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# MODERN ELECTRICS

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

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"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

Edited by H. Gernsback

Volume V | APRIL, 1912 | No. 1


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Modern Electrics

VOL. V. APRIL, 1912 No. 1

# The Practical Electrician

**A Popular Course in Electricity on the Construction of Electrical Apparatus and Experiments to be Conducted with them**

By PROFESSOR W. WEILER, of the University of Esslingen, (Germany)
Translation by H. GERNSBACK

## CHAPTER III.

(Continued)

REFERRING to Fig. 88, if i, r, be the current and resistance in the shunt, and I, R, the current and resistance in the galvanometer branch, and if e is the potential difference between AB, we have, from Ohm's Law:

$$i = \frac{e}{r}, \text{ and}$$

$$I = \frac{e}{r}$$

Dividing the second equation by the first, we have:

$$\frac{I}{i} = \frac{r}{R}$$

That is, the current intensities in the galvanometer and in the shunt are to each other as the inverse ratio of their resistances.

From the rules of proportion, we have:

$(I+i) : I = (r+R) : r$ and $(I+i) = I \times \frac{r+R}{r}$; If $I = \frac{1}{10}$ of the total current, we have $I \times \frac{r+R}{R} =$ total current.

$(r+R) : r$ is called the multiplying factor of the shunt, that is, the current intensity of the galvanometer must be muliplied by this ratio to obtain the total current.

### 71. DIFFERENTIAL GALVANOMETERS. SCHWEIGER 1820.

This kind of galvanometer, also sometimes termed multiplicator, is so named from the fact that the moving needle is located in the inside of a frame which has several different windings made of very fine silk covered wire.

If the student desires to make such an instrument, he should proceed as follows:

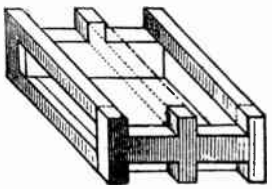


Fig. 90.

The instrument is best placed on a small shelf, which latter should be attached to a stone wall in order to minimize vibration. An instrument for all around work is made by using from 1,600 to 2,000 turns of No. 24 to No. 30 B. & S. gauge silk covered wire, wound in separate coils of from 400 to 500 turns, the ends of each coil being connected to separate binding posts so it will be possible to connect the various coils in series or in parallel or whatever other connections are desired.

The frame used for the wire, which latter should best be run through shellac or melted paraffine when being wound, is shown in Fig. 90, which is a little over half size. In order to keep the space for the needle unobstructed,

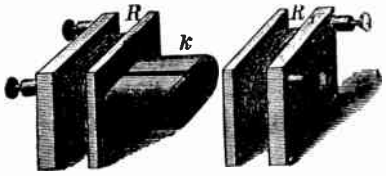



Fig. 91.

a thin piece of copper or brass is first placed in the grooves and the wire is then wound on top of this. The completed frame is then fastened by means of brass screws to a large base, as shown in Fig. 92. The base itself has several large thumb screws to adjust the instrument to an absolutely level position.

The scale can be made of white celluloid, or, if desired, of paper, and if celluloid is used the graduations may be scratched in by means of a very sharp file and the scratches then filled in with India ink. This makes quite a good scale.

Anyone handy with tools can make the frame, as shown in Fig. 90, of brass or copper, soldering the various parts together.

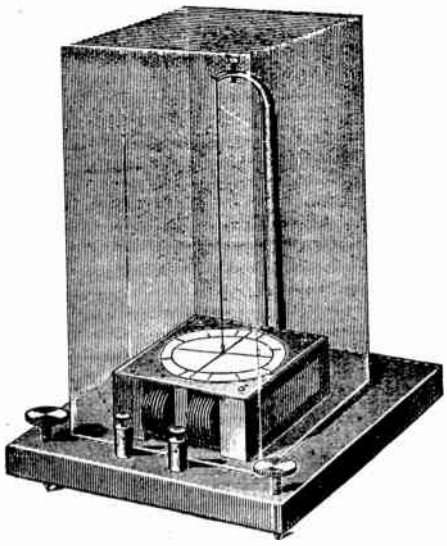


Fig. 92.

Another method of making a frame for differential galvanometers is shown in Fig. 91. A piece of copper sheet, 1-32 inch thick or less k, is bent in an open oval, as shown in illustration. The wooden frames R and $R_1$ are then made and wound with wire in the usual manner. These frames should be made to fit the oval k with but little friction.

The reason for using copper is that the latter dampens the swing of the needles and thus diminishes the number and extent of the needle's oscillations.

The astatic needles are best made of a good grade of piano wire and should

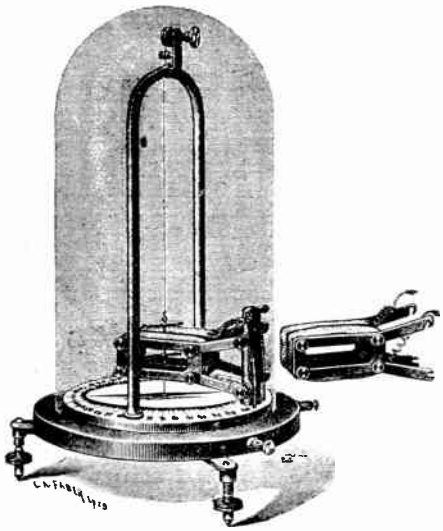


Fig. 93.

be about ⅛ inch shorter than the space available in the center of the frame.

Several equally hard pieces of wire should be magnetized at once, being thoroughly saturated magnetically. To test these pieces two of them should be placed at exacly equal distances from the same end of a compass needle. By trying different pieces of wire, two will eventually be found, which will hold the compass needle at zero. In other words each must be equally strong if the effect on the compass needle be zero. The two needles are then wound in their exact centers with a piece of fine copper or brass wire, in such a manner that the wire holds the needles in place so that they can not slide backward and forward. Of course it is understood that one needle goes inside of the frame and the other goes on the top of the frame, as shown in Figs. 93 and 94.

It is highly important that the two

needles be parallel to each other and that their north poles point in opposite directions.

To suspend this astatic needle pair, an upright, as shown in Fig. 92 should be used. This upright is screwed to the wooden base by means of three brass screws. The top of the upright is curved as shown, and is provided, at the top with a fine groove, the extreme end of which comes exactly over the center of the galvanometer frame.

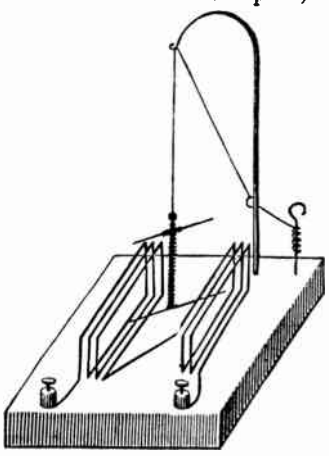


Fig. 94.

To suspend the pair of needles a fine cocoon thread is attached to the upper needle and this fine thread goes through the groove in the upright to a screw as shown, which latter screw serves the purpose of raising or lowering the needle as desired. The entire instrument is covered by a glass case, which may be made by the experimenter himself by cementing the glass pieces together by means of ordinary china cement.

The galvanometer shown in Fig. 93 is the so called Ernecke type and is a precision instrument which could hardly be made by the average experimenter.

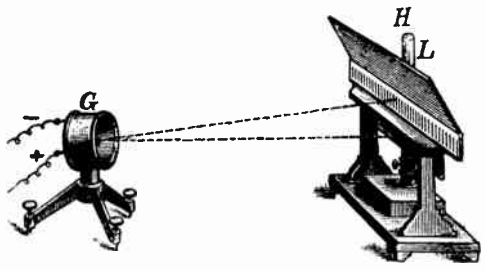



Fig. 95.

To measure alternating currents the physicist Bellati uses the following arrangement:

He uses an ordinary frame, such as shown in Fig. 91, but in the inside he places a very fine piece of iron wire, which is very small, and suspends it with a cocoon thread. The upper needle he replaces by a very fine glass thread or a thin piece of straw.

If one speaks or sings in a telephone receiver connected with the coil, the resulting alternating current produces a magnetic field in the inside of the coil, which tends to turn the iron wire parallel with the coil windings.

A very simple differential galvanometer for the student is shown in Fig. 94.

There is no frame of any sort used in this instrument but the heavy wire, which may be as thick as No. 14 B. & S., is wound upon itself and as it is heavy enough, it stays in place fairly well. The cocoon thread can be made shorter or longer by means of the crude arrangement made of an ordinary hook, as shown. Even this instrument is rather sensitive and should be covered with some sort of a glass cover. Where extreme sensitiveness

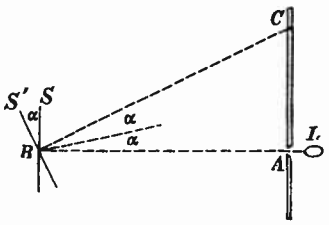



Fig. 96.

is required the mirror galvanometer as shown in Fig. 95 is used.

In such an instrument the circular scale and the aluminum pointer is replaced by a mirror arrangement.

In Fig. 95, G represents a galvanometer which is made of a copper, brass or zinc tube of about 1 inch width and 1 inch length. This tube is wound with many thousands of turns of fine wire and the entire arrangement is mounted on a tripod with leveling screws as shown. In the inside of the tube is placed a cardboard tube, in which is fastened a short cocoon thread, which suspends a small, extremely light, mirror. On the back of the mirror two or three short pieces of good watch spring are fastened by means of shellac. These steel pieces are carefully magnetized. Opposite the galvanometer is placed a wooden frame, H, behind the middle of which is a small oil lamp L, with a flat wick. Through a very narrow slit a light ray is made to fall on the mir-

ror and from this it is reflected on a paper scale as shown. In order that this light ray can be easily seen the top of the scale has a brass screen, which shuts out almost all the light from the lamp. Usually G. and H. are placed about one yard apart.

Schematically the arrangement is as in Fig. 96.

When the mirror $S^1$ is deviated from its original position, S, the light ray LAB is deflected through the angle 2a to BC. It is of course understood that this "Pointer" has absolutely no weight and for this reason can be made of practically any length. This arrangement has only one bad feature, which is, that it is necessary to operate the apparatus in the dark.

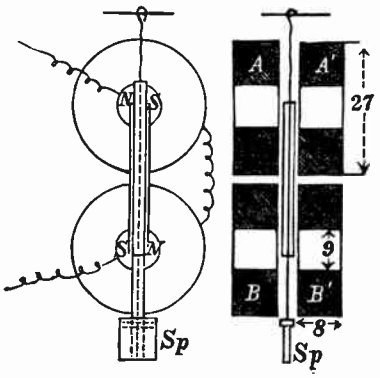



Fig. 97.

An ingenious differential galvanometer is due to Broca.

This galvanometer, as distinguished from others has a needle pair hanging vertically. The two spools $AA^1$ and $BB^1$ contain both the same amount and size of wire and measure 146 Ohms. The double needles are 0.2 to 0.6 millimetre thick and 36 millimetres long. At the bottom they have a very thin piece of mica, carrying a very light mirror Sp. This mirror is not flat, but is curved and its radius is 3.75 metres. its surface is a square centimetre and its weight only 0.1 Gram.

The two spools are moved together as near as possible, so dimensions of the double needle are very small. The system is suspended by means of the usual cocoon thread. In this system the magnetic circuit is almost closed and for this reason the needles keep their magnetism almost indefinitely.

(To be continued.)

## SAVED BY THE MINE TELEPHONE.

The public at large has for some time past appreciated what great reason they have to be grateful for the invention of the telephone; but there are today two miners in Kansas who are more than grateful. They owe their lives to it.

These two miners, or "shot-firers," to be exact, are employed by the Girard Coal Company in a mine at Radley, Kansas. The mines of this company have recently all been equipped with Western Electric mine telephones, and, according to the rules of the Coal Company, the shot-firers must report to the night engineer, by means of the telephone, the progress of their work as they go through the mine lighting the shots. This enables the engineer to know where his men are, so that if he does not hear from them at certain intervals, a rescue party is sent down.

One evening after the miners had left. the shot-firers went down as usual to fire the shots which would bring down the coal for removal during the next day. The two men had just entered a refuge hole and one was in the act of ringing the engineer to tell him they had lighted the shots in that particular entry, when an explosion occurred. The force of the explosion was so strong that it blew in the back end of the refuge hole. and the shot-firer did not even get a chance to talk, but was immediately overcome by the after-damp. His partner. who was with him, was likewise overcome. The night engineer, knowing that this was the station from which they should next report, immediately tried to call them, but was unable to get any response and started the distress whistle. In fifteen minutes after the explosion had occurred a rescue party was in this refuge hole and had the two shot-firers out working upon them and succeeded in resuscitating them.

There is an employers' liability law in some states which compels the operator to pay a considerable sum for loss of life or personal injury. The fact that the telephone very often prevents accidents and assists in quick rescue work, saves the operator a great amount of money. In the Girard Company's mines there were three severe explosions during the winter, but not one of the telephones was injured.

# A New Gun Light Attachment

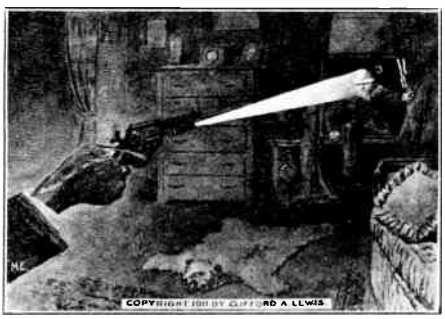
This little device should find favor with those who have use for firearms in repelling burglars or strong arm men. It is readily attached to most any form of revolver, rifle, etc., and

Attachment on "Colt Automatic."

does not interfere in any way with the use of the arm.

A small tube attached beneath the barrel of the revolver is supplied with a combination of lenses and battery, which project a powerful beam of light parallel to the barrel and also to the flight of the projectile, and makes the hitting of the desired object absolutely certain even in the darkest night. The range of this beam of light is limited by the sustained horizontal flight of the bullet.

