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MODERN ELECTRICS

Vol. II. NOVEMBER, 1909. No. 8

A New Condenser

By Our Brussels Correspondent.

The new Moscicki condenser is now in use in a number of wireless plants in Europe, and has proved to be very successful. It realizes a condenser of an industrial type, and in such condensers we have the following principal defects to be overcome, namely that the resistance to the breaking down of the dielectric is too small, also that the metal foil parts are not in good contact with the glass or like material over the whole surface. Moreover, such apparatus have in general an insufficient cooling. All condensers which use organic matter such as paper, cloth, etc., should be rejected, according to the ideas of the present inventor, for these substances will disintegrate with time on account of an electrolytic action taking place in the liquids which the substances contain.

In the course of numerous tests on different forms of condenser obtained on the market, M. Moscicki found that the

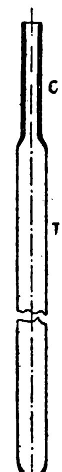


Fig. 1

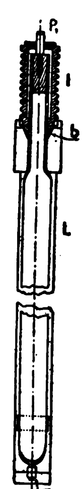


Fig. 2

rupture occurred almost always at the border of the plates. He finds for instance that a glass sheet of 0.5 millimeter thickness can support in the middle part a tension as high as 67,000 volts, while near the borders the coating is perforated at a tension of about 11,700 volts. He also found that any foreign bodies lying

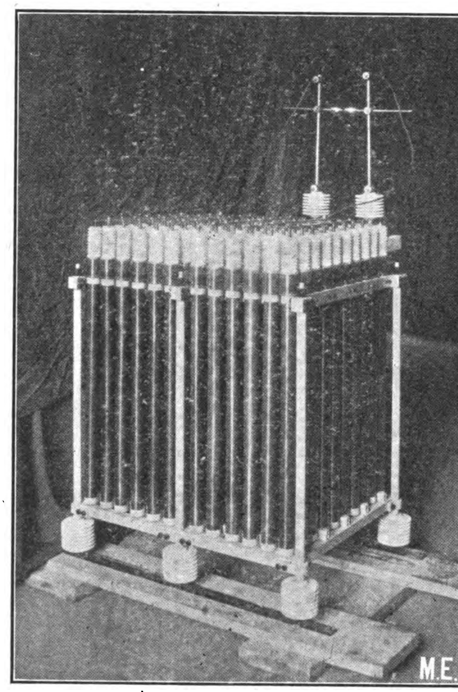


Fig. 3.

between the dielectric and coating were likely to cause a breakdown. To avoid these disadvantages, he forms the elements of the condenser (Fig. 1) by glass tubes T, whose neck has a thickness of three or four times the rest of the tube. The tube is coated inside by a layer of silver deposited by chemical means and this very thin layer is covered with an electrically deposited layer of copper which gives enough strength. Thus the border of the outer coating or the dangerous part, is just at the place where the glass is strengthened. Such tubes have the same resistance to tension as if they had everywhere the same thickness as the neck, while the capacity is determined by the thickness of the main or thinner part. This mode of construction allows us to avoid the two great disadvantages above mentioned, that is, the low resistance of the glass at the borders and the lack of adherence of the coatings. Each of the tubes is provided with an upper contact P^1 connected to the inner coating and a lower contact P_2, joined to the outer one. The neck is sealed into a porcelain insulator tube I, with grooves, which gives a good insulation between the two coatings. The glass tube is then

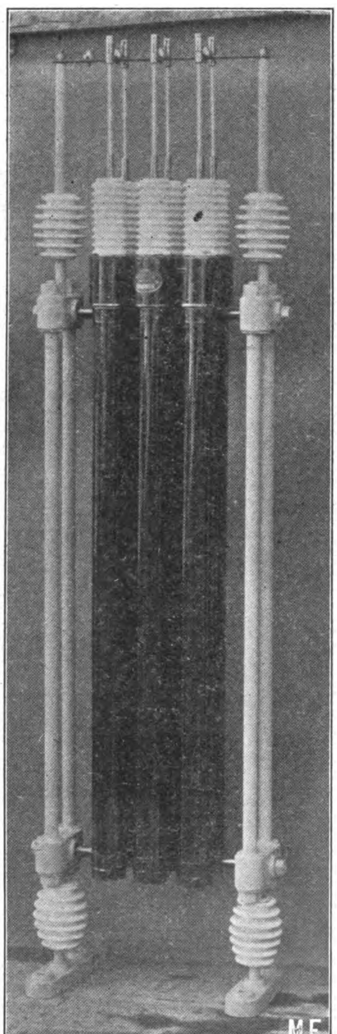


Fig. 4.

placed in a brass or sheet iron tube L, and this is tightly closed by a cap in which is placed a conical rubber stopper *b*. The contact of the inner coating is connected to the metal tube. The annular part between the metal and the glass tubes is filled with a non-freezing liquid, a mixture of distilled water and glycerine. Such a method of mounting gives another good point. The liquid distributes the heat in the whole mass and prevents any local heating which would break the tube. The polished copper part on the outside would give a poor heat radiation, but the present tube, which is blackened, radiates very well. The single tubes are used generally for 10 to 15,000 volts, and are tested at the works at 27 to 40,000 volts. By grouping the tubes in series we can obtain higher tensions up to 100,000 volts. Each tube has a fuse-plug which cuts it out in case of accident, leaving the others working as usual.

NEW DETECTOR.

A French experimenter during recent researches on detectors consisting of bodies in imperfect contact, found that a detector consisting of a metallic point resting on a piece of copper pyrites behaved like an automatic decoherer when it was connected in circuit with a battery and telephone, but also possessed the additional property of receiving signals without the battery, thus exhibiting the same properties as an electrolytic detector. In the case of the electrolytic detector this property is explained by a polarization which gives rise to a dissimilarity of the electrodes. In the case of the metallic point and copper pyrites electrodes, however, the property is believed to be explained by the production of an electromotive force due to a thermo-electric effect at the point of contact.

W. A. O. A.

The Wireless Association of America was founded solely to advance wireless. IT IS NOT A MONEY MAKING ORGANIZATION. Congress threatens to pass a law to license all wireless stations. The W. A. O. A. already has over 2,000 members—the largest wireless organization in the world. When the time for action arrives, the thousands of members will exert a powerful pressure to oppose the "wireless license" bill. This is *one* of the purposes of the W. A. O. A. There are more.

A Remarkable New Power Battery

By Our Berlin Correspondent.

It is singular that during the last 15 years no real advance has been made in primary batteries, except that existing types have been improved upon mechanically, not so much with the idea to increase the electrical output, but to manufacture the battery cheaper and cheaper, till finally we arrive at a state where it is practically impossible to still further decrease the cost.

If we look around among the best existing batteries of to-day we are struck with the fact that there is only one type of battery that can be used continuously without damaging it. The writer speaks of the Edison-Lalande battery, now well known all over the world. As is known, this battery can be used for "power" purposes; that is, to light lamps, run coils, etc., for long hours and the drop of voltage will be only very slight.

While this form of battery is undoubtedly very efficient, there are several serious objections to it, which are responsible for the fact that it is not used more freely.

The greatest defect is the low voltage which is only 0.7 volt, that is, if an experimenter has a spark coil requiring 6 volts, about 9 cells must be used. As the cells are quite expensive, this is a serious objection.

Furthermore, the Edison-Lalaude type uses a strong solution of caustic potash, which burns holes in clothes and is more or less dangerous to handle and not to everybody's liking.

Then, the weight and bulk of the battery is very great, making the transportation over great distances prohibitive on account of the high charges, and on the other hand, very few experimenters have enough room to spare to accommodate even 6 such batteries.

When the writer says that there is only one battery for continuous power purposes, he of course speaks of a practical battery, that is, one which is always ready, at a moments notice and does not use up material when not in use.

Of course the Bunsen and Bichromate of Potash type are power batteries, and are used for continuous work, but are practically not used at all anymore, as the former uses nitric acid which gives off poisonous fumes, besides the zinc is eaten away steadily whether the battery is used or not. The other type, as far as efficiency goes, is still worse, as the electrolyte deteriorates rapidly whether used or not and the zinc and carbon elements must be withdrawn from the electrolyte when the battery is not in use.

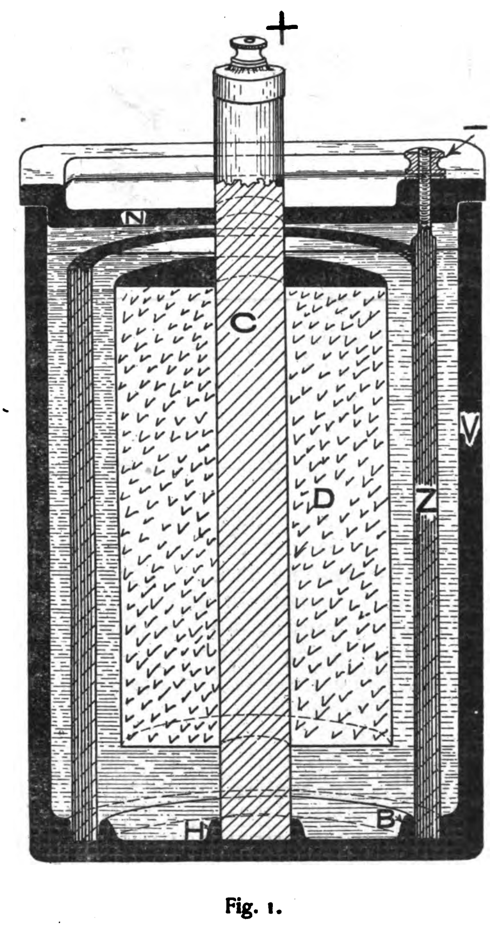


Fig. 1.

It remained to the German scientist and battery expert, Herr Hugo Krebs, to produce a battery which has none of the above defects and which, after five years' experimentation and a series of tests by the Berlin Imperial State Testing Laboratories, has been pronounced the mose efficient and most serviceable battery ever invented.

Referring to Fig. 1, which represents a cross section through the battery, we have the carbon rod C around which is pressed the mass D, in which centers the novelty of the cell. This mass is composed of a number of metal salts extremely rich in oxygen, acting as depolarizer of the cell.

On account of the patents it is not possible at the present time to state what these salts are.

The electrolyte is composed of several chemicals, of which chloride of zinc is one of the principal ones. An amalgamated zinc cylinder Z, forms the other element. This battery is of course a wet one, with liquid electrolyte, but of course it can be made dry, but the capacity will then decrease about 25 per cent.

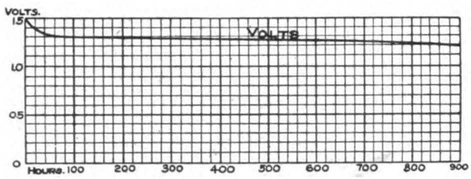


Fig. 2

The jar V presents some novelty. It is made in one piece of pressed black fibre, which by a special process has been made waterproof. This jar is also acidproof, although the electrolyte used in the new battery is neutral and absolutely harmless.

This jar is very light but marvelously strong and is practically unbreakable. The walls are only about 1-8 inch thick; the same jar made in glass weighs exactly 3 1-2 times as much as the treated fibre jar—giving quite a saving in weight. The jar itself is square, so as to take up little room.

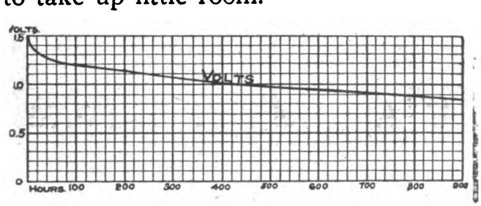


Fig. 3

At the bottom a circular groove B is pressed, in which the zinc rests, while the carbon rests in a recess H. Thus the zinc and the other element can never touch and are always separated a certain distance, which can not be varied. This insures a perfect wearing of the zinc.

The cover N, also made of treated fibre, closes the cell hermetically and safeguards against evaporation. It also further centers the carbon C.

The most remarkable fact is that the battery can be used like a storage battery and it behaves like one in every respect. Current can be drawn steadily from it with practically no drop of voltage.

Fig. 2 shows the discharge curve obtained by the Berlin Imperial State Testing Laboratories. It will be seen that the voltage at the start is 1.6, while the average voltage is about 1.4, which is indeed very high.

The battery under test was a regular stock size and rated at 200 ampere hours. It gave 45 amperes when tested at the amperemeter and the complete battery weighed 10 lbs. (An ordinary storage battery of 200 A. H. would weigh 30 lbs, while two Edison-Lalaude batteries in order to give 1.5 volts and 200 A. H. would weigh 35 lbs.)

The battery in question was shorted through a resistance of 10 ohms *continuously* for 900 hours, after which time the voltage was still 1.2 volts. The battery was not given a chance to recuperate.

Fig. 3 shows another battery of the same style and capacity shorted *continuously* through the low resistance of 4 ohms, during 900 hours. At the end of this period the voltage was still 0.85, or 0.15 volt higher than an Edison-Lalaude type when new!

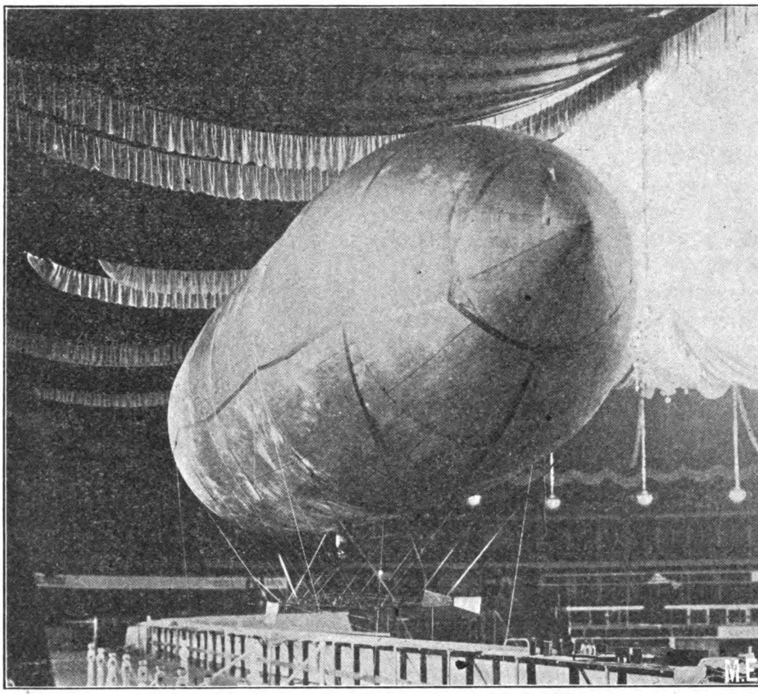
To fully appreciate this output it will be known that a common electric bell has a resistance of 4 ohms. Therefore the new battery could operate such a bell continuously for a period of over 50 days, while the best dry cell on the market (2 1-2x6 inches) will not operate the same bell for 4 days.

The new battery has a marvelous recuperating efficiency. If used only for a few hours at a time each day and left to rest over night the 200 ampere hour battery will give an actual discharge of about 300 ampere hours.

These remarkable features will undoubtedly make the new battery very popular for small lighting plants, for wireless stations where a steady, strong current is always needed and to the electrical experimenter, etc.

The battery at the present is only manufactured in Germany, but will be made shortly in the U. S. by a large manufacturing concern who has purchased the rights for the U. S. and Canada.

The Electrical Show in New York



One of the most interesting exhibits seen at the recent electrical show held in Madison Square Garden, New York, was the Anthony-Murray Wireless Dirigible Balloon, which is controlled by wireless telegraphy. Mention has been previously made in the September number of MODERN ELECTRICS regarding the tests at Sandy Hook with this invention, but a personal interview with Mr. Anthony brought out a number of interesting points. The photograph will enable the reader to understand most of the following description.

A gas bag thirty-five feet long supports a framework which weighs 20 lbs when completely loaded, ready for flight. This frame is made of pine strips 1/4" x 1/2", and carries 9 dry batteries, 3 clockwork switches, the selector, the coherer - decoherer, the relay, two motors and the propellers, also the rudder. The various movements of the machinery are controlled by a code of dots and dashes, by which either the lifting or pulling propeller or the rudder may be operated, these dots and dashes being assorted, as it were, by the selector, which is a device of Mr. Anthony's invention. Mr. Anthony claims that should any stray wave interfere with the operation of the ship, he can immediately overcome the effect of same by the code method of control. Mr. Anthony also claims that the ship can be controlled over a distance of twenty miles. Of course it is understood that no actual ground is used on the ship, the needed capacity being obtained by a metal keel carried below the framework. At the sending end a large capacity plate is used instead of a direct ground.

During the progress of the show a large gas balloon having a capacity of 18,000 cubic feet, and owned by the famous aeronaut, Leo K. Stevens, was sent up almost nightly from the roof of the Garden, carrying a ring of fourteen flaming arc lamps. Of course it was a captive balloon, and carried a cable connected to the current supply, but still it made quite a display, and being up about 1,000 feet, could be seen for quite a distance. This was one of the N. Y. Edison Company's advertising schemes.

(Continued on Page 358)

Ether of Space

By F. E. D'Humy.

It may be of interest to some of us to wander a few moments from our everyday occupations and acquaint ourselves with that most marvelous and important substance known as ether. It is the ether of space that is referred to—not the anaesthetic used by surgeons while carving their patients.

Ether cannot help but be of interest to telegraphers since the advent of wireless telegraphy.

To lead up to a comprehensible understanding of this most intangible substance it may help us if we use, by way of analogies, some physical phenomena with which we are all familiarly acquainted; we will therefore start with the well-known phenomena of sound and then follow with light, and by the latter show evidence of the all-pervading ether.

It is, of course, generally known that the transmission to a distance of light, heat, sound, power, etc., requires some intervening medium as a means of conveyance. For instance: In the mechanical transmission of power, the belt or shaft may be considered the conveying medium of mechanical energy; in sound transmission the air is the conveying medium, and in the propagation of light or heat the ether is the conveying medium.

The propagation of sound may be explained as follows: A body emitting sound is in vibration, moving to and fro. This motion is imparted to the air in little waves or ripples which keep traveling outwardly until their amplitude ultimately dies down to nothing. This can be nicely pictured by dropping a pebble into a pond and watching the small annular ripples which rapidly spread outwardly to larger diameters until they ultimately strike the bank or dwindle to nothing.

That air is the medium by which sound travels is demonstrated by the well-known experiment of placing an electric bell in a glass chamber and then gradually pumping the air from the chamber until the sound of the bell ceases to be audible, although the vibration of the tapper against the gong can be plainly seen through the glass walls of the chamber.

