W. A. O. A.

SEE PAGE 429

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Vol. I. No. 12

MODERN ELECTRICS

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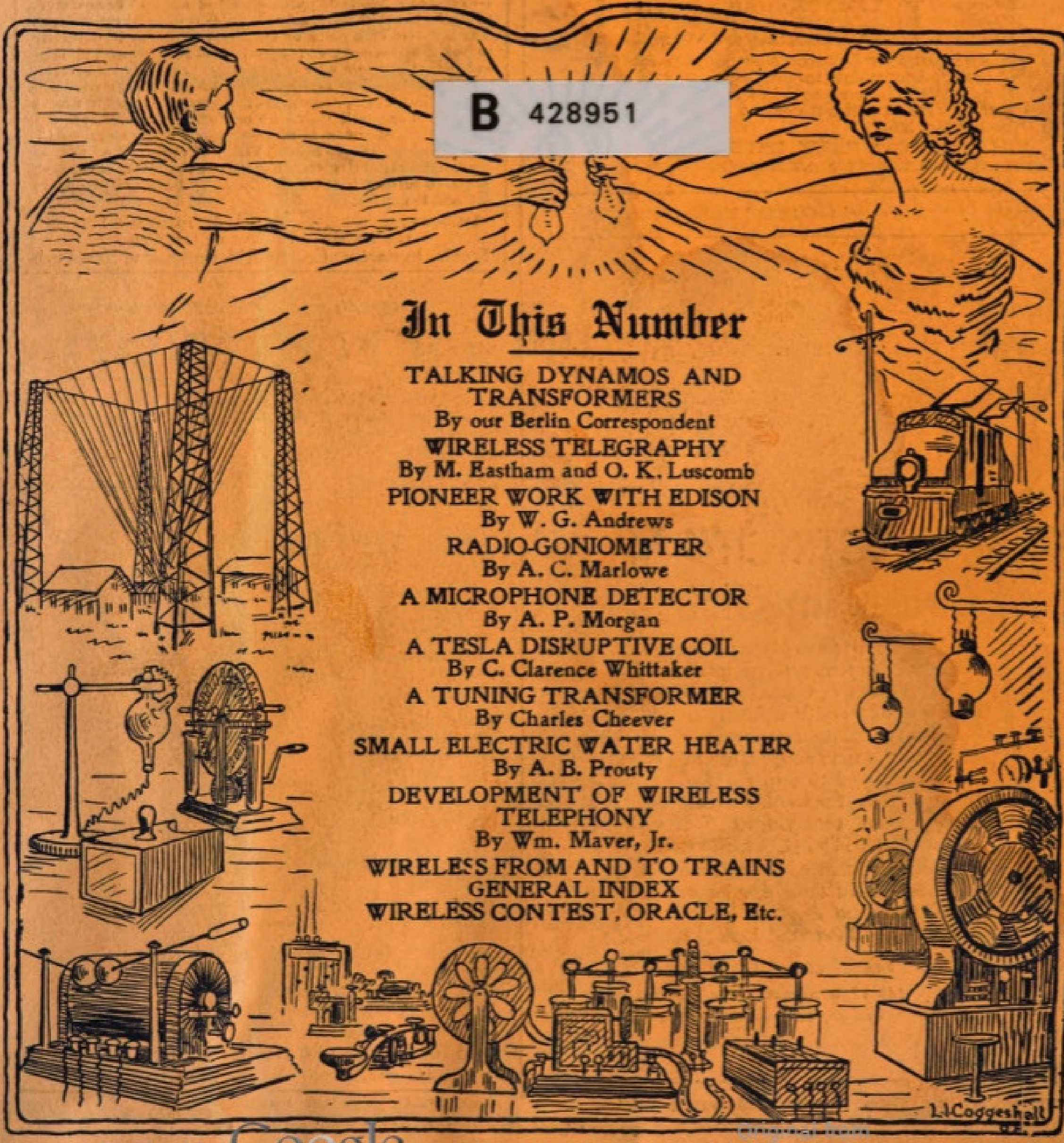

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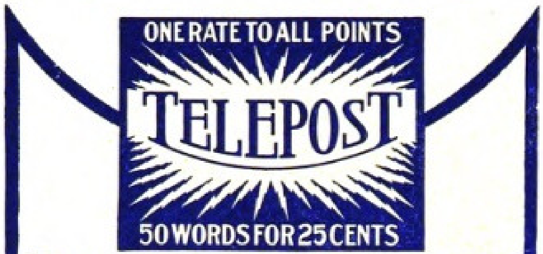

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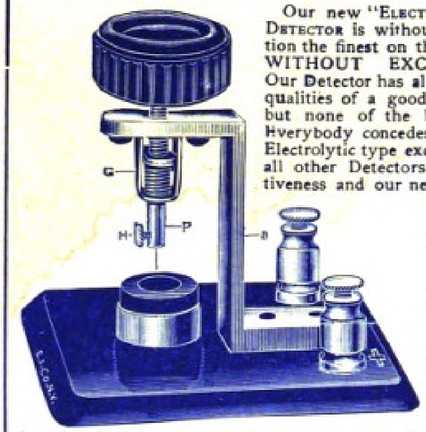

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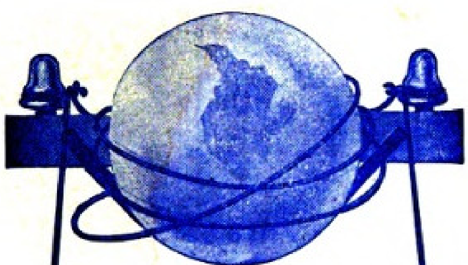

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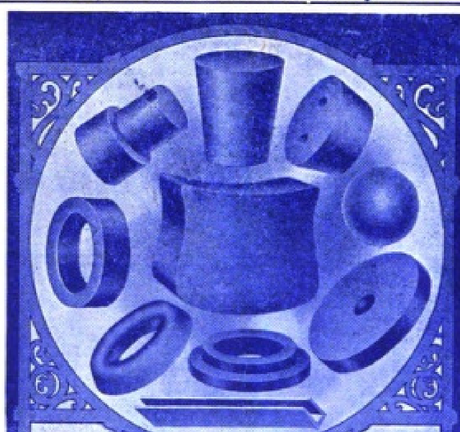

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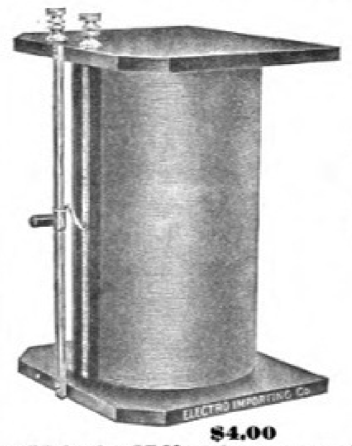

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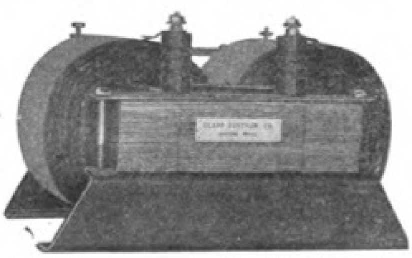

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MODERN ELECTRICS

Vol. I. MARCH, 1909. No. 12.

Talking Dynamos and Transformers

By Our Berlin Correspondent.

Professor W. Peukert has just published* several important experiments with talking dynamos and transformers, which, on account of their far-reaching importance are sure to excite worldwide attention.

Professor Peukert developed his experiments as follows. He first took an iron ring, K, Fig. 1, made of soft iron wire, wound in one piece. He

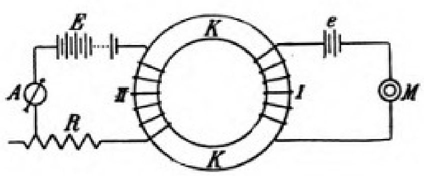


Fig. 1

then wound on it several turns of wire, I, the ends of which were connected with battery e and transmitter M. If one talked in M one could hear the voice faintly by placing the ear against the iron ring.

Speech, therefore, was made audible without the use of a telephone receiver.

The explanation of this, as well as of the following phenomenae is, that the iron molecules in the iron ring, are made to swing in unison with the vibrations of the transmitter.

It is a well known fact that the permanent magnetism of iron may be considerably affected by even weak magnetical forces. Bearing this in mind, Professor Peukert wound a second spool of wire, II, on the iron ring.

The result was indeed surprising. At once the iron ring began to talk astonishingly loud, and by varying the rheostat, R, speech could be heard distinctly and plainly three to four yards distant from the ring.

*E. T. Z. Berlin.

The second experiment is illustrated in Fig. 2. Fig. 3 shows the arrangement as actually used by the experimenter.

A bobbin of wire was placed between the poles of an electro-magnet. With this arrangement the reproduction of the voice was very satisfactory, and could be plainly heard all over a large room. The strength and clearness of the voice depends much on using the right current strength, and of careful regulation with rheostat, R.

Reproduction of the voice is also experienced, even if S S does not actually touch the poles of the electro-magnet. It suffices that the spool is in the magnetical field. Of course the voice, in this case, is heard much fainter.

As the foregoing experiments showed clearly that the most important requirements are found in the permanent magnetization of the iron, the

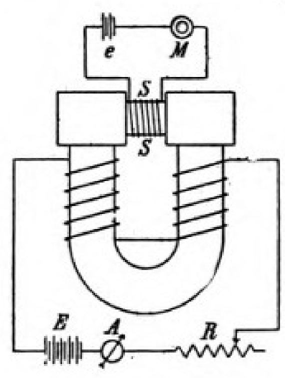


Fig. 2

idea of using a strong permanent magnet was self-evident. The professor therefore constructed a powerful permanent horse shoe magnet as illustrated in Fig. 4. Between its poles, N and S, the spool of wire, S S, with soft iron core, is anchored.

The results of this simple device were amazing. The reproduction of the voice is extraordinarily pure and clear, and is far ahead of the ordinary telephone, which uses vibrating diaphragm. By skillfully proportioning the different parts it has been possible to evolve a new telephone receiver which has been tried very successfully lately over long distance telephone lines.

There could hardly be a simpler instrument than the new receiver. There is no vibrating diaphragm to get out of order, and as the magnetical circuit is entirely closed, there are practically no losses at all, and the sensitiveness of the instrument is greatly increased. In the ordinary receiver, the diaphragm only vibrates, while in the new one the entire iron mass—which is quite large, compared with a small diaphragm—vibrates down to

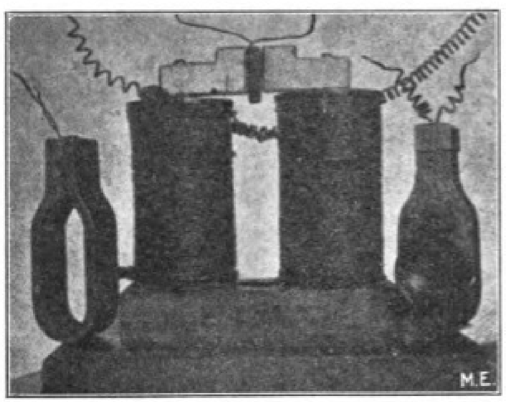


Fig. 3

the smallest particle. This explains why the new instrument reproduces so powerful. This result can even be increased by placing a shallow, funnel shaped ear piece on one side of the magnet (Fig. 3, right-hand side). By pressing this against the ear the faintest sounds are made audible.

Another, and very important, feature of the new receiver is that the disagreeable crackling noises so often experienced with the old receiver are entirely eliminated. Fig. 3 (left-hand side) shows the simplest form of this receiver.

By referring to Fig. 1 it will be seen that the arrangement closely resembles the ordinary A. C. transformer. Therefore experiments were made with regular commercial transformers, the results always being surprisingly satisfactory. The big transformers used before large audiences talked so clear and loud that everybody in the audience was able to understand each word.

The experiments of the "talking transformers" were then carried on

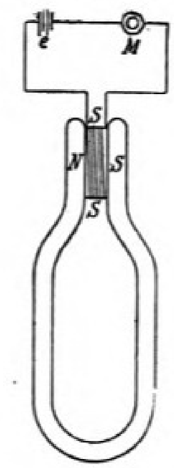


Fig. 4

further by replacing the transformers with a dynamo. Fig. 5 shows the arrangement and connections. It is of course self-evident that in this experiment the dynamo must be at rest. Most any dynamo may be used for this experiment, the only requirement being that the battery E and resistance R is suited for each particular dynamo. Professor Peukert usually uses storage batteries at E, the number depending on the size of the machine.

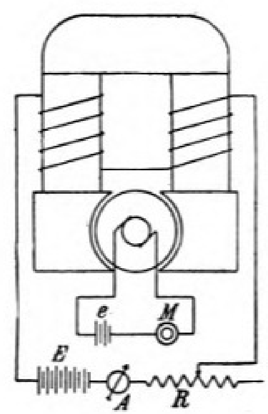


Fig. 5

A 500-watt dynamo used worked so well that it did not only talk, sing, or laugh, but it also reproduced music from pianos, cornets, pistons, etc., in a truly marvelous manner.

