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Vol. I. No. 6

MODERN ELECTRICS

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In This Number

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

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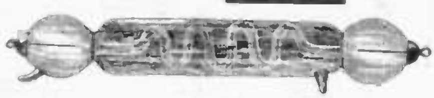

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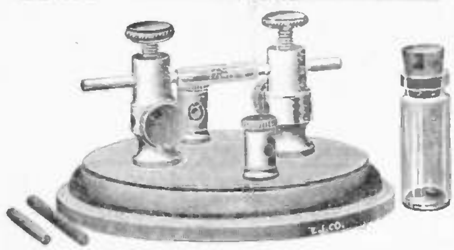

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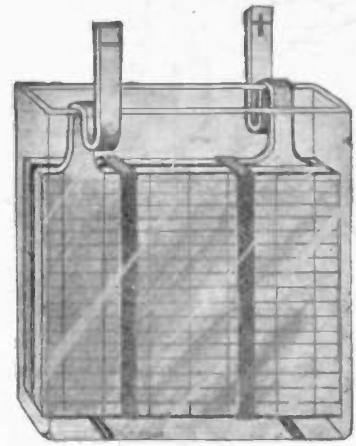

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MODERN ELECTRICS

Vol. I. SEPTEMBER, 1908. No. 6.

Modern Electric Tubes

By H. Gernsback.

(Concluded.)

Puluj's Tubes.

Dr. T. Puluj, of the Vienna University, thinks that only by observing discharges passing through tubes containing rarefied gases, can we learn more about the mystery of electricity.

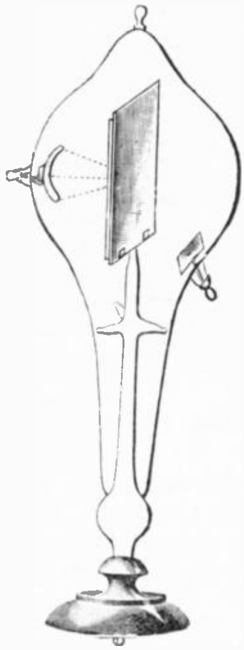


Fig. 24

Dr. Puluj's reasoning seems correct, as we have learned more about electricity through the study of vacuum tubes than possibly through any other apparatus.

It is safe to predict, that if we shall ever know what electricity is, this knowledge shall probably be imparted to us through the medium of a vacuum, or some other, yet to be invented, tube.

Dr. Puluj devoted a great deal of thought to the phosphorescence in vacuum tubes and also invented some quite interesting tubes.

Fig. 24 shows one of these tubes. It was constructed to demonstrate the heat radiation in a thin mica foil.

A thin mica foil is placed in the centre of the tube. On one side of same a concave electrode is arranged as shown in illustration. The reverse side of the foil, (away from the concave electrode) is coated with a film of chalk. This side faces another plane electrode. If same is used as the negative pole, the chalk film is bombarded broadside by the rays and gives forth a vivid, orange-colored phosphorescence.

If, however, the concave electrode is made negative now and the chalk film is observed, one sees first a very light phosphorescing spot, which, after a few seconds, makes place to a perfect ring of light, growing larger and larger.

Fig. 25

If at this stage the induction coil is stopped, a small phosphorescing spot remains on the foil for a few seconds.

Fig. 25 shows Puluj's phosphorescence lamp. It is made as follows:

An elliptical piece of mica foil is placed obliquely in the lamp. Below an aluminum disc is fastened, to act as cathode, while above a very small square aluminum foil forms the anode.

The mica foil facing the cathode is coated with calcium sulfite.

If operated this lamp gives quite a strong light which has a somewhat greenish hue. It is strong enough to light up

Fig. 26

a room and it is possible to read a paper a foot away from it.

The light, of course, is intermittent, but as the breaks on the coil interrupter follow each other with great rapidity, the eye gets the impression that the light is continuous.

That this is really not the case may be demonstrated by standing not too far away from the lamp and moving any object in quick succession back and forward. The object in that case will appear multiplied a great many times. The quicker the interruptions of the coil are, the more objects the eye seems to see.

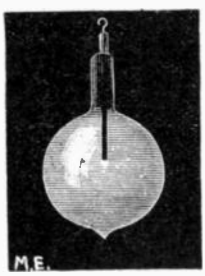


Fig. 27.

This experiment may be tried with success with an ordinary Geissler tube in a darkened room.

Fig. 26 demonstrates the electrical shadow in connection with the phosphorescence on the glass walls.

The double centre electrode is of aluminum, while to the right another electrode is stationed. It is made of mica and has a star cut out of it. The left electrode is cut in shape of a star and also made of mica.

As soon as the tube is operated, the left electrode casts a dark star on the light background, while the right electrode casts a white star on the black background.

Tesla Tubes.

The most wonderful of all tubes, however, are the Tesla tubes. To operate same the usual induction coil, which must be used with all the preceding tubes, is of no value. Only high frequency currents of an extremely high potential —running up into millions of volts—can be used with these tubes, and it may be stated right here, that such currents, despite the remarkable high voltage, are quite harmless and the operator may let

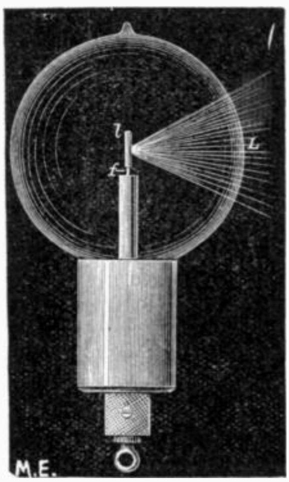


Fig 28.

the full charge pass through his body unharmed.

This is one of the many seeming paradox of Tesla currents, the answer to the problem being, that such currents produce the so-called "skin effect"; that is, they will not enter the body itself, but will run along the skin, no shock of any sort being felt.

As the Tesla coil is described elsewhere in this issue, and as this article only deals with tubes, the writer will give a description of the Tesla tubes below.

These tubes distinguish themselves from all others, that they either have only one leading-in wire and one electrode, or no leading-in wire, and some of these tubes do not even possess an electrode of any kind, nor have some of them any metal whatsoever in connection with the tube.

The radical departure in these tubes is to be attributed to the peculiar effect of the high frequency currents, which pass glass as easily, as light or magnetism.

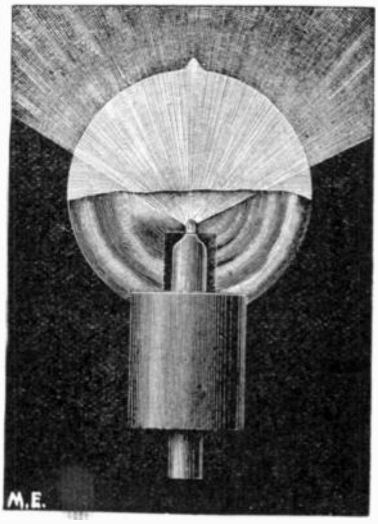


Fig. 29

In fact, these currents come very near to light, and it will be only a matter of a few years when we shall see electricity transformed into light directly.

The theory is that light is composed of the vibrations of the ether. The wave-length of the visible light rays is 0.00005 centimeters (1 meter=100 centimeters), while the fastest electrical vibration yet discovered is 30 centimeters, or 600,000 times longer than the light-wave.

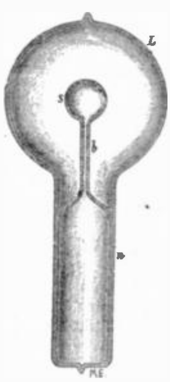


Fig 30

Ordinary light rays follow each other from 4,000-7,000 billion times per second, while the quickest electrical waves follow each other not faster than 6,000-8,000 times per second! We seem quite far away from 4,000 billions, but nevertheless, we shall "get there" yet.

Fig. 27 shows one of the first Tesla tubes, or rather lamps, having only one electrode. A piece of carbon, or, better, a piece of non-combustible material (which may be a non-conductor) will light up vividly in an intense white heat as soon as connected with one end of the coil.

Fig. 28 shows a similar lamp. f. is a short carbon filament, l a piece of chalk. As soon as the lamp is connected with the coil a brilliant white light is produced, the chalk sending out white hot "radiant matter." This lamp, like all Tesla tubes, must, of course, be highly evacuated.

An intensely interesting tube or lamp is shown in Fig. 29. In the hollow part of a carbon rod, a small spherical piece of ruby is placed. After the lamp is operated a short while the ruby will begin to melt, and the light effects produced can only be termed as marvelous. The effects are so beautiful that it is

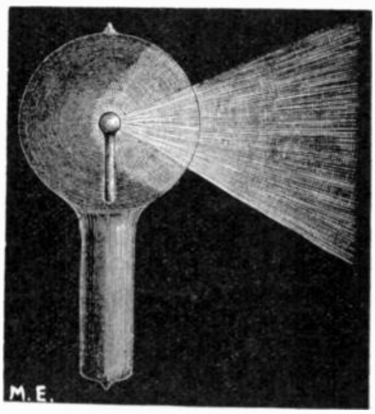


Fig. 31

wholly impossible to describe them adequately.

The strange part is that one may hang the lamp upside down without danger of the ruby falling down, as same is very adhesive and tenacious in its melted state.

Possibly the strangest of all Tesla lamps is shown in Fig. 30. This lamp has no "connections" nor metal parts, whatsoever. It is a hollow glass ball, with a neck, n, on which a tube, b, is set, having at its upper end an enlarged part, s, forming a second hollow glass ball. As will be seen, the lamp is composed of two entirely separated spaces.

Both spaces are, of course, evacuated. It is of high importance that s is in the exact centre of L. Around the neck n, a piece of tinfoil is wrapped, to make connection with the coil.

This lamp, however, does not work at once; it must be excited beforehand, which, as one might be led to think, is not done by connecting it to the coil, but simply by touching the glass ball with the hand. Nor does the lamp work well after this. It will give a light, true, but generally speaking, it is not "ripe" yet.

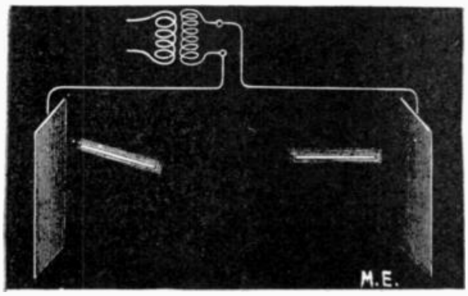


Fig. 32

It must be "nursed" for some time, which may take minutes, hours, or even days. After the tube is fully excited and is operated, it will appear as shown in Fig. 31.

The light which emanates from the lamp is of a mild white and rotates around the central ball with the same number of revolutions per second as the alternations of the coil.

The rotation of the light seems to be synchronous with the alternations.

This rotating lightbeam is marvelously sensitive against magnetic and electrostatic effects. If the tube is hung on a wire and if one comes near the lamp, the beam of light turns away. If one walks around the tube, the light will proceed at the same pace, but one can never catch up with it. In this instance it acts the same as the tail of a comet, which is always turned away from the sun.

A small magnet, 2 yards away from the lamp exerts a powerful influence upon its light. The magnet may increase or decrease the speed of the light rotation, all depending upon the position of the magnet.

The direction of the rotation of the light is determined by the terrestrial magnetism. If the tube is hung up with the ball pointing downwardly, the light will rotate in the same direction as the hands of a watch, providing the experiment takes place in the northern part of the globe. In the southern hemisphere, the direction of the rotation is reversed.

The ideal method of an illumination, according to Tesla, is shown in Fig. 32. Two large metal plates are suspended and are connected with the high frequency coil. Vacuum tubes, having no metallic connections whatsoever, when placed between the plates, light up vividly.

It is not absolutely necessary to have the tube exactly between the plates, as they will light well under or above the plates. The philosophy of this experiment is that an electrostatic field is created between the plates and the electrical energy surging back and forward between the plates is sufficient to light up the tubes to a bright glow.

Indeed, it is not necessary to have two plates to create an electrostatic field. If we suspend, near the ceiling of a room, one large plate, insulating same carefully, and connecting one wire of the coil to the plate, while the other wire is grounded, one can walk all around the room with a well lighted tube, which has no metallic connections whatsoever. In other words, we have a "wireless light."

If the light is not wanted we put the tube in our pocket or in a drawer. Of course this will not extinguish the light; as the electrical energy passes through wood or cloth the same as through air. But as practically no heat is developed in these tubes, there is no danger of fire.

In all possibility this is the light of the future.

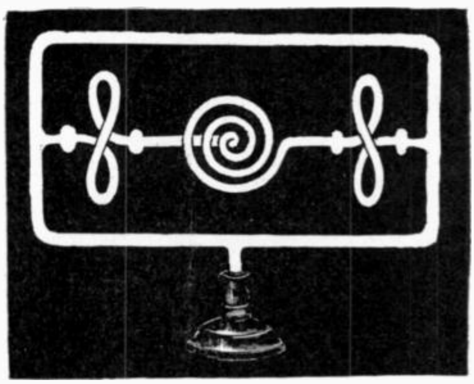
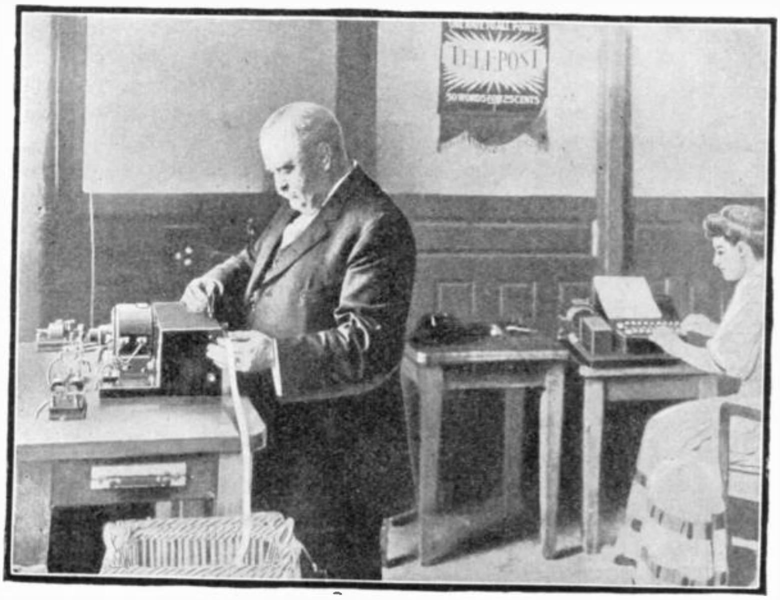


Fig. 33

Fig. 33 shows another form of Tesla tube having no electrodes, nor metallic connections. It may be used as a reading lamp in an "electrostatic room" as explained above.

(THE END)

Thousand Words A Minute



Operator Sending Message, Young Lady Perforating Tape.

We are living in the age of speed. Centuries back savages were worshipping the god of fire or some other god. We in our civilized age have a new god worshipping him as no savage ever worshipped his ancient god. Our new master is as terrible as any of the other older ones, in fact, more so, because he demands more victims forever.