The action of carrying sound from a vibrating body to the ear is mechanical, just as the transmission of the power from one pulley to another by means of a belt is mechanical.

The ripples in the air produced by a vibrating body are termed "sound waves." These waves, unlike the visible waves that were seemingly confined to the surface of the water when we dropped the pebble in, are not confined to one surface or strata, but unless given direction, such as by means of a megaphone or the like, propagate spherically, that is in all directions through the body of the air.

Air is an invisible material substance in a gaseous state. We are only cognizant of its presence when it is in motion, by the wind or breezes we feel, or when its temperature changes from normal by the sensation of heat or cold, or by the act of breathing or by the sensation of sound. Eliminate sound, motion, or the necessity for breathing and we find ourselves physiologically unconscious of the existence of air. In early childhood we are utterly unconscious of its presence. Our baby arms swing and beat the air without our becoming conscious of its resistance. Yet at this stage our education is sufficient to enable us to recognide one solid from another, for do we not already distinguish papa from mama?

It is only as we grow older and our education develops to a stage where we exercise reasoning power that we begin to realize the existence of the atmosphere. Similarly, the lower order of animal life is unconscious of the existence of the atmosphere. Even a fish in water is not cognizant of the medium in which it lives. It can move about with ease. Progress from one position to another is seemingly unhampered. It can rise, go downward, forward, turn around and remain stationary, all without apparent resistance from the water. With the lower mental development that we imagine a fish to possess it can be justly accepted that it is entirely unconscious of the water.

It is now clear to us that our knowledge of the presence of our atmosphere is simply a degree of education. Once realizing this, it is not difficult to conceive the possibility of the existence of something infinitely less tangible than our atmosphere and yet fully as important to our existence.

Now, then, in addition to the senses of feeling and hearing, we have an equally important sense, which is that of sight. While the latter phenomena may seem more difficult to clearly understand it cannot be considered more wonderful than that of sound, for a further development of our education teaches us that they both work on the very same principle. This is, mechanical vibration. Sound is mechanical vibration of the substance composing our atmosphere, and light is the mechanical vibration of ether. The air vibrations affect the nerves of the ear, the ether vibrations affect the nerves of the eye.

We have already seen that our knowledge of the existence of our atmosphere was a progressive step in one's education and was acquired by reasoning only. By carrying this progression a step further, and having determined that light is vibration, we reason that light, like sound, must of necessity have a medium for conveying it to a distance, but in this case, instead of air being the medium, we have the substance which has been named ether.

Ether, when not in motion, like air, does not become evident to our senses.

Ether is far more extensive than air, it is all-pervading, it extends throughout the universe, it is present in all matter everywhere. We ordinarily are unable to conceive of ether as having any density; on the contrary, our conception of it is generally rarefication in the extreme. We cannot see it, touch it knowingly, taste it, smell it, etc., etc., and we are absolutely unconscious of its presence.

The only way we know of its existence is by mental reasoning. We know there *must* be a medium for the propagation of light and heat.

Having thus determined the existence of ether, the undulatory theory of light can be explained as follows:

The atoms or molecules of a luminous body, such as a candle flame, a gas flame, an electric lamp, etc., vibrate with infinite rapidity, and these vibrations are imparted to the ether in very much the same way as a piano string imparting vibrations to the air produces the phenomena of sound. When these ether vibrations, or ether waves, impinge on the retina of the eye we experience the sensation of light. These waves or vibrations are very rapid and vary in frequency for different colors. Calculations have shown that when light waves are manifested as red light the rate of vibration is about 400,000,000,000,000 per second, and when manifested as violet light, about 700,000,000,000,000 per second, and for yellow, blue, orange, etc., the rate of vibrations falls between these figures. To better conceive the high rate of these oscillations let us compare them with sound:

To produce the note C, 261 oscillations of air per second are required.

The rate that light waves travel is about 186,000 miles per second, while sound waves travel about one-fifth of a mile per second.

An ether light wave is about one sixty-five thousandth of an inch long; an ether wireless telegraph wave may range from a few feet in length to 100 feet or more, and an air sound wave for the note C about 4.3 feet long.

Ether is everywhere; it extends throughout the entire universe, permeates everything, even solids of the greatest density. It is true that ether light waves do not manifestly pass through all solids, for wood, metals and many other substances are opaque to light, but we have other solids equally dense and hard as those mentioned—glass, for instance, through which the ether light waves are carried with but very little resistance.

We have seen that wood is opaque to light waves, but it is not opaque to ether waves, known commonly as X-Rays. These pass with ease through wood and some other substances that are opaque to light waves.

Ether wireless telegraph waves are found to pass through metals, stone, earth, glass, anything, in fact, with greater or less facility.

The probable reason that light waves do not pass through metals and yet do pass through glass is due to the inability of the ether permeating the mass of the metal to vibrate at the frequencies of light, while the ether permeating the mass of the glass has no difficulty in vibrating at those frequencies. If this is the case there is no doubt that each substance permits its permeated ether to vibrate at its own attuned frequency and tends to resist frequencies varying from this.

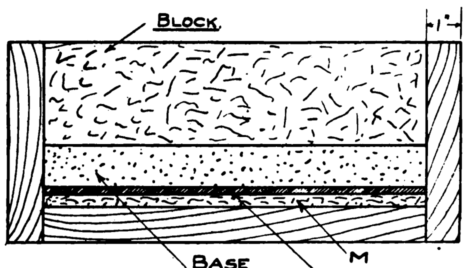
It has already been said that ether is ever present everywhere. We live in it,

(Continued on Page 386.)

How to Make a Marble Base

By Jas. J. McNulty.

There is nothing which makes an instrument look neater than a marble base, but as this is too expensive and difficult to handle it is not used by the average amateur. While wooden bases are more convenient for portable outfits the base described below will prove superior where weight is not a factor.

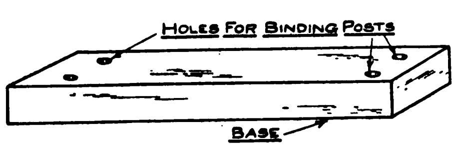


-FIG 1-

Make a mold of common wood one inch thick, then paint the inside with Japan dryer and let dry. The inside dimensions should be made according to the desired size.

Vermont marble dust makes the smoothest surface but any kind should give satisfactory results. A rubber mat (M) should be placed in the bottom of the mold so that it may protect the glass which is placed over it, C Fig. 1; this should be plate glass. The mold is now ready for use.

Mix one part Portland cement and three parts marble dust with a sufficient



-FIG 2.-

amount of water to permit pouring. This must be well agitated while pouring. Be sure no lumps form. It will save labor and trouble if you provide for holes for the binding post before this hardens. This should be done by inserting a glass or wooden plug in the soft composition where the posts are to be located. Pour to the required depth and take care that there are no air holes and that it is smooth.

This must be covered with a well tamped concrete block and left undisturbed for at least a day. Then take the block off and tap marble lightly; if it does not loosen slightly warm it.

A fine polish may be given this by a solution of one part oxalic acid and five parts clean water, rub vigorously till a good polish is produced. Now wash off solution and extract the plugs and you have a neat imitation marble base. The complete base is shown at Fig. 2.

THE ELECTRICAL SHOW IN NEW YORK.

(Continued from Page 355.)

The United Electric Light and Power Company exhibited a sign controller operated by wireless, which was simply a selective relay, as described in a recent issue of Modern Electrics.

The Electrical Testing Laboratories also had an interesting exhibit of machinery for testing strength of wire, and also instruments for various resistance tests. Among the other exhibits were those of the New York Electrical School, The Marconi Wireless Telegraph Company, at whose booth Mr. Jack Binns was the center of attraction, The Electric Storage Battery Company, who exhibited the largest and smallest storage cells in the world, (the large one giving 46,000 ampere hours, the small one 1 A. H.), The Collins Wireless Telephone Co., at whose booth was exhibited the Sanches High Frequency Apparatus, etc.

W. A. O. A.

If you are a new subscriber, and happen not to have read the January, 1909, Modern Electrics, drop us a postal and we will send you free of charge a handsome pamphlet setting forth the purpose of the Wireless Association of America and a free membership card. Address all communications: Wireless Association of America, 84 West Broadway, New York.

BACK ISSUES.

We wish to buy January, 1909 copies. We will pay a good price for same if in first class condition. We should be glad to hear from any of our readers who desire to dispose of these copies.

Can a Galvanic Battery Furnish Alternating Current?

By Professor W. Weiler,
OF THE UNIVERSITY OF ESSLINGEN
(GERMANY.)

Modern Electrics and several other periodicals recently published the following remarkable notice:

W. Kistiakowski built a battery made of two pieces of sheet iron which were placed in a solution of sulfuric acid, and an 18° solution of bichromate of potash, the two solutions being mixed in even volume. This battery when connected to a voltmeter gave some surprising results.

The hand of the voltmeter would first go up to +0.4 volt, then go back to zero, and then go up to —0.4 volt. This play is repeated for hours, but the hand of the meter does not sway back and forward rapidly; the action is somewhat slow. At zero the hand stops from 5-10 seconds before restarting either way. At the highest points the current is sometimes as high as 0.15 ampere.

The author will shortly publish the theoretical explanation of this periodical phenomenon.

The author has repeated above experiments, which he had made already years ago, with a few changes.

The electrolyte was prepared as per directions, the voltmeter, however, was replaced by a very sensitive astatic galvanometer, having two needles suspended by a fine cocoon thread. The sheet iron electrodes in the battery were replaced by two iron rods (size of a thin nail), and were as nearly alike as possible.

Let us call the electrodes A and B. After they were carefully cleaned by means of emery cloth, A was inserted first in the solution, then B: the needles deviate, oscillate back and forward for a few times, and soon come to a standstill. We now again clean A and B, but this time B is first inserted in the solution, then A. The needles now show a current opposite the one first observed.

We now insert the iron nails at the same time and to the same depth: the deviation of the needles is very small, and if the iron nails are of exactly the same dimensions, weights, and size, and are inserted with great precision into the electrolyte, no current will be generated.

These experiments were made with electrodes of aluminum, silver, and copper, using the same solution. The results are always the same, except that the deviations are smaller or greater by using the different metals, which of course is quite natural.

The same metal electrodes were then inserted in other solutions, such as diluted sulfuric acid, nitric acid, muriatic acid, and plain water. Also two carbon plates such as are used in an ordinary bichromate of potash battery were tried, all with the same results as above.

Two graphite rods (cut out of pencils), chemically pure metal wires and two pieces of platinum foil of different sizes did not produce any current whatsoever in any of the solutions.

It is interesting to note, that after carefully examining the electrodes, no current was generated any more after the electrodes were both attacked by the solution or if they had not been attacked at all.

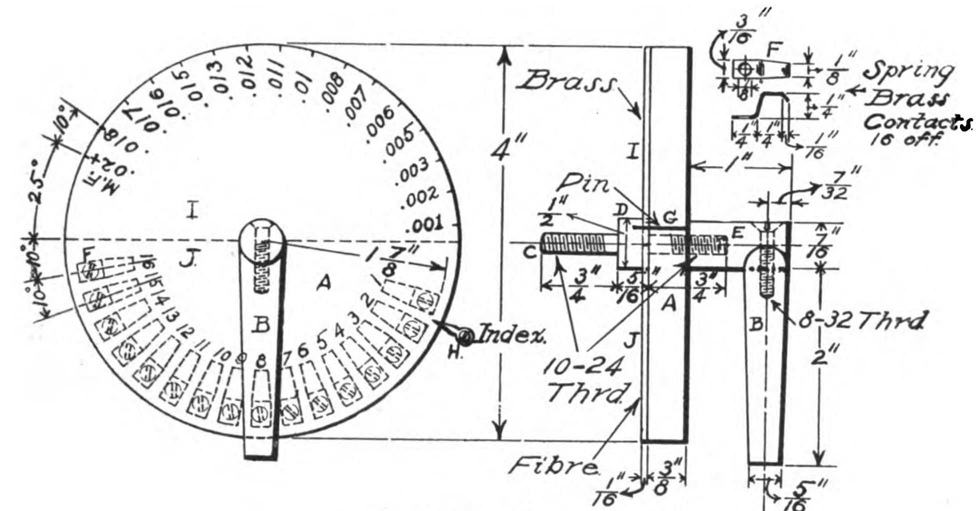
The deviations or oscillations of the galvanometer are therefore the direct result of the rightening terrestrial magnetism, of the decreasing (falling) direct current, the inertia of the needle system and the non-homogenic qualities of the electrodes.

After the immersion of the electrodes in the solution, the ensuing current deviates the needles from its former north-south direction, returns after the current decreases, but the momentum of the needles drives it past the other side of zero. The little remaining current has still sufficient power to carry the needles back to the other side, etc.

We therefore see that the phenomenon is in reality a changing current, but not an alternating one.

A Variable Mica Condenser for Detectors

By H. W. Secor.



—Fig. 4—

A mica condenser for receiving circuits is beyond the attainment of most wireless experimenters, as mica is a very expensive material except in small pieces. However, it is possible to construct a mica condenser of sufficient size for shunting around detectors, etc., at small expense, when made as outlined below, and the time and money spent on it will amply repay the builder in the results obtained; owing to the high resistance and inductivity of mica as a dielectric.

From some electrical supply house or repair shop obtain sufficient banding mica (this is used for banding armatures with), 4 x 1 inches, to make 32 dielectric leaves, each .006 inch thick; which may be measured by means of a micrometer.

The charging leaves may be made of tinfoil, but in this case, it is advantageous to make them out of leaf copper or aluminum, about .005 inch thick, because of the many connections to be made. By referring to Fig. 1, the number and size of the various leaves may be seen, there being 17 common or like leaves, forming pole 1 of the condenser. The other pole is made up of 16 switch leaves, which are connected in multiple to said pole one at a time by means of a special rotary switch described later.

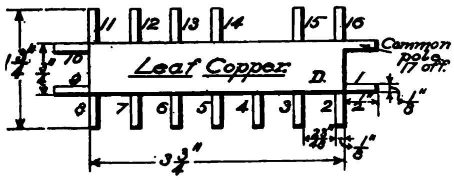
The connecting lugs of the switch leaves are each brought out at a different point to improve the general efficiency and working of the condenser, by keeping the insulation as high as possible. It is understood that the 17 leaves forming the common pole or one side of the condenser, are all cut alike, with respect to their connecting lugs.

Having cut the required number of charging leaves and mica sheets, they are now to be assembled as shown in Fig. 1 and in Fig. 3, at A, care being taken that a mica sheet is placed between every metal leaf. When all the leaves are built up the whole condenser is compressed between two fibre pieces of the size shown at E, Fig. 2, and held together by means of four 6-32 machine screws and nuts, the screws being slipped through the holes in the corners.

Rubber covered leads are now soldered to all the projecting lugs; one lead to the common pole lug, and one lead to each switch leaf lug. The condenser is now immersed in hot paraffine, until all air bubbles cease to rise from it. It may now be placed into a hollow wood base, the top of the base serving for the support of the rotary switch shown in Fig. 4.

Referring to Fig. 4, the disc A should be made of polished hard rubber, also the stud E and handle B. On the bottom face of this disc is fastened a semi-circle

I, of 1/16 inch brass, either screwing or riveting it to disc A, and a semi-circle J, of 1/16 inch fibre or hard rubber fastened in like manner, opposite the brass piece.

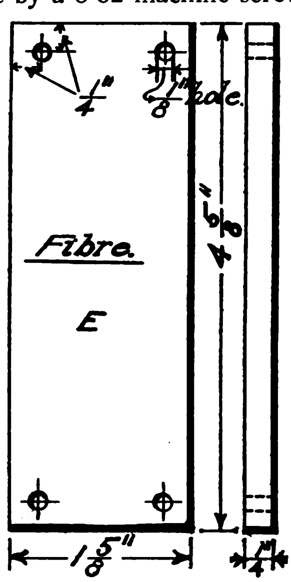


—Fig 1—

The spring brass contacts F are made out of thin stock and have their front ends bent down as shown, to add to the smooth working of the switch.

The center stud, C, is made of brass of the size shown and secured to the disc A by the pin G, and stud E. The pin G passes into the shoulder D, thus preventing the disc from turning on the center stud. The threaded lower portion of the stud C passes through the top of the wood base of the instrument and is secured by a washer and two lock nuts. The brass semi-circle I is fastened to the brass stud C electrically, by soldering.

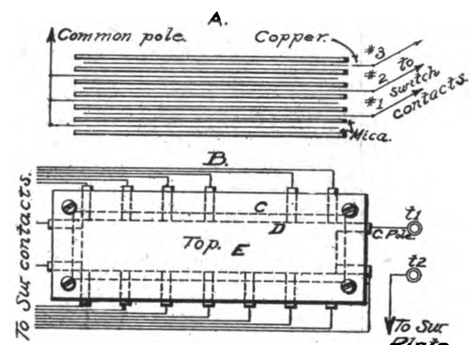
The contact springs are fastened to the base by a 6-32 machine screw passed



—Fig. 2—

through the 1/8 inch hole in them, also through the top of the base, and secured by a washer and nut. The lead wires should be soldered to the screws. The numbers of the contact springs correspond to the numbers of the condenser lugs, i. e., No. 1 condenser sw. lug lead goes to No. 1 contact spring, etc., until all of the 16 leads are properly connected.

H is a small index hand, fastened alongside of the switch disc on the wood base, and serves to indicate the values of the capacity being used. The values marked around the periphery of the disc A are the capacities of the various steps of the condenser, in micro-farads. It will be seen that this switch connects each succeeding step on parallel with its neighbors. Hence if the capacity of the first step is known, the value of any other step is found by multiplying the



—Fig 3—

number of the step by the capacity of the first step.

The value of the first step or unit was found from the regular formula, given below, where, K,=the inductivity of the dielectric.

(6.0 being the average for mica):

a=area in sq. inches of active dielectric surface.

d=thickness in inches of dielectric.

Taking one dielectric or mica sheet as a basis, the values of the above quantities are:

K=6.0.

a=.75×3.75=2.8125 sq. inches.

d=.006 inches.