Who would have guessed that such a prosaic machine as a dynamo could

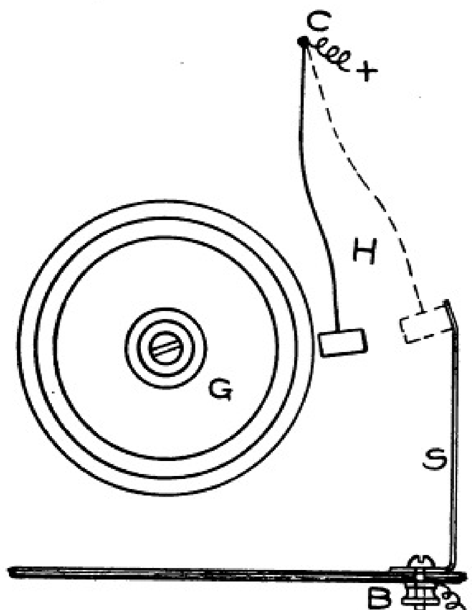
(Continued on Page 453)

One Clock Made to Strike in Several Rooms

By C. B. McCauley.

The following paper may be of interest to some readers of Modern Electrics How one striking clock may be made to strike in several rooms.

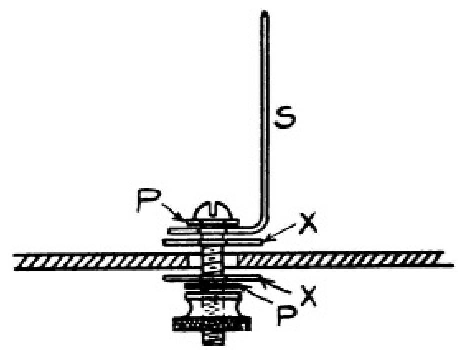
First, in the case of an eight-day mantel clock. Remove the back, which is usually held by four flat-head machine screws. Then take the weight from the pendulum, to prevent injuring the delicate mechanism at the top of the pendulum. Locate the hammer that strikes the gong. Cut from a piece of rather springy sheet brass a strip about 6 inches long and 1/2 inch wide.



ME. -Fig. 1-

Examine the base of the clock to see if it is made of wood, which is nearly always the case. If so, mount the strip of brass or copper, as shown in Fig. 1 at S. When the hammer H (Fig. 1) is raised, indicated by dotted lines, it will make contact with the spring S, which is held in place by the bolt B passing through the spring S and the bottom of the clock. In case the bottom of the clock is not made of wood or some other insulating material (which would be a rare exception), the bolt and spring must be insulated from it by rubber or leather washers X (Fig. 2). The hole K in the base of the clock will have to be about three times the diameter of the bolt, so that the bolt will not touch the sides of the hole (Fig. 2). The washers P are brass or copper.

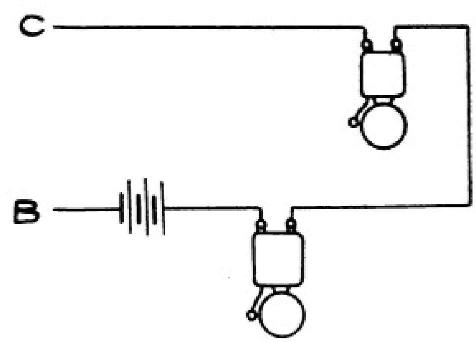
In the case of cabinet clocks, the spring S is bolted to the side or back of the cabinet. With the reader using a little judgment this automatic circuit closer



-Fig 2.-

can be easily constructed. The arrangement of the striking circuit is shown in Fig. 3.

Common electric bells may be used as strikers by connecting both terminals of the electro magnet to the binding posts of the bell. A 4 ohm telegraph sounder may be used by putting a piece of rubber



M.E. -Fig. 3.-

over the end of the upper set screw, so that the armature will make no noise on being released. These bells or sounders are connected in series, as shown in Fig. 3. The number of cells of battery required depend upon the length of circuit and number of strikers used. Common dry cells, or salamoniac batteries, give good service.

Pioneer Work With Edison*

By W. S. Andrews.

I had the honor to be associated with Mr. Edison in the early days. Some of Mr. Rice's graphic accounts have brought back to me memories of the troubles and trials which we experienced in those old days for the lack of material and instruments; for instance, trying to measure volts without volt-meters, amperes without ampere-meters, etc.

In the old days when we first started in with electrical wiring we had no wire of any kind, with the exception of a limited quantity of some that was single cotton covered. After a great deal of work, however, we persuaded some of the wire manufacturers to make for us what was called cotton-braided wire, which was covered with a coat of white lead, and known as Underwriters' wire. But this was far from perfect, as moisture took to it very quickly. After two or three fires happened, it was re-christened "Undertakers' wire."

In 1883, on the Fourth of July, Edison started his three-wire station in Sunbury, Pa. A quarter of a century ago; a short time to look back to, but a long time to look ahead to. In view of the fact that such tremendous strides have been made since that time, it may be interesting to give a short account of some instruments and apparatus which we used in Sunbury station, also in testing dynamos at that time.

All dynamos of the Edison system were of the low-tension type, 115 volts being about the highest pressure used. These were all made at the Edison Machine Works, New York City. Three types of belt-driven machines were standard at that time. This was in 1882. These machines were standardized according to the number of 16 C. P. lights that they would carry without undue heating. There was the Z machine which would carry 60, the L which would carry 120, and the K, 240—each size thus carrying double the number of lights of the one before it. These machines were shortly redesigned and relettered. The letters were picked out from the alphabet without regard to order at all. The largest was H, the next smaller Y, then S, T, R and G. Why these letters were chosen I do not know. The men in the testing-room, however, found it so difficult to remember them that they adopted the following sentence—the first letter in each word of which stood for a type letter of a machine:

"Have You Seen Thomson's Reflecting Galvanometer?"

In testing these machines electrically they were connected to a large bank of lamps on the ceiling of the testing-room which was very high. The bank consisted of about one thousand 16 C. P. lamps. There were no volt-meters at all, and the only means we had for measuring was by means of a standard battery made up of very small Daniel cells. The solution was carefully made of chemically pure acid and distilled water. It was supposed that the electromotive force of these cells was 1.079. We connected them in series with a Thomson galvanometer and high resistance of 20,000 or 30,000 ohms; a very crude way, but the best we had. It was my especial duty, once each week, carefully to clean the battery and renew the solution so as to insure the voltage remaining constant.

It was also common practice to check the candle power of incandescent lights by comparing them with a standard candle which was supposed to burn 120 grains of tallow in an hour. Of course we had to weigh this before and after burning.

As early as the '80's, as Mr. Rice has already said, the term "weber" was used. This was afterward changed to "ampere" in '85, at least in the Edison Machine Works. Later on, the electrical unit of power became popularized by the name of volt-ampere, afterward changed to watt. Edison's dynamos were rated in 16 C. P. lamps as late as 1890. At this time it became general to rate them in watts or kilowatts. It was thought by some a great mistake to rate dynamos in kilowatts at that time.

In regard to measuring amperes, the method we adopted down there was to take strips of German silver, and, knowing the volts and resistance, we could

*A talk before the Schenectady Section A. I. E. E., October 29, 1908.

figure out amperes. In order to measure amperes from "jumbo" dynamos, which delivered 400 or 500 amperes, we used so-called shunt boxes—these being about 4 feet long and 24 inches square. We generally calibrated the galvanometer as we naturally would so as to read in amperes direct without any calculation. In regard to the measurement of electrical resistance, I do not know that there is any method in use at the present time which is better than the one we had then.

The only means of maintaining normal voltage in lighting plants was by observing a pilot lamp located on the headboard of the dynamo. When a man was sent out to set up a dynamo he would show the engineer how bright this pilot lamp ought to burn at the proper voltage.

In large isolated plants, Edison automatic regulators were sometimes used; but these devices did more harm than good because they relieved the operator of responsibility. Edison would not have them because he paid men to regulate the voltage, and insisted that this was part of their duty. Automatic regulation also was expensive, and I know cases where the regulator cost more than the dynamo.

The story of the Cumberland station is worth recalling here. Word came to Edison in New York that the Cumberland people were burning out armatures rapidly. I made my appearance at the station in the evening and was met by a colored man, the engineer. I asked him if he were the only attendant, and if he attended the boilers, engines, machines, etc. He said, "Yes, sah; I'm a hustler!" I asked him if he had been burning out armatures lately, and told him that I had come from New York to give him advice. I then asked him how he knew when the dynamos were carrying too much current. He said that some one had told him that when the wires were carrying too much electricity they would get hot. He therefore felt of the wires occasionally, and if he found one getting hotter than the others, he would put in a little more resistance and cool it down. As far as I know, this is the first record we have of a "hot wire" ammeter.

I went back and reported to Edison. Edison said, "We have got to get up an ammeter." We set to work and made some in about a week or so. We got up the old Edison pendulum ammeter, and the first sample of this device was shown to Edison at the machine works. He said it was pretty good, but that we needed something rough. "Have six made up. When you examine and test them in the testing-room, have them packed and then call me. I do not care to see them until packed and ready for shipment." When this was done, he was notified and came in. Edison said, "Put them on the table. Now, then, get up on the table and kick 'em off; for if they won't stand this, they will never reach Cumberland in operating condition." They were kicked off the table as hard as the fellow could kick them, and sent spinning over the floor. Edison then said: "Now I will look at them." Then after a careful examination they were approved for shipment. It is needless to say there were no jewel bearings in the instruments at that time.

INCREASED SENSITIVITY OF ELECTROLYTIC DETECTORS.

Mr. Jégou, a Frenchman, has found that by connecting two electrolytic detectors in parallel, the sensitivity is from 20-40 per cent. greater as if only one detector alone were used.

Contrary to Mr. Branley's views, who used the detectors in series, Mr. Jégou not alone claims higher sensitivity, but states the following advantages:

If one of the detectors should accidentally get out of order, signals could still be received, which would not be the case if the instruments were connected in series.

Furthermore, the fine Wollaston wires are only used up half as quick, and the resistance—which is about 50,000 ohms per detector—is cut in half. Consequently much less gas is developed on the fine wires, which in turn necessarily makes the entire arrangement far more sensitive.

"WIRELESS."

Where are those eyes so blue,
In this cold world of ours?
Reflecting cupids dart,
Each glance has greater powers.
Lock up your hearts, dear girls.
Escape while land is near.
So stormy is the port,
Shipwrecks of hearts we fear.

W. P. English, Jr.

Note: The above anagram, by Mr. W. P. English, Jr., chief operator of the United Wireless Telegraph Co., of Boston, was addressed to "Jack" Binns, the famous "C. Q. D." man.

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Vol. I. MARCH 1909. No. 12

EDITORIALS.

In the November issue the Editor called attention to the fact that it was of the utmost importance that amateurs refrain from annoying Government and commercial stations. His call was duly seconded by several other magazines, but it seems that despite this, conditions have not improved greatly of late. Those who did not follow the notices in the daily press will find food for reflection in the following:

While the fleet was returning a few weeks ago, it was impossible for the Government operators to receive messages on account of interference from Massachusetts amateurs.

In Brooklyn, N. Y., the Government officials have forcefully taken down several aerials of amateurs who, being told not to interfere, kept on annoying the Government stations the same as before.

Naturally the officials have taken steps to eliminate all this, and it will be only a matter of months before a bill will be passed licensing all wireless stations in the United States, if experimenters using sending instruments continue to interfere with regular business.

How serious the matter stands may be guessed by reading Dr. de Forest's letter, published elsewhere in this issue.

Personally, the Editor does not believe that any amateur or experimenter *wilfully* interferes or annoys Government and commercial stations. It seems that most of the offenders are actually ignorant of the damage they are doing. Most of them are unable to read the codes fast enough, for lack of practice, and when told to "get out" nine times out of ten, do not understand, and consequently pay no attention.

Most experimenters do not even know the interference signal, and it is published herewith. If you happen to be an experimenter, and while working at your instruments you hear the following signal repeated several times:

— · · — — · · — (99)

stop sending at once. This interference signal should be sacred to every wireless experimenter, and the Editor appeals to the honor of everyone, to whom wireless progress is at heart, to respect this signal.

Most amateurs usually only wish to communicate with one or more friends a few miles away. The distances are seldom more than three to five miles. It would therefore appear that amateurs and experimenters could with very little experimenting find out which would be the SHORTEST aerial they could use to successfully transmit to the other station. The shorter your aerial, the shorter the wave length.

As Government and commercial stations usually employ only long wave lengths, the chance of interfering with them is reduced greatly if you use SHORT AERIALS FOR SENDING.

If this is done, they will hardly ever tell you to stop interfering, and for yourself you will not be annoyed, either.

It is also advisable to use as little power in transmitting as possible. As long as the station to whom you intend sending, gets your signals clear enough, be satisfied. Do not try to use more power than is absolutely necessary, and you will not interfere with the big stations.

The Editor wishes to advance another idea. Most experimenters owning sending apparatus, usually also own receiving instruments capable of picking up stations several hundred miles distant. To do this, high aerials are required. It is therefore suggested to use two separate aerials, one a very short one for sending, the other tall one for receiving. This will be the ideal combination to steer clear of all trouble.

If this is not done, and done very quickly, you will be confronted, one not all too distant day, by an official who may ask you if you are prepared to pay $100 or $300 license to operate your station. Failure to do this will mean that your aerial will be taken down, and wireless, as far as an amateur and experimenter is concerned, will be a dead art, the same as it is today in England, where nobody is allowed to attach even a quarter inch spark coil to an aerial without authorization from the government.

Other papers please note.

WITH THIS ISSUE

a good many subscriptions of our original subscribers expire. Don't fail to re-subscribe at once; the **green** wrapper means the time is out, and you don't wish to miss a single copy.

PREMIUMS shall be given to old subscribers, who subscribe again this month. See announcement of 'Premiums.'

WIRELESS TO AND FROM TRAIN.

