secure the same amount of capacity. One condenser may have several times the capacity of another having the same lineal dimensions. The difference is in the amount of pressure applied to press the tinfoil and dielectric together. Uniformity is only secured by the use of machinery. We would be pleased to have the results of your experiments in building the adjustable coil you mention.

½ K. W. COIL.

(469.) W. R. ORGAN, California, asks:

1.—How many turns in each one of the block secondaries in the E. I. Co.'s ½ K. W. transformer coil, and how far will it send over level land?

A. 1.—We are unable to say how many turns there are in the secondary of an E. I. Co. ½ K. W. transformer coil. However, the number is exceedingly large as they are wound with No. 30 B. S. enameled wire which occupies very little space and makes them about three times as efficient as other ones. With an aerial 100 feet high it is capable of transmitting up to 100 miles.

2.—I have a home-made transformer coil which gives a 5-8-inch spark, ¼ inch thick with condensers and the spark is full and steady. How far will it send?

A. 2.—Probably from 25 to 40 miles.

3.—How many pounds of No. 30 enameled wire are necessary in the secondary of a 1 K. W. transformer?

A. 3.—We cannot say how much secondary is required without having some definite information concerning the design of the transformer.

RECEIVING RADII.

(468.) Ross McCollum, California, asks:
1.—How far can I receive with an aerial 50 ft. high at one end and 30 ft. at the other with four wires 125 ft. long, two 75-ohm receivers, fixed condenser, double slide tuner and silicon and iron pyrites detectors?

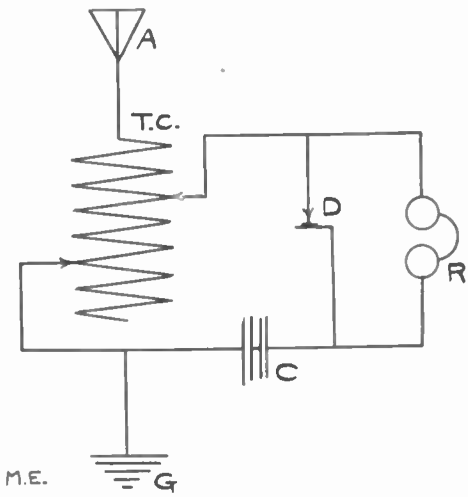
A 1.—150 to 300 miles.

2.—How far can I send with above aerial and ¼ K. W. transformer, helix with seven turns of No. 6 brass wire, condenser with fifteen glass plates 7 by 5, with tinfoil on both sides?

A. 2.—50 to 75 miles.

3.—Which diagram is the better of the two which I have enclosed?

A. 3.—Neither is very good. Diagram given below will give better results.



GROUNDED AERIAL.

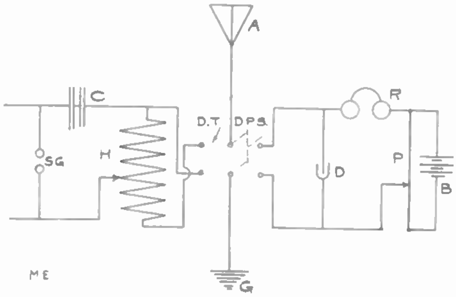
(470.) Wm. Hilbert, Maryland, writes:
1.—On Christmas night my aerial came down in a heavy snow storm. Although my aerial was lying on the tin roof I put my receivers to my ear and heard B call X F and X F answer. B is one mile away and X F, which is the Bay Line boat, was about two and one-half miles away.

A. 1.—It is nothing unusual for a sensitive detector to respond when the aerial is seemingly grounded and especially when the signals come from such a nearby source.

CONNECTIONS.

(475.) Charles R. McGorray, Kansas, asks:
1.—Will you give a diagram of the connections of half K. W. coil, sending condenser, spark gap, helix and D. P. D. T. switch, universal detector, potentiometer, and two telephone receivers?

A. 1.—You will find diagram below. We would suggest that you add a double slide tuning coil and an adjustable and fixed condenser to your receptor.



RECEIVING DISTANCE.

(472.) ARTHUR K. KIMBALL, Massachusetts, writes:

1.—How far can I receive with an aerial 50 feet high, silicon detector, tuner, fixed condenser?

A. 1.—75 to 150 miles.

2.—What is my sending radius with the same aerial, a 1-inch spark coil, spark gap, E. I. Co. key and national storage battery?