The formula for the capacity in microfarads of a condenser for inch measurements is:

$$\text{M. F.} = \frac{2{,}248\ K\ a}{d\ 10^{10}}$$

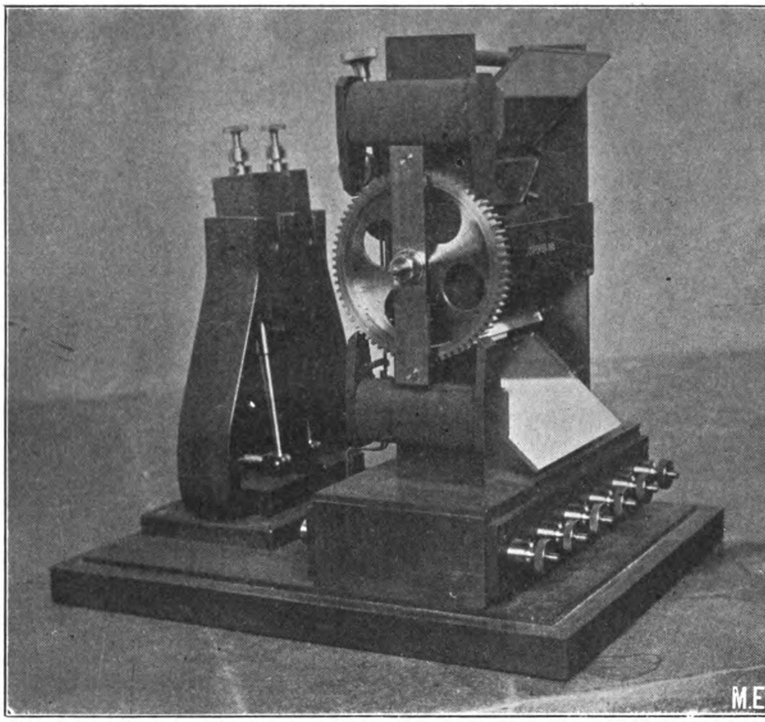
Now, putting the known values into the formula, we have:

$$\text{M. F.} = \frac{2{,}248 \times 6.0 \times 2.8125}{.006 \times 10{,}000{,}000{,}000} = .00063+ \text{M. F.}$$

(Continued on Page 879)

Wave Form Apparatus

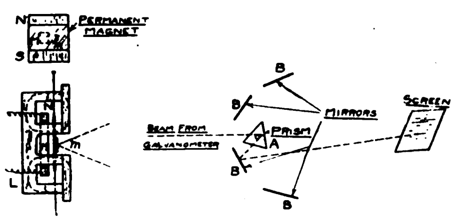
By A. C. Marlowe,
Paris Correspondent Modern Electrics.



The present instrument is designed to show the wave-forms which are produced in different electric circuits, and the waves are thrown by this means upon a screen. It has several advantages over the oscillographs which are used for this purpose, the main one being that the image is of large size and is projected upon a screen at several feet from the instrument, while in the oscillograph the image is thrown on the ground glass plate of the apparatus and this is but a few inches square.

The Abraham device, known as "rheograph," consists of two separate parts, the double galvanometer and the revolving device or "synchronoscope." We represent the two mounted together on the same base with the double galvanometer in the rear. This latter uses two similar galvanometers mounted independently and next each other. Each galvanometer consists of a permanent magnet between the poles of which is mounted a moving mirror device. This is shown in section, and consists of a special kind of transformer with a laminated part LL made up of thin sheet iron. We have mounted on the iron the fixed coil M, which is designed to receive the current coming from the circuit whose wave form is to be taken. Next it we have a second coil, N, which is formed of a single turn of an aluminum strip and at the middle of the coil or rather frame is fastened a light mirror M. The magnetic field passes according to the dotted lines and thus through both coils. The frame and mirror are stretched between fine wires at the top and bottom so as to allow the frame to swing freely and very rapidly in order to follow all the variations of current. When we send a variable current in the fixed coil, we have corresponding induced currents in the movable coil and this will swing exactly according to the current in question.

In order to take the wave form of an electromotive force, we place a condenser in series with one of the galvanometers and connect the whole upon the source of current. For taking the wave of a given current, we make the current pass in the primary of a small transformer and connect the secondary upon the other galvanometer. Thus we realize a galvanometer for momentary currents, but having a large mirror of 6 by 8 millimeters so that photography or projection can be easily carried out. A beam from an arc lamp is thrown upon the mirror of the galvanometer and it is reflected thence through the apparatus seen in front. This latter is used to spread out the vibratory movement given by the mirror, as we would otherwise have only a horizontally moving spot of light on the screen. By giving the beam also a vertical movement we obtain the wave form by a series of successive reflections. A total-reflecting prism A is placed at the center so as to rotate in synchronism with the current, using as a motor a simple toothed wheel of soft iron revolving between the poles of the electromagnets which carry the current in question, supposing we are using alternating current, as is often the case. This



prism itself would spread out the beam which is reflected from it, and would give three images of the wave on the screen at each revolution. To multiply the effect, the light from the prism is not thrown directly on the screen, but it is reflected successively from four fixed mirrors, BB. These are placed so as to act one after the other and throw the image of the curve always in the same place on the screen. We thus obtain twelve images in succession, and this appears to the eye as a single image. The two galvanometers can be used to give a projection of the current and electromotive force waves at the same time upon the screen and in their proper relation to each other. The instrument can also be used for very brief phenomena, such as oscillating discharges, etc., these being best produced periodically by a contact worked by alternating current, and the latter is used to drive the synchronoscope as before.

Correspondence

Mr. H. Gernsback, Editor Modern Electrics.

Dear Sir.—Some time ago a friend of mine and myself had an interesting experience with our wireless, which we thought might interest you.

We were listening at our receiving outfit, hoping to get a message, when suddenly we heard a peculiar rumble in our receivers. While we were wondering what it was, we experienced a rather severe earthquake.

We feel pretty sure that we heard the disturbance in the earth through our ground and that the rumble was caused by it.

It is rather interesting to note that we were warned of the coming earthquake before we heard it.

Yours very truly,

Ellery W. Stone.

Oakland, Cal.

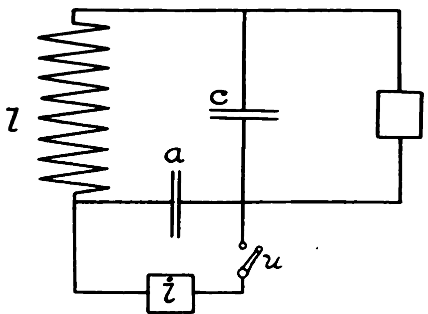
DUPLEX WIRELESS.

Mr. Marconi has invented a new form of apparatus for stations for duplex wireless telegraphy, in which a commutator is rotated synchronously with the studded or toothed disc before employed, which disc causes groups of electrical oscillations to be generated at regular short intervals. The commutators and studded disc are coupled mechanically, and the combined apparatus causes the receiver to be operative only during the intervals between the discharges, and to be rendered inoperative during the short periods when the discharges are taking place. Each commutator has the same number of bars as there are studs on the disc, and each is provided with pairs of brushes connected together at regular intervals by the commutator bars. The result is that the aerial is connected through the secondary to earth and disconnected from the receiver during the time a stud is passing between the side disc contacts—that is, during the time of discharging—and connected through the secondary to the receiver during the intervals between the discharges. The operative periods of the transmitting apparatus are considerably shorter than those of the receiving apparatus, so that the making of each sign occupies several operative periods.

Paris Letter

STORING WIRELESS ENERGY.

The following arrangement is used by Burstyn for securing an increased effect of the waves, in the case we are receiving undamped oscillations. A thermo-detector *d*, which has a relatively high electric resistance, is connected to the oscillating system consisting of the self inductance *l*, and condenser *c*. The condenser placed at *a* has no great influence

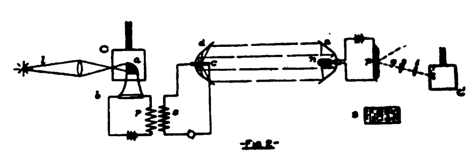


-FIG-1-

on the oscillations. If such a system now receives waves either by direct action or by coupling with an aerial, the detector *d* produces a continuous current of small value which acts to charge the condenser *a*. This occurs as long as the switch *u* is open. Should *u* be closed, the condenser *a* will now discharge through the receiving instrument *i*, which can be a galvanometer, telephone or relay. Another disposition is to have the detector traversed by a current from another source, and in this case we use the method of mounting in Wheatstone bridge. In general, *u* is an interrupter with rapid action. Before the discharge takes place, the condenser *c* can be cut off, if desired. The advantage of the present method is that we are able to store up a certain amount of electricity in the condenser so as to accumulate the energy, and then discharge it at the proper time. We thus secure an increased effect in the receiving instrument.

TELEPHOTOGRAPHIE.

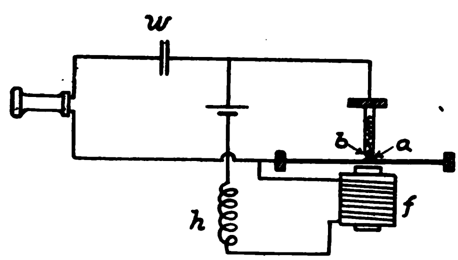
An Italian scientist, Bernochi, has devised the following apparatus in order to transmit photographic images to a distance: The photograph, in the shape of a positive film, is wrapped around the glass cylinder C, this latter being mounted on a rotating screw device like a phonograph cylinder, so that it revolves and at the same time rises so as to allow the beam of light *l*, which is concentrated to a focus on the film, to traverse the image in all its parts in succession. The beam falls on the reflecting prism *a*, placed inside the cylinder and is then received on the selenium cell *b*. The cell is connected in series with a battery and the primary *p* of a transformer, whose secondary *s* is mounted in the circuit of the arc lamp *c*. The lamp is placed at the focus of a parabolic reflector *d*. A series of variable currents is given by this means in the primary circuit of the transformer, and the currents which are set up in the secondary circuit will cause the light of the arc lamp to fluctuate in a corresponding way. The beam of light from the reflector is directed to the receiving station, where it is received by a similar parabolic mirror *e*. There is a selenium cell of cylinder form *n* at the focus of the mirror, so that all the light is concentrated upon it, and the cell is in series with a battery and a mirror galvanometer *p*. This latter receives a beam of light from the point *f* and reflects the beam at *g*, this being concentrated to a point *i* by the lens *l*, and the point of light lies at the surface of a photographic film wrapped around the moving cylinder C'. Variations of light in the parabolic reflector system will cause corresponding effects on the selenium cell, and the mirror of the galvanometer thus causes the



beam at *l* to move up and down within a short range. Placed at *s* is a small screen with a shaded transparence from dark to light, so that the beam's movement causes a bright or dim spot on the cylinder in the well-known way. As the second cylinder moves at the same rate as the first by using synchronous motion, we have the photographic image traced upon this cylinder by the beam of light.

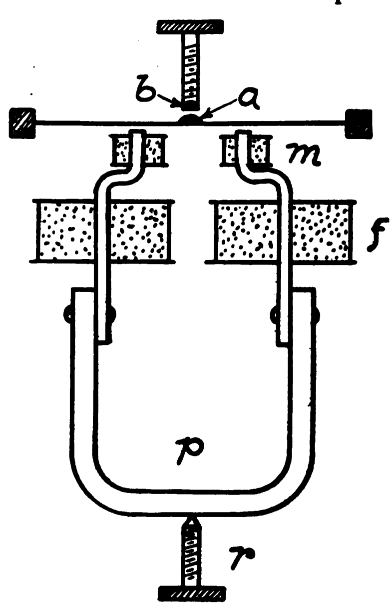
NOVEL TRANSMITTER.

In the new form of telephone transmitter which is shown here, there are used two metallic contacts which are automatically kept at a minute distance apart, about that of a wave-length of light. This is done as follows: One contact *a* is on the telephone diaphragm, and the second contact is mounted above it at *b* on the end of an adjustment screw. The distance between the two



M.E. -FIG.3-

contacts is controlled by the electromagnet *f*, which is mounted in series with the contacts, also with the battery and the inductance coil *h*. The electromagnet separates the contact to an extent which is limited by the lowering of the current, but the device does not act as a buzzer, as will be farther seen. Sounds spoken

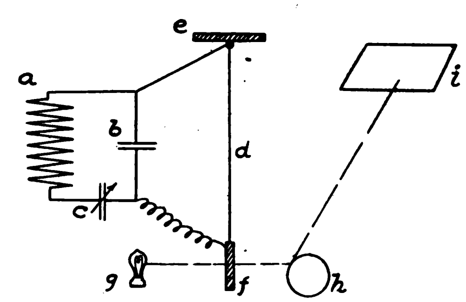


M.E. -FIG.3a-

before the diaphragm will vary the conduction at the contacts and the effect is heard in a telephone receiver, which is mounted across the contacts with the condenser *w* in series with it. The choke coil *h* prevents a buzzing effect which would otherwise take place at the contacts. Instead of the coil we may employ a simple resistance coil or else a condenser placed in shunt upon the electromagnet. This also cuts off the voice currents from the electromagnet. When used as a telephone relay (Fig. 3a) the incoming line is connected to the coils *m*, whose cores are polarized by the permanent magnet *p*. On the same cores are the bobbins *f*, which are used as seen above for regulating the contacts *a b*. The outgoing line is connected across these latter contacts. The height of the permanent magnet is adjusted by the lower screw *r*. The incoming currents can also be used upon the bobbins *f* alone.

WIRELESS WAVES MADE VISIBLE.

Wave-forms of electric oscillations are shown by a revolving mirror method in

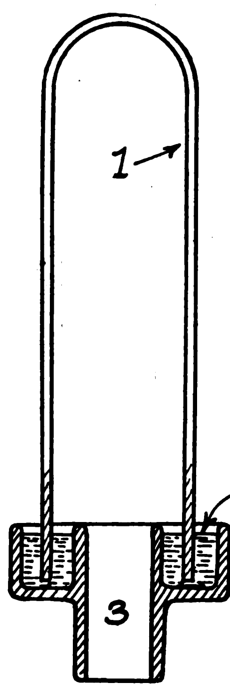


M.E. -FIG.4.-

the following way: At *a* is an inductance which receives the oscillations together with the fixed condenser *b* and the variable condenser *c*. Across this circuit is placed a length of very fine wire *d*, which is attached above at the fixed point *e*. At the lower end the wire is connected to a screen *f*, which is free to move, and the wire thus expands and contracts under the influence of heat caused by the electrical oscillations. The screen *f* takes the corresponding movement, and back of it is placed a lamp *g* so that its beam passes through the screen and falls on a rapidly-revolving cylindrical mirror *h*. From thence the beam is reflected on to the fixed screen *i*, where the waves are to be traced by the moving spot of light. The movement of the screen causes the beam to strike the mirror forward or backward of the zero position, so that we have a variation in the place where the beam will strike the screen. In this way the electrical oscillations in the system are made visible.

NOVEL LEYDEN JAR.

The following method has been devised in order to reduce the marginal radiation from condensers of the Leyden jar type, this being done by the use of an oil bath in which the open edges of the jars are immersed so that the edges of the tinfoil are covered by the oil. To carry this out we use the arrangement shown in the section. Oil or like bath is placed in the annular trough 2, whose middle part, 3, is tubular, so as to give passage



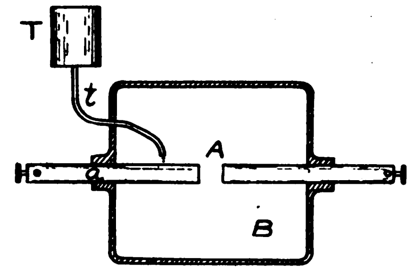
-FIG.5-

M.E.

for the connections with the inner tinfoil coating of the jar, 1.

ARC FOR RADIOPHONY.

A new arc method for radiophony is brought out by a German inventor. The arc A, which is acted on by a magnetic field in the usual way is enclosed in a cylindrical chamber B, and in this a liquid hydrogen compound is vaporized. It is found best to have the liquid dropped from the holder T by means of the tube *t*, entering the cylinder. It can be dropped on one or both electrodes, or can be fed through a channel cut in one of the electrodes *a* into a shallow well near its end. The temperature within the cham-



M.E. -FIG.6-

ber is high enough to prevent condensation, except on the walls. Safety valves are provided for the chamber.

WIRELESS AS BURGLAR ALARM.

The value of wireless as a burglar alarm is one of the latest discoveries. The steamship Corwin, while off Nome was riding high in the water, and the heavy band of copper that encircles the wooden hull and to which is attached the ground wires of the wireless apparatus, was shining only a few inches below the surface of the water. Three Eskimo who had come out in their boat noticed the bright copper and immediately began trying to wrench it off.

The crew were soon attracted to the side of the vessel by a commotion and cries of pain. They saw the Eskimo writhing in the water and shouting with might and main.

For some minutes they were at a loss to understand the strange actions of the natives. Then it was discovered that the little brown men were hanging to a loose wire with one end attached to the copper plate. Suddenly the whirling ceased and the Eskimo dropped into the water and swam away to the ice floe.

Upon investigation it was found that the United Wireless operator aboard had been sending a message to the government wireless station at Nome, and that the Natives grasped the ground wire just in time to get the full 25,000 volts of electricity, and were unable to let go until after the operator had ceased sending.

PHONE LINES CATCH WIRELESS MESSAGES.

The first wireless message to be received in Trenton from professional sources was caught by the wire of the Bell Telephone Company at the East State street office, but where it came from none of the telephone people are yet able to learn definitely.

While the Inter-State fair was in progress the wire experts of the company were put to no little inconvenience. Patrons on lines that were practically noiseless entered complaints that the wires buzzed in an unaccountable manner. Inspectors who were sent out sought for broken wires, loose connections and all the other faults that happen even to the most carefully cared for lines. But search as they would none of the inspectors were able to locate the troubles.

For the most part the difficulty seemed to be with the lines which were not run underground, like those in the suburban sections. By Friday afternoon the trouble seemed to be over and the inspectors were again puzzled that the trouble should disappear so quickly.

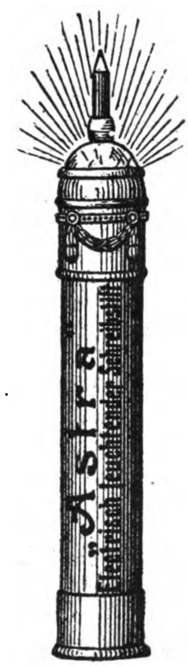
No solution of the trouble was found until Friday night when, as the men were working on the testing table, the receivers on the men's ears began to click like telegraph sounders, and sections of messages were caught by those who knew the Morse code. It was first thought that the telephone wires had become crossed with those of the telegraph companies. Tests showed this was not the case. A more thorough investigation showed that the wires in the suburban sections had caught messages from a wireless station and carried it into the central office.

It is believed by the telephone men that the messages were intended for the Inter-State fair grounds where wireless instruments were in operation but that they were intercepted by the lines of the telephone company and carried to the telephone central office. The telephone men are open to conviction that this may not be the cause of the clicking but until that is proven they claim the rights of a citizen from Missouri.

With the C. Q. D., the P. D. Q., the I. O. U. and the V. D. B. doing such valiant service, what's the use of words, anyway?