Its utility in the hands of the police will be readily recognized by an officer of experience. Those who have had occasion to enter a dark building



"Spotting" a Burglar.

where a burglar, or other criminal, on the alert and ready to fire at the first appearance of the peace officer, is supposed to be hiding, know, in the probable battle that will ensue, at how great a disadvantage the officer is if he must use his flashlight in one hand and his revolver in the other—the advantage lies almost wholly with the hunted.

Armed with a Lewis Gun Attachment, the police officer knows that the flash of his light does not make him a target, but blinds his adversary and makes it possible for him to place a bullet in any part of his quarry's exposed anatomy.

The courage born of this sense of security greatly adds to the efficiency of the officer and reduces to the minimum the chances taken by him.

Armed with a gun fitted with this device, the home becomes a veritable citadel of strength for the defenseless woman and child, for the woman who can press the button can perforate and disable a burglar as easily as punching


"Stopping" a Train Robber.

a milk ticket. The burglar and the porch climber will have no further terror for those who dwell in the city or the country.

## GREATEST WIRELESS STATION.

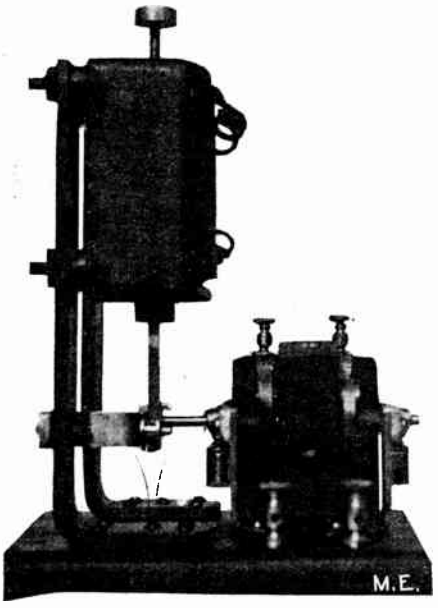
Berlin, March 21.—The German Wireless Telegraph Company has completed arrangements with the town of Neumunster, near Kiel, for the erection of a series of seven gigantic wireless towers, which, when completed, will comprise the largest station in the world. Each tower will be 500 feet high. Three towers will be constructed next Summer and the four others later.

The towers will be as high as the central station tower at Nauen, near Potsdam, but each station's equipment will be many times more powerful.—*N. Y. Times.*

# Stopping Trains by Wireless Waves

By Frank C. Perkins.

By means of a unique wireless apparatus a train traveling at 45 miles an hour between North Parkdale and West Toronto was brought to a standstill with the throttle wide open, the steam gauge registering a pressure of 190 pounds. This equipment includes a solenoid coherer, (shown in an upright position in the accompanying illustration Fig. 1, ready to receive the wireless wave) installed on the locomotive for wireless train control. The drawings, Figs. 2 and 3, are diagrams of the block equipment and engine apparatus while illustration Fig. 4 shows the interior of the box at Golden avenue at West Toronto, showing vane type of relay, transformer and oscillators ready for service.




Wave Receiver.

In the test above referred to, the brakes had been applied on the big locomotive and the train of twelve cars by electricity. The engineer's hand had nothing whatever to do with it and there was something uncanny in the demonstration. Experiments with a wireless train control system have been conducted on that part of the C. P. E. right of way since May, 1911. This demonstration was the culmination of a long series of successful tests and engine No. 798 weighs, when loaded, close to 115 tons. The twelve

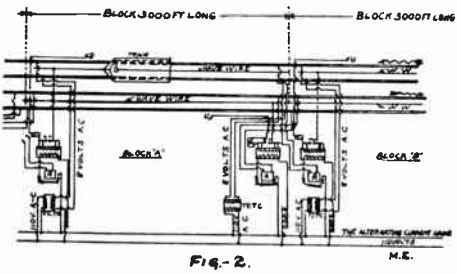



Fig.-2.

cars making up the train would make, on a conservative estimate, about 240 tons more. When one takes into consideration the speed at which the train was running, the grip of the wireless at once commands attention. This automatic train-control system is the invention of Frank W. Prentice, who was a despatcher for the Canadian Pacific.

The installation comprises two miles of double tracking consisting of six blocks, each 2,500 to 3,000 feet in length. The wireless wave generators and transformers which raise the voltage from 110, to 22,000 are located at the end of each block, being controlled by alternating current and relays. The wireless wave wire is contained in a wooden trunking, laid midway between the rails. The arrangement is such that a train entering a block stops the wave in the block to the rear, giving the danger signal to a train entering that block. The current runs to meet

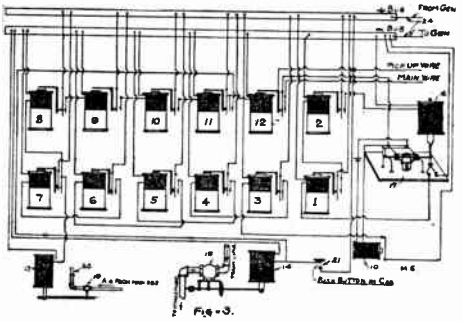



Fig.-3.

board of the locomotive, and consists the train always. The receiving device is located on the foot, or running

of a rotating coherer for receiving the current, a train line valve and an air whistle, both controlled by this coherer. There is connected with the coherer a receiving antennae suspended beneath the engine, six inches above the wooden trunking in the centre of the track. When the block ahead is safe the wireless wave emanating from the wave wire continuously spans this gap between the track and the moving train, assuring the engineer that all is well.

It is held that three seconds after this continuity is broken by some train occupying the block ahead the air whistle gives warning to the driver; three seconds more and the brakes are applied to the train, whether the engineer wills it or no, the train is brought to a complete standstill. When


the air whistle gives the alarm the driver can, if he wishes, press a button in the cab and so prevent the application of the brakes. But the whistle continues in action as long as there is danger ahead. The entire system is thus placed beyond human control in its action. Apart from the value of such a control in the point of preventing collisions expert railway men estimate that the value of the invention will be tremendous in the matter of shortening the time of the freight trains between divisional points. The facility with which trains may be allowed to follow each other out of the stations commends itself to them.

## OPPOSE WIRELESS CONTROL.

### Commercial Companies Are Against Bill for Government Regulation.

Washington, March 21.—The Alexander bill for the regulation of wireless telegraphy was referred to-day by the House Committee on Merchant Marine and Fisheries to a sub-committee comprising Judge Alexander, Chairman, and Messrs. Ayres, Thayer, Stone, Porter, and Parran, with instructions to consider the objections filed against the measure by the Marconi and other commercial wireless companies.—*N. Y. Times.*

## WILL GET WIRELESS EQUIPMENT FOR STEAMSHIPS.

The Insular Line has arranged for wireless stations on the steamers *Harry Luckenbach, Julia Luckenbach, Borinquen* and *Grayson.* Installations are to be made as each ship arrives in New York. United Wireless equipment will be used.—*Elec. Review & West'n Elect'n.*

## WIRELESS TO ACCOMPANY MOUNTAIN CLIMBERS.

White Salmon, Wash.—A party of White Salmon people is figuring on making the ascent of Mount Adams in July, taking with them professional guides and a portable wireless telegraph set. The apparatus will be evenly distributed among the men so as to practically make no additional weight to carry.

W. S. Bates, one member of the party, a rancher on Burdoin heights, south of Mount Adams, is a telegrapher of many years' experience and he is desirous of testing out the range of his extra sensitive apparatus of the DeForest type. If the rock formation prevents securing a first-class ground the experiment will be useless. If the ground can be secured in a stream where there is plenty of soil, it is more than probable that Honolulu can be "picked up" and possibly Japan, especially at night, at the point where the party will make its last camp at an altitude of about 6,000 feet Both men and women will be in the party.—*Portland Oregon, Evening Telegram.*

## OUR SUPPLEMENT.

THOMAS ALVA EDISON, perhaps the world's greatest living inventor and electrician, was born at Milan, a small canal town in Erie County, Ohio, on the 11th of February, 1847. On his father's side he was descended from an excellent family of Dutch millers, who emigrated from Amsterdam to America about the year 1737. They were men who lived long lives—Edison's great-grandfather lived to the age of one hundred and two years, and his grandfather one hundred and three—and from them he inherited the great physical powers of strength and endurance which have marked his wonderful and chequered career. Edison's father, Samuel Edison, was a nurseryman, dealer in grain, in lumber, and in farm lands, and later, a produce merchant.

Mr. Edison owns perhaps more patents than any other living inventor and to date more than 1,100 patents have been issued to him.

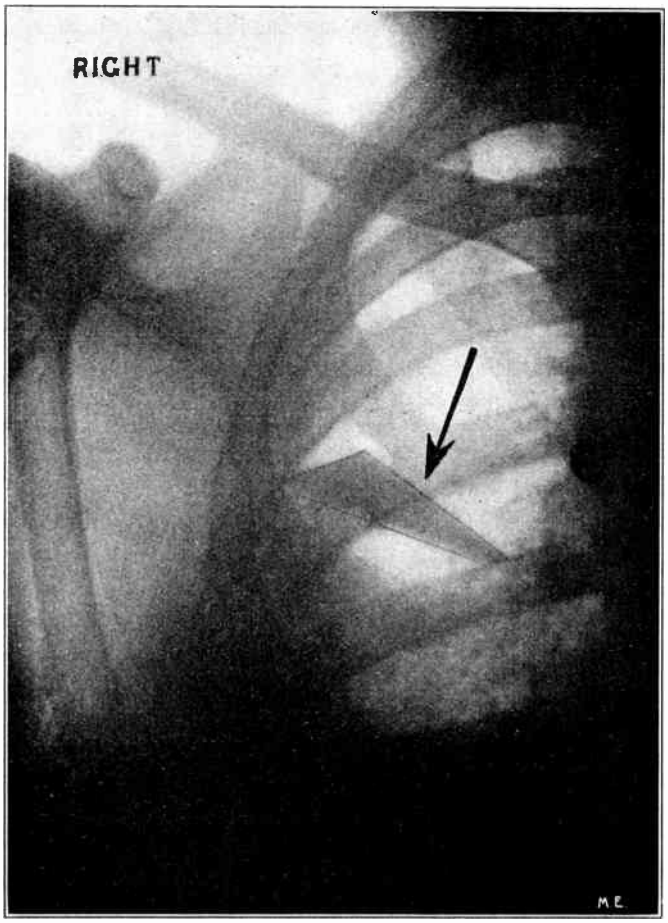
Perhaps the earliest invention of Mr. Edison was his Automatic Recorder which he invented while he was a telegraph boy at Indianapolis.

The best known inventions of Mr. Edison are the Quadruplex Telegraph, the Electric Lamp, the Phonograph, his Electric Kinetograph, his Ore Mining Machine and his latest invention, the Edison Storage Battery.

Mr. Edison's present home is Orange, N. J., where he has one of the most complete Electrical and Chemical Laboratories in the world.

He has also another laboratory in Fort Myers, Fla., which though not as complete as his Orange Laboratory is used by Mr. Edison when he goes to Fort Myers on his usual spring trip "to take a rest."

# A Remarkable X-Ray Photograph




The illustration herewith shows an X-Ray photograph, of the right side of the chest of a New York fireman. While at a fire two years ago, he was injured by the fall of a plate glass window. A triangular piece of the glass, about two inches long, entered his chest above the fourth rib and lodged in his lung at a point opposite the fifth and sixth ribs.

At the time, the surgeons feared to remove the glass, on account of the hemorrhage that would surely follow, so it was left in, and it is there yet. The fireman, though retired, is alive today, and though others have survived gun-shot wounds where the bullet was not removed, he is probably the only one who carries a piece of broken glass around in his lung.

# Electric Cooking in Domestic Science

By Frank C. Perkins.

THE accompanying illustration shows a part of the electrical equipment for teaching domestic science with electric cooking apparatus in the public schools of Telluride, Colorado, which is a prosperous mining town in the south-western part of the state.

The Telluride Board of Education voted to fit up laboratories suitable for the teaching of sewing, cooking, and the household arts. Their action was based upon a definite need in the community for instruction along these lines. The population is made up of peoples representing many of the European races. Children from these homes were in need of an opportunity to become familiar with American standards of living and home-keeping.

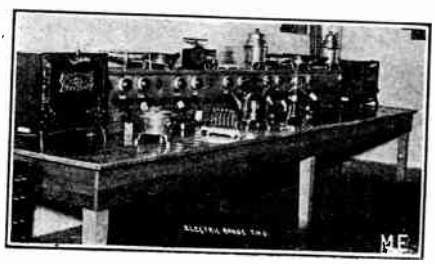
When it came to the selection of a suitable source of heat for cooking purposes, it was assumed that the usual coal range would have to be used. Gas was not available. Gasoline was promptly rejected owing to danger of fire. The manager of the Telluride Electric Light and Power Company, proposed the installation of electrically heated cooking utensils. The proposition was thought impracticable at first. but a more thorough investigation convinced the members of the board that it was thoroughly practical. After some consideration this installation was decided upon.

The desks were so planned that one eight inch electric stove would supply heat for two girls working on opposite sides of the desk, the stove being placed between them. Ten of these stoves were thus installed on the desks. Each stove was controlled by a heat regulating switch placed within easy reach of the girls using the stove. A simple turn of this switch gave the girl the exact amount of heat desired for the work in hand.

In order to accommodate the larger cooking utensils usually used in demonstration work or in cooking larger quantities than the small stoves would cook economically a table was installed at one side of the kitchen, on which table cords and plugs were provided to which these larger utensils might be attached. The same system of heat regulating switches were installed here. Each outlet was controlled by a switch and one utensil at a time, or all the utensils at once might be attached to these plugs and the heat accurately regulated.