A. 2.—Two to three miles.

AERIAL

(473.) AMOS KUNSTAD, Wisconsin, writes:

1.—Please give me the names and addresses of some good schools in Chicago or vicinity where electrical engineering is taught as a profession.

A. 1.—We do not know of any but would refer you to the correspondence schools which advertise in our columns.

2.—Name some wireless stations from which I can receive with the following apparatus: Aerial composed of one wire 400 ft. long, 75 ft. high at one end and 40 ft. at the other, electrolytic and silicon detectors, 100-ohm receiver, variable condenser, tuning coil and potentiometer.

A. 2.—We would advise that you make your aerial up of 4 wires 100 ft. long rather than a single one 400 ft. long. The following stations are in your State: Manitowoc, M. W.; Milwaukee, M. K., and Milwaukee, C. M. W.

WIRELESS QUERIES.

(474.) CHESTER M. CAPEN, Massachusetts, writes:

1.—How far can I receive with a 40 ft. aerial 50 ft. long, double slide tuning coil, 1,500-ohm watch case receivers, electrolytic and silicon detectors, potentiometer and fixed condenser?

A. 1.—200 to 350 miles.

2.—How far could I send with the same aerial, a 1-inch spark coil, helix, zinc spark gap and a glass plate condenser?

A. 2.—One to three miles.

RECEIVING.

(475.) CHARLES NOBLE, Pennsylvania, writes:

1.—What would be my receiving range with a 10-wire aerial, 65 feet high, a pair of 1,000-ohm E. I. Co. receivers, electrolytic detector, one variable condenser, one fixed condenser, three slide tuner, and a potentiometer?

A. 1.—500 to 800 miles.

INDUCTANCE.

(476.) U. L. Tolostad, South Dakota, asks:

1.—The length of wire or the number of turns of wire which can be employed before self induction will become detrimental to the passage of the talking currents.

A. 1.—Your question is dependent upon several factors, such as the strength of the currents, the size of the core, etc., which make it impossible to answer. However, do not carry the winding beyond that point in which the circumference of the last layer is twice the circumference of the first layer.

2.—Would a condenser counteract the self induction?

A. 2.—No.

WIRELESS QUERIES.

(477.) Geo. Cox, North Carolina, asks:

1.—Will a ¼ inch induction coil in circuit with an adjustable condenser and sending helix send ¾ of a mile with a 4-wire aerial 50 ft. high and 100 ft. long, providing the receiving station had an aerial 50 ft. high, a double slide tuning coil, variable condenser, fixed condenser, potentiometer, electrolytic detector and two 75-ohm telephone receivers?

A. 1.—Yes.

2.—What quantity of German silver wire will be required to wind the potentiometer described in the May, 1909, issue?

A. 2.—About one-half pound.

3.—I have made an induction coil wound with No. 40 S. C. C. on the secondary. The coil is 5 inches long and 2 inches in diameter. How long a spark ought this to give?

A. 3.—It is impossible to say from your description.

CONNECTIONS.

(479.) Harold Leigh, Kansas, writes:

1.—My aerial is made up of 6 aluminum wires 2 ft. apart, 75 ft. long, 45 ft. high at one end and 30 ft. at the other. Will it cut down my receiving radius to have the instruments 10 ft. below the lower end?

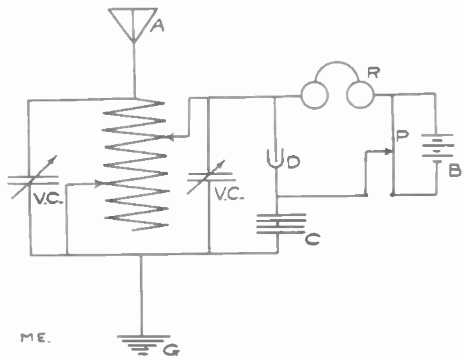
A. 1.—No. This is the best end to lead in.

2.—What power is the station at Fort Riley, and what is their call?

A. 2.—3 K. W. Call F. Z.

3.—Will you please tell me how to connect up a double slide tuner, 2 variable condensers, a fixed condenser, electrolytic detector and a pair of 1,000-ohm receivers?

A. 3.—Diagram given below. One vari-



able condenser is sufficient with a double slide tuner.

COIL.