LUMINOUS PENCIL.

This is the latest German novelty. If you are a reporter and happen to interview somebody in a dark street, you pull out your "Astra-Schreibstift," turn the end sideways and a strong light shoots past the pencil directly on the writing pad.



A small battery is contained in the slender case, while a little tungsten lamp furnishes the light. The pencil is mounted on top of the lense.

"Modern Electrics"

Monthly feasts for wireless fiends,
On it's pages, then in their dreams,
Dashing sparks leap into space,
Ever increasing the wireless pace,
Rattling, crashing they jump the gap,
Next we'll have the wireless map.

Everyone not long ago,
Looked on wireless as a show,
Even now there are a few, who
Cannot give it, its just due,
Talk about wireless, the way it did raise,
Really the U. S. have the wireless craze,
Idolized by every lad,
Catching signals is the fad,
Surely America is wireless mad!

ROGER L. MOORE.

MODERN ELECTRICS

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EDITORIALS.

In order to see in just what relation MODERN ELECTRICS readers stand to the various advertisers of this magazine, it has been decided to open a contest among the readers, which will give the advertisers a good idea of the "pulling" power of MODERN ELECTRICS.

It may be safely asumed that almost every other reader of this magazine will between now and January first spend some money on electrical and kindred goods, such as will be found advertised in this magazine.

It is only natural that we would like to see you patronize our advertisers, who are really the ones who make the magazine possible, as if to-day all our advertisers should discontinue to advertise in MODERN ELECTRICS, we would have to discontinue the magazine.

You must always bear in mind that the dollar which you spend to subscribe to the magazine does not pay at all for the twelve issues which you get for one year. The actual cost for paper, printing, cuts, mailing, office expense, honorary for articles, etc., is about $1.60 for twelve issues now.

You can therefore easily understand that the advertiser pays to keep the magazine running.

In other words, to put it squarely before you, *you* are getting the best magazine of its kind in the world, and the advertiser pays the greatest share to have you get it. Therefore, it is practically your duty to patronize the advertiser as much as lies in your power.

Just *how* much you are patronizing the advertiser we are anxious to ascertain. Our statistical department wants exact figures, and we are asked to supply them.

To get these figures we decided to open a contest which will close December 31st. The results will be published in the January or February issue.

All we desire to know is how many orders you have sent between now and December 31st to the advertisers in MODERN ELECTRICS. We would also like to know of what amount each order is, and will pay

25 DOLLARS IN GOLD

to the person who has sent the greatest amount of orders to the advertisers between now and December 31st.

Of course it is understood that if one reader distributes twenty orders to three firms, while another reader sends twenty orders to ten firms, the latter will win over the former.

The amount in money sent for orders does not enter into consideration in this contest, therefore if one reader sends five orders having a total of twenty dollars, while the next sends ten orders having a total of twenty dollars, the latter would win over the former.

It is simply the greatest amount of orders to the largest number of firms that count. This gives everybody a fair chance, and will satisfy our statistical department.

Therefore, every time you send an order to one of our advertisers between now and December 31st, drop us a postal stating something like this:

Sent to-day order for $6.25 to X. Y. Z. Co. Yours truly,

JOHN SMITH, JR.

Address the card to: Statistical Department MODERN ELECTRICS.

All cards will be kept and assorted after the first of January, 1910. The winner will be checked by inquiring from the various firms if his orders are in accordance with his statements.

SEEING BY TELEGRAPH.

Alfred Gradenwitz gives in the *Revue Generales des Sciences* a popular account of the efforts made by Professor Ruhmer of Berlin, to realize "television," of which he claims to be the first inventor. The means employed is the selenium cell, the electrical resistance of which varies when exposed to light. As Dr. Gradenwitz points out, on these lines it should be theoretically possible to reproduce on a screen the image of anything happening at the other end of a telegraph wire, but for the inertia of the selenium cell, which takes an appreciable time before it gives signs of being affected. This difficulty has now, he claims, been surmounted by Professor Ruhmer, and the forthcoming Exposition Universelle at Brussels will contain an apparatus, to be constructed at a cost of over a million dollars, by which scenes showing living and moving personages will be reproduced by telegraphy. The process is at present kept secret, but Dr. Gradenwitz, who has himself seen a working model of the apparatus, says that the principle consists in using a very sensitive mirror galvanometer to reconvert every fluctuation of the current caused by variations in the lighting of the transmitting screen into corresponding luminous variations at the other end. At present, as a writer in the *London Athenaeum* remarks, the affair seems to resemble a toy of the cinematograph kind rather than a scientific apparatus; but as nearly all practical electrical appliances, from elecaerial wire at the receiving station and trostatic machines down to wireless telegraph apparatus, have begun in the same way, we should do wrong to neglect it.

HIGH SPEED WIRELESS.

The Cullercoats radiotelegraphic station at the mouth of the Tyne was the scene the other day of a demonstration of a new high-speed automatic transmitter for use with wireless telegraphy. The station is fitted for working with both the deForest spark method and the Poulsen arc method or radiotelegraphy, but it is for the latter that the high-speed transmitter is adapted. It may be recalled that the arc system yields undamped electrical oscillations, the amplitude of which remains constant, whereas when the spark is used the amplitude gradually decreases and the waves die away. The difference may be compared to that which exists between the sustained tones of an organ pipe and the evanescent sound given out when the note of a piano is struck. The object of the demonstration was to show that with the employment of the automatic transmitter a speed of sending can be obtained rivaling that realized with submarine cables. The instrument has been devised by Dr. Valdemar Poulsen and the Continental syndicate for Poulsen wireless telegraphy; but at present there is only one example of it in existence, at Lyngby in Denmark. This place is about six hundred miles from Cullercoats in a direct line, and as it is near Copenhagen the course of the electric waves for a part of the distance lies over land. The machine is worked on much the same principle as the Wheatstone automatic transmitter used in ordinary land telegraphy; that is to say, the message to be sent is represented by a series of holes punched in a continuous paper strip, those on one side of the central line being the dots of the Morse code and those on the other the dashes. The paper strip is fed into the sending apparatus, which consists essentially of a rotating contact-making device, and the holes in it actuate mechanism by which the continuous waves produced by the arc generator are cut up into lengths, short for the dots and longer for the dashes. The groups of oscillations thus sent out are picked up by the antenna or conducted to a detector, which consists of a piece of tellurium pressed lightly against a surface of galena, this combination constituting a unilateral conductor. The current from it goes to a "string" galvanometer, in which a fine metal wire, normally stretched in a vertical position, is deflected sideways by the action of the current. This string or wire is mounted in the beam of a Nernst electric lamp, with a suitable optical condenser, which throws the light on a narrow slit, behind which a band of photographically sensitized paper is moved by an electric motor. 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 this band, which is immediately drawn automatically, first through a developing bath, and then through a fixing bath, so that as fast as the message arrives it can be read on the paper band in the form of a wavy or zigzag line, like that yielded by the siphon recorder in submarine telegraphy.

There was no opportunity of seeing the transmitter itself, since, as has already been said, the only example of it yet made is in Denmark, but several experiments were carried out in receiving messages sent by it. To begin with, a standard telegraphic word of five letters, "Paris," was sent repeatedly at the speed of fifty times a minute, the resulting record being perfectly sharp and clear. Next some other words, which had already been punched at Lyngby, were transmitted at the same speed with equal success. Then a message selected at random, being, in fact, twenty-seven words of the letter that accompanied the invitation to be present at the demonstration, was transmitted with the ordinary hand-key to Lyngby by wireless telegraphy, and after being punched there was returned by the automatic transmitter at the speed of fifty words a minute. Finally, as a severer test of the capabilities of the apparatus, this same message was transmitted several times over at a speed which well exceeded one hundred words a minute. In this last case it was read by an operator who had not seen the original, and it was found to be perfectly clear and accurate with the exception of one or two letters, the mistakes in which were probably attributable to errors made in punching the tape. Dr. Poulsen and his associates anticipate that they will succeed in telegraphing across the Atlantic at a speed of at least fifty words a minute with the expenditure of one hundred horse-power; what an advance in the practice of wireless telegraphy would be realized by the fulfilment of this anticipation may be imagined from the fact that as Mr. Marconi stated on June 25, in his speech at the Imperial Press Conference, the present speed of wireless working across the Atlantic is twenty-five words a minute.

"POWERLESS WIRELESS."

By Jim Notus.

First select two or three of your most vigorous and active electric eels (several of these useful animals will be found in every well-equipped amateur laboratory), being careful to get them all direct current or all alternating current—whichever you prefer. The A. C. Eels can readily be distinguished by the alternating red and white stripes which encircle the body. Each of these stripes also represents a cycle. For my own part, I prefer the D. C. kind, with electrolytic interrupter, as they are much more tractable.

Make a separate tank for each eel. Fill with acidulated water, and add a few chunks of blue vitriol, which is all the food these useful mollusks require. Wrap a piece of bare copper wire—No. 30—around the tail of first fish; to other end of wire fasten a piece of blue vitriol, which is to be swallowed by the next eel. Continue this process until all are connected in series; connect end wires to sending key, and the rest is simple. With right hand on key, reach out with left hand and gently stroke the positive eel (distinguishable by his long, silky fur); immediately he will begin to purr, each purr representing an interruption. So rapid are the alternations that it is no feat at all for a prime heifer eel to reach high C.

[Note.—"Fips," equipped with 3 guns and 2 clubs, left hurriedly for Ontario, where Mr. Jim Notus resides. "Fips" tried the eel-stunt and got stunned and stung by the high discharge. He left, saying he would present Mr. Notus with a few electric "bees."—Editor.]

NEW WIRELESS RECORDS.

Washington. — The army transport Sheridan made splendid records for wireless communication on her recent trip from San Francisco to the Philippines and return, via Nagasaki.

This ship, according to a report to the Quartermaster-General's Department, received and transmitted wireless messages 3,500 miles, from North Head, Washington, while she was between Guam and Honolulu on her return.

An Interesting Test of Wireless Instruments During the Hudson-Fulton Celebration

By A. C. Austin, Jr.

Just before the opening of the recent Hudson-Fulton celebration the writer was requested to loan some wireless telegraph instruments to the New York State Naval Reserve for the purpose of testing the instruments during the celebration. After the tests had been completed the writer interviewed Wireless Quartermaster Smith, of the Reserves, and procured photographs of the instruments as they were installed. The first photograph shows the training ship, U. S. S. "Granite State." This was originally the frigate "John Hancock," and was one of the crack frigates of her day, serving in both the Mexican and Civil wars. She is now used as a training ship by the Naval Reserves, having been roofed over and permanently moored at 97th street and the Hudson River. The aerial, which may be seen in the picture, is 175 feet long, and at the highest point is 93 feet above the water line, or about 50 feet above the instruments. It is of four wire type, out-and-in connection. The instruments which were installed on the "Granite State" may be seen in the second photograph. Operator Smith is shown in the act of taking a message. The coil was operated on 110 volts, D. C., in connection with a Gernsback electrolytic interrupter.

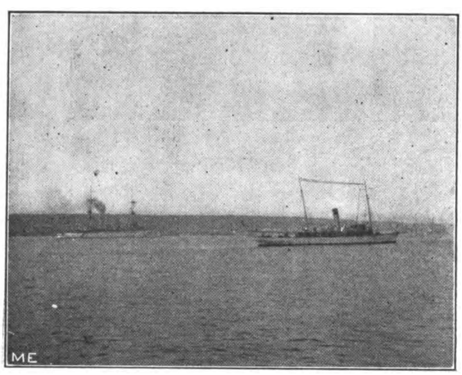
The other station was installed on the U. S. S. "Wasp," a gunboat in service, which has been loaned by the government to the Reserves for the purpose of training men to actual ship duty. The third photograph gives a fairly clear idea of the general appearance of the ship, and the aerial may be seen between the two masts. The length of the aerial is 90 feet, and it is 80 feet above water and about 60 feet above the instruments. This aerial also is of the four-wire type out-and-in connection. In the distance may be seen the German battleship "Hertha."

The fourth photograph shows the operating room on board the U. S. S. "Wasp." Among other things, attention is called to the novel method of installing the helix. This was put up in a hurry, and only intended for temporary use, but it would seem that this idea might be used by many of the amateurs. In this case also the coil was operated on 110 volts in connection with an interrupter.

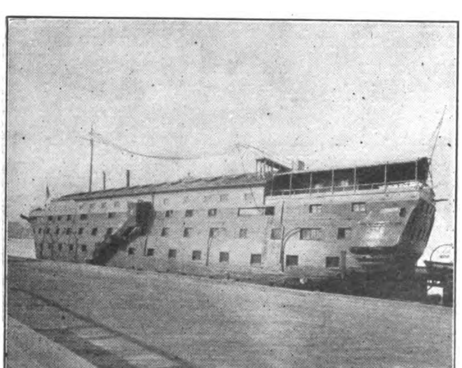
During the second week of the celebration the "Wasp" sailed up the Hudson River, and as stated by the operators, they were enabled to exchange signals over a distance of thirty-one miles. Operator Smith stated that he considered this very good work, as the interference from the international fleet was very marked.

However, the signals were received so clearly that Operator Smith remarked that if the two installations had had higher aerials, and if there had been less interference, in all probability messages might have been exchanged over a distance of fifty to one hundred miles.

These results are quite remarkable if it is remembered that all the instruments used were not intended for commercial use, but rather for amateur work.

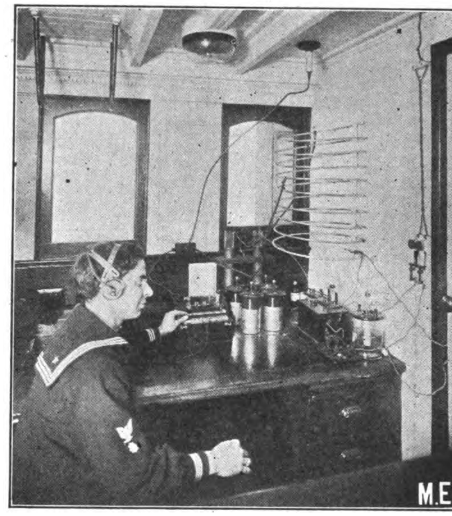


The instruments furnished were manufactured by the Electro Importing Co., of New York, and com-



prised the following:

No. 8050 transformer coil; No. 8000 Gernsback electrolytic interrupter; No. 9220A adjustable zinc spark gap; No.



9223 1 quart Leyden jar; No. 9270A sending helix; No. 8100 antenna switch; No. 9950 junior tuner; No. 9240 variable condenser; No. 10000 fixed condenser; No. 9002 electrolytic detector; No. 1305 head telephones (2,000 ohms), and No. 9250 potentiometer.

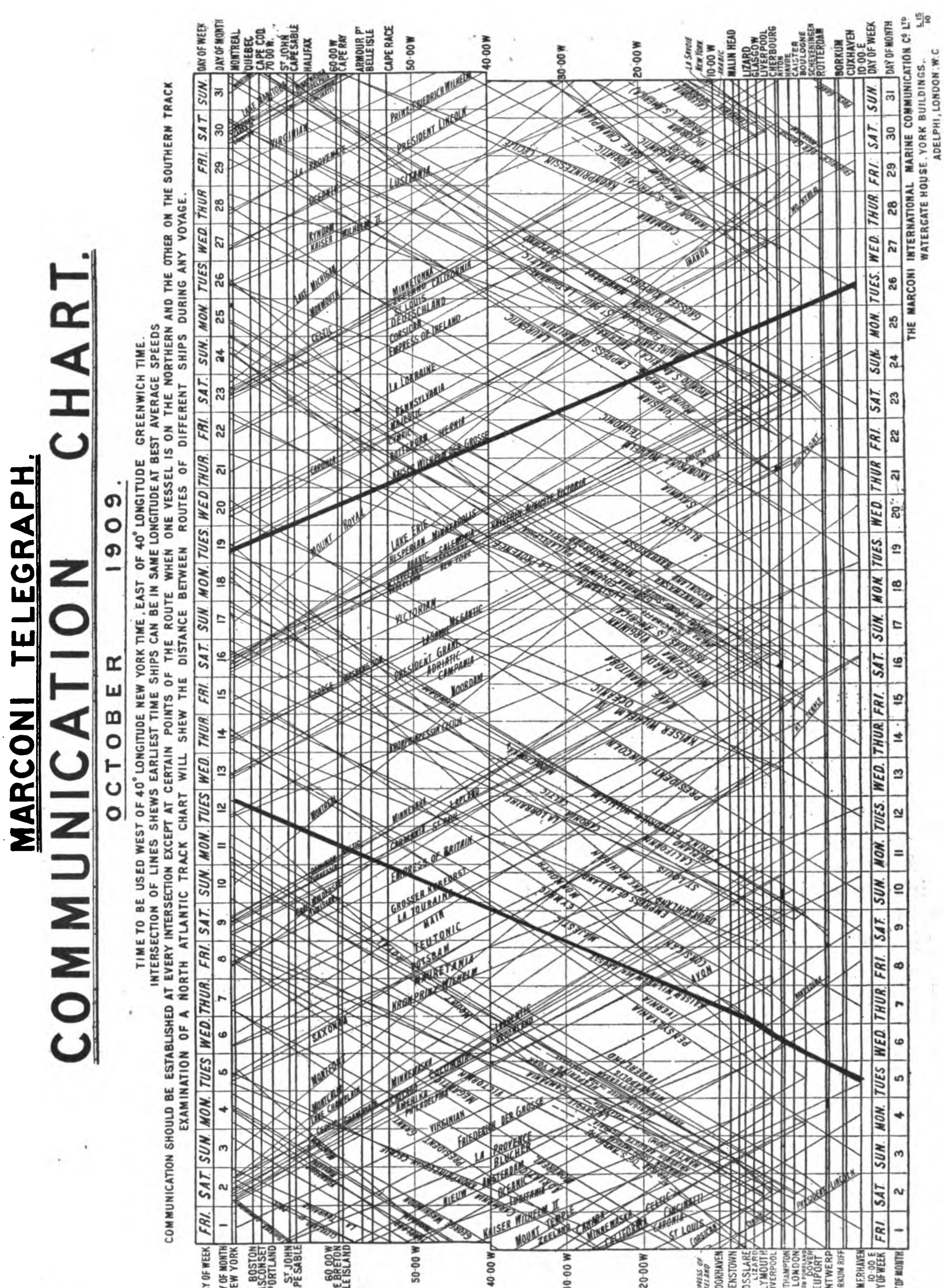
NEW WRINKLE ON AERIALS.

The following may be of some use to readers of MODERN ELECTRICS:

Amateurs using a rope to hoist their antenna experience great annoyance in lowering it every time it rains.