The name of the terrible is God of Speed. Furthermore, he is not imaginary, but happens to be very real. He effects every human being on this globe, and if we were to be without him for any length of time, the world would stand still.

It seems rather surprising, bearing above in mind. that although almost every branch, electrical or mechanical, in the service of transmitting intelligence, has made enormous strides towards great speed, the telegraph has actually gone back, speed concerned, during the past decade.

This seems rather astounding, but nevertheless, it is an accomplished fact.

The average modern telegraph operator, as statistics show, does not manipulate the key as rapidly as the operator twenty years back.

It may be said right here that the days of the hand manipulated telegraph are counted. We must have machine operated telegraphs to cope with the ever increasing telegrams and we must have, furthermore, cheap rates.

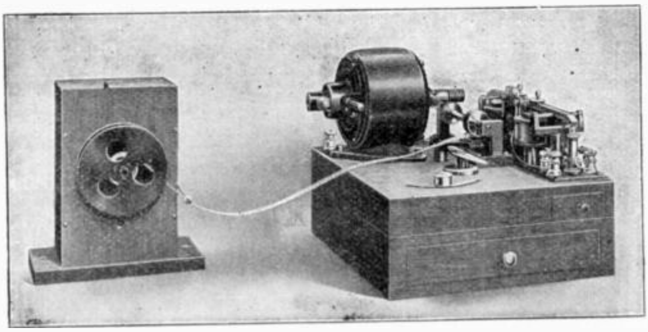
Our business men realize that it is ridiculous to send a short telegram, for instance, from New York to Philadelphia, paying 50 cents for same to have it delivered in an hour, while a long letter mailed for two cents at the same time, arrives only two hours after the telegram.

The wonder is that machine telegraphy has not been introduced before. However, the wonder is somewhat lessened when we consider the almost unsurmountable difficulties encountered in rapid telegraphy.

While it is comparatively easy to transmit signals at great speed over short lines, it is wholly impossible to try rapid work on a long line with the old apparatus. The strong static charge of a long wire line is sufficient to "blur" the signals to such an extent that they cannot be made out intelligently any more.

All the early and modern workers were baffled how to overcome the difficulty, but the honor belongs undoubtedly to Patrick B. Delany to be the first one not alone to overcome the static charge, but to actually *use* same, and force it to do useful work.

Fig. 4 gives the arrangement of the circuit, without which it would be difficult to fully appreciate the novelty and ingenuity of the invention.



Perforator.

Contact fingers F, pressing on top of a perforated tape are electrically one, being connected to the line, the contact fingers pressing upward underneath the tape are separate, C, being connected to the positive current B, while H is connected to the negative curent K. The battery is grounded in the middle at G. When the tape is drawn by the motor M (not shown), and the lower hole allows contact fingers F and C to come together a positive impulse is sent over the line and is recorded on the receiving tape R as a dot. When a hole in the upper row permits contact F and H to come together a negative impulse goes over the line, but it makes no mark on tape R. It performs useful work, however, in preventing the positive dots from running together on the receiving tape. In the case of a dash, the positive and negative holes in the tape have a greater angle. The negative does not follow the positive immediately, as in the dots. It is set back a distance representing a dash; therefore, while the contact fingers F, C, are separated by the tape some of the static charge is running out at the receiving station and continues the mark which started with the dash impulse until the contact F, H, come back together in the delayed upper hole and a negative impulse is sent to cut off the dash at a corresponding length. It will be understood that the record on tape R is made by electro-chemical action. The tape R is dampened with ferro-cyanide and certain other chemicals, which when acted upon by a positive electric current decomposes the iron recording wire W, leaving an indelible mark. Now, as already stated, where there is not sufficient discharge at the receiving end of the line the condenser V can be regulated to make up the deficiency.

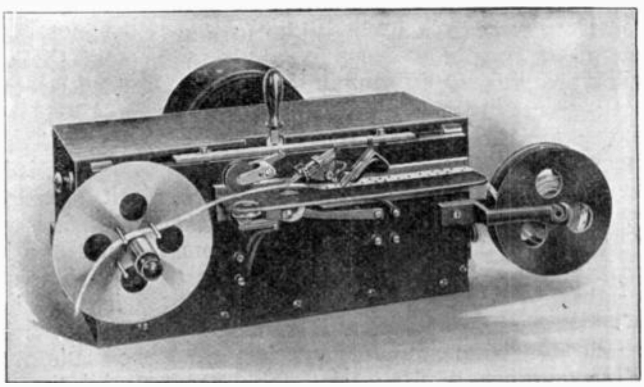
Once perforated the tape can be fed through a motor at an incredibly high speed, the contact fingers will, of course, not be affected whatsoever by the speed and the receiving instrument will produce a clean record of the message at the rate of 1,000 words a minute.

One of our illustrations shows both the facsimiles of a perforated tape and the message as received at the distant station.

Perforator.

The Delany perforator is a very ingenious apparatus and may be used by anybody. It is not necessary at all to be familiar with telegraphy, because the machine has thoroughly mastered the Morse code.

The general appearance of the apparatus resembles somewhat a typewriter, but its inside contains intricate machinery to make it possible that any time a key is struck, to immediately produce a Morse character. If, for instance, you depress the key P, the perforating arrangement



Transmitter.

will punch ten holes, five below and five above; in fact, each Morse character is punched double, for the purpose explained above. The dash on the perforated tape is represented by two dots, which, however, are not placed as near above each other as the dot-characters, but are arranged somewhat more obliquely.

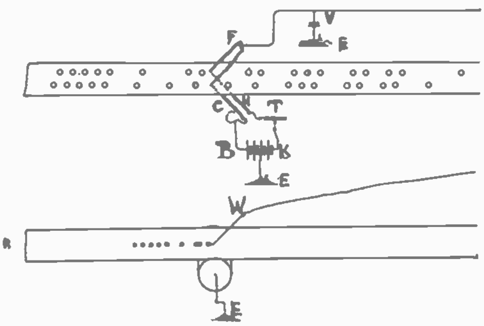
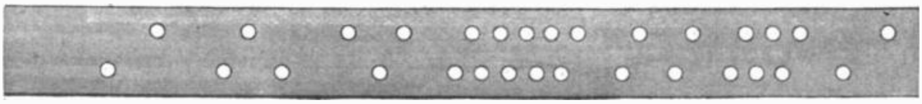


Fig. 4

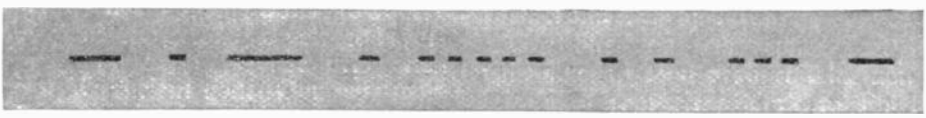
Transmitter.

As soon as the perforated tape is ready, it is passed through the transmitter, which takes the tape, feeding it between the contact fingers at high speed. Each time a hole passes a contact finger, an electrical impulse is sent over the line and same is reproduced electro-chemically at the rereceiving station.

T E L E P O S T



Facsimile Perforated Tape

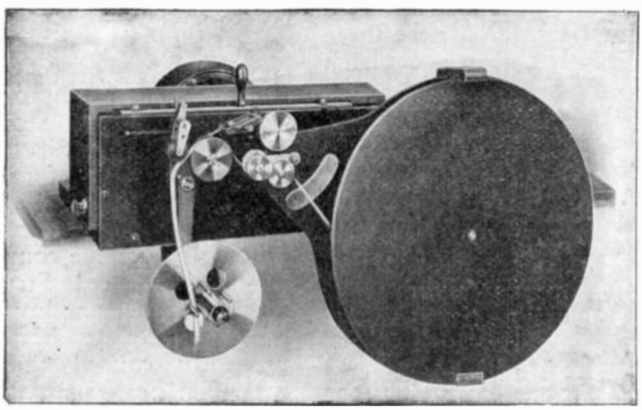


T E L E P O S T

Facsimile Receiving Tape

Receiver.

The question, if the receiver and transmitter must work synchronously, presents itself at once. Fortunately this is not the case, as the system could never attain commercial value, because synchronic working of two distant stations for any length of time has as yet always proved a failure.



Receiver.

As soon as the operator at the receiver gets a message (no matter at what speed same is being sent) he simply regulates the speed of his motor till the dots and dashes appear as they should. If too long, his motor is retarded; if too short, it is speeded up; this can be accomplished almost instantaneously. Thus it may be seen that it is a comparatively simple matter to transmit 1,000 words a minute, and as the telegram is not taken by sound, but is printed electro-chemically on a tape, mistakes are practically impossible, as the record is always before the eyes of the person transcribing the message from Morse into English.

The advantages of this new system, the "Telepost," are many and truly revolutionary. Four single wires are capable of handling as much business as sixty-eight wires of the present telegraph companies

With the Morse key system there is of course one wire to each two operators. With the "Telepost" system a single wire can transmit the combined work of forty pairs of operators.

Another great advantage is that messages going at the rate of 1,000 words a minute can be sent over a telephone wire, without in any way interfering with the conversation being held at the same time over the same wire. This can be done so nicely that it is impossible to detect even a slight noise in the telephone receivers.

The new Telepost Company, due to all these great advantages, is of course, in a position to greatly lower present telegraphic rates, which, for instance, for a ten-word telegram from New York to San Francisco amount to $1.00.

The company proposes to adopt a uniform telegram rate of 50 words for 25 cents, regardless of distance. There will be but one rate to all points. Such a rate cannot help but make telegraphing more popular as it is now, and we predict that a good deal of regular business correspondence will hereafter go by way of the "Telepost" system.

Despatches are handled in three distinct ways. First, as telegram; second, as telepost; third, as teletape.

As telegram a 25-word despatch is transmitted by wire and delivered by special messenger.

As telepost a 50-word despatch is transmitted by wire, but delivered by mail.

As teletape a 100-word despatch is transmitted by wire, but the message is not transcribed at the receiving end, but the original receiving tape is sent by mail to the addressee, who of course must transcribe the despatch from Morse to English.

Date, name, address and signature are transmitted free. The rate for the three different methods of sending a despatch is 25 cents in each case.

When we realize that 80 per cent. of all transacted business in this country is practically done by correspondence, and when by means of "Telepost," days and weeks are won, we know that we will have advanced as much as from the old-time stage to the express train.

Business in our days must be transacted quickly. If a man in San Francisco to-day writes to a house in New York asking for a quotation, after he received his catalogue or printed matter, he must wait ten days for an answer. By this time his enthusiasm may have cooled down—and the New York house possibly loses an order.

If, however, the man in 'Frisco sends the same letter by "Telepost" in the morning and has his reply in the afternoon by "Telepost" the New York house has a much better chance to get the order than at the present time by correspondence through mail.

Truly we must welcome "Telepost" as a new factor to assure and bring new business.

PILFERING ELECTRICAL ENERGY.

The controllers of the New York Edison Co. have recently caused the arrest of a certain individual who was in the habit to sell his "customers" a certain "regulator," which, applied on an electrical meter caused same to run backward and consequently cheat the company out of their just dues.

It goes without saying that the inventor of the article had a large clientele, which may be does not reflect well upon New Yorkers, but people in New York are being robbed all year round by the trusts, and few can resist the temptation to "get square" with somebody or other, given a chance.

The "regulator" was nothing but a powerful electromagnet which, when applied to the meter in a certain manner would overpower the electromagnet in the meter, it being not as strong as the "regulator."

The consequence was that the field in the meter was reversed and the meter run backwards. The "regulator" when applied to a meter for a few hours while in use would undermeasure the meter up to 60 per cent.

This "regulator" was used mostly in New York breweries over Sunday, when the inspectors would of course, not pay visits.

The device might have been in use yet were it not that a forgetful "customer" left the "regulator" attached to the meter on a fine Monday morning, when an employé of the company dropped in to read the meter! Strangely to say, he was an honest employé, and he reported the case to his company, who promptly caused the arrest of the manufacturer of the device.

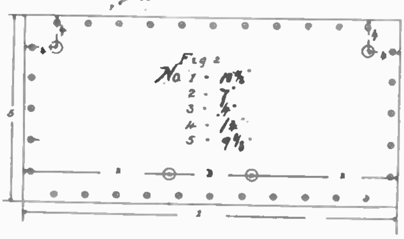
No, Alexander, wrong again. No conundrum was ever used in a detector; you mean carborundum!—"FIPS."

A Tesla Coil

By A. C. Austin, Jr.

The Tesla coil, shown in the illustrations was recently built for the purpose of experiment, and as many strange and beautiful effects may be obtained with it, the author will describe in detail the construction of the apparatus.

This particular coil, when used with a two-inch induction coil, and a condenser of four sheets of tinfoil 10x12



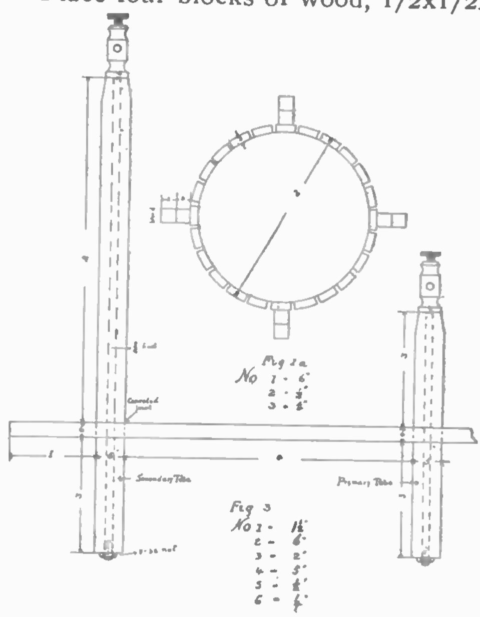
inches mounted on glass plates, gave a spark 4 to 6 inches long and in a darkened room there was a heavy brush discharge when the terminals were separated about eight or ten inches, and occasionally a single spark would pass even at this distance. At all times the secondary terminals, when the light in the room is turned down will have a luminous glow, and streams of light will be seen emanating from them in all directions, at times more intense than usual, and particularly so when one of the secondary terminals is grounded. When the terminals are placed just beyond the distance at which sparks will pass, a great amount of ozone will be liberated.

The construction details of the coil in question are as follows:

Obtain, or make a case 18x9x9 inches, inside measurement, made of 1/4-inch hard wood, and line same with sheet zinc about 24 or 26 gauge, soldering at the joints, and being sure that they are liquid tight. One-quarter of an inch from the top of the case, place a strip 1/2 inch square all the way around the inside this forming a base to set the cover on and to screw same to, leaving a space about two inches long in the middle of each end for the supports of the coil to fit through.