(478.) ALFRED FINLEY, Oregon, asks:

1.—How much wire should I use to wind the secondary of a coil having a core 11 inches long, ¾ inches in diameter and a primary composed of 2 layers of No. 16 B. S. gauge? What size should the wire be, and what spark will the coil give?

A. 1.—Use 6 pounds of No. 34 and you will obtain a 5-inch spark. We would recommend that you use two layers of No. 12 double cotton covered wire on the primary in place of the No. 16.

APARTMENT AERIAL POLE.

(Continued from Page 520)

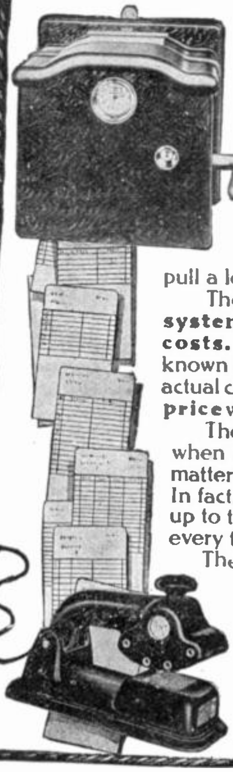
braces. Bolt these braces to the pipe, running the bolts through the holes bored in it, and screw one brace to each one of the base boards (Fig. 2).

Nail small blocks of wood on the bottom of two ends of one of the base boards to make it stand level.

A glass insulator can be placed on the top of the pipe to receive the guy wires and pulley for raising the aerial.

Contributed by

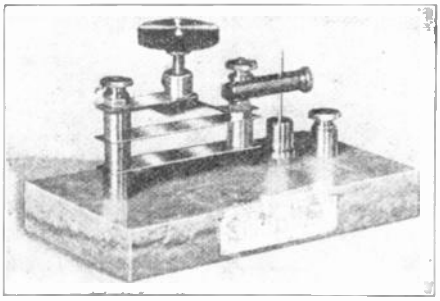
ROBERT D. SKELLY.



Remarkable Feat for Wireless Boy.

"With a wireless station that cost him just $19, Elmer Lamb, an 18-year-Toledo boy, living on Erie near Galena St., on Friday picked up the U. W. Co's 2 K. W. station at Atlantic City, N. J. and a few minutes later picked up the cruiser Oklahoma on the Atlantic coast, and the station at Cape Cod, Mass. The feat is regarded as remarkable here. The boy's instruments complete stood him just $19. Station is equipped with a 50-ft. aerial, Ferron Detector, tubular condenser, tuning coil and 2,000 ohm head set.——From Toledo News-Bee, of Sept. 18th, 1909.

The Celebrated Ferron Detector



FERRON DETECTOR. PRICE $5.00.

The Ferron Detector is fast becoming the acknowledged detector for high class wireless work. Guaranteed to be excelled by none for sensitiveness, and far superior to any detector in existence selling for $5.00. With our highest grade receiving set it has a proven range exeeeding 2,000 miles. Because of its extreme sensitievness, no battery or potentiometer is required. It will withstand the strongest signals and remain adjusted for weeks. The users of electrolytic detectors will appreciate this point The base is of finely polished Italian marble, and the metal parts beautifully nickel plated. The following enthusiastic letter unquestionably proves the Ferron to be much more sensitive than any silicon:

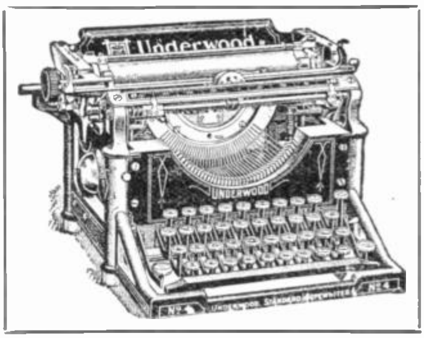
"My profound felicitations; your detector is certainly a bird, and as the president would say it has all others done to a frazzle. While in Beverly, Mass., I tested it out with a silicon, and I could get P. C. (85 miles) as loud as I could get P. G. (15 miles) on the other."

Send 3c STAMP for our New Big Catalogue of Anything Electrical.

J. J. DUCK, 432 ST. CLAIR STREET, TOLEDO, OHIO

When writing please mention "Modern Electrics."

The ENDURANCE OF THE Underwood Standard Typewriter



Enables it to meet the exacting requirements of every day usage . . . . . .