Wireless messages flashed from a train running at a speed of a mile a minute were received on February 27 by an operator stationed on the roof of the La Salle street station. The messages were sent by an operator on a special Lake Shore train bringing Frederic Thompson and members of his "Via Wireless" theatrical company to Chicago from Buffalo, the train having been equipped with instruments under the direction of Frederick Sammis, chief engineer of the Marconi Wireless Company, for the purpose of making the experiment.

The train, which left Buffalo at 10:30 o'clock in the morning, was composed of ten cars. The instruments on the train were operated by G. L. Schaefer, of the North German Lloyd steamship Kaiser Wilhelm II., and the receiving station in Chicago was in charge of Neil McIntyre, a wireless operator specially detailed from the Cunard liner Lucania. Mr. Sammis was in charge of all the Marconi stations used in the experiment. One station was at Cleveland, another at Toledo and a third at Elkhart.

The tests were watched by a score or more who made the trip for that purpose. The first message received was when the train was eighty miles east of Cleveland and running at an exceptionally high rate of speed.

The first message received from the train in Chicago was sent from a point near La Porte.

On the train, messages were received before the train reached Cleveland, and from that time until the train reached Chicago.

BACK NUMBERS.

The demand for back numbers of MODERN ELECTRICS had been greater last month than for any previous one.

The following issues only can now be supplied at the regular price of 10 cents: April (as soon as reprinted), October, November, December, January, February.

We have about a dozen copies of each, May, June and August, left. These are sold now at 50 cents each.

July and September are entirely exhausted. We would like to hear from readers who desire to sell their copies for these months.

A Microphone Detector

By Alfred P. Morgan.

Some time ago Modern Electrics published an article describing a novel detector which made use of old safety razor blades. The detector had a piece of weighted pencil graphite placed across the razor edges so as to make an imperfect contact.

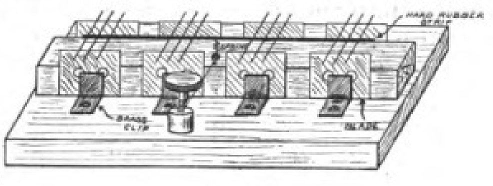


Fig. 1

The Shoemaker system at one time employed a microphone detector which made use of steel knife edges bridged by several incandescent lamp filaments, for commercial work, and obtained very good results. Four detectors in series were connected up as in Fig. 2. Eight blades are necessary and twelve pieces of filament, each 1 1/2 inches long. The filaments may be obtained from some old 16 C. P. burned-out lamps. Only the perfectly straight part of the filament should be used. The blades, which are separated by about 7/8 of an inch (between opposite edges), are held firmly in place

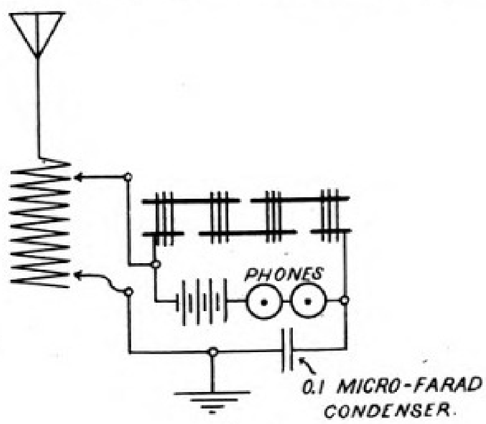


Fig. 2

by clips made of spring brass. Three pieces of filament are laid across each pair of blades. A very light strip of hard rubber or wood is placed on the filaments and pulled down by means of a fine hair spring or a small rubber band, the tension of which is adjustable with a thumb screw. The tension of the spring or band is always increased when receiving signals from a nearby station and decreased for the weak and distant ones.

The construction of the base is clearly shown in Fig. 1. No very definite dimensions are necessary nor can they be easily given, for the sizes of razor blades vary considerably. This leaves the experimenter free to utilize what material he may have on hand.

The detector circuit and connections are shown in Fig. 2. Four dry cells are used. As the Shoemaker system employs an aerial of the loop type the circuit for this is given in Fig. 3. The condensers are each very small, being about four thousands of a microfarad in capacity. They are each made of three sheets of tin foil 1 1/2 inches long and 3/4 of an inch wide interposed between sheets of very thin oiled paper. The two tuning

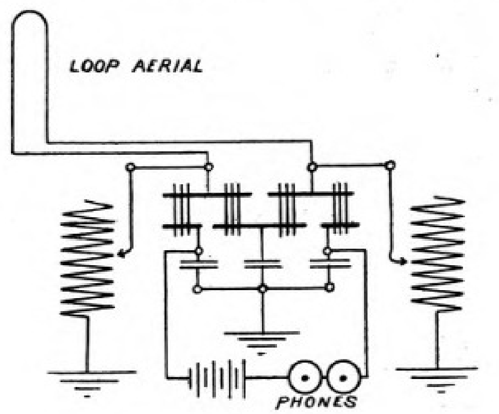


Fig. 3

coils are of course variable and have an inductance equal to that formed by about 350 feet of No. 16 copper wire when wound closely together.

This style of detector is now somewhat out of date, but will prove interesting to those who own a Massie type microphone detector employing carbon edges and a steel needle, or to those who wish to experiment. An amateur can make one of these detectors and it will be more sensitive than the Massie type, for the edges of the knives can be made sharper. It may perhaps be well to say that the knife edges and the filaments should not be handled with the fingers, but kept perfectly clean and free from oily matter.

Wireless Association of America

Under the Auspices of "Modern Electrics"

To the Members of the Wireless Association of America:

According to numerous authentic reports in the daily press the question of wholesale interference (whether deliberate or unintentional matters little) on the part of amateur wireless operators has recently become acute.

Governmental stations have suffered most from this cause, on account of the great importance and urgency of much of their business, certain commercial wireless stations not equipped with perfected tuning devices, have also been seriously interfered with by the countless spark stations of energetic but unthinking students.

It is not the desire of any one to put a damper on the enthusiasm for wireless work which so many American youths are displaying, but for their own best interests it is time to sound a careful warning.

If the present promiscuous working of unlisted sending stations continues as it has, means, effective and drastic, will certainly be taken to remedy this evil, and that right quickly.

Without question Congress will be asked to pass legislation requiring licenses for all transmitting stations, limiting their number in given districts, limiting their power, and prescribing the wave length that may be employed.

All stations not belonging to the government or to legitimate commercial companies will doubtless be absolutely prohibited by law, if the present inconsiderate interferences are continued.

Such legislation will not be engineered by wireless experts, versed in the art, and who alone are competent to frame intelligent restrictions which shall not hamper the proper development of the new art.

If such legislation be hurried, ill-considered, and too sweeping, it will be a very great misfortune, but such can be confidently expected unless amateurs at once limit the power and the activity of their transmitting stations.

Members of the Wireless Association of America have it largely in their power to avert this legislation. In your own interests, therefore, do so.

Put up as many *receiving* stations as you wish. You can have all the fun and obtain all the telegraphic practice and instruction you desire, without interfering with any one.

But transmitting stations of more than one-quarter horse power, and they only with very carefully tuned radiating circuits, and using *very weakly damped oscillations,* should be at once discontinued if within fifty miles of a government station.

Furthermore, confine your transmitters in every case to wave lengths of less than 250-300 meters.

If you can not do this, turn your spark coil into an X-ray machine!

Disregard of such warnings, whether or not you consider them right and just, will certainly result in drastic prohibitive legislation, at no far distant date. Cordially yours,

Lee de Forest.

New York, March 1, 1909.

W. A. O. A.

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

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

Radio-Goniometer of the Bellini-Tosi System

By A. C. Marlowe.

Paris Correspondent Modern Electrics.

The present engraving shows a view of the instrument known as radio-goniometer or director, which forms part of the Bellini-Tosi system of directed waves.

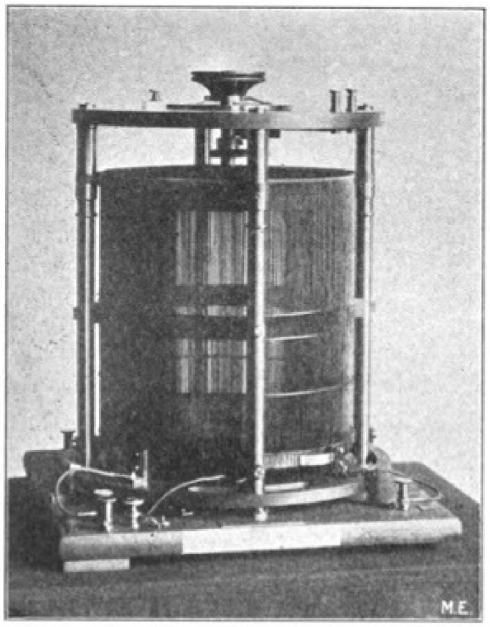
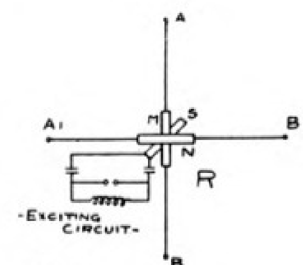


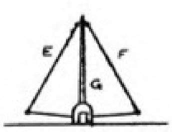
Fig. 3

The new method is creating considerable interest in Europe, as it is claimed to solve the much-sought problem of directing waves to a desired station. The radio-goniometer is used in connection with a triangular antenna (Fig. 1), having the two main wires E F supported on a single mast G and connected with the instruments at the station. There are two sets of triangular antennae placed at right angles (Fig. 2), with the radio-goniometer R mounted as shown. It consists of a central coil S which turns about a shaft so as to take any direction. This coil is connected to the usual wave-producing apparatus. A fixed coil M placed outside of the movable coil is connected to the set of mast wires A B. A second coil N of like construction is joined to the second set of mast wires lying at right angles (A-1, B-1) to the former set. The action of the mast systems, considered separately, is the following. When waves are set up in the system A B, the waves are given off in a general front and back direction from the plane of A B and not from the sides, seeing that at the sides the effect of the two nearly vertical wires is neutralized. In the same way the second system A-1 B-1 sends off waves at right angles to the former set. If now we excite the two systems at the same time, the result will be waves given off in a certain direction, which depends upon the relative value of each circuit. Thus, if A B is excited alone, the waves will naturally be in the horizontal direction, and A-1 B-1 will give waves in the vertical sense. With both circuits excited equally we will have waves proceeding at an angle of 45 degrees, and so on.

To excite the circuits we use the middle coil S, which receives the impulses from the apparatus. When S is placed parallel to the coil M, it has an inductive effect upon this coil and no effect upon the second coil, therefore the mast system A B is excited alone, and the waves are horizontal, or east-west. Placed parallel to N, the result is that the waves are vertical, or north-south. When at 45 degrees it has an equal effect upon the two coils and the waves are now at 45 degrees, or northeast-southwest. Turning through any other angle, the wave-direction follows this angle all around the horizon.



M.E. -Fig. 2-



-Fig. 1-

But the waves still follow two directions (north-south), and it is desired to cut off the waves in one direction so that we only have the north-directed waves, for instance. This will give us a truly directive system. The inventors do this by using a simple vertical antenna mounted at G in the center of the crossing triangles. This wire acts to cut off all the waves proceeding toward the rear and only allows the front waves to be sent out, so that now we can direct our messages to a determined point anywhere on

(Continued on Page 436)

A Tesla Disruptive Coil

By C. Clarence Whittaker.

The "Tesla" disruptive coil is a coil which increases both the tension and the frequency of the current of an ordinary induction coil. In the larger coils of this kind all insulating parts are made of hard rubber and the whole coil is immersed in paraffine oil.

In the coil which we will here describe, hard rubber and oil will be replaced by glass and paraffine respectively, as these are the next best substitutes. Fig. 1 shows a vertical cross section of this coil. The primary coil consists of about twenty-five turns of large rubber-covered wire, such as flexible lamp cord, wound in one layer. It is wound on a glass gas lamp chimney. The tube on to which the secondary is wound is made of some hard wood such as maple. It is highly important that this should be entirely free from all moisture. After it has been turned to the proper dimensions it must be dried in a hot oven, after which it should be thoroughly soaked in boiling paraffine. This will render it entirely impervious to moisture. The secondary is wound on to this and consists of one layer of No. 32 or 34 D. C. C. copper wire. The ends of this layer should extend about an inch beyond those of the primary layer. It will be seen from the illustration that the relative position of the secondary and primary coils is the reverse of that in an induction coil; that is, the secondary lies within the primary. The upper terminal of the secondary is brought directly to the top through a glass tube; the lower terminal, on account of the great difference of potential

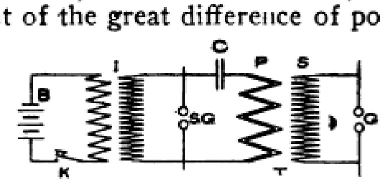
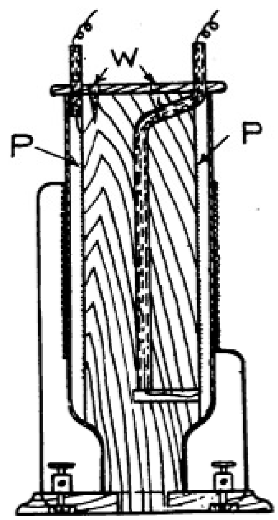


Fig 2

existing between these two ends, must be brought to the top by leading it through another glass tube, which has been fitted to a hole drilled lengthwise in the wooden form and to a shallow slot nearly perpendicular to this hole.

The base is attached to the hard-wood form, as shown in illustration, and contains two binding posts to which are led the terminals of the primary.