Make a cylinder of wood 6 inches in diameter and 17 inches long. This cylinder should be built in practically the same way as the tuning coil cylinder described in the June issue of this magazine, except that the slats should be placed very closely together. On this cylinder, after rounding the edges of the slats with a rasp, wind four hundred turns of No. 30 B. & S. gauge single cotton covered wire, beginning a little more than an inch from the end of the cylinder and, winding the turns as accurately as possible 1/16 of an inch apart. Coat the cylinder and wire with shellac, giving some four or five coats, waiting until the first is dry before putting on the second, and so on.

Place four blocks of wood, 1/2x1/2x



1 inch at equal distances from each other, on each end of the coil, so as to form supports for four sticks, 1/2x 1/2x17 inches, running lengthwise on the coil, and separated from the secondary wire, on which to wind the primary coil.

Now make two grooves 1/8 inch deep and 1/8 inch wide, making this mea-urement a trifle full, and cut same a scant 1/4 inch apart, the edge of the

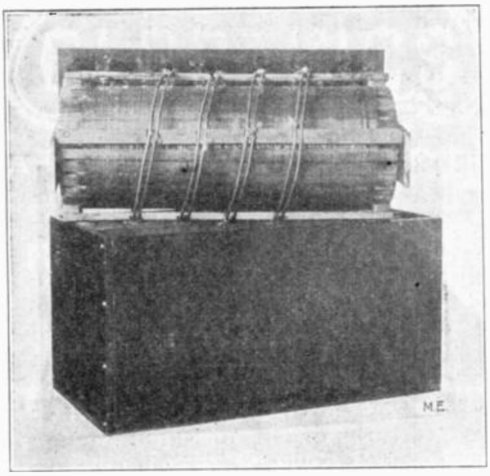
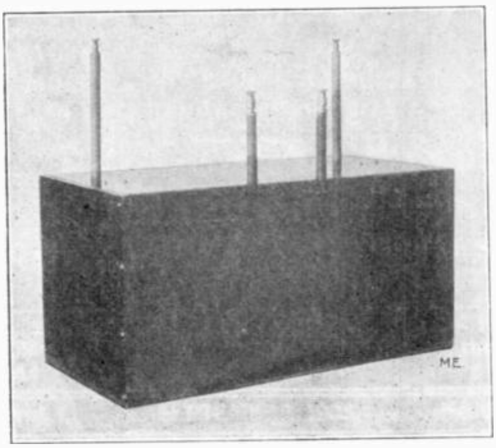


Fig. 4

first groove to be 3 1/4 inches from the end of the coil on the strip which is to be at the top of the coil when finished, and, turning the coil in the same direction as when winding the secondary, cut two grooves 3 3/4 inches from the end on the next stick, 4 1/4 inches on the next strip and coming back to the strip from which the start was made 5 1/4 inches from the end, making the last grooves just 2 inches away from the first ones cut, continuing on until



The Finished Coil

enough grooves have been cut to wind four complete double turns of wire in. Procure about 30 feet of No. 6 B. & S. gauge soft drawn bare copper wire, and wind four double complete turns in the grooves, fastening same into the grooves by tieing with stout cord or twine. All of the preceding operations are clearly explained in Figure 1, and also by the photographs, Figs. 4 and 5.

Obtain a sheet of hard rubber 18 1/8 x9 1/8x1/4 inches and trim to fit perfectly tight in the top of the transformer case. Drill the holes for screws around the edges and then drill a hole at each end 1/2 inch in diameter, the center of the hole to be 1 3/4 inches from the side and 1 3/4 inches from the end of the rubber sheet, as shown in Figure 2. Also on the opposite edge of the rubber sheet drill two holes 1/2 inch in diameter 4 inches apart and

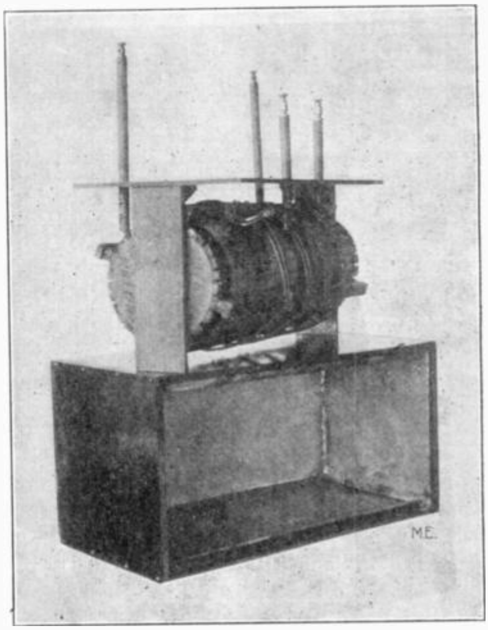


Fig. 5

each one 7 inches to center, from the end, as also shown in Figure 2.

Insert in the first mentioned holes hard rubber tubes 1/2 inch in diameter, projecting 2 inches below the cover, and 6 inches above, fastening same tightly by cement (Fig. 3). The two other holes should be fitted with tubes of the same kind, projecting 2 inches both above and below. Now make four pieces of brass rod 3/4 inch longer than the tubes, and put 1/2 inch of 8/32 thread on each end, and putting these rods through the tubes screw a binding post on the top and a nut and washer on the bottom to clamp same into the tubes. The last operation is clearly shown by Figure 3.

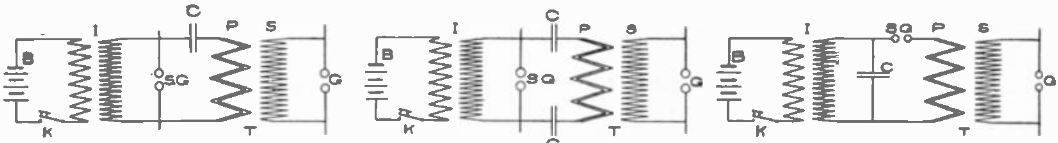
Now take the coil, and on each end

place a standard of wood 1/2 inch thick, making a bracket shaped piece to fit the top of the standard, and projecting inwards, so that the rubber top may be screwed to these standards, and hold the coil suspended in the oil. The exact measurements and details of this operation cannot be given, and it will be necessary for the person building this coil to use the head a little bit, and simply make it fit. Photograph 5 will give a fairly clear idea of the method used by the author.

Connect the secondary terminals to

the right capacity of the condenser, but when the right adjustment is found the coil will be found to work very satisfactorily. Of course with a larger induction coil, for instance a 3 or 4-inch coil the transformer will do a greater amount of work, but as before stated, a two-inch coil is used by the author. A smaller coil was tried but the result was very unsatisfactory.

This Tesla coil has been used both for experimental and for wireless work, and has given very satisfactory service.



"A" "B" "C"

the brass rods running through the secondary tubes, soldering same tightly, being careful not to leave any slack wire, and running straight from the end of the winding to the rod, and not too close to either the primary winding or the zinc lining of the case. Now connect the two windings of the primarv together, again soldering well, and making the windings in parallel, and then connect to the brass rods running through the primary tubes. This last operation is somewhat difficult, and care must be taken not to make the single wire cross over too close, as one of the turns might short circuit.

Procure about five gallons of linseed or paraffine oil, and after boiling pour into the case while still warm, putting in enough to fill the case about 3/4 full. Now lower the coil slowly and carefully into place, and just before screwing down the cover see that the oil comes up to about 1/2 inch from the cover. The placing of the coil into the oil while still warm drives all the air bubbles out, and diminishes the danger of the insulation breaking down. However, the oil must not be too warm when the coil is immersed, as the heat might melt the rubber tubes and cause the rubber top to warp.

A number of different methods of connection are shown by the diagrams "A," "B" and "C," and these may all be tried. The amateur using this coil will experience some difficulty in obtaining the right length of spark and

GEISSLER TUBE IN AERIAL.

Many wireless stations use now a hot-wire ammeter in the antenna for the purpose of ascertaining how much energy (amperes) is radiated.

Not everybody can afford a hot-wire ammeter, same being quite expensive. Mr. Gernsback, to this effect uses a small Geissler tube connected in series with the antenna. This has been found quite satisfactory, especially if a sending helix is used and one does not exactly know when the maximum amount of energy is radiated from the antenna.

By placing the Geissler tube in the antenna, one can quickly find the maximum radiation simply by observing when the tube lights up brightest.

The tube being a conductor, it offers practically no resistance to the waves.

WIRELESS TELEGRAPH RECORD.

Thus far Marconi held the record for long distance wireless telegraphy. With the completion of the giant station at Nauen (Germany) operated by the "Gesellschaft fuer Drahtlose Telegraphie," new records have been made. The Nauen station has been able to transmit to the wonderful distance of 2,550 kilometers, while Marconi has not reached farther than 2,400 kilometers.

The record of the Nauen station covers the 1-16 part of the circumference of the globe, which, as will be known, is 40,000 kilometers.

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EDITORIALS.

The Editor feels that he has pleasantly surprised his readers this month by presenting them with a supplement listing all the wireless telegraph stations of the United States.

The Editor received a large number of inquiries during the past, referring to call letters, wave length, etc., of the commercial and government stations. He felt that a list of the stations, presented in this number, in form of a supplement, was urgently needed, and that it would fill a long felt demand.

The supplement has purposely been inserted loosely, so that the reader may take it out undamaged and hang it up in his station, where it will undoubtedly be welcomed. The Editor suggests to mount it on stiff cardboard, as it will very likely be handled a good deal.

All the information that could be had has been incorporated in the list, but as several stations are incomplete as yet and no data could be had, such spaces were left open. MODERN ELECTRICS will publish from time to time the missing data, and readers are requested to fill out the list to make same complete.

The Editor proposes to furnish a supplement of the wireless stations of the United States each year, as new stations are being built very rapidly. Thus the "Wireless Fiends" will once more satisfy their wireless hunger.

It may be of interest to know that this magazine has the honor to be the first one to publish a list of the wireless stations of the United States, which again proves that MODERN ELECTRICS' motto: "To print what our readers WANT, not merely what strikes the Editor's fancy," is becoming more apparent with each issue.

As several readers will have observed, we have reduced the fee to register wireless stations and we hope for a speedy increase of the list.

There are a good many experimenters having only a receiving station, and we have had quite a few letters from them asking for information if receiving stations could be registered.

As the idea of the "Wireless Registry" is to bring our readers in touch with each other, there can be no objection to registering receiving stations, and we invite our readers having such a station to send their registry at once.

So as not to create confusion, receiving stations will be preceded by an asterisk in the future, thus:

*P. Smith, New York, P.S. 220.

As soon as P. Smith installs a sending station, he will advise us, and his station will be found listed correctly in the annual blue book containing all our readers' stations.

One word of advice: The wave length of a receiving station is computed exactly as that of a sending station, only the length of the antenna is measured from the top of the wire down to the detector. To compute the wave length, consult Editorial in the July issue.

Parties having tuning coils should supply us with the length (in feet) of the wire wound on the tuner, and state the length of the antenna separately.

And before we forget it—It is *not* necessary to be a subscriber to join the Wireless Registry. Every reader is welcome.

WIRELESS TELEPHONE PHILADELPHIA-NEWARK.

Philadelphia.—A. Frederick Collins, who has been conducting extensive experiments in long-distance wireless telephony between a station on the roof of the Land Title Building and his Newark laboratory, left for his home in Newark, after having made what he considered a very satisfactory test.

The apparatus here is simply for the receipt of messages, while the one in Newark can both receive and transmit. The receiving wire was suspended by three Eddy tailless kites, and a connection was made with the Newark station, about 81 miles away. Mr. Collins said that the articulation was perfect, and that the metallic sound, so annoying in wire telephony, was absent.

The string attached to the kites was insulated every 30 feet, and the aerial was attached to the string just above. The receiving instrument, a quarter box, contains a receiver, induction coil, with needle to attune the instrument. The distance covered is so far the greatest obtained by the Collins system.

LOUD-SPEAKING 'PHONE.

BY OUR BERLIN CORRESPONDENT.

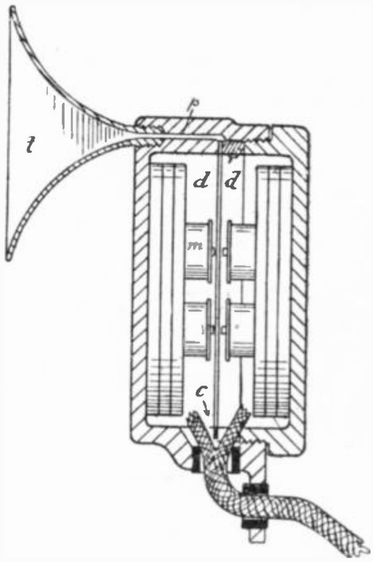
An ingenious device has recently been patented.

Loud-speaking telephones are a very urgent necessity, especially in public, and also in noisy places.

But it is especially the public telephone which is dangerous. Statistics show that a score of people are infected annually by using these public telephones. If we can construct a telephone receiver which we do not have to press tightly to our ear, and which can be held 1/2 inch or so away from the ear, and still talk loud enough, we shall bless its inventor.

It seems that such a 'phone has recently been invented, and, judging from the first test, it will have a future not alone for above mentioned purposes, but also for wireless telegraphy to multiply and intensify weak sounds.

Referring to illustration, it will be seen that two sets of electro-magnets are used, also two diaphrams, dd. These diaphrams almost touch the poles of the electro-magnets mm. Between the diaphrams dd, a pasteboard ring c is placed, and an air chamber is consequently



formed between the two diaphrams. At the upper part of the pasteboard ring a small piece is cut out. At this point a small channel p ends, which is in communication with the funnel t.

The electromagnets acting on the diaphrams expulse the air or cause it to be drawn in the air chamber, due to the vibration of the diaphrams. The result is that the reproduction of the voice is greatly intensified, in fact, words can be plainly heard a foot away from the instrument.

There is just that much difference between an electric fan and a baseball fan. The former runs around and shoots off cold air, while the latter runs around shooting off—well, you know!—"FIPS."

Experimenting With The Tesla Coil

By H. Gernsback.

Ever since this magazine was started, subscribers have been clamoring for an article on Tesla coil experiments. This is not surprising when we bear the fact in mind that literature on Tesla high

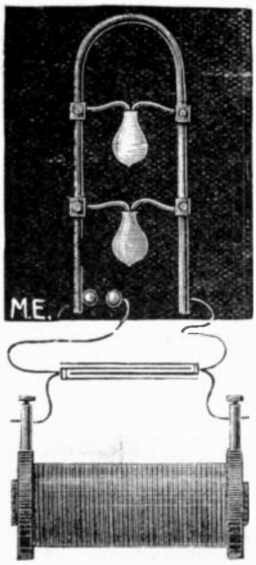


Fig. 1

frequency currents is very scarce indeed. The few books treating upon the subject are so purely technical that the average experimenter gets hopelessly entangled in his efforts to plow through the maze of theories, foot-notes and technicalities, useful only to the hardened scientist.