The electric cooking equipment used on this table consisted of two each of the following utensils: oven, grid, broiler, double boiler, toaster, frying pan, and one each of the following: coffee percolater, chafing dish, waffle iron, and a flat iron.

In addition to the above equipment two water heating coils were installed in a ten gallon tank. These coils heat



The Electrical Kitchen.

ten gallons of water to a boiling point in from fifteen to twenty minutes. It is held that the great advantage of the above installation lies in the fact that the only energy used is the energy directly applied to the work being done. No utensils are heated but the utensils being used and these are heated only to the extent necessary for the particular kind of cooking being done. There is no waste. Because of these facts they have been able, in the Domestic science laboratories of the Telluride Public Schools, to cook with electricity and actually save money, as compared with what it would cost to do the same cooking with coal.

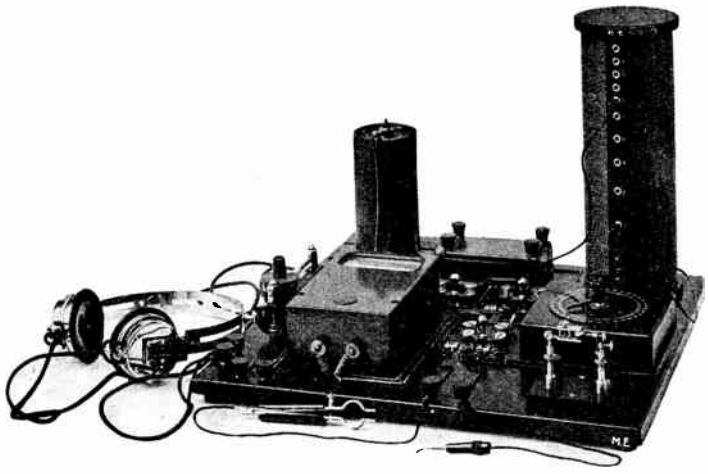
It is claimed that at the prices obtaining in Telluride it would cost from $12.00 to $18.00 per month for fuel and janitor service to operate coal ranges. By using electricity there is a saving of the extra janitor service, and

(Continued on Page 53.)

# Paris Letter

## APPARATUS FOR TESTING DETECTOR MINERALS.

Dr. G. Seibt of Berlin has devised a compact set of apparatus for testing out minerals for detectors. It consists of a small buzzer sending set having an inductance variable by steps and a rotary variable condenser. The receiving set, in which the minerals are tested, is, in appearance, very much like the sender, and is shown in the illustration. At the right are the inductance, variable condenser, and detector stand containing mineral used as a standard. To the left of the inductance is a small fixed condenser. In front of this are several switches. In front of the dry battery is a galvanometer and to the left of this is a potentiometer. A telephone head set and a pair of forceps and an exploring needle complete the equipment.



Mineral Testing Set.

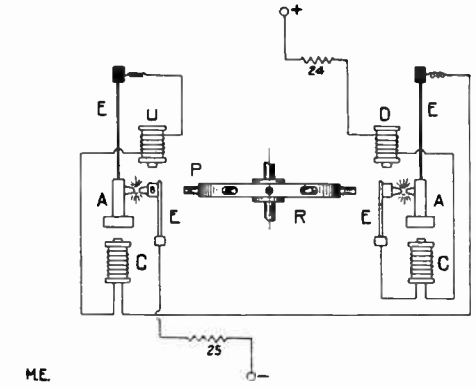
The mineral to be tested is clamped in the forceps and its surface is then gone over with the exploring needle to locate the sensitive spots. Comparison may be made at any time with the standard mineral in the detector stand by simply throwing the proper switches.

The mineral forceps and the exploring needle may be seen lying on the table in front of the apparatus.

The wave-lengths of both the sending and receiving sets may be varied over fairly wide limits.

## METHOD OF PRODUCING ELECTRICAL OSCILLATIONS.

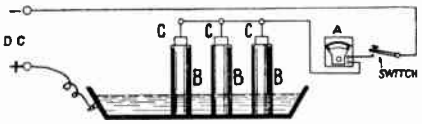
In this apparatus, oscillations are produced from two arcs without the use of the familiar condenser and inductance arrangement. In this apparatus, use is made of two arcs having their electrodes mounted in holders composed of magnetic material. These holders are mounted on springs, E, which tend to bring the electrodes together, but are held apart by the magnets, C and D. The disc, R, has a number of magnets, P, mounted around its edge, and when revolved rapidly enough keeps the electrodes in vibration which varies the resistance of the arcs and sets up oscillations in the circuit. The oscillations are, however, of comparatively low frequency.



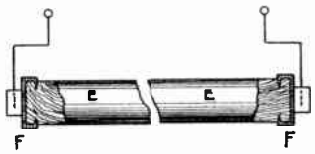

## METHOD OF ELECTRICALLY SEASONING LOGS.

If the logs are short they are set on end in a trough containing water, a solution of soda, zinc sulphate, or

other convenient solution. Ring shaped electrodes are then partly driven in the top ends and the space inside the ring filled with the same solution as is used




in the trough. These ring electrodes are connected to one side of a source of direct current and the trough to the




M.E.

other. The sap is driven out by the action of the current, and the progress of the work may be told by watching the ammeter. If the logs are long, metal caps are fitted to each end and connected to the current supply directly.

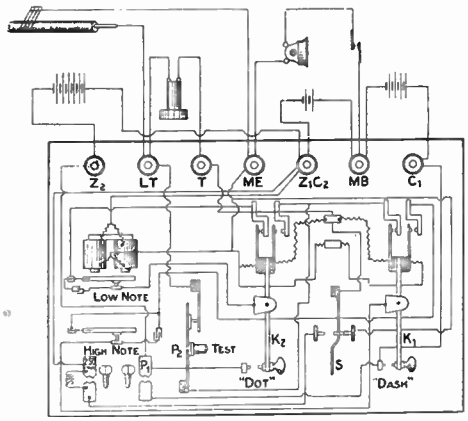
## TONE TELEGRAPH.

This apparatus invented by Mr. Edward Raymond Barker, employs two musical tones instead of the dot and dash ordinarily used in telegraphy. Also the receiving instrument is a telephone receiver instead of a sounder. Assuming that the higher pitched tone is used for the dot and the lower for the dash, the letter A becomes HL instead of dot-dash, B is LHHH instead of dash-dot-dot-dot, etc. As both tones have the same length a considerable amount of time is saved in transmitting a message.

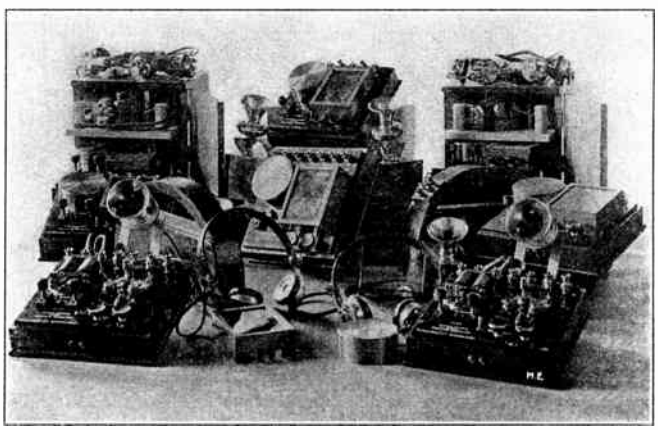
This apparatus has one electro-magnet with two differently tuned vibrating tongues energised respectively by the right-hand key 1, which gives a high note for a "dash," and by the left-hand key 2, which gives a low note for a "dot."

To test current and telephone to line, depress one of the keys and at the same time press the button $P^2$, thereby taking the short-circuit off the telephone, which accordingly will sound a loud note.

In the event of the vibrator system being used on a circuit of very low resistance, it may be advisable to insert a resistance in the sending circuit. This is easily done by unplugging the coil of 250 ohms provided on the instrument for that purpose. At the operator's pleasure switch S need not be worked by the keys automatically, but may, by means of the cam, be kept de-




pressed for "sending," and raised for "receiving"; if, however, automatic switching be preferred, it is always feasible. The contacts on keys 1 and 2 are arranged so as to be suitable for use, if required, with two electro-




The Tone Telegraph.

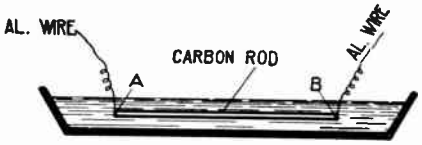
magnets with their respective tongues differently tuned, as in another model of two-tone transmitter.

The illustration shows a number of

these instruments. The apparatus that resembles a telephone transmitter is a loud speaking receiver used for testing. The wiring is shown in the diagram.

## HEATING RESISTANCE.

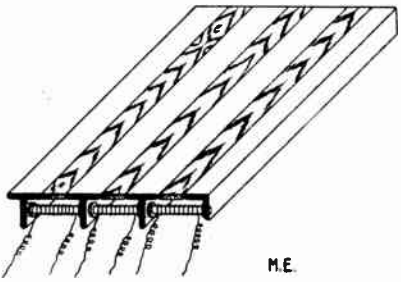
Here is an improvement in heating resistance units for heating water by direct contact or again for water resistances. Generally, on account of the slight difference in potential between A and B an electrolytic action is set up and the contacts corrode, which




is bad. Through the use of aluminum wire which becomes coated with a layer of oxide this trouble is avoided, for the layer of oxide, while being a fairly good conductor of heat, is also a fairly good insulator and protects the wire and contacts. Thus electrolysis is prevented.

## MAGNETIC FLOOR.

This is an amusement device in the shape of a floor that may be magnetised at will, when anyone stepping upon it becomes "glued to the floor" so to speak, if he happens to have iron heel plates on his shoes. The floor is made up of T beams with electro-



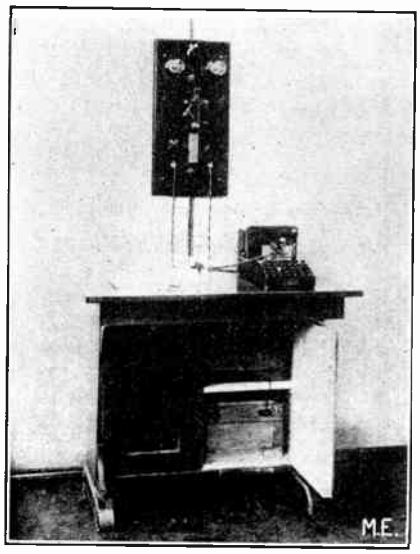

magnets between them as shown. Strips of wood are fitted in between the iron pieces to make the surface of the floor smooth.

## THE TELEPRINTER.

This apparatus, which is made by Siemens & Halske, the well known German manufacturers of electrical apparatus, is a new type of telegraph typewriter.

It is fitted with a keyboard like an ordinary typewriter, the letters being arranged in alphabetical sequence. There are 26 black and 2 white keys representing letters of the alphabet, figures or signs of punctuation, and either letters or figures can be transmitted.

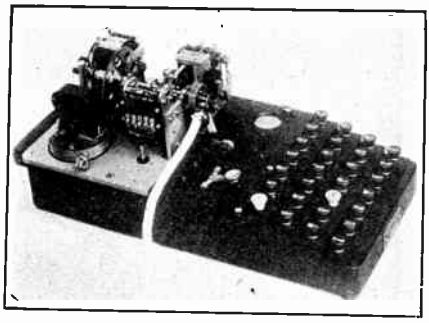
The message as dispatched by the




Subscriber's Equipment.

sender appears in print simultaneously on the sending and on the receiving apparatus, so that both the sender and receiver have a printed record of the message before them.

The receiving apparatus is started automatically by the sending current and stops automatically, and no attendant is required to set it going.



Subscriber's Instrument Without Cover.

By the use of suitable appliances it is possible at a moderate cost to combine the Teleprinter with the telephone, or to send both telegraphic and telephone messages simultaneously

over the same wire without the need of special switches.

It obviates misunderstandings arising from deficient hearing, indistinct sending, etc., as the message is printed on a strip of paper both at the sending and receiving ends, thus furnishing both users of the instrument with a written record.

A message sent by the Teleprinter cannot be overheard like that of a telephone or other telegraphic apparatus, and the receiving instrument can be placed in a locked box so that no one but the possessor of the key has access to the printed strip of paper.

The power required for working the apparatus may be obtained at a moderate expense from a battery or from any direct current electric lighting circuit.

## CURING DISEASE BY MEANS OF THE ELECTRIC ARC.

**By Charles Proner.**

By means of the electric carbon arc lamp, ultra-violet rays are produced which, when utilized, can cure tuberculosis of the skin, (lupus vulgaris).

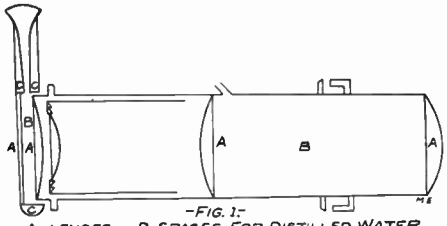
Dr. Niels R. Finsen, of Copenhagen, Denmark, the discoverer of this wonderful treatment, found that the violet end of the spectrum possesses a certain property which can cure this disease which has heretofore been pronounced incurable.

Lupus vulgaris is a disease that not only attacks the skin, the mouth, and the nose, and leaves horrible patches, but frequently attacks the internal organs or other parts of the body.

Prof. Finsen has also found that by placing the patients in a room into which the rays of the sun penetrate through sheets of red glass, the most dangerous stage in their disease can be entirely prevented. In many cases he found that the scars on the patient's face or other parts of his body have been made hardly noticeable.