The manner in which I overcame this trouble was to attach a weight at the lower end of the rope. This weight may be made detachable in order that the antenna may be lowered when desired.

When it rains, the rope, instead of pulling the pole down by shrinking, lifts the weight. Contributed by F. SCHLOEDER



COMMUNICATION CHART.

Above chart is now used entirely by all Atlantic steamers equipped with the Marconi system.

By its means each steamer knows when it can be in communication with other ships.

Each ship has its course traced in red lines (in above chart heavy black lines). Where the line crosses other lines and upon the dates shown above and below, communication will be had.

Above chart is for the Lloyd steamer "Kaiser Wilhelm der Grosse." As will be seen, the left line is for the voyage from Europe to America, leaving Bremerhaven Tuesday, October 5, to arrive in New York Tuesday, the 12th of October.

(Continued on Page 379)

A Transmitting Condenser

By Forrest P. Guptill.

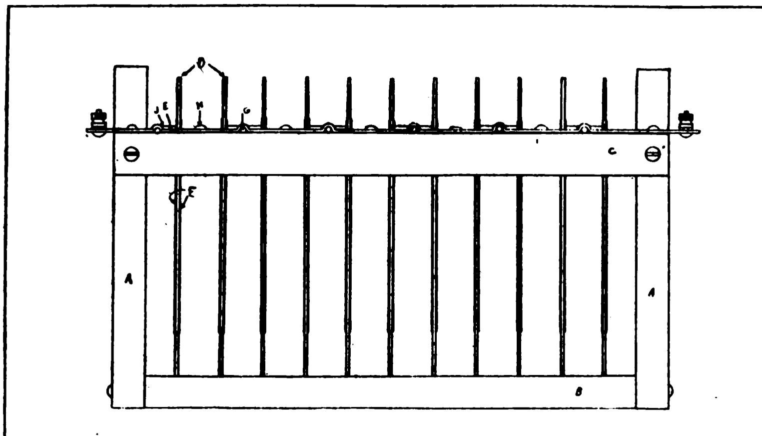


Fig. 1

The following condenser is easily made, looks well if carefully made, and has proved very efficient:

The size depends altogether upon the size of coil with which it is to be used, but the one here described is about the proper capacity for a one inch spark coil. A good way to do is to make one plenty large enough and then cut out all unnecessary plates.

Two pieces (A,A) are cut from ¾ inch stock 4¾ by 8 inches. These are joined together at the bottom by two strips (B,B) cut ¾ inches square and 1½ inches long. The side pieces

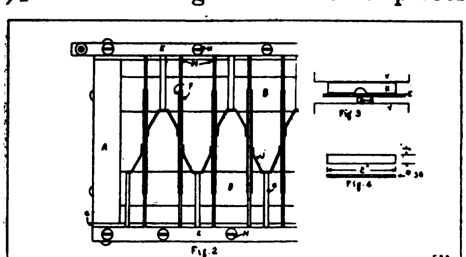


Fig. 2

(C,C) are made ¾ by 1 by 13 inches. Eleven saw-cuts (M-Fig. 2) exactly ⅛ inch deep are made on one side of each of these pieces beginning 1½ inches from the ends and 1 inch apart, to hold the plates. (D) These pieces are then screwed to the ends (A,R), 1½ inches from the top with round head screws.

As old photographic plates make admirable condenser glass, procure eleven old 5x7 plates and clean with hot water. Now cut out twenty-two sheets of tinfoil 3 by 5 inches. Tinfoil used by florists is excellent for this purpose as it comes in long strips 5 inches wide, which can be cut into 3 inch pieces, thereby making no waste. The foil (F) is fastened to the glass (D) with what is commonly known as "Banana oil." Apply the oil with a brush, place the foil in the center, leaving a margin all around of one inch, and roll down with a rubber print roller. If one is not at hand a rolling pin will answer. When both sides of the plates have a sheet of tinfoil they may be put in the rack already made.

Next procure two strips of No. 22 gauge soft brass (E) ½ inch wide and about 14 inches long; (a little is allowed for the curves) also about 2 feet of No. 8 brass wire and a piece of No. 30 spring sheet brass sufficient to make the clips J.

In a piece of soft scrap iron, file a groove with a small round file as in K, Fig 3. Now place the brass strips (E,E) over the groove in the iron, a piece of the brass wire (G) on top, and clamp all in a vise (V,V) as in Fig. 3. Make six of these curves in both strips (E) beginning 1 inch from one end and 2 inches apart leaving 2 inches at the other end. Drill a hole between each curve for the screws H, also one at the long end for a binding post, and we are ready for the contacts.

Cut from the brass wire eleven pieces 2 inches long (G); also cut from the spring brass eleven pieces as in Fig. 4 and bend to shape as in J, Fig. 2. Now solder one clip onto the end of each piece of wire. An easy way to do this is to melt a small quantity of solder in a can cover, put a drop of soldering fluid on one end of the wire and also on J, dip the end of the wire into the melted solder and before it sets touch it to the point on J. When cool this will make a secure joint.

The strips E are now screwed to C, inserting a clip under each curve in the brass as in Fig. 2. A screw from a dry battery is put in the end of each strip for connections; and the condenser is complete. If well finished hard wood is used this instrument will add to the "professional look" as well as the efficiency of any wireless station.

MARCONI STATIONS SOLD.

It is stated that the agreement for the transference of six working shore stations in the United Kingdom from Marconi's Wireless Telegraph Company to the post-office is complete. These stations are at the following places: Liverpool, the Lizard, Crookhaven, Rosslare, Caister, and Niton. The post-office also takes over, under the agreement, the North Foreland station which has hitherto been under the joint control of the company and Lloyd's; and it is presumed that it will reopen two stations which the company had abandoned—those at Withernsea and Holyhead. These shore stations exist for communication between the shore and passing ships; but the agreement also gives the post-office the right to use the Marconi system for the transmission of telegrams from the mainland to islands in the waters of the United Kingdom for a period of fourteen years.

OPTICAL ILLUSION.

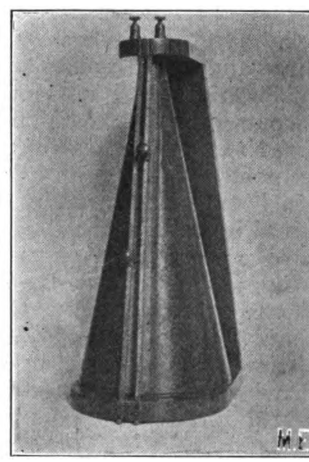
In the September number of MODERN ELECTRICS there is a drawing of the windings of a motor. If the magazine is held in the hand and moved around in a circle the armature will be seen revolving according to which way the magazine is moved.

Contributed by ARTHUR TODD.

AN IMPROVED TUNING COIL.

A new type of tuning coil for wireless telegraphy receiving circuits has been devised by Prof. G. E. Marsh of the Electrical Engineering Department of the Armour Institute of Technology of Chicago, and it stands for the latest form of this well-known piece of apparatus. The coil consists of a single layer of insulated copper wire wound on a conical wooden core. As in the usual construction, the insulation has been removed along an element of the cone and two sliding contacts permit any portion of the cone-shaped solenoid to be introduced into the receiving circuit and thereby enable its inductance to be adjusted to suit requirements.

The theory underlying this form of construction is based upon the dependence of the inductance of a coil or turn of wire upon its size. This may be expressed as follows: The inductance of a solenoid varies directly with the cross-



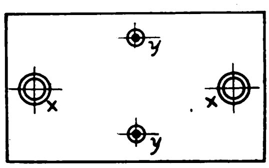
sectional area of the coil. In other words, doubling the diameter of a circular coil increases the inductance to four times its former value. In the manipulation of the ordinary tuning coil, the inductance of the receiving circuit is varied by approximately equal amounts when one of the contacts is moved from one turn to the next. This constancy of the unit of change will clearly prevent the attainment of precise tuning, especially if this unit-change is large. It was to obviate this shortcoming that the conical tuner was designed. This new type allows a variation in the inductance of the circuit, resulting from the shifting of the contact from one turn to the next at the small end, as small as a tenth or twentieth part that produced by moving the contact one turn near the large end. Sharper tuning is therefore possible with this type than with the cylindrical form.

A Simple Detector

By Jacob Landau.

A simple but efficient detector, which was made by the writer, and which is very simple to make, will be described. It can not be used over great distances, but for indoor experimenting at exhibiting, it is very good. It works best with a five hundred ohm potentiometer and a hundred or hundred and fifty ohm receiver.

-Fig. 1.-

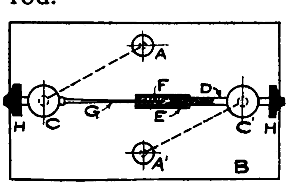


X-Large Posts. Y-Ordinary Posts

-Fig. 2.-

Make a board for the base, six inches long, three and a half inches wide, and any suitable thickness, and give it one or two coats of shellac, and then varnish it. Next procure two ordinary binding posts and two of the kind shown in Figure 1, and mount them as shown in Figure 2.

Procure a piece of glass tubing 1½ inches long, ⅛ inch inside diameter and a brass or copper rod to fit the tube, about four inches long. A thick copper wire will do. Put the tube on the rod, which should fit tightly, leaving about 1 inch of tubing projecting from the rod.



A-A' Ordinary Posts. E-Glass Tube,
C-C' Large " . F-Nickel, Silver & Iron Filings
B- Base G-Needle
D- Brass Rod
H- Rubber or Wood Handles

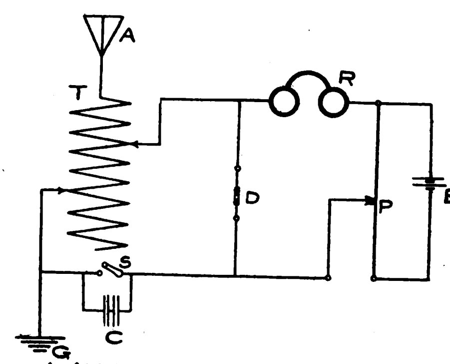
-Fig. 4.-

Now get a steel needle or hatpin, magnetize it, and put a little wooden or rubber knob at the unpointed end to facilitate handling it. Also put a wooden or rubber knob on the brass rod for the same purpose.

Take a clean file, a piece of silver, nickel and iron and make filings from each, keeping them separate. Now mix the silver and nickel filings, so that there is three times as much silver as nickel, this being the best combination. Put these filings in the tube, which should be in an upright position.

Now get the iron filings and put them on top of other filings carefully. (always keeping tube in an upright position) little by little. Now put the rod in the binding post with the filings pointing upward, and put the magnetized needle in the other binding post, and lower it gently on the filings.

To adjust it, cut out the potentiometer and connect it in series with the battery and receiver and move the needle in the until the battery current is barely audible in the receiver. The detector should be mounted on the wall in an upright position, as any vibration will be recorded. The space between needle and



A-Aerial G-Ground
B-Batteries R-Receivers
C-Condenser S-Switch (I-P)
D-Detector T-Tuning Coil
P-Potentiometer

-Fig. 5.-

tube should be filled with parrafine as that excludes dust. The detector is shown complete in Fig. 4, and the connections in Fig. 5.

This detector was made in April, 1909, and I have only put in new filings once. A bottle, or vial of silver-nickel filings should always be had and a vial of iron filings also. I have received messages with that detector over a distance of about 6 miles one winter night. Whenever it is lightning and the aerial grounded, and this detector left without any connection but battery and receiver, it can be heard loud enough without putting receiver to ear. It should always be used in an upright position.

Wireless Telegraph Contest

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

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

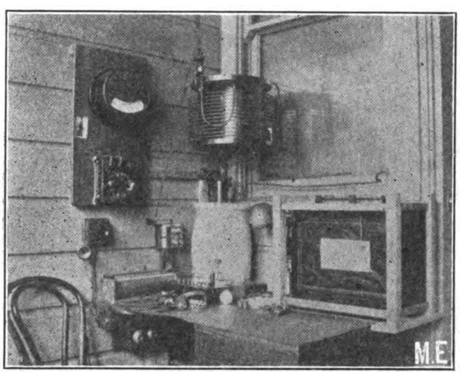
It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

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

FIRST PRIZE, THREE DOLLARS.

Enclosed please find photo of my wireless outfit.

The transmitting set consists of a 1-K.W. open-core coil, 12 plates 14x20 in the condenser, a helix on hard rubber, zinc spark gaps, reactance coil with taps, Westinghouse ammeter, break key and throw switch.



My receiving set consists of variable condensers, tuning coil, potentiometer, any kind of detector but find carborundum the best for long distance work.

I have two masts 82 feet high and 100 foot flat top aerial with 6 wires and a hot-wire meter to tune in with.

I think everybody gets fine ideas from your MODERN ELECTRICS.

R. W. WILEY.

San Francisco, Cal.

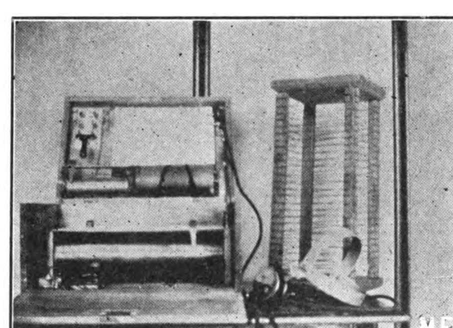
HONORABLE MENTION.

Enclosed find a photograph of my wireless set, which has been in operation for about one year.

My aerial consists of four No. 14 bare copper wires, each forty feet long. They are strung from a pole 55 feet high, at one end, to the roof, which is about 35 feet high.

In the upper left corner of the box cover is a D. P. D. T. switch. The white card next to it covers a .001 M. F. condenser for receiving. Below the switch is a potentiometer, made of No. 32 German silver wire. Next to this on the right is a dry cell, used for receiving. The long coil in the bottom of the box is a double slide tuning coil. It consists of about 400 feet of No. 26 bare copper wire, wound on a core 12x3 3/4 inches. In the extreme lower left corner is a silicon detector with a fine screw adjustment. Next to this is the transmitting key. To the right of the box is the helix and below it is the ear receiver (85 ohms).

The box I made myself. It is 14x10x7 inches, and the front closes up and the top down, thus making it easy to carry from place to place. I made all the instruments and also the receiver headband. I have all the transmitting instruments except the induction coil, which I am going to get shortly. My call letters are



P. J. I got many valuable hints in the making of the set from MODERN ELECTRICS.

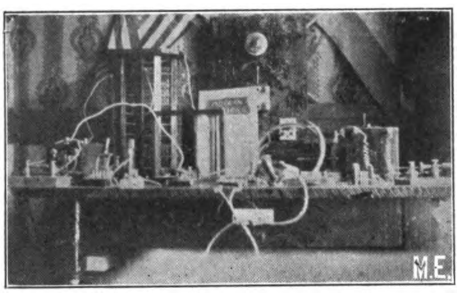
P. E. JOSSELYN.

Massachusetts.

HONORABLE MENTION.

Please find enclosed photo of my wireless station.

Sending: Consists of spark coil, helix wound with twelve turns of No. 8 B. & S. wire on a wood drum 15x8x7 inches, to the left of the helix may be seen an "Electro" spark coil, in front of same is the spark gap which is made from two old battery zincs soldered to pieces of No. 12 B. & S. wire; to the right of the spark gap is the D. T. D. P. and S. P. S. T. switches, the former controls the sending and receiving circuits, the lat-



ter the primary of the coil. I use an ordinary telegraph key for sending. My adjustable condenser is made from test tubes and set in a wood frame. There are only two tubes shown in the picture, as I had an accident just before the picture was taken and broke the other two.

Receiving: All of my wiring is taken from the E. I. Co. catalogue diagrams.

Double headband phones. In back of the headband may be seen my variable condenser which consists of a brass plate in a wood frame; to the right of the condenser is my tuner and is wound with 253 turns of No. 20 B. & S. enameled wire and has about 233 meters wave-length; to the right and left may be seen my three detectors, "Electro-Lytic," "Molybdenite" and "Carborundum," which are controlled by a three-point switch.

My switchboard, in the center of the picture, and the switches control various apparatus, such as lamps, motor and coil.

The aerial consists of 4 aluminum wires 50 feet long, on spreaders 4 1/2 feet wide.

All of my apparatus has been made by myself except the headband and spark coil, which I found cheaper to buy.

Richard C. Lent.

Brooklyn, N. Y.

HONORABLE MENTION.

Enclosed find photograph of my wireless set.

The instruments were nearly all constructed by myself. They are in a house built especially for wireless.

The sending apparatus consists of: 1 K. W. coil of the open core transformer type, operated on 110 A.V. C. 60 cycles, using an impedance coil which can be seen in lower right hand corner of picture.

Helix is made of copper ribbon wound on wooden frame.

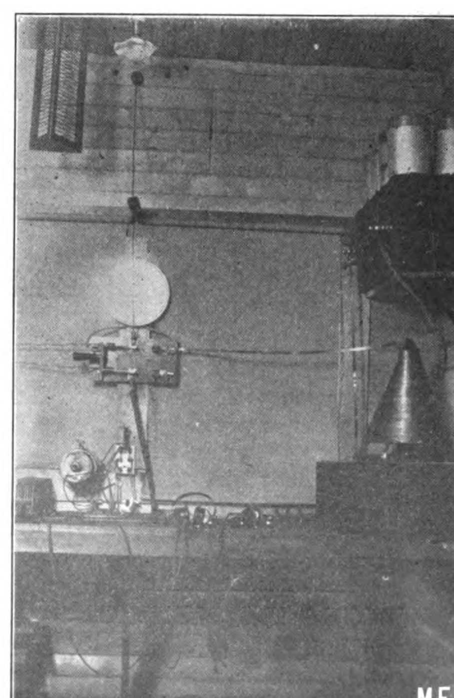
Condenser, which is of the plate glass variety, is in the box under the helix.

Sending key is ordinary Morse key, fitted with contacts under the table, as described in Modern Electrics for September.

I use copper strip to connect up the secondary circuit.

Receiving instruments consist of: Inductive tuning coil, variable condenser, "Pericon" detector, small fixed condenser, and two pair of telephones wound to a resistance of 3,000 ohms per pair.

The aerial is composed of four wires 250 feet long, of seven strand phosphor bronze, on 15 foot spreaders.



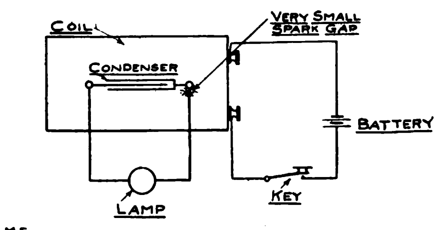
I think your magazine a very excellent one, as it gives the latest ideas in wireless telegraphy and telephony.