The scope of the present series of articles is to make the experimenter and amateur more fully acquainted with the wonderful high frequency currents, without indulging too much in theory, so

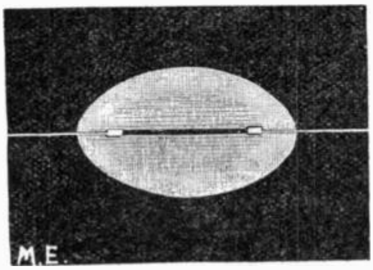


Fig. 2

thoroughly hated by the young experimenter.

Most of the experiments described in this article can be carried out with the Tesla coil described elsewhere in this issue.

In some of the illustrations in this article a coil resembling a common induction coil is shown for simplicity's sake, but it is of course understood that same stands for the Tesla coil, as none of the experiments can be performed with a spark coil alone, no matter how large.

Although the potential of a well construeted Tesla coil runs up into hundred thousands of volts, such currents, as ex-

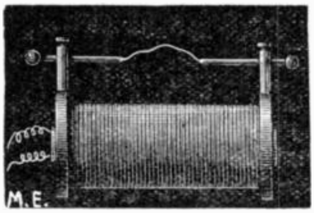


Fig. 3

plained elsewhere, are harmless to the human body. For this reason experiments with such currents are less dangerous than those made with even a three-inch spark coil.

Possibly the most puzzling experiment to the individual acquainted only with low tension work is the phenomenon of the impedance. The meaning of this word is "seeming resistance." If we short-circuit an electric lamp by

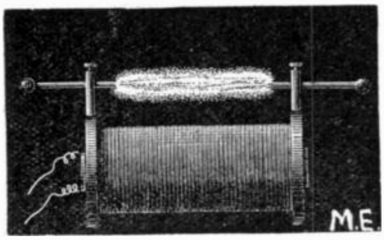


Fig. 4

means of a heavy wire, we would hardly expect that we could light up the lamp thus short-circuited, under ordinary circumstances. By means of Tesla currents, however, we can light up several lamps, despite their being shorted with a heavy (No. 8 or 9) wire.

The arrangement is shown in Fig. 1. One or more 50-volt lamps are made to slide up and down on a heavy copper wire loop. This loop is connected on one side to the Tesla coil, bridged by a large condenser (Leyden jar). The other wire from the condenser terminates at a brass ball. Another similar ball is placed opposite the first one and is connected to the wire loop.

In operation intense white sparks jump between the balls. By moving the lamps up and down the loop, the highest degree of incandescence is quickly ascertained.

Experiments with the impedance will

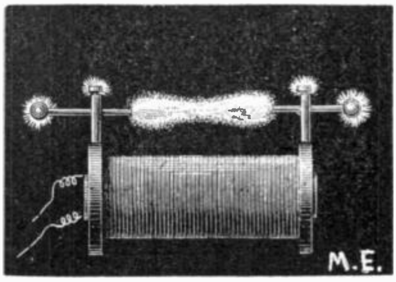


Fig. 5

come out best when the wire of the loop is very heavy. A copper rod even 1/2 inch thick bent into shape as shown in Fig. 1 will give excellent results.

Another interesting experiment with the impedance is shown in Fig. 2. It represents an ordinary incandescent lamp having a straight filament. One would be led to think that the current would take its way from terminal to terminal. Under certain conditions, however, the carbon filament stays black, and sparks jump from one terminal to

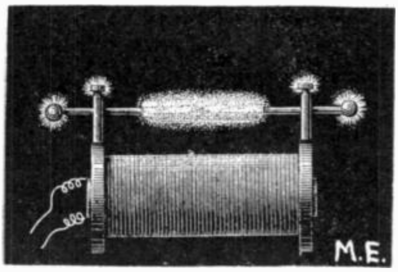


Fig. 6

the other, as if the filament was not there at all, or if it were an insulator.

In operation, five typical forms of discharges are observed with the Tesla coil. If we use little current (amperage) in the primary circuit, we obtain a thin light thread between two sharp points (Fig. 3). This thread is extremely sensitive and will change its position if one breathes lightly from a little distance. The slightest draft in a room causes the thread of light to flicker violently.

If we increarse the amperage up to a certain extent, we produce the flame discharge (Fig. 4). This flame is capable to radiate quite a good deal of heat, and the noise produced by the flame is little;

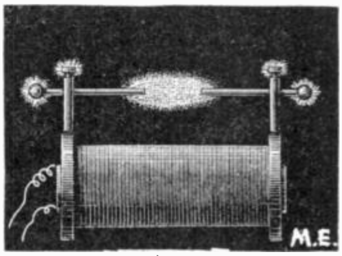


Fig. 7

much less, in fact, than the spark discharge of a one-inch coil.

The previous two experiments could not be strictly termed as high frequency ones, as the alternations were comparatively low. If we increase the current still more we obtain the high frequency arc discharge. Same is characterized by the brush discharge which takes place on

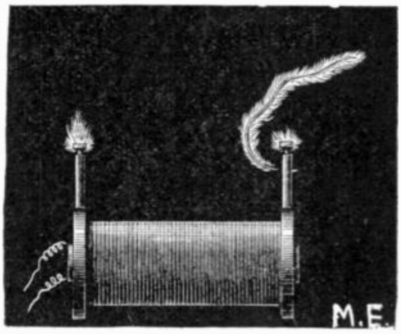


Fig. 8

all the metal terminals (Fig. 5). The arc produces a good deal of ozone, which makes itself known by a peculiar, but pleasant and invigorating, odor.

By further increasing the amperage and by separating the discharging rods but little, we obtain a peculiar spark dis-

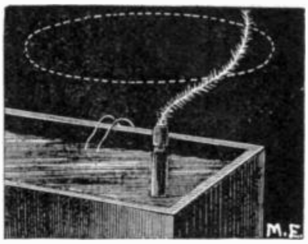


Fig. 9

charge composed of extremely thin, blinding, white threads enclosed in a large flame or spray (Fig. 6). This discharge is the most beautiful; it can be further intensified by using a strong air current trained against the spray. Sparks can be made to fly off, similar to those produced by sharpening a metal tool on a grind stone. These electric sparks, when blown on the experimenter's skin,

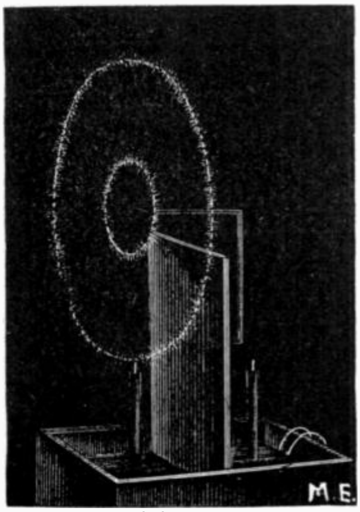


Fig. 10

produce a rather unpleasant sensation, but are quite harmless.

Fig. 7 shows the fifth typical form of discharge. When the current is increased to its maximum, and when the oscillations have reached their highest value, it is quite hard to confine the charge to the discharging rods. It is

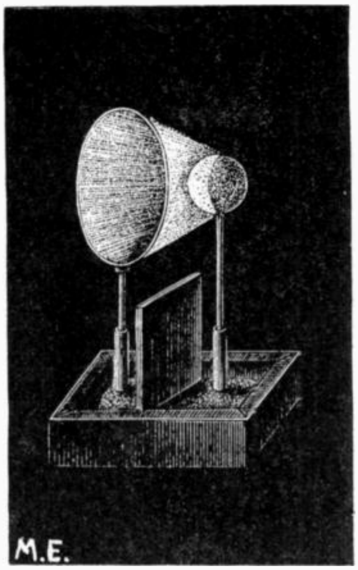


Fig. 11

neither easy to obtain a spark discharge; if produced at all it will only take place when the rods are quite close together.

A short piece of thin, cotton covered copper wire when attached to one end of the coil is enveloped in a beautiful light discharge (Fig. 8).

Fig. 9 shows another interesting experiment which, when produced in the dark, is quite impressive. A very thin, bare copper wire attached to one end of the coil, rotates in a circle. The length of the bare wire must be ascertained by experiment.

Two rings formed of copper wire, the smaller ring placed into the larger one, and both connected to the poles of the coil, will show a very pretty discharge (Fig. 10).

By concentrating the effect the intensity of the light is greatly increased as shown in Fig. 11.

A circle of copper wire is made, which is connected to one pole. The other pole carries a brass ball, its diameter being approximately 1/4 of that of the circle. As soon as the coil is started, the discharge takes place between the surface of the brass ball and the rim of the circle. A hollow cone of light is formed, presenting a weird appearance.

(To be continued.)

METALS NOT TRANSMUTED.

Mme. Curie and Mlle. Gleditsch have repeated the experiments which were made by Sir William Ramsay and A. T. Cameron, and as a result of which the earlier investigators announced that they had observed the production of alkaline metals and lithium in solutions of copper salts submitted to the action of radium emanations. The observations of Ramsay and Cameron were by many regarded as showing a process of the transmution of elements.

Mme. Curie and her collaborator declare that they have been unable to confirm the conclusions of Ramsay and Cameron. It is impossible to say that no trace of lithium or sodium is formed, but Mme. Curie considers that the fact of the formation of these elements out of copper cannot be held to be established.

WIRELESS WEATHER SERVICE.

The German government intends using wireless telegraphic plants on board the Atlantic steamers to establish a regular official weather report service for announcing approaching cyclones, etc.

The reports will be sent to the Hamburg Naval Observatory.

Luna Park, Coney Island, By Night

60,000 Electric Lamps in this part of the Park. Cost to light the Park, $5,600.00 each week.

WIRELESS STATION ON WALDORF-ASTORIA.

Within a few weeks wireless messages will be sent between the Waldorf-Astoria in this city and the Bellevue-Stratford in Philadelphia. Work on the installing of stations on the roofs of the two hotels has just begun.

A wooden flagstaff, thirty-five feet high, will be used as the principal mast of the wireless plant at the Waldorf-Astoria, and steel masts will be used at the Bellevue-Stratford. The service will be available to the general public, and will be used to communicate with ocean steamships.

"It will be a great thing for Philadelphia," said Lawrence Maresch, assistant manager of the hotel, "and if it works as perfectly as we expect, communication between the two hotels will then be more easy and much quicker than at present.

"It will enable us to receive for our guests the news of ships at sea, and we anticipate that messages from friends on board will be of frequent occurrence."

"I am going to hang up my antenna," said I to my somewhat deaf uncle Joe. "What, you're going to hang up Aunt Ena!" roared Uncle Joe, as he made a dash for me, "not if I kin help it. Hey, Ena, whe-e are ye?"—"FIPS."

NEW YORK, THE TELEPHONE CITY.

The latest statistics show that New York leads all the towns of the world, as far as the telephone is concerned..

Here is the latest official list showing the number of telephones actually installed:

New York,	310,000	telephones.
London	148,000	"
Berlin	78,000	"
Paris	50,000	"

The daily average number of calls is 1,250,000. Think of it, one and one-quarter million calls in a single day! Just figure out how many nickels and dimes the street car, elevated and subway companies would get each day if each of the 1,250,000 calls had to be made in person, if for some reason the telephone service should stop altogether! There are no less than 803,400 miles of underground telephone wire in the city of New York, or enough to stretch three wires from the earth to the moon and still have 83,400 miles of wire left over!

A man named Kohn walked into the supply store.—"Do you keep materials for detectors?" he demanded. "And may I ask, what is this?"

"Oh, Silicon."

"Sir! How dare you call me 'Silly Kohn?' I'll report you to the manager!" —FIPS."

Wireless Department

The Construction of a Transmitting Tuning Coil

By A. C. Austin, Jr.

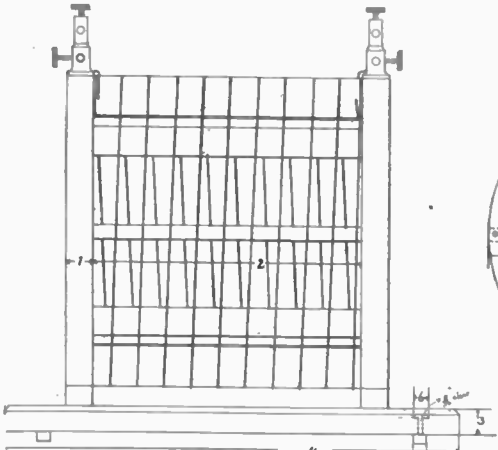


Fig 1

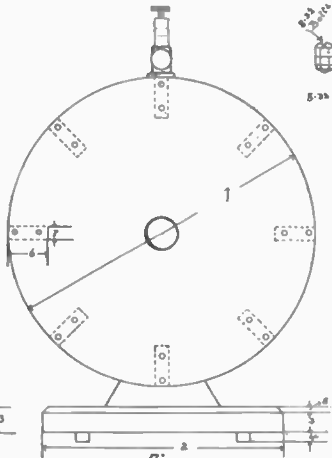


Fig 2

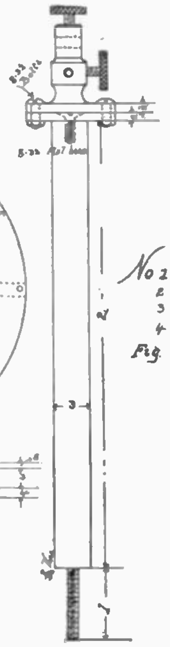


Fig 3

Some few months ago the writer constructed an inductance, or tuning coil for the transmitting circuit, which has proved very efficient, making possible the use of many different wave lengths in transmitting, either with open or closed circuits, and opening up a wide field of experimentation in tuned transmission in which many interesting phenomena have been noted.

The construction was very easy and the cost so slight, that in face of the great efficiency of the instrument, the writer has often wondered why he did not build one before.

The details of construction are as below:

Procure a piece of hard wood one inch thick and about 18x9 1-2 inches, and bevel the edges on one side, truing up to 17 1-2x9 inches. Get another piece of 3-4-inch hard wood about 12x 28 inches and from same cut two discs 11 1-2 inches in diameter. Do not cut around the entire circle, but leave a base 3 1-2 inches wide at the line of the periphery, and spreading in triangular form to 3 3/4 inches wide on the bottom. The distance from the line of the periphery to the bottom should be 3-4 inch. Now in the center of each disc bore a hole 1 1-4 inches in diameter, same being for the spark balls to pass through. Of course, it is understood that if the spark balls are larger than those described herein that the holes must be correspondingly larger.

Now make eight strips of hard wood 1-2 inch thick, 1 1-2 inches wide and 10 inches long. Get thirty-six round head brass screws about 1 1/2 inches long, and placing the strips at equal distances between the two circles, with the 1-2 inch face on the circumference, fasten by two screws in each end of each strip.

Figures 1 and 2 will explain the foregoing directions.