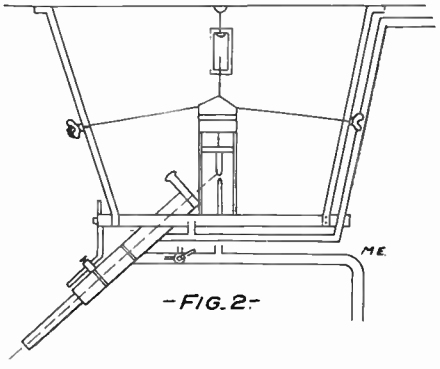
The standard treatment in use today at the Finsen Institute at Copenhagen, makes use of a telescope, as shown in Fig. 1, and an arc-lamp. The telescope consists of two rock-crystal lenses. The space between these lenses is filled with distilled water to absorb the heat and to prevent the lens nearest the light from breaking. The distilled water is kept cool by causing it to circulate through the telescope and a metal reservoir.

This telescope is used in connection with a carbon arc light, which consists of a stand carrying, on a horizontal arm, both the lamp and the concentrating apparatus.




-FIG. 1.-
A-LENSES B-SPACES FOR DISTILLED WATER
C- RESERVOIR FOR CIRCULATING WATER

The lamp which concentrates rays into the telescope requires a direct current of 20 amperes at 55 volts. It can revolve around a vertical axis on which it is fastened with a screw. A rheostat is




-FIG. 2-

situated in front of the lamp to regulate the voltage and amperage. The method of arranging the arc lamp and the telescope is shown in Fig. 2.

## LARGE ELECTRIC FURNACE.

It is reported at Sharon, Pa., on the authority of prominent engineers that the National Malleable Castings Company is preparing to install an electric furnace at its plant at Sharon for refining steel for special castings. The company recently started an idle open-hearth furnace at its Sharon plant, making three in operation. An order for 10,000 tons is being filled.

This will be the first electric furnace in the district to be utilized exclusively for castings. The Firth-Sterling Steel Company has a 2½-ton electric furnace in operation at its plant at Demmler, and the Carnegie Company has a combination open-hearth and electric installation at Homestead.

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A Magazine devoted entirely to the Electrical Arts.

H. GERNSBACK, Editor

O. J. RIDENOUR, Business Manager

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**Vol. V. APRIL No. 1**

THIS issue marks the beginning of the fifth year of *Modern Electrics*.

We cannot help but feel proud of the achievement, and we believe our readers share this view.

*Modern Electrics* perhaps more than any other magazine of its kind has assisted in educating and instructing the Electrical Experimenter and especially the Wireless Enthusiast. We cherish the hope that *Modern Electrics* in time will be the greatest magazine of its class, printed anywhere, because it serves a definite purpose and fills a highly important mission.

The voting contest just terminated, shows conclusively that *Modern Electrics* has been on the right track and knows what the reader at large is after. It goes without saying that our policy for the coming year will be governed largely by the results from this voting contest and we will give our readers exactly what they ask for, the same as we have tried to do ever since the magazine started five years ago.

As to elaborateness and distinction from other magazines this month's supplement gives a faint idea of things to come during the present year. Not only do we intend to keep on enlarging the magazine, as we have enlarged it in the past, but we will give our readers all kinds of supplements, never before attempted by other magazines of this class.

Of course we cannot at this moment disclose our plans as fully as we would like to, but among others, we have in mind, beginning with the middle of the year to give with each magazine complete blue prints, showing the detailed construction of very important apparatus. This in itself will be a vast undertaking and only by raising the price of the magazine, as we have done, can we hope to give our readers such extraordinary values, never before attempted by similar magazines.

In conclusion we desire to thank our readers for their hearty support and trust that they will not find occasion to complain of the quality or quantity of the new and better *Modern Electrics*.

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*Extra copies of this month's supplement, suitable for framing, will be mailed on receipt of 5 cents.*

# Alloys for Permanent Magnets*

In the investigation of electrolytic iron and its alloys, carried out at the University of Wisconsin, under a grant from the Carnegie Institution at Washington, tests were made of the magnetic qualities of all samples. Among these many showed low permeabilities and high coercive forces, suggesting their utility for permanent magnets, rather than as electromagnectic material. Upwards of 100 samples were tested for this feature; all the bars contained chromium, manganese, molybdenum, nickel and tungsten as binary alloys, or in various combinations together or with other elements. Much information regarding the best steels and the best treatment for permanent magnets has undoubtedly been accumulated by the manufacturers and users of such material, but is held as a trade secret; and published data along these lines is very meager. Again, such publications deal largely with the study of the critical points of the steels, with the view to determining the proper heat treatment to give them for best service.

The tests here recorded are for the most part on carbon free alloys. The results are mainly of value, therefore, as indicating the influence of the various elements in inducing the conditions necessary for a good permanent magnet. They are made upon an Esterline permeameter, an apparatus giving directly the flux density in the bar under test for any impressed magnetizing force. It consists of a small dynamo, driven at predetermined constant speed. The test bar forms part of the magnetic circuit of the generator and can be subjected to magnetizing forces of varying degrees. The flux density in the bar, being directly proportional to the voltage set up, can be read off on a properly calibrated millivoltmeter.

It is not necessary to make a complete magnetization curve in testing material for permanent magnets. The desirable feature is to have as high a residual magnetism as possible, or better, to have a high retentivity after some disturbing factor has tended to destroy the residual magnetism, together with a high coercive force to resist the tendency towards this loss of the magnetic flux. The method of procedure was as follows: The bar was inserted in the permeameter, the magnetizing force H was raised to the maximum of 200 and the density $B^{max.}$ was recorded, H was decreased to zero, and the retentivity $B^{ret}$ noted; next the coercive force $H^c$, necessary to reduce the retentivity to zero, was determined. Similar readings were taken for the reverse magnetizing forces, and the average of these positive and negative readings of $B^{max.}$ $B^{ret.}$ and $H^c$ for each bar was recorded for comparison. In fact, the whole operation is identical with the taking of a hysteresis loop, in which only the few readings noted above were recorded.

The bars were tested as forged, and after water quenching at 1,000°C. To prevent oxidation of the samples while heating them for quenching, a barium chloride bath was used. The quenching at 1,000°C. may not have brought out the best qualities of some of the bars; but it was deemed the best general treatment, since with so many bars under test it was impossible in this research to subject each sample to tests for its critical points and special conditions of heating.

In addition to the general test noted above, all bars which showed a fair retentivity and a coercive force above $H^c=30$ were subjected to a test for their stability or their ability to hold residual magnetism after shock. For this test the bar was subjected to the maximum magnetising force of $H^c=200$, and the retentivity noted when this magnetising force was reduced to zero. The bar was then removed from the machine, subjected to the disturbing factor, and the retentivity again recorded after reinserting the sample in the permeameter. The two means commonly employed in practice for seasoning permanent magnets were used—namely, jarring or rapping the bar, and boiling. For the latter treatment each bar was inserted in a piece of wrought

*Abstract of a paper read before the American Electrochemical Society.

iron pipe, which served as a shield to prevent the mutual influences of the magnetic fields, and boiled in water for three hours.

A large number of comparative trials of the rapping and boiling treatments showed them to be practically equal in their effect, and because of the simplicity of the former, it has been resorted to in the later tests. However, should the material be very brittle, it would be safer in practice to use the boiling method.

The alloys tested are divided into five groups, according to their content of chromium, manganese, molybdenum, nickel and tungsten, either alone with iron, or together with iron and other elements, except the above five; in addition, a sixth miscellaneous group includes materials of various compositions in which more than one of the above five metals are present. The result as a whole showed a wide variation in the physical and magnetic hardness of the various bars, not only before quenching, but afterwards as well. Also, it appeared that the effect of quenching was varied in its results, with either increase or decrease of coercive force, or with no material alteration. However, it appeared that where marked changes were the result, it was generally with an increase of magnetic hardness.

*Chromium.*—In the chromium group it appears that this element alone, even in percentage as high as 16.65, does not result in bars of high coercive force suitable for permanent magnets, even after quench at 900°C. And the coercive force was no higher with large than with small chromium additions. A large number of chrome-silicon alloys were tested, and in practically all cases the bars were relatively soft and of low coercive force in the forged condition. The coercive forces in all but two instances were well below 30, and the alloys were thus unsuited in this state for permanent magnets. In these two instances but little change resulted on quenching; but for the other bars, quenching resulted in a marked increase of coercive force; and with the accompanying relatively high retentivities, these materials were well adapted for permanent magnets. The best alloys seemed to have about a medium chromium content (5 or 6 per cent), since then the retentivity was high and the coercive force great enough to ensure stability.

The addition of vanadium also seemed to be very beneficial, although in this case the raw forged bars were especially hard, and the coercive forces were high initially and suffered but little change in quenching. Here, again, the best results seem to be gained with medium chromium content, because of the higher retentivities. In a few instances carbon was present, together with vanadium and silicon. The materials showed hardening upon quenching, but the magnetic results were no better than where there was no carbon.

Summarizing, it may be said that the addition of chromium alone to carbonless iron will not result in a material suitable for permanent magnets; but that the further addition of 0.75 to 1 per cent. of silicon or 0.3 to 0.5 per cent. of carbon to 5 or 6 per cent. of chromium is highly beneficial and gives an alloy very suitable for this class of service.

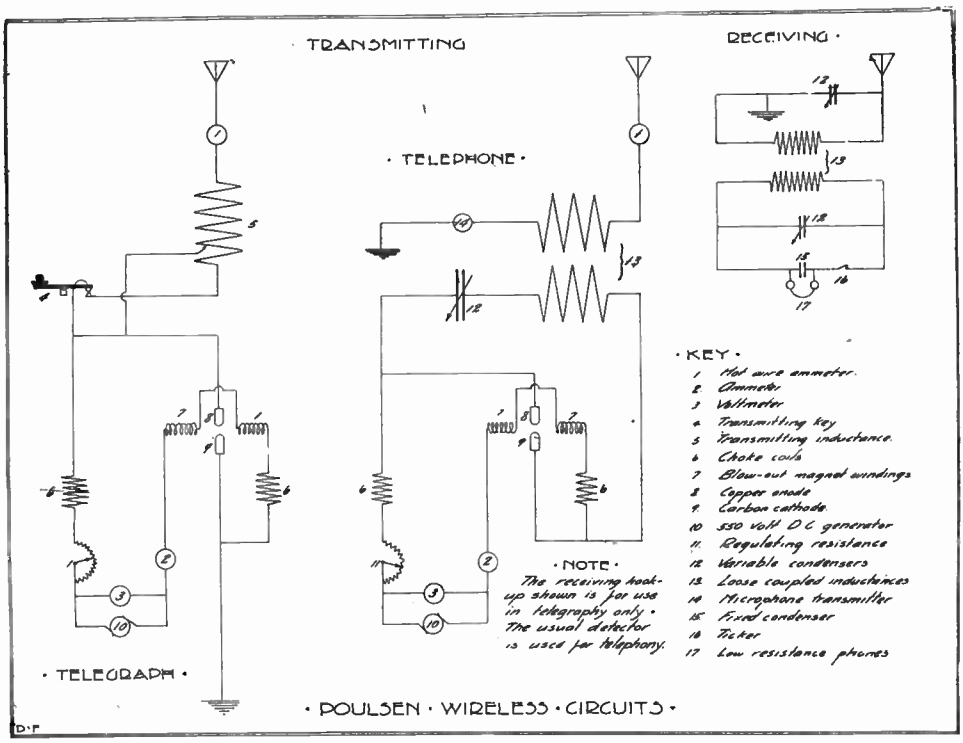
*Manganese.*—According to the classification adopted, the only manganese alloys falling in this group were of a series in which manganese alone in varying amounts had been added to the iron. In the raw forged condition the coercive force increased, with a corresponding decrease of retentivity, for each increase of manganese content, until at 10.41 per cent. Mn, the alloy was non-magnetic. A bar with 10 per cent. of manganese had the high coercive force of 90.1, but the retentivity was too low for permanent magnets. The most satisfactory bars were two with 4.51 and 6.0 Mn. where the retentivities were fairly high and the coercive forces great enough to ensure stability. But three bars were tested after quenching, and the result was a decrease of coercive force, a peculiarity corroborated by other tests upon this series.

*Molybdenum.*—Of the entire set of this series of alloys only one was magnetically hard in the forged condition; this was a bar of composition 8Mo, 0.3V, 0.6C, which had the high reten-

(Continued on Page 53.)

# The Poulsen System

By Dean Farran.




OWING to a lack of reliable data, considerable curiosity exists among amateurs in the vicinity of the wireless stations of the Federal Telegraph Co., equipped with the Poulsen Arc system, as to the working of the apparatus.

Those who have tried to read signals from these stations and have only succeeded in hearing a confused jumble like static, or dots and dashes in a strange code, are apt to be puzzled. This is, of course, due to the entire absence of any spark in their transmitting circuit, and to their active wave length being out of range of the average amateur's apparatus. A brief description of the apparatus used may be welcome to many.

Those who have studied physics may have read of the experiments carried out by W. Duddell in 1900, regarding the peculiar effect of shunting an inductance and a condenser in series around a direct current arc formed between two solid carbon rods. Duddell found that, by a certain combination of inductance and capacity, the arc could be made to give out a clear musical note, the pitch of which depended upon the capacity and inductance. This action is caused as follows:

It is a well-known fact that the electric arc, as a conductor, defies Ohm's law, in this way: In an ordinary conductor, at a constant temperature, the amount of current flowing is directly proportional to the potential difference between the ends of the conductor. That is, for every increase in potential difference there is a proportional increase in current, and vice versa. Now, in an electric arc, these conditions do not hold. An increase of current through the arc is accompanied by a decrease in voltage, and vice versa. If, then, a shunt consisting of a condenser and a large inductance, in series, is put around the arc, a certain amount of current is taken from the arc to charge the condenser. This decrease in current through the arc is accompanied by an increase in the potential difference of the electrodes, which still further charges the condenser, until it has reached its maximum charge. When the condenser is fully charged, current is no longer drawn from the arc, and the original current flows through

it, slightly reducing the potential difference to the original state. When the condenser begins to discharge, still more current flows through the arc, still further decreasing the potential difference. The inductance in series with the condenser helps it to discharge completely, and causes it to charge in the other direction.