Everett S. Rogers.

Portland, Me.

LIGHTING LAMP WITH SPARK COIL.

While experimenting with a 1 1/2 inch induction coil I found that by connecting a Leyden jar across the secondary terminals and putting a 2 C. P. 4 1/2 volt lamp also in circuit between the secondary terminals, that the lamp would light up, if a small spark gap was left between the light and one of the secondary terminals, the same as it would on a battery circuit. By increasing the gap the incandescent light faded and finally a bluish-green light full of tiny sparks took its place. I tried substituting small



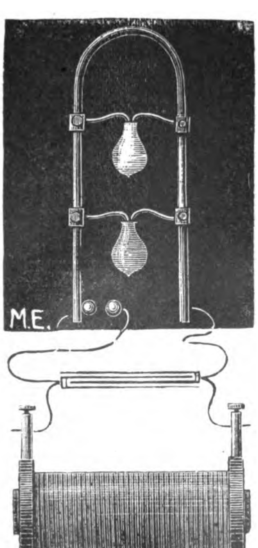
motors, medical coils, etc., in place of the lamp, but they failed to work.

I would be very much obliged to you if you would explain the cause of this at your first opportunity in MODERN ELECTRICS, which, by the way, is the best electrical magazine I have ever read or heard of.

Yours truly,

CLARENCE B. DILTS.

[The explanation of this phenomenon is found in the so-called impedance (seeming resistance) of high tension oscillatory currents. Described in the October, 1908 issue. Cut republished herewith.—*Editor.*]



THE WIRELESS ASSOCIATION OF NEW ORLEANS.

The Wireless Association of New Orleans was organized by Messrs. Seibert and Schluter at the latter's residence on August 17. The object of the association is to further the arts of wireless telegraphy and telephony, and to prevent experimenters from interfering with the commercial and naval stations. The meeting was well attended and the following officers were elected: Mr. J. Nadau du Treil, president; Mr. Geo. Seibert, first vice-president; Mr. H. Schluter, second vice-president; Mr. P. Gernsbacher, secretary; Mr. L. Reiss, treasurer.

The meetings will be held at Mr. A. Switzer's laboratory, 1508 St. Charles avenue, on Wednesday, every two weeks, beginning September 1. The association invites all to join who own or operate a wireless station in New Orleans. Those who wish to become members may communicate with Mr. P. Gernsbacher, 2022 State street.

COMMUNICATION CHART.

(Continued from Page 373)

As an example it will be seen that on Saturday, the 9th, the steamer was to be in communication with the following ships: Teutonic, Potsdam, Montfort, Montcal, Pennsylvania, Yvernia, Majestic, Mauretania and Kronprinz Wilhelm.

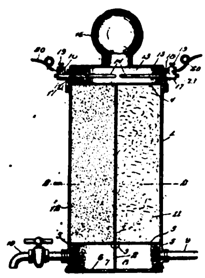
A VARIABLE MICA CONDENSER FOR DETECTORS.

(Continued from page 361.)

And since each switch or charging leaf charges two mica sheets the value of the first step is 2×.00063+M. F., or .00126 +M. F. The value of the second step will be 2×.00126+M. F., or .00252+ M. F. The fifth step 5×.00126+M. F., or .00630+M. F. This condenser will give capacities suitable for any of the standard detectors, .01+M. F. being suitable for the silicon detector, .003+M. F. for the Ferron, Electrolytic, etc., etc. The capacity of the condenser should be varied for different resistance phones, the best value to use being ascertained, when in use, by moving the switch until the signals are heard the loudest.

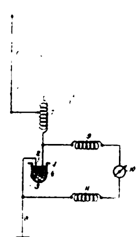
Electrical Patents for the Month

936,993. ELECTRIC WATER-PURIFIER. MATHEW R. FREI, Kansas City, Mo. Filed May 1, 1909. Serial No. 493,394.



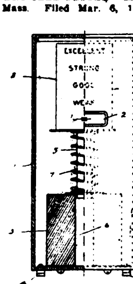
1. An apparatus for purifying water the same comprising a receptacle subdivided by means of a vertical partition into chambers, perforated plates supported within the lower portions of said chambers a short distance above the bottom of the receptacle, fibrous filtering material in one of said chambers granular filtering material in the other chamber, a perforated plate covering said chambers, means for supplying water to the space upon one side of said partition below the filtering material, means for drawing off water from the space upon the opposite side of the partition below the other filtering material, a cap fitted to the upper end of the receptacle and inclosing an electrolyzing chamber, electrodes extended into said electrolyzing-chamber and a reservoir surmounting said cap and in communication with the electrolyzing chamber.

936,258. RECEIVER FOR SPACE TELEGRAPHY. WILHELM SCHLOEMILCH, Oberschöneweide, near Berlin, Germany. Original application filed Oct. 3, 1903, Serial No. 175,600. Divided and this application filed Jan. 1906. Serial No. 294,366.



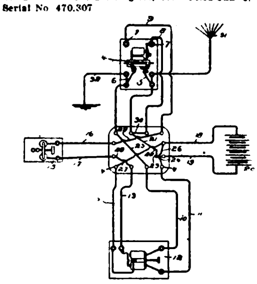
1. A receiver for wireless telegraphy comprising an electrolyte, electrodes of different materials in contact therewith to form a primary battery, a circuit connected with said electrodes and an indicator influenced by variations of current in said circuit.

936,001. DRY-CELL TESTER. EDWIN S. LINCOLN, Brookline, Mass. Filed Mar. 6, 1908. Serial No. 419,564.



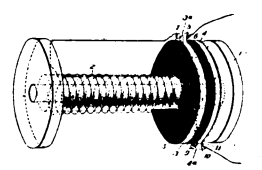
1. In a cell testing device, the combination with a casing, of contact members located upon the exterior of said casing, a solenoid magnet within said casing, a core adapted to enter said magnet, a washer surrounding said core and resting upon said magnet, said casing having a side opening formed therein, a drum mounted directly upon the upper end of the core, said drum bearing strength indicating matter upon its periphery, and a spring which bears between said drum and the washer, the spring normally tending to eject the core from the magnet, said core being drawn into said magnet against the tension of said spring.

935,721. WIRELESS-TELEGRAPH SYSTEM. VINCENT C. DE YBARRONDO, Los Angeles, Cal. Filed Jan. 2, 1909. Serial No. 470,307.



1. In a portable wireless telegraph system, a central switch board formed of superimposed sections one of the same being provided with oppositely extending oblique grooves on its opposite faces forming seats for the wires, and vertical openings adjacent said grooves whereby the wires on one face of the section may cross each other without contact by passing through the openings to the opposite face and thence to the first named face substantially as described.

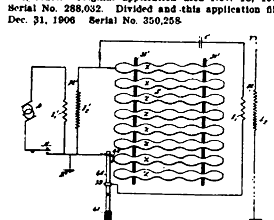
936,669. ELECTRICAL COIL. MAURICE C. RYPINSKI, Pittsburg, Pa., assignor, by mesne assignments, to Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa., a Corporation of Pennsylvania. Filed Nov. 18, 1907. Serial No. 402,728.



1. The combination with a coil of wire, of a disk located at one end of said coil and having a radial slit and having projections at the respective sides of its slit for connection to a terminal of the coil and to an external circuit.

2. The combination with a cylindrical coil of wire, of two disks located at one end of said coil and having radial slits and projections at the sides of the slits for connection to terminals of the coil and to an external circuit.

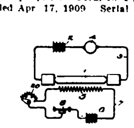
937,282. SPACE TELEGRAPHY. SEWALL CABOT, Brookline, Mass. Original application filed Nov. 18, 1905, Serial No. 288,032. Divided and this application filed Dec. 31, 1906. Serial No. 350,258.



1. In a space telegraph transmitting system, the combination, with a sonorous circuit, of a multiple-series spark-gap and means for including any desired number of the electrodes thereof in said circuit.

2. In a space telegraph transmitting system, the combination, with a sonorous circuit, of a multiple-series spark-gap having its electrodes formed of a non-arcing metal and means for including any desired number of said electrodes in said circuit.

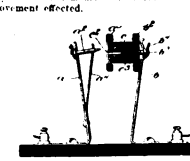
936,207. TELEPHONE-TRANSMITTER. CLIFFORD D. BABCOCK, New York, N. Y., assignor to United Wireless Telegraph Company, New York, N. Y., a Corporation of Maine. Filed Apr. 17, 1909. Serial No. 490,555.



1. In the art of transmitting speech, an element whose electrical conductivity is abnormally sensitive to small changes in temperature, when a given critical temperature is approached, and comprising in its composition a chemical compound, substantially as described.

937,242. AUTOMATIC CIRCUIT-BREAKER. NEWMAN H. HOLLAND, Brookline, Mass., assignor to Western Electric Company, Chicago, Ill., a Corporation of Illinois. Filed Oct. 22, 1904. Serial No. 229,640. Renewed Mar. 18, 1909. Serial No. 484,275.

1. The combination with two frictionally engaging members, of means tending to cause relative movement of the same, and means for applying heat to said members to cause unequal expansion thereof; whereby the frictional engagement of said members is overcome and their relative movement effected.

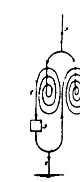


2. A protector for electrical circuits comprising a heat coil having an opening therein and a pin frictionally secured in said opening; whereby an abnormal current in the circuit expands said heat coil and permits a relative movement of said heat coil and pin, thereby opening the circuit.

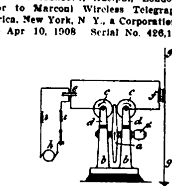
936,684. RECEIVING SYSTEM FOR HIGH-FREQUENCY ELECTRICAL OSCILLATIONS. FREDERICK K. VREELAND, Montclair, N. J., assignor to Wireless Telegraph Exploitation Company, New York, N. Y., a Corporation of New York. Filed Nov. 4, 1905. Serial No. 285,862.

1. In a receiving system for high frequency electrical oscillations, a current multiplier comprising dissimilar coils traversed by the oscillations and wound in close inductive relation, such coils acting on each other so as to reverse the current in one coil and thereby augment the current in the other coil, in combination with means for detecting the augmented oscillations, substantially as set forth.

2. In a receiving system for high frequency electrical oscillations, the combination of dissimilar coils wound in close inductive relation and connected in parallel and in the same sense in a circuit traversed by the oscillations, thereby augmenting the oscillations, and means for detecting the augmented oscillations, substantially as set forth.

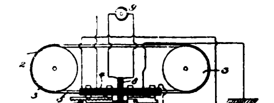


935,382. APPARATUS FOR WIRELESS TELEGRAPHY. GUGLIELMO MARCONI, Adelphi, London, England, assignor to Marconi Wireless Telegraph Company of America, New York, N. Y., a Corporation of New Jersey. Filed Apr. 10, 1908. Serial No. 426,184.



1. A transmitter for wireless telegraph apparatus comprising, a plurality of metallic bodies having continuous surfaces and located adjacent each other so as to form a spark gap, means for causing a movement of said bodies so that said surfaces have a high relative velocity to produce disruptive discharges in the gap between said bodies.

935,386. WIRELESS TELEGRAPHY. WALTER W. MASSIE, Providence, R. I., assignor to Massie Wireless Telegraph Company, Providence, R. I., a Corporation of Rhode Island. Filed Feb. 27, 1907. Serial No. 359,618.



1. A magnetic detector having a coil and magnets, and means for simultaneously moving the magnets toward and simultaneously from each other in a direction substantially axially of said coil.

Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending October 20

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.

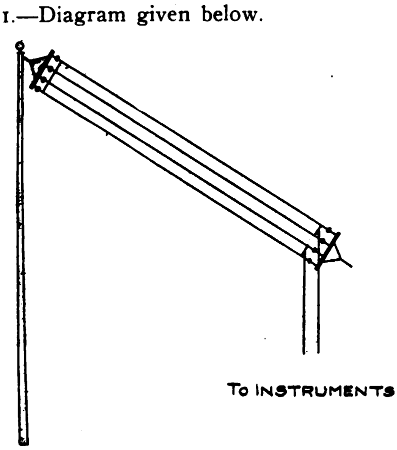
If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

LOOP ANTENNA.

(364) CLARENCE KIRTLEY, Iowa, writes:

1.—I would like to know as to the construction of the looped antenna, i.e., as to how many wires and how it is placed in the air, whether suspended from one pole or stretched between two?

A. 1.—Diagram given below.



WIRELESS QUERIES.

(365.) R. W. GREENE, Pennsylvania, writes:

1.—How far can I send and receive with these instruments? Sending, 1 inch spark coil, spark gap, and inductance coil, and condenser. Receiving, single slide tuning coil, condenser, "Electro"-Lytic detector, battery resistance and 1000 ohm telephones?

A. 1.—Sending two to three miles, receiving 75 to 100 miles with an aerial 75 feet high.

2.—Give diagram for best and simplest construction of aerial for use with said instruments.

A. 2.—We refer you to query No. 364.

3.—Would surrounding hills make it necessary for aerial to be above them, as some are 100 feet high?

A. 3.—No. Unless the aerial is placed close to the bottom of same.

INSUFFICIENT GROUND.

(366.) CARRYL WEIL, New York, asks:

1.—The ground of my wireless seems to be the great trouble, I use galvanized iron pipe 2½ feet long and I buried it 4 feet in the ground. Is anything the matter with it? Is it deep enough?

A. 1.—The actual surface contact from the pipe to the ground is by far too small. See answer to question No. 2.

2.—Which is the best for ground, the gas or water pipe?

A. 2.—The water pipe ground is by far the best and should be used wherever possible.

3.—Will a pint Leyden jar be enough for a ¾ inch coil? Can I get a good pint jar at the Electro Importing Co.?

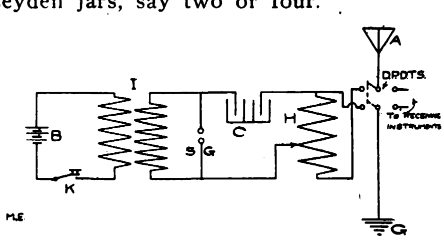
A. 3.—Yes.

WIRE FOR HELIX.

367.) CHAS. JESSUP, New York, asks:

1.—Please give diagram of how to connect 1 inch spark coil, Helix, three Leyden jars, key, spark gap, batteries and D. P. D. T. switch.

A. 1.—Diagram given below. We would suggest that you use an even number of Leyden jars, say two or four.



2.—How far can I send with a four-strand aerial, 30 feet long, 35 to 40 feet high, wires 1½ feet apart, using the above apparatus?

A. 2.—Two to three miles.

3.—What is the best wire to use for a Helix, copper or brass and what size?

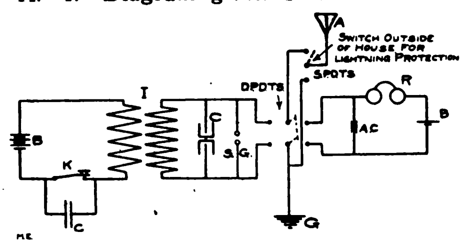
A. 3.—We would prefer aluminum wire about ¼ inch diameter.

WIRELESS QUERIES.

(368.) RAYMOND H. SHAW, Vermont, writes

1.—Will you please give a diagram of a lightning arrestor or switch, in the following circuit, using the following instruments: 50 feet aerial of aluminum, wire 30 feet long, 1 inch coil of E. I. Co. "Electro" zinc spark gap, "Auto" coherer, detector, 2 75 ohm telephone receivers.

A. 1.—Diagram given below:



2.—Also please tell me about how far it will send and receive.

A. 2.—Sending two to three miles, receiving 25 to 50 miles.

WIRE FOR TUNER.

(369.) H. HUMMEL, Kentucky, writes:

1. What is size of inclosed wire, and how would it work for tuning coil?

A. 1.—No. 30 B. & S. gauge bare German silver wire. This wire cannot be used for winding a tuning coil as it has too high a resistance. You must use copper wire.

2.—What is the receiving radius for following station: Electrolytic detector, fixed condenser, 1000 ohm receivers, tuning coil, good ground, and aerial?

A. 2.—100 to 200 miles.

3.—May ordinary galvanized telephone wire be used at all for aerial?

A. 3.—Yes, but not with very good results; use aluminum or copper wire.

BOOK ON WIRELESS.

(370.) ELMER OSTERMAN, California, asks:

1.—Kindly refer me to a good book on Wireless Telegraphy. I do not care for a book that tells how to make the apparatus but one that covers the care, handling, and the working of such instruments, as the following: Transmitting set, transformers, oscillation transformers, glass plate condenser, spark gaps with radiators, hot wire milimmeter, etc., receiving set, detectors, selective tuner, tubular condenser, high resistance head phones, variable condenser, etc.

A. 1.—We think that the Operators' Hand Book, by Victor H. Laughter, covers almost all of these points.

WATER RHEOSTAT AS POTENTIOMETER.

(371.) CLIFFORD HIGBY, Idaho, writes:

1.—Would it not be possible to use a small water-rheostat as a potentiometer?

A. 1.—Not unless the water rheostat is constructed in a special way so as to obtain the three connections.

2.—What code, Morse or Continental, is used by the stations on the Pacific coast?

A. 2.—Morse code is used by most of the stations on the Pacific coast.

3.—Which would be the best way to protect the building and instruments from lightning striking the aerial?

A. 3.—We refer you to query No. 368.

GALVANIZED WIRE AERIAL.

(372.) HAROLD E. LEIGH, Kansas, asks:

1.—Will you please tell me if an aerial made of 3 wires of telephone galvanized wire, 20 feet long and 2 feet apart, strung on a pole 40 feet high at one end and fastened to the corner of a house 20 feet from ground, would do to receive messages 200 miles with a good set of receiving instruments, and a water pipe for a ground?

A. 1.—We do not think so as the aerial is not long enough. If the aerial was 100 feet long we believe you would have no difficulty in receiving messages over this distance. You would also obtain better results by using aluminum or copper wire for your aerial.

2.—What is the nearest station from Hutchinson, Kans., that has a sending station strong enough to send here?

A. 2.—We refer you to the Wireless Blue Book.

3.—If I have my aerial 30 feet from my instruments, but only 10 feet above them, could I receive as far as if the aerial was 30 feet above my instruments?

A. 3.—No.

SENDING AND RECEIVING DISTANCES.

