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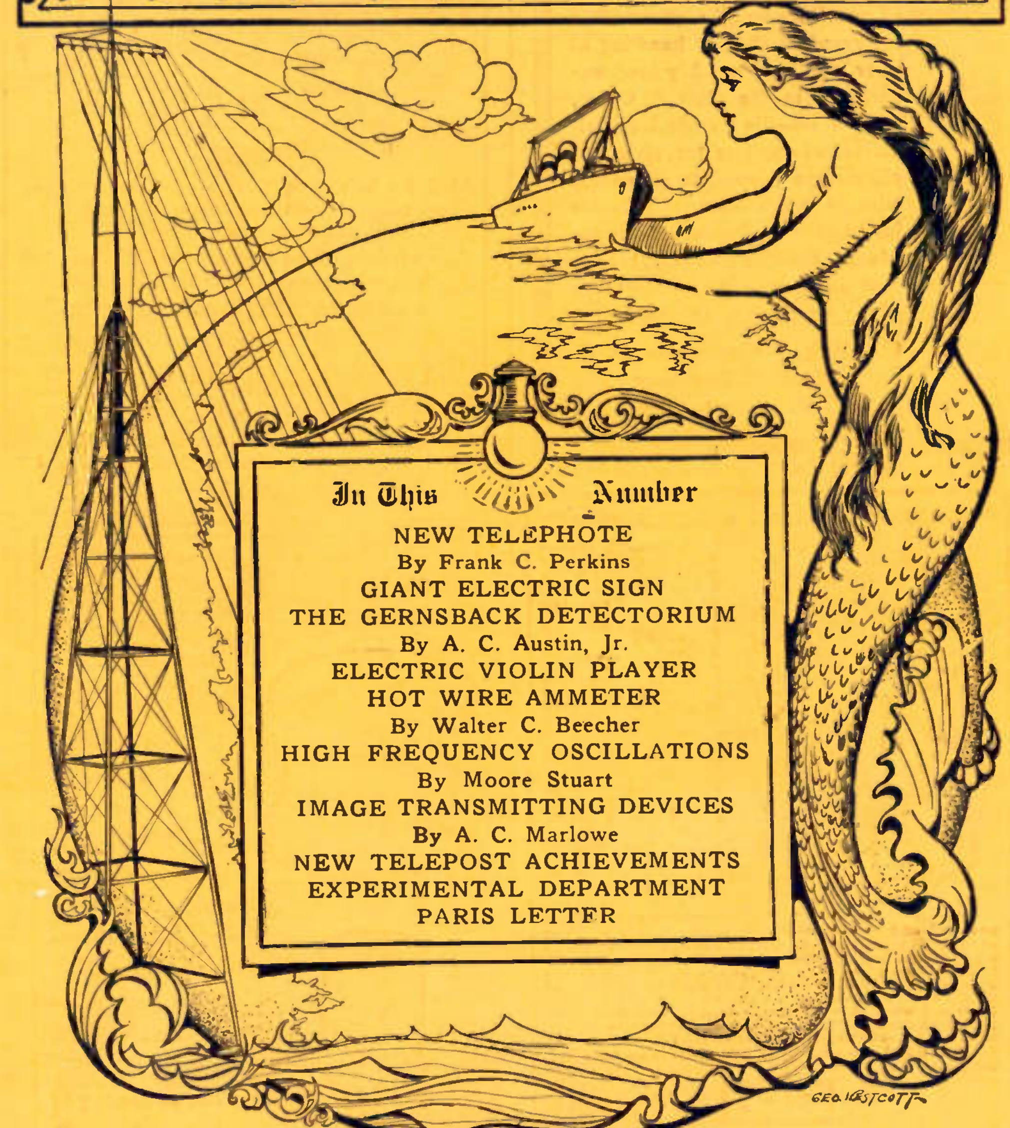

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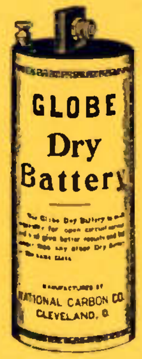

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On account of a great demand of our readers, we have prepared a few hundred complete bound Volumes No. 2, of this magazine (April, 1909, to March, 1910).

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

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

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Modern Electrics

VOL. III. JULY, 1910. No. 4

A New French Telephote Apparatus.

By Frank C. Perkins.

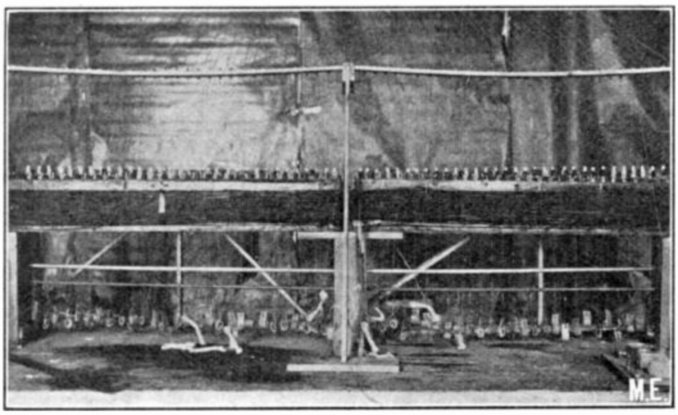


FIG. 1

IT is stated that a decade ago a Polish Prof. Szczepanik, of Krakow, first conceived the idea of transmitting pictures to a distance by means of an electric current and the use of selenium on account of its change of electric conductivity with varying intensity of light falling upon it. Some remarkable experiments have been made by Ruhmer, of Berlin, in the transmission of images and recently the well known French Scientists Rignoux and Fournier, have designed similar apparatus and made some interesting experiments along these lines.

Failure has attended their efforts to obtain instantaneous vision by means of a single selenium cell on account of the inertia of selenium not allowing a single cell to transmit more than 30 signals in a second.

A system of multiple selenium cells has therefore been utilized by Ruhmer as well as Rignoux and Fournier. The latter experimenters utilized a row of selenium cells as shown in the accompanying illustration, Fig. 1, with the transmission wires attached, a letter "T" at the transmitting station being indicated in illustration, Fig. 2, while Figs. 3 and 4, show the letters "T" and "E" as appearing at the receiving station. The current from each cell reaches a receiver with galvanometer and mirror with a unique device so arranged that the mirrors can reflect the light of a lamp and project it on a screen. The position of

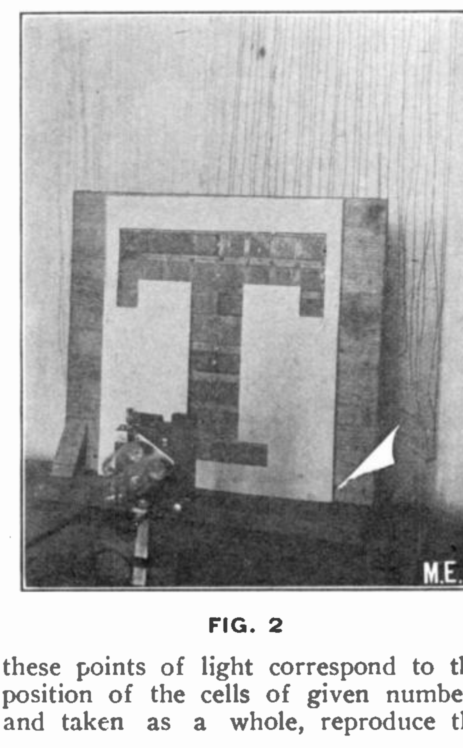


FIG. 2

these points of light correspond to the position of the cells of given numbers and taken as a whole, reproduce the image at the receiving station similar to that at the transmitting station.

It is maintained that the telephote as it will ultimately be constructed will contain only two transmission wires, one for the selenium and the other to insure the synchronism of the apparatus with a rotary collector which will gather the currents running from each selenium cell.

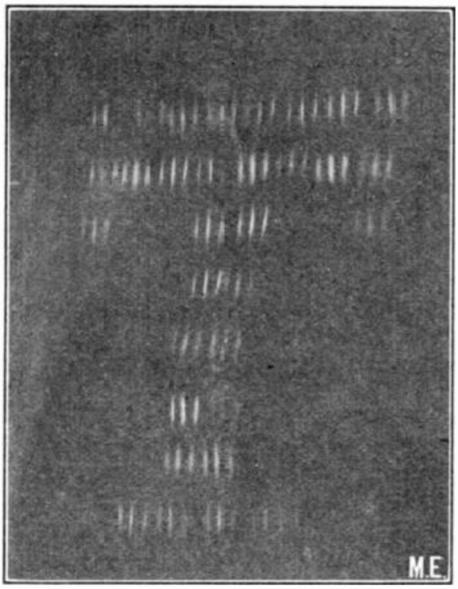


FIG. 3

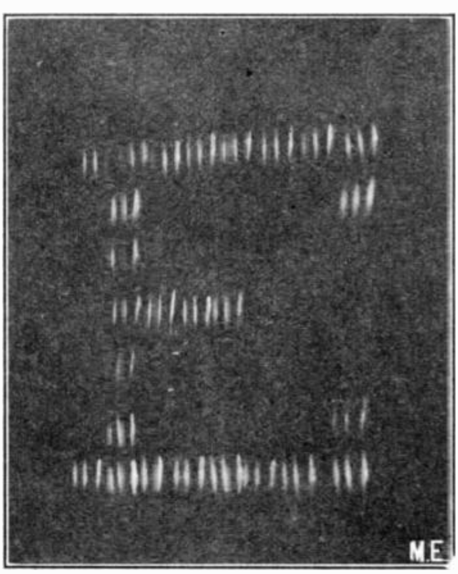


FIG. 4

It is maintained that for long distance transmission, each cell will be connected to a relay which will be utilized to replace the feeble current by a much stronger one, but proportional to the first.

It is held that these currents will be collected by means of a rotating device operating at a speed of 600 revolutions per minute and the currents will be sent successively through a single wire of the line. A polarising coil will be employed and it is claimed as a result of numerous experiments that over thirty thousand signals may be transmitted with the greatest regularity, the electric signals being transmitted and translated into luminous signals with accuracy, and projected by means of a set of mirrors revolving synchronously with the collector of the transmitter. It is maintained that all the various points so transmitted will be produced every tenth of a second, since the collector, as well as the disc containing the mirrors, turn at a rate of 10 revolutions per second. The impression on the eye will, therefore, be continuous and it is thought that by means of only two wires, the transmission of an animated picture of an object placed at the transmitting station will thus be realized and a practical system of television developed.

SPRINGFIELD WIRELESS ASSOCIATION.

The Springfield Wireless Association was organized at their rooms on Saturday, May 14, 1910, starting with a membership of 12 members.

The following officers were duly elected:

A. C. Gravel, President; T. F. Cushing, Secretary; Roy Armstrong, Treasurer, and Donald W. Martensen, Technical Advisor.

The purpose of the Association is to regulate the amateurs so as to cause no annoyance between amateurs and commercial companies, or between the amateurs themselves. Also to assist the amateurs in this vicinity in the proper erection of stations, location of trouble and proper selection of apparatus for their respective stations.

Any amateurs wishing to join should write the Secretary, c/o Club rooms, 323 King Street.

A Simple Hot Wire Meter.

By Walter C. Beecher.

THE hot-wire meter shown in the accompanying sketch is probably the most easily constructed and in many ways, the most satisfactory of this class of instruments. The figure is self explanatory. In this type you are not limited to any specific dimensions, and any ordinary experimental work-shop will contain everything necessary for its construction.

The base should be made of hard rubber. say 6 inches long, by 1 inch wide, but good hard wood boiled in paraffine makes a good substitute. The square holes should be exact size of uprights, the holes K. K. quite small and the holes from the bolts E. E. should be enlarged from front to a point slightly back of holes K. K., as will presently appear.

The uprights A. A. are of hard brass, about 3/32 square. They are threaded at base by running an iron nut over them, so as to make a thread on the corners only, for a space equal to thickness of base. They are fastened to base by two nuts on each, one above, as shown, and one below, for which a slight hole is counter-sunk. About 9 inches above the base is a good length for uprights.

The uprights are given a slight bend, not as much as shown, for the wires B B will complete it. The wires B B are of steel or platinum. They are fixed at tops of uprights by drilling a fine hole, through which the wire is passed and soldered. Two metal straps are bored for screws E E and binding posts G G. And are firmly fixed to base by binding-post shanks. Then the screws E E which are threaded only at the end, are passed through holes in straps and base. Now, with a fine drill, run down through holes K K through the screws. It will be seen that a wire passed through K into these holes will be fastened firmly by turning the screw, as the wire will be wrapped more or less around the screw. About two full turns will be correct.

The cross-pieces C C should be very light, and are bored with a very fine drill for pivots I I.

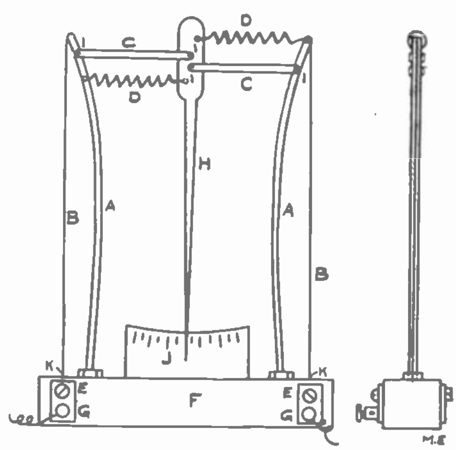
The pointer is made from very light metal, and the instrument assembled. Pins make convenient pivots, which should just fit the holes, yet work easily.

The springs D D should be light, being wound for a close, i. e. a pulling spring, and they may be soldered to needle and uprights, or passed through small holes made to receive them.

The scale may be made from metal or paper, and may be divided by trial, by comparison or just arbitrarily.

The instrument may be adjusted by screws E E, locking with nuts at the back.

When neatly made, the instrument has a "Scientific Look" and should be cased in a glass front case. It is well to keep



always a small dish of sulphuric acid open in the case of delicate instruments, which should be renewed from time to time. This absorbs any moisture, and is an absolute necessity where high tension currents are worked upon.

A wonderful wireless record recently was made by a Telefunken station near Berlin keeping in touch with a steamship during its entire voyage from Hamburg to West African port, 4,000 miles distant, the waves having to cross the Alps and the Algerian tableland.

The Electric Violin Player With Piano Accompaniment.

ONE of the latest as well as most interesting and remarkable of Electro mechanical musical devices has just been placed on the market, by the Mills Novelty Co., of Chicago.

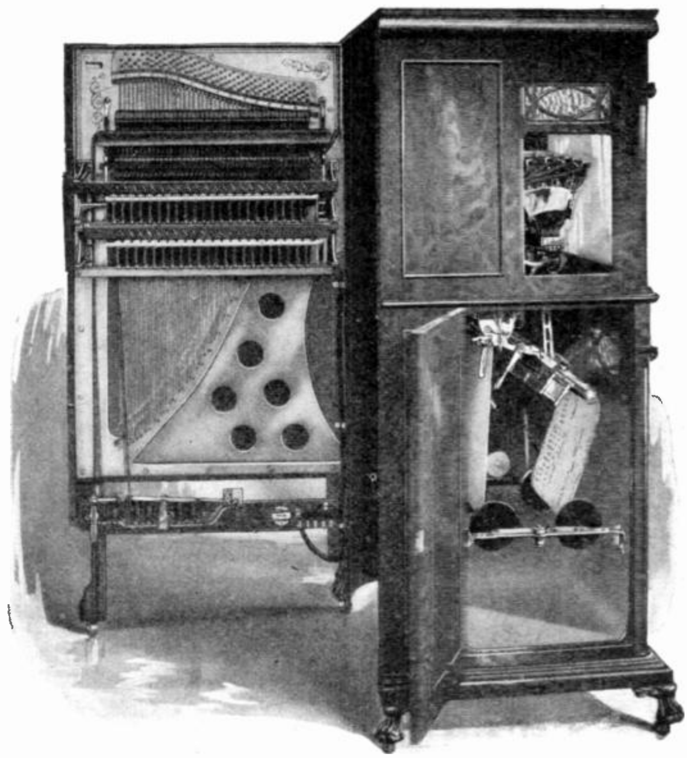
It was first exhibited by the U. S. Patent Office in their exhibit at the Alaska-Yukon Pacific Exposition at Chicago, has worked continuously for the past five years and his Company has spent a fortune of no small magnitude in the development of this truly remarkable device, which has culminated in a thoroughly practical and artistic musical instrument.

The Electrical Violin-Piano executes

Seattle, having been selected by them as being one of the most wonderful inventions of the age.

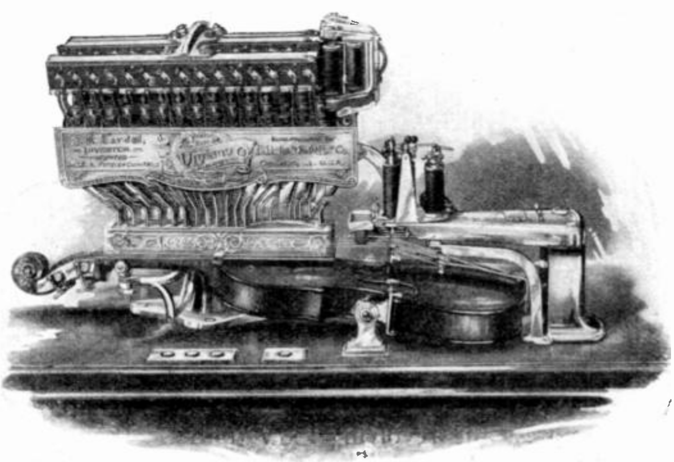
The inventor, Mr. H. K. Sandell of all of the movements of the trained artist with most wonderful precision and correctness, and with spirit and range that surpasses the limitation of manual execution, and its rendition of the most difficult classical as well as the popular airs is truly marvelous.

The bowing movement is supplied by small revolving wheels built up of flexible celluloid disks, closely controlled as to the speed and pressure with which they act on the strings. The fingering is performed by a bank of electro-magnets, whose armatures depress mechanical fingers over the strings on the finger-board. The effects of staccato, vibrato, pizzicato, glissando, etc., are also produced by other electro-magnets, energized, like those controlling the fingering, from contact brushes which penetrate the perforations of a paper record, similar to those used in mechanical piano players.



For the combined piano and violin player shown in the accompanying illustration a special perforated music roll 14¼ in. in width is employed, controlling 125 contacts, 55 of which actuate the piano accompaniment and 70 of the violin movements. This perforated paper roll passes under a row of 125 contact brushes, each composed of five brass wires of .040 in. diameter, the perforations in the paper permitting the brushes to make contact with the brass roller beneath, which completes the 110-volt circuit to the corresponding magnet windings. The brushes are compactly arranged with a distance of less than 0.112 in. between adjacent ones. For the violin there are 60 contacts controlling the fingering magnets, 12 for each of the D, G and A strings and 24 for the E string. Four other brushes energize the piccato or "picking" magnets, and there is one for each of the staccato, vibrato, speed, loud, soft and cut-off control magnets.

The record is fed through the contact device by a 1/20 H. P. motor, which also operates the bowing wheels. An ingenious provision has been made to prevent the paper roll breaking or its end running through the contact brushes, which would evidently energize all the magnets in both instruments simultaneously. Just before the



record reaches the brushes, it passes under a pair of broad rollers connected to a relay cut-off, and oppositely energized from the platform beneath the paper. The presence of the paper normally separates these contacts, but in case the record breaks, or at the end of the piece, the rollers fall on the platform, completing the relay circuit, and operating the cut-off, which both stops the motor and interrupts the supply of energy to the magnets. There is also a special contact on the record for operating the cut-off, and the above described emergency stop comes into play only in case of other failure.

The records for the violin necessarily cannot be made by "playing," as piano-player records are commonly perforated. The special requirements of the violin make it necessary to "lay out" these records on the drawing board, reproducing exactly the notes and intervals of the score. The auxiliary-control perforations are later added by ear, when the piece is played in the factory for the first time. A method of recording the violinist's fingering directly is now being experimented with by the manufacturers of the player. A special finger-board has been devised which the musician handles in the usual way, leaving records of his fingering on a moving sheet which passes under the strings. In this way it is hoped ultimately to make the production of these records almost as direct and automatic as the operation of singing into a phonograph record On account of some of the long sustained contacts required by the violin, which render the record subject to tearing along these perforations, especially when running scales, the notes as they appear on the record are staggered with respect to their relation on the finger-board; that is, adjacent notes will be operated by contacts which are separated by those of several other notes.

As before noted, the bows are four small revolving disks ¾ inch in diameter, each made up of 50 cone-shaped flexible celluloid washers, which are of approximately the thickness of the hairs of an ordinary bow. The return circuits of the electro-magnets controlling the fingers on each string are led through the corresponding bow magnets, which depress the revolving bow into contact with the string. Thus when any finger magnet is energized, that string is played by the same circuit. Cakes of resin are fed against the bows, keeping them in good condition.

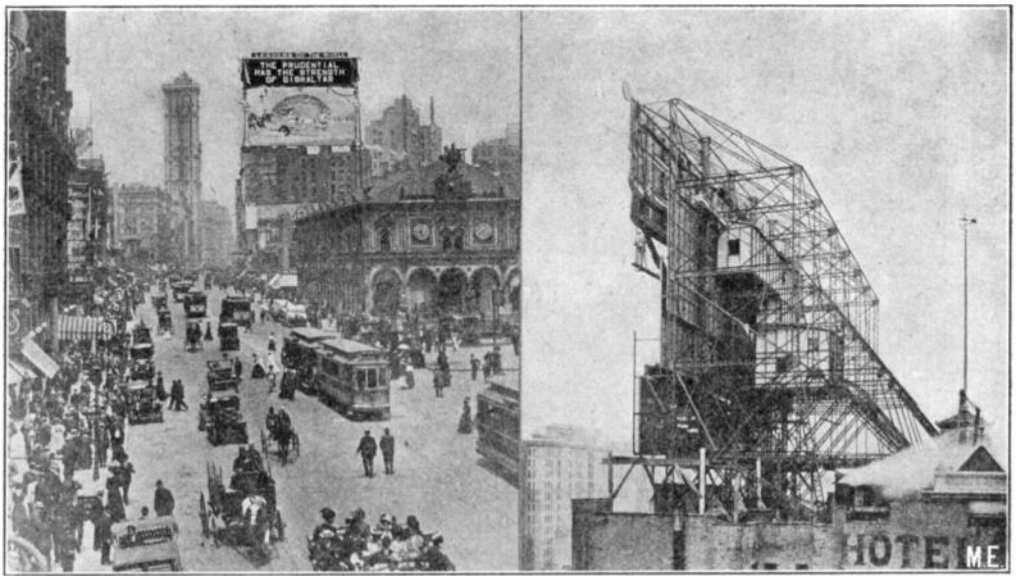
Much of the expression of the well-played violin comes from the handling of the bow. When the musician seeks to produce a louder note, he bows more rapidly and, unconsciously, with increased pressure on the string. This double effect is accomplished in the violin player by electro-magnets, energized through special record contacts, which vary the speed by a friction wheel-and-disk, at the same time applying correspondingly more or less pressure to the bows. For obtaining sudden very high bow speeds for chords, another magnet operates a planetary gear in the bow transmission, multiplying the rate to the desired value. The bow speed is thus capable of variation from 15 to 1,000 R. P. M. The "bouncing bow" action is obtained by another magnet, situated just behind the bow magnets, which imparts a "bouncing" motion to the bows when suitably energized by a succession of perforations in the record. The pizzicato or "picking" magnets take the place of the performer's thumb in rendering certain pieces. The armatures of these coils ply the strings with a surprisingly human picking action. An interesting departure has been made in obtaining the vibrato movement. This is accomplished by a large magnet whose weighted armature is arranged to shake the tailpiece sidewise.