Obtain four double binding posts, and flattening the top edge of each circle so as to make a flat base for the posts, place one on each, screwing same down firmly. Be sure that the posts are both on a line with the top strip. Now starting at the left hand side of the coil, measure 1-8 inch from the end of the top strip, and turning the coil toward you, 1/4 inch from the end on the next. 3-8 inch on the next, and so on. adding 1/8 inch each time you move to a new strip, making guiding marks, afterward cutting a groove at each of the marks, being sure to make same slightly diagonal on each strip instead of straight across. so that there will be a continuous spiral of grooves on the coil. These measurements will give exactly ten turns of wire on the inductance coil. spaced one inch apart.

As close to the inner side of the circle as possible bore a hole 1/8 inch in diameter, 3/4 inch from the top of the top strip. Give the frame two coats of shellac, and also the base.

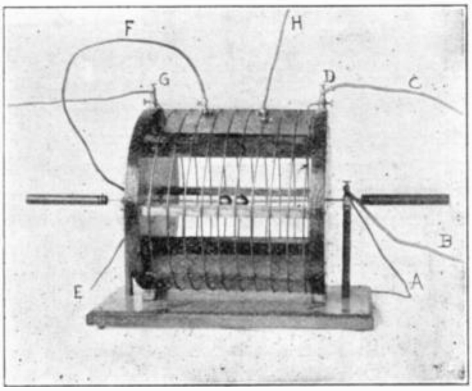
Obtain thirty-five feet of No. 8 B. & S. gauge bare copper wire, if possible tinned, and holding the frame so that when winding the wire it will wind away from you, take the end of the wire and push it through the hole in the top strip, left hand side, and bring the end up to the lower hole in the binding post, screwing same down tight, and then proceed to wind the wire on the coil, finishing off at the other end in the same way. This method takes the strain from the binding posts.

Procure two pieces of rubber rod 1/2 inch in diameter and 6 1/4 inches long. also a piece of rubber 1/8 inch thick and two or three inches square, from the last named piece cutting two pieces to fit the bases of the two remaining binding posts. Now screw the rubber bases on to the rubber rods. and then screw the binding posts on the top of the same, as shown by Figure 3.

Obtain two pieces of brass rod 7 inches long and large enough to take an 8/32 thread, and put 1/2 inch of thread on each end. on one end of each rod putting a rubber handle about 3/4 inch in diameter and 5 1/2 inches long, and on the other after putting through the binding posts last mentioned, a brass ball one inch in diameter. Bore a hole 1 1/2 inches from the end of the base, one on each end 1/2 inch in diameter and 1/4 inch deep, and then in the center of same another hole large enough to put an 8/32 screw through. Now embed in the free end of the rubber standards an 8/32 screw. letting same project about 1 inch, and after screwing the coil to the base, centering same carefully, place the rubber standard for the spark gap in the holes, and putting a nut on underneath, screw same down tightly. On each corner of the base put a small rubber standard about 1/2 inch high, so that the base will not rest directly on the operating table. This gives the instrument a finished appearance.

Obtain two double connectors, and slot one end of each down to the hole so that it may be slipped onto the wire on the coil and screwed fast, a slight turn of the thumb screw enabling it to be removed from any one turn and placed on another quickly and conveniently.

One method of connection is shown in the cut, connections being made with "Pirelli" cable, "a" leading from



Assembled Coil.

the secondary of the induction coil to one side of the spark gap, "b" leading from the same side of the spark gap to the adjustable condenser, "c" leading from the condenser to binding post "d" on the inductance coil; "e" leads from the other side of the secondary of the induction coil to the other side of the spark gap, and "f" from there by a flexible connection to any point on the inductance coil. Binding post "g" on the inductance coil is directly grounded, and the aerial "h" is placed, by means of the other flexible connection, between points "f" and "d". The inductance of the closed circuit is varied by moving flexible connect "f", and the capacity by varying the condenser, and tuning is accomplished by moving the flexible connection leading to the aerial.

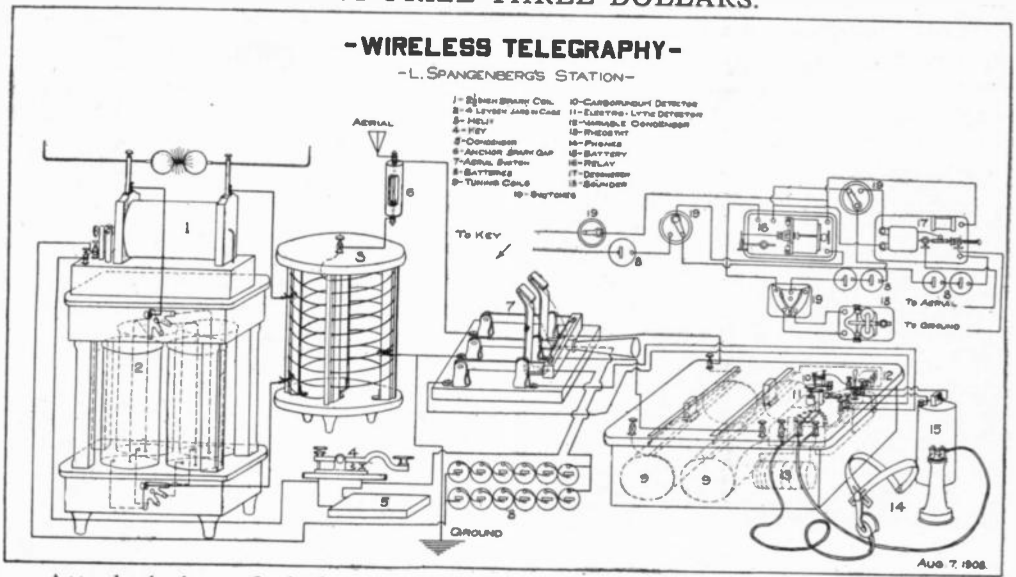
Each turn of wire on this coil is

(Continued on Page 218)

Wireless Telegraph Contest

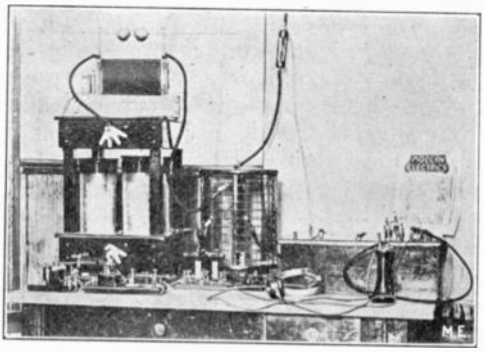
Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three ($3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have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

FIRST PRIZE THREE DOLLARS.



Attached please find photograph and drawing of my wireless station.

The sending instruments consist of a 2 1/2 inch induction coil, four Leyden jars in case, Helix, anchor spark gap, aerial switch and key, all made by myself with the exception of the key. At present I work my coil with dry batteries.



The receiving instruments consist of a receiver which has tuning coils, two detectors, one electro-lytic and one carborundum type, variable condenser and rheostat, all made by myself and mounted on and in this box which makes it portable. The phones and batteries are attached to binding posts, as seen by drawing.

The tuning coils have a capacity of 928 meters wave length.

It will be noticed that I have a decoherer with micrometer screw and relay attached to my aerial and ground, which is only used when some one is calling during my absence from the phones. The noise of the decoherer attracts my attention, and I can readily cut these out and cut in my regular receivers.

I have switches arranged so that I can practice telegraphy with the use of the key relay and sounders when desired. The key relay and sounder were picked from a scrap heap, the relay magnets being both burnt out, and the key and sounders are from an old learner's set which had been thrown away.

The decoherer I made myself, and I rewound the relay magnets, polished up the key and sounder and mounted them on separate bases, so I have practically made the entire outfit myself.

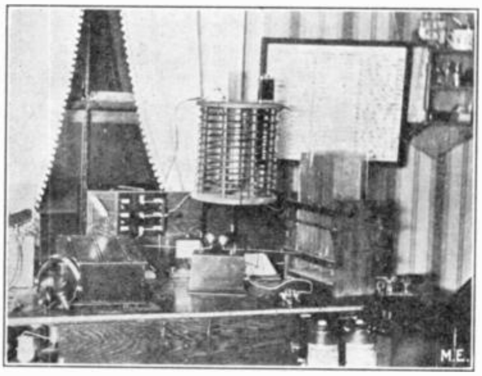
My aerial is suspended from a sixteen-foot pole, mounted on the house, the ground being attached to the gas pipe.

I think the MODERN ELECTRICS is the best magazine on wireless telegraphy ever published. You will notice in the picture that I always have it handy, and I think for the last two months I have bought the first one sold of every issue.

L. SPANGENBERG.
478 E. 18th street, Paterson, N. J.

HONORABLE MENTION.

Enclosed please find flash light photo of my wireless station. I made all my instruments, including the oak table



on which they rest and the chest at the extreme right, except my coil and telephone receivers. From left to right is an "Electro"-lytic detector enclosed in a mahogany box with a very fine adjustment, a pair of 2,250 ohm telephone receivers, a mahogany box which contains three coils, one of which is inductive, all three being used for tuning; my 1-inch spark coil and a frame holding 4 plate condensers; at the right, directly above the spark coil, is a sending coil for changing the wave length in sending messages. In the background is a copy of the Morse and Continental codes and also a few calls.

I think that MODERN ELECTRICS is the best paper on wireless out, and it is very valuable to me.

S. KENDALL BUSHNELL.
Arlington, Mass.

HONORABLE MENTION.

Enclosed herewith is a photograph of a wireless telegraph outfit constructed by the writer, with the exception of the Morse key, relay, knife switches and one of the induction coils.

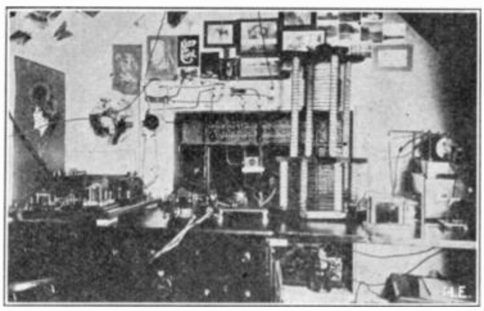
The receiving apparatus, shown in the left half of the photo, consists of two silicon detectors and an electrolytic detector with the necessary tuning apparatus. The double-contact tuning coil and the high resistance potentiometer are used with both silicon and liquid detectors. The special oscillation transformer with variable primary and secondary is used only with the silicon detector.

The transmitting apparatus shown at the right consists of a one-inch coil and a two-inch coil connected together, a pole changing switch for reversing the polarity of the secondary terminals, a spark gap (inclosed in a small glass box), a glass plate condenser, a sending transformer or "tuner," and a Morse key.

The aerial wires come in at window casing to the knife switches there shown, and are thence carried to the middle pole of the single pole, double throw knife switch at the right of the Morse key.

The sending transformer consists of a primary of twelve turns of No. 10 wire and a secondarv of forty-five turns of No. 14 wire. These are made adjustable by means of sliding contacts. The condenser is made up of forty sheets of tin foil 4x5 inches between glass plates 6 1/2x8 1/2 inches, and is made adjustable by means of the protruding foil ends.

Tht writer has experimented in wireless telephony to some extent. The



transmitter is shown in the photograph, on an arm extending over the desk.

The set above described has given the writer absolute satisfaction, not only by its quality as a long distance receiving outfit, but by its absolute reliability as a means of local communcation.

CARL L. HARTSHORN.
W. Somerville, Mass.

"Knick-Knacks"

Electrical Stars

By M. G. Hugo.

It is surprising to find that almost every other amateur or experimenter never saw or heard of the wonders of a revolving Geissler tube, producing the marvelous electrical stars, although he has in his possession all the apparatus needed to produce them.

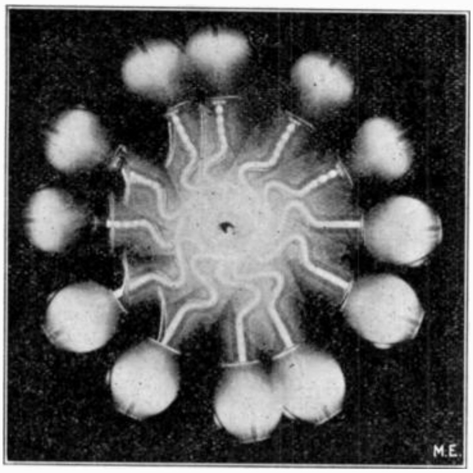


Fig. 1

The majority of our readers are well acquainted with the Geissler tube, but to most of them, possiblv, the thought never occurred to revolve a tube at high speed while in operation. At first thought we would be led to believe that a revolving tube would not look any different than one at rest, which is possibly the reason that very 1ew try the experiment, but let them "discover" it and they will sit for hours in front of a silently revolving tube, watching the ever-changing stars.

When a tube is made to revolve at high speed and the vibrator of the spark coil works very fast, we see a luminous circle of various colors, depending of course on the natural colors of the tube. As the tube is revolving too fast, the eye cannot follow it, and the consequence is that the colors "mix" or mingle, producing new colors and new effects. This is especially true of the Geissler tube containing fluorescent liquids.

If we now screw the coil vibrator back (slowing down its speed) we will at a certain point find that we have a seemingly slow revolving star which may have 8 to 16 corners. If the speed of the vibrator is reduced still further, we can get a 4 or 8 cornered star which is "standing still" despite the fact that the tube is revolving at high speed. The strangest part, however, is that sometimes while we look on the direction of the star is reversed, revolving in the opposite direction of that of the motor.

To understand how this is brought about, we have to remember that the current of a spark coil passing through the tube is not continuous, but is interrupted all the time by the interruptions of the vibrator. While the tube is at rest we fail to observe these interruptions, as they are too fast for our eye to follow. It is the same with an electric bell; the clapper of same is striking so fast that our ear cannot hear each stroke, and a continuous sound is the result.

In the rotating tube we are made to see the interruptions, as if for instance four interruptions occur while the tube has turned around once, we must of course see four tubes at practically the same time. Therefore, if there are four interruptions to one revolution we see an 8-cornered star (each tube having two ends). If we have eight interruptions we shall see a 16-cornered star, and so on.

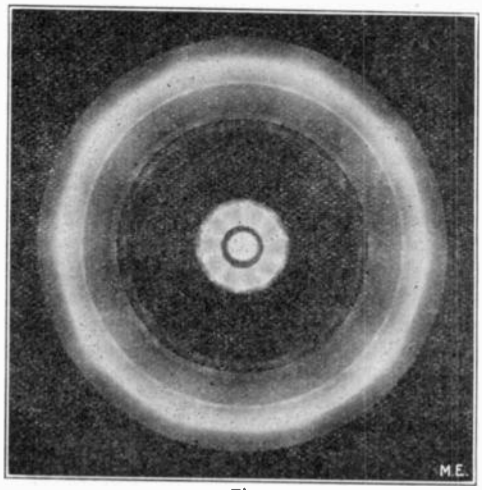


Fig. 2

If the interruptions of the vibrator per second are less fast than the revolutions of the tube per second, the star will obviously turn backward.