(375.) C. W. SCHWARTZ, Connecticut, writes:

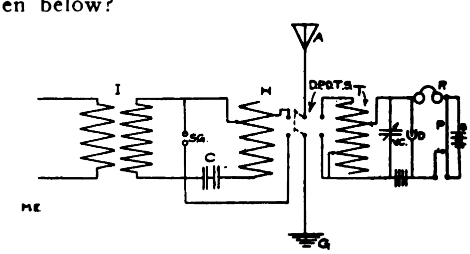
1.—What would be my transmitting radius using a 6 inch coil, electrolytic interrupter, helix of No. 8 copper wire, zinc spark gap, aerial 70 feet high, composed of 4 No. 14 bare copper wires spaced 1 foot apart and extending vertically into the air, ground on water pipes, also large area of chicken netting sunk in soft ground?

A. 1.—Probably 30 to 40 miles if the ground is perfect.

2.—What would be my receiving radius with same aerial and ground, double slide tuning coil, E. I. Co. bare pt. "Electro"-lytic detector, E. I. Co. non-inductive potentiometer, two 2000 ohm receivers, fixed and variable condensers?

A. 2.—300 to 500 miles.

3.—Can you give a better wiring diagram for sending and receiving than the one given below?



A. 3.—We would not suggest any change in the diagram you show.

WIRELESS BETTER IN WINTER.

(376.) EDWARD SISK, Tennessee, asks:

1.—What would be the receiving distance of following: E. I. Co.'s electrolytic detector, variable and fixed condenser, Junior receivers 2000 ohm, large tuner aerial 75 feet high, umbrella style, composed of 5 phosphor bronze wires, situated in highest part of city, town 898 feet above sea level?

A. 1.—800 to 1,000 miles.

2.—Would a variable condenser take the place of a fixed condenser using two variables and not any fixed condenser?

A. 2.—Yes.

3.—Does wireless work as well in winter as in summer?

A. 3.—In most cases signals may be received with great intensity during the winter months because during the summer static disturbances are generally more pronounced and cause more trouble in the reception of signals, besides the air is much dryer in winter.

LOOSE COUPLER FOR ½ K. W.

(377.) J. P. BRIGGS, Massachusetts, asks:

1.—How far can I receive with the following: Horizontal antenna, 2 wires, 300 feet long, 50 feet high and 150 feet above sea level. Loose coupled tuner, with 2 slides on primary and adjustable secondary. Silicon detector and 2,000 ohm head set?

A. 1.—500 to 1,000 miles.

2.—Can you give me data regarding a loose coupled transmitting tuner, suitable to run with a ½ kilowatt transformer?

A. 2.—We cannot give you data as requested, but refer you to Fleming's book, sent on receipt of $6.00.

3.—What would be the transmitting distance of above set under the most favorable conditions?

A. 3.—We are unable to state the distance exactly as much depends upon the condition of the tuner, but with a well constructed and well balanced one, 100 to 120 miles should be covered.

RECEIVING DISTANCES.

(378.) RICHARD JOHNSTONE. California, writes:

1.—Please give receiving range of the following instruments: Single slide tuning coil, silicon detector, fixed condenser and 500 ohm receiver, in connection with an aerial 40 feet high and 50 feet long, having 4 wires 1 foot apart.

A. 1.—300 to 400 miles.

2.—Also the range of the following: Double slide tuning coil, electrolytic and carborundum detectors, fixed condenser and variable condenser, potentiometer, two batteries, 2,000 ohm receivers, and an aerial of No. 14 copper, 80 feet high and 160 feet long, consisting of 4 wires two feet apart.

A. 2.—500 to 800 miles.

THEORY OF ELECTROLYTIC DETECTOR.

(379.) HEBER W. DAWSON, Canada, writes:

1.—When a horizontal aerial is used, is it best to have it at right angles to the direction in which the distant station is located?

A. 1.—Yes.

2.—Is there any considerable energy lost by leakage in having a small grounding switch inserted between the aerial and instruments?

A. 2.—Most assuredly.

3.—In a receiving system, will the battery current in the local circuit decompose the acid solution in the electrolytic detector?

A. 3.—Yes. The action of the electrolytic detector is as follows: The water being decomposed by the current, forms gas bubbles around the platinum wire, which, as is known, are an insulator. The incoming waves break down the film of these bubbles, whereby more current will flow through the detector—a click will be heard in the phone.

I K. W. TRANSFORMER.

(580.) FRANK M. J. MURPHY, Pennsylvania, writes:

1.—With a flat top aerial 100 feet in height, 200 foot stretch between masts, and total length of 350 feet 4 (or 6) aluminum wires on 12 foot spreaders, situated on 100 foot hill, surrounded by other hills of greater elevation than top of aerial, and distant a mile or more, what will be receiving radius with following instruments: Holtzer Cabot 4,000 ohm head phones, ferron and electrolytic detectors, non-inductive potentiometer, two slide tuner wound with 600 feet of No. 16 copper wire, and variable condensers?

A. 1.—500 to 800 miles.

2.—What will be sending range with one K. W. coil (primary 17 inchx1¾ inch 325 turns No. 12 square wire—secondary No. 28 —3,000 turns), suitable helix and glass plate condenser?

A. 2.—150 to 200 miles.

3.—Using 12 foot spreaders, what is the relative advantage of a 6 over a 4 wire aerial?

A. 3.—We do not think there is any advantage in using a 6 wire aerial.

RECEIVING DISTANCE WITH TUNING TRANSFORMER.

(381.) HOWLAND B. JONES, New Jersey, writes:

1.—How far can I send with an electrolytic interrupter, 1 inch E. I. Co. coil, 110 volt current, and wireless key?

A. 1.—7 to 10 miles.

2.—How far can I receive with a tuning transformer, silicon and perikon detectors, 1,000 phones, condenser, and potentiometer?

A. 2.—100 to 300 miles.

GENERATOR QUERY.

(382.) H. HACKLEY, California, writes:

A. Can a common, ordinary generator be converted into a motor and if so, how?

A. A.—Yes, by simply connecting it to the current supply.

B.—How far can I receive with 2 double slide tuning coils, receiving transformer, electrolytic detector, variable condenser, fixed condenser, 2 two-thousand ohm receivers, 1 potentiometer with aerial 130 feet high and 160 feet long, 6 wires?

A. B.—500 to 1,000 miles.

C.—Will 6 of the E. I. Co.'s ½ K. W. transformer coils joined together equal a 3 K. W. sending plant?

A. C.—No, but if all 12 secondaries were mounted on one primary the output of the coil would be about 3 K. W.

OSCILLATION TRANSFORMER.

(383.) JAS. MCNULTY, Illinois, asks:

1.—Should the oscillation transformer described in September issue be wound on iron core?

A. 1.—No.

2.—Please give diagram showing how to connect up the E. I. Co.'s auto coherer and 2,000 ohm polarized relay to give best results.

A. 2.—The auto coherer will not work a relay. You must use a coherer which must be mechanically decohered, in conjunction with a battery and relay. The auto coherer belongs to the class of self-restoring detectors.

250 WATT TRANSFORMER.

(384.) G. I. WELSH, Pennsylvania, writes:
1.—Referring to the 250 Watt Closed Core Transformer described in the April edition of MODERN ELECTRICS, can this be arranged to work with battery and independent vibrator by using brass strips instead of iron strips to fill in the opening between the U-shaped pieces? Would the winding on the primary have to be put on different, and if so could it be put on in sections similar to the secondary so that with slight alterations it could be used on 110 A. C. current?
A. 1.—No; it is impossible to work a closed core transformer on batteries.

WIRE FOR COIL.

(385.) JOHN FIGURES, Texas, asks:
1.—Will you please tell me what size the wire inclosed is, and if it would do for 1 inch coil. How much would be required?
A. 1.—No. 36 enameled and No. 40 single silk covered wire. The No. 36 wire might be used for a secondary of the coil, but we would not advise the use of No. 40 as it is too fine.
2.—What size core is used in a 4-inch coil?
A. 2.—8½ inches long by 1⅛ inches in diameter.

RECEIVING WITHOUT AERIALS.

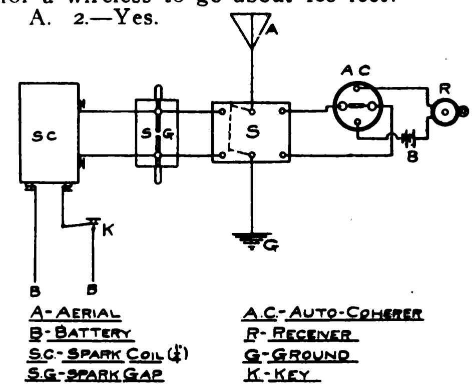
(386.) W. L. SEIBERT, New Jersey, writes:
1.—Can a molybdenite detector be used with a tuning coil, 75 ohm receiver and fixed condenser, without any aerial? If so, give diagram and state range of effectiveness.
A. 1.—Almost any detector may be used without an aerial for short distances.
2.—What is the wave-length of the United Wireless Co.'s stations?
A. 2.—Most of the United Wireless Telegraph Co.'s stations use a wave length varying from 400 to 600 meters.

WIRE FOR SECURING HELIX.

(387.) LAWRENCE STEPHENSON, Ohio, writes:
1.—What is the size of enclosed wire?
A. 1.—No. 14 B. & S. gauge bare copper wire.
2.—If suitable for sending helix, how many feet of it would be required for making one?
A. 2.—The wire is not large enough for use of the sending helix. We refer you to query No. 367.
3.—Are gravity cells suitable for sending or receiving in wireless?
A. 3.—Gravity cells have an average of 1 volt and 1-10 of an ampere. It is therefore readily seen that a very large quantity —about 30 or 40 cells—would be needed for sending. For receiving 6 or 7 cells will prove satisfactory.

WIRELESS QUERIES.

(388.) CARL F. GRABER, Illinois, writes:
1.—Would you please answer the following question: "Is the antenna and ground necessary on an outfit that is used for only a few hundred feet?"
A. 1.—Not absolutely necessary.
2.—Will the accompanying diagram do for a wireless to go about 100 feet?
A. 2.—Yes.

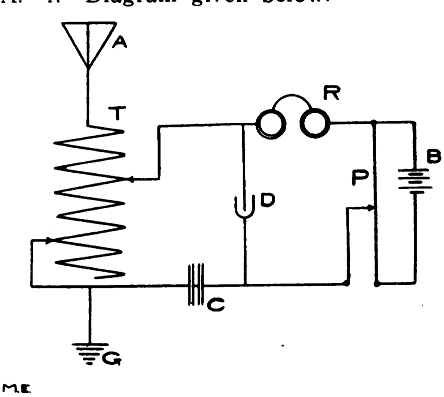


"WIRE" WIRELESS.

(389.) LYTTON CALROW, Illinois, writes:
1.—Enclosed is a description of my wireless and wire telegraph. Please tell me why my wireless works when I telegraph on my wire telegraph. I do not use the same batteries or the wires are not crossed.
A. 1.—This is caused by induction, the aerial and wire for the telegraph line running nearly parallel for a short distance.

RECEIVING CONNECTIONS.

(390.) STANLEY CUNDIFF, California, writes:
1.—Will you please tell me how I can connect up a liquid detector, a double slide tuning coil of about 500 meters, a pair of 2,000 ohm head receivers, a small condenser and a potentiometer of 300 ohms to the best possible advantage?
A. 1.—Diagram given below.



(391.) ROBT. F. ADAMS, Texas, asks:
1.—I have a wireless receiving outfit consisting of the following instruments: Large double slide tuning coil, potentiometer, electrolytic detector, variable and fixed condensers and one 1,000 ohm receiver; have connected the above instruments up by diagrams shown in MODERN ELECTRICS, but can hear nothing but a few static "splashes." Aerial is 110 feet long, consisting of 2 iron wires 16 inches apart, one end is supported about 40 feet high and runs close to the ground at the other. Isn't the aerial high enough, or why can't I hear any stations?

A. 1.—We do not think your aerial is high enough. We suggest that you raise the lower end about 40 feet. That you are able to hear static splashes would indicate that your instruments are connected correctly and we think the entire trouble is the height of your aerial.

BICHROMATE BATTERY.

(392.) LOUIS CLAPTON, Arkansas, asks:

1.—I made a battery according to directions in the June issue of MODERN ELECTRICS, using two carbon plates and zinc plate in a solution of sulphuric acid, but failed to get any results. I would like to know what can be the trouble. Would three of these cells run an E. I. Co.'s 1/8 inch spark coil in a wireless telegraph station?

A. 1.—The battery in question will of course not work with sulphuric acid alone, you must use what is called Chromic acid, which is prepared as follows: 50 parts water by weight, 10 parts bichromate of potash, 4 parts sulphuric acid. Mix well and pour in battery jar, being careful to first dissolve the b. of p. and then add the acid. Three of these batteries will of course work the 1/2 inch coil for wireless telegraphy.

GERNSBACK INTERRUPTER.

(393.) B. PFUNDT, New Zealand, Australia, writes:

1.—Am I to understand that with a Gernsback electrolytic interrupter wired in series with the primary of a E. I. Co.'s 1 inch coil that I can safely use a 220 V direct current lighting main to supply the primary current and without any fear of damaging the coil and without any adjustment on the interrupter?

A. 1.—Yes.

COHERER DISTANCE.

(394.) J. H. MAHER, Ohio, writes:

1.—What will be the receiving distance of the following instruments, with aerial 50 feet high, 75 feet long, 4 strands of aluminum wire 12 inches apart, electro coherer No. 1097, 100 ohm relay, 5 ohm telegraph sounder?

A. 1.—About three miles.

2.—With this outfit: Electro tuner, Jr., Electrolytic detector, Electro potentiometer, Electro variable condenser?

A. 2.—100 to 200 miles, but you will not get loud, audible signals as with the instruments under query No. 1.

REWINDING RECEIVERS.

(395.) H. HUMMELL, Kentucky, writes:

1.—How can I change a 75 ohm receiver to a 1,000 ohm?

A. 1.—By having the receiver rewound. If you consult our advertising columns you will find several firms who do this work.

ETHER OF SPACE.

(Continued from Page 357)

like fish in water. More than that, we not only live in it but the ether also permeates our bodies. Physicists have concluded in recent years that ether is many million times more dense than the densest matter known to man, such as gold or other dense substances, that it possesses a strength many millions of times greater than the strength of steel; that it is capable of motion or vibration more rapid than anything else known.

Yet, notwithstanding this inconceivable density and strength, we are entirely unconscious of its presence physiologically and we move through it with absolutely no resistance.—*Postal Telegraph.*

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

CLASSIFIED ADVERTISEMENTS.

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

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

Advertisements for the Dec. issue must be in our hands by Nov. 25.

ELECTRICAL APPARATUS.

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

GET YOUR ELECTRIC GOODS FROM US! Big catalogue for 5 cents. Address, Lester E. Wahl & Co., East Brady, Pa.

ELECTRICAL BOOKS, BLUEPRINTS, ETC.

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

ATTENTION WIRELESS EXPERIMENTERS! For 35c. we will furnish you blue prints for best connection and installing of your wireless plant. Send us your wants. United Electrical and Chemical Laboratory, North Powder and Baker City, Oregon.

"MODERN ELECTRICS" back issues, except April and May, 1908, 25c. each; No. 1302 polarized relay, 100 ohms, brand new, $6.00, prepaid. Richard Loewe, Visalia, California.

AMATEURS! Make your own switchboards. Excellent imitation marble. Cheaply constructed. Full instructions, 25c. A. Benson, Stewartville, Minn.

MONEY MADE METALIZING FLOWERS. Big demand. Enormous profits, easy work. Particulars and sample, 10c. Full instructions, 50c. A. Benson, Stewartville, Minn.

QUESTIONS ABOUT WIRELESS answered clearly and promptly, giving diagrams when necessary, 25 cents coin; satisfaction guaranteed. Do it now. Wireless Inquiry Bureau, Lima, Ohio.

TECHNICAL INFORMATION answered promptly, 25c. Wave-length figured mathematically, size of aerial. "C," 65 Cole street, Bristol, R. I.

HOW TO MAKE A WIRELESS TELEGRAPH guaranteed to work 100 miles. Very cheaply made. Detectors and blueprints, 25 cents. Thais Wireless Station, 90 Laurel st., W. Lynn, Mass.

BLUE PRINTS of 20 of the best Wireless Hookups now used, postpaid for 25c. in coin or stamps. H. H. Holder, South Norwalk, Conn.

WIRELESS

ARE YOU BUILDING A COIL? We have just imported a stock of THE BEST NORWEGIAN CORE WIRE, No. 22, FINELY ANNEALED. The wire is cut in straight lengths from 6 in. to 24 in. NOT IN COILS. Price per pound 20 cents. ORDER AT ONCE AS SUPPLY IS LIMITED. ELECTRO IMPORTING CO., 86z West Broadway, N. Y.

YOU BET

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

ENAMELED WIRE FOR TUNERS, ETC.—300 feet No. 28 or 125 feet No. 24 for 25 cents. 1000-ohm No. 40 for receivers, 50 cents. 4½, 4 and 3½ inch heavy cardboard tubes, 15 cents per foot. 400-ohms potentiometer wire, 10 cents, Middlesex Wireless Supply Company, 94 Antrim st., Cambridge, Mass.

1,000 OHM WIRELESS RECEIVERS, $1.75. Very sensitive and efficient. NEW DETECTOR with receiving condenser, $3.50. Long distance receiving set complete with pair of receivers (2,000 ohms), $12.25. Double-slide tuning coils, $3.50. Fixed receiving condensers, $.30. This apparatus is of the best design, material and workmanship. Send stamp for latest circulars. Alden Wireless Co., Campello, Mass.

WIRELESS EXPERIMENTERS, have a lot of 6 foot receiver cords, 2-conductors silk covered nickel plated tip, at 55c., postpaid. H. Rugen, 572 Linden street, Ridgewood, L. I.

A MODERN, very efficient receiving set, having three variable condensers, electrolytic, perikon and silicon detectors. Price, $15. Allen Dudley, Milford, Mass.

SPECIAL PRICES. The only wireless key enabling receiving operator to interrupt transmitting operator at any part of message. Will not burn out detector or phones, $2.75. 1,000-ohm wireless receiver, double pole, solid hard rubber case, wound with copper wire, $1.75. "Eclipse" double slide tuning coil, $3.00. "National" receiving condenser, 30c. Waterhouse Bros., Bourne, Mass.

WIRELESS OPERATORS ATTENTION. Green Carborundum. Something New. Every Crystal works. 50% more sensitive than the blue crystals. Price 50c per ounce. ELECTRO IMPORTING CO., 86-Z W. B'dway, New York.

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

FOR SALE.

6-VOLT 40 AMP. HR. STORAGE BATTERY, $4.00; sending coil, oil-immersed, A. C., gives fat 1-4 inch spark, with condenser and zinc spark gap, 4 cell chemical rectifier, complete, ready to run, $8.00. D. C. fan, almost new, $3.00 Address George P. French, Melrose Highlands, Mass.