It will be seen that, if the condenser is made small enough, it will charge and discharge very rapidly, and if the inductance is sufficiently large, undamped oscillations of a very high frequency will be produced. Duddell's apparatus was so arranged that the rate of charging and discharging, i. e., frequency, gave him a high musical note. This is practically the same as the Poulsen Arc apparatus, with the exception that the Poulsen Arc is improved so that a much higher frequency is obtained. Without going into too many details, Duddell and other physicists found that, in order to get a frequency high enough for wireless telegraphy, the voltage must be high in comparison to the current used, as otherwise the condenser must be so large as to make the frequency too low for this purpose.

Poulsen's improvements on Duddell's "singing arc" consist of replacing one of the carbon rods with one of copper, burning the arc in a strong magnetic field, and surrounding it with an atmosphere of hydrogen or hydro carbon gas. This arrangement, with a small capacity and a large inductance in series shunted around it, gives very strong undamped oscillations of a frequency of from 200,000 to a million or more.

The Poulsen apparatus, as used by the Federal Telegraph Co., is, then, practically as follows: The arc is formed in an atmosphere of coal gas or other hydrocarbon gas in an air tight chamber, between the poles of a strong electromagnet. The magnet coils may also be used as choke coils to prevent oscillations passing back into the generator, or additional choke coils may be inserted. The voltage used is about 500 volts, D.C., the copper electrode and arc chamber being cooled by water circulation.

The oscillation circuit is formed by connecting one electrode direct to the earth connection, and connecting the other pole to the antenna through a large inductance. The condenser, in this case, is the capacity of the antenna and earth.

The Morse key is arranged to cut in a few more turns of inductance when depressed, thus giving out a longer wave. This accounts for the unreadable signals heard by many amateurs, who cannot tune to the longer, or working wave, and only hear the shorter, or compensating wave, when they key is up. The working wave is generally 2000 to 3000 meters long.

The receiving apparatus differs from the ordinary, in that it has no detector. As the frequency used, is of course, so high as to be practically inaudible to the ear, it must be broken up to be audible. This is accomplished by a device called a "ticker," which is merely an interrupter capable of special adjustments, placed in series with a small condenser, around which is shunted a pair of *low* resistance phones. Across the ticker and small condenser is shunted a variable condenser. The received oscillations charge the variable condenser when the ticker is open. Upon its closing, the variable condenser discharges into the small condenser. When the ticker again opens, the small condenser discharges into the phones, causing the signals to be heard. The ordinary low frequency spark cannot, of course, be heard on this arrangement, but the quenched spark, or so-called "sparkless" system can be.

Great advantages are claimed for the Poulsen system, such as its noiselessness, the ease of handling high-powered sets, the absence of high voltages, etc. It is claimed, also, that greater distances may be covered overland with this system, and the work being done by the Federal Company shows this to be true, as they constantly work from 500 to 900 miles overland in daylight.

## WIRELESS FROM HAWAII TO WASHINGTON.

On February 3, wireless communication was held between the United States navy fleet at Honolulu and the office of the department in Washington, the message being relayed by the stations at Mare Island Navy Yard and Key West, Fla. The transmission was effected in daylight over a distance of 2,100 miles from Honolulu to Mare Island, and 2,200 miles from Mare Island to Key West. This is an unusually long distance for day messages.

# New Fessenden Station in Brooklyn

The National Electric Signaling Company, exploiting the wireless patents and inventions of Prof. Reginald A. Fessenden, formerly special scientist in wireless research for the U. S. Government, have opened an extensive laboratory, with a large corps of engineers and mechanicians, in one of the new Bush terminal buildings at Brooklyn, N. Y.

The National Company have a number of contracts and are preparing to erect one of the most powerful radio-telegraphic and radio-telephonic stations on the Atlantic seaboard. On the roof of the 6 story concrete building, in which they are located, two gigantic steel towers are being erected, the appearance of one of them being shown by Fig. 1.

The towers or masts are substantially constructed to withstand a gale, and also the very large aerial which is to be supported between them. The aerial span is about 400 feet, and the height above the ground approximately 250 feet. The towers are insulated from their supporting surface on the roof by large foot insulators of porcelain, about 2 feet high.

The cross arms at the top of the towers are of solid steel, about 40 feet long, and the aerial wires of stranded phosphor bronze will be anchored to these. Figure 2 shows the arrangement of the aerial and masts on top of the building.

The National Company are building the high frequency alternating current dynamo or alternator developed by Prof. Fessenden. These alternators are usually built and operated to deliver a frequency of 40,000 cycles per second or more, which results in the received signals being very high pitched or similar to a shrill whistle, enabling them to be read through most any static or interference, and giving great carrying power.

The company at present has several alternators under construction at the General Electric Company's works, which are to deliver an alternating current with a frequency of 200,000 cycles per second. Frequencies in excess of 40,000 cycles, are suited to wireless telephone requirements, and this station will undoubtedly make some new records worth while, inasmuch as the Fessenden alternator delivers the best radiophone current of any apparatus so far devised, in that the frequency of the oscillations is constant, which is not the case with arc type generators, which often develop weak oscillations at times when most needed.

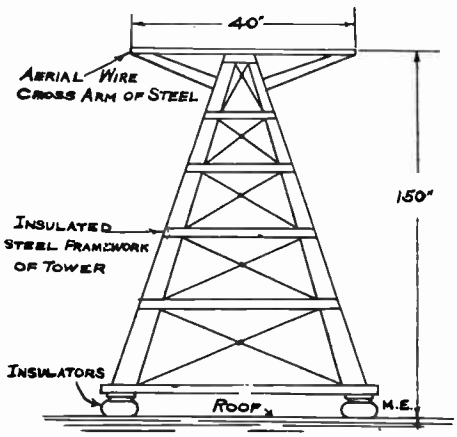


FIG.-1

The high frequency alternators rotate at enormous velocities, the speed often being as high as 30,000 revolutions per minute. To drive the dynamo by direct drive or coupling without any belts or chains, use is made generally of a steam turbine, such as the De Laval, in which a spindle speed of 25,000 or 30,000 R. P. M. is common.

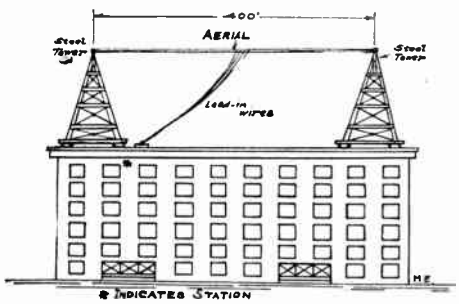


FIG.2.

# Wireless Legislation

## WIRELESS CONTROL.

The following article appeared in the March 23d issue of the New York Times. It speaks for itself:

THE WIRELESS CONTROL BILL.

This Nation and the pursuits of its people are not maintained for the sake of the army and navy, and their officialism. On the contrary, the military and naval establishments exist to assure protection to the people in their commerce and arts of peace. But the steps forward which civilization is taking render war preparations daily less necessary. For this reason we oppose the passage of the Alexander bill for the regulation of wireless telegraphy which would make the convenience of the army, the navy, the governmental departments, and their officials paramount, and would hamper the development of a great modern enterprise.

Representative Alexander's bill is drawn ostensibly to prevent "interference" with governmental messages by placing commercial wireless communication absolutely under departmental control. The commercial companies must obtain Federal licenses, subject at all times to such restrictions as the Secretary of Commerce and Labor may impose. Bureaucratic methods early in February threatened seriously to hinder the extension of the Marconi wireless system in Great Britain. The British postal authorities closed the United Kingdom to messages from the Marconi station in Spain, and it seemed for a time that the task of connecting the British Nation with the outside world by this new means of intelligence would fall.

The pathways of the ether should not be involved in red tape. Mr. Marconi has devised a method of preventing interference between the commercial and the governmental stations by modifying the wave lengths. President Griggs of his company has offered to enter into an arrangement between the United States Government and itself, and other wireless companies, whereby certain wave lengths may be designated for departmental operations and for commercial companies, respectively.

Such an arrangement would dispose of the chief of the alleged difficulties. As for permitting governmental bureaus to issue, modify, amend, and revoke the rules that shall govern the spread of communication between the American people and foreign countries, the idea ought not to be tolerated, save in time of actual war. Official control of commercial wireless business would be always in the bureaucratic interest, and not in the interest of progress and enlightenment.

The following letter was sent to the *New York Times* in answer to the foregoing editorial. It appeared in the issue of March 29th:

## 400,000 WIRELESS AMATEURS.

### To Discourage Their Work Would Check Progress in the Art.

*To the Editor of The New York Times:*

I note your timely article on "The Wireless Control Bill." While you have taken your stand very well, as far as the commercial interests go, I would like to give the views of the wireless experimenters and amateurs whom I have represented for the last six years.

Although it is not generally known, there are to-day close to 400,000 wireless experimenters and amateurs in the United States alone. The Wireless Association of America to-day numbers 16,189 members, and there are now 122 wireless clubs and subsidiary wireless associations scattered from coast to coast.

Much has been written and said against the wireless amateur, and while it is true that some mischief has been done, report has never been made of any case where serious damage was done, except in a single instance a few years ago, when a Massachusetts amateur transmitted a false "S. O. S." call, which sent a United States Government boat out on a fool's errand. On the other hand, the amateur has done a great deal of good by taking up distress calls, and it should be understood that good work has frequently been done in the past by amateurs receiving and transmitting such calls where they would probably not have been received by the few commercial and Government stations. Furthermore, a great many amateurs, while not necessarily schoolboys, have done much to further the art in general, and many patents have been taken out during the last three years by such students interested in wireless.

The interests which would like to see the Alexander bill passed have evidently not looked very much into the future. On account of the vast distances in this country, radio-telegraphic and radio-telephone intercommunication will positively find a distinct usefulness, greater without doubt than that of the present telephone. An immense usefulness alone will be found in radio-telephone stations between moving vehicles and fixed posts.

There is a feature in wireless which perhaps is not appreciated. It has been recognized that, on account of the great interest which a young man finds in the study of wireless, this new art does much toward keeping him at home, where other diversions usually, sooner or later, lead him to questionable resorts; and for this reason well informed parents are only too willing to allow their sons to become interested

in wireless. If it were only for this reason, it would be worth while not to curb enthusiasms for the new art. The public fully shares this view, which has been proved time and again.

H. GERNSBACK.
Business Manager Wireless Association of America, Editor Modern Electrics.
New York, March 27, 1912.

## WIRELESS BILLS OPPOSED.

### It Is Declared Legislation Planned Would Prevent All Progress.

The negotiations between the British Post Office and the Marconi Company for a complete interlacing of the British Empire by means of wireless communication has revived interest here in the bill introduced before Christmas by Senator Nelson of Minnesota, Chairman of the Committee on Commerce, putting practically all wireless communication in the United States under the control of the Secretary of Commerce and Labor. The bill was proposed as a result of complaints by Government officials of interference with important messages by amateur operators.

As the bill stands it is sharply opposed by the wireless interests of the country. Their objections are leveled particularly at the features of the bill putting practically all power in the drafting of regulations either in the hands of the Secretary of Commerce and Labor, a subordinate bureau chief, or the President. Point is given to these objections by the recent action of the British postal authorities in closing Great Britain to messages from the new Marconi station in Spain, after permitting formal messages of congratulations to be exchanged for a single day.

A similar bill which was printed in our February number was introduced in the House of Representatives by Mr. Alexander. Mr. Alexander to-day received a strong protest from President John W. Griggs of the Marconi Wireless Telegraph Company of America setting forth its objections to the bill, and declaring that the measure would place the ordinary administration of naval and military affairs in a position of dominance over a matter of commerce in time of peace. The letter said, in part:

"It is only within the past year or so that the earnings of the company have more than equaled its operating and administrative expenses. This company has more than 7,500 stockholders, residents and citizens of the United States. Its benefit and usefulness to the public have been enormous, while the returns to its stockholders have hitherto been nothing. The latter cherish a reasonable hope and expectation that a time will shortly come when by means of this system and in addition to the ship to shore and shore to ship business transatlantic communication can be carried on perpetually day by day and night by night in competition with the ocean cable lines.

"At the present time a limited amount of commercial business for New York merchants and a certain amount of newspaper matter is forwarded by this system, the latter being chiefly published in an American journal, namely *The New York Times*. It only needs the erection of a receiving and transmitting station of proper magnitude in the United States to make this communication extensive and to furnish to the commercial world a cheaper means of communication with Europe than the Atlantic cables now afford. The company aims to be and is an agency of commerce as well as an agency for the protection of the safety of those who go down to the sea in ships.

"It is submitted that there is no justification for placing the ordinary administration of naval and military affairs in a position of dominance over matters of commerce in times of peace. The general provisions of this act, which vest, in the President by one section and in the Secretary of Commerce and Labor by another, the power to regulate, and from time to time to add to, modify, amend, or revoke such regulations as in their judgment may see expedient, would render it impossible for any commercial company to engage successfully in transatlantic business and would forbid as a business proposition, the investment of money sufficient to build and equip proper stations for transatlantic business.

"The passage of this bill could have no other effect than to discourage and, indeed, destroy all further effort to bring to success the long labors of those who have been trying to establish a workable system of transatlantic communication by radiotelegraphy which shall compete with the cable companies. I am not aware of any business or interest of the War or Navy Department that would justify Congress in placing its every-day operation of wireless stations in a position paramount to the commercial business of the country.

"With reference to the matter of interference between different stations, Mr. Marconi has invented a system by which, by an arrangement of wave lengths, this can be avoided. This company is now and always has been ready and willing to enter into an arrangement between the United States Government and itself and other wireless companies whereby suitable wave lengths shall be designated for departmental operations and for commercial companies respectively."—New York Times.

## THE PROGRESSIVE WIRELESS CLUB, OF SEATTLE, WASH.

This is a new club, organized February 2, 1912.