Tuning of the violin can be performed by any amateur, who has only to push the button A, striking at once the piano note and the corresponding violin string, which is then adjusted by a thumbscrew. The other tuning buttons actuate the fingers of different strings, which should give the same note; if not, these are also adjusted by a thumbscrew. It will be evident that the range of the electrically operated violin exceeds that of any imaginable human performer, playing chords which would require stretching the length of the finger-board, besides performing on any number of strings simultaneously.

Forming the back of the case is an electrically-operated piano, used to accompany the violin, and played from a part of the same record roll. Auxiliary

(*Continued on page 214*)

Giant Electric Sign.



A monstrous sign has been recently installed on the top of the Hotel Normandie on Broadway, New York City.

The illustrations which we present herewith cannot do the sign justice and one must have seen this wonder to fully appreciate the effects.

Broadway, used to all kinds of sensations, stands aghast and views the chariot race from all points of vantage each night.

Although the sign is located at Broadway and 38th street, it can be well seen as far down as 25th street.

When seen close at hand the effect is not so striking as when seen at about 36th or 35th street.

It is built to carry out a great enthusiastic Roman Chariot Race, with all the splendor of the scene faithfully reproduced in heroic proportions, brilliant color and swift action. The sport of Cæsars is depicted by means of the most advanced products of the electrician's skill. An exciting re-enactment of the amusement of the olden days will be shown with all its vivid realism.

The display with its structural supports covers the entire roof of the building, on which it is located. It is 60 feet high from the bottom to the extreme top, and 90 feet wide.

Assembled on the viewing stands to witness the great event are vast crowds of people painted in oil and apparently cheering on their favorite Charioteer in his mad dash for first honors.

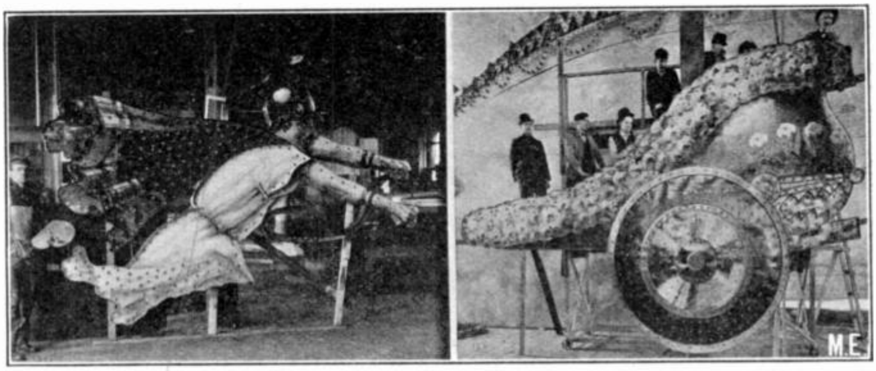
Far ahead of the three speeding chariots, past the main viewing stand, appear five Roman cavalry-men apparently clearing the arena track for the great race which has just started.

When the big switches are thrown in, foremost in the race appears a huge pair of thoroughbred horses, outlined in flame, galloping madly and drawing with apparent ease the whirling chariot and giant driver on to victory. The arena track apparently moves from beneath the swiftly rolling wheels and plunging hoofs.

This main chariot and swift blooded steeds, together with the driver, is 40 feet long and 20 feet high, two to three times life size. The wheels are 8 feet high.

As the lights on the walls of the arena flash by we see the other two chariots and fiery steeds apparently coming forward at great speed and straining every nerve to overtake the leader and win the race.

It is a scene such as Cæsar cheered shown in mammoth proportions. The gallant racers spell both victory and triumphant endeavor.



A real live blood-stirring event is reproduced in fire, as the display is almost entirely electric, beautifully hand-painted in oil and studded with many thousands of various colored electric bulbs, arranged to bring out the most elaborate effect. Imagine its magnitude, containing nearly twenty thousand electric bulbs or more lights than are now used in eight or ten of the larger electric displays on the "Great White Way" combined.

With one device, the position of the horses' limbs are constantly changed, throwing them smoothly backward and forward, with such speed and grace in electricity, as to cause the horses of fire to appear to be running at a terrific speed.

Another device causes the wheels of the main chariot to appear to revolve so swiftly that the spokes cannot be seen. Every little detail is perfect, even to the illusion of dust rolling up behind the wheels.

Still another device causes the crimson robe of the leading charioteer, as well as his Roman skirt to flutter in the wind, making the race most realistic.

A further device causes the manes and tails of the horses to appear to be blowing fiercely in the wind.

While the great chariots and fire horses are plunging onward at swift speed, another device manipulates the lights illuminating the road-bed which is hand painted in oil to represent great stretches of track behind and ahead of the racers. The entire road-bed appears to recede from under the flying hoofs and rolling wheels.

Still another device causes the many lights that decorate the central arena walls to appear to move in the opposite direction to the teams, which operation, together with the moving effect of the road-bed, adds wonders to the general action; completing the illusion as though the great race were actually passing around the amphitheatre.

The whole display is built on a staged effect. Four distinct stagings separated by several feet give the idea of distance. The vast arena seems to stretch far away until it blends with the great multitudes at the other end of the amphitheatre eagerly awaiting the approach of the racers. Overhead shines a blue sky; on all sides are the cheering spectators. The different figures and stagings are cut out in their exact shape from the metal of which they are built, making everything as realistic as possible.

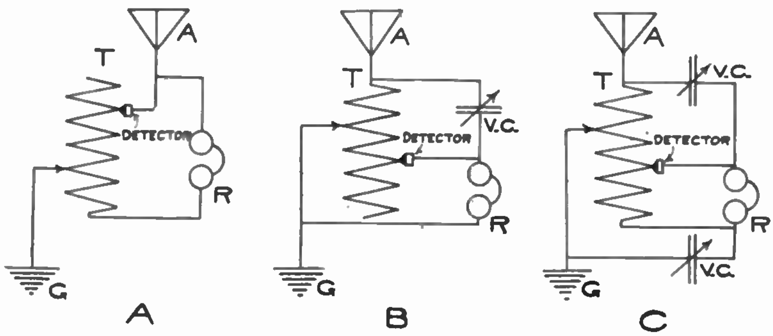
The front of the stadium wall or main viewing stand is most elaborately decorated with great festoons of colored bulbs, gracefully draped in artistic clusters.

The chariots, traces, capes, breast-collars and harness are all of red and gold, and studded with ruby and amber lamps. A great wreath of electric flowers, about two feet wide, carried out in their natural colors, embellish the top and side of the winning chariot.

(*Continued on page 227*)

The Gernsback Detectorium.

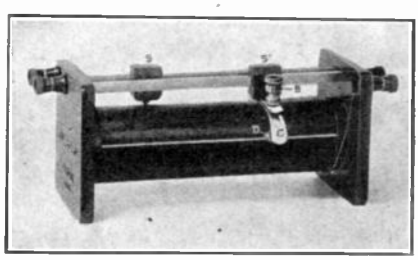
By A. C. Austin, Jr.



Recent developments in the wireless art seem to show a general tendency toward simplification of the instruments. In the course of his experiments, Mr. Gernsback conceived the unique idea of combining the two most vital receiving instruments, i. e., the detector and the tuner. Mr. Gernsback, who calls his new device "The Detectorium," has just been granted basic patents on his invention and it is safe to predict that in the coming years the new instrument will be widely used on account of its great compactness and light weight. The Detectorium, illustrated herewith, weighs only 18 ounces, and as only a set of head phones, weighing 14 ounces, is needed to complete a very efficient receiving station, weighing with aluminum antenna about 2 1/2 lbs., it will be readily seen that the new instrument is especially suited for aeroplane work.

From the illustration one might be led to believe at first glance that the instrument is only an ordinary standard double slide tuning coil. However, by glancing at the illustration closely the detector D may be plainly seen and herein lies the important part of the invention. The slider S is a common slider similar to that used on any standard tuner. It makes contact by means of a brass ball which rolls on the bared convolutions of the coil. Slider S' has no ball, but has attached to the lower part a stiff spring H which carries the regulating screw B. This screw bears on another thin spring C directly underneath spring H. At the end of spring C a detector element D is attached which may be a blunt piece of silicon, embedded in a brass cup as shown. This brass cup in the latest model is detachable. The blunt silicon point makes contact with another portion of the bared convolutions of the coil as shown.

The bared copper convolutions therefore act as the other element of the detector. By means of the adjusting screw B, the pressure of the silicon member upon the bared wire convolutions may be varied at will. Unlike any other detector, this one has its detecting element, the silicon, pressed upon the circuit com-

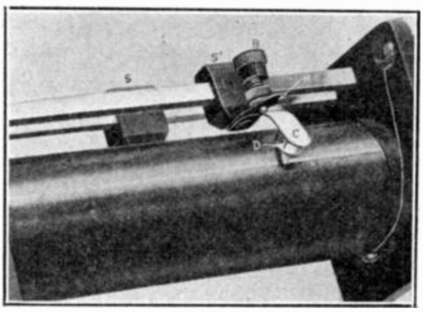


Detectorium Complete.

pleting member. In all other detectors, the reverse is the case; the silicon member being fixed, while the contact making member is pressed upon the silicon member. However, this is not the most important function of the detectorium. Mr. Gernsback *actually tunes with a detector;* something which has never before been accomplished. As the detector acts also as a slider, it will be seen that direct tuning is accomplished simply by moving the detector D backwards and forwards until the message comes in loudest. Consequently the detector performs the duty of slider and detector simultaneously.

While Mr. Gernsback has used silicon a great deal in his experiments, he has found that almost any other thermo-electric detector works just as well in connection with the detectorium. For instance, Galena, Carborundum, Iron Pyrites, etc., work splendidly, especially the latter. As before stated, in a later model, the inventor used detachable cups, containing different materials which may be quickly attached to the spring C by a snap clip.

Mr. Gernsback finds that the detectorium works best when connected as shown in diagram A and states that interference may be readily and quickly tuned out with this connection. The writer in testing the detectorium which the inventor put at his disposal found that much better results were obtained by using connections as shown in diagrams B and C. In fact, the detectorium when connected as in diagram C compares favorably with the loose coupled tuner for cutting out interference, and the writer is under the impression that it will find a



Detail of Detector-Slider.

wider use than the loose coupled tuner, as it is easier with this instrument to pick out a station when calling. The sliders may be placed in such a position that almost any station calling may be heard and then by varying the detector slide and the direct ground all other stations but the one wanted may be tuned out.

It is understood that the detectorium uses no batteries of any kind as the rectified current of the incoming waves is sufficient, as in the common thermo-electric detectors, to operate the telephone receivers.

PRINCIPLES OF WIRELESS USED LONG AGO.

Silas St. John is one of the most interesting persons in the city to meet, especially in a conversation linking modern American life with the days of a period gone by, says the Arizona Republican.

Speaking of wireless telegraphy Mr. St. John says that while it has been wonderfully improved in recent years, it has been utilized in a crude way for generations, nobody knows how long, by those who were skilled in woodcraft. He says that when his father's oxen used to stray away, one or more of the beasts always carrying a bell, the practise was to go to the neighboring wood and selecting the tallest tree put the ear close to it and the sound of the bell could be heard a great distance, the sound waves being caught at a high altitude by the tree and passed down through its trunk. By a little skill and practise they could easily distinguish also the direction from which the sound came, so the stray cattle could be located quickly and recovered with small loss of time.

WIRELESS ASSOCIATION OF PENNSYLVANIA.

Amateur wireless operators of Philadelphia and vicinity made their first concerted movement against any legislation that will curtail their privilege of experimenting when they formed the Wireless Association of Pennsylvania, at a meeting in the Odd Fellows' Temple. One hundred and eighty-eight amateurs joined.

The primary object of the club is to fight the Depew bill, which, if passed, would limit the privilege of using the air to commercial wireless concerns alone.

A constitution and by-laws were drafted last evening and officers were elected for the term of one year. They are: Howard Rattay, president; B. F. Rittenhouse, first vice-president; C. H. Stewart, second vice-president; Thelwell Russell Coggeshall, secretary, and R. G. Mackendrick, treasurer. The directors are Frank Henderson, W. J. Diery, Garrett Krue Krusen, W. S. Larrimore, F. B. Chambers, L. W. Parks and J. D. Urian.

New Telepost Achievements.

A Choctaw Indian Operating a Telepost Transmitter.

WITH the opening up of its extensions, now under way in the East, West and South, a new and interesting phase of the manifold uses of the Telepost automatic telegraph system, which will command the keen interest of all, is to be inaugurated.

This is the system of distributing press matter, which makes possible the simultaneous transmission of a news story to newspapers in every city between New York and San Francisco or between any two other points on any given line.

While the Telepost has been supplying newspapers along its lines in New England and in the Middle West with its rapid service for some time, it has not made any effort to put its news distributing system into general use. But with the forthcoming enlargement of its operating area, this will be done.

No feature of the automatic system, which is effecting a revolution in the telegraph art in every community to which it has been introduced, more lucidly and interestingly demonstrates its marvelous capacity to do things in a fraction of the time and at a fraction of the cost to which the country has become inured since the time of Morse.

The spectacle of a humanly conceived machine sending 2,000 to 5,000 words a minute over a piece of copper wire, backward or forward with the same facility, and over either a telephone or a telegraph wire is one that inspires and thrills, even in this age of constantly recurring wonders.

The ability of a telegraph system to carry intelligence of world wide interest into hundreds of newspaper offices at once by the simple drawing forward of a lever is calculated to stir the most jaded imagination.

Its striking possibilities for up to the minute newspaper uses was impressively demonstrated at the Farmers' Convention, recently held in the Coliseum at St. Louis in connection with the speech delivered there by President Taft. The Telepost was the only telegraph company that had its wires in the Coliseum. While the President was speaking a report of the proceedings was prepared for the Telepost, and the minute the Nation's Chief Executive concluded, it was flashed to newspapers in Chicago, Indianapolis, Terre Haute, Springfield and other cities in the middle West to which the system extends. Before the newspaper men representing the different newspapers and press associations had got outside the building a thousand word story of Taft's reception at the convention hall and every incident of interest connected with his stay there up to the moment of his departure for the luncheon of the Business Men's League at the Southern Hotel, was in the cities named. And with it a special message of greeting to the farmers of America given by Mr. Taft to President Sellers of the Telepost, who was one of the speakers at the convention, for transmission over the automatic lines.

The feat was interesting, as demonstrating the possibilities of the automatic system in connection with rapid press work. Page by page the copy as finished was turned over to a girl who perforated the message on a tape. This is the first stage of sending an automatic message. The typist working at high tension speed, had the message transcribed to the tape ready for transmission two minutes after the last page had been turned over to her. President Taft had not yet left the hall. As he was making his exit 15 seconds later by a rear entrance, the tape with its curious array of circular perforations was inserted in the sending apparatus, a lever was quickly pushed forward and the story was on its way. Ben. V. Hampton, a Choctaw Indian seen in our engraving, delegate to the convention from Oklahoma who was interested in the workings of the automatic system, at his own request was allowed to pull the lever. This privilege pleased him immensely. In one minute the message complete was in the offices of the company in the cities named. There it was translated in "takes" from the code in which it was received on the chemically prepared tape used by the company and in two minutes more it was being hurried by messengers to the various newspaper offices. From half to a full hour later the press association reports of the story began to come along. The demonstration was designed to illustrate the superiority of the Telepost automatic system for press work over the slower and more expensive hand method of transmitting copy.

It was watched with keen interest by a large number of the delegates to whom the enormous speed, accuracy and simplicity of the system appealed as extraordinarily interesting.

During the week of the convention the delegates saw more than 500 messages flashed over the automatic wires to Chicago, Indianapolis, Terre Haute, Springfield, Sedalia and other points in the middle West reached by the Telepost wires, at a speed approximating 2,000 words a minute. Whereat, the solons of the soil marveled, as their ancestral prototypes of years ago wondered at the first railroad train run in this country and as did their still earlier predecessors who stood aghast when Fulton navigated his Clermont up the Hudson.

Recently President Sellers gave a demonstration of the news distributing feature of the automatic system to a number of the publishers of the country who came to New York to attend the American Newspaper Publishers' Convention. The publishers were amazed and delighted with what they saw.

Preparations to inaugurate this service are under way. Within a short time etxensions of the Telepost system to Louisville, Toledo, Detroit, and from New York to Philadelphia, Wilmington, Baltimore and Washington will be ready. With their formal opening the service will be put into force.

WIRELESS TO CANAL ZONE.

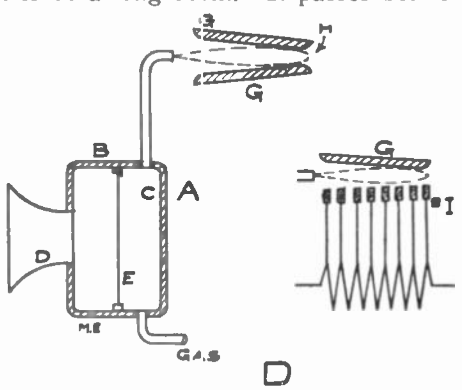
Washington city has been put into wireless communication with the Panama Canal Zone through the installation of a new wireless telegraph equipment, including antennae, at the naval station at Colon. The new equipment consists of the latest approved design of Fessenden apparatus manufactured by the National Electric Signaling Company. The transmitting apparatus is of the high frequency three-hundred-cycle type, with rotating spark gap attached to a generator of twenty-five kilowatts capacity.

Two compressed air condensers of 0.036 cubic feet a minute capacity each, operating under 250 pounds air pressure, are also used. Power for operating the transmitter is received from the isthmian canal commission plant at Gatun. The receiving apparatus includes an electrolytic detector with special tuning devices for eliminating interferences from other nearby stations. The transmission ranges on this apparatus include Washington, D. C., Norfolk, Va., New Orleans, Key West and Guantanamo. The new apparatus has already demonstrated its superiority over the old outfit.

Paris Letter.

AN INGENIOUS TRANSMITTER.

The following device makes use of a manometric flame whose length varies with the sound, in order to produce effects for wireless telegraphy or radiophone work. The use of the flame is caused to give variations in the length of the spark gap according to the sound. We produce the flame in the usual way by means of the gas chamber A across one side of which is placed the diaphragm E. The gas which supplies the flame H is made to pass through the chamber, and by speaking against the diaphragm we give periodic variations to the gas pressure and the flame will rise and fall according to these. A horizontal flame is used in the present case, and it is of a long form. It passes between

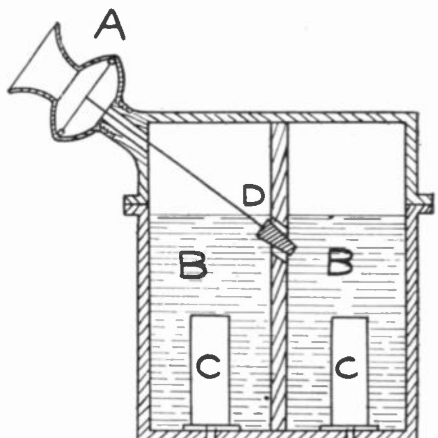


the two converging electrodes G G which are attached to the ends of the circuit so as to make a spark gap. As the flame shortens, the spark follows the tip of the flame and this causes the spark to lengthen, as we now have a wider gap at this point. Lengthening of the flame will give the contrary effect, and the spark now shortens. Speaking against the membrane will thus give a rapid variation in the spark, so as to produce the corresponding radiophone effects in the circuit.

Another way of causing such a flame to give variable effects is shown in the second diagram. The upper electrode remains as before, but below it we have a series of contact pieces (I) instead of a simple electrode. Such contacts are connected to the different ends of an inductive coil. A long flame causes the spark to start from one of the lower electrodes lying to the right, and vice versa, so that we have a selective action upon the electrodes and thus upon the turns of the inductive coil which are included in the circuit, according to the length of the flame.

NEW TRANSMITTER.

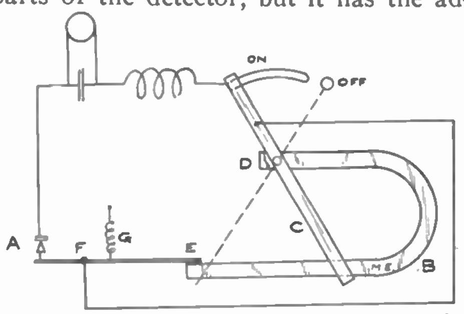
Various means have been used so as to cause the vibrations of a telephone diaphragm to vary a liquid resistance and thus cause changes in the current of the circuit. In this way a stronger current can be used upon the circuit containing the receiver. A French patent has been granted to the following device. The telephone diaphragm A is mounted in connection with two separate chambers B B, each of which contains a similar electrode C. In a partition separating the chambers is a small hole D,



which allows the liquid to communicate. The current is passed in the two wires, and the resistance of the circuit depends upon the size of the hole D. A conical stopper is placed in the hole, and it is connected by a wire or rod to the diaphragm in such way that any movement of the diaphragm will give a corresponding movement of the stopper so as to change the size of the orifice. Speaking into the mouthpiece will thus cause variations of resistance due to this cause, and these will act on the distant telephone receiver in the usual way.

AN INGENIOUS PRESSURE REGULATOR.