5-IN. RUHMKORFF SPARK COIL for sale, perfect condition. A bargain for some one. F. E. Scholfield, Bronxville, New York.

2 K. W. 30,000 VOLT TRANSFORMER, $100. 3 K. W. 120 cycle self-exciting generator, $115. D. F. Bernhardt, New Brighton, S. I., N. Y.

FOR SALE, complete wireless outfit, $10.00. Address, M. Lewry, 573 Washington ave., Brooklyn.

FOR SALE. Dynamo, 110 volts; 9 tungsten lamps, 2 amp., excellent condition, almost new, $15. 1 1-2 inch Electro coil, good condition, $4. Write R. B. Smith, 103 Glenwood ave., E. Orange, N. J.

FOR EXCHANGE, Dynamo, 650 watts, direct current, with pulley, in best condition, worth $50.00, for large induction coil, wireless outfit, other electrical apparatus, or $25.00. Vick Azbe, St. Mary's Hospital, Jefferson City, Mo.

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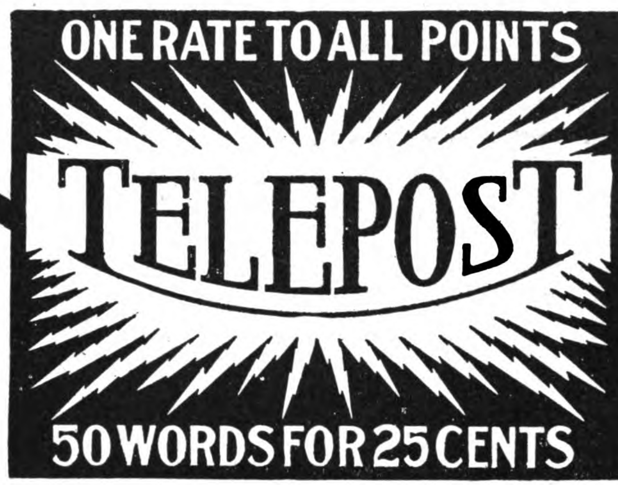
The charge ranging from one cent to one-quarter of a cent a word to the general public makes communication by telegraph an economic convenience for every one. You can send

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



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

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

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

¶You ought to know all about it.

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

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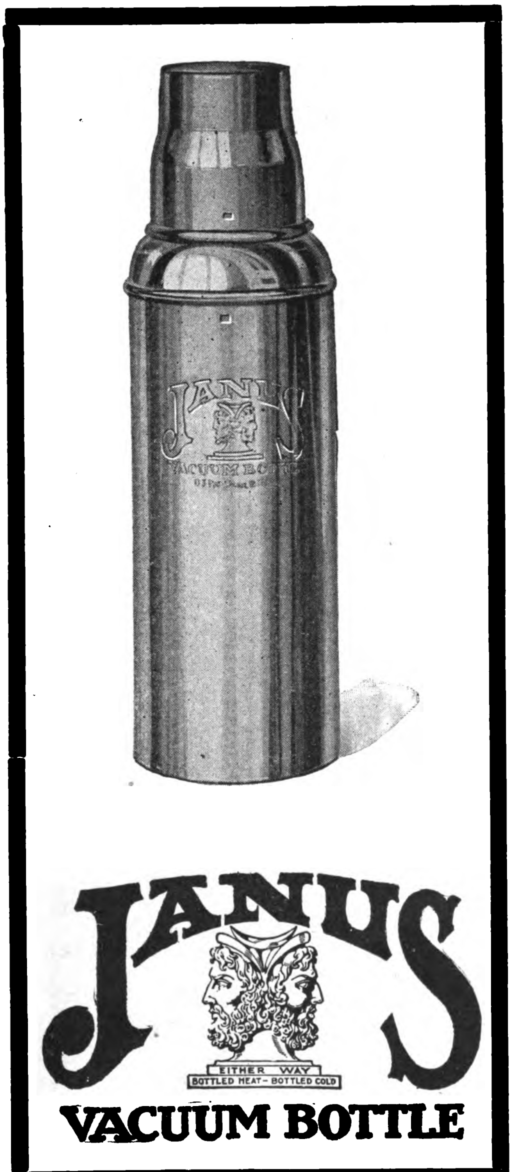

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The cost of the JANUS BOTTLE is little, the convenience derived from its use great. Hot coffee, water, or milk — anything hot, or anything ice cold; either way, anywhere, at any time you desire. The JANUS BOTTLE does it all.

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U. S. Patents 889,992, June 8, 1908
" " 39480, Sept. 1, 1908

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Murdock Wireless Apparatus

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Double Receivers, in Series, with Head Band, Cord and Block

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200-Ohms....	$4.50	200-Ohms....	$7.00	3,000-Ohms..	$12.00
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1,500 "	6.50	1,500 "	10.00	5,000 " ...	14.00
2,000 "	7.50	2,000 "	11.00	6,000 " ...	15.00
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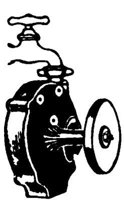

Complete with emery wheel, buff wheel, pulley to run sewing and washing machine, polish. **$2.50** In some cities where we have no agents and where the water pressure is good, a **sample motor will be given free**; apply at once if you want to make some extra money, or if you can devote your whole time, liberal salary and commission will be paid.

ALCOHOL STOVES, LAMPS AND FLAT IRONS.

ENGINEERS WANTED to send for catalog of indicators, Reducing Wheels, Planimeters. Address,

LIPPINCOTT M. S. CO.,
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STOP—Buying inferior instruments
LOOK—At our goods first
LISTEN—With our receivers.

Double slide tuning coils........ **$ 4.00**
2000 Ohm Receivers complete.... **6.75**
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——All Instruments Guaranteed——

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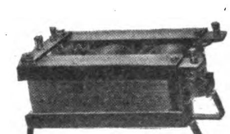
250 watt 10,000 volt transformer for use in wireless telegraphy. Special price delivered to any part of U. S., **$30.00.** Will send up to fifty miles. Speaking arcs, transformers, etc. supplied for use in wireless telephony. Drawings and plans furnished. Send for descriptive matter.

VICTOR H. LAUGHTER
University Building Detroit, Mich.

When writing please mention "Modern Electrics"

A New Wireless Transformer



By actual test 5 times more powerful than any equally rated Transformer on the market : : :

¼ K.W. with Adjustable Reactance...**$26.00**
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All goods for the wireless experimenter carried in stock. Send for our Wireless Catalog.

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136 Liberty Street, New York

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Reputation from accomplished facts and not promises has carried the Star Safety Razor through thirty successful years. The expense of large advertising space prohibits going into detail in regard to the Star Safety Razor. You get value in this article and are not paying for the advertisement. Men who have used this Razor for many years, and who have also tried numerous thin blade Safety Razors, state that THERE IS BUT ONE SAFETY RAZOR that gives entire satisfaction—and THAT IS THE "STAR."

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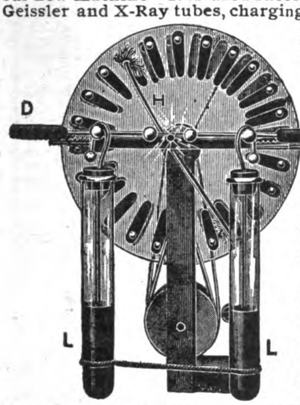
"Electro" Static (Wimshurst) Machine

Guaranteed to generate in any kind of weather, no matter, foggy or rainy. The first machine ever constructed which can truthfully claim this. We absolutely guarantee a fat, powerful **3-in. spark** from our new machine It is used successfully to operate Geissler and X-Ray tubes, charging the biggest Leyden jars, firing powder, working wireless sets for short distances raising a person's hair, etc. Anybody interested in electricity owes it to himself to possess one of these wonderful machines which can be used to perform thousands of interesting experiments. Our cut shows the machine plainly.



It comprises two 8-in. glass crystal plates revolving in opposite directions, two adjustable oscillator and discharging rods and balls D, collectors H and one iron clamp to fasten body to table. Size over all 11x14 in. Weight boxed 8 lbs. Nothing to wear out, no batteries, no trouble, simply turn the crank, the machine does the rest. **Price, complete boxed, $3.75.** If you haven't got our 114 page electrical cyclopedia No. 5, send 2c stamp postage; contains 100 experiments.

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The "ELECTRO"-LYTIC BARE POINT DETECTOR

(PATENT PENDING)

Our new "Electro"-Lytic Detector is without a question the finest on the market WITHOUT EXCEPTION. Our Detector has all the good qualities of a good Detector but none of the bad ones. Everybody concedes that the Electrolytic type excels by far all other Detectors in sensitiveness and our new type—already adopted by two of the leading wireless companies—is without doubt the acme of perfection. Please bear in mind that our new Detector has been designed for *hard commercial work*, it is not an amateur contrivance. Here are a few points: Hard rubber base ½ in. thick, hard rubber thumb nut 1 in. diameter, graphite-carbon cup moulded in brass cup (under hydraulic pressure,) heavy cast brass standard, etc. The most important part is that the 1-10,000 inch Wollaston wire does not need to be soldered, as in all other Detectors, a screw holds it in a unique manner. The last 1-16 inch piece of wire is utilized, new wires inserted in 10 seconds, etc. By means of an ingenious plunger movement, the fine wire is raised and lowered with greatest precision—less than 1-10.000 inch at a time. The wire cannot turn in a circle, (as wires do, *directly* attached to thumb screws,) it can only move *up or down*, not sideways, etc. This has been found is of tremendous importance. ALL METAL PARTS ARE HEAVILY SILVER PLATED, as we found that silverplate is not attacked by fumes of the acid. We also furnish bottle to hold acid, and and one pipette to fill acid in cup.

Introduction price, **$1.50** By mail extra 12 cents

Write for new Pamphlet on this Detector.

Electro Importing Co., 86-Z W. Broadway, New York

AERIAL INSULATION.

By George F. Worts.

The writer of this paper has noticed that during the past year while various authors in the electrical magazines have been "suggesting" to the wireless amateurs various important points in the construction and operation of wireless stations, the question of insulation has been sadly neglected. This important feature in the successful operation of any wireless plant is far too important to be slighted. In most of the articles upon the construction of wireless stations, even the most detailed have not given much space to insulation.

In receiving, perfect insulation is not especially necessary, as the electric impulses coming in weakly as they do, will follow the metallic conductor with hardly any leakage. It is in transmitting that high dialectric insulation is necessary. The high frequency waves freed from the oscilator at a tension of more than 10,000 volts have a marked tendency to leap to any object having even the slightest capacity and subsequent grounding ability. To overcome this very undesirable feature, insulation past the secondary of the transformer or induction coil must be the very best possible. The oscillator should either be upon rubber, marble, fibre or lastly hard wood properly treated with an insulating com-

(Continued on page 399)

AERIAL INSULATION.

(Continued from page 398)

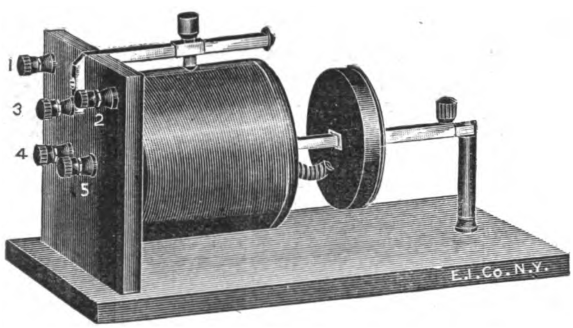
pound. Rubber is preferable in all cases. The helix case should be of rubber or fibre. Wood may be used in this case if properly insulated by boiling in a half and half mixture of parafine and beeswax. From the helix to the aerial as few insulators as possible should be used. The leading-in tube should be either glass or rubber. The walls of the tube should be at least 3/8 of an inch thick and preferably 1/2 inch.

The aerial insulation itself, exposed to the most trying extremes of our climate, should be treated as carefully as possible. It must first of all withstand high electrical discharges in the wettest weather and often near salty water. It must withstand the boiling sun of August and the freezing cold of January. It must have combined all the most desirable characteristics possible to obtain, both in mechanical and electrical strength. There are many insulators on the market, all of which are more or less desirable. The corrugated, slender, navy type is the best for all circumstances. The ball type, inferior, but cheaper, can also be used to advantage. The aerial wires should be individually insulated from the spreaders while the spreaders should be insulated from their supports. Aerial poles, towers, etc., if of metal, should be grounded to prevent aerial leakage. As a final word the writer would suggest to the amateur the use of the loop aerial with the four-pole switch, as described in the September number of this magazine, or Mr. Austin's automatic relay, described in a previous issue, in place of the old style leaky anchor gap so detrimental to the radiative energy of your station.

The Electro

THE "ELECTRO" LOOSE COUPLER (Receiving Tuning Transformer)

(Patent Applied For)



No. 12000

is the latest word in wireless

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

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

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

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

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

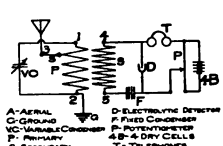
We have been experimenting for long months to produce a loose coupler within the reach of everybody and as usual succeeded. Not alone did we succeed but we improved the old type to such an extent that it has a far greater selectivity than any similar instrument on the market NO MATTER WHAT ITS PRICE.

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

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

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

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



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

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

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

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

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

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

Adjustment: When connections are made and detector is adjusted, move secondary up to the centre of primary, then adjust slider till signals come in loud; then move secondary back and forth till position is found where signals are loudest. Now the variable condenser is adjusted. Dimensions: length of base 12 inches, width 6 inches, height over all 6½ inches, weight 2¾ lbs. No. 12000, the "Electro" Loose Coupler, (Patent applied for) as described,

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News

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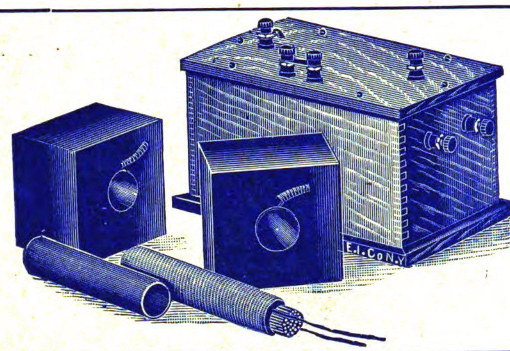

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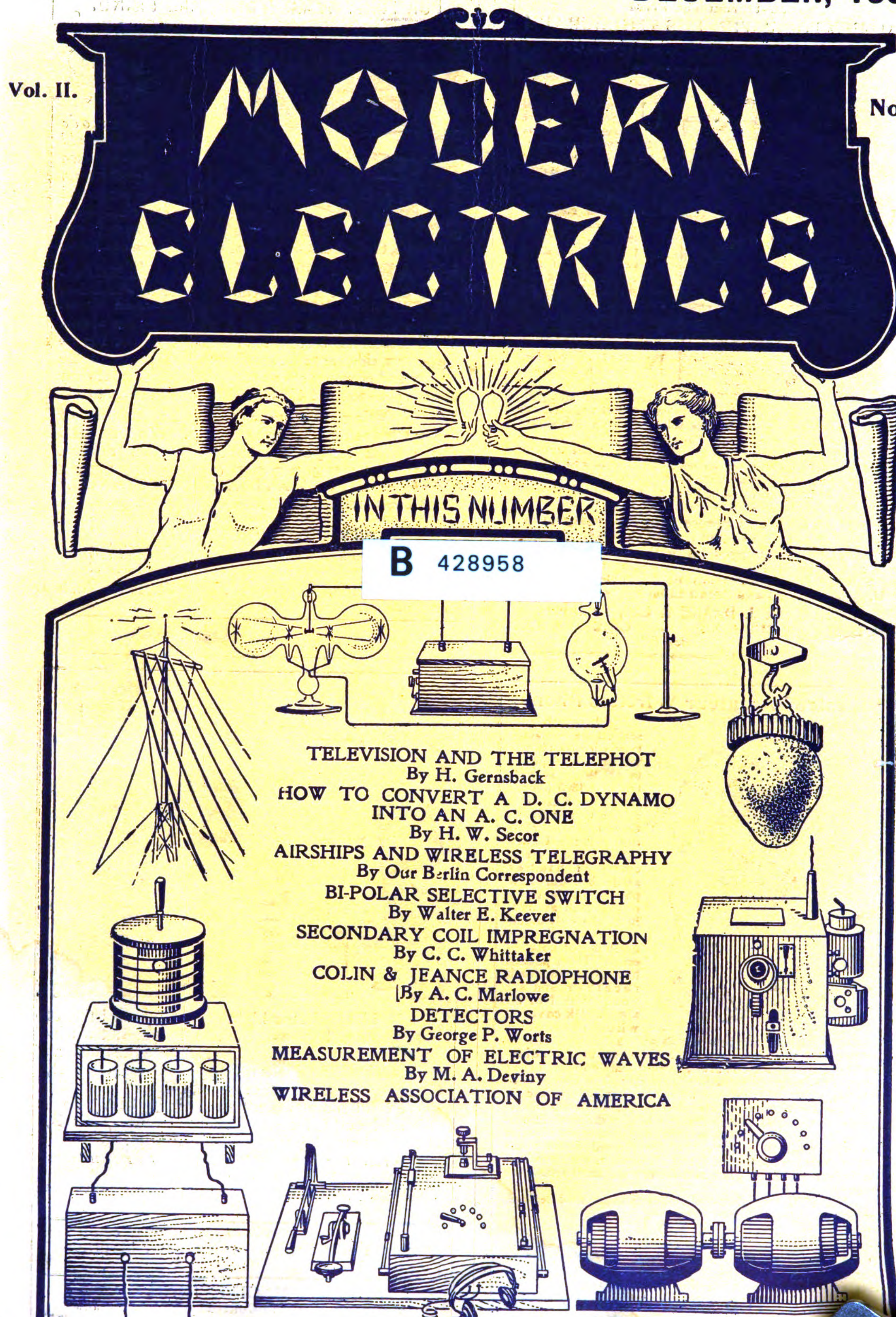

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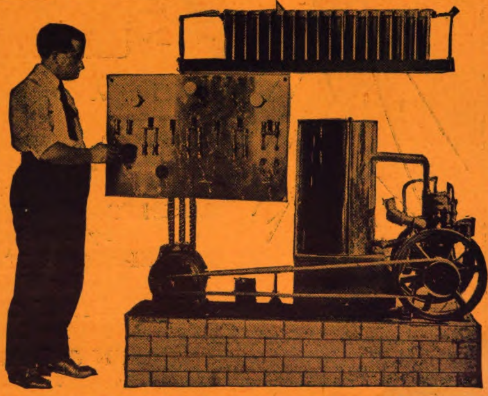

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