The whole coil should now be warmed so that when the molten paraffine P is poured between the outer glass and the secondary, no fractures will occur. Enough paraffine must be poured in to completely fill the glass. After this has cooled, a thin wooden top, previously boiled in paraffine, may be fitted around the terminal tubes and attached to the hard-wood form by means of wooden



-FIG. 1-

plugs W W. These secondary terminals should be situated as far distant as possible, as the brush discharge from this current is very marked. The connections are shown in Fig. 2.

The primary of this coil may be thought of as analogous to the antennae of a wireless station which is transmitting, and the secondary as analogous to one receiving. In regarding the coil in this light, the value of condensers coupled to the spark of the transmitting apparatus in wireless telegraphy is clearly shown by the following: When the condenser C is not used with the coil, only a small current is noticeable at the disruptive terminals; but when the condenser is attached, as in Fig. 2, a multitude of high tension discharges occur.

However paradoxical it may seem that this disruptive discharge is of so high a tension and frequency that no perceptible shock can be obtained from it, it is nevertheless true. The slight burning sensation which is experienced when the current is passed through the body when contact is made with the bare hands vanishes when contact is made with metallic objects held firmly in the hands, on account of the greater surface offered by these electrodes.

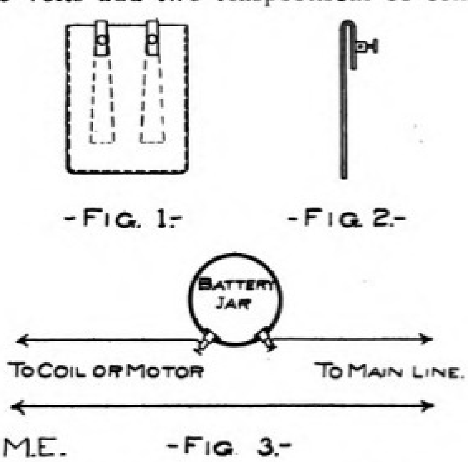
With this current, exhausted tubes may be made to glow brightly, but differently from those operated by an ordinary induction coil. Both terminals in the tube exhibit the same brightness on account of the condenser in the circuit, which tends to make each alternation of the current of equal moment.

TO MAKE A WATER RHEOSTAT

By J. S. Welter.

A water rheostat for reducing 110 or 220 volts alternating or direct current down to the proper value for running spark coils or small motors, etc., can be made at small expense.

The materials needed are two pieces of sheet lead 1/8 inch thick and 1/2 inch wide and 7 inches long, and two binding posts. The posts on battery carbons will do very well. Procure a battery jar 5x7 or 6x8 inches in size. The lead strips should be bent in the shape shown in Fig. 2 and holes drilled to fit the binding posts, in the strips 1 1/2 inches from bend in the short side of the strips. Fasten binding posts on strips, as shown in Fig. 2. The strips should fit tightly on the jar with binding posts on the outside. To operate, put strips on jar, as shown in Fig. 1, and fill jar with soft water to within one inch of the top. For 110 volts add two teaspoonsful of com-



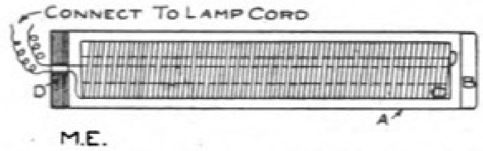
-Fig. 3.-

mon salt, and for 220 volts one teaspoonful. If this does not give enough current, add more salt. The amount of current can be varied by moving the strips closer together or farther apart. The closer they are the more current flows. Fig. 3 shows the proper connections for use with same. The writer has used this rheostat with a 2 inch wireless coil with very good success.

A SMALL ELECTRIC WATER HEATER.

By A. B. Prouty.

The following is a description of a small water heater which has proved very satisfactory. It is very useful in heating a small amount of water for shaving or



similar purposes. It is of such small size that it may be easily carried in a traveling bag.

It consists of a copper tube A 6 inches long and 1 1/2 inches in diameter. The tube should be made of No. 22 gauge sheet copper, and have a lap joint. The copper cap B should be 1/4 inch deep and 1 1/2 inches in diameter. It should be firmly soldered to the bottom of the tube. A porcelain insulating tube 5 inches long, 11/16 inch in diameter, and with a 3/8 inch hole, is next obtained. The head of this tube is sawed off, as it is of no use. About 100 to 150 ohms of German silver wire, No. 24 or No. 22, is now wound on the tube, in such a manner that the adjacent turns do not touch. One end of the wire is brought up through the middle of the tube, so as to have both ends at the top. These ends are soldered to a piece of lamp cord, and then taped. A heat-resisting cover D should next be made. It must be about 1/4 inch thick, and have a small hole through the center to allow the cord to pass through. The coil of wire is inserted in the tube, and a mixture of quick-setting plaster of Paris poured in until the tube is completely filled, when the cover is firmly imbedded in it. The ends of the conducting cords, which may be of any length, may be attached to a socket plug.

The heater is placed in the vessel containing the water, and the current is switched on. It only takes a very few minutes to heat the water to the boiling point. The heater is very useful and well repays one for the trouble of making it.

This heater works of course only on 110-120 A. C. or D. C. current.

BROWN & SHARP WIRE GAUGE.

Number and Diameter in Inch and Millimeter.

0000	.460	11.684	19	.036	0.912
000	.410	10.414	20	.032	.813
00	.365	9.265	21	.028	.724
0	.325	8.252	22	.025	.643
1	.289	7.348	23	.023	.574
2	.257	6.543	24	.020	.511
3	.229	5.826	25	.018	.455
4	.204	5.189	26	.016	.404
5	.182	4.620	27	.014	.360
6	.162	4.115	28	.013	.320
7	.144	3.665	29	.011	.287
8	.128	3.264	30	.010	.254
9	.114	2.906	31	.009	.226
10	.101	2.588	32	.008	.203
11	.091	2.304	33	.007	.180
12	.081	2.052	34	.006	.160
13	.071	1.829	35	.006	.142
14	.064	1.628	36	.005	.127
15	.057	1.450	37	.004	.114
16	.051	1.290	38	.004	.102
17	.045	1.150	39	.003	.089
18	.040	1.023	40	.003	.078

AEROPHONE HEARD 200 MILES

Boston.—A. Stein, of the National Signaling Electric Company, made the statement that clear and audible speech by aerophone had been transmitted for 200 miles. This feat was accomplished from Plymouth, Mass., to a station at Jamaica, L. I.

A CLOCK FOR EIFFEI TOWER.

Experiments are being made with the object of utilizing the Eiffel Tower as a novel form of clock, by means of an electrical apparatus which flashes enormous illuminated figures from the second platform so as to be visible over the greater part of Paris and even the suburbs.

PREMIUMS.

We have decided to make a new rule in connection with our premiums. We will give any of the premiums (for the necessary subscriptions) which have been published in the various numbers. We therefore do not restrict new subscribers to certain premiums, published originally for certain months.

Talking dynamos now, eh? That's nothing. You ought to listen to our "talking" gas meter when its wheels spin around, and it yells "1,000 cubic feet" before you count ten.—"Fips."

Correspondence

Editor Modern Electrics, New York:

Dear Sir: In the November issue you published an article describing an arc lamp as a receiving detector.

I would say that since last year my friend, A. Wolff, of this city, and myself, have been communicating with each other, using the arc lamp as detector.

One morning I was running an arc lamp, while experimenting in aerophony. Suddenly I began to hear sharp buzzes in the arc, which sounded exactly like some one telegraphing.

I went over to my wireless set and listened in, finding to my surprise that Wolff, who uses the A. C. current of the power line on his coil, was sending.

Our stations are exactly five-eighths of a mile apart. I afterwards told Wolff of my experiments, and we decided to communicate with each other without the use of aerial or ground.

I have a six-inch coil connected with the 110-volt A. C., using a Wehnelt interrupter. A. Wolff has an arc lamp running from the A. C. at his home.

I usually "transmit" with my coil, without using any aerial or ground,and Wolff can always distinctly hear from the buzzing of his arc lamp what I am transmitting. When I finish sending, I switch in my arc lamp, while Wolff will start sending, and I can always read the messages plainly.

We have communicated in this manner for some time, and as we use no aerials nor ground, we never have experienced interference from other stations. In other words, we are telegraphing over the city's power line.

Sincerely yours,

Henry Heim, Jr.

Alameda, Cal.

SPECIAL.

To new subscribers, mentioning this notice, we will send free of charge the January, February and March issues, and start the subscription with April, if the regular subscription price is sent in. Offer expires April 15. Premiums are not affected by this offer.

Wireless Department

Wireless Telegraphy

By Melville Eastham and O. Kerro Luscomb.

(Part II.)

In our previous article we described several systems for generating electro magnetic waves, the last being the one which the writers consider the most satisfactory. It is our intention in this article to give a more detailed description of the various instruments employed and their proper selection and use. It is assumed that alternating current is available at ordinary potential, that is, about 110 volts. The question of the proper spark frequency to employ has not received the attention justified by its importance, although a number of writers have of late commented favorably on the use of a high spark frequency for two different reasons, the first being, as Lord Raleigh has shown, that the ear is much more sensitive to a high note than to a low one, and secondly, because atmospheric disturbances (X's) are found to always give a sound much like that of a low frequency spark and so confuse the operator, while a spark of high frequency may be read through quite strong disturbances. In spite of this, it has been found that a spark of very low frequency, too low, in fact, to make a musical note (which requires about 15 a second), can be heard at a greater distance, the energy being the same in both cases. In view of the fact that there is some doubt as to the most satisfactory spark frequency, it would seem best to employ apparatus designed so that any ordinary frequency may be used by only changing its adjustment. The writers personally believe that an extremely low frequency, about 5 a second, is preferable for calling another station, and a spark of about 100 per second would give the best results for sending messages, as the low frequency spark can be heard much farther, while the high frequency note is better for fast sending, and for the elimination of "atmospheric."

As mentioned in the previous article, two different types of transformers are available, known as the open core and closed core types. The open core type has been used much more generally in wireless work because it was the natural development from the induction coils which were first used in wireless telegraphy. The open core transformer, due to its uncompleted magnetic circuit, requires about five times as many turns, to produce a certain potential, as are necessary on a closed core transformer, in both primary and secondary, and this, of course, means that the loss due to resistance is five times as great as in the latter type.

The method most often used for controlling either type is a variable resistance coil, which, of course, uses up a part of the energy in heat, while controlling the flow of the current. It is much better practice to use some form of impedance coil, as this simply limits the current, but does not in itself use up any amount of energy. It may be said that practically all modern high power stations are using the closed core transformer with impedance control. The potential which the secondary of the transformer should give will depend upon the amount of power which it is intended to use, varying from about 4,000 volts at 1/2 K. W. to 20,000 volts at 20 K. W.

The ordinary commercial transformer has often been found unsatisfactory for wireless work, because the coupling between primary and secondary is too close. A transformer having a very high mutual inductance (close coupling) between primary and secondary, has a very strong tendency to maintain a constant potential across its secondary terminals, exactly what is *not* wanted, because when the condenser discharges across the spark gap, there is, for an instant, a "dead short" on the secondary. With a transformer having a high mutual inductance, this short circuit allows an arc to form at the gap, due to the increased current. By putting a series inductance in either the primary or secondary circuit, this tendency may be partially overcome.

If this series inductance has just the proper impedance to operate with the condenser employed, a condition of resonance can be had in which the capacity of the condenser is just sufficient to overcome the inductance of this series coil, that is, the lagging current caused by the inductance coil is neutralized by the leading current, due to the capacity. The proper inductance to use in series with the secondary of a very closely coupled transformer may be found by making $2 \pi n L$ equal to $\frac{1}{2 \pi n C}$ where n is the frequency of the alternating current supply, L the inductance of the series coil in henries, and C the capacity of condenser in farads. The inductance of the transformer can, in most cases, be neglected, as it drops to practically zero when the other quantities are right. When the above equation is satisfied, the impedance of the secondary circuit is practically zero and the current flows with only the resistance in the primary and secondary circuits, and in the series inductance to be overcome.

The tendency for an arc to form is practically removed in this case, as the arc destroys itself, due to the following cause. As soon as the condenser discharges, and the gap becomes conducting, the condenser is virtually short circuited, and the current is greatly decreased, because the impedance is operative, as the capacity does not now tend to neutralize it.

By eliminating arcing at the spark gap, the heating is reduced to a minimum, and the necessity for compressed air, rotary spark gaps, or similar devices is obviated.

Another advantage of this resonance arrangement is that by opening the spark gap so far that a spark is not produced, the current oscillates back and forth with each alternation, and increases with each swing until the condenser is charged to a potential sufficient to jump the spark gap. In this way a spark frequency may be produced as low as several per second, with a corresponding increase in the energy of each spark, due to the stored-up energy of a number of alternations.

Where a transformer has a sufficiently low mutual inductance, it may be made self-controlling, that is, it will require no resistance or inductance to limit the current, and resonance may be produced with no inductance except that possessed by the secondary of the transformer itself. A transformer having these qualities is much to be desired for wireless work.

In the usual wireless telegraph installations, the power factor is very low, that is, the product of the volts and amperes is not equal to the watts, but is materially greater because the current and E. M. F. are out of phase with each other, on account of the inductance in the primary circuit. The power factor of a non-resonance transformer is usually about 50 per cent., while that of the resonance type is much higher.

Transformers are usually rated in Kilowatts or fractions thereof, at 100 per cent. power factor. This would mean that a 1 K. W. commercial transformer working at a 50 per cent. power factor is only good for 1/2 K. W., although it may usually be operated at a somewhat higher power, as it is only used intermittently in wireless work.