The pressure to be given to detectors of the Perikon type may be conveniently adjusted by a magnetic device which is brought out by A. Gruber, of Berlin. The magnet acts variably upon a lever so as to vary the pressure between the two parts of the detector, but it has the ad-

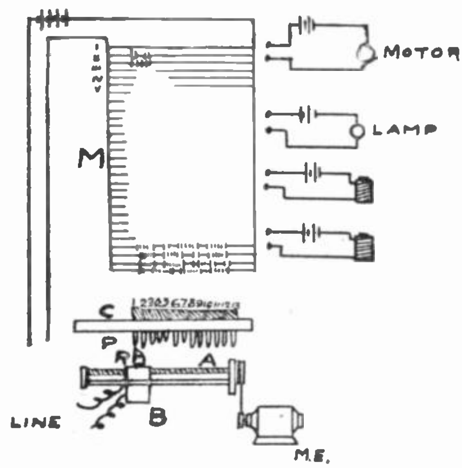


vantage of using a permanent magnet for the purpose instead of an electromagnet, so that a battery is not required and the whole can be mounted in a compact shape. The permanent magnet B carries an armature C, which turns upon a pivot at D. The lower arm of the magnet gives a pull upon the end of the lever E, this latter being pivoted at F, and the other end of the lever acts so as to give the pressure upon the detector A. When the armature is swung into the position shown by the dotted line, it connects the two poles of the magnet, so that there is scarcely any free magnetism at E, and the lever has but little pressure. Placing the armature in the position here shown will give nearly the full strength to the magnet pole, so that we have the greatest pressure on the detector. Any other point between these limits can be obtained by simply swinging the arm, and this gives a very exact and convenient way of regulating the detector. The circuit of the detector is connected to the contact pieces, as will be observed, so that swinging the arm to the off position will also cut off the current from the detector.

WAVE CONTROL.

A new form of wave-control device is shown in the present diagram. It can also be used as a printing telegraph over a line or by wireless. A frame contains a set of say thirteen movable pieces (C) which carry lower projecting ends (P), so that by raising up a certain number of the pieces we can compose various signals. We represent the receiving instrument here. Such signals are set up from the distant station by sending impulses in the electro-magnet (B), which causes the cam R to rise. The device B moves along under the pieces by means of the screw shaft A, this being driven by a motor. Using a synchronous device, or in any suitable way, the sender presses his key when the cam is under the pieces 1, 3, 4, 5 and 7, so that he sets up this signal at the receiving end. In the second place, the frame C is moved along a board (M) which contains a number of ranges of contacts, I, II, III, etc.

The frame will now make contact and



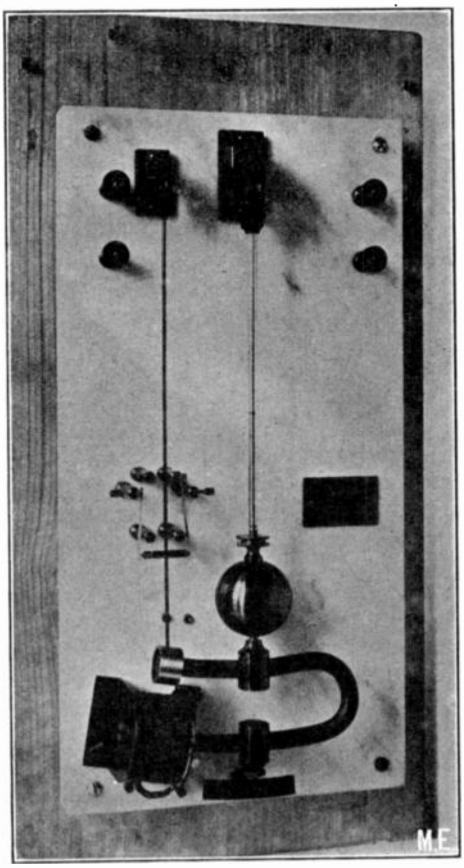
complete the circuit upon the particular range which belongs to it and upon no other, say the range IX. This will cause the closing of the local circuit belonging to this range and will perform the operation which is special to this circuit, such as the printing of a letter upon a paper strip or the closing of a relay so as to light lamps or steer a torpedo. When the circuit has been closed the whole is restored to the zero position, when the sender can make a second signal. In practice the contact M can be mounted on a drum which is rotated before the frame C.

SPECIAL.

Send us $1.00 before August 10th and we will send you MODERN ELECTRICS for one year, and present you FREE with the two latest books, "Making Wireless Instruments" and "The Wireless Telephone."

An Electric Pendulum.

A NOVEL form of pendulum for electric clocks has been devised by M. Charles Fery, a prominent scientist of Paris. It is designed to be used for very accurate clocks. In all the forms of electric pendulums with which we are familiar, the pendulum is attracted by an electromagnet, and also carries the contacts which come against fixed contacts so as to make and break the current at the proper time. However, the slight mechanical movement involved in making the contact is a disadvantage when



the clock is to work very accurately, and it always causes more or less disturbance, hence it is recognized that it would be much preferable to do away with the contact were this possible. M. Fery now succeeds in doing this in a very ingenious manner. The pendulum ball is suspended as usual from an upper point (see photo) and it carries below a U-shaped permanent magnet. A solenoid mounted on one side serves to attract the magnet at each swing of the pendulum, and the current impulses are given by a special contact piece. On the end of a swinging arm is mounted a copper or brass ring, which has a larger diameter than the upper limb of the armature. The latter thus enters the copper ring at the end of each swing, but does not touch it. The entrance of the magnet into the ring causes currents to be set up in the closed circuit which is formed by the latter, and this causes a repulsive effect to take place between the magnet and the ring, according to the well-known principle. The ring is thus pushed somewhat to the left and this causes the rod to swing and bring a fixed piece which it carries, into contact with a spring piece. In this way the usual contacts can be made for an electric pendulum without having any contact pieces mounted upon the pendulum itself.

TELEPHONE ON LEHIGH TRAINS.

Following a series of experiments by General Manager Maguire of the Lehigh Valley Railroad, all Lehigh trains are to be equipped with a specially constructed portable telephone by which they can call up the nearest dispatcher's office from any point along the road.

The device consists of an extension pole which can be hooked over the telephone wires running parallel to the track, and is intended to end the isolation ot trains while passing through thinly settled sections. In the freight service it is thought that it will be especially valuable in preventing delays through minor accidents. Heretofore when a coupling has broken or a drawhead pulled out freight trains have often remained still several hours before assistance could be obtained.

On passenger trains it is intended to use the telephone for the accommodation of passengers as well as the train crew, the sending and receiving of messages to be allowed while a train is waiting at a station.

Persons wishing to call a passenger known to be on a certain train may be connected with the next station in advance and the passenger will be paged when the train pulls in.

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EDITORIAL.

Very often the Editor receives communications from anxious parents who desire to be enlightened regarding the future prospects of electricity.

They are usually prompted to write because their son wishes to take up the study of electricity as a profession, and the parents naturally wish to ascertain as far as possible what the outlook is.

While it is comparatively easy to answer all such inquiries, the parents usually forget the most vital point, namely, if their son has sufficient ability to make his way. In this lies the answer.

If the young man does not like the work, if he is forced by his parents to take up electricity—or for that matter, any other art—he will be at best a second-rater—usually a failure.

If, on the other hand, he is an enthusiast, and is in love with his work, electricity will unquestionably prove a veritable gold mine to the young aspirant.

There are so many things to be invented and to be done as yet; there are so many new discoveries made each day; that it is hard to picture anything that holds more opportunities than electricity, unless it be a cock-sure gold mine.

It seems futile to point out the many hundred different ways in which old established methods have been revolutionized and entirely supplanted by electrical inventions—look at the electric light, the telegraph, the telephone.

It seems just as futile to attempt to realize what the future holds to revolutionize present day "up-to-date" and "modern" methods. To mention a few:

Our whole social life will be subject to a tremendous change, as soon as some genius perfects the apparatus, which connected to any standard telephone, makes it possible to "see over the 'phone."

Calls in person will then be almost unnecessary. Meetings can be held, without the various members being present. Theatre-going will be eliminated, the factory superintendent will sit in his office where he can see every part of the building at will and at any time, merely by pressing a button, which connects his telephot with any part of the building he desires to inspect.

Invent the "cold light," that converts 95% or 100% of electricity into light, and your fortune is made. To-day only 5% to 8% of electricity is converted into light, the rest is lost in useless and undesired heat.

An equally large fortune awaits him who converts the stored up energy in coal, directly into electrical energy. To-day 90% is wasted in useless heat and smoke.

These are only a few. There are thousands more.

Decide for yourself if there is a future in electricity.

GOVERNMENT RAIDS UNITED WIRELESS.

Acting under directions from Washington, Post Office Inspectors, headed by Chief Inspector Walter S. Mayer, raided the luxurious offices of the United Wireless Telegraph Company at 42 Broadway just after noon on June 15th, and arrested the President, Col. Christopher Columbus Wilson, and its First Vice-President, Samuel S. Bogart. They were taken before United States Commissioner Shields, arraigned on a charge of using the mails to defraud and later released under heavy bail.

About the same time a Deputy Marshal went to Mahopac Falls, Putnam County, N. Y., and arrested William W. Tompkins, President of the New York Selling Agency of 18 Broadway, which handles the stock and advertisements of United Wireless.

The raid on the concern and the arrests caused great excitement in Wall Street, for the United Wireless Company had recently been sending out reams of literature extolling its marvelous growth and its impregnable financial condition. The news of the company's troubles, however, will cause the greatest concern through the West, where the largest amount of the stock was sold.

Behind the bare charge of using the mails for fraudulent purposes the Post Office authorities assert that the men under arrest conducted one of the most gigantic schemes to defraud investors that has ever been unearthed in this country. It is alleged that the company was formed for the purpose of selling worthless stock; that its claim of possessing more than $14,000,000 worth of assets is wholly false, and that the stock has steadily decreased in value because the business has been a losing one.

At the same time it is alleged that some of the officers of the company have become enormously wealthy, that the price of the stock has been advanced a score of times, starting at $7.50 and recently selling as high as $50 a share. The par value of the stock at present is $10 a share. It is further alleged that the officers had a simple method of keeping all the stock to themselves in order to dispose of it as they saw fit, by allowing it to have no market value for outsiders through refusing to make it exchangeable on the stock books of the company.

While the inside officers of the company were privileged to sell their stock, all of the outside purchasers were required to accept stock certificates stamped "Not transferable until Feb. 11, 1911." The alleged valuation of the stock, it is said, was raised from time to time by arbitrary methods on the representation that the business was growing with extraordinary rapidity. These extravagant representations, it is said, were used to keep the stockholders satisfied. Altogether there are about 28,000 stockholders, scattered principally through the West. According to the Post Office authorities, these stockholders stand to lose upward of $20,000,000.

WHAT THE WILD WAVES SAY.

WHAT wireless waves were saying
Was once my ardent quest
We got the "modern" hook-up
And learned the code with zest.

In buying apparatus,
We tried to get the best,
And found that every maker
Was sure he beat the rest.

However, we succeeded,
Some were bought second-hand,
We made our own loose coupler
And a fine detector stand.

By dint of careful tuning,
They came o'er sea and land
So loud and clear, by golly!
They beat the very band!

"9, 9" says Bellevue-Stratford,
"2, 3" retorts D U,
"GA, GA, old puttyhead,
Have an MS for you!

"To Mister Thomas Hardup,
Sis Susie has got twins,
Please break the tidings gently
And send some safety pins."

At ten comes old Marconi
As faithful as the clock;
He sends out all the daily news
And quotes the market's stock.

What those wild waves are saying
We long since learned to know,
So worry not, my expert friend,
About each wireless "Bo."

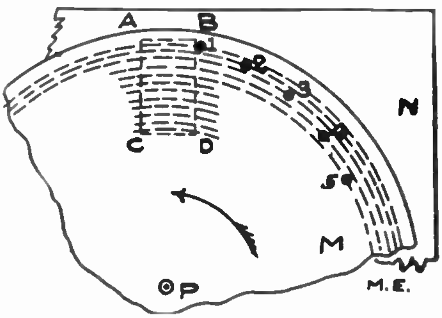
WILLIAM J. COQUELIN.

Image Transmitting Devices.

By A. C. Marlowe.

Paris correspondent Modern Electrics.

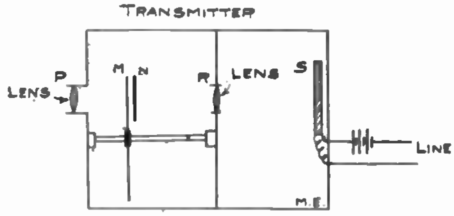
AMONG the recent television apparatus we note one which has been de-



-Fig 1-

vised in France by M. De Vendenil. Between the image and selenium cell is interposed a revolving shutter so as to uncover all the points of the image in rapid succession. The rear part of the shutter is a plate N, having the opening A B C D representing the image. Before it rotates the circular disc M, and it has a series of circles traced upon it so as to cover the whole of the image A B C D. On each circle is a small hole 1, 2, 3 etc. The hole 1 moves over the image and

Transmitter

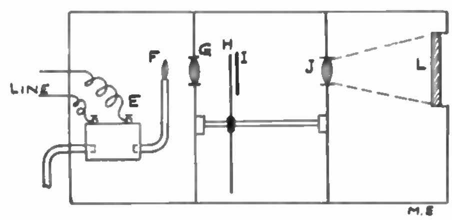


-Fig. 2-

when it reaches the end of its row, hole 2 commences to move over the second row and so on, so as to uncover all the points of the image in succession. In Fig. 2 we have the transmitter. The image is projected by the lens P through a second lens R and thence on the selenium cell S. Between the two lenses is mounted the above-mentioned shutter M N, so that in reality there is only one point of the image thrown on the selenium at a time. To produce the corresponding effect in the receiver he uses the variations in an acetylene flame which are given, Fig. 4, by using a chamber which is divided into halves by a diaphragm A. The line current acts upon a magnet B, so as to operate the diaphragm and this gives differences of pressure in the acetylene gas which occupies the second chamber and feeds the flame. We thus have varying brightness of the flame according to the current in the line. This device is mounted in the receiver at E F, and the flame sends light through the lenses G and J to the final screen L. Between the lenses is a second rotating shutter like the above, so that each point of the image is thrown in succession on the screen.

M. Armengaud, of Paris, is at work on

Receiver

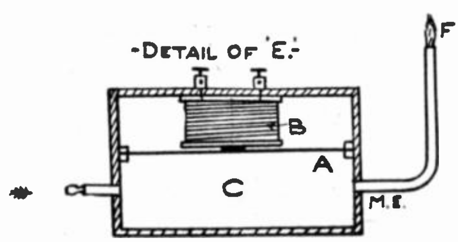


-Fig. 3-

an apparatus in which the shutter works in a different manner to cover the image. The latter is formed by the lens M on the ground glass screen C. Behind it is the selenium cell S. Between the image and the cell is the shutter A. B.

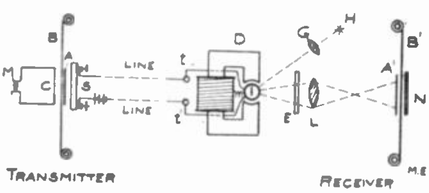
In order to allow all parts of the image to be covered in 1/10 second, he uses the

-Detail of 'E.'-



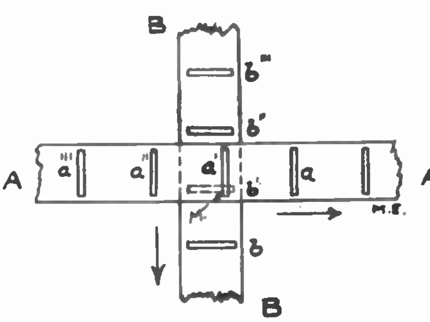
-Fig. 4-

shutter device (Fig. 2) consisting of an endless horizontal band A, which is mounted on rollers so as to move beltwise in the direction of the arrow. Behind it is a vertical band B, which is arranged in like manner to take a rapid downward movement. The square portion which is given by the crossing of the two bands is disposed so as to cover the whole surface of the image, and acts as the screen placed at AB as before seen. In the band A, which is opaque, are a number of vertical slits A A' A" etc., equally spaced. The band B has likewise a set of slits B B' B" etc., of the same width. Light from the image will be cut off from the selenium cell except at the crossing point M of the slits A' and B', etc. We have thus a small square which gives light from one point of the image upon the cell. When both bands are moved in the direction of the arrows, this point will be displaced so as to uncover different parts of the image so that the opening passes over all its surface. The whole is mounted as seen in the photograph, using moving picture bands with their mechanism in the two cases. The



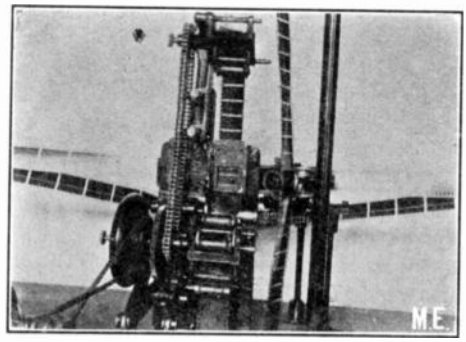
-FIG 1-

films are blackened by developing, and the gelatine is removed so as to make the slits or clear spaces. A small electric motor works both bands. The mechanism is somewhat modified here. Film B has a downward movement, but the slit B (or B' etc.) is brought to a stop so as to allow one of the slits A to



-FIG. 2-

pass across its whole length. The band B then comes down one step so that another of the slits B comes into place, and this is again passed over by A, etc. However, the spacing of the vertical slits is such that at each move, the next slit B will come to a point lying next under the former position, so that a new line of the image is uncovered each time. This is done by spacing the slits B at, say, 9/10



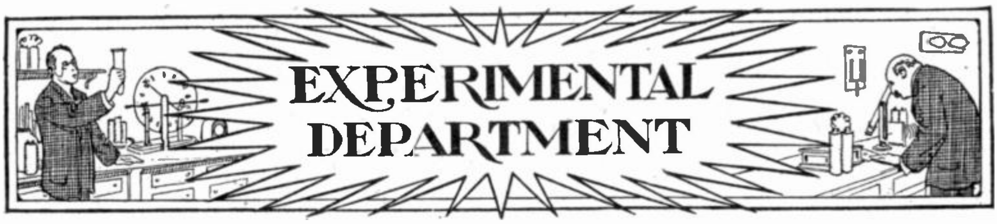
of the height of the image instead of at 10/10. The vertical band requires to be stopped each time, but the horizontal band can be moved without stopping, it is found. The receiver has not yet been constructed, but it is proposed to use the method shown here, in which the current comes to a galvanometer D with swinging mirror M, and the light is thrown on the lens L, so as to reach the screen N. Before the lens is a shaded color screen which gives bright and dark parts according to the current or the swing of the mirror. Before the ground glass screen N is a moving band shutter like the above. All the points are thrown on the screen within 1/10 second, so that the eye perceives the image.

WIRELESS ASSOCIATION OF CENTRAL CALIFORNIA.

The Wireless Association of Central California was organized May 27th, 1910. The following officers were elected: President, G. DeYoung; Secretary, Mr. B. K. Leach.

The purpose of this club is to promote wireless in California.

The club was organized with a membership of ten. Anyone in California, who has a station, is eligible for membership. Applications may be had by addressing The Wireless Association of Central California, 860 Callish St., Fresno, Calif.



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

A SIMPLE HEAD-BAND.

Having no head-band at hand, I took a piece of No. 10 aluminum wire, and bent it to the shape shown at A in figure, twisting it together as at B. Then with a pair of pliers, the two ends were bent to fit into the two holes in the sides of the receiver case, allowing it to swing freely, and with a little adjustment found

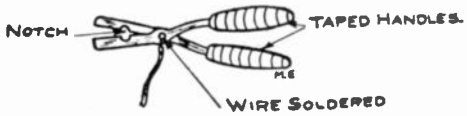
it to fit the head snugly, besides being very light and cheap. A double head-band may be made as at B. If made of nickel-plated brass, or phosphor-bronze wire, it will be found very neat as well as useful.

Contributed by

C. L. JAEGER.

HELIX CLIP.

Sometime ago I found myself in need of a good helix clip, so devised the following, which has done good service for several months.



-FIG. 1-

I took an old curling iron, cut off all but an inch of the jaws with a rat-tail file, made a notch in each jaw as shown in figure and soldered flexible conductor to base of jaw. I then sandpapered and shellacked handles, but to give better insulation afterwards, taped them.

Contributed by

STUART R. WARD.

TO IMPROVE SPARK GAPS.

If your batteries are almost run out and you get a measly little spark across your gap, or if you have just bought some new cells and you would like to make a brilliant, fat spark, better than you have had, I recommend the following.

Take off the electrodes or points of your gap and with some sulphuric acid (strong) brush over the points or the place where the spark jumps. After you have left the acid on two minutes, wipe the points clean. Now take some mercury and put on a thick amalgam, that is to say, rub on the mercury with your fingers until it looks like a heavy silver plate, then replace the electrodes and with the usual adjusting you will notice the difference between the spark you have now and the one you have had before.

If you have followed the directions carefully this will last a number of weeks.

Contributed by

DONALD PIERI.

FOUR POINT SPARK GAP.

12. Brass wheel, 1 inch diameter, 1/4 inch thick, with holes tapped for 8/32.

11. Plugs 1/4 inch diameter, 3/8 inch long, all tapped for 8/32 screw, 1 zinc, 1 brass, 1 ball, 1 point plug.

2. Base, preferably of fibre, 6 x 3 x 1/2 inch.

3-4. Binding post.

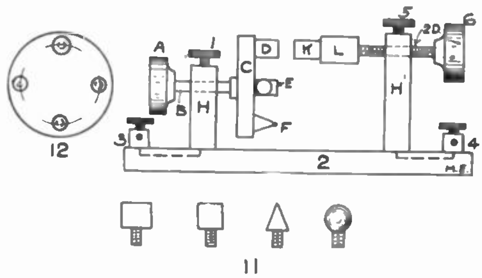
H-H. Two pieces of steel with 1/8 inch holes, H 1 tapped for 8/32.

L. Brass plug to screw zinc plug (in) N K.

K. Two zinc plugs 1/4 x 3/8 end threaded for 8/32 screw.

5. Small screw to hold adjustment screw No. 20.

6. Fibre knob on end of adjustment screw.



D. Zinc plug.
E. Brass plug.
F. Point plug.
G. Ball plug.
C. Brass wheel, 1 inch diameter x 1/4.
A. Fibre knob on screw B.
B. 1/8 inch screw 2 inches long.
1. Screw to hold screw B when adjusted.

The above spark gap I have used with success for six months. No description as to how it is made is necessary if the above is read over. When a zinc gap is wanted, simply turn screw B until the zinc plug is opposite the zinc plug K. To shorten the spark, move No. 6 up until the desired spark is obtained. A good combination is when plug F is used. When another spark is wanted, thumb-screw A is turned to next plug and so on.

Contributed by

THOS. DRURY.

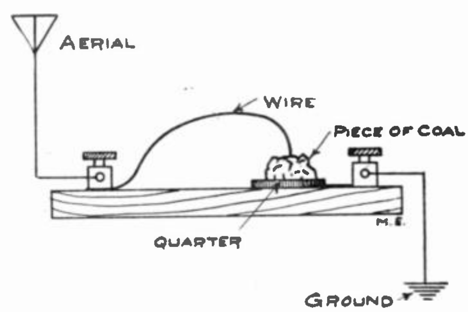
WHO BEATS THIS?