If the speed of the tube and that of the vibrator is the same the star will stand still (Fig. 1). Fig. 2 shows the tube as it appears under very fast vibrations. The photographs, however, cannot do the tubes justice, as we cannot take an instantaneous photographh on account of the weakness of the light of the tube.

As for the apparatus to revolve the tube, an ordinary small battery motor, raised, so that the tube does not touch the table, is used (Fig. 3).

The axle of the armature should be lengthened to allow a rubber disc O of

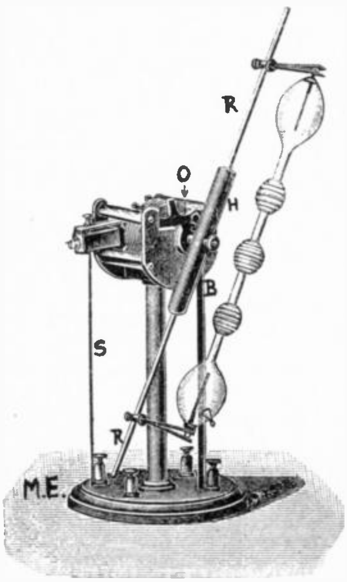


Fig. 3

about one inch diameter to be fastened on same. This disc has a groove around its circumference so that a copper wire can be laid in it. A brass strip B is made to rest against the rubber disc so that it keeps contact with the copper wire while the armature revolves the disc.

A hard rubber tube H is also forced on the axle, and two brass rods R and R′ are fastened by means of shellac in the tube. It is important that the rods fit tight. R goes all the way through the tube to touch the axle. R′ does not reach the axle and should be about 1/2 inch away from same. A thin wire from R′ goes to the rubber disc and is fastened to the copper wire in the groove.

(Continued on Page 218)

WIRELESS REGISTRY.

This Department has been started with the idea to bring the wireless amateur in closer touch with commercial land and ship stations. Each month a list of new members will be printed here and once each year an official BLUE BOOK will be issued by MODERN ELECTRICS, giving a list of all the members who registered during the year. Each member will receive the Official Blue Book free of charge. The Blue Book will also contain a complete list of commercial and government stations, their call letters, wave length, etc.

To register a station requires: Total length of aerial (from top to spark balls), spark length, call letter (if none is in existence M. E. will appoint one), name and address of owner.

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

For other particulars see June issue of this magazine.

NAME AND ADDRESS OF OWNER.	CALL LETTER	APPROXIMATE WAVE LENGTH IN METERS.	SPARK LENGTH OF INDUCTION COIL.	
Cromwell Gibbons, Jr., Jacksonville, Fla.	**C.R.**	72	1	**ins.**
E. B. Peters, Providence. R. I.,	**B.P.**	160	1	"
Louis Bonsib, Vincennes, Ind.	**X.L.**	120	3	"
Philip Wood, Arlington, Mass.	**P.W.**	210	1½	"
Dr. Carroll H. Frink, Fernandina, Fla.	**C.P.**	104	12	"
Don G. Burnside. Pt. Pleasant, W. Va.,	**P.P.**	80	2	"

Jimmy has the wireless craze. Also he is blessed with an older sister. Consequently does errands for her. Sister has beautiful wavy hair. Needs lots of ribbons.

"Jimmy, go out and get me three yards of black ribbon. Get it in one length."

Jimmy goes. On the way he figures out how high his antenna should be.

Conversation overheard at the notion store:

"I want three yards of black wavelength."

"Excuse me; what is it, please?"

"Three lengths of black waves!"

"Beg pardon?"

"Three black wavelengths!"

"? ? ?"

"Oh, hang it. I mean three wavelengths of black ribbon!"

"Sorry, but we don't keep it."

"Well, I guess I better go back and have her write it down for me."—"FIPS."

Laboratory Contest

FIRST PRIZE THREE DOLLARS.

This photograph is of my laboratory which I use in connection with my electrical and wireless experiments.

Most of the chemicals I have refined myself from crude materials, using apparatus such as retorts, flasks,

tubes and crucibles, which I obtained from supply houses.

At the bottom of the picture is seen my electric furnace made of fire brick with electrodes of 3/4 inch cored carbons. I have already made emeralds in this furnace, using from 8 to 10 amperes and about 90 volts pressure, which gives a heat of about 4,000 degrees Celsius.

By removing the top of the furnace and placing Kryptol in the lower receptacle I can get heat enough to make alloys in crucibles or ladles held above it. I also use this method of heating for lighter work, such as rapid evaporation, boiling flasks and heating porcelain crucibles.

In the chemical laboratory I have about 18 elements, some of them rather rare around here—such as platinum, tantalum, antimony, tungsten and uranium.

Besides this, I have the use of a blow-pipe outfit, and frequently use it in determining the kind and quality of rocks and minerals that I run across.

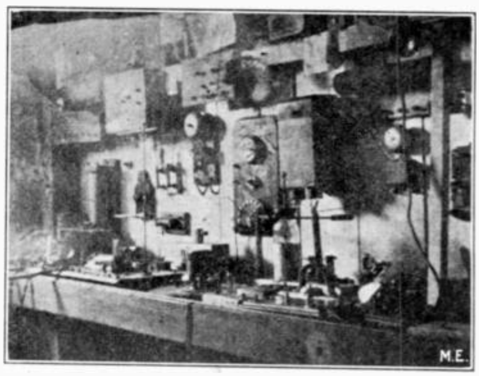
I occasionally make a qualitative or quantitative analysis. I have made several delicate tests for arsenic in this laboratory, and as I always use chemically pure materials, I generally get good results.

Don G. Burnside.
Point Pleasant, W. Va.

HONORABLE MENTION.

The enclosed photograph shows my laboratory and equipment. On the bench are numerous electrical instruments, many of which were made by myself. The switchboard directly behind the bench contains the switches for controlling the current from three storage batteries for a one-inch induction coil, also controlling the current of fifteen dry cells. A fourteen-notch controller distributes this current to binding posts throughout the shop.

On the bench are placed the tuners, a microphone with which I can hear with a telephone receiver the buzzing noise by merely moving anything near the transmitter. In the middle of the bench is a Wehnelt interrupter which, with a water resistance in series with a 110-volt circuit is used with my wireless transmitter. A voltmeter and ammeter are placed so that the strength of the current can easily be ascertained.



A telegraph sounder relay and lightning arrester is used, as the line runs two blocks to a friend's; also a tangent galvanometer which is very delicate.

Other Instruments.

Two small induction coils, rheostat for 110 volts, a pole changer for a 1/4 horse power motor, bell which rings when a wire is crossed or grounded in the shop, a 10-volt dynamo run by hand power, a small electric light switch board for lighting the laboratory at night, and a pole finder; these instruments are occasionally used.

My age is 15 years.

Earl Hanson.
Garden City, Long Island, N. Y.

HONORABLE MENTION.

Inclosed you will find a picture of my electrical apparatus. At the left is a 1/4-inch spark coil and at the right are three motors, a volt meter, and two batteries. In the middle of the table is a rheostat, lights and switches.

I live in an apartment house where I cannot erect a pole, so I cannot have a wireless telegraph. I get MODERN ELECTRICS every month and I think it is a fine magazine for any boy that is interested in electricity

ARLAND R. CRAPO.

New York, N. Y.

WIRELESS TALK OVER 310 MILES.

Paris.—Naval Lieutenants Colin, Jeance, and Mercier, the inventors of a wireless telephone apparatus which recent tests have shown to be superior to anything existing, achieved remarkable success with their new instruments communicating with the wireless station at Raz de Sein, Department of Finistère, a distance of about 310 miles. The transmitted words were somewhat faint, but could be plainly distinguished, and the officers are confident that they can make great improvements in the apparatus, which has been the result of only four months' experimentation, enabling the exchange of conversation up to 600 or 700 miles.

Lieut. Colin, the chief inventor, is a well-known wireless expert, having installed the wireless station in the Eiffel Tower, which is one of the most efficient in the world.

"Fips's" Editorial Column.

Ugh! I must say I am pleased. In fact, I am so pleased with myself that my head commences to get turned, especially when the boss catches my ear and drags me in his office, because he says I write insulting articles.

However, I am pleased. I received no less than eight—count 'em—eight letters from admiring friends, and one —oh, la! la!—from a "she." Only she forgot to give her street address. Bashfulness.—But it's really nice to see that you are appreciated, it warms one up and "spurs you to higher ideals" as the boss says.

I hate to criticize other men's articles and their work, but for a whole month I have been waiting to hear that Spring Hill College would be blown up, down in Mobile, Ala. I ask Rev. P. J. Phillipe, S. J. (See July number, page 116) what in earth he wants to do with that murderous cannon in front of his wireless set. Does he want to blow it up, or is it merely a scare crow?

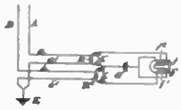
Furthermore, I demand that those awful blinkers be taken off that poor Frenchy's head (page 128, July issue). What has he done to be compelled to wear a horse headgear?

The other day I asked the boss a discreet question. I said, says I: "Do you ever look into the future?" He was a bit surprised, but said: "Oh, I guess I do; why?" "Well," says I, "now that the weather is hot, it doesn't matter, but suppose around October or November, won't she get cold?" "Who?" he roared. I said quite slowly, says I, holding back a little: "The lady on the front cover of the magazine. Won't she freeze on the newsstands? Hadn't we better buy her a new——"

At this point a sudden thunderstorm blew up and the air got blue around us. I thought I had better go home, and as it was near closing time, I left somewhat hurriedly, however, not without first bumping against the young lady stenographers and some other kind hearted people who applied some more speed to me, seeing I was in a hurry. In fact, I made my exit on both hands and feet because it was a good deal easier. Besides, our ancestors walked the same way.

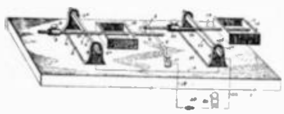
Electrical Patents for the Month

894,378. WIRELESS SIGNALING APPARATUS. Lee de Forest, New York, N. Y., assignor to De Forest Radio Telephone Company, a Corporation of New York. Filed Jan. 17, 1903. Serial No. 139,404.



1. In a space signaling apparatus, the combination with a sending device having a plurality of wave producers, each having a period differing from the others, of a receiving apparatus having a plurality of and complemental wave responsive devices, and an indicating device connected with all of said wave responsive devices.

894,384. ALARM. Edward Pfeifer, Columbus, Ohio. Filed Feb. 25, 1908. Serial No. 417,746.

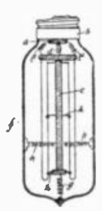


In a device of the character described, the combination with a pair of supports, of longitudinally extending rods pivotally supported from said supports, a transversely disposed contact rod, a member adapted to be depressed by air heavier than normal and supported from one of the longitudinally extending rods between its pivoted portion and the contact rod and a member located upon the other longitudinally extending rod beyond its pivotal point, a counterweight located upon said rod between its pivotal point and the contact rod, said counterweight being adapted to elevate the last named member when the air is lighter than normal there being an electrical circuit between the contact rod and each of the supporting members, and an alarm in said circuit whereby when either of the longitudinally extending rods contact with the transversely disposed contact rod, an alarm will be sounded.

895,005. SUPPORT FOR TELEPHONE RECEIVERS. Frank Simons, Buffalo, N. Y. Filed Oct. 1, 1906. Serial No. 336,941.

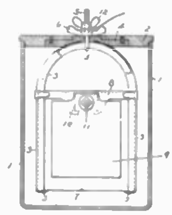
A support for telephone receivers, comprising a U shaped clamp adapted to fit onto the arm of a telephone transmitter and having a laterally extending lug provided with a vertical opening and a notch in the upper end of said lug, said clamp having its ends extending beneath said arm and provided with alined apertures, a binding-screw passing through one side of said clamp and impinging against said arm, a clamping-screw passing through one of said alined apertures and threaded into the other of said apertures, a supporting member formed of a single piece of wire and having an outstanding intermediate portion, a depending retainer portion entering the opening in the lug of said clamp, and a receiver support formed at the outer end of said intermediate portion by curving the wire into two alined U-shaped supports connected by a single laterally disposed portion of the wire, the inner end of said intermediate portion fitting into the notch on said lug.

896,092. ELASTIC SUSPENSION FOR THE FILAMENTS OF ELECTRIC INCANDESCENT LAMPS. Paul Drussidt, Remscheid, Germany. Filed Apr. 16, 1908. Serial No. 427,529.



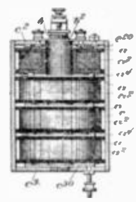
1. In an electric filament lamp, an internal rigid filament carrier, a rigid filament holder supported thereby by an elastic supporting means and filaments carried by said filament holder and connected with the filament carrier by coiled conducting wires.

894,487. PRIMARY BATTERY. Eben G. Dodge, Newark, N. J. Filed Apr. 29, 1907. Serial No. 370,749.



1. In a voltaic battery, the combination with an inverted U shaped hanger of a copper oxid plate supported in said hanger, a cross piece secured to the sides of said hanger and zinc plates secured to said cross-piece but insulated therefrom.

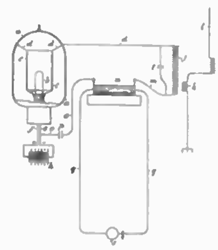
894,479. INDUCTION COIL. Amos R. Bliss, Lowell, Mass. Filed Apr. 13, 1908. Serial No. 426,767.



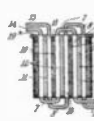
1. An induction coil comprising a primary winding, and a secondary winding composed of units each of which consists of a coil of wire wound on a spool provided at opposite ends with external contact members connected, respectively, with the terminals of the winding.

896,130. RECEIVER FOR WIRELESS TELEGRAPHY. Guglielmo Marconi, London, England, assignor to Marconi Wireless Telegraph Company of America, New York, N. Y., a Corporation of New Jersey. Filed Mar. 13, 1907. Serial No. 362,121.

1. In a receiving apparatus for wireless telegraphy, the combination with an oscillatory circuit, of an oscillation valve, an induction coil, the oscillation valve and the primary winding of the induction coil being connected in series and operatively connected with said oscillatory circuit, and a detecting device connected with the secondary winding of said induction coil.

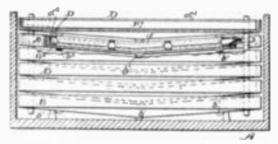


895,715. THERMOCHEMICAL GENERATION OF ELECTRICITY. Lucien P. Basset, Paris, France, assignor to Maurice Bacqua de Labarthe, Paris, France. Filed Mar. 27, 1906. Serial No. 306,340.



1. A process of generating electricity, consisting in circulating two electrolytes separately in compartments separated by porous walls, one of the electrolytes being a weak solution of sulfuric acid containing sulfurous acid, and the other being a weak solution of sulfuric acid containing bromin, said electrolytes reacting on each other so as to form hydrobromic acid and sulfuric acid.