The voltage of a transformer should be such that when operating at full power, the condenser it is intended to operate with will be charged to that potential by the energy in a single alternation.

The voltage of a resonance transformer does not depend on the ratio of the primary to the secondary turns, but varies with the energy supplied.

The selection of a suitable condenser is a problem which should be given as much consideration, at least, as any other part of a sending station's equipment. It has been the general custom with many amateur and professional designers of wireless apparatus to use some form of the antiquated Leyden jar, although any one can easily see that it is extremely inefficient in a number of ways. The only really useful part of the Leyden jar is, of course, the dialectric and the metal coating, and of the total volume required for a condenser of this sort, only about 5 per cent. is used in this way, the rest being taken up by air space, and as a cubic inch of glass is capable of storing only a certain amount of electrical energy, it will be seen that Leyden jars require about 20 times as much space as is really necessary. Probably the most serious objection to the Leyden jar is the large amount of "brushing" which takes place at the edges of the tin foil, as this brushing shows up both as a very large loss of energy, which may be detected by the heat generated and the change in capacity, the brush acting like an additional conducting surface, and so increasing the capacity, and as this increase only takes place during the first part of the wave train, the wave length is not the same at the beginning and at the end of a wave train.

In one of the most recently constructed condensers of the Leyden jar type for a United States battleship, the amount of heat generated was so great that in spite of the immense surface exposed, it was found necessary to place an electric fan underneath it to prevent the condenser from getting too hot.

Condensers may be divided into a number of general types; the Leyden jar type is the best known and is essentially a jar of "Jena" glass, or some other glass, having a very high disruptive strength. This jar is coated inside and out with metal foil with the exception of the space near the top, which is left bare to prevent sparks from jumping over the top. A number of modifications of this jar have been made, one of which is the Shoemaker type, in which the jar is made about 2 1/2 inches in diameter and 24 inches long.

The "Telefunken" high power type is about five feet long and six inches in diameter. The "Mosciki" type is made in the form of a tube, the metal coating extending within a short distance of each end, the glass having a greater thickness at the ends, as electric strain is much greater there. Pickard has improved the method of making these jars by burning into the glass a thin metal coating, and strengthening this by an electro plated layer of metal over it. The main advantage of this type is that the coating cannot blister, a fault which is common to almost all other jars. All of the above-mentioned condensers have the disadvantage of wasting a great deal of energy in the form of heat, and of varying their capacity during operation as before mentioned.

It is usually considered better engineering practice to use some form of the plate type condenser. A condenser made of pieces of plate glass coated on each side with metal foil, and immersed in oil, has been successfully used by Stone, Pierce and others, the oil preventing the corona or brush at the edges. Massie uses sheets of rubber with tin foil not immersed.

The Clapp-Eastham Co. make a condenser of thin sheets of glass coated on both sides and cast in a solid insulating compound, which increases the mechanical strength, as well as preventing brushing. These are usually made in units of .02 M. F., one unit being used for each 250 watts of power. By various connections, these can be arranged for any capacity required. Marconi, in his high power stations at Glace Bay and Clifden, is using large metal sheets with air as a dialectric. His total capacity at each station is about 1 M. F.

Probably the best condenser to-day is that of Fessenden, which he has covered by broad patents. It is very simple, consisting of metal discs about 14 inches in diameter, separated by an air space of about 1/4 inch, every other plate being supported by a central rod, the alternate plates by metal supports at the outside edge. These condensers are built up about five feet high, and enclosed in air-tight steel tubes and air forced in until the pressure is about 250 pounds per square inch.

The break-down strength of air under this pressure is very much higher than at atmospheric pressure. The brush effect is only slight, and it has been noticed that when any pair of plates arc across, the heat generated soon raises the pressure to a point where the arc can no longer be maintained.

As the proper capacity for a sending condenser depends upon the power, wave length, spark frequency and persistency of wave train, etc., this will be left for discussion in a later paper.

RADIO-GONIOMETER OF THE BELLINI-TOSI SYSTEM.

(Continued from Page 430)

the horizon. In practice we first use the single antenna. When a message comes, we put in circuit the combined system, and by turning the radio-goniometer we can find the position in which we again receive the signals. A second and like instrument serves for the sending, and its pointer is put on the same scale-mark, so that we can now transmit to this station alone. The present system is perfected by actual work carried on upon the Channel coast of France between three posts, having Dieppe as a center and working to 107 miles and less. The position of a distant station can be found to within one degree.

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INDEX.

Development In Wireless Telephony

By William Maver, Jr.

(Concluded.)

A detector such as is employed in wireless telegraphy, is availed of in wireless telephony. Fessenden and Poulsen use the electrolytic, or liquid barreter, or a thermo electric couple as detectors, while de Forest utilizes the audion, all in combination, of course, with a telephone receiver in a local circuit.

The Telefunken Company in Germany, experimenting with wireless telephony employ the singing arc burning in air with a water cooled copper electrode. It having been found that with the arc burning in air the frequency of the oscillations is increased by putting a number of arcs in series, the Telefunken Company place six of the arcs in series on a two hundred and twenty volt supply circuit, and twelve arcs on a four hundred and forty volt supply circuit.

Reports of these experiments place the speaking distances at about twenty-five miles. These and other experimenters in wireless telephony in which the arc oscillator is employed, indicate that considerable difficulty is met with in maintaining a uniform tone of the voice in the telephone; the words being received in alternately low and high tones, rendering speech indistinct and very hard to understand. This is doubtless due to irregularities in the operation of the arc.

In connection with the wireless telephone experiments thus far made by Mr. Fessenden, between Brant Rock, Mass., and a station in the vicinity of New York City, it is reported that speech has been transmitted with an expenditure of only two hundred watts, less than one-third of a horse power. On this basis Mr. Fessenden concludes that with a mast six hundred feet high and an expenditure of ten K. W. it will be possible to telephone between America and Europe without wires.

It may be noted that Mr. Fessenden has in operation a wireless duplex telephone system in which he employs an inductance and capacity to balance, as in wire telegraphy, but, of course, no resistance.

A great advantage to be obtained by sustained oscillations, both in wireless telegraphy and telephony, is that the property of resonance may be more fully availed of than with more or less intermittent oscillations. In some respects, however, perhaps sustained oscillations and the better resonance gained thereby may be of more utility for wireless telegraph purposes than wireless telephony, especially as regards increased distance of transmission. This appears obvious if it be considered that in both wireless telegraphy and wireless telephony the receiving apparatus is practically the same. In wireless telegraphy, however, the full effect of the radiated waves from maximum to zero is available, whereas only a comparatively small portion of the received wave energy, namely, the modifications of the wave energy due to the action of the microphone transmitter (about five per cent. of the total energy, it has been estimated), is available in wireless telephony. Improvements in the direction of more powerful transmitters whereby a large percentage of variations in the amplitude of the waves may be obtained, are now to be looked for. It is stated that Fessenden expects to perfect a transmitter capable of producing a variation of twenty-five or fifty per cent.

As the writer remarked in the opening words of his paper on "Wireless Telegraphy," read before the association last year, "wireless telephony, if only available for a comparatively short distance, obviously could be installed to advantage in the officer's room of every ship that floats ocean, lake, river or harbor," because of the fact that it requires no specially trained operator. But it was, of course, assumed that the apparatus would be considerably less complicated than that in use in wireless telegraphy. At present this is not the case, and the amount of expertness necessary to properly manipulate the present apparatus is, rather beyond that now possessed by the ordinary ship's officer.

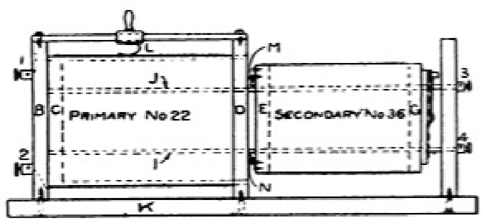
Still, wireless telephony may now be said to have arrived at a point of practical utility, although, of course, as previously intimated, it is still susceptible of much improvement in many directions.

(Continued on Page 447)

A Tuning Transformer

By Charles Cheever.

Make a cardboard tube 4 inches in diameter and 6 inches long by wrapping two layers of thin cardboard on an old wire spool and glueing the layers together. The tube should be wound with string while drying, to hold the outer layer of cardboard in place. After it has dried remove string and wind the tube with one layer of No. 22 S. C. C. magnet wire, beginning 1/2 inch from the end and ending 1/2 inch from other end. When the wire has been wound it should be given a coat of shellac and the spool removed.



M.E -FIG. 1-

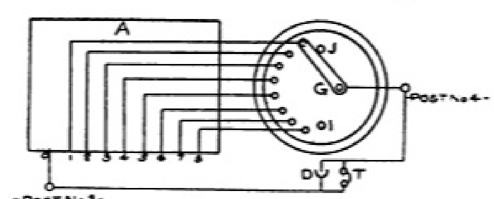
Three end pieces 5 inches square by 1/2 inch thick (B, D and H, Fig. 1) should be cut out, and also a baseboard (K, Fig. 1) 14 inches long, 6 inches wide. A circle C large enough to fit closely inside the tube should next be cut out. Find center of each of the square pieces, and on one B draw a circle of the same diameter as the circle C, and by means of screws, screw C onto B, so that the circle C coincides with circle drawn on B. Make a point 1 inch directly below the center of B and another the same distance directly above center. At these points bore a hole slightly less than 3/16 inch, through B and C, as shown by dotted lines. (Fig. 1.)

Cut a circle from the center of the second square piece D, the size of the outside diameter of cardboard tube. Slip D over the end of the tube and glue firmly, so that the end of the tube is flush with the outer surface of the piece D. Now slip the other end of the tube over the circle C and glue it, so that the whole primary coil will set evenly. Mount two binding posts 1 and 2 (Fig. 1) in a suitable position on B and connect one end of primary to post No. 1. The other end of winding is not used. Bare a 1/2 inch strip on the top of the winding and mount a slider L so as to make a contact with the winding. A good method for baring wire and of making slider has already appeared in back numbers of "M. E." The slider is connected to post No. 1. This finishes the primary.

Make another cardboard tube 5 inches long and 3 1/2 inches diameter in the same way as the first one was made. Cut out two circles 1/2 inch thick, which will just fit in the ends of second tube, as E and C (Fig. 1), and bore holes 1/4 inch diameter above and below center of each in the same manner as in B. Also bore 3/16 inch holes in the square end H, as in B.

Wind the tube with one layer of No. 36 S. C. C. magnet wire, winding in the same direction as in primary. Take off taps every 1/2 inch of winding and stop winding 1/2 inch from each end. The best method of doing this is to make a hole in the tube every 1/2 inch and push taps down through.

A nine point switch is arranged on one of the circles in such a manner that lever will not interfere with the holes bored. This will not be described, as much depends on kind of a switch used. Connect the taps to switch as is shown in Fig. 2, in which A is the tube with the taps 1, 2, 3, 4, 5, 6, 7 and 8, and G is an end view of the same, showing switch.



-FIG. 2-
M.E.

Two brass rods are now obtained 13 1/4 inches long and 3/16 inch diameter. Thread one end of each rod for a distance of 1/4 inch to take an 8/32 inch nut. If the amateur does not possess a die and tap it is advisable to buy one of size mentioned. Drive the unthreaded ends of the rods in the holes bored in B, so that rods take position of J and I (Fig. 1). Glue the circles E and G in the tube so that ends are flush with tube, having the holes in line so that the tube will slide freely on the rods J and I. On the ends G and E arrange two brass springs M and N so that they will make contact with rods J and I. One spring is connected to switch handle and other to the other end of secondary coil.

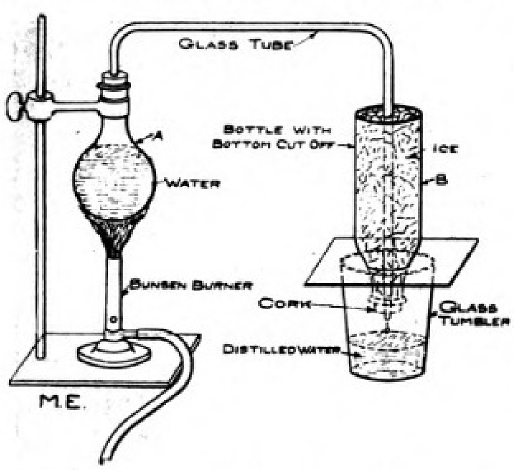
Mount primary coil on base board, having B 1/2 inch from end of board. Then mount end H 1/2 inch from other end, passing threaded ends of rods through holes in H. Screw a binding post to each rod. Coil is now completed except giving woodwork a good coat of shellac.

Connect antennae to post 1 and ground to post 2, and connect the detector D and receivers, as shown in Fig. 2. A condenser may be used between post 3 and detector if desired. The wiring diagram is for so-called thermo-electric detectors. If an electrolytic is used, a battery and potentiometer must be used and connected as shown in diagrams of previous issues of "M. E."

A SMALL DISTILLING PLANT.

By R. C. Morse.