I noticed an article in the June issue entitled "Can You Beat It?", wherein the writer received wireless messages at very little expense. However, I think I have "gone him one better," to use a slang expression. In place of the piece of silicon, which cost him ten cents, I went out into my coal shed and picked up a small, smooth piece of anthracite coal. Going back to my room, I took a small piece of No. 10 copper wire, which I found on the floor, and taking a quarter from my pocket fashioned a detector stand like the one shown. I then inserted the piece of coal. I took four porcelain plates from which I had just finished eating my supper and carefully insulated my brass bedstead by placing a plate under each leg. Thus so far, you see, no cost for detector or aerial. I then connected a wire to my table knife and shoved this into a large flower pot in the center of the room for a ground. Then taking the 80-ohm receiver from the house telephone in my room, I connected up this crude set. No sooner had I done so than I distinctly heard and copied the "R. C. G." (Revenue Cutter "Gresham"), which lay about a quarter of a mile from my outfit. The signals came in clearly and distinctly. For originality, I think this goes one beyond my friend of the last issue.

Contributed by

PHILLIPS B. WILDE.

(NOTE.—Mr. Wilde's *"ground"* (?!)

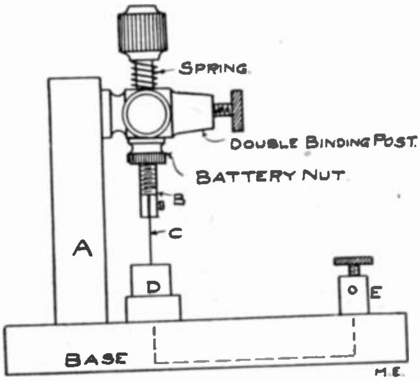


beats everything ever shown. A much simpler way is to take a white sheet of paper, and write the word "ground" on it. Place the paper on the floor and put the knife on the "ground." It'll never know the difference!!!—"FIPS.")

SIMPLE DETECTOR.

The base and the back (A) can be made out of wood or any such material, being a good insulator, the base is 4 x 2 x 1/2 inches. The double binding post is fastened within about a half an inch from the top of (A) which is 2 x 2 1/2 x 1/2 inches.

The rod (B) is threaded for about one inch of its length and an insulated handle fastened to one end while the other end is made so as to receive the wire (C) as described in the December, 1908, number of MODERN ELECTRIC. The cup and its support (D) may also be constructed as there described. Connections are made to the double binding post and to post E. This detector will



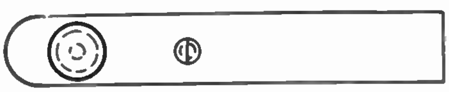
be found to work very satisfactory and is very easy to construct.

Contributed by

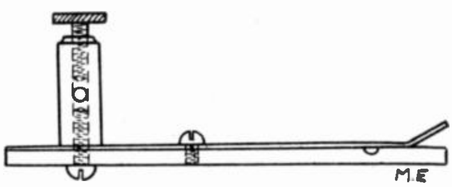
I. L. RILEY.

A HELIX CLIP.

Take a piece of brass 1/8 inch thick and cut a strip 1/2 inch wide and 2 3/4 inches long, as seen in Figure 1; file a notch 1/2 inch from the front end shown by arrow in Figure 2, in which the wire is held, then get a strip of 1/32 thick, 1/2 inch wide and 2 3/4 inches long

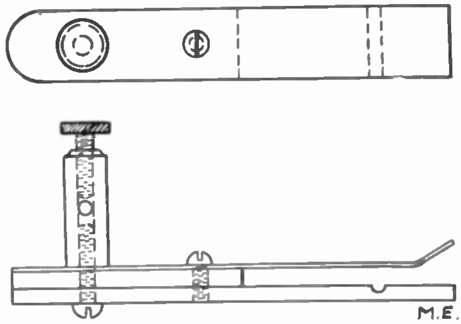


-FIG. 1-



-FIG. 2-

spring brass and bend as seen in Figures 2 and 3, 1/4 inch from front. Then drill and tap for a 5/32 inch machine screw, 1 1/8 inch from back end, then take a binding post and drill hole 1/2 inch from back to screw it on; this may be seen in Figures 2 and 3.



-FIG.- 3-

If very heavy wire is used, a piece of brass as thick as necessary, 1/2 inch wide and 1 5/8 inches long may be placed between spring and bottom, as seen in Figure 3 with arrow pointing it out. This is done so the strain on the spring is not so great. This will prove an excellent helix clip when finished.

Contributed by

E. H. ZIMMERMAN.

CLEAT INSULATORS.

In the April issue of your excellent magazine there are a number of cheap insulators to be used by amateurs.

After a number of others had broken,

I used common two-wire cleats. I find them cheap and quite efficient.

I hope this will benefit some amateur.

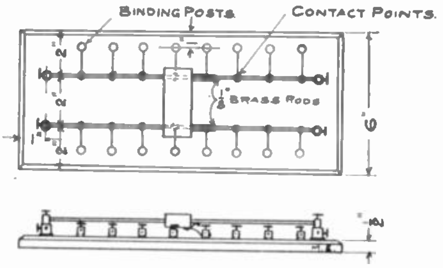
I built an antenna for a friend of mine for a two K. W. station using the cleats in tandem, as shown.

Contributed by

EUGENE WULFF.

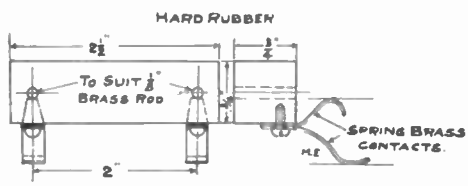
HOW TO MAKE A DETECTOR SWITCH.

This switch is easily constructed for any amount of detectors. First, make a base out of wood or hard fibre 1/2 inch thick, 4 inches wide and 12 inches long for 9 detectors. Bevel 1/4 inch all the way around the edge. Now bore two holes 1 inch from each end and 2 inches from the sides, as shown in Fig. 1. Get four binding posts, as shown, and place in these holes. Take the bolts of an old



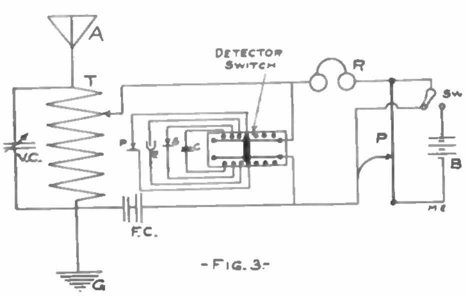
-Fig 1-

battery and file out the screw part smooth. Two of these should be used for every detector. Bore 9 holes 2 inches from each side and end. Place 18 of these bolts in the holes and put nuts on



to hold them. Bore 18 holes 1 inch from each side of the base opposite the holes for the bolts. Now place 18 small binding posts in these holes and connect these with the bolts.

Get two rods 1/8 inch in diameter and 10 inches long and place them in the



-Fig. 3-

upper four holes of the first four binding posts. Make a piece of hard rubber 1 1/2 inches long and 3/4 inch square. Bore two holes 1 inch apart in the center of the rubber, as shown in Fig. 2.

Fasten two springs 1/4 inch wide and a desirable length for contacts, and arrange so that they will touch the rods. Put this slider on the rods and slide the slider to one end and get the rod the same distance apart at each end or they will not bind in sliding. This switch can be made smaller or larger for as many detectors as desired. It can also be used for sending and receiving if made large enough to keep the sparks from jumping.

Contributed by

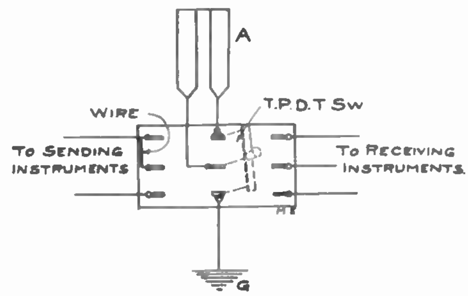
JAY ROSS.

SIMPLE HOOK-UP.

Enclosed you will find a little item which may help some amateurs who use the loop aerial.

It is no doubt troublesome to some who use the loop aerial, and wishing the straight for sending.

In experimenting along this line, I have found it very convenient to take a common triple pole double throw switch



and connect the two aerial lead-in wires to two of the levers and the ground to the third. To one side connect the receiving instruments as in any other switch. On the other side run a wire (about No. 14 for average use) from one post to the other, which makes contact with the aerial, thus bridging across. Now connect as with a straight aerial switch.

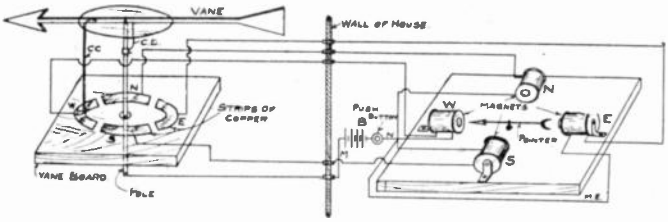
It will be seen that when the switch is placed for receiving the loop aerial is used and when sending it is the same as for a straight away aerial. For more clearness in the connections see diagram.

Contributed by

PAUL JACKSON.

A MAGNET INDICATOR FOR A WEATHER VANE.

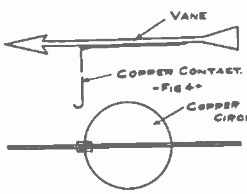
I recently worked out a plan for a magnet indicator for a weather vane, by which, pressing a push button the direc-



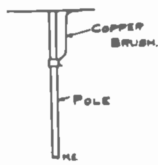
-FIG. 1-

tion of the wind can be readily ascertained. This outfit is valuable to persons who are in such a position that the weather vane cannot be readily seen.

The chief articles are four electromagnets; bell magnets will do. These are to be placed in a box. The dimensions may be left to the maker. For the indicator take a piece of brass about 6 inches long, then on the point solder a piece of steel which is to be attracted by the magnets when in operation.



-FIG. 2-



-FIG. 3-

The vane is made as per diagram. For the brushes use copper as in Figs. 2, 3 and 4, by studying the diagram, one may easily see how it works, which is nothing more than a bell outfit. Bell wire will do for the wiring. For better working qualities use eight magnets connecting them up the usual way, that is, from the magnet to the main line, marked M and one to the contact strip on the weather vane board. Two or three batteries inserted in the main line is enough for good working. By using eight magnets the pointer will point N. E., N. W., S. E. and S. W.

This instrument was made about a year ago by the writer and is still working, showing that it is worth while making.

Contributed by

FRANK W. LOMNITZER.

AUTOMATIC BREAK SWITCH.

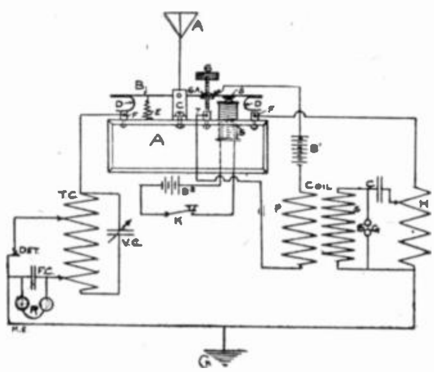
First a box is made 6 or 7 inches long, 3 inches wide and 2 inches deep. This is "A" in drawing. A thick strip of brass, "B", about 6 inches long and 1/4 inch wide is pivoted in the center and supported by the brass bracket "C".

Two strips of spring copper (D-D) are fastened to the arm B by soldering. A pull spring is fastened between the bracket C and the copper D. Now two small pieces of brass (F-F) are placed under the spring copper (D-D) to make contact with.

A piece of fibre or hard rubber (6A) is fastened to the arm (B) and extending over to one side to support and insulate the adjustable thumb screw (6). A small contact (7) is placed under the thumb screw (6).

A small piece of iron (8) is placed on the under side of the arm (B) with solder, exactly over the bell magnet (9), which is supported by the box (A).

The contacts (F-F, D-D, 6, 7) should be tipped with platinum to make good connections.



Now just a word more: the connections may be gotten from the diagram, and this is important:

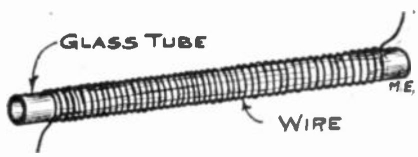
If *every* wireless amateur should make one of these instruments, and when they heard a Navy Station sending (or any large station) would shut down and wait until the station who was sending was through, there would be no interference whatever, for it will be seen how this instrument works. The spring (E) always keeps the receiving set connected except when the key is pressed which makes the magnet (9) pull the arm (B) on to the sending side. The spring copper (D) on the sending side should be bent so as to touch its contact (F) just before the thumb screw (6).

Contributed by

HAROLD PETERSON.

TO BEND GLASS TUBING.

I was experimenting one day with a rheostat wound on glass tubing and as I was using the 110 volt lighting current the wire became red-hot, which also



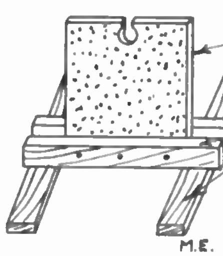
heated the tubing which would then bend very nice and evenly, as quite a long space was heated at the same time. I would recommend this method above all others I have tried. Use about No. 30 iron wire and wind closely and evenly. Connect to the lighting circuit in series with a water rheostat, as then you need not use so much wire, which will save time and trouble in winding it on.

Contributed by

CARL B. RUTHERFORD.

WIRELESS INSULATOR.

Where the wires leading from the aerial are carried over the roof of a building, it is necessary to insulate them well. For this purpose an asbestos shingle or sample of asbestos building



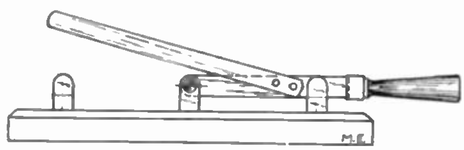
lumber nailed to some cross-pieces (Fig. 1.) with a small groove in the top to hold the wire will answer the purpose. A square of hard rubber or shellacked wood with the groove lined with asbestos is also good. About one inch below the top and in the center, bore a hole, a little larger than the lead-in wire. Then saw a narrow slit down from the top.

Contributed by

LYLE DE VEAUX.

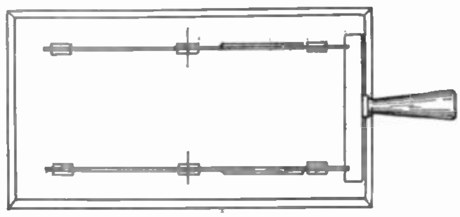
QUICK ACTION SWITCH.

This is an attachment whereby an or-



-FIG. 1-

dinary two-pole double throw switch can be converted into one of the new quick-action switches. All that is necessary are two strips of brass or copper, the same width and thickness as the blades of the



-FIG. 2-

switch, the length should be about one and one-half times the length of the blade. They are next offset in the man-

-FIG. 3-

-FIG. 4-

ner shown in Figures 3 and 4 in order that they may be riveted to the regular blades. The angle and the offset must be determined by the clearance that you wish to give the switch. I have found that the best results can be obtained by having a clearance of three-quarters of an inch between the blades and contacts on one side, while the other is closed. I find that much better results can be obtained by using copper rivets rather than bolts and nuts in fastening the pieces to the blades. Figures 1 and 2 give an idea how the switch looks when completed.

Contributed by

W. F. HALLIDAY.

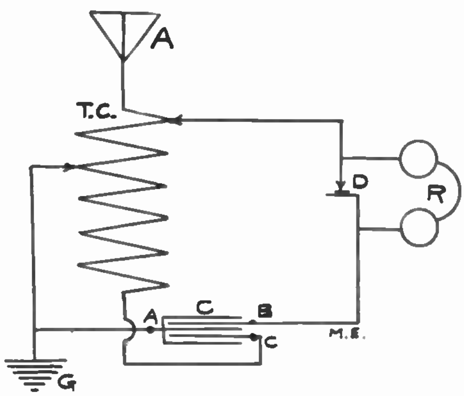
NEW RECEIVING CONDENSER.

Enclosed please find diagram of condenser and connections that I have used quite successfully. The condenser needs very little explanation. I made it out of 17 sheets of foil 3 1/2 x 5 inches. Nine of the sheets on one side are all connected together. This is shown under A in the drawing. On the other side I connected four sheets together and then

-Fig. 1-

I connected the other four together. In the condenser, as in others, the sheets on opposite sides alternate.

I have found that by connecting A and B the same way that an ordinary



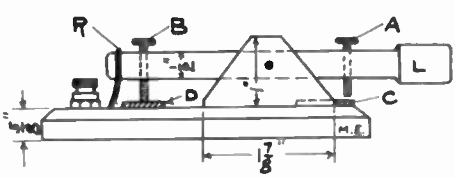
-Fig. 2-

condenser is connected, and connecting C to the end of the coil winding, the signals come in a great deal louder than by the ordinary way by connecting.

Contributed by

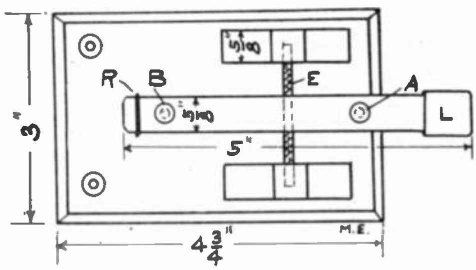
LOUIS DRIGGS.

A HOME-MADE TELEGRAPH SET.



-Fig 1-

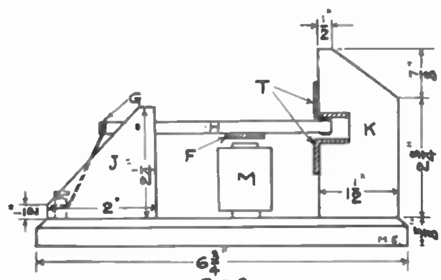
A great number of the experimenters in electricity are now using "wireless" instruments, but there are still a large number who have what the others term



-Fig 2-

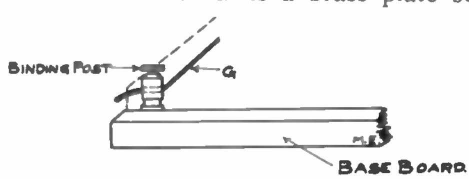
"old fashioned" instruments. A large amount of pleasure can be derived from a home-made telegraph set. The set which I will describe costs very little and can be easily made.

As most of the dimensions are given in Figs. 1, 2 and 3, it is hardly necessary to give much description. In Figs. 1 and 2 (which show the key) the adjusting screw B and the adjustable contact screw



-Fig. 3-

A can be taken from an old battery. The rubber R is fastened from the lever to the base to bring the lever up. C is a brass plate 5/8 inch by 3/4 inch to make contact with A. D is a brass plate so



-Fig. 4-

placed that the screw B will not wear into the base. Both C and D may be fastened to the base by means of small screws or brads.

In Fig. 2, E is a brass or iron rod fastened in the lever and pivoted into the supports. One binding post is connected to C and the other to A (by means of flexible cord or by a small wire which has been coiled into a spiral).

Fig. 3 shows the sounder. The base

is to be 5/8 x 1/2 x 6 3/4 inches. The armature lever is 3/8 x 5/8 x 5 1/4 inches.

At one end of the armature a groove is made to hold the rubber band G; at the other end two small screws or a number of tacks are driven to produce the click when they strike T. T is brass or tin bent at right angles and fastened in the cut in K.

The supports J and K are made from 5/8 inch wood. The armature F is made of soft iron.

The places for pivoting H (between the two blocks J) and of making the cut in K are determined by the height of the electro-magnets M. The armature lever H should be placed so that when the current is on F will not quite touch the magnet cores.

Fig. 4 shows the method of fastening the rubber band G to the base. It is led through the binding post so that it may be adjusted to any tension.

If the instruments are stained and finished nicely, they will present a very neat appearance.

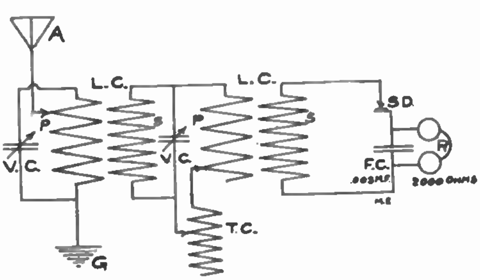
Contributed by

GAYLE FOSTER.

NEW WIRELESS CONNECTION.

I think the following will be of interest to your readers:

When listening the other night, there was so much interference it was almost



impossible to tune in the desired station. Having an extra loose coupler I connected them, as in diagram, and found that I could hear the messages louder as well as tune a great deal easier. Static also diminished a great deal. By putting a single slide tuner in, it made quicker tuning possible.

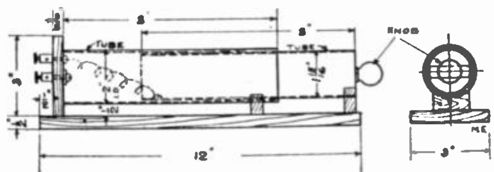
Do not be discouraged with the first attempt. You will find the slides will be in different positions and a few turns on one tuner makes a lot of difference. Only use a few turns on the single slide tuner, or it can be left out entirely.

Contributed by

ROBERT MUNS.

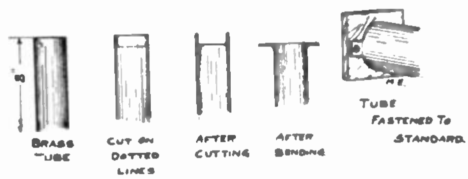
TUBULAR VARIABLE CONDENSER.

Secure two boards, one measuring 12



-Fig-1-   -Fig-3-

x 1/2 x 3 1/2 inches, and the other 3 x 3/8 x 2 1/2 inches. Secure two (2) 2/32 brass tubes, one being 8 x 2 inches and the other 8 x 15/16 inches. The 1/16 inch difference is allowed so that one tube can be inserted into the other. Fig. 2 will explain fully the method of fastening the larger tube to the board that



-Fig 2-

measures 3 x 3/8 x 2 1/2 inches, which is the standard.

Cover the outside of the smaller tube with paraffine paper, so as to insulate it. Solder a piece of wire (which is insulated) to one end of the smaller tube, and bring it to the standard connecting it to binding post B, Fig. 1. Fasten the standard to the base, leaving a margin of 1/2 inch on three sides. Seven inches from the standard fasten a small rest to the base to support the stationary tube. A piece of wood 1/2 x 1/2 x 3 inches will do. Four inches from this rest place another, this measuring 1/2 x 9/16 x 3 inches. Fasten a strip of brass to one end of the small tube. Have it on the opposite end to where the wire was fastened. Then fasten an insulating knob to this strip of brass. Fig. 3 will make this point clear. Polish your condenser so as to give it a business-like appearance. Figure 1 shows the completed condenser. This, if constructed according to directions, will prove to be an ideal condenser.