The officers are as follows: President, Hubert A. Davis; vice-president, Edward Lachall; secretary, Howard Hemen; treasurer, LeRoy Fetterly; adviser, T. B. Miller; chief operator, Herman Knudsen.

This club was started with 17 members present, all living within 2 miles of each other, and having sending sets from 1 inch coils, up to 1½ k.w. transformers.

## DORCHESTER WIRELESS ASSOCIATION.

The Dorchester Wireless Association was formed January 1st, 1912, for the purpose of furthering the development in wireless telegraphy in Dorchester, Mass. Officers were chosen as follows: President, Karl H. Kaiser; treasurer, Ralph J. Sims; secretary, Richard F. Lufkin, 222 Harvard street.

All interested should communicate with the Secretary.

## THE WIRELESS ASSOCIATION OF CANADA.

**President, Wm. C. Schuup; Secretary, Thomas Hodgeson.**

The Wireless Association of Canada has been organized for the sole objects of furthering the interests of amateur wireless telegraphy in Canada.

Brother amateurs in Canada are urgently requested to send for charter to organize a branch of the association, in their particular territory, or for an individual application. For further information, address Wireless Association of Canada, Corresponding Secretary, 189 Harvard avenue.

NOTRE DAME DE GRACE,
Montreal, Que.

P. S.—We would be pleased to receive catalogs from advertisers in this magazine. Address, same as above, only marked "Purchasing Dept."

## PLAZA WIRELESS CLUB.

The Plaza Wireless Club has been organized with the view of bringing amateurs together. The officers are: Paul Elliott, president; Myron Hanover, secretary-treasurer, 156 East Sixty-sixth street, New York City.

## AMATEUR WIRELESS ASSOCIATION OF NEW BEDFORD.

The Amateur Wireless Association of New Bedford has at present twenty-four members and is desirous of extending to other amateurs in New Bedford and its vicinity the benefits of same through their becoming members. The purposes of the association are to promote wireless telegraphy among individuals for both knowledge and pleasure. Through becoming a member of the association they aid in preventing interference and also extend their knowledge of wireless telegraphy and other affiliated arts. Practical demonstrations and lectures being arranged for every meeting of the association. The association has measuring and testing instruments of various kinds which are loaned to members free of charge, and also has a 1 k.w. transmitting set at the clubhouse with which to conduct experiments of research. The rating of stations of members are from a 1 inch coil to a 3 k.w. open core transformer. The officers of the association are as follows: Chas. Kraihanzel, President; Chester Dahl, Vice-President; Edw. DeMello, Secretary, 84 Dunbar street, New Bedford, Mass.; Wm. Isherwood, Treasurer; Herbert Charnely, Collector; Central Operator and Librarian, Lester Jenkins; Auditors, Chester Dahl, Geo. W. Pope.

## THE AMATEUR WIRELESS CLUB OF GENEVA, (N. Y.).

This club was recently organized with about twelve members and the following officers elected: Henry B. Graves, Jr., president; Chas. Hartman, vice-president; Lawrence Reed, treasurer; Benj. Merry, 148 William street, secretary. Any person within five miles of Geneva, and interested in wireless, may join by interviewing secretary or by writing to him. We would like to hear from other wireless clubs.

## THE YOUNG EDISON SOCIETY.

As our name implies, this is an organization of young electricians and chemists, we hold meetings each week, and all members are expected to take an active part, either by reading an essay. or an appropriate paper or talk. Again a member with an unsolved problem,

puts it before the society, who endeavor to answer it at the following meeting.

Another advantage of the society is, we let our mechanical books and magazines go around the circle, thus every member has the advantage of a large scope of information, at a very small cost.

Our title is F. Y. E. S., which means Fellows of Young Edison Society.

At present we have about forty members, and are still growing.

We want to see boys all over the country get busy, and organize Young Edison societies, be an F. Y. E. S.

We will be glad to hear from any of the boys, and will give all the help we can.

Address all letters to

HARRIE E. TORBETT,
Rogers, Ark.

## BERKSHIRE WIRELESS CLUB.

The following officers have been elected: Warren A. Ford, President; William Yurkee, Vice-President; Charles Hodecker, Treasurer; Jas. H. Ferguson, Secretary, 18 Dean street, Adams, Mass.

## CARDINAL WIRELESS CLUB.

The Cardinal Wireless Club has been recently organized at the South Division High School of Milwaukee with the following officers: Mr. K. Walthers, President; Mr. F. Dannenfelser, Vice-President; Miss A. Peterson, Secretary.

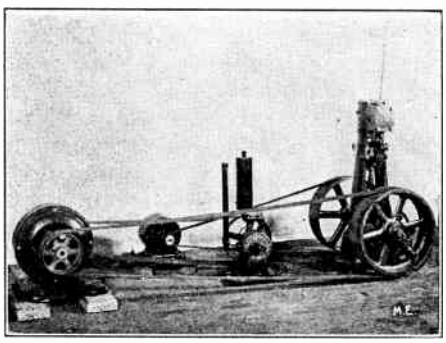
## MARCONI ABSORBS UNITED WIRELESS.

As a result of a merger which has been brought about between the Marconi Wireless Telegraph Company and the United Wireless Telegraph Company, when the suit of the former against the latter corporation for alleged infringement of patent rights came up in the United States District Court on March 25th, the United Wireless entered no defense and consented to the granting of a decree in favor of the Marconi Company.

As a further result of the merger all the stations and contracts of the United Wireless will be taken over by the Marconi Company. This involves about 500 ship and 70 land stations in the United States.

## COMPRESSED AIR FOR WIRELESS SPARK GAPS.

In stations which are obliged to use the ordinary form of spark gap, either open or muffled, the efficiency of the apparatus may be increased somewhat through the use of compressed air to clear the gap of ionized air and vapor from the spark terminals. Various methods of applying the air jet to the gap are in use. Sometimes a nozzle is placed so that it blows across the space between the terminals. In another well known type there is a hole drilled through the center of one of the terminals. Air blown through this hole strikes the face of the opposite terminal, and, spreading in all directions effectually clears the gap. Keeping the gap clear of metallic vapors and ionized air, helps it to promptly damp out the primary oscillations as explained in the article on the quenched spark in the February issue of *Modern Electrics*.



Wireless Station Power Plant.

The illustration shows the power apparatus for a station of one to five kilowatts capacity. At the left is the alternator which furnishes the current for the wireless transformer. Next is the exciter which furnishes direct current for the fields of the alternator. Then comes the blower for furnishing the compressed air for the spark gap, and at the right is the engine for driving the whole business.

We are informed that the United Wireless Telegraph Company is experimenting with this and expects to equip a number of its stations with compressed air apparatus.

## PETITION TO PRESIDENT TAFT CALLING FOR PATENT REFORM.

The Inventors' Guild has forwarded to President Taft a petition in the form of a resolution adopted at a meeting of that body on Nov. 24 directing the attention of the President to the urgent need of reforms in the Patent Office and in the patent courts and suggesting the appointment of a Congressional committee to investigate the subject of the patent monopoly. The Inventors' Guild, of which Mr. Ralph D. Mershon is president, embraces many of the most prominent inventors in the country, including Thomas A. Edison, M. I. Pupin, Charles A. Bradley, H. Ward Leonard, John F. Kelly and Peter Cooper Hewitt.

The petition points out that the constitutional provision giving to Congress "power to promote the progress of science and useful arts by securing for limited times to inventors the exclusive right to their respective discoveries" was intended to obtain for the benefit of the nation the publication of every new and useful invention in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it pertains to make, construct, compound or use the invention after the limited time for which the exclusive right is secured to the inventor by patent, and thereby to secure the great benefit which all experience shows results to a nation from publishing inventions, in contradistinction to following a policy which would tend to encourage trade secrets, monopoly and trade combinations, which minimize the value of inventions to the nation.

The petition proceeds to say that a patent is in effect a contract between the government and the inventor by which the government, in consideration of the right to publish the invention for the benefit of the nation, agrees that in return for his satisfactory disclosures of his new and useful invention under reasonable conditions, to be determined by the government, it will secure the inventor for a limited time in the exclusive right to his new and useful invention. But an inventor, after having performed his part of the contract by having made proper disclosure of a new and useful invention to the United States government officials, is frequently subjected to unreasonable delay, expense and injustice before obtaining his patent, and after having obtained his patent is not equitably secured in his exclusive right as the Constitution intended that he should be secured in return for his disclosure in good faith of his new and useful invention; and, as a consequence of this unfair treatment of inventor patentees, the United States is not obtaining in the degree that it should the national benefit of the best inventive work of its many able inventors.

The United States patent system, it is stated, has been evolved to its present condition without proper consideration of the rights of the nation and of the inventors, who are the two real parties at interest, but on the contrary has been developed to its present condition almost entirely as the result of suggestions from persons who do not occupy the position of one of the parties to the contract which every patent represents, and who do not suffer damage from the delays, complications, injustice and expense characteristic of the United States patent system and the United States courts which hear patent causes, such damage being borne principally but indirectly by the nation and to a lesser degree, but directly, by the inventor-patentees.

It is further stated as a well-known fact that modern trade combinations tend strongly toward constancy of processes and products, and by their very nature are opposed to new processes and new products originated by independent inventors, and hence tend to restrain competition in the development and sale of patents and patent rights, and consequently tend to discourage independent inventive thought, to the great detriment of the nation and with injustice to inventors, whom the Constitution especially intended to encourage and protect in their rights.

Under existing methods of trying patent causes, an inventor-patentee of average means could not, at his own expense, carry to a conclusion an average patent litigation against a wealthy opponent, and therefore a few wealthy

(Continued on Page 78.)


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

## FIRST PRIZE TWO DOLLARS.

### A MERCURY SENDING CONDENSER.

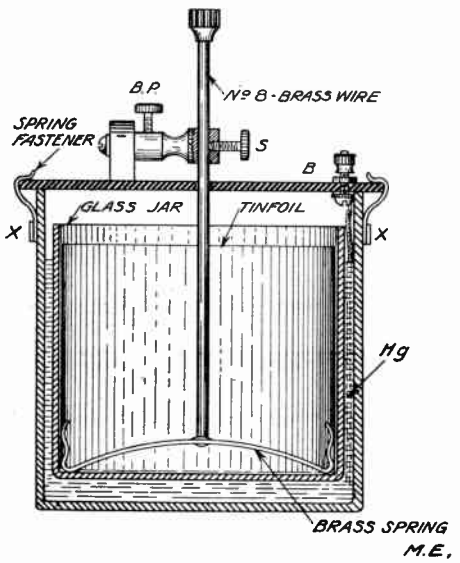
While a little harder to construct than a simple Leyden jar the results obtained with the following condenser will more than repay the additional expense and labor involved.

Two glass battery jars are necessary, one slightly smaller in diameter than the other. The smaller one, which should be several inches shorter than the larger, is lined with tinfoil to within an inch of the top. It is then slipped into the larger one, for which a circular cover of wood, fibre or hard rubber is provided.

To this cover is fastened a brass post, carrying a double binding post by means of which the immersion of the smaller jar in the mercury is regulated. If an 8-32 rod is used the upper hole of the binding post should be redrilled.

XX is a strip of copper or brass ribbon fastened tightly around the outer jar to hold the spring clips in place. A bare stranded wire reaches almost to the bottom of the mercury from binding post B. As the specific gravity of mercury is many times that of glass the inner jar will float on the surface unless held in place by the set screw. The inner jar may be filled with sand to partly counteract its tendency to float, but this increases the weight of the apparatus.

By means of the electrose knob the condenser may be adjusted while testing with a hot wire meter or Geissler tube. The chief advantages of this instrument lie in its easy manipulation, accurate adjustment, and comparative




freedom from dust, blistering and brush discharges.

Contributed by

STUART R. WARD.

## SECOND PRIZE ONE DOLLAR.

### A VARIABLE CONDENSER.

The following is a description of a variable condenser, which to my knowledge has never been published in any book or magazine.

The principal material needed and its use is described below.

1. A hardrubber adjusting knob with a threaded brass rod attached, about 3½ inches long. The rod should have an 8-32 thread on it. If difficulty be had in securing this knob a good substitute may be made by using an old detector knob and fastening a 3-inch rod to it by means of a brass nut as in Fig. 3. The rod passes through a threaded nut as at A. This knob is used to raise and lower the plunger.

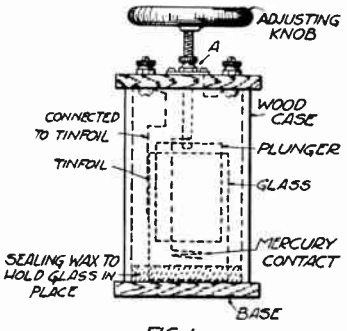



FIG. 1

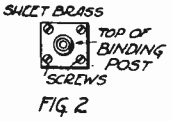



FIG. 2

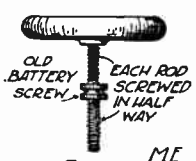



FIG. 3

2. About one-half pound of mercury. The mercury is used as one of the conducting surfaces of the condenser. Its level is raised or lowered by turning the adjusting screw. If desired, water may be substituted for the mercury, but this will increase the resistance and the water also has a tendency to "creep."

3. A thin table glass, that is free from bubbles and cracks and with sides that do not slant. The bottom and top should be of the same diameter. The glass should be about two inches in diameter and about three and three-fourths inches in height. The outside of the glass should be covered with tinfoil to within one-fourth inch of the top and about one-half of an inch of the bottom; the bottom should not be covered.

4. A piece of wood should be turned out on a lathe. Its diameter will depend on the diameter of the glass and it should be about two-thirds the length of the glass. There must be about one-sixteenth of an inch between the wood and the side of the glass. After this has been done the piece should be immersed in melted wax to make it waterproof so it will not soak up the mercury.