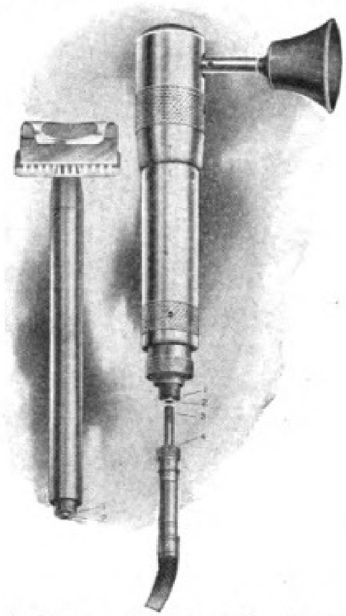
Sometimes when making storage batteries, etc., it is necessary to have distilled water. The above illustration shows how



I make the water that I use in storage batteries and in all my experiments. The bottle, A, is filled about 3/4 full of water and a Bunsen burner or a spirit lamp is placed under it; a glass tube carries the vapor through a bottle, B, which has the bottom broken off, full of ice. The steam is then condensed and the pure water drops into a glass tumbler, C. It is necessary to have a cork in bottle, B, to keep the melted ice water in.

ELECTRIC RAZOR.

In the June issue, while describing the new electric boot black, mention was made of a much needed electric barber. It would seem that it has now been invented. The electrical razor is one of the latest devices. This razor is similar in design to the well-known safety razor so widely used throughout the United States. It consists of a handle, blade and



a blade holder. The handle is attached to the blade holder by a screw thread and the blades are held in the holder by a spring. Inside of the handle of the razor is located a rotary eccentric which gives the blade a vibratory movement, this movement being sufficient to cut the hair as the blade of the razor is drawn down across the beard. The blade is protected by a safety device which makes it impossible to cut the flesh.

The blade of this razor is 1 1/2 inches long and 3/4 inch wide. The handle is about 5 inches long and the razor weighs complete 3 1/2 ounces. The razor can be operated at variable speeds; and the faster the vibrator is operated the closer to the face the beard is cut. For an ordinary, medium shave, it is necessary to draw the blade but once over the face.

ON ACCOUNT

of the space taken by the index, it was not possible to include the laboratory contest in this issue. It will be found at its usual place next month. If you have a good photo of your shop, send it by all means at once—you won't regret it.

Wireless Telegraph Contest

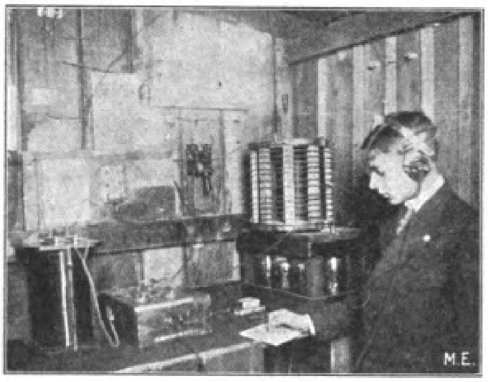
Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three ($3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have 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.

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.

Find picture of my wireless telegraph station.

I made most of my instruments except the spark coil and tuning coil.



On the left are the sending instruments. I use a 1 inch induction coil. I run my coil on the 110 volt current which comes from the city. I have six 32 C. P. lights connected in multiple. I get very good results from this; you will see the lights upon the wall.

I use one quart Leyden jars for my condensers. Three on each side of the spark gap. The jars are enclosed in a hard-wood case on the table.

On top of the case is the Helix; it is wound with eight turns of No. 8 brass wire.

The spark gap is enclosed inside of the Helix.

I use a Morse telegraph key. I can get a distance of eight miles under most any condition with these instruments.

For the receiving instruments I use a silicon detector, which is of my own design.

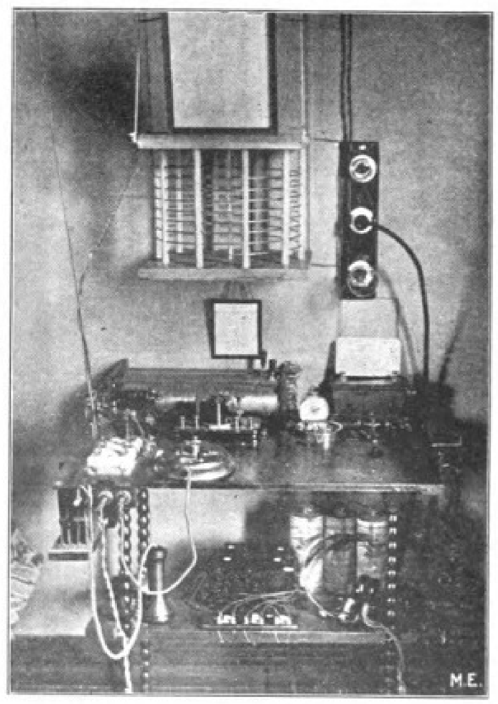
I use a two-point switch for turning on battery current when using carborundum. The E. I. Co. receivers are wound to 2,000 ohms. All of my receiving instruments are contained in and on a hard-wood box except the tuning coil. The tuning coil has a capacity of 320 meters wave length. Just over the table is the double throw switch used to connect the receiving and sending to the aerial and ground. To the left of the switch is a list of all the call letters in the United States.

My aerial is suspended from a 60 foot pole. Composed of four aluminum wires eighteen inches apart. The aerial is 85 feet long, running down from the pole to my house. I have four wires that lead down from one end of the aerial and lead to my instruments. The pole is inserted in the lot next door from me. I talk over my wireless with the Clyde Line steamers equipped with the United Wireless system. I also have heard other long distance stations working. There are a few other amateur stations here which I hear fine. MODERN ELECTRICS is the best magazine and is a great help to me.

Florida. CROMWELL GIBBONS, JR.

HONORABLE MENTION.

I enclose photo of my wireless station, of which the following is a description:



At the right is seen the key and a 1 inch coil, which is operated from the small transformer seen on the lower shelf of the table. This transformer gives different voltages at different terminals, and also runs the small motor which is employed to operate an automatic calling device, at the extreme left hand side of the table, just back of the aerial switch. The speed of the motor is regulated to a nicety by means of the E. I. Co. rheostat regulator, which is all the more appreciated here, as the motor being operated on A C makes a disagreeable rumbling noise unless about 12 volts are used in connection with the rheostat, when the noise and vibration are eliminated. The rheostat is often used beyond its capacity, and altho it sometimes is very hot, it has not been injured by this abuse.

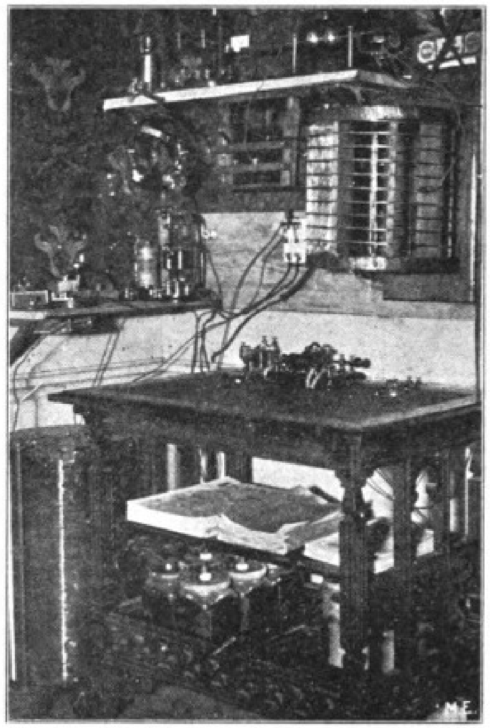
On the wall to the right is a snap switch controlling the current to the transformer, also a lamp to furnish better illumination than that afforded by the fixture, some distance away. The zinc spark gap is enclosed in the sending helix, this latter is used merely in series with the antenna, as the outfit is wired for open circuit transmitting and receiving. The silicon detector, at the left of center, is connected by means of a plugging arrangement which permits quick changes of detectors. The double head phone also plugs in. At the left edge of the table is a small adjustable condenser. A 1,000 ohm relay, all connected, awaiting the installing of a coherer-call combination, is seen just in front of the two coils, one of which is the potentiometer, the other the receiving tuner. The two frames contain copies of the codes. This station is in daily operation with two neighboring ones, each of which is about a mile away. A log book is kept of all intercommunication, changes, etc. The antenna is suspended horizontally on the roof of a four-story apartment building, and is about 60 feet from the ground. It is composed of four strands of No. 16 bare copper wire, each 30 feet long. The success of the station is due to the assistance and encouragement gained from MODERN ELECTRICS.

D. J. STUMP.

Chicago, Ill.

HONORABLE MENTION.

Please find enclosed a picture of my experimental wireless station. I have a 1½ in. spark coil, a transmitting tuning coil built from 35 ft. of No. 8 copper wire. This tuning coil I built myself, also the series-multiple condenser, which consists of five 5x7 glass plates, 16 sq. in. of tin foil to each plate. My aerial is 40 feet high, consisting of 40 feet No. 8 rubber covered wire and 35 ft. No. 4 bare copper wire. I have two D. P. D. T. knife switches, one changes from receiving to the transmitting apparatus, the other changes from the coherer receiving set to the detector receiving set. My coherer works in connection with a 150-ohm relay and 4-ohm tapper. With the electrolytic detector I have a tuning coil built from descrip-



tion in MODERN ELECTRICS, also a potentiometer of same origin.

Besides these, I have a carbon-iron-mercury detector, two 1,000-ohm telephone receivers with head band, variable condenser of my own make, a very sensitive D'Arsonval galvanometer, standard sounder and key, switches and batteries.

My success in receiving any great distance has been poor, which I believe is due to my aerial having too small a capacity.

MODERN ELECTRICS has got the real goods!

R. W. DERAUF,

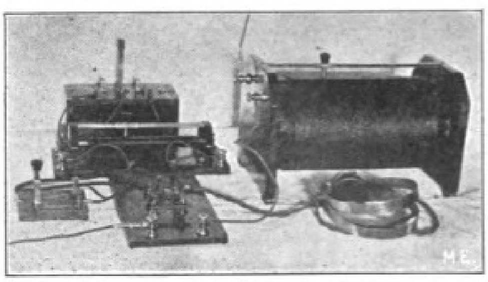
Iowa.

HONORABLE MENTION.

Enclosed is a photograph of my "wireless" instruments. Since last August I have been interested in wireless telegraphy. I put an antenna on my house with two poles ten feet high. The antenna is similar to the ones that are erected on battleships. First I used the iron and carbon detector, and then I used the electrolytic detector of my own make. Messages came in very loud then, but since I have the tuning coil that is seen in the picture I receive messages very much louder.

The instrument in back of the board is a potentiometer, made with No. 30 German silver wire, and two little spools of No. 40 German silver wire, and it works very satisfactorily. The instrument in back of the potentiometer is a cell box with a switch on the top. The use of the switch is that when it is thrown to one side it puts the cell to work with the carbon, silicon, or any other detector of that form, and when it is thrown on the other side, it puts the potentiometer to work with the electrolytic detector. Altogether it makes a very compact little set of receiving instruments.

I have two chums who derive great pleasure from their wireless telegraph also, and I would advise every boy



who is able to construct a wireless telegraph to do so.

ALFRED ADAMS,

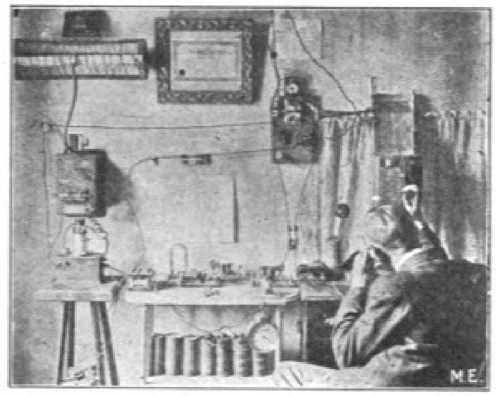
Flatbush, N. Y.

HONORABLE MENTION.

Enclosed please find photo of my wireless instruments and experimental station. On the right of the picture is the tuning coil, which can be readily seen; capacity about 61 meters. On the extreme left is a small 1-inch induction coil with a zinc spark gap, directly above; also a small Leyden jar for sending condenser. On the middle of the table can be seen a 1,000 ohm relay, which I constructed myself; magnets were procured from a polarized bell. In connection with this I have a "Telimco" coherer, which receives under favorable conditions 8 miles.

I also have a 75 ohm receiver in connection with a carbon detector, which I use to receive from a station about one mile distant. The other receiver is a 1,000 ohm in connection with a silicon detector; with this set I can easily receive messages from stations 400 miles distant. My aerial is situated on the top of my residence, and is made of two strands of copper wire.

I have experimented with wireless tel-



egraphy for about two years. Shortly after I started I was looking for a magazine which dealt principally on wireless telegraphy, and when I received your first copy of MODERN ELECTRICS, I felt safe in saying I had found such a magazine.

WM. A. BIESMANN.

Illinois.

HOW TO MAKE AN ATTACHMENT PLUG.

An excellent attachment plug can be made from an old fuse plug and a piece of flexible cord.

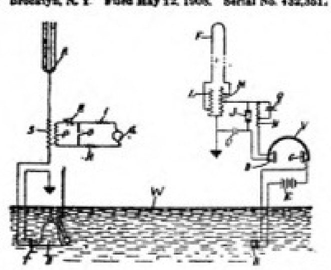
First make a hole in the mica on top of plug big enough to pass a piece of flexible cord through. Next solder one end of the cord to the piece of metal in the bottom of the plug.

Solder the other wire in the cord to the outer brass shell of the plug in the same place and manner as the fuse was attached; screw the top on and you will have a very good plug.

Contributed by F. E. Scholfield.

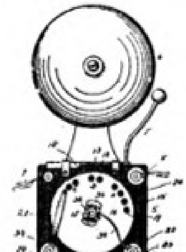
Electrical Patents for the Month

913,028. SIGNALING SYSTEM. ROBERT H. MARRIOTT, Brooklyn, N. Y. Filed May 12, 1908. Serial No. 432,351.