This is one of the reasons why UNDERWOODS are replacing other makes everywhere

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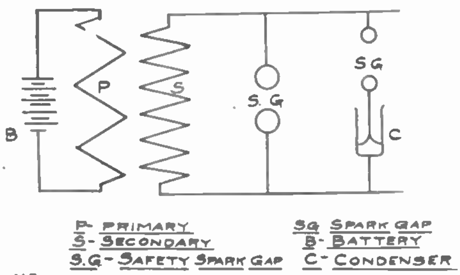
CHARGING A CONDENSER WITH A SPARK COIL.

To charge a condenser with a static machine is quite simple. Connect it to the machine and turn the crank; but with a spark coil it is a little different. When an electric impulse from a coil flows into a Leyden jar or other form of condenser, it charges it, but only to be discharged back through the wire of the secondary coil, or perhaps through the spark gap, if one that is sufficiently small is present.

The diagram given shows a way to charge it, and preventing it from being discharged. "P" and "S" are respectively the primary and secondary of a spark coil. A spark gap "S G," just the size the coil is rated for, is connected across the secondary. The function of this is merely to act as a "safety"; as in case the other spark gap is too large the coil is liable to injury. A condenser is now



connected across the same terminals with the spark gap "S G," as shown in diagram, with another spark gap "S' G'" a trifle smaller than "S G," so that the spark will jump here instead of the other.

When the coil is in operation, the spark jumps the gap S' G' and charges the condenser. As soon as the impulse, or current, stops flowing into the condenser, the spark stops and hence breaks the circuit. The jar is now charged and cannot discharge as it did when connected, as in wireless; or right across the secondary terminal. The condenser should be well insulated, and can now be discharged with a discharger.

Contributed by M. S. KICE, JR.

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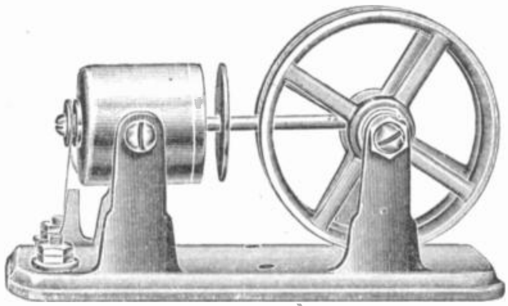

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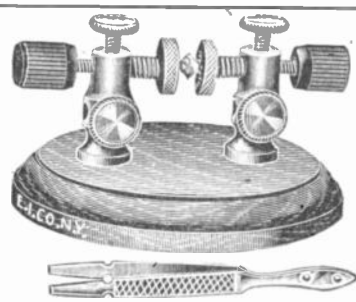

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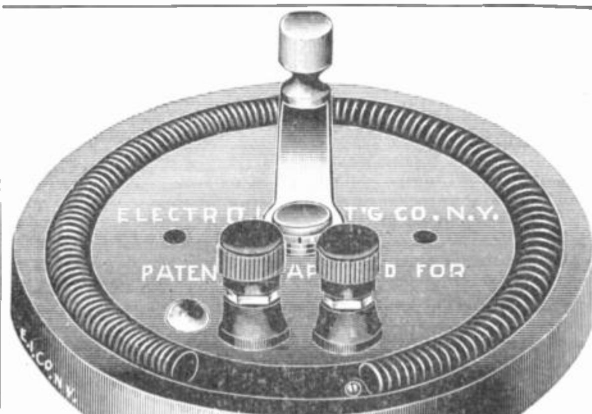

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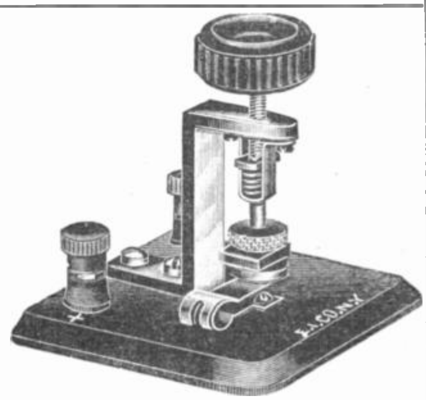

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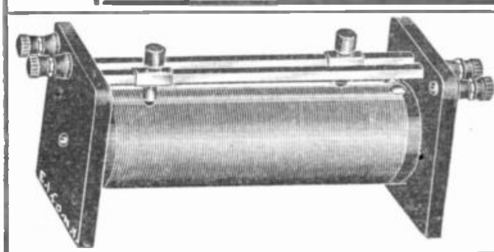