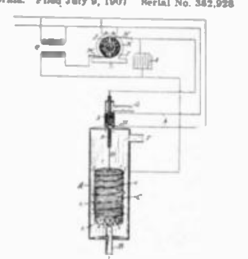
895,549. STORAGE BATTERY. George A. Ford, Cleveland, Ohio, assignor to Harriet S. Ford, Cleveland, Ohio. Filed Oct. 27, 1905. Serial No. 284,819.



1. A storage battery unit consisting of a tray molded from paper pulp having a reinforced upturned marginal flange, a bottom which inclines upward from a central point toward said flange, and integral bosses extending downward from the bottom of said tray, and an electrode in said tray.

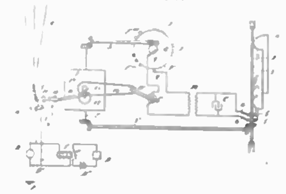
2. A storage battery unit consisting of a tray made of infrangible absorbent material having an upturned reinforced marginal flange and an electrode in said tray consisting of two plates each having a plurality of vanes and the bottom plate having an upturned marginal flange and the top plate having a marginal edge which rests upon the top of said marginal flange, the vanes of said two plates intermeshing substantially as described.

895,729. ART OF SEPARATING SUSPENDED PARTICLES FROM GASEOUS BODIES. Frederick G. Cottrell, Berkeley, Cal., assignor to International Precipitation Company, San Francisco, Cal., a Corporation of California. Filed July 9, 1907. Serial No. 382,928.



1. The improvement in the art of separating suspended particles from gaseous bodies, which consists in subjecting said gaseous bodies to the action of a system of electrodes maintained at a high difference of electrical potential by intermittent connection with a source of alternating current, at intervals synchronized with the period of said current.

894,318. AEROPHORE. Lee de Forest, New York, N. Y., assignor, by mesne assignments, to De Forest Radio Telephone Co., a Corporation of New York. Filed Dec. 22, 1905. Serial No. 292,921.



1. An aerophore comprising automatic means for transmitting predetermined electromagnetic wave signals in predetermined directions, and means for receiving electromagnetic wave signals during the intervals of time in which signals are not being transmitted.

894,866. DRY BATTERY. George M. Wheeler and Henry Wilhelm, Brooklyn, N. Y. Filed Oct. 12, 1907. Serial No. 397,089.

1. A dry battery cell of a size to receive the filling mixture and made up of a plurality of tubularly folded sheets one a zinc sheet, and a closure for each cupless tube.

Original Electrical Inventions for Which Letters Patent Have Been Granted, For the Month Ending August 10th.

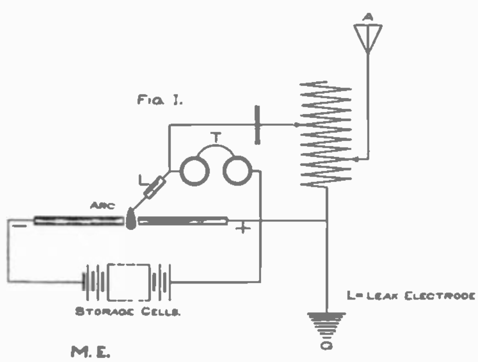
Copy of any of the above Patents will be mailed on receipt of 10 cents.

An Oscillation Responder

By John L. Hogan, Jr.*

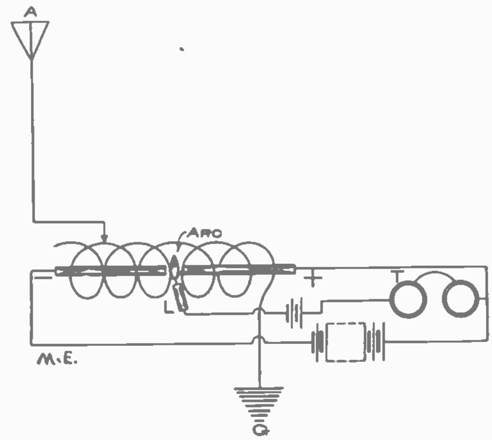
A second gas detector, which at its best is even more sensitive than the Flame detector before described, but which has as great practical difficulties to overcome, forms an interesting subject for test and discussion. The same principle, that of shattering a column of conducting gas by a received impulse, applies in both the present and the flame detectors, but in the arc form the gases are at a higher temperature, and therefore the ionization is more intense and the detector more sensitive to slight changes.

This type of oscillation responsive device is very simple—the entire outfit is composed of merely a pair of telephones, a carbon arc and a platinum electrode. These are usually grouped and connected as shown in Fig. 1. The arc length should be adjustable and the platinum "leak" terminal should be so arranged that it may be inserted at any point in the arc flame. The arc must be formed between *cored* carbons, and should be operated on storage cells, as the variations of commercial lighting or power currents would cause so much noise in the telephones that no "wireless" signals could be read. Even with these precautions the



hissing will be considerable, and this is why the detector is not useful, as it stands, in practical telegraphy.

It is customary to connect one telephone lead direct to the leak electrode, and the other to the arc's positive terminal. In this way, because of the drop of potential between positive and leak terminals in the arc, the telephones will carry a current which varies as conditions in the arc are varied. If now the "oscillation leads" of a receiving tuning system are connected across the telephones, any electrical impulses which they carry from the antenna and ground will cause variations in the arc, and as such will register the usual sounds in the telephones.



The ordinary method of connection is given in Fig. 1. This may be widely varied, however, and many interesting results observed. It is sometimes advantageous to place a source of E. M. F. (that is, a battery) in the telephone circuit—this in some cases should oppose the leak current, and in others assist it. At times a series resistance will be found useful, and it is always advisable to provide means for varying the applied voltage. The oscillation leads may be connected across the entire arc, or one of them may be in the form of a platinum electrode similar to that of the telephone circuit. Or the oscillations may be superposed upon the arc inductively, as is shown in Fig. 2. Other changes will suggest themselves and should be carefully followed to their finalities. If the receiver's greatest defect (excessive noises in the telephones) be kept in mind when mapping out new experiments, it is possible that it might be remedied, and thus the detector made actually valuable. In any event, time spent in testing and in careful observation will be by no means lost—and there is always the fascinating possibility of deducing "something new."

*A flame detector was described by Mr. Hogan in the June issue.—Editor.

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.

TUNING QUERIES.

(64.) DOUGLAS CHAPMAN, L. I., N Y., asks:

1.—How is the wave length of an aerial or tuning coil reckoned?

A. 1.—This has been fully explained in an Ediotrial in the July issue.

2.—Is large wire better than small wire for a tuning coil?

A. 2.—It all depends. For sending, the tuning coil must have very heavy wire; for receiving, thin wire, No. 20, is used.

3.—How could one station with a 500 foot aerial call up a station with a 300 foot aerial?

A. 3.—A station with 300 feet aerial should have a tuning coil to make up for the 200 ft. shortage. If the two stations have not 500 feet of aerial, one could not call up the other unless by "forced oscilla-tions."

WIRELESS CODES.

(65.) ELIOTT SMITH, N. J., asks:

1.—Is the Morse code used exclusively in the U. S. by wireless companies?

A. 1.—The Continental code is used mostly, as the signals can be made out better for wireless telegraphy than the Morse.

2.—Are the Morse and Continental codes the only ones used in wireless?

A. 2.—Any code may be used; such codes are usually called secret codes.

3.—Kindly advise a way that an amateur can tell what code a station is using without losing part of the message.

A. 3.—There is no way to tell unless you know the code in which that particular station is sending. If someone is talking to you in a language which is foreign to you, you can not understand him. Substitute code for language, and the results will be the same.

TWO INCH SPARK COIL.

(66.) CHARLES SCHMIDT, N. J., asks:

1.—I am going to make a coil dimensions of which are as follows: Length of core, 7½ inches; diameter of core, 15-16 inch; size of primary wire is No. 14 D. C. C., 12 ounces, and secondary wire is No. 36 D. C. C., 2½ pounds. What spark will it give?

A. 1.—This will give you a 2 inch spark.

2.—What size wire is sample enclosed?

A. 2.—No. 13 iron wire.

3.—What spark coil is required to transmit 9 miles?

A. 3.—With good instruments at the receiving end a 2 inch coil might do.

4.—What is the voltage of a dry battery?

A. 4.—1.5 when new; usually about 1.4 volts.

5.—Can dry sulphate of copper, salamoniac salt be used for wireless?

A. 5.—We doubt very much if such chemicals would be practicable for wireless, at least not with any existing detector.

SEARCH LIGHT GLASS.

(67.) S. T. RUSNACK, Ill., writes:

1.—How should I improve my wireless so that I can communicate within 100 or 150 miles; also receive messages?

A. 1.—You will have to tell us what instruments you have in use, as without such information we could only be guessing.

2.—What is the reason the front glass on a searchlight is cut into sections?

A. 2.—As one plain piece of glass, if used, would easily break in transportation or in moving it around, small pieces of glass are used, same having ground edges, and as each piece can move around, the chance of breakage is reduced greatly.

3.—Could acetylene gas be used to run a small gas engine the same as gas?

A. 3.—No.

4.—My storage battery registers 4 volts and 8 amperes. It is composed of 4 plates, 2 plates to a cell. How must I figure to find out how many ampere hours each cell has?

A. 4.—You do not give size of your plates, without which we can not give you the desired information.

5.—Supposing of a 12 inch coil the primary winding consists of .110 inch double covered silk square wire, and the secondary has 12 pounds No. 36 silk covered wire. Could I make a coil for a 6 inch spark of one half of the above mentioned wire?

A. 5.—No; you would hardly get more than about 4—4½ inches.

TUNING COIL.

(68.) Robert F. Adams, Texas, asks:

1.—How should the tuning coil described in the June issue of MODERN ELECTRICS be connected to be used with an electro-lytic detector?

A. 1.—The same connections are made as per diagram onp age 90 of the June issue.

2.—Why are binding posts used at both ends of the brass rods on which the sliders move, on above coil?

A. 2.—If you consult the diagram on page 90 of the June issue, you will find a connection in punctuated lines B; this is the second connection.

3.—About how many miles can one receive messages by using an electro-lytic detector on a tuned circuit, and a 60 foot aerial?

A. 3.—Providing the sending station is strong enough, and has a tuner, there should be no trouble to receive as far as 400—500 miles.

GAS ENGINE TRANSMITTER.

(69.) Magee Adams, Ohio, asks:

1.—Please explain the theory of tuning a receiving station.

A. 1.—This has been fully explained in an Editorial in the July issue.

2.—If a gasoline engine using a make and break spark for ignition is operated near a filings coherer, will the sparking of the engine affect the coherer enough to work the relay?

A. 2.—If your coherer is sensitive enough it will certainly operate. Even an electrical bell operated near the aerial will sometimes operate the instrument.

3.—Please describe the construction of the exciter and anchor gap as used in the two-mile set described in the July issue, as I cannot understand their operation or construction from the description there given. Also give their advantage, if any, over the ordinary spark gap.

A. 3.—This has been explained in query No. 59 of the "Oracle." The anchor gap has nothing to do with the regular spark gap.

4.—Please describe the instruments necessary to tune a sending station using Leyden jars connected in the secondary circuit.

A. 4.—Tuning coil and variable condensers are practically all you need.

5.—Do trolley flashes and static discharges affect a filings coherer much?

A. 5.—If close to the aerial, they will affect same.

MOTOR RUN AS DYNAMO.

(70.) Jos. Kotchee, Ill., writes:

1.—I have a 110-V. direct current ¼ h. p. motor and run it at the rate of 1400 r. p. m., and no current is obtained, no matter in what direction I run it. How can I change it to a 110-V. dynamo?

A. 1.—The field of your motor, if run as a dynamo, needs exciting. A few dry cells connected to the field will excite same, and will start the dynamo. You also should turn the brushes in the opposite direction.

2.—How can I charge a ½ pt. Leyden jar with a ½ inch E. I. Co. spark coil?

A. 2.—This has been explained in the July issue of MODERN ELECTRICS, on page 144.

3.—What spark will the coil give, the core being ⅝x8 inches long, 45 feet of No. 15 S. C. C. magnet wire for the primary, and 1½ pounds of No. 34 or 36?

A. 3.—About ¾—1 inch.

WEHNELT INTERRUPTER.

(71.) Waldo E. Bemis, Cal., asks:

1.—Can either of the sizes of iron wire inclosed be used for a tuning coil 2 1/2x8x8 1-2 inches with about 4 sliders and inclosed in a wooden box, such as are used on commercial stations? If so, which size would be best?

A. 1.—Wire enclosed is iron wire No. 28 and No. 19 S. W. G. You can not use iron wire with a tuning coil. You should use nothing but copper wire. Use No. 20.

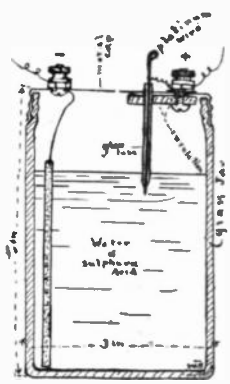
2.—Can a water rheostat be used as a tuning coil?

A. 2.—You seem to misunderstand the philosophy of a tuning coil. It is nothing but a piece of wire coiled on a spool, and serves for the purpose of either lengthening or shortening the aerial. Consult editorial in the July issue.

3.—Is carborundum used the same as silicon in a detector?

A. 3.—Yes.

4.—Would an interrupter like the enclosed diagram work, and if not, why?



A. 4.—The sketch which we reproduce herewith represents a Wehnelt interrupter. However, you can not use same with less than 24 volts, either direct or alternating current. By pushing the platinum wire more or less into the electrolyte, more or less current will flow through the coil.

5.—About what is the voltage and amperage of the secondary circuit of an E. I. Co. 1-inch coil used with 2 Wehnelt interrupters?

A. 5.—We can only guess at this, as all depends how much current flows through the two Wehnelt interrupters. It might reach 10,000-11,000 volts.

IDEAL BATTERY.

(72.) Wesley E. Pierre, N. Y., asks:

1.—What is the highest voltage an E. I. Co.'s 1-inch spark coil can be run on without injury?

A. 1.—8 volts.

2.—What would be the cost of the "Ideal Battery" mentioned in the August number, per cell?

A. 2.—The cost of the material alone would be about $1-$1.25. However, the battery could be made smaller than dimensions given in the August issue.

WIRELESS QUERIES.

(73.) Clarence H. Pfeifer, N. J., writes:

1.—If the aerial of a wireless outfit, using a one-inch coil, was equipped with ordinary porcelain insulators, would there be any leakage?

A. 1.—In dry weather there would not be any leakage, but during rainy weather the porcelain insulators might probably leak, if of very small type.

2.—Is zinc better than brass for a spark gap?

A. 2.—Yes, zinc seems to have some better properties than brass, and is now frequently used in wireless stations.

3.—Can the "Electro"-lytic detector receive messages without an aerial?

A. 3.—Yes, for short distances.

4.—What is the size of the sample of wire and is it good for the secondary of a wireless coil?

A. 4.—Wire which you enclose is No. 28 S. W. G. bare copper wire. This is quite heavy for spark coils, but you might try it. However, we would not recommend to use it bare. Use double cotton covered wire.