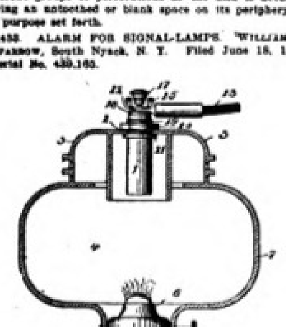
1. In a system for the communication of intelligence by different forms of energy coöperatively, the combination with a bell at a transmitting installation and a telephone transmitter at a distant receiving installation, said bell and telephone transmitter being located in a common body of water, of a telephone transmitter located at the transmitting installation, in the same body of water aforesaid and at a sound-transmissible distance from said bell which is negligible as compared with the distance between said bell and said distant telephone transmitter, means located at the transmitting installation, and controlled by the telephone transmitter in the water thereat, for emitting electric waves having reproducible characteristics substantially corresponding with those of the sound waves emitted by the bell; means at the receiving installation for receiving electric waves; and telephonic means at the receiving installation for observing the receipt of the electric waves by their receiving means, and the succeeding receipt of the sound waves by the telephone transmitter in the water at the receiving installation.

912,300. AUTOMATIC SIGNAL-ALARM. PEABODY A. BROWN, Denver, Colo. Filed Mar. 22, 1905. Serial No. 251,357.



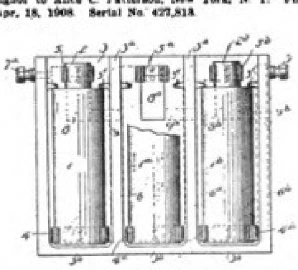
1. In an automatic signal alarm, the combination with an electric alarm having a vibrating hammer, of a part connected with the hammer and provided with a pawl, a ratchet disk mounted in suitable proximity to the alarm mechanism and engaged by the said pawl, the disk being provided with perforations arranged in groups, a signaling circuit provided with a contact located to engage the different groups of perforations as the disk is actuated, having an untoothed or blank space on its periphery for the purpose set forth.

912,458. ALARM FOR SIGNAL-LAMPS. WILLIAM K. BRASHOW, South Nyack, N. Y. Filed June 18, 1908. Serial No. 439,163.



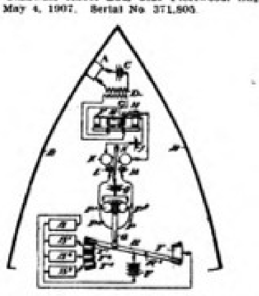
1. A thermo-electric signaling device, comprising a casing, a thermal couple mounted therein, a contact member adjustable on said casing and insulated therefrom, a contact face on said couple inclined to said adjustable contact to effect rubbing contact therewith, and a signaling circuit connected with said couple and contact member.

911,522. ELECTRIC-BATTERY HOLDER AND BATTERY. GEORGE L. PATTERSON, New York, N. Y., assignor to Alice C. Patterson, New York, N. Y. Filed Apr. 18, 1908. Serial No. 427,813.



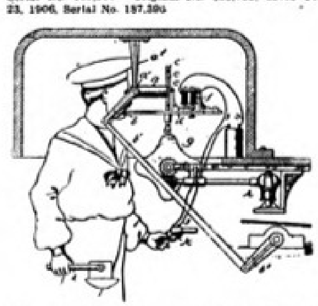
In apparatus of the character described, a holder, devices carried thereby arranged to make electrical and mechanical connection with a plurality of batteries, said devices including two sets of terminals, both terminals of one set being electrically connected with one of the terminals of a second set when no battery is in engagement with the first-mentioned set, and a circuit closer in the first-mentioned set adapted to be operated by a lateral movement of the battery when the latter is inserted in or removed from the holder.

913,372. MEANS FOR SIGNALING OR EFFECTING OPERATIONS BY MEANS OF SOUND-VIBRATIONS. JOHN GARDNER, Knott End, near Fleetwood, England. Filed May 4, 1907. Serial No. 371,805.



1. Sound signaling apparatus comprising in combination a sound receiving transmitter, a telephonic receiver in circuit therewith, a tuned diaphragm therefor, microphonic contacts upon and operable by the said diaphragm and in a normally closed electric circuit, a device included in such circuit and having a movable part which moves when the contacts are vibrated and the current is consequently reduced, a local electric circuit, and a signaling instrument contained in the local circuit, such local circuit being controlled by said movable part to affect the signaling instrument upon and during the persistence of the microphonic vibrations, as herein set forth.

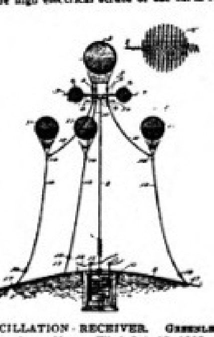
12,916. SIGHTING-MACHINE. BRADLEY A. FISKE, U. S. Navy, assignor to Western Electric Company, Chicago, Ill., a Corporation of Illinois. Filed Dec. 29, 1908. Serial No. 469,907. Original No. 833,781, dated Oct. 23, 1906, Serial No. 187,390.



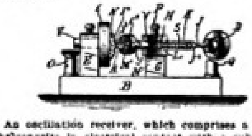
1. In a sighting-machine for guns, the combination with a gun having a trunnion mounting, of a sighting-tube having a pivotal mounting in bearings independent of the gun, lever mechanism connecting said gun and tube for moving said tube with the gun and for maintaining said gun and tube in parallel relation to each other, a target-picture in front of said sighting-tube, means for imparting movement to said target-picture, means mounted near the end of said tube and movable therewith around the same center for marking said target at the point aimed at by the sighting tube.

911,269. APPARATUS FOR COLLECTING ATMOSPHERIC ELECTRICITY. WALTER I. PENNOCK, Philadelphia, Pa. Filed June 26, 1907. Serial No. 380,907.

1. The combination with an electrical collector comprising a bar of non-conducting material, and an open spherical conductor carried by said bar, of means to support said collector in the high electrical strata of the earth's atmosphere.



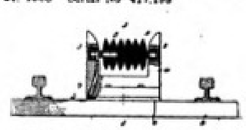
912,726. OSCILLATION-RECEIVER. GREENLEAF W. PICKARD, Amesbury, Mass. Filed Oct. 15, 1908. Serial No. 457,793.



1. An oscillation receiver, which comprises a fragment of chalcopyrite in electrical contact with a substantially rough, unpolished fracture surface of the electrically conducting solid, the mineral red oxid of zinc substantially as described.

2. An oscillation receiver, which comprises the substances zincite and chalcopyrite in electrical contact with each other substantially as described.

911,948. ELECTRIC-RAILWAY SYSTEM. WILL E. DAWKINS and JOHN W. DAWKINS, O'Fallon, Ill. Filed Feb. 21, 1908. Serial No. 417,199.



The herein-described trolley system comprising a stand having the upper portion thereof bifurcated, a contact roller mounted between the arms of the bifurcated portion of the stand, a feed wire having an electrical connection with the contact roller, a series of double convex insulating disks journaled upon the feed roller between the arms of the bifurcated portion of the stand, springs engaging the end disks of the series and serving to hold the various disks in yielding contact with each other, vertical guide ways upon the rolling stock, slides mounted upon the vertical guide ways, a longitudinally disposed blade carried by the slides, the said blade being designed to separate any adjacent pair of the insulating disks and engage the contact roller between the same, and springs for normally holding the blade in a yielding engagement with the contact rollers.

11,153. MEANS FOR CHECKING HORSES. TOBIAS TODESCO, Philadelphia, Pa. Filed Sept. 3, 1908. Serial No. 451,601.

1. A horse checking device comprising two presser buttons adapted to close against a horse's nostrils, electromagnets for actuating said presser buttons and said magnets in an electric circuit including a source of electricity, and a circuit closer or switch.

Original Electrical Inventions for Which Letters Patent Have Been Granted for Month Ending February 23rd

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.

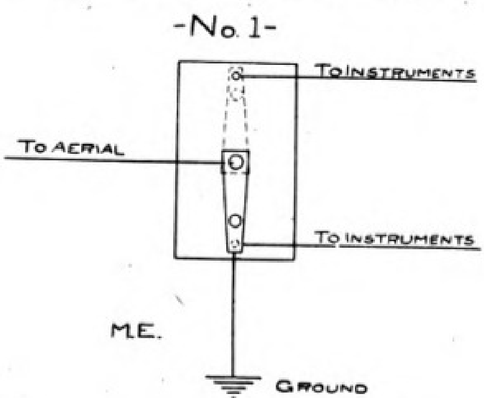
Name and address must always be given in all letters. When writing only one side of question sheet must be used; not more than three questions answered at one time. No attention paid to letters not observing above rules.

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

GROUND SWITCH.

(165.) ROBERT F. ADAMS, Tex., writes:

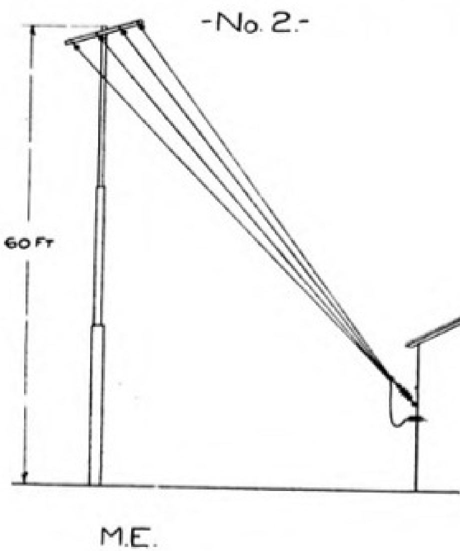
1.—Would a switch made of heavy brass



like the drawing No. 1, be O. K. for grounding aerial during a thunder storm, the switch to be placed on outside of building? Operation of switch is as follows: When thrown as shown in drawing the aerial is grounded. When thrown as shown by dotted lines the aerial is connected for receiving.

A. 1.—Yes, but we would suggest that you have your instrument grounded separate from the ground to be used during the thunder storm.

2.—I wish to make an iron pipe aerial, as shown in drawing No. 2, using No. 14 aluminum antennae wire, and wish to know if it is all right?



A. 2.—The aerial is all right provided iron pipe is insulated at base and capped to prevent the rain water making ground on the pipe, thus casting a "shadow." We would also suggest that you use spreader at the lower end of the aerial.

TESLA COIL CONDENSER.

(166.) DEWITT VAN PATTEN, Mich., asks:

1a.—I am making the condenser for the Tesla coil as described in the September number of M. E. Would it be all right if I fastened the sheets of tinfoil (which are 10x12 inches) on to glass plates 10x14 inches with shellac?

A. 1a.—Yes.

1b.—In winding the primary of the Tesla coil, I made a mistake and put the wire 1 1-4 inches from the secondary instead of 1 inch. Would you advise me to change it?

A. 1b.—If as we understand it you have simply meant the distance between the primary and the secondary 1-4 inch more than shown in the original directions we would not advise you to change it.

2a.—What kind of an aerial would you advise me to use for wireless telegraph under the following conditions, viz.: There is a tree about 2 yards from my room which is 60 feet high and the peak of the house is 22 feet high. There are no electric railways or transmission lines anywhere near. I expect to use the Tesla coil for transmitting.

A. 2a.—A 4-wire aerial running from the top of the tree to the back of the house, all ends connected, 4 wires leading down from the spreader and all four connected together before reaching the operating room.

2b.—Will an "Electro"-lytic detector operate a 1,000-ohm relay?

A. b2.—No.

3.—At about what temperature F. should the oil be put in the coil case of the Tesla coil when assembling it?

A. 3.—The oil should not be heated to a temperature more than 100 degrees.

TRANSFORMER.

(167.) WILBUR S. ROSS, Kansas, writes:

1.—Would you please tell me if the transformer described in the October issue of MODERN ELECTRICS could be used for wireless work, and if it could be used, how far would it send (for wireless) telegraphy with aerials of proper height on 110 volt alternating current?

A. 1.—No. you must use what is known as a high tension step-up transformer.

2.—Could No. 20 annunciator wire be used in its construction?

A. 2.—No.

3.—If not why not, and what is the difference between annunciator and magnet wires of the same size?

A. 3.—Because annunciator wire is paraffined and by heating it the paraffine would melt, also this wire takes up a great deal more room than magnet wire. The only difference between magnet and annunciator wire is that the insulation of the magnet wire is not paraffined.

1-4 K. W. TRANSFORMER.

(168.) HARRY BUTZ, Wis., writes:

1.—Will a 1-inch spark coil operate a filings coherer with a 150 ohm relay a distance of three-quarters of a mile?

A. 1.—Yes, provided the filings coherer and the relay are correctly adjusted.

2.—What will be the cost to construct a ¼ K. W. 15,000 volt transformer for wireless?

A. 2.—We think it would be cheaper for you to buy a ¼ K. W. transformer from some of the parties who manufacture same regularly. You could not obtain the certain kind of iron used in its construction.

TRANSMITTING DISTANCE.

(169.) G. L. BUTLER, N. Y., asks:

1.—Would you advise the use of a 2½ or 4-inch spark coil for transmitting regularly 100 miles overland?

A. 1.—No; it would be necessary for you to use a coil rating for 8 inch-10 inch spark length.

2.—Would above coil transmit if I use a tuning coil, potentiometer, variable condenser, electro lytic detector and telephone receivers of 1000 ohms each at the receiving station?

A. 2.—Yes.

COIL QUERIES.