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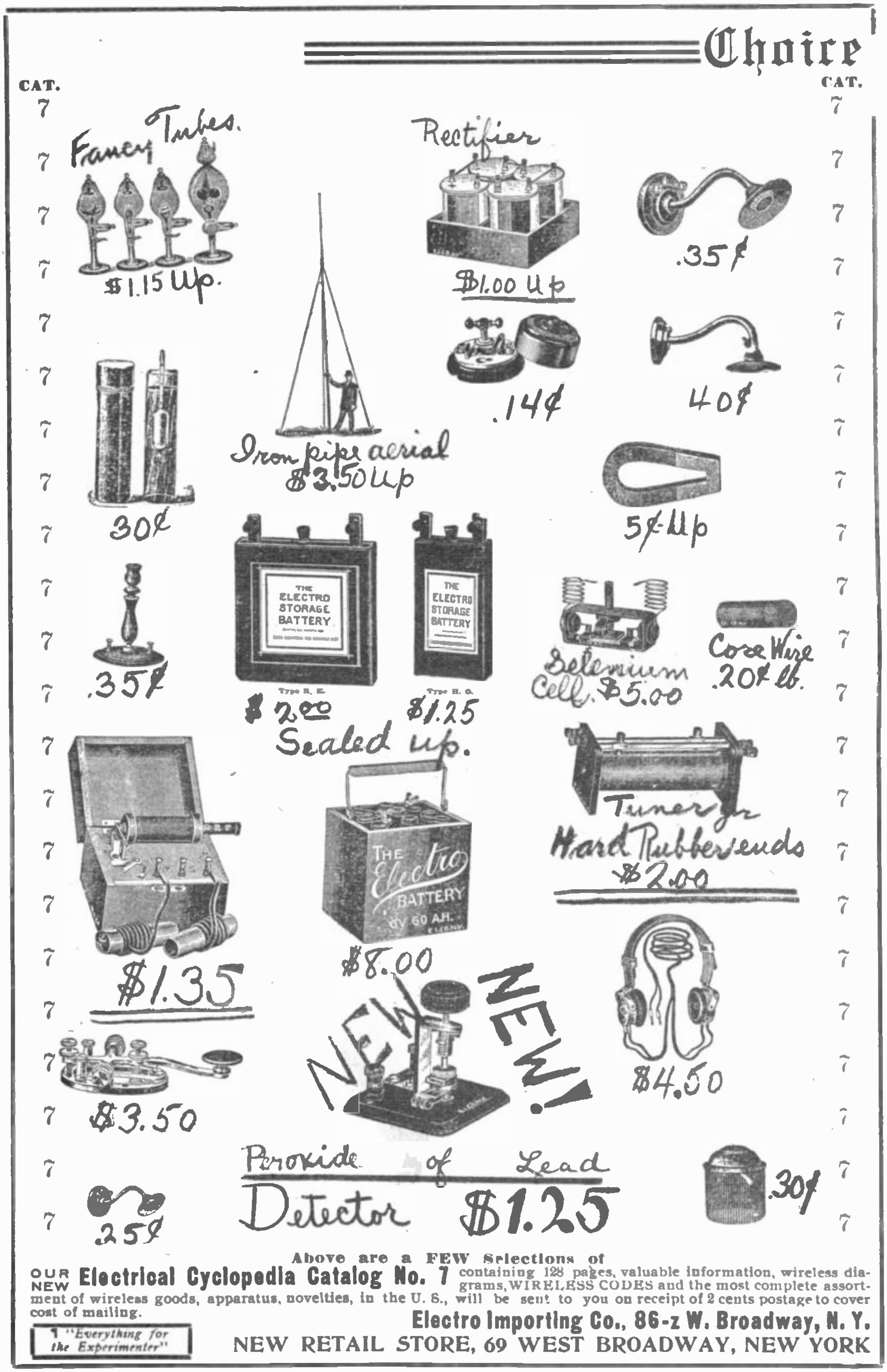
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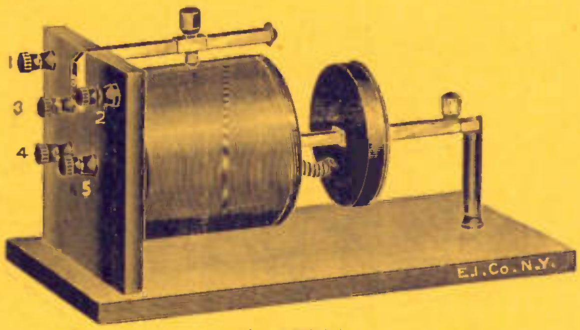
THE "ELECTRO" LOOSE COUPLER (Receiving Tuning Transformer

(Patent Applied For)

is the latest word in wireless.