This piece will act as a plunger and will raise or lower the mercury by being raised or lowered by the adjusting knob; in other words the mercury will be raised or lowered by being displaced by the plunger. A small wire is connected to the rod (Fig. 1), and extends down through a small hole through the plunger, the lower end of the wire is wound in a spiral shape as it will insure a good contact.

The case for this condenser I made out of three-eighths inch mahogany and then stained and varnished it, which gave it a very handsome appearance. It should be about five and one-half inches high and about three and one-half inches square.

After the parts are all made they should be put together and after the glass is found to be in the right place a small amount of sealing wax should be poured around it to hold it there.

One of the sides of the case should be left off in order to connect the wires, after which it should be screwed on.

The condenser is adjusted by simply turning the knob, and if made right it will present a very fine appearance and will be found to have a very high capacity.

The connections are the same as with any other type.

Contributed by

JAY J. JAKOWSKY.

## TRANSFORMER FOR POULSEN TICKER.

Since a 15 k.w. Poulsen station will soon operate in Chicago the amateurs will want a ticker detector. Those not having A. C. cannot very well have one.

I have made one using an induction coil to get the A. C.

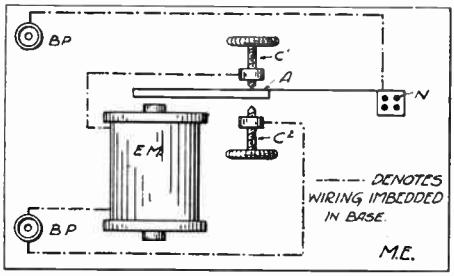
A core of iron wire ½ inch in diameter and six inches long is wound with two layers of No. 22 enameled copper wire. This is insulated and over this is wound two more layers of the same wire. This is the secondary, using a vibrator to interrupt the primary. When the primary circuit is closed the induced current flows in one direction and when

the primary circuit is broken the induced current flows in the opposite direction. This gives an alternating current, the frequency depending on the speed of the vibrator. With 2 or 3 dry cells this will give good results.

Contributed by
ALFRED HOLMSTROM.

## A DOUBLE CONTACT INTERRUPTER.

While this form of interrupter has only one magnet, it is capable of making as many oscillations per second as any double magnet type, this is due to the double contact.




The electro magnet, E. M., is fastened to the base, and the armature, N, nailed in place, it is made out of a bell-armature.

The brass pieces holding the contact screws are drilled and tapped 8-32 about ½ inch deep, and screwed in place from under the base.

The contact screws, $C^1$ and $C^2$, which are fitted with platinum points, are about ¾ inch long.

The principle of this interrupter is that when the armature is at $C^1$ the contact is closed including the magnet, but when the contact is closed at $C^2$ the magnet is excluded.

Contributed by
WALTER NEUMANN.

## BRUSH DISCHARGE PREVENTION.

A simple way to prevent brush discharge, on Leyden jars and fixed condensers, used on spark coils, or transformers, is to paint the edge of the tinfoil with aluminum paint. This aluminum paint is made of powdered aluminum, and is therefore a conductor of electricity.

Contributed by
FRANK GREENFIELD.

(Shellac or Black asphaltum is better.—Ed.)

## A SILICON DETECTOR.

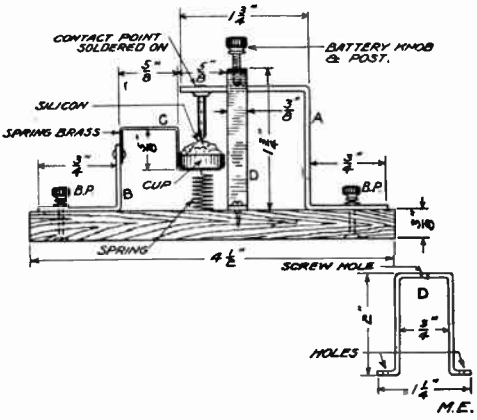
Here is a silicon detector which I am using in connection with my wireless set.

The parts are mounted on a hard wood base 4½x1¼ inches and ⅜ inch thick.

Two pieces of brass, B, and D, are bent as shown in sketch. A, and C, are made of spring brass. All these are ⅜ inch wide, and of any convenient thickness. A small brass spring is placed under the end of C, supporting the cup.

The contact point, made of a small brass nail with the head flattened is soldered to A, as shown. All holes for screws are No. 19 drill and all tapped holes are made with a No. 29 drill and tapped 8-32 thread.

The sketch gives all necessary dimensions and shows how the detector is assembled.




Contributed by
C. W. SEAMAN.

## CRYSTAL MOUNTING.

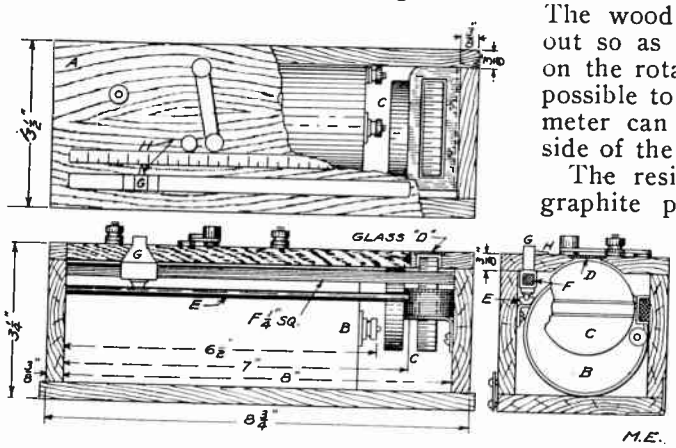
As most experimenters know, soldering takes a good deal of the sensitiveness away from the mineral, and tinfoil wads no matter how tightly packed, do not hold the crystal firm. Wads of fine copper wire (34-36 B. S.) jammed between the crystal and the cup hold it firm and make a good contact.

Contributed by
VAN ALLEN TREAT.

## A COMPACT RESISTANCE METER.

It is well known that one of the most accurate instruments for measuring resistance is the Wheatstone Bridge. This instrument has, however, a great disadvantage in that the resistance in ohms cannot be read directly, but must be computed from certain readings. A method which surmounts this difficulty is what is known as the "substitution" method. This is the method employed in this instrument, and readings are taken directly, without any computation whatever.

It consists of a box (a), with hinged bottom, containing a strong dry battery (b) of convenient dimensions (about those shown). Then there is the galvanometer (c). This is of an improved construction which obviates the difficulty in taking readings, found in the ordinary tangent galvanometer. It consists of the brass form (1) for the coil, this form having a projecting tongue (2) on one side, to fasten it to the box (a). This form should be wound full with No. 36 S. C. C. or enamelled wire. Before this is done or the form finished, however, two glass beads (3, 4) should be glued with strong glue to the inside faces. These glass beads are to act as bearings for the pivot (5) on which is mounted the rotating part (6) of the galvanometer. This consists of a large circular piece of cork or wood of the dimensions shown, with two grooves cut in it, in which the strong clock-spring bar-magnets (7, 8) are glued. Around the circumference of the cork is pasted a strip of paper the width of the cork and graduated in degrees. Only ninety degrees need be graduated on it, since it is evident that the magnets cannot rotate more than a quarter of a turn. These magnets should be placed with like poles on the same side.




On the side of the coil opposite the tongue (2) another piece of cork (9) similar to the rotating one (6) should be glued. If the magnets and battery are strong, the galvanometer will be dead-beat, a great advantage.

The cover of the box (a) should be perforated with a small square hole, admitting a square piece of glass (d) with a line scratched on it with some hard material, such as a sharp piece of steel or carborundum. The glass is placed with the scratched face downward, to make readings more accurate. The wood under it should be cut out so as to bring the graduations on the rotating cork (6) as near as possible to the glass. The galvanometer can then be screwed to the side of the box as shown.

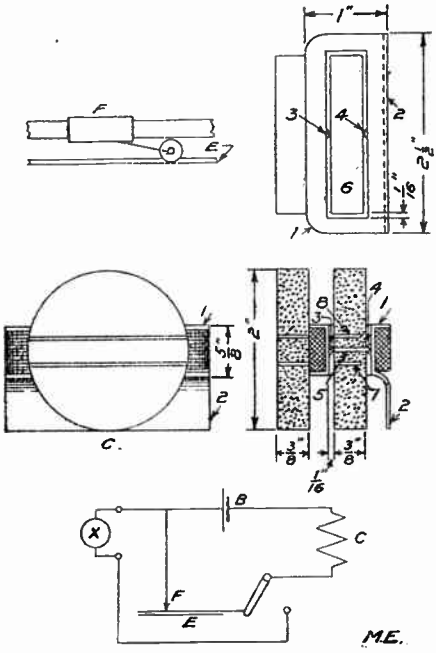
The resisting medium used is a graphite pencil (e) of about the length shown. This is intended for measuring high resistances; for low, a piece of German silver wire, or a coil of it, can be used.

A slider (f) bears on this rod; this slider is the same as used on a potentiometer or tuning-coil (in fact a potentiometer can be used instead of the graphite-rod (e) and slider (f), but this makes the instrument less compact, except that it must be designed so that it will not wear away the graphite-rod. The form shown in the side elevation consists of a ball pressed against the rod (e) by a helical spring. The one shown in the detail drawing is better, consisting of a strong spring cut in the shape of a fork at the loose ends. The ends of the fork are then bent over to serve as bearings for the pivot of a small brass pulley, which bears on the graphite-rod with good strength. It should be kept in mind that no iron or steel should be used in the construction of this apparatus, as it would interfere with the proper working of the galvanometer.

A hole should be cut through the cover of the box (a) to admit the slider-handle (g), which carries a small index

(h). This indicates upon a scale (i), which is drawn on a piece of paper pasted to the top of the box (a), as shown.

A switch and two binding-posts should be fastened to the top of the box (a) and the apparatus wired as shown in the detail drawing. To make connection with the graphite-rod it could be copper-




plated at one end and the connecting-wire soldered to this. All joints should be soldered, if possible.

To calibrate the instrument first short-circuit the binding-posts with a heavy piece of copper ribbon (x) with the greatest amount of contact-surface possible. Turn the switch for a moment to the right and note the reading on the galvanometer. Then turn the switch to the left and bring the slider to such a position that the reading on the galvanometer is the same as before. Then put a mark where the index points on the scale and label it O. Turn the switch to off again, and substitute a coil of 20 feet No. 37 or 10 feet No. 40 copper wire, and proceed as before except that the point opposite the index should be labelled 10. The space between 10 and O should then be subdivided into as many divisions as possible.

The same should be done with standards of increasing resistance until the whole scale is filled.

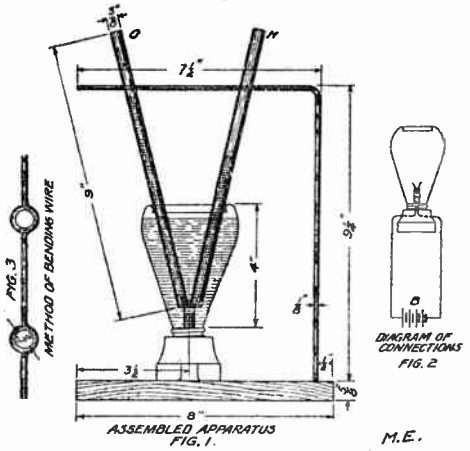
To measure the resistance of any conductor, connect it across the binding-posts, as x in the diagram, turn the switch to the left and note the reading of the galvanometer. Then turn the switch to the right and push the slider until the reading of the galvanometer is the same as with x. The reading opposite the index then shows the resistance of x in ohms.

Contributed by P. MERTZ.

## NOVEL APPARATUS FOR DECOMPOSING WATER.

Secure about 18 inches of ⅜ inch glass tubing, one porcelain wall socket, a piece of ⅛ inch galvanized iron wire, and a large 32 c. p. lamp. If a 32 c.p. lamp can not be had a 16 c. p. will do.

Now for construction, make a base out of a piece of oak or other hard wood 8 inches long, 3 inches wide, and ⅝ inch thick. Mount socket and wire (after bending wire to shape shown) on base. Next break off the tip of the lamp and bend in the broken edges by heating. Then screw it into the socket. Now cut the tubing into two pieces and




seal each piece at one end. Fill the lamp with water to which has been added a small quantity of salt, or, better, sulphuric acid if it is to be had. Now put the tubes in place one over each platinum wire after filling both of them with water.

You can now turn on the current which should be about 5 to 8 volts and the gases will begin to rise in the tubes displacing the water. Hydrogen will rise from the negative electrode and oxygen from the positive, the hydrogen rising twice as fast as the oxygen.

Contributed by

GEORGE F. TWENHOEFEL.

## A SENSITIVE GALVANOMETER.

Here is a galvanometer which is very simple in construction and if properly made is only surpassed by the high resistance phone.

The base board may be of any good piece of wood of about 3x3 inches with holes drilled for binding posts. Now make a reel of cardboard or wood (the dimensions are clearly given in Fig. 1). and drill a hole for a brass

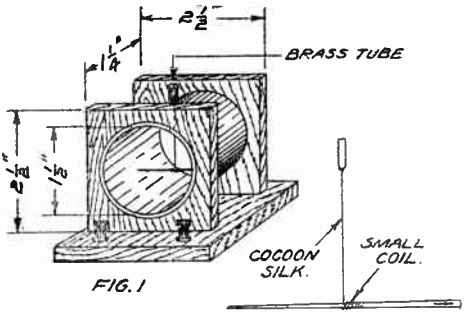



FIG. 1




FIG. 2

M.E

tube at the top. Wind about one-fourth pound of No. 30 D.C.C. wire on the reel. Be sure that the same amount of wire is wound on either side of tube.

Now magnetize the finest needle you can find. Take a small piece of the wire and wrap three or four turns around the needle as shown at A in Fig. 2. Now place two or three inches of black silk thread on a sheet of writing paper. With one or two needles unravel one end of the thread until you have obtained a silk fibre that is scarcely visible to the naked eye. Put a drop of glue on the coil at A, Fig. 2, and carefully fasten the silk fibre to it. After the glue has thoroughly set balance the needle by pushing the coil toward or away from the eye. All the superfluous silk may be rolled upon the upper part of the thread.