Contributed by

H. LINDE.

A WAY TO TEST OUT DETECTORS.

An easier way to test out detectors is by the electric light current. It is a much easier way than to connect up a buzzer and batteries, but you must have the light current in your house. The way to do it is this: After you have the silicon, electrolytic or whatever form of detector you are using (as it will work with any kind) in adjustment and connected up, put on your receivers and click on and off the light. Keep adjusting the detector until the click comes in loudest. I had my detector so sensitive as to hear the click as loud when a light was turned off way down in the cellar as one turned on and off up in the attic, where my station is.

Contributed by

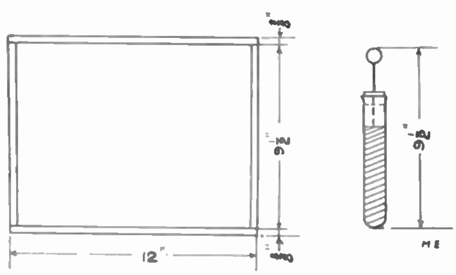
ARCHIBALD MACDONALD.

ADJUSTABLE SENDING CONDENSER.

Those who prefer Leyden jars to any other form of sending condenser have undoubtedly had trouble with their connections.

I have made one of the condensers which I am going to describe and which I have found very efficient for sending.

The materials to be used are as follows:



-FIG. 1- -FIG 2-

2 hardwood pieces 12 x 2 1/2 x 1/4 inches.

2 hardwood pieces 9 1/2 x 2 1/2 x 1/4 inches.

4 test tubes 8 inches long and 1 inch in diameter.

2 strips of spring brass 12 x 2 inches.

8 pieces of tinfoil 5 x 3 1/2 inches.

8 round pieces of tinfoil 1 3/4 inches in diameter.

4 brass or copper rods 9 1/4 x 1/16 inches

4 brass balls 1/4 inch in diameter.

2 binding posts.

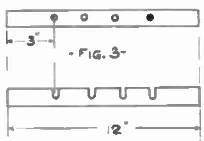
4 small brass wood screws.

4 corks 1 inch in diameter.

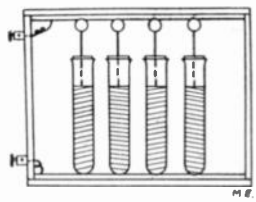
8 one inch brads.

First take the pieces of wood and with the brads put them together as in Fig. 1.

Next take the test tubes (which can be procured at any drug store for five cents each) and with shellac put one of the large pieces of tinfoil on the inside, with the aid of a stick two feet long and 1/2 inch in diameter to about two-thirds of its length. Another piece is then put on the outside to the same height. Cover the bottom of the tubes on the inside and outside with two of the round pieces of tinfoil. Next the corks are forced into the tubes about one-fourth of an inch and cut off about one-sixteenth of an inch above the tubes. Give the tubes above the tinfoil three or four coats of shellac, letting each coat dry before the next is applied.



-FIG. 4-



-FIG. 5-

A brass ball is soldered on each rod and then the rods are forced through the corks until they come in contact with the inner coat of tinfoil at the bottom of the tubes. You now have four small Leyden jars, as in Fig. 2.

Holes are now indented in one of the brass strips and grooves in the other to the depth of one-eighth of an inch as in Figures 3 and 4. Screw the piece with the grooves on the top of the frame, on the inside and the other on the bottom.

Put the binding posts in position as in Figure 5, connecting the upper one with the top piece of brass and the lower with the other piece.

Slip the Leyden jars in position as in Figure 5 and connect as regular Leyden jars.

You may use as many of the jars at a time as you please and therefore have an adjustable condenser.

Contributed by

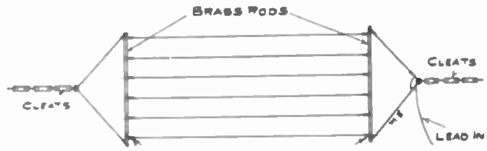
A. T. VAN DEUSEN, JR.

HINTS ON WIRELESS.

Here are a few tips which I hope may be of use to some of the wireless "fiends" who read your dandy magazine.

Cast off gauge glasses make excellent lead-ins, you can get these at any factory.

A good temporary lightning ground is made by shunting a piece of heavy wire (or better spring brass) bent in the form of a rectangle minus one long side across the knives of your aerial switch.



-Fig. 1-

An easily insulated aerial (straight away) may be made by using a couple of brass rods for spreaders. The lead-in may be connected wherever it is handiest and the number of cleats must be governed by the tension you are handling.

Contributed by

FRANK WM. ALSIP.

NOVEL AERIAL.

While experimenting the other day with my wireless, I found that if I touched the aerial wire from the switch offset to the brass on the lamp socket, that the messages came in just a trifle louder than with the aerial. I thought that the closeness of the aerial had something to do with it, but on taking it down it did not change it. I have been able to hear stations 100 to 150 miles away with it.

Contributed by

CARL V. CROPP.

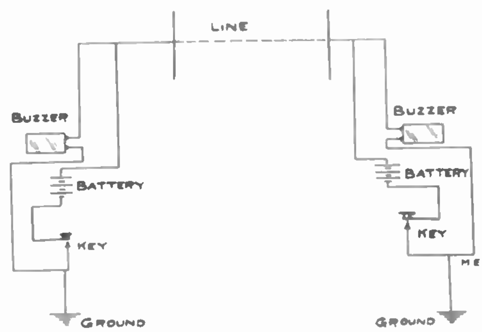
A SIMPLE BUZZER TELEGRAPH.

By CLAUDE W. CARLSTROM.

The diagram shown is that of a simple buzzer telegraph. A glance at the same is all that is necessary to make clear to one the manner of connecting up. One wire is stretched between the instruments, or from house to house, and the return is made through the ground.

The instruments necessary for such an outfit are first: two (2) buzzers of the ordinary type used in the place of bells in houses (one for each station). The above named type of buzzer will be found to work quite well, but would say that the *small* (generally nickel plated case) buzzer will give much better results. These cost slightly more than the others, but will be found much more satisfactory, and second: two (2) strap keys (single contact). Push buttons may be used in place of the strap keys, but I would advise the use of the former in preference to the latter, as the difference in price is generally only about five cents ($0.05) and the manifold increase as regards ease of sending and correctness of signals is well worth the slight difference in cost; third: battery enough to run buzzers well over distance required. Wire enough must be bought to cover distance between stations, once, with some to spare for connections.

It is to be noted that this manner of connecting up leaves each station in per-



fect readiness to receive, as there are no switches to throw and one station can call the other at any time.

Contributed by CLAUDE W. CARLSTROM.

WIRELESS AND SIGNAL CLUB NAMES OFFICERS.

The Sacramento Wireless and Signal Club, an organization of amateur operators, has elected the following officers: President, William Archbold; vice-president, Philip Pratt; secretary, Elwood Rackliffe; treasurer. Guy Banvard; chief operator, Elwood Miller; assistant operator, Noe Ochsner; sentinel, John Murray.

A committee has been appointed to tender its sympathy in behalf of the club to the family of Clarence Houghton, deceased, who was active in the wireless field.

The Poulsen System of Wireless Telephony and Telegraphy.*

By C. F. Elwell.

As soon as the methods of signaling through space first given to the world by Marconi were well understood, scientists throughout the world recognized the shortcomings of both the transmitting and receiving apparatus. Transmission was first effected by means of strongly damped oscillations generated by means of powerful sparks from condensers charged by means of large induction coils, in the primary circuit of which a suitable telegraph key was inserted.

Many improvements have been made in this type of transmitting circuit. Commercial transformers working at a frequency which would give the maximum sensitiveness to the telephone receivers at the receiving station have been substituted for inefficient spark coils. Many attempts have been made to suppress the noise of the sparks, which with the increased use of large amounts of power became distressing to the operator besides betraying the message to unauthorized parties. Apparatus doing this successfully also decreases the efficiency of the apparatus. Keys had to be devised to break the necessarily large primary currents and quite an array of electromagnetic and oil-immersed keys are now in use. For heavy power working the speed is limited by such apparatus. Sending condensers have been improved both as to bulk, durability and cost.

Signals were received by means of the Branly coherer on which much time and money were fruitlessly spent. Then came the magnetic, electrolytic and thermo detectors with increased sensitiveness and automatic decohering features. But these detectors have not the well defined resistance which is necessary for accurate resonance tuning effects.

The Danish inventor, Valdemar Poulsen, took up the study of the wireless transmission of signals and recognized the fact that further advance depended on decrease of the damping of the oscillations and increase of sensitiveness of detectors. He determined to follow up the generation of undamped waves as being the line on which more selective telegraphy would be obtained and telephony also be made possible. After a profound study of the "singing arc" following in the footsteps of Elihu Thomson and Duddell, he evolved his present type of arc generator. This generator, with suitable capacity and inductance in shunt to the arc, sets up trains of practically undamped waves of frequencies from 200,000 to 1,000,000 per second, according to the values of capacity and inductance in the shunt circuit. Not only this, but he has been able to transform as much as thirty kilowatts of direct current to high-frequency current in the shunt circuit.

This generator applied to telegraphy gives improved selectivity of the instruments to an extent never reached by spark methods, permits of duplex working, gives great range with small amounts of power, better results over land, better daylight working and, last but not least, a great increase in speed. For the purposes of telegraphy he had to invent a new type of detector which is now known as the "ticker" and which has been shown to be much more sensitive than any other detector. This detector was necessary in order to render the telegraph signals audible because the alternations take place at a speed much above the limits of audibility.

In the Poulsen generator the arc takes place between a water-cooled copper anode and a revolving carbon cathode. The anode and cathode project through two opposite sides of a water-cooled chamber. The arc takes place in the presence of a powerful magnetic field at right angles to the flow of current. A small motor revolves the cathode very slowly and prevents a deposit of carbon taking place and so shortening the arc gap, which is maintained at from three to five millimetres in length. The chamber is equipped with an inlet and outlet for supplying the arc with a hydrogen-containing gas. Drops of alcohol on being introduced into the chamber are immediately vaporized and this method of gas

* Paper read before the San Francisco Section of the American Institute of Electrical Engineers.

supply is in use on shipboard. In the chamber there is a yoke which is attracted by the magnetic field when the current is switched on and a small copper tip serves to strike the arc. This automatic arc-striking feature was devised for wireless telephoning, so that talking and listening could be carried on with ease.

A large amount of heat is produced in the water-cooled chamber which is removed by means of the cooling water. A certain amount of power is absorbed in the regulating resistance in series with the arc. Of the power which is converted into high-frequency oscillations, part is dissipated as heat in the capacity and inductance and part is radiated by the antenna.

A wattmeter may be used to measure this radiated energy by using a direct-coupled antenna and measuring the watts at some point in the condenser circuit with and without the antenna. The difference will be the watts radiated.

Fleming has shown that if W represents the energy in ergs radiated per second, when the oscillations are persistent, W equals 128 A^2, where A is the current read on a hot-wire ammeter. Thus a current of two amperes would give a radiation of 512 watts, showing that when working with persistent oscillations and open antennas, we can use very small antenna currents, and obtain powerful radiation effects.

The generation of high-frequency alternations in a shunt circuit to a continuous-current arc is somewhat as follows: If the arc is steady and is then shunted by a condenser, the current rushes into the condenser and momentarily robs the arc of current, causing the potential difference in the carbons to rise and continue charging the condenser. When the condenser is full the arc current returns to its former value, the potential difference falls, and the condenser discharges from the arc, and the cycle repeats itself. A part of the energy of the continuous current arc is thus changed into the energy of electric alternations in the condenser circuit.

The characteristic curve of the arc is, as is well known, a falling characteristic, i.e., the voltage decreases as the current increases, and for a carbon-arc is comparatively flat. It has besides a persistency which renders it irresponsive to rapid variations of current. Hence only slow alternations can be obtained from a large-current carbon-arc.

With the Poulsen arc, with its carbon negative and cooled copper positive, immersed in hydrogen, a very steep characteristic is obtained and one which responds to exceedingly rapid variations of current through it. A condenser of small capacity may be employed in the shunt circuit and yet convey to it a considerable amount of energy because of the large variation of the difference of potential at the arc caused by small arc current variations. So alternations of high frequency can be produced.

This theory is confirmed by the study of small current carbon-carbon and carbon-aluminium arcs in air. For they have steep characteristics and can produce alternations of high frequency. The theory of the part played by the hydrogen on large-current carbon and metal arcs is not yet well understood. It appears to be partly due to its greater conductivity compared to air, thus helping to cool the arc electrodes. Poulsen also considers that hydrogen increases the conductivity of the arc.

Practically, the "ticker" consists of two fine crossed gold wires, which are vibrated at the rate of 100 vibrations per second, by means of an electro-magnet or clockwork. This may be connected to a secondary circuit which is coupled electro-magnetically with the primary circuit.

The rapid telegraph transmitter is operated by means of a punched tape. The tape has a series of small holes down the center. The holes on each side of this central line are punched by hand and those on one side represent the dots, while those on the other represent the dashes of the Continental code. The central line of holes engages the teeth of a sprocket wheel which serves to feed the tape forward at a regular rate. The tape gear wheel has a number of very small and light radial pins, which tend to fly out except when they are held in position by the tape. Wherever a hole occurs a pin is allowed to spring outwards. These pins are mechanically connected to larger pins on a further attachment of the spindle which fly out when the smaller pins are actuated by the tape. Spring contacts are in series with a set of brushes which press on the segments of three rotating commutators, one of which has a comparatively large number of alternate conducting and insulating segments, and is reserved for dots, while the other two have longer spacings of commutator segments, which are kept for the dashes. In this way all the actual making and breaking of the current is accomplished on these larger segments, while the tape controls the whole apparatus by means of the lightest possible form of mechanical construction. This reduces the effect of inertia to the lowest limit. There are seventy-two pins, each representing a dot and space. An average word has five letters, so it is possible to transmit three words for one turn of the transmitting combination, and the speed of the machine, which is driven by a direct-current motor, can be varied between the limits of ordinary hand speed to a transmission of 300 words or more per minute. The practical limit at present is in the receiver and not in the sender.

A complete rapid receiver consists essentially of a form of string galvanometer in which a gold string is used in connection with a thermocouple. The absence of inertia permits the string to follow the rapid impulses sent out by the rapid sender. A coating of soot is placed on the wire, and the wire itself is mounted in the beam of a Nernst or arc lamp. A suitable optical condenser throws the light on a narrow slit behind which moves a band of photographically sensitized paper. The shadow of a small portion of the wire as it vibrates to and fro in response to the signals from the sending station is thus imprinted on the band, which is then drawn, first through a developing bath, then through a fixing bath, and then through water to wash it. The message may be read on the developed band as soon as it emerges from the light-tight box and may be kept as a permanent record. The signals are read above the zero line which is traced by the shadow of the wire when no impulse is present. A short impulse makes a dot and a long impulse a dash.

The problem of wireless telephony involves essentially three things: (1) The production of undamped or persistent waves in a transmitting antenna. (2) Means for modulating these waves in accordance with the wave form of the spoken voice. (3) Means for detecting the waves at the receiving end and their reproduction into articulate speech.

The Poulsen generator offered a means of supplying the undamped waves in the transmitting antenna and it was only necessary to connect a michrophone at or near a node of current in the antenna to supply a means of modulating these waves in accordance with the wave form of human speech.

At the receiving end almost any self-decohering detector will do, but the production of good clear articulation depends quite a little on the degree of coupling of the primary circuit with the secondary circuit. This also applies to the sending circuits in which quite loose coupling is employed.

Poulsen has transmitted good, clear, articulate speech over the 180 miles between Esbjerg and Lyngby, Denmark. Majorana claims to have talked 312 miles over water with a specially constructed microphone of his own devising. More recently I have carried on successfully two-way working between Stockton and Sacramento, Cal., a distance of fifty miles over land, and while working between these two stations was heard by St. Helena and Palo Alto, distances of seventy-five and eighty-five miles respectively.

There is no doubt that wireless working gives telephony of a higher grade than wire working. There is absolutely no noise in the receiver until spoken words are heard. To one who has talked over long-distance wire lines with considerable induction this feature readily appeals. Low-resistance receivers are not necessary.

With the Poulsen generator of continuous waves it is possible to telegraph at hand speed, i. e., twenty-five words per minute in many ways. For example, it is possible to signal by: (1) Short-circuiting a resistance in the generator circuit; (2) short-circuiting a resistance in the antenna circuit; (3) making and breaking the arc; (4) altering the length of the arc; (5) altering the strength of the transverse magnetic field; (6) altering the flow of gas through the arc.

In practice the inventor short-circuits a turn or two of the sending inductance by means of an ordinary Morse sending key. The absence of the spark permits of the use of an ordinary key when telegraphing 2,000 miles, for the current is even then quite small. For receiving, Poulsen uses the ticker which has the great advantage of not being receptive to ordinary damped wave signals.

The tuning possible with the Poulsen arrangement for telegraphy is extremely close. One-half to one per cent. change in the capacity of the resonant circuit is readily noticed on the received signals. Duplex working has been carried out with 3.9 per cent. change in wave length.

The rapid wireless-telegraph transmitter and receiver have already been described. In practice the transmitter is connected in, just where the Morse key would be for hand-speed telegraphy. Good, clear, readable records have been received over 180 miles, mostly land, at the rate of 300 words per minute.? Over 600 miles good records have been received up to 150 words per minute. As a means for handling large quantities of business and with a record at both transmitting and receiving stations the rapid system has a good future. Poulsen estimates that he can handle 100 words per minute across the Atlantic with a sixty kilowatt generator and suitable antenna.

In the first place the absence of all noise is brought home forcibly in a Poulsen station. It seems hard to believe that anything is being done at all. The key may be of the ordinary Morse type, for the currents handled are quite small even for large distances. There are no insulation difficulties, for the voltage at the top of the antenna is not estimated to to be over 3,000 volts. The sending helix may be handled without shock, even though the voltage be over 1,000.

Very small capacities are used with heavy-power working, eliminating a source of expense and a very bulky part of large "spark" stations. The capacity in connection with a twelve-kilowatt set is about 0.0017 microfarad. At the Cullercoats (England) station the condenser takes up less than a tenth of the space occupied by the condensers for a "spark" system of the same power installed in the same stations.

Undamped waves of small amplitude are less obstructed by atmospheric conditions and suffer less absorption over land than damped wave trains. For example, in coming around the north of Scotland the undamped wave signals are picked up long before the damped wave signals of equal power.

The form of the resonance curve of the receiver circuit depends on the decrement of the transmitter and receiver. If the transmitter is undamped, a very small change in the period of the receiver will put it out of tune, hence, a receiver circuit can be employed which is sensitive to undamped waves of some exact period, but which is exceedingly unresponsive to waves differing by a very small fraction of one per cent. in wave length from the syntonic value.

In the matter of energy, good signals have been transmitted over 500 miles with one kilowatt, and over 2,000 miles with six kilowatts and a limited antenna. The efforts of Marconi and others to reduce the damping of their wave trains is evidence that undamped wave trains will be the means of communication of the future.

In telephony at the present time better articulation is obtainable than with wires and it is quite probable that a method of obtaining secrecy will soon be devised.

In telegraphy there is no doubt that the Poulsen system has great range for little power and that it works readily over land and in daylight. I look to see the present records of distance now held by spark methods broken by stations using the continuous waves. The present speed of the rapid telegraph sender is dependent on the receiver, but a newer type of rapid telegraph detector is coming out which will no doubt result in the handling of greater speed than 300 words per minute. Great advances can be expected in the next five years in wireless working, but they will be along the lines of work with continuous wave trains.

VISITORS.

A recent visitor to our new offices, was Mr. H. L. Falk, of New Orleans, the well known wireless expert. He is at present installing a new wireless telegraph station for the Hotel Majestic, Philadelphia, Pa. The equipment is being supplied by a new million dollar wireless company.

SPECIAL.

Send us $1.00 before August 10th, and we will send you MODERN ELECTRICS for one year and present you FREE with the two latest books, "Making Wireless Instruments" and "The Wireless Telephone."

High Frequency Oscillations.

By Moore Stuart.

A great many people, even at this time, have not the slightest knowledge of how wireless communication is carried on, i. e., the theory.

This is especially true of the amateurs in wireless, many of whom have constructed and set up their own set of instruments.

This is we believe a simple, concise explanation of the theory of the "etheric wave."

If it were possible to vibrate a pencil or similar object in the hand, to the speed of 32 vibrations per second, it would emit a sound increasing in pitch, as the speed of vibrations is increased.

If the number of vibrations is still increased the sound would soon become inaudible, that is, the pencil would still be emitting waves, but waves that will have to be detected by some other agency than the ear, because very soon after the sound becomes inaudible and the number of vibrations increased, heat will be given off, to be detected by the sense of feeling. Perhaps it would be well to state here that all the waves from the lowest sound wave to X-Ray ultra-violet and the highest frequency wave yet obtained may be changed to heat in some form or other. As, for instance, in wireless, when the waves create heat in a detector of the thermo-electric type (mineral detectors), and form a minute current of electricity.

If the vibrations are still increased, to millions per second, light will be produced. Although an impossibility, let us still imagine it is the pencil vibrating at this speed. Now, when the pencil goes forward, as it were, red light will be produced and on the return stroke blue. As the speed is increased the light will go through all the colors of the rainbow.

These waves travel at the rate of 185,000 miles per second. The waves of the wireless travel at this speed also, so that the vibrations per second necessary to produce light will also produce waves for wireless communication.

Now, if the rate of vibrations is still further increased, the waves will pass beyond light and become impossible to see. These are known as the X-Rays, because of their many peculiarities.

If the vibrations were to be still further increased in number, the waves emitted could not be detected by means known to man at present.

Thus it will be seen that waves are detected originally by the senses in order, hearing, feeling, seeing and lastly the X-Ray can be detected by sight again by the use of a prepared screen although any of the forms of waves may be transformed into heat.

At present it is impossible to create waves very much higher in frequency than the X-Rays, but stop and consider the possibilities of such a wave, when produced. It will be possible to light lamps of the Geissler tube variety at great distances without the use of connecting wires, communication can be carried on over immeasurable distances and other marvelous feats performed because it will be noticed that with the increasing frequency of the wave the greater the penetrating qualities of the wave, as for instance light will penetrate a great many more materials than sound will, and the X-Ray will in turn penetrate more matter indefinitely than light will.

So what are the possibilities of the higher frequencies when obtainable?

HOW TO SILVER GALVANOMETER GLASSES.

By H. W. Secor.

Make up a formula as follows:

One hundred parts by volume of a 10% solution of nitrate of silver and add, drop by drop, a quantity of ammonia just sufficient to dissolve the precipitate formed. Make up the volume to 10 times the amount by adding distilled water.