While an ordinary tuning coil is admirably suited for ordinary work it is not a success where exceedingly fine tuning is required. In fact even the best tuner cannot tune within 10% accuracy. Furthermore, now when so very many stations are working simultaneously, we must have an instrument which is capable of tuning to an exceedingly fine degree—within 1% accuracy—and furthermore be able to ABSOLUTELY tune out ANY unwanted station.

The loose coupler does this in an astonishingly perfect way and in addition will bring in distant stations 3-5 times as clear and loud.



No. 12000

The new instrument is nothing but a transformer which serves to increase the intensity of wireless signals At the same time it is the most accurate tuner as yet devised. For this reason the large commercial stations and government stations are using it exclusively now, as it enables them to work "through" other stations.

The loose coupler is not a new invention. It has been known for years, in fact has been used by European governments for two years.

However, the experimenter has been deprived of its use as the cheapest on the market sell at an exceedingly high price making it prohibitive for the average experimenter to procure this useful instrument.

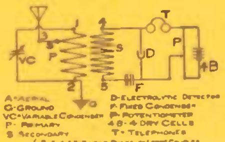
We have been experimenting for long months to produce a loose coupler within the reach of everybody and as usual succeeded. Not alone did we succeed but we improved the old type to such an extent that it has a far greater selectivity than any similar instrument on the market NO MATTER WHAT ITS PRICE.

By means of our new secondary it is possible to "feel off" compasatively few turns of the primary and as each layer (of the secondary) assists the other one, it will be easily understood why we obtain such marvelous results with our instrument, never duplicated before.

Certain far off stations come in quite loudly even if the secondary is pulled clear out as far as it will go, that is the air distance between primary and secondary is fully 6 inches.

If the instrument was well "in tune", we frequently heard a 2 K. W. station 30 miles distant so loud that the signals even when the phones were one foot from the ear, were plainly audible.

We found the connections as per diagram to give best results. The variable condenser is especially recommended and will be of considerable value. Any detector can be used of course. Personally we prefer the "Electro-" Lytic Detector as the signals come in very much louder.



The construction of the "Electro" Loose Coupler is of the highest perfection.

All wood parts are of quartered oak, metal parts nickel plated. The wire on both primary and secondary is warranted to be the best black enameled wire. 5 hard rubber binding posts are provided as shown. If the variable condenser is not used, post No. 1 remains unconnected.

The secondary is machine wound as it would be quite impossible to wind the very fine wire otherwise. It is of course highly important that no wire of one layer should cover any other, in other words the winding must be done with highest precision only made possible with a special winding machine.

The secondary, projecting from the right has a square tube which slides on the square guiding rod with greatest ease. At the far end a hard rubber knob is provided which serves as a handle to move the secondary back and forth.

We use no sliding contacts to make connections with the secondary, a flexible cord passing through the center of the primary connects with posts 4 and 5. No loose contacts possible.

On the primary a single sliding contact is provided with our well known slider used on our other instruments. A stop is provided so that the slider cannot be moved beyond a certain point. The secondary can be moved back and forth with the greatest possible ease and will not stick, or require two hands to move as is the case with even expensive makes. Our loose coupler is built to pick up wave lengths up to 800 meters and as the majority of commercial and government stations have only a wave length up to 600 meters, our instrument will be found to respond in practically all cases.

Adjustment: When connections are made and detector is adjusted, move secondary up to the centre of primary, then adjust slider till signals come in loud; then move secondary back and forth till position is found where signals are loudest. Now the variable condenser is adjusted. Dimensions: length of base 12 inches, width 6 inches, height over all 6½ inches, weight 2¼ lbs. No. 12000, the "Electro" Loose Coupler, (Patent applied for) as described,

INTRODUCTION PRICE $3.75

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No. 12001 "Electro" Loose Coupler with two slides **$4.00**