COIL QUERIES.

(74.) Chas. Farnham, Oregon, asks:

1.—I have a primary coil 7 1/2 inches long and 2 inches in diameter, with 1-inch iron wire core wrapped with same wire as sample inclosed. Please tell me what size it is. What size of wire should I use for secondary, how many feet, about the cost of same, and about what the length of spark?

A. 1.—Wire which you enclose is No. 14 S. W. G. By using 2 1/2 lbs. of No. 36 wire in the secondary you should be able to get a 2-inch spark from your coil. About 12 volts are needed to get this spark. Price of this wire is about $2.12 per lb.

2.—Please explain in next issue the principle on which a tuning coil works.

A. 2.—This has been explained several times, but in short, it might be explained thus: A tuning coil is nothing but a piece of insulated copper wire, wound on a spool, and connected in series with the antenna. By cutting in more or less wire, the antenna will be lengthened or shortened. To receive, the antenna should be theoretically just as high as the one of the sending station. The tuning coil serves the purpose to adapt itself to any aerial, merely by cutting in or cutting out wire.

3.—Please print an article telling how to make a tuning coil for the sending instruments.

A. 3.—You will find it in this issue.

TUNED CIRCUITS.

(75.) Geo. I. Henderson, Ill., asks:

1.—Please give me dimensions of primary, core and secondary, number of sections and size of wire for both primary and secondary for a transformer to work on 110 volts 60 cycle alternating current or house current, and to transmit messages a distance of 15 miles.

A. 1.—It is impossible to give you all the data you ask for in this column, besides we doubt very much that you could make such a transformer yourself.

2.—How far should the spark gap be apart to transmit this far?

A. 2.—About 1/4 inch.

3.—Should I use a glass plate condenser across the secondary terminals?

A. 3.—If in a tuned circuit, yes.

4.—How high must the aerials be to transmit above distance, using a silicon detector on the receiving circuit and using standard tuned circuit diagrams of the Fessenden system?

A. 4.—About 50 to 60 feet.

2-INCH SPARK COIL.

(76.) Ralph Nienhausen, Minn., writes: I have a primary six inches long with 3 turns of No. 15 wire. Would like to know how many pounds of wire I should use for the secondary to get a good 2-inch spark?

A.—About 3 lbs. No. 36 wire.

TWELVE-INCH SPARK COIL.

(77.) Arthur E. Lund, Kansas, writes:

1.—In constructing a 12-inch spark coil, how many sheets of paraffined paper should I use between each section of the secondary, there being 200 sections?

A. 1.—We do not suggest to use paraffined paper on such a large soil, and would advise you to use hard rubber discs 1-32 inch thick. One disc should be used between each section, or at least between each second or third section.

2.—In wireless telegraphy, is the potentiometer needed when a tuning coil is used?

A. 2.—A potentiometer has nothing to do with the tuning coil, and has nothing in common with same. The potentiometer is only intended to regulate the current of the battery. A potentiometer is nothing but a rheostat connected in a different way, in shunt with the battery. See August issue.

3.—In building the above 12-inch coil, how many layers should the primary be wound with?

A. 3.—Two layers of No. 10 B. & S. wire.

4.—Would a Leyden jar connected across the spark gap of a coil increase the spark length?

A. 4.—No, it would cut the spark length down, but you would get a much heavier spark, which is more suitable for wireless work.

5.—Can you please give a description and illustration of the Allstrom relay?

A. 5.—This has been described in the May issue, on page 65.

RESISTANCE OF WIRE.

(78.) Orville Hills, Missouri, asks:

1.—What is size of wire of which sample is enclosed?

A. 1.—No. 34, single silk covered copper wire.

2.—How many feet of same wire will it take to make a resistance of ten ohms?

A. 2.—38 feet.

3.—About how much will the silicon for the silicon detector cost, and where can you buy it?

A. 3.—The Electro Importing Co., of New York, sells enough silicon for one detector for 25 cents.

CLASSIFIED ADVERTISEMENTS.

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

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

Advertisements for the October issue must be in our hands by Sept. 25.

ELECTRICAL APPARATUS.

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

When writing please mention "Modern Electrics."

ELECTRIC LIGHT OUTFITS, including batteries, switch, 2 c. p. lamp and receptacle, 20 feet of wire, all for $1.00. Electric bell outfits, $1.00 and upwards. Brown Electric Co., 31 Rutland st., Dover, N. H.

When writing please mention "Modern Electrics."

BOYS send your address for free "First Lesson on Electricity" to Richard Teichmann, 85 Water st., Brooklyn, N. Y. No stamps required.

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MODEL STEAM ENGINES. Vertical, improved Webster type, high speed, double action model steam engines and boilers. These little engines and boilers make ideal power plants for running small dynamos, model boats, lathes, etc. They are well designed and finely enameled and polished. Every amateur electrician or mechanic who has a small dynamo should have one of these fine little engines. 1-20 h. p. engine, 3-4 inch bore, 1 inch stroke, $3.50; brass boiler, $3.00; 1-12 h. p. engine, 1 inch bore, 1 1-4 inch stroke, $4.50; brass boiler, $4.00; 1-6 h. p. engine, 1 1-4 inch bore, 1 3-4 inch stroke, $6.50; brass boiler, $5.00. Above prices are for finished engines, ready to run. No catalogue published. No castings sold. D. L. Jones, 3213 East 12th st, Kansas City, Mo.

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ELECTRICAL BOOKS, BLUEPRINTS, ETC.

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

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WIRELESS EXPERIMENTERS. Tuned circuits are necessary for the successful operation of wireless stations. Our set of ten blue prints of tuned transmitting and receiving stations, 25 cents. Blueprints for construction of electrolytic detector, 15 cents. Range with tuned circuit, over 500 miles. Imperial Wireless Co., 230 S. Pacific ave., Pittsburg, Pa.

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WIRELESS APPARATUS.

WIRELESS DETECTOR. This is the detector for amateurs; compact, efficient, and easily adjusted. Price, postpaid, $1.00. We also handle a complete line of wireless supplies. Circular on request. Address, Vulcan Detector Co., Box 50, Mt. Vernon, N. Y. (oc.)

When writing please mention "Modern Electrics."

WIRELESS. Instructions and diagrams for constructing carborundum and silicon and electrolytic detectors, 35 cents each. Large piece carborundum, 10 cents. Large piece silicon, 25 cents. Blue print showing Morse continental and Navy codes, 15 cents each. Blue prints of Marconi, Telefunken, Stone, Massie, Deforest wireless systems, 20 cents each. Wireless Detector Co., Los Angeles, Cal.

When writing please mention "Modern Electrics."

WIRELESS TELEGRAPH OUTFITS and wireless supplies for amateurs. If you live near St. Louis, write us, we can save you money on these goods. Send 2-cent stamp for descriptive pamphlets. Linze Electric Co., Olive Street, St. Louis Mo.

When writing please mention "Modern Electrics."

FOR SALE, Wireless Detector parts, complete, ready to assemble, 15 cents. Wm. L. Little, Ansonia, Conn.

When writing please mention "Modern Electrics."

ELECTROLYTIC DETECTOR of an entirely new design. The new construction embodies three important points, rigidity, extra delicate adjustment, and extraordinary sensitiveness. Price, $2.00. Send for photo and details to Harold P. Donle, 9 Phillips st., Providence, R. I.

When writing please mention "Modern Electrics."

WIRELESS TELEGRAPH EXPERIMENTERS. The efficiency of a telephone receiver is not in its high resistance, but in the number of turns of wire on its magnets. High efficiency receivers are made to get the best results from your apparatus. Each receiver is of the bipolar type, and has 9,000 turns of No. 40 wire on its magnets, with a resistance of 1,500 ohms. Compare this with other receivers having only 2,000 turns of the same size wire, and a resistance of 1,000 ohms. Furthermore, the price is reasonable. One complete receiver, with headband and 6 feet cord lists at $5.00. Double head receivers (18,000 turns of No. 40—3,000 ohms res.) complete with cord list at $8.00. To Readers of "MODERN ELECTRICS" I will sell these receivers at $1.00 less than the price listed above, for the month of September only. This is to introduce the high grade wireless telegraph tuned circuit apparatus that I handle, and this discount will only hold good for one month. Better buy at once. W. C. Getz, 645 N. Fulton ave., Baltimore, Md.

When writing please mention "Modern Electrics."

FOR SALE.—Induction coils, cheap; 1-2, 3-4 and 1 inch spark. G. D. H., 2827 Southport, Chicago.

When writing please mention "Modern Electrics."

ATTENTION WIRELESS EXPERIMENTERS! Fused silicon, piece large enough for one Detector, 20 cents; Pneumatic Rubber Ear Cushion, fits any telephone receiver and positively excludes all outside noise, each 50c.; Wollaston Wire, 25c. per inch; Condensers for receiving stations, 40c.; Carbon Cups for Electrolytic Detector 20c.; Carborundum, finest selected crystals, 25c. per ounce; Pirelli High Tension Rubber Cable, 10c. per foot. Send 2c. stamp for 100-page Catalogue No. 4. ELECTRO IMPORTING CO., 86-Z West Broadway, New York City.

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FOR SALE.

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B. S., care of Modern Electrics Publication

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FOR SALE OR EXCHANGE, in whole or in part, $50 electric railway; hardly used. Also 'phones, telegraphs, supplies, etc. Make an offer. A. J. Comey, 42 Main st., Canandaigua, N. Y.

When writing please mention "Modern Electrics."

HOW TO MAKE A 110-VOLT TRANSFORMER.

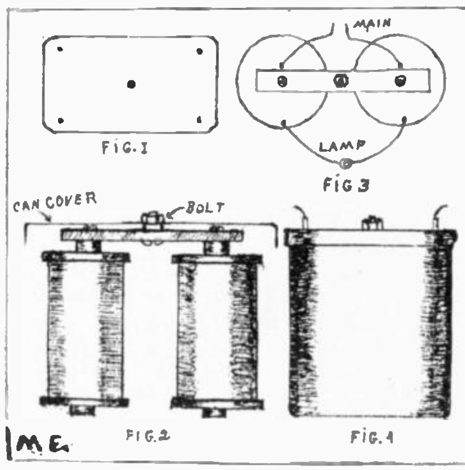
By R. C. Hutchings.

Secure a small tin can; a cocoa tin makes the neatest (Fig. 4).

Punch five holes in the cover (Fig. 1); the center hole is to admit a small bolt, such as are used in dry batteries.

The magnet cores are made of soft iron rods 2 1-2 inches long and 1-4 inch in diameter, threaded at one end to admit a small machine screw; these are fastened together by a steel bar 2 inches long, 1-4 inch wide, with three holes bored in it to admit the bolt and machine screws (Fig. 2). This may be gotten very cheap at any machine or blacksmith shop.

Cut four pieces of thick cardboard



one inch in diameter with a quarter of an inch round hole in the center; these are fitted on the magnet cores at each end.

Now cover the cores with two turns of note paper; then wind the magnets like common bell magnets with No. 34 D. C. C. magnet wire.

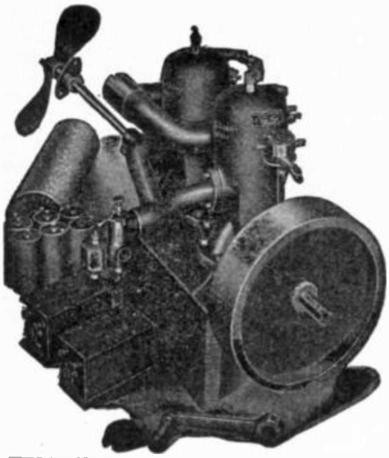
The magnets are then bolted to the can by means of the small bolt (Fig. 2).

Run the wire terminals through the four holes in the can cover, insulating them with small guttapercha tubing.

For connections see Fig. 3.

Now fill the can with crude oil, and immerse the magnets by fitting the cover on tight (Fig. 4).

This device may be used on 110-volt circuit for running battery motors, lighting miniature lamps, etc.



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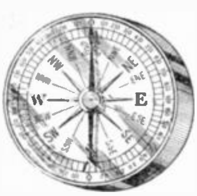

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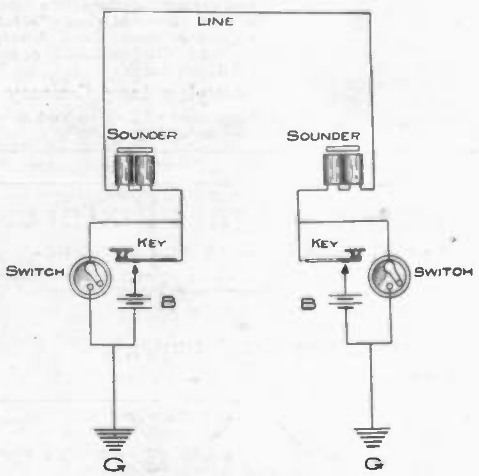

ME.

by following diagram, using common two-piece or combination telegraph sets and one extra switch for each station.

When not sending, keep key open and extra switch closed.

When wishing to call up, open extra switch and work the key.

After calling or being called keep extra switch open and use key, which will throw both batteries into play.

Contributed by Ray Newby.

San Jose, Cal.

THE CONSTRUCTION OF A TRANSMITTING TUNING COIL.

(Continued from Page 203)

about equal to fifty feet of wire, and by using this coil in various ways it is possible to add approximately 500 feet to your sending wave length.

This coil may also be used for open circuit tuning, and, in fact, the wireless experimenter who builds this coil will find many different ways of tuning possible with same, and, provided the inductance and capacity are properly balanced, will also find that the distance he is capable of sending will be increased from 50 to 100 per cent.

Went out boating to sea. Storm. 50 meters wet wavelength. Receiving station (the boat) put out of commission by forced "ossillations." Stomach out of "tune" through long waves. Boat and I "cohere" and "decohere" frequently. Tapper not required. Detector: steamship. Call letter: "Help." Aerial: Rope from steamship. Choke coil: Rope coiled around my neck. Oscillations: "Dampened," or rather wet. Ground: Thank God, none, else I wouldn't write this!—"Fips."

ELECTRICAL STARS.

(Continued from Page 207)

S goes to a spring to make contact with the axle. The coil current is led to the posts of S and B, and will operate the tube. The remaining two binding posts belong to the motor proper, which revolves the tube.

The high tension current from the coil flows thus: From S to axle, thence to R, passes the tube, goes to R′, wire in rubber disc O, brass strip B, back to coil.

Two binding posts are made to slide on the rods to take larger or smaller tubes.

A NOVEL METHOD TO CONNECT WIRES TOGETHER.

When wires from No. 30 up have to be joined, try welding them in the flame of an alcohol lamp instead of soldering them. Hold the two bared ends of wire together in the flame until they melt, then push both ends together and withdraw from the flame. The joint will scarcely be noticed, and forms the best possible electrical connection.

Contributed by J. M. Walsh.

Scranton, Pa.