Dilute a 40% solution of formaldehyde to a 10% solution. Dip the glass to be silvered, (previously cleaned with a piece of chamois) into a mixture of 2 parts of silver solution to one part of formaldehyde.

After 10 or 15 minutes, wash the glass in running water and varnish the back. The silver will adhere to both sides and must be removed from the face side.

This is the manner in which the small, but perfect, glass mirrors, used in reflecting galvanometers and other instruments are made.

PROTEST OF THE WIRELESS ASSOCIATION OF RHODE ISLAND.

The following resolutions were adopted by the Wireless Association of Rhode Island at its sixth regular meeting held in the City of Providence, Wednesday, April 13, 1910:

Whereas, There are now before Congress H. J. Resolution 182, by Representative Roberts of Massachusetts and a S. Bill 7243 by Senator Depew of New York, calling for the regulation of the allied sciences of Wireless Telegraphy and Telephony and,

Whereas, The Wireless Association of Rhode Island has always been and is now in favor of intelligent and reasonable regulation of the allied sciences of Wireless Telegraphy and Telephony, nevertheless it desires to protest against the proposed regulations in the aforesaid bills in their present form for the reason that the interests of the Experimenter and Manufacturer are without proper representation on the proposed board as provided for in H. J. Resolution 182 and against the proposed system of licensing of stations as proposed in S. Bill 7243. In view of the fact that the experimenter and manufacturer are largely responsible for the high standard of efficiency which has been reached in the allied sciences of Wireless Telegraphy and Telephony in this country at the present time, it would be, in the opinion of this Association, highly unjust not to have the aforesaid interests properly represented on any such proposed boards. Therefore be it

Resolved, That the Wireless Association of Rhode Island protest against legislation which does not accord proper representation and protection to the experimenter and manufacturer and be it further

Resolved, That copies of this resolution be sent to the President of the United States; to representatives and Senators of the United States, to the several Wireless Societies of the United States and to all Wireless periodicals.

SAMUEL W. BRIDGHAM,

Chairman Committee on Legislation of the Wireless Association of Rhode Island.

A NOVEL RHEOSTAT.

By O. A. SHANN.

There are numerous small size rheostats on the market which answer the purpose of the amateur and experimenter satisfactorily, but there is always the one feature about each of them that causes inconvenience, to say the least. This disadvantage is the necessity of fastening the small rheostat down to the instrument board or table as the wires connected to it are more or less inflexible, they push the rheostat all around whenever they are disconnected or disturbed.

As for fastening the rheostat to the wall, one would hardly care to disfigure it with a little piece of apparatus which he may have only occasional use for.

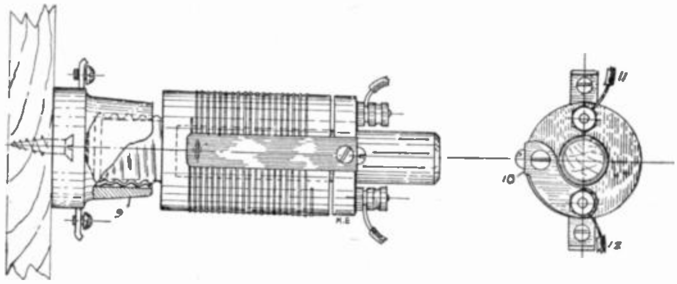
The rheostat shown in the illustration and about to be described does away with the above difficulty and has one or two worthy features besides, namely, an ordinary lamp receptacle is used for connecting up to the battery or generator circuit and when the rheostat is not being used a lamp may be inserted and lighted. As is seen, the rheostat may be disconnected very easily.

Referring to the assembly drawing, a keyless lamp receptacle part (9) is shown fastened to a board by a wood screw in regular way. The positive and negative power leads are connected to it. Leads part 11 and 12 are the ones which have the rheostat in series with the power circuit.

Part 10 is a brass strip about No. 18 B. & S. gauge, which rubs over the resistance wire and slide back and forth, and may be turned to the left or right for finer adjustment.

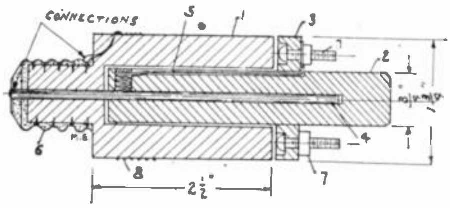
The section through the center shows the construction quite clearly. Part 6 is the base of a discarded incandescent lamp with all the glass and plaster removed from it. To this is secured the tight-fitting end of wooden block part 1. When the block is turned up and bored it should have a snug fit hole in it for the 1/8-inch brass rod, part 4, which in turn is soldered to bottom connection piece of socket. Part 6 is to be glued to part 1 and then prick punched at the bottom of each thread, as shown in illustration, to hold it to wood.

Parts 2 and 3 are made of wood and glued together, the projecting short end of part 2 acting as a handle for adjusting rheostat.



Near the end of part 2 a round hole is made with a groove running up to screw, part 7. A brass spring wire, about No. 22 B. & S. gauge is run in groove and the little coil is dropped in the hole—see illustration—so that it makes good sliding contact on the brass rod, part 4. The other end of wire is connected to screw part (7). A little wood plug is put over spring to keep it in place.

Part 2 must have free sliding fit in part 1 and over part 4.



SECTION THROUGH CENTER

After part 1 has been shellacked and rubbed down, the wire is run onto it, first drilling hole through to part 6 and shoving wire in and soldering it to outside of base. Each turn is separated from the next by its own thickness. The other end of wire is wrapped around a small brad and tacked fast. It is well to have the sliding brass strip touch two turns of wire at a time, giving good, broad contact and preventing slider from digging in between turns.

Other details not mentioned are clearly shown in the sketches.

When the wire is wound on the cylinder, it should have two coats of shellac and be allowed to dry, then the part of wire under the slider should be scraped and cleaned.

The subject which has purposely been left till last, is the quantity, kind and size of wire to be used. A No. 24 German silver bare wire would be about right. As there is about 1 7/8 inch coil space, forty-five turns could be used, separating each wire from the next by its own thickness. Each turn would have a trifle less than 6 inches in it and forty-five would have about twenty-one feet. As there are 54 ohms in a foot of No. 24 B. & S. German silver wire, a total resistance of 10 ohms, approximately, may be obtained.

The safe carrying capacity of this rheostat should not exceed 3.6 amperes.

ELECTRIC VIOLIN PLAYER.

(Continued from page 184.)

magnets control the speed, loudness, stroke, etc., as in the violin. The armature of each hammer is acted upon by two electro-magnets, one of which is wound to be several times as strong as the other, both being traversed by the same current. When the bow is started, both magnets are in circuit, by a variable cut-off device (controlled by the "pedaling" magnet) serves to interrupt the stronger magnet at some point in the course of the bow, thus varying the force of the stroke, as with the pedal of a piano. All contacts are of platinum.

The whole player device requires about 1/2 ampere at 110 volts direct-current. For alternating current circuits a small rotary converter is supplied to fit within the case. The wires, cables and magnets are carefully insulated, and all of the mechanical parts show excellent workmanship. Any violin of standard dimensions can be played by the machine.

The Chilean government is going to expend something more than $240,000 in establishing wireless communication between Santiago (the capital) and Punta Arenas.

Wireless Telegraph Contest

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

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

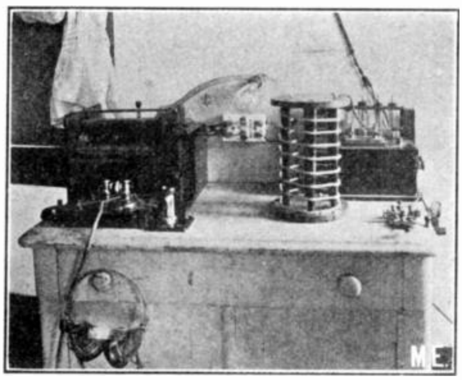
It it also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

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

FIRST PRIZE—THREE DOLLARS

Please find enclosed a photo of my wireless station. The aerial is composed of four strands of No. 14 aluminum wire, 85 feet long, 35 feet high at one end and 30 at the other.

The sending set consists of an E. I. Co.'s 1-inch spark coil, spark gap, helix wound with No. 6 aluminum wire, adjustable leyden jar condenser, and key. The coil is run by 110 A. C. in conjunction with a Gernsback interrupter, which is within the cabinet.



The receiving set consists of a large double slide tuner, E. I. Co.'s variable and fixed condensers, silicon and perikon detectors, with 2,000-ohm phones. A D. P. D. T. switch is used to throw in the sending or receiving apparatus. Nearly all of the instruments are of the E. I. Co.'s make.

CURTIS HUEBNER.

New Jersey.

HONORABLE MENTION.

Enclosed please find description of my wireless station and also photo for publication in your magazine.

The sending radius of my station is 200 miles under ordinary conditions, and the receiving radius is from 2,000 to 3,000 miles, inasmuch as I have one of the best equipment of instruments for receiving made, including five different detectors of standard make—namely, the perikon, electrolytic, silicon, carborundum and ferron. The receivers being those of the latest design of 6,000 ohms, leather headband, etc., made by the Holtzer-Cabot Co. I also use a pair of E. I. Co.'s 2,000 ohms.

I use a tuning transformer of my own design, having two layers of secondary, and I use with this coil two rotary calibrated variable condensers, a fixed condenser and a wave meter.

Aerial is composed of 8 strands of No. 8 B. & S. copper wire, 60 feet long and 75 feet above ground.

The sending circuit is composed of one kilowatt transformer and a condenser of my own make, built up of 25 pieces of plate glass 12 inches square with double thickness tinfoil between.

The tinfoil is shellacked on the glass and a thin layer of paraffine spread over, after which the whole is placed in a wooden box and insulating compound

poured over it and on all sides. The condenser complete weighs about 100 pounds.

The spark gap is the E. I. Co.'s, with zincs 1 inch in diameter and 3/4 inch thick, and the discharge more than fills the gap, even when there is a space of one quarter of an inch. The wireless key is the E. I. Co.'s with extra large platinum contact points made to carry 3 K. W.

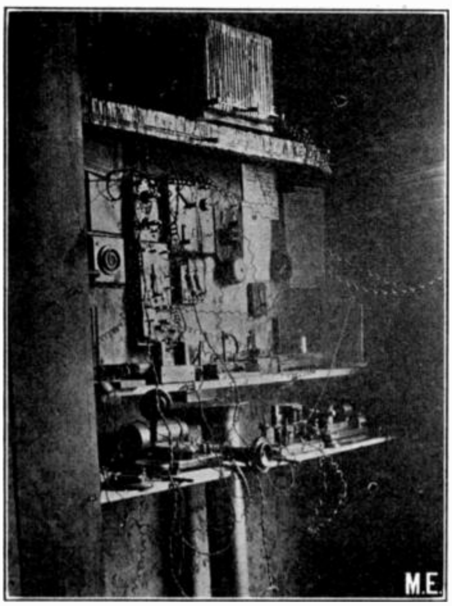
Either sending or receiving circuits are switched into operation by an extra large double-throw switch with a slate base measuring 6 inches by 12 inches.

The receiving wave length of my station is 425 meters and my call letter is S. N. All amateur stations invited to call. CHAS. L. PICHEL.

Scranton, Pa.

HONORABLE MENTION.

Enclosed please find photo of my wireless station. The outfit shown I constructed myself, relay and phone excepted. Only the receiving outfit can be seen, as it is impossible to photograph



the sending set, which is in case on left of photo. The particulars are as follows: two single slide tuning coils at top of photo; selective switch on wall, first shelf left side; fixed condenser, galena, sulphide and galena, peroxide of lead, sulphide zinc and copper oxide detectors. lower shelf; microphone detector, post office phone, Marconi detector, tapper and relay. The long tube is a variable condenser. With the above outfit I obtain excellent results, thanks to MODERN ELECTRICS, which is miles ahead of any magazine we have here in England.

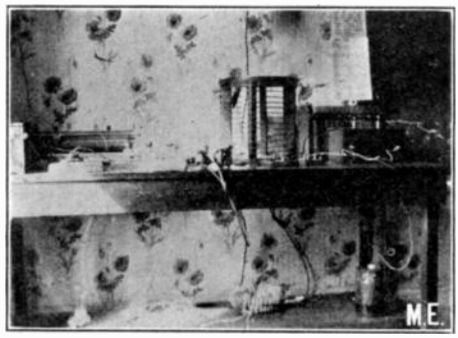
F. C. STIMPSON.

Leyton, London, N. E.

HONORABLE MENTION.

Enclosed please. find photograph of my wireless station.

My aerial is of the horizontal type, 64 feet high at the house end and 40



feet high at the lower end. It consists of 4 No. 14 wires, spread 2 feet apart and each 60 feet long. The pole on the house is 26 feet long and supported by twelve guy wires. The wires in the foreground are electric light and telephone ones, and give a good idea of the interference I have to work through.

The instruments shown were recently exhibited at the Minneapolis Electric Show and are all home-made, except the phones. The receiving set at the left consists of a double slide tuner, variable and fixed condensers, potentiometer, silicon, molybdenite and electrolytic detectors, and 2,000-ohm E. I. Co. phones. A buzzer test is kept under the table.

The sending set at the right consists of a 1-inch spark coil, electrolytic interrupter, heavy key, a variable glass plate condenser and a helix, and is used on 110 volts, A. C.

The instruments are screwed down upon the table and all the wiring is done with flexible cord. Messages are sent and received daily with this equipment. Since these pictures were taken I have built a 1/2 K. W. transformer and a large condenser, also a loose coupler, which have greatly strengthened the station. PHILIP EDELMAN.

Minneapolis, Minn.

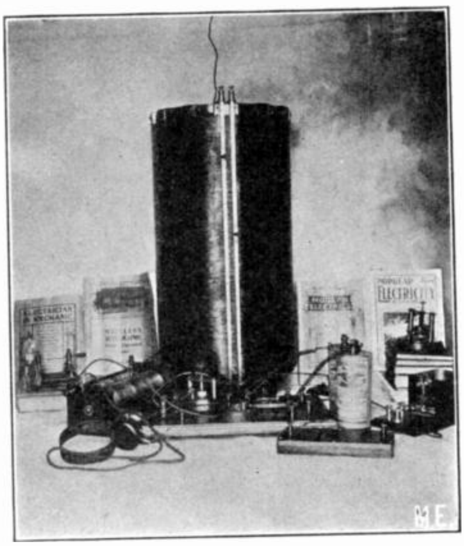
HONORABLE MENTION.

Enclosed please find photos of my wireless station.

I use the looped style aerial and it is composed of 4 No. 14 aluminum wires spaced 2 feet apart and is 95 feet long and only 40 feet at highest point.

My receiving outfit consists of the following instruments, viz.: Large-size tuning coil shown in back of picture, which was built by instructions given in the June, 1908, issue of MODERN ELECTRICS. It is 2 feet high, 12 1/2 inches diameter, and is wound with 440 turns of black enameled wire, No. 18, B. S. gauge.

In front of tuning coil is a connecting board with which I can quickly "hook up" instruments in various ways. On top of said board is an electrolytic detector, one single point switch for switching in battery, and one 3-point switch for switching in different detectors. To the left of board is a potentiometer and one 1,000-ohm E. I. Co. telephone receiver. To the right and in



front of board is the fixed condenser and battery.

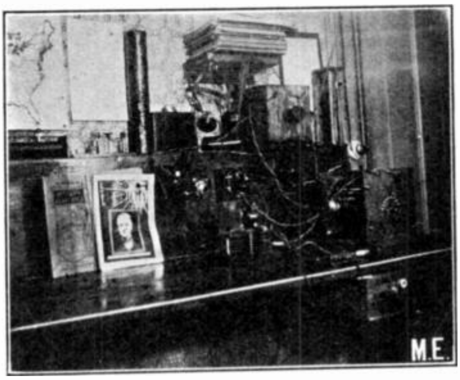
In front of the "Electrician and Mechanic" is a zinc spark gap, which I made some time ago. In front of "Popular Electricity" is a silicon detector which is not in use at present. A 150-ohm box-sounding relay is partly shown in extreme right.

I have no transmitting outfit at present. All the instruments with the exception of relay and telephone receiver were made by myself per instructions given in the magazines (shown in picture), to which I am a regular subscriber. ROBT. F. ADAMS.

Texas.

HONORABLE MENTION.

Enclosed please find photo of my wireless station. I have been experimenting for about six weeks and have only just finished the receiving set.



As can be seen in photo to the right of picture, upon a shelf by the door is a double slide tuning coil of 375 meters; next to this is a Variometer and a pair of 2,000-ohm E. I. Co. receivers; the big long coil standing next is the primary to my transformer and after this can be seen detector and potentiometer, and on the wall in order is a switch of my own construction of rotary type for receiving and sending. Snap switch for testing outfit and then silicon detector.

On the bench proper is a variable condenser, fixed condenser, which can be seen by side of variable, while next to this is my doughnut transformer. All of these, with the exception of phones, are of my own construction and I have received many helpful hints from MODERN ELECTRICS, which I think is the best magazine in the field. I take three other electrical magazines.

WILLARD J. SIMONS.

New York.

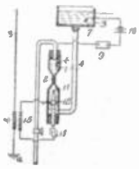
WIRELESS VIA PIKE'S PEAK.

Denver.—According to information received here, a wireless telegraph station will be established soon on the top of Pike's Peak.

It will be used as the midway transmitting and receiving point in an effort to send wireless messages from the Atlantic to the Pacific Coast.

Wireless Patents for the Month.

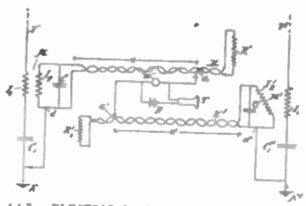
962,015. RECEIVER FOR ELECTRIC SIGNALING. REGINALD A. FESSENDEN, Washington, D. C., assignor to The National Electric Signaling Company, a Corporation of New Jersey. Original application filed Jan. 9, 1905, Serial No. 240,268. Divided and this application filed Jan. 6, 1906. Serial No. 294,929.



1. A receiver for electro-magnetic waves having in combination a constricted conducting fluid path, means for producing a bubble and means for causing the bubble to move into the constricted fluid path.

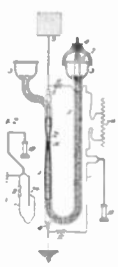
961,260. APPARATUS FOR DETERMINING THE DIRECTION OF SPACE-TELEGRAPH SIGNALS. JOHN STONE STONE, Boston, Mass. Filed Apr. 15, 1909. Serial No. 490,134.

1. An apparatus for determining the direction of space telegraph signals comprising two separated elevated receiving conductors, two receiving circuits each associated with a different one of said elevated receiving conductors, two artificial lines each connected with a different one of said receiving circuits and an oscillation-detector connected with said artificial lines.

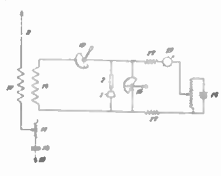


962,417. ELECTRICAL RECEIVING APPARATUS. JAMES MURRAY BOYLE, New York, N. Y. Filed July 28, 1905. Serial No. 271,709.

1. A receiver comprising two bodies of electrolyte of different characteristics, having a minute surface or region of connection, and suitable electrodes in series therewith.

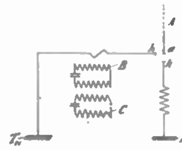


962,262. WAVE-DETECTOR FOR WIRELESS TELEGRAPHY. WILHELM SCHLOEMILCH, Berlin, and PAUL FERNAND PICHON, Südende, near Berlin, Germany, assignors to Gesellschaft für Drahtlose Telegraphie M. B. H., Berlin, Germany. Filed Apr. 14, 1906. Serial No. 311,678.



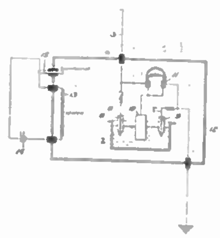
1. A wave detector for wireless telegraphy, consisting of two contact bodies, one of which is formed of one of the naturally found manganese compounds containing moisture.

960,304. WIRELESS TELEGRAPHY. ROBERTO C. GALLETTI, Rome, Italy. Filed Dec. 20, 1907. Serial No. 407,298.



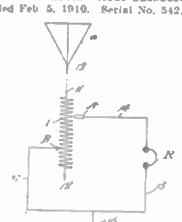
A system of wireless telegraphy in which a closed oscillating circuit is used to accumulate energy which is emitted periodically by an antenna, the duration of the emission of the energy by the antenna being continued until the emission reaches the steady condition.

962,016. RECEIVER FOR ELECTROMAGNETIC WAVES. REGINALD A. FESSENDEN, Washington, D. C. Filed Mar. 16, 1906. Serial No. 306,386.



1. A receiver for wireless telegraphy, comprising a body of electrolyte, two fine terminals in contact therewith and a larger terminal also in contact therewith, combined with circuits for passing electromagnetic waves through the electrolyte, and means for indicating resulting changes of conductivity in the electrolyte.

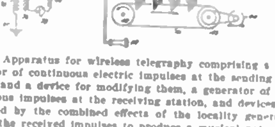
961,855. DETECTORIUM. HUGO GERNSBACK, New York, N. Y. Filed Feb. 5, 1910. Serial No. 542,207.



1. A wireless telegraph and telephone tuning coil including a movable contact element of such material as to form a detector.

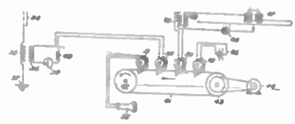
960,631. WIRELESS SIGNALING. REGINALD A. FESSENDEN, Brant Rock, Mass. Filed Oct. 10, 1907. Serial No. 396,817.

1. In apparatus for transmission of electric energy, the combination with a generator of practically continuous impulses at the sending station and a device to modify them, of a receiving station comprising a generator of continuous impulses and devices by which the combined effects of the locally generated and the received impulses normally annul each other's effects, whereby when the sent impulses are modified in character, an indicating effect is produced by interrupting said normal mutual annulment.



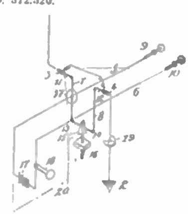
2. Apparatus for wireless telegraphy comprising a generator of continuous electric impulses at the sending station and a device for modifying them, a generator of continuous impulses at the receiving station, and devices operated by the combined effects of the locally generated and the received impulses to produce a musical note only when the impulses are modified in character, substantially as described.

962,018. METHOD OF SIGNALING. REGINALD A. FESSENDEN, Brant Rock, Mass. Original application filed Oct. 10, 1907, Serial No. 396,817. Divided and this application filed June 24, 1908. Serial No. 412,417.