(170.) "New Brunswick" writes:

A. 1.—What telegraph code do most of the wireless operators use?

A. 1.—Morse code.

2.—Kindly give dimensions for a one and a half (1½) inch spark coil.

A. 2.—Core 7 inch length by ⅞ inch diameter. Primary wound with 10 ounces No. 14 wire. Secondary 5 inches long by 2¾ inches diameter, wound in 10 sections. 2 lbs. of No. 36 wire. Condenser, 40 sheets of tin foil, 7 inches by 4 inches. Use 10 volts, and 4 amperes.

3.—Would it be advisable to make a two-inch coil having the secondary winding of No. 22 copper wire? If so, what size wire would I need for the primary?

A. 3.—No; the largest wire to use in an induction coil is No. 28; any larger wire than this will not give satisfactory results.

WIRELESS DURING STORM.

(171.) CARLISLE OTTOFY, Mo., writes:

A. 1.—From whom can I get a list of ships using wireless stations running upon Lake Michigan?

A. 1.—We would suggest that you write to the Clark Wireless Telegraph Co., Detroit, Mich.

2.—Is there any danger in sending a message during an electrical storm?

A. 2.—Yes; ground apparatus.

3.—How far am I able to send with a 2-inch coil 50 feet aerial, perfectly tuned?

A. 3.—From ten to twelve miles, depending upon the sensitiveness of the receiving instruments.

TESLA COIL.

(172.) THOS. J. P. SHANNON, Cal., asks:

1.—Enclosed you will find a small piece of wire. Please let me know what size it is.

1.—No. 33 B. & S. gauge single cotton covered.

2.—Can I use this wire for the secondary of the Tesla coil that is explained in your September magazine on page 19?

A. 2.—While it may be possible to use this wire on the Tesla coil described in the September issue, we do not advise it.

3.—If you have any extra data on this coil I will appreciate it if you will send it to me, as I expect to build one as soon as I hear from you.

A. 3.—We would suggest that you write to the author of the article, whose address you will find in our advertising columns.

4.—How many pounds of wire are required for the secondary of the Tesla coil?

A. 4.—About 2 ounces of No. 30 wire.

5.—What is the price of a .01+ microfarad condenser?

A. 5.—We refer you to the Electro Importing Co., New York City.

3 1-2 K. W. TRANSFORMER.

(173.) AUGISTINE J. COLMEY, N. Y., writes:

1.—With an aerial 100 feet high and of 200 feet span, how far should I be able to send, using a tuned circuit, with a 3.5 K. W. transformer during: (1) The day? (2) The night?

A. 1.—If the inductance and capacity of the closed circuit are adjusted correctly to the natural period of the antenna, you should be able to send during the day from 300 to 500 miles, and during the night about 1000 miles.

2.—How far can I receive using an electrolytic, 3000 ohm phones, same aerial as above and condensers, etc.?

A. 2.—Probably about the same distance.

3.—Who sells a key to break a 35 ampere circuit for a wireless transformer?

A. 3.—We would suggest that you write the United Wireless Co., 42 Broadway, New York City.

WIRELESS QUERIES.

(174.) MAGEE ADAMS, Ohio, writes:

1.—An ordinary make and break gasoline engine spark coil is fitted with a vibrator on its core so that the sparks will occur between the vibrator hammer and the contact post. The aerial wire is connected to one side of the vibrator and the ground wire to the other side of the vibrator. Would such an outfit if connected to the aerial described below transmit messages for a half mile a "Telimco" coherer and decoherer being used in the receiving station?

A. 1.—We do not think so. Use spark gap in secondary. This will do it.

2.—Would an aerial composed of four wires suspended under one another, each wire being about forty feet long and the top wire about fifteen feet above the earth, work very successfully in a filings coherer receiving set?

A. 2.—No. We refer you to previous issues of MODERN ELECTRICS, articles on Aerials

3.—Would an ordinary medical induction coil operate a small Geissler tube very brilliantly?

A. 3.—No. It would not operate the tube at all.

COIL QUERIES.

(175.) WALTER W. HARTMAN, Kansas, writes:

1a.—What is the best way to wind layers of an induction coil secondary? How are they connected?

A. 1a.—A large induction coil should be wound in sections, not in layers, which should be connected in series.

1b.—Is it a good plan to boil the sections in linseed oil after winding?

A. 1b.—No; the sections are usually wound with paraffine, and if you boil them afterward in linseed oil it will boil out the paraffine insulation.

2.—Can an induction coil be run off of a 110-volt alternating current? If so, how is the condenser attached?

A. 2.—No condenser is needed when using the coil on 110-volt A. C. as you do not use a vibrator. However lamps must be used in series with the coil as shown in query No. 131, January issue.

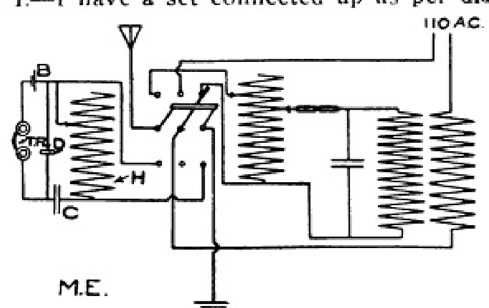
3.—About what size of a spark ought an induction coil give that contains 12 pds. of No. 32 D. C. C. magnet wire?

A. 3.—We should estimate that such a coil would give a heavy 3 to 4-inch spark.

200 WATT TRANSFORMER.

(176.) FRED MORRIS, Cal., asks:

1.—I have a set connected up as per diagram.



It consists of 200-watt transformer, 8 plate condenser, etc., 50-foot mast and aerial 50 feet long, 5 wires. Receiving—Silicon or carborundum detector, 250 ohm phones, tuner of 250 meters wave length, condenser, etc. How far should I send and receive?

A. 1.—Provided inductance and capacity are correctly adjusted, you should be able to send messages from 50 to 60 miles, and receive from a distance of 250 to 500 miles.

POTENTIOMETER.

(177.) CHAS. R. KIME, Ark., writes:

1.—Can a rheostat be used as a potentiometer?

A. 1.—No, not very successfully, on account of its inductive effect.

2.—Can a one-inch coil be used on 110 A. C. with a water rheostat and electrolytic interrupter?

A. 2.—Yes; although the spark is very small but quite heavy.

3.—Which is used mostly by wireless operators, the Morse or the Continental code?

A. 3.—Morse code is used generally in this country except by government and Marconi stations.

1000 OHM RECEIVERS.

(178.) PAUL MILLER, N. J., asks:

1.—What ought my sending radius be with a one-inch coil, six-volt "Royal" storage battery, E. I. Co. adjustable condensers (six), E. I. Co. Helix and aerial about 30 feet high?

A. 1.—About 3 to 5 miles.

2.—Are the glass enclosed platinum wire electrolytic detectors considered efficient for long distances if the other necessary instruments are used?

A. 2.—Yes; although we believe the bare point detector to be 25 per cent. to 30 per cent. more sensitive.

3.—Can single pole receivers be wound to a resistance of one thousand ohms?

A. 3.—Yes, but they will not be as sensitive as regular wireless receivers made for this purpose.

RECEIVING DISTANCES.

(179.) FRED W. MEYER, JR., N. Y., writes:

1.—Kindly let me know what my receiving distance would be using the following instruments: 1000 ohm receiver, electrolytic detector, auto coherer and aerial composed of 4 strands No. 14 aluminum wire on 4 foot spreaders, 2 feet apart and 45 feet high.

A. 1.—With the auto-coherer about 50 to 100 miles; with the electro lytic detector, 100 to 300 miles.

2.—What does a tuning coil do when put in the circuit?

A. 2.—A tuning coil has the effect of adding in more wire to the aerial, thus increasing the wave length. Its inductive effect also increases the wave length.

3.—A potentiometer?

A. 3.—A potentiometer varies the potential of the battery current. See article on Potentiometer in the August issue.

TESLA COIL.

(180.) WILLIAM J. SAUELREY, Pa., writes: In the September issue of MODERN ELECTRICS, in describing the Tesla coil on page

193, it says wind 400 turns of No. 30 B. & S. gauge single cotton covered wire, winding the turns 1-16 inch apart. Now, there would not be enough room on the whole cylinder to get 400 turns on winding them 1-16 inch apart. Will you please explain this to me?

A. We refer you to page 254 of the October issue on which the correction is made regarding the error in the article by Mr. Austin, on How To Make a Tesla Coil, in the September issue.

WIRELESS QUERIES.

(181.) L. C. YEAU, Mass., asks:

1.—Does the buzzing sound in the telephone receivers, caused by the grounding of the local electric lighing circuit, effect the receiving qualities of the wireless outfit? If so, how can it be stopped?

A. 1.—Yes. The only way this inductance can be stopped is by using a double slide tuner.

2.—How should a horizontal aerial, consisting of three aluminum wires, be connected together when I have three leading in wires?

A. 2.—Connect the three wires together at both ends of the aerial, and also at the point of leading in.

3.—How far will a filings coherer work, same having a good aerial and relay?

A. 3.—A filings coherer is only good for experimental work and does not work fast enough to receive commercial messages. The ordinary filings coherer will not work more than 5 to 10 miles. Of course if you use same with a polarized relay, the resistance of which is 10,000 ohms and the vacuum filings coherer, it will be able to work a distance of 50 to 75 miles.

WIRELESS TELEPHONY

(Continued from Page 437)

Telephoning without wires has the advantage over wire or cable telephony that it does not have to contend with the static capacity of the conductor. When therefore, the necessary improvements in this art have been made it is perhaps not beyond bounds to expect that the claims now made by certain enthusiastic inventors, as to transatlantic wireless telephony, and which in some quarters are considered visionary, may be ultimately realized.

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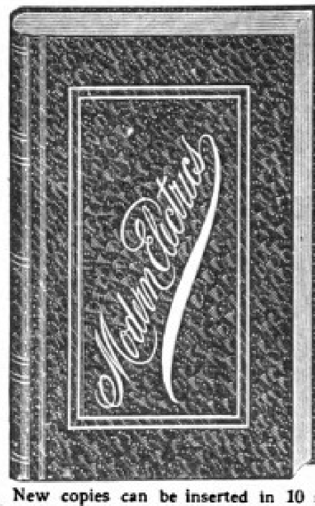

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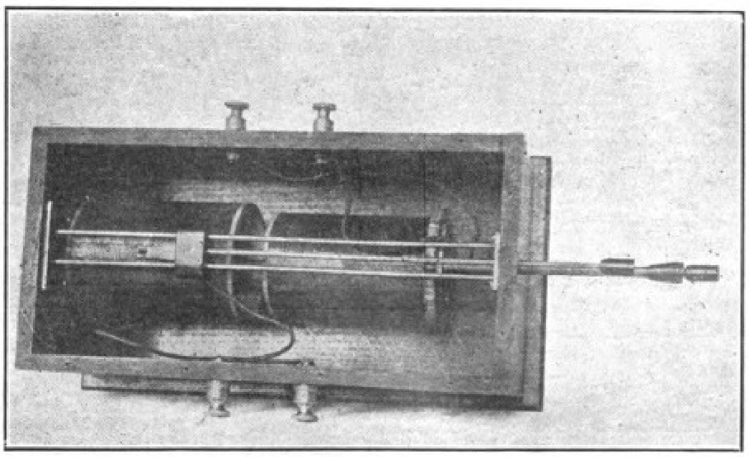

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TALKING DYNAMOS AND TRANSFORMERS.

(Continued from Page 422)

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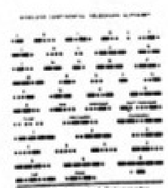

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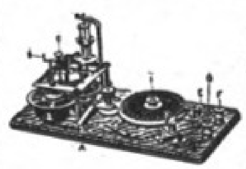

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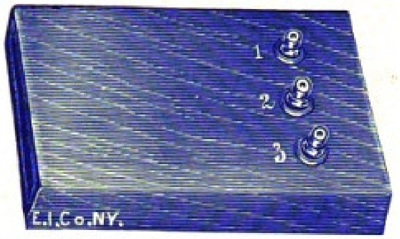

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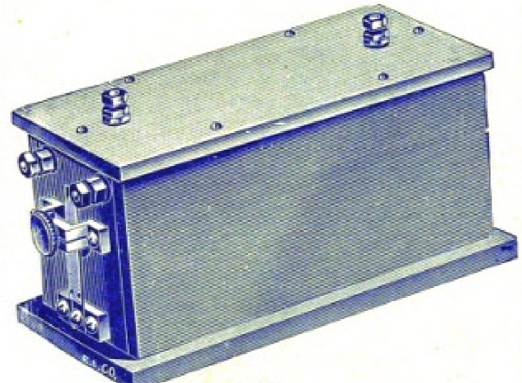

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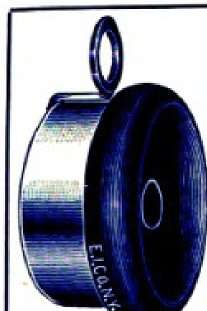

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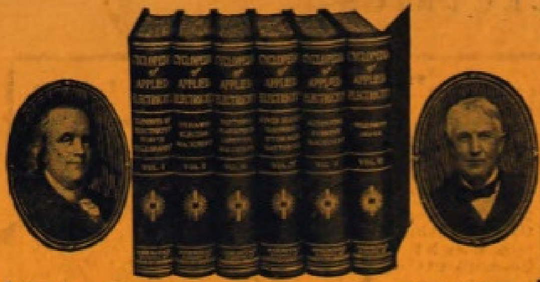

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