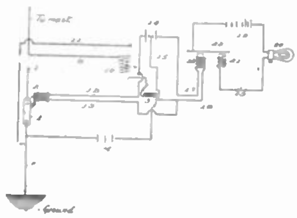
1. The method of signaling by maintaining a continuous flow of impulses at a receiving station, normally annulling their effect by received impulses sent from another station, and signaling by modifying the sent impulses and thus interrupting said normal annulment.

962,017. ELECTRICAL APPARATUS. REGINALD A. FESSENDEN, Brant Rock, Mass. Filed Apr. 18, 1906. Serial No. 312,520.



1. Electrically actuated means for producing an indication comprising a coil having a large co-efficient of magnetic induction per unit of mass i. e., a ratio of self inductance to mass of more than one hundred thousand.

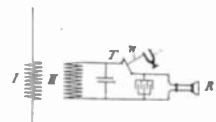
961,914. WIRELESS LIGHTING SYSTEM. EDWARD B. TUSTIN, Jr., Bloomsburg, Pa. Filed Apr. 1, 1908. Serial No. 424,608.



1. In combination, a lighting circuit, lamps therein, and an electrical circuit closer for the lighting circuit included therein, an electro-magnet in said lighting circuit coöperating with said circuit closer to hold the same closed while current is passing in the lighting circuit, an antenna circuit, a local circuit including a relay and having electrical connection with the antenna circuit upon opposite sides of the coherer, a tapper circuit, and a circuit closing circuit having a battery and a closer common to each, said closer adapted to be operated by the relay, and the circuit closing circuit including an electro-magnet for closing the working circuit, the battery common to the tapper and circuit closing circuits having like elements electrically connected with each and having the opposite elements electrically connected with the opposite ends through the circuit closing contact and armature of the aforesaid relay.

961,645. RECEIVER FOR WIRELESS TRANSMISSION OF SIGNALS. VALDEMAR POULSEN, Copenhagen, Denmark. Filed Oct. 22, 1907. Serial No. 398,619.

1. An arrangement for receiving of signals transmitted by means of rapid electric oscillations comprising an oscillation circuit, an electro-magnetic apparatus, and a device for intermittently connecting and disconnecting the said apparatus to and from the oscillation circuit.



Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending June 28

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.

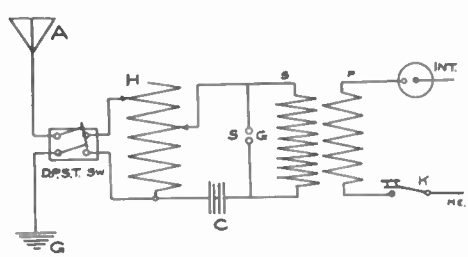
If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

SENDING RANGE.

(607.) Ben Hassenger, Mich., requests:

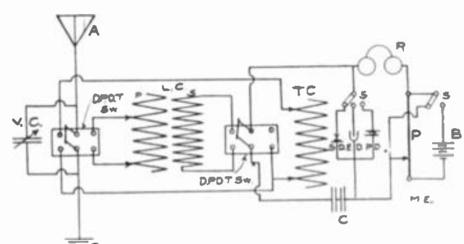
1.—Answer the following: Sending set consists of one 1-2 transformer coil, E. I. Co., one helix wound with 12 turns of No. 8 copper wire wound on a 12-inch frame and I have 12 turns on, 1 gallon Leyden jar, one wireless key, one electrolytic interrupter, E. I. Co., zinc spark gap, run on 110 A. C., aerial consists of 8 aluminum wires, 10 inches apart and 60 feet high and 60 feet long, ground on gas and water both, one D. P. S. T. switch. How far can I send with this outfit? Give diagram how to connect.

A. 1.—50 to 75 miles. Diagram given below.



2.—Receiving set consists of one loose coupler, 2-slide on primary, one 2-slide tuner with 570 turns of 28 enameled wire on a core 12 1-2 inches long and 3 inches in diameter, one fixed condenser, E. I. Co., one variable E. I. Co.'s condenser, 3 detectors, silicon, electrolytic and perikon, and 2,000-ohm phone set, one potentiometer, one battery for liquid detector, one D. P. S. T. switch. Give diagram how to connect both loose coupler and 2-slide tuner so I can use one and not the other at different times, and also how to connect the three detectors so I can use them at separate times; also, how far can I receive with same?

A. 2.—Diagram given below. 300 to 500 miles.



TUNING TRANSFORMER.

(608.) X. Y. Z., Cal., writes:

1.—How far can I receive with two aerials 40 feet high at one end and 32 feet at the other with wires 18 inches apart, one aerial facing east and the other facing west, with water pipe ground, 400 feet No. 20 copper covered wire, single slide tuning coil, fixed paper condenser, variable condenser, 4 sheets glass 8 x 14, tinfoil on one side of each plate, 7 x 13, having air as dialectric and moving in and out, 80-ohm carbon rod potentiometer, E. I. Co. crystal detector stand using molybdenite, one 75-ohm telephone receiver and one 75-ohm head receiver connected in series, one good dry battery?

A. 1.—50 to 75 miles.

2.—If a station is wanted having a longer wave length than another, is it true to receive, move the slider up the coil, adding more inductance?

A. 2.—Yes, if the aerial lead is connected into the bottom of the helix.

3.—I have just constructed a receiving transformer with 140 feet of No. 28 copper wire on secondary and 50 feet No. 24 copper wire on primary, with single slide on secondary. How much better would it be to my station than a tuning coil, and why, and in what respects?

A. 3.—About 25 per cent. better. Greater selectivity is attainable by its use.

INDUCTANCE AND RESONANCE.

(609.) Frank Upholt, Jr., Philadelphia, Pa., writes:

1.—Kindly tell me why I hear the buzz

MURDOCK
WIRELESS APPARATUS

What We Find in the Mail Every Day.

STYLE "AM."

"I think it my duty to inform you that your 2000 ohm receivers have been subjected by me to an exhaustive test, and that they came out first by a large margin for loudness, distance, and reliability. One of the six pairs in this competition sell regularly at $14.00; another pair was imported and cost $22.50. The three remaining pairs sold at approximately the same price as yours, i.e., $7.50. This letter is entirely unsolicited." Sincerely,

H. BESSER, M. D.

Everything for Wireless.

WM. J. MURDOCK CO.
40 CARTER ST., CHELSEA, MASS.

162 Minna St. San Francisco | 221 So. Clinton St. Chicago

Patents that PRODUCE

TO-DAY we represent Inventors for whom we have continuously served as patent attorneys for **A Third of a Century,** and our clientage constitutes a larger body of SUCCESSFUL Inventors than is constituted in the clientage of any other attorneys practicing before the Patent Office.

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R. S. & A. B. LACEY

Dept. 5. WASHINGTON, D. C.

ESTABLISHED 1869

When writing, please mention "Modern Electrics."

of an automatic gas burner in my receivers. Has gas pipe ground with condenser in series with it and silicon detector.

A. 1.—This is due to the inductive kick of the magnets in the gas burner and should be heard only when lighting or extinguishing the gas.

2.—How is the height of aerial determined; from the foot of pole or from instruments to top of aerial?

A. 2.—From the instruments to top of aerial.

3.—What is inductance? Resonance?

A. 3.—Inductance is defined as the property possessed by any electrical circuit, causing it to develop magnetic lines of force around it. Resonance is that state present when two oscillating electric circuits are in syntony or tune. Thus, when two oscillating circuits, such as the transmitting and receiving circuits of a wireless system are tuned to each other, they are said to be in resonance.

RECEIVING RADII.

(610.) HAROLD HERMANN, Ohio, writes:

1.—What would be my receiving radius with a silicon detector, 1,000-ohm receiver, variable condenser, fixed condenser, tuning coil (600 meters) and 50-foot aerial suspended between 2 poles 75 feet apart and composed of 6 No. 14 bare copper wires?

A. 1.—200 to 250 miles.

2.—If I have 2,000-ohm receiver instead of 1,000 ohms, how much farther could I receive.

A. 2.—Up to 400 miles.

3.—From what U. S. Army stations could I receive (1,000-ohm receiver)?

A. 3.—None, that we know of.

CONNECTIONS.

(611.) WILLIAM BUCKETT, JR., N. Y., asks:

1.—Will you please give diagram for connection of following instruments, using D. P. D. T. switch? By doing so you will greatly oblige a new subscriber: Induction coil, Leyden jars, key, spark gap, sending helix, single slide tuning coil, fixed condenser, receivers, potentiometer, silicon and electrolytic detector.

A. 1.—See answer to queries No. 333 and No. 359 in October, 1909, issue.

VARIABLE CONDENSER.

(612.) B. F. ALLEN, N. Y., writes:

1.—How many watts does the "Electro" 1-2 K. W. transformer coil consume? How many square inches of tinfoil are needed for a condenser on the secondary of the same? For a 2-inch coil?

A. 1.—500 watts. Use 12 glass plates 10 by 12 inches coated on both sides with tinfoil 7 by 9 inches, connecting the plates in parallel. For 2-inch coil condenser, see answer to query No. 517 in June issue.

2.—In the receiving circuit, how many plates in all should a rotary condenser have having for the rotating plates semicircular plates 6 inches in diameter and stationary plates to match, the stationary plates being 1-8 inch apart?

A. 2.—Use 20 stationary plates and 19 moving ones.

3.—How many square inches of tinfoil for fixed condenser in the same circuit and which should be used for dielectric, glass or paraffine bond paper?

A. 3.—See answer to query No. 514 in April issue.

TWO-INCH SPARK COIL.

(613.) B. CAMPBELL, Montreal, Canada, says:

1.—I want to make a 2-inch spark coil, and have a core 8 inches long by 2 inches in diameter. Please tell me how much and what kind of wire to wind my primary with and what size secondary wire to use.

A. 1.—Use 2 layers primary No. 14 D. C. C. magnet wire. Secondary of 3 lbs. No. 34 S. S. C. wire.

2—Would two or three small plate condensers of about 8 (3 1-4 x 4 1-4) plates each be as good as one large one?

A. 2.—Yes.

3.—Please explain how you wind the primary or secondary of a coil in sections.

A. 3.—This would take up more space than is allowable in these columns. We refer you to our excellent 25-cent handbook on induction coils by K. Stoye.

SENDING AND RECEIVING RADII.

(614.) LEON BEROTH, Mich., asks:

1.—Would you kindly tell me my sending and receiving distance of the following instruments: A transformer tuning coil, silicon detector, potentiometer, fixed condenser, variable condenser, 1,000-ohm receivers, with an aerial 60 feet high at one end and 30 feet at the other and 20 feet between the two, with six strands of No. 8 aluminum wire, zinc spark gap, helix, key, 1 1-2-inch E. I. Co.'s spark coil, Gernsback interrupter operated on 110 volts D. C.?

A. 1.—Sending range, 8 to 12 miles, under good conditions, and receiving radius 300 to 500 miles.

2.—Is it better to use two aerials, one just below the other, and why is this done?

A. 2.—No. Unless you refer to the duplex aerial.

3.—Will you kindly give a diagram showing the best way to construct an aerial and how to connect them together, showing where to take off the wire leading to the station?

A. 3.—See answer to question No. 463 in February, 1910, issue.

TWO-INCH COIL HELIX.

(615.) RAYE BIDWELL, Chicago, Ill., writes:

1.—Please give dimensions of a 2-inch spark coil that will run on 6 dry cells or a 6-volt 60-ampere storage battery.

A. 1.—Core 10 x 1 1-8 inches, primary 2 layers No. 14 D. C. C. wire, secondary 3 lbs. No. 34 S. S. C. wire, condenser 100 sheets tinfoil 9 x 7 inches.

2.—How many feet of No. 8 aluminum wire will it require for a helix for this coil?

A. 2.—Wind 15 feet of this wire on a circular frame 10 inches in diameter, spacing the turns 1 inch apart.

3.—How many square inches of tinfoil will it require for a condenser to be used across the vibrator?

A. 3.—See query No. 551 in May issue.

LIGHTNING DISCHARGE.

(616.) ARCHIE THOMAS, Mass., writes:

1.—Suppose the aerial wires to be grounded directly during a thunder storm.

In driving screws in a cramped corner,

or high overhead, or down a hole, or where you must hold on with the other hand —you need the

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Now is the lightning drawn from the air silently or with a loud crash?

A. 1.—Silently.

2.—Do the waves sent out from a transmitting station follow the curvature of the earth? The reason I ask this is as follows: My wireless station is situated as you will see by the drawing, on the opposite side of a hill from the transmitting station; is it possible for me to get the transmitting station clearly if it is of 5 K. W. and 50 miles distant, providing I have a good receiving set?

A. 2.—Yes.

3.—What is the receiving distance of my wireless station? It is as follows: Aerial 36 feet high and 25 feet long, consisting of 4 wires, 1,500 meter loose coupler, perikon and ferron detectors, variable condenser, fixed condenser, and 2000-ohm Murdock receivers. How can I increase the efficiency of same?

A. 3.—Receiving radius 100 to 150 miles. You may improve your station by using a higher and longer aerial.

CHOICE OF GROUNDS.

(617.) ROY J. NEWLIN, Ind., inquires:

1.—Would you advise the use of a water well with 3-inch casing and 96 feet deep, or a gas pipe as a ground for wireless?

A. 1.—The water well, most certainly.

2.—Please give diagram for connecting up the following: Electrolytic and silicon detectors, double slide tuner, potentiometer, 75-ohm receiver and battery. What would be the receiving distance with aerial four strands 108 feet long, 60 feet high?

A. 2.—For diagram of connections see answer to query No. 548, in May issue. You can receive up to 500 miles with aerial and instruments named.

3.—Would the diagram for lightning arrester switch outside of house work?

A. 3.—Yes, but we would advise that you use a S. P. D. T. knife switch with porcelain base. Connect the aerial lead to the knife blade ground to one jaw and instrument lead to the other. Thus a direct ground is readily made by throwing the blade in the grounded jaw.

ALUMINUM FLUX.

(618.) GEO. URBACH, Ind., asks:

1.—Is the current flowing in the secondary winding of an induction coil alternating or direct?

A. 1.—It is an unsymmetrical alternating current; i. e., the 2 half waves, positive and negative, forming 1 cycle, are not equal in form or magnitude.

2.—How many sheets of tinfoil 7 x 4 1-2 inches should be used in making a condenser for the primary of a 1 1-2 inch induction coil?

A. 2.—250 sheets.

3.—Where can I obtain a good flux for soldering aluminum?

A. 3.—Write to Electro Importing Co., 233 Fulton street, N. Y. City.

STRAY CURRENT.

(619.) H. A. BAKER, Mass., writes:

1.—The other night while experimenting, I disconnected my aerial from the tuning coil, and connected a wire from the gas jet in its place. I use the water pipe for a ground. When I listened in the phones I could hear a loud buzzing. I then put an electric bell in place of the phones and by loosening the armature spring the bell was kept ringing continuously until disconnected. Not very loud, but still enough to be heard in the next room. I used a silicon detector. Without the detector, it would ring for a few seconds only, at long intervals. Would like to have it explained.

A. 1.—This phenomena is probably due to stray leakage currents from power cables in the neighborhood. There have been cases where it was possible to light up a 110 volt 16 C. P. lamp when connected to the gas and water pipes in a house.

AUTO COIL.

(620.) L. J. BARTON, writes:

1.—How far can I receive with aerial 50 feet high at one end and 25 feet high at other end and composed of two strands aluminum wire? Instruments are tuning coil, detector and 100-ohm receivers.

A. 1.—60 miles.

2.—How many feet of No. 20 enameled wire will I have to use on a tuning coil, core 4 inches in diameter,, 10 inches long? And what would it cost?

A. 2.—450 feet. Cost, $1.12.

3.—Would an automobile coil giving about a ⅜-inch spark do for wireless? If so, how far would it send?

A. 3.—Yes. ¼ to ½ mile.

CALL LETTERS.

(621.) ALFRED O. BRAGG, Maine, asks:

1. Could I receive Wellfleet, Biscuit Rock, a 5 K. W. station at Portland, Me., and Portsmouth, N. H., with the following outfit?

Aerial 150 feet long, 4 wires No. 14 aluminum, 65 feet high, loose coupler wound with No. 22 in both primary and secondary, one 1200-ohm 'phone with "gold" diaphragm, Ferron detector, Fixed condenser, variable condenser, single slide tuner (optional) ground on water pipe?

A. 1.—Yes, if you rewind your loose-coupler secondary with No. 28 wire.

2.—Please give me the present call letters of Portsmouth, N. H., Cape Elizabeth, Me., Brant Rock, Boston Herald office and the Charlestown Navy Yard.

A. 2.—N. A. C., N. A. B., B. O., B. H., N. A. O., respectively.

DIAGRAM CONNECTIONS.

(622.) L. E. ADLER, La., writes:

1.—Give diagram for connecting the following instruments, receiving: Single slide tuner, tuning transformer, silicon, carborundum and electrolytic detector, fixed condenser, variable condenser, 75-ohm receiver. potentiometer, two choke coils for potentiometer, buzzer and push button for testing. Sending: 1-inch induction coil, key, helix, as described in your book, "How to Make Wireless Instruments," 2 1-pint Leyden jars, spark gap, hot-wire ammeter, required batteries, S. P. D. T. switch for lightning protection, D. P. D. T. switch for changing from receiving to sending, and other required switches?

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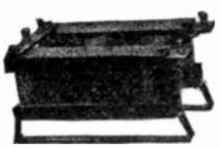

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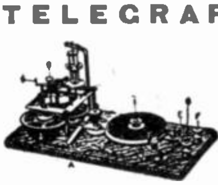

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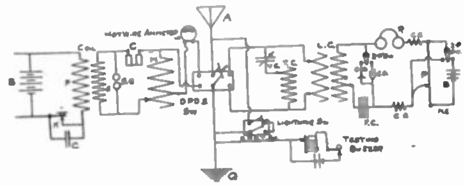
A. 1.—Diagram given below.



2.—How far can I send and receive with the above instruments with an aerial consisting of 4 wires each 80 feet long, 35 feet high at one end, and 45 at the other?

A. 2.—60-80 miles.

3.—If using Leyden jars, should the condenser in an induction coil be taken out?

A. 3.—No.

1½-INCH COIL.

(623.) M. J. Schlosser, Ill., asks:

1.—Size of wire and core to an inch and a half spark coil

A. 1.—Core, 7 x 1 inch. Primary of 2 layers No. 14 D. C. C. wire. Secondary, 2 pounds No. 33 S. S. C. wire. Condenser, 100 sheets tinfoil 7 x 7 inches.

2.—Should primary and secondary windings be connected in any way, and should paper be put between them?

A. 2.—No; a ⅛-inch wall fibre tube should separate them.

3.—How many strands aluminum aerial wire would it be advisable to put on an aerial 75 feet high and 100 feet long?

A. 3.—4 wires spaced 3½ or 4 feet apart.

DETECTOR CRYSTAL.

(624.) Frank Davis, Minn., inquires:

1.—What is the name of the crystal used in a Ferron detector?

A. 1.—Iron pyrites.

2.—What is the receiving distance of the following instruments: Electro-loose coupler, 2000-ohm phones, 2 variable condensers, Ferron detector, and an aerial 100 feet long and 100 feet high, composed of 4 wires, each 2 feet apart?

A. 2.—750-1000 miles.

"AERIAL-LESS WIRELESS."

(625.) Frank Copemann, N. Y. City, says:

1.—How can I make a wireless without an aerial?

A. 1.—By using large capacities such as plates or cylinders in the house. Messages have been sent 30 miles in this manner.

2.—Can medical coils be connected together in series and make a ¼-inch spark or more?

A. 2.—Not satisfactorily, as they have not strong enough insulation to stand the increased strain.

3.—Describe a tantalum detector.

A. 3.——The tantalum wire is arranged to just touch a small cup of mercury.

SPARK GAP.

(626.) Eustice Bernhardt, Visalia, Cal., says:

1.—Kindly tell me from which aerial I

can get best results, one composed of 6 No. 14 aluminum wires 2 feet apart or 4 wires 3 feet apart, or 12 wires 1 foot apart.

A. 1.—The 4 wires spaced 3 feet apart will give as good results as the others, as anything spaced less than 1 meter is a waste of wire.

2.—Which give best results as a spark gap in sending, brass spark balls or zinc rods?

A. 2.—Balls are used for short distance ungrounded sets, with short aerials such as used for demonstrating, and zinc rods for regular work with ground connection and aerial.

3.—In making a 1-plate condenser for a ½ K. W. transformer coil, is the tinfoil placed on both sides of the glass plate, and how much foil is necessary?

A. 3.—Yes. 819 square inches tinfoil is required, with glass 1-16 inch thick.

"SILICA-CARBIDE DETECTOR."

(627.) ALFRED ABERCROMBIE, writes:

1.—Can a "make and break" engine spark-coil be connected up and used to advantage in conjunction with a 1-inch "jump spark-coil" for wireless work, and if so, please give wiring diagram.

A. 1.—No.

2.—Is the new "silica-carbide" detector more sensitive than the Perikon?

A. 2.—No.

3.—Where can I buy a Pyron or Perikon detector?

A. 3.—Write to Wireless Specialty Apparatus Co., New York City.

WIRELESS TELEPHONE.

(628.) ADOLPH R. SALINGER, JR., Mass., writes:

1.—I have 2 telephones wired up about ½ mile, one wire running in the air, and the other is the ground. Will you please tell me if I could do away with that wire?

A. 1.—Yes. Consult our treatise, "The Wireless Telephone," page 26, sent post-paid for 25 cents.

"SENDING RANGE."

(629.) ROYAL E. TERHUNE, N. J., says:

1.—If my station is equipped with a receiving apparatus, that can receive from 1000 to 1200 miles, and another station 1000 miles distant has a set that will send 50 miles, can I hear the messages plainly?

A. 1.—No. A set of 50-mile sending range can send only that distance.

2.—How far will a 1½ K. W. closed core transformer, with 20,000 volts output send, the secondary being wound with enameled wire? And what battery power would be needed if it can be run with same?

A. 2.—50-100 miles. It cannot be used on batteries.

"TUNING COIL."

(630.) C. C. WILLIAMS, Kentucky, wishes to know:

1.—How much wire will it take to make a tuning coil 12 x 4 inches, using 24 B. & S. gauge enameled wire?

A. 1.—840 feet of wire.

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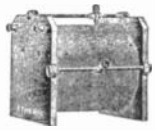

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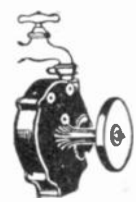

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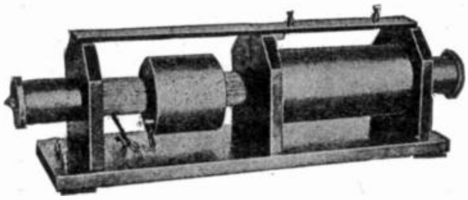

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2.—What would be the receiving distance, using above tuner with electrolytic and silicon detector, 1 pair 75-ohm receivers and aerial 30 feet long, 50 feet high.

A. 2.—75-100 miles.

SECONDARY CURRENT.

(631.) A. E. WILKINSON, Oregon, inquires:

1.—How many volts and amperes does a 1-inch coil deliver with a Gernsback interrupter on a 110-volt, 6-ampere A. C. main?

A. 1.—20,000 volts and about .001 ampere.

2.—Would you kindly send me directions how to make a 1000-meter double-slide tuning-coil? How many feet and size of wire, and diameter and length of core, using D. C. wire?

A. 2.—825 feet No. 18 wire wound on a circular core, 13 inches in diameter.

3.—I have an 8 candle-power light within 3 inches of my lead in wire. Should the filament jump toward the wire when I am sending? Please find enclosed a sample of the wire. What kind is it?

A. 3.—Yes. This is due to the magnetic effect of the high voltage wire. Wire enclosed is tinned copper.

PEROXIDE LEAD DETECTOR.

(632.) H. LOUNSBURY, Nebraska, says:

1.—How far should the spark gap be on a E. I. Co. 1-inch coil to get the best results in wireless? Also the ½-inch coil?

A. 1.—3-16 inch on the 1-inch coil; 1-16 inch full on the ½-inch coil.

2.—Is the peroxide of lead detector better for wireless for short distances of 50 to 150 miles, considering convenience, than the electrolytic?

A. 2.—Yes.

3.—Where can brass tubing be obtained?

A. 3.—Write to the Electro Importing Co., 233 Fulton St., N. Y. City.

RECEIVING RADII.

(633.) H. W. TAYLOR, Mass., writes:

1.—Will you kindly tell me the receiving distance of my wireless telegraph outfit, and also necessary improvements, in the order that they are most needed? Aerial, 50 feet high, 75 feet long, made up of 4 strands of No. 12 aluminum wire, 1½ to 4 feet apart; tuning coil, double-slide, 18 inches long, 3 inches in diameter; detector, silicon; condenser, fixed, waxed paper and tinfoil; receiver, 1000 ohms, with headband; ground, steam radiator pipe?

A. 1.—400 miles. If possible, space your aerial wires 4 feet apart and connect a variable condenser across tuning coil.

2.—How far would above set receive with a tuning transformer?

A. 2.—20 to 30 per cent. further.

WAVE LENGTH.

(634.) LOUIS DIGGS, N. Y., inquires:

1.—Will it make any difference in the tuning of a station to use one pole and have the aerial slanting? I want to use, if possible, a pole 100 feet or more, and I am unable to use two poles?

A. 1.—No.

2.—Is there any place where I can obtain the unassembled parts of a commercial tuning transformer?

A. 2.—Refer to our advertising columns.

3. Would an 8-wire aerial 70 feet long have too great a wave length to receive from ordinary amateur stations?

A. 3.—No.

I-INCH SPARK COIL.

(635.) DELLWYN WALTIS, JR, Penna:

1.—Please .ell me what the receiving distance is of my wireless station with a silicon detector, double-slide tuner, pair of 2000-ohm receivers (Holtzer & Cabot); fixed and variable condensers; aerial 50 feet high, 50 feet long; 4 aluminum wires.

A. 1.—350 to 400 miles.

2.—Receiving range of same instruments but aerial, 150 feet high?

A. 2.—1000 to 1500 miles.

3.—How can I make a 1-inch spark coil?

A. 3.—Core, 8 x 1 inch; primary, 2 layers No. 16 D. C. C. wire; secondary of 1 pound No. 34 S. S. C. wire; condenser, 100 sheets tinfoil 7 x 5 inches; battery, 12 volts.

¼-INCH COIL CONDENSER.

(636.) ROY WILMARTH, Mo., inquires:

1.—Will a core for a spark coil work all right if it is put in a brass tube 1-32 inch thick, and then the primary wound on the brass tube?

A. 1.—No: The core's inductive effect will be wasted mostly in setting up useless currents in the brass tube. The brass tube may be used if desired, providing it has a slit running its entire length.

2.—How many glass plates 5 x 7 inches would it take to make a glass plate condenser for a ¼-inch spark coil?

A. 2.—Two.

ALUMINUM AERIALS.

(637.) L. SCHUMACKER, Minn., writes:

1.—With a pair of 1000-ohm receivers, "Electro" loose coupler, two fixed and one variable condensers, potentiometer, battery "Ferron" and "Electro"-lytic detectors and an aerial composed of four No. 14 aluminum wires, 80 feet long and 50 feet high at one end and 60 feet at the other, what would be my receiving radius over land in North Central United States? Please give diagram of the best connections of this outfit.

A. 1.—350 to 500 miles. See diagram in answer to query No. 548 in May number.

2.—Does a corrosion on aluminum aerials interfere with sending or receiving messages?

A. 2.—Yes: At joints; all joints should be soldered on any aerial to give satisfactory results.

RECEIVING RADII.

(638.) W. L. BAKER, Los Angeles, Cal.

1.—How far can I receive with the following instruments: 4 wire loop antenna, one end 70 feet, other 25, and 125 feet long, E. J. variable condenser, fixed condenser, 2,500 metre tuning coil, silicon detector and pair of 2,000-ohm receivers?

A. 1.—500 to 600 miles.

GRAFLEXES, KODACKS, ANASTIGMAT LENSES

Up-to-the-Minute High-Grade Outfit at Square Deal Prices.

Send stamp for Special Bargain List.

WILLOUGHBY & A SQUARE DEAL

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We carry the finest and largest stock of wireless and electrical goods. Send us your order and see how quick we ship goods. No waiting—goods sent same day order is received. Don't fail to get our large catalogue, which contains a large page of Morse, Continental and Navy Codes.

Send 2 cent stamp for catalogue.

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With illustrations, diagrams and fine copy of the Codes, 25c. A 2c. stamp brings our bulletin of wireless supplies.

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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 1909 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.

2.—Please give largest station in San Francisco, its power and call letter.

A. 2.—U. W. Telegraph Co's. 5 K. W. station. W. C. 700 meters. Call P. H.

3.—Could I receive from it?

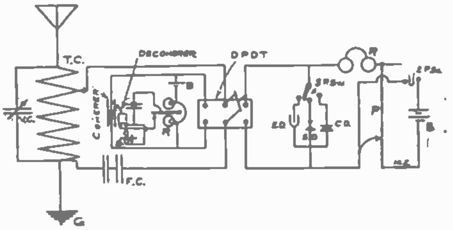
A. 3.—We think so.

RECEIVING CONNECTIONS.

(639.) A. Y. X., Fla., says:

1.—Please give diagram for connecting up the following instruments: E. I. Co's. single slide tuning coil, fixed and variable condensers, 2,000-ohm telephone receivers, potentiometer electrolytic, silicon and carborundum uetectors, a filings coherer, 1,000-ohm relay and sounder. In making diagram use as many switches as you see fit.

A. 1.—See diagram below.



2.—Where could I get a good perikon detector?

A. 2.—Consult our advertising columns.

1-MILE SET.

(640.) DONALD BEACHER, Penna., inquires:

1.—What comprises the best one-mile wireless set?

A. 1.—1-inch coil, condensers, battery and key for transmitting: For receiving double slide tuner, electrolytic detector, 2,000-ohm head phones, potentiometer and battery, fixed and variable condensers.

2.—In the accompanying diagram you will find a detector which I made myself. Do you think it is any good, and can I use it on a one-mile set.

A. 1.—Yes.

25-MILE OUTFIT.

(641.) HARRY WALKER, N. Y. City, writes:

1.—Name the instruments I would need for a complete outfit, the sending radius of which will be approximately 25 to 30 miles, and please, also state where I can find articles describing the different instruments?

A. 1.—Using an aerial 75 feet high, you will require for transmitting a 4-inch coil, condenser, spark gap, helix, key and battery. Receiving, tuning coil or loose coupler, electrolytic detector, head phones (2,000 ohm); potentiometer battery, fixed and variable condensers. We would recommend that you get our book, "How to Make Wireless Instruments," 25 cents postpaid, describing in detail the making of the various instruments.

AERIAL.

(642.) WILLARD J. SIMONS, N. Y., writes:

1.—How far should I be able to receive with aerial 55 feet high at both ends and 75 feet apart, with four wires 18 inches apart, one double slide tuning coil of 375 meters.; one silicon detector, one electrolytic, one potentiometer, one variable condenser, one stationary condenser, made of six glass plates, with tinfoil between, and 2,000-ohm receivers?

A. 1.—300 to 500 miles.

2.—Can you give me approximate wave length of the above aerial; is a tuning coil of 375 meters large enough, or would a larger one give me a longer range?

A. 2.—92 meters; with tuning coil cut in 467 meters. A larger coil will give you a greater range.

3.—Which of the enclosed diagrams are the best for an aerial. There is a telephone line, 110-volt line, alternating C, a 500-volt direct C, with two 500-volt direct current motors in the factory, neither one of which are more than 100 feet away. Would not this cause considerable static electricity?

A. 3.—Diagram B: Most likely you will experience trouble from induction, but you should be able to cut it out readily with a good variable condenser in circuit and the aerial you show.

GIANT ELECTRIC SIGN.

(Continued from page 186.)

Some facts:

Contains about 20,000 electric bulbs, ten times as many as the largest electric sign now burning on Broadway.

Requires 600 H. P. to operate.

One-third of a New York City block wide.

Rises seventy-two feet in the air.

Seven stories of an ordinary building high.

500,000 feet of wire used to complete it (over 95 miles).

70,000 electrical connections.

Required eight railroad cars to transport it to New York.

A large force of expert riggers and electricians worked 90 days to erect and complete it.

Real life action is reproduced in fire by the flashing of electricity at the rate of 2,500 flashes per minute.

About 2,750 electric switches in operation.

Operators in constant attendance.

METAL E. KONIGSLOW STAMPING & TOOL WORKS. CLEVELAND, O. DIE MAKERS. HARDWARE SPECIALTIES. STAMPING

Wireless Association of America

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

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

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

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

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

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

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

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

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

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

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

Beautiful solid gold button, $2.00.

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

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

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

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

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

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

SEND TO-DAY FOR FREE APPLICATION CARD

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

Up to July 1st, 1910, The Association Numbered **8965 Members** The Greatest Wireless Association in the World.

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CLASSIFIED ADVERTISEMENTS.

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

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

Advertisements for the August issue must be in our hands by July 25.

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SPARK COIL and transformer parts. You assemble them. Real experience. Write for particulars. A postal will get them. Electrical Testing Co., Peoria, Ill. (2)

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

When writing, please mention "Modern Electrics."

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

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

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

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SPECIAL PRICES. Cardboard tubes per foot, 4½ and 5 inch, 20 cents; 3½ and 4 inch, 12½ cents; 2½ and 3 inch, 10 cents. Tubular condensers, 75 cents. Detector stands, $1.50. Potentiometer wire, 400 ohms, cotton covered, 10 cents. 800 ohms enameled, 25 cents. Middlesex Wireless Supply Co., 12 Beacon street, Somerville, Mass.

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WIRELESS EXPERIMENTERS, ATTENTION!

We are offering a practical correspondence course in "Wireless Telegraphy" at $1.00. Forest City Wireless School. Send stamp for particulars. Address communications to H. R. Darling, Sec., Middletown, Conn.

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SPECIAL PRICES. 1,000-ohm wireless receiver, double pole, special thin diaphragm, hard rubber case, wound with copper wire, $1.75. Leather covered head-band, double, $1; single, $0.60. "National" receiving condenser, $0.30. Waterhouse Bros., Bourne, Mass.

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RECEIVING OUTFIT for sale. Address M. Lewry, 573 Washington ave., Brooklyn.

FOR SALE. Minerals, all guaranteed and tested sent postpaid. Silicon, carborundum, franklinite, zincite, copper pyrites and iron pyrites, large pieces, 20 cents for each mineral. Order from Mr. H. Grossman, 1197 Broadway, Brooklyn, N. Y.

FOR EXCHANGE. Good testing magneto generator, worth $6.50; will exchange for good induction coil. R. H. McKay, Brown City, Mich.

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Steel Lever Wireless Telegraph Keys

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We are the makers of these high grade wireless keys. They are provided with extra large contact points, and the bushings are all of mica, to withstand the heating caused by breaking heavy currents. These keys are much easier to manipulate than the heavily built types. There is no side motion of the steel lever, as it is supported on adjustable trunnion screws. One of these keys has been successfully used to operate a two K. W. commercial wireless station.

The steel lever is heavily nickel plated, and the brass frame is finely grained and gold lacquered.

List No.		Net Price.
450	Leg Key, nickel-plated lever, brass frame	$1.80
451	" " fully nickel plated	1.92
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FOR WIRELESS USE

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The double head sets complete include adjustable leather-covered headband, two receivers, and green silk double telephone cord, six feet long.

List No.		Net Price
478	Double Head Set Complete, each receiver, 75 ohms	$3.00
479	" " " " " " 500 "	4.50
480	" " " " " " 1000 "	6.00
481	" " " " " " 1500 "	7.00

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The book is arranged in such a manner that ALL calls are classified ALPHABETICALLY. Therefore, no matter from what part of the country or the sea, the wireless call comes, you will immediately locate the sender.

This book is the most complete one of wireless stations published and is warranted to be the most accurate one in print. No more guesswork.

In addition we furnish a

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in three colors, size 13 x 9½, which can be mounted or hung in your station. Gives location and distances for all Government and Commercial stations in the United States, and ENABLES YOU TO COMPUTE QUICKLY DISTANCES, WHEN TRACING A CERTAIN CALL.

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It contains description of twenty-five (25) different pieces of apparatus, each fully illustrated. Clear photographs of the actual apparatus, diagrams, dimensions and sketches of the necessary pieces will be found in great profusion.

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A book that every experimenter and amateur in the wireless art must possess.

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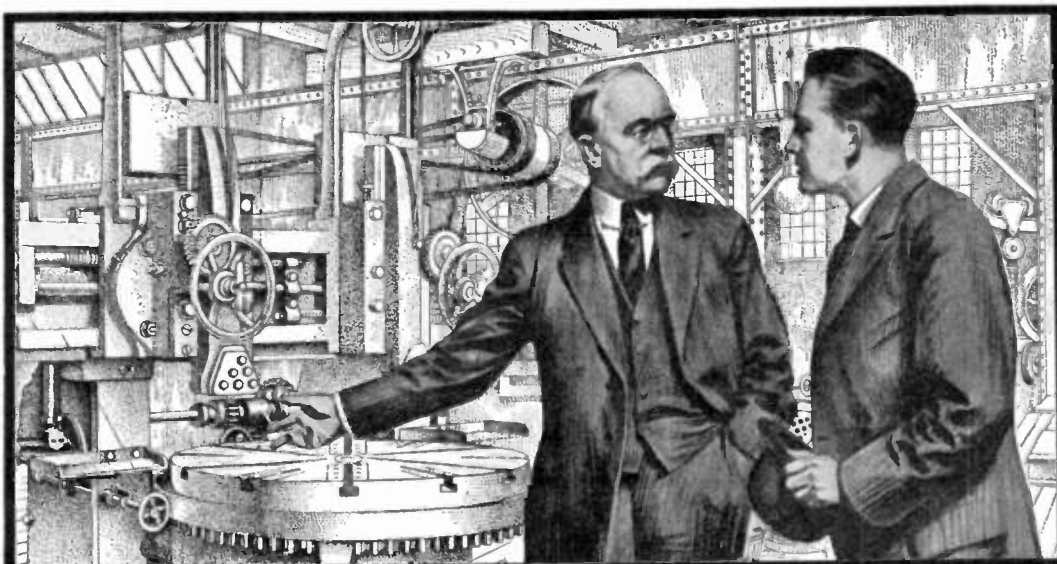

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Every month there are received at the I. C. S. upwards of 300 voluntary letters from men that spare time study has qualified to "produce." Those letters prove conclusively that there is a way for every man—for you—to get ready to "produce." The I.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

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

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Stationary Engineer	Municipal Engineer	Bookkeeper
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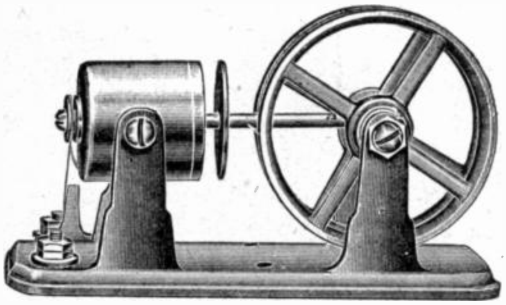

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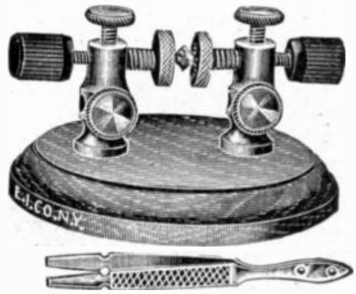

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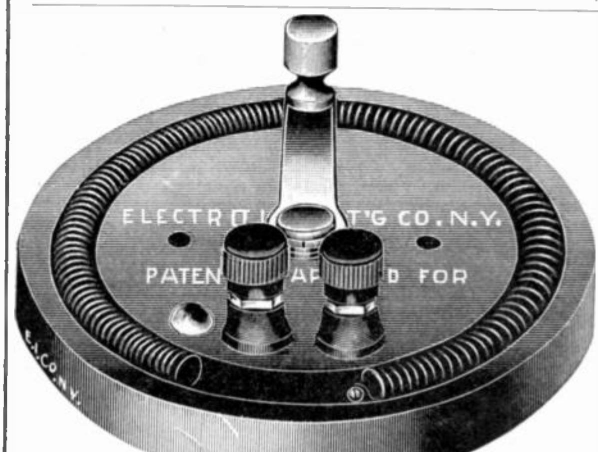

"ELECTRO" RHEOSTAT (Patented Feb. 1, 1910.) The only air cooled rheostat made. Just the thing to dim down lamps, for Wireless, etc., etc. Rheostat sells for 50c.

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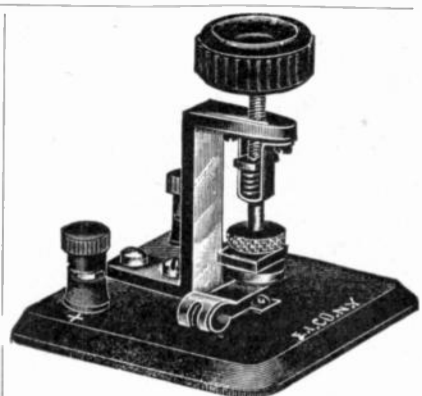

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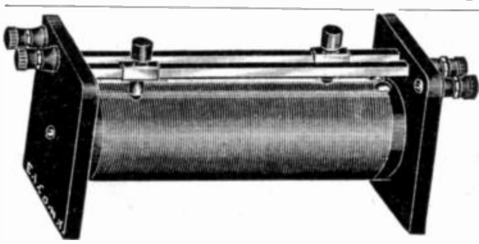

JUNIOR TUNER with solid hard rubber ends. The finest small tuning coil made. Used in the best wireless stations in the U. S. Rolling ball sliders, (patented Feb. 1, 1910), nickel trimmings, hard rubber posts, etc. Must go by express.
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We, however, don't accept orders for less than 50 cents.

Two months ago we advertised some old style Junior Tuning Coils, and old style Electrolytic Detectors. Our stock report of May 1st shows that of the former we had 126, of the latter 59.

Up to June 1st we had to return 16 orders on these tuners and 26 orders on detectors—as they are all gone. If you should chance to see our June ad., **PLEASE REFRAIN FROM SENDING ORDERS,** as we cannot fill them on these two articles.

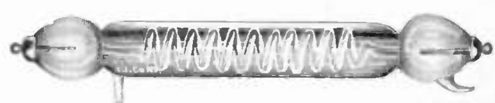
It is the same with most of our advertised "specials." Our customers are keenly on the lookout for bargains.

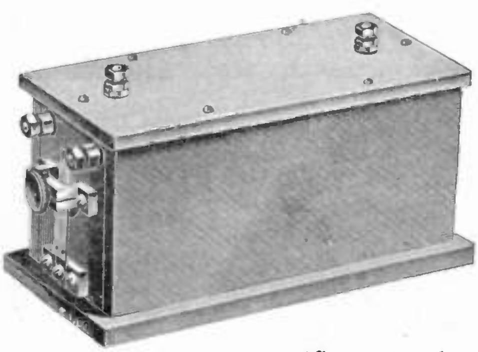
Moral: "Don't delay your order if you see a bargain on these two pages."

WE SHIP WITHIN 48 HOURS.

ODD SIZE GEISSLER TUBES

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





1¾-2 INCH COILS

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

Now $7.50 Regular price, $9

ONLY 12 LEFT OUT OF 45

2½-IN. COILS

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

Now $10.00 Regular price, $13.50

ONLY 19 LEFT OUT OF 52

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2¾-3 INCH COILS

We have a few special coils on hand, which our shop calls "under-coils," for the reason that they do not give OVER 3-in. spark, which a regular 3 in. coil must give to pass the inspection department. There is no flim-flam business about these coils. They are guaranteed to give 2¾-in. on 8 volts and 3-in. on 10 volts, but they will not give OVER 3-in. as our regular coils, AND THAT IS THE **ONLY** DIFFERENCE.

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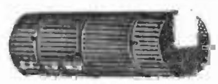

529

If you are building a coil you can't afford to use but the best Norwegian iron core wire. Our's is best by test. Used by all the leading manufacturers. All lengths in stock from 6-24 inches. Thickness is No. 22 B. & S. Regular price, 20c. lb.

Now 15 cents.

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Special Summer Prices

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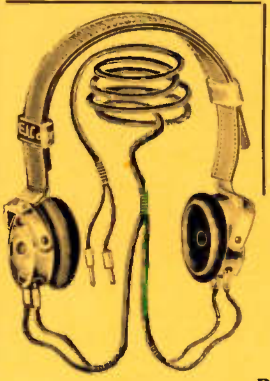

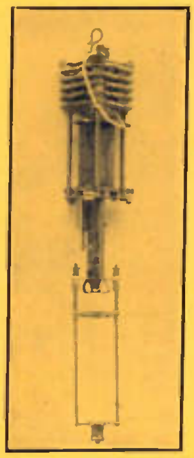

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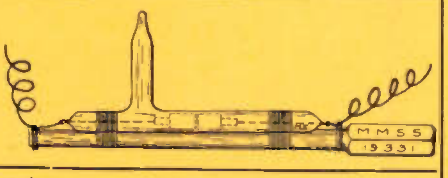
Now $3.50. **Regular price, $7.50**
By registered mail, extra, 16c.



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