Place the needle inside the coil; bring the end of the silk thread up through the brass tube and carefully pull the needle up till it is exactly in the center of the coil and fasten the thread with glue, to a wooden plug in the top of the tube. Next securely glue the coil to baseboard and connect to the binding posts. To exclude disturbing air currents, enclose with a glass case such as a lamp chimney. If the experimenter desires to compare currents with this galvanometer, place a graduated scale, drawn upon a piece of cardboard, just below the needle. Of course the coil must in any case be parallel with the magnetic meridian.

This instrument could be wonderfully improved by fastening a very small mirror to the needle and by causing a beam of light from a lamp to fall on the mirror, the reflected light could be focused on a scale placed on a suitable frame just in front of the lamp.

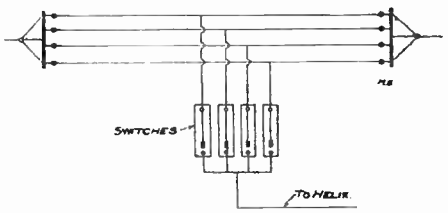
The author finds this apparatus so sensitive, that the tiny current generated by dipping a steel needle and piece of zinc (connected by wires to galvanometer) into a drop of salt water will set the needle swinging. Of course this instrument may be greatly improved in appearance, but the writer will leave that to the constructor.

Contributed by

ERNEST BARNHARD.

## ADJUSTABLE AERIAL.

If separate leads are brought to S. P. S. T. switches an aerial can be adjusted



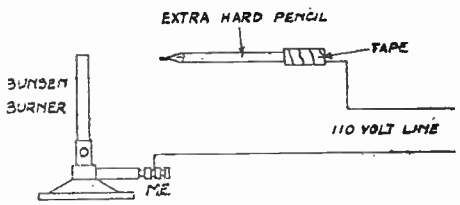

for different sizes.

Contributed by

CLEON C. HAMMOND.

## ELECTRIC GAS LIGHTER.

The drawing shows a very handy lighter for a Bunsen burner. The diagram is, I think, self-explanatory ex-




cept that I might add that the hard pencil having a high resistance, no other resistance is necessary.

Contributed by

HOWARD E. LUCAS.

## BICYCLE LAMP.

I have noticed many contributions in this magazine giving directions for making electric searchlights, but none of them have the batteries to supply them with current. The following are directions for producing a lamp that includes the source of current.

For the containing case of the batteries nothing is better than an empty hand-soap can, such as "Cleanso," "Kleenu," or similar ones. On it should be soldered a bracket to fit the one on the fork of the bicycle so

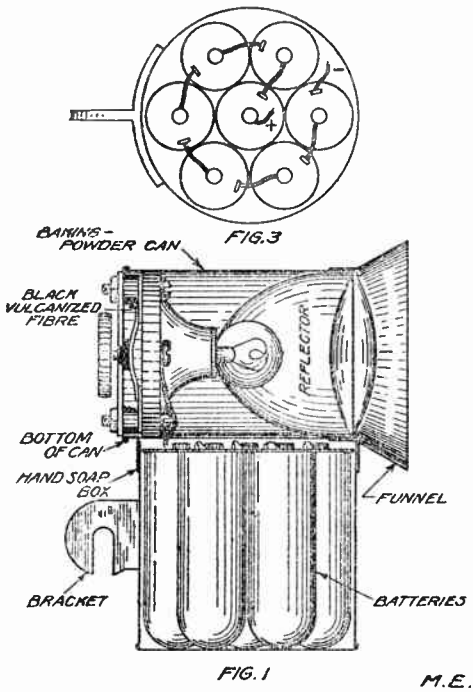



FIG. 1 M.E.

that the lamp may be conveniently attached there. The cover of this can should be punched with two holes, of the same diameter. In the box the batteries are placed and sealed. These batteries consist of small test-tubes which will easily fit into the box, and when as many as possible have been crowded in, melted paraffine should be poured around them, until it comes on a level with the top of the test-tubes.

Two good forms of cells are shown in the illustration. Fig. 4 shows the "Bennet" cell. This type is very efficient and cheap. Fig. 5 shows the "Daniell," which is also efficient, although it is somewhat more expensive than the other. Its advantage lies in the fact that it does not contain corrosive acids or alkalies. The cells are connected as shown in Fig. 3, and the wires pass through the two holes in the cover, before spoken about. On top of this cover is soldered a baking-powder can with the body cut off below the ridge underneath the cover.

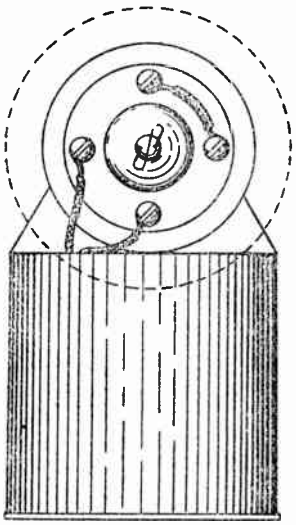


FIG. 2 M.E.

The back of this can is arranged as shown in the drawing Fig. 2. A round plate of black vulcanized fibre is fastened by two insulated screws to the bottom of the box. These screws also serve to hold the lamp socket, which should have a screw thread adapted to a miniature base. To a metal thumb-piece a metal washer should be soldered as shown, and a copper or brass spring fastened to it. This spring bears upon, and electrically connects two copper plates fas-

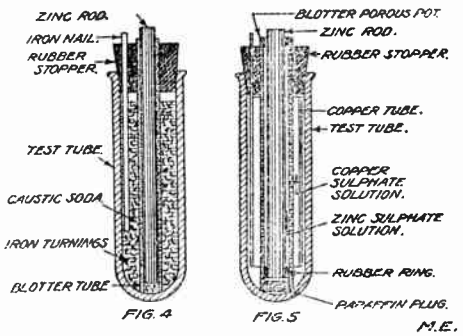
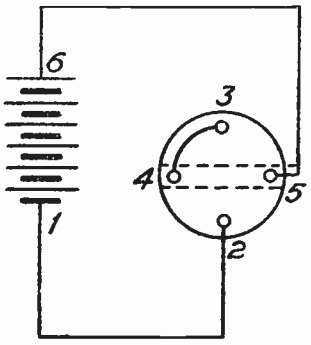



FIG. 4 FIG. 5 M.E.

tened under fibre washers to the screws mentioned above. A very concave parabolic reflector should be screwed on the socket beneath a min-

iature tungsten lamp, and a strong convex lens fastened onto the cover of the baking-powder can. Around this cover should also be soldered part of a funnel, with the seam on the lower side. The object of having this funnel is to prevent as much rain as




WIRING DIAGRAM

M.E.

possible (during a rainstorm) from entering between the lens and cover into the baking-powder can, and the object of having the seam on the bottom is to help gather the rain to that place, when it will easily drip down. The wire connections should be made as shown in the diagram, care being taken to prevent the possibility of a short-circuit.

Such a lamp, although the bulb itself is very small, will give a strong beam of light, on account of the extreme concavity of the reflector and the great strength of the lens.

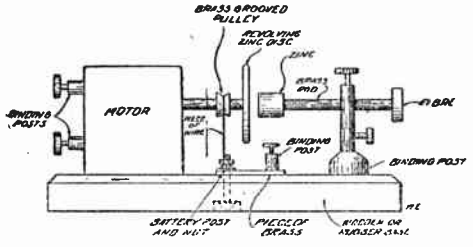
This lamp, if made as per directions, will operate during the worst snow or rainstorm without going out or short-circuiting, as most other lamps will do.

Contributed by

P. MERTZ.

## A SIMPLE ROTARY GAP.

Here is a simple rotary spark gap. If you have an old motor lying around




it can be easily made without much cost. I don't think that it needs much explanation as it is a very simple drawing, every part being named.

Contributed by

E. E. HAYWARD, JR.

(This gap will not produce a musical spark.—Ed.)

## WATER RHEOSTAT.

In the accompanying drawing is shown a water rheostat which I have used with great success on account of its very fine regulation. To make it, take a gravity battery jar, J; make a wooden cover, T, to fit this, in the center of this bore a hole large enough for rod A, to slip through, and over the hole fasten the brass collar, C, with thumb-screw, D. Lead wire, S, to binding post, B, and from binding post, $B^1$, a rubber covered wire is led to metal plate, P. Place insulating handle, H, on the rod, $P_1$. To operate simply slide the rod up and down through the brass collar until the right amount of current

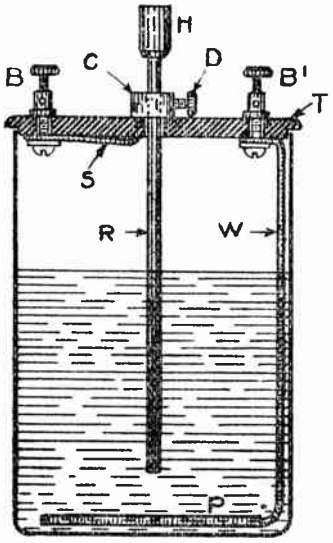



FIG. 1 M.E.

is obtained and tighten thumb-screw. The jar is filled with a solution of sal-ammoniac and water.

Contributed by

ROBERT WALLACE.

## ESCAPING GAS ALARM.

A good many people who have suffered accidental death through escap-

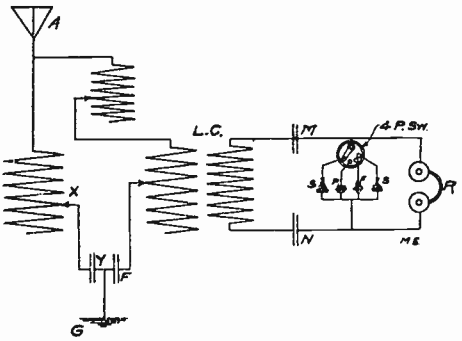
ing gas might have been spared if they had had a simple alarm to awaken them when the gas went out.

Get a small thermostat and mount same on the side of a box large enough to hold a cell of dry battery. Then mount on one of the other sides an electric bell and a one point switch. Next mount the whole apparatus on the wall behind or above the gas jet and adjust the thermostat so the bell just won't ring when the gas is burning. Should the gas, for any reason, go out, the thermostat will close the circuit and ring the bell.

Contributed by
DAVID KUSKIN.

## TONE OF RECEIVED SIGNALS.

The tone of the signals in wireless telegraph receiving set make quite a difference in the efficiency, as very deep signals are harder to read than those of a higher pitch. The hook-up given in the figure gave a tone of medium pitch without the use of coil X and condensers M and Y. Of course all stations did not have the same tone but they all were quite high. When




X and Y were added, to cut out static, the tone of the signals was reduced very much.

Condenser M was added without any thought of changing the tone, but the signals at once became much shriller. When M was short circuited the tone at once dropped and by a switch it could be regulated at will.

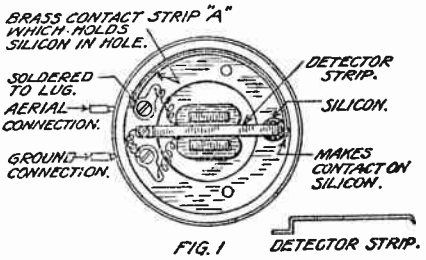
Contributed by G. TODD.

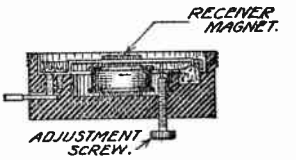
## COMBINATION RECEIVER.

First obtain a hard rubber receiver, then drill a hole between the two screws which hold the cord tips, tap the hole out to a 6-32 thread.

Next get the contact strip, A, this strip may be of spring brass, or a piece of an old clock spring is excellent, it should be long enough so it will go a little over half way around the inside of the receiver.

Most of the rubber receiver cases have a small hole bored about half way through the case at the point where the silicon is shown in the diagram, but if not a ¼ inch hole may be drilled about ⅛ inch deep. Get a piece of silicon




which will push in this hole quite snugly, then take the contact strip, A, and bend it around the inside of the case so that one end presses against the screw (c) and the other against the silicon, the end which presses against the silicon should be between the casing and the silicon, as shown in diagram. The diagram will fully describe the detector strip. This strip should spring down enough so as to make contact with the silicon when the adjustment screw is unscrewed, when the screw is screwed up it will break the contact.

Be sure and do not let the detector strip touch any metal part of the receiver magnets or the diaphragm, if it does it will ground the detector.

The writer made a set as described out of a rubber receiver by the name of "Solid" and with an aerial 20 feet long and 15 feet high it worked successfully up to 20 miles. Connections are shown in diagram.

Contributed by
GEORGE TOWNSEND

## DETECTOR HINTS.

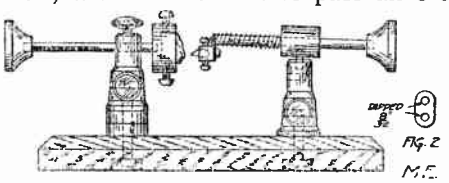
Amateurs who have trouble in making silicon, galena, and ferron, or other crystal detectors sensitive will find that by putting a small quantity of mercury in the mineral cup and then putting in crystal, it makes a perfect contact (as good as solder), and don't harm crystal. It increases its sensitiveness quite a little

Contributed by C. W. JONES,
Connecticut.

## PERIKON DETECTOR STAND.

The following is a description of a "Perikon Detector," which I have been using for some time with excellent results. It cost me exactly $.40, and was made, excluding the base, in twenty minutes. Ali the material necessary can be purchased from the Electro Imp. Co., and will conform nicely.

The base is of mahogany, 3x5½ inches, and beveled to improve its appearance. If this cannot be procured, a S. P. D. T. switch base will do nicely. The two standards, are double binding posts. The one supporting the zinc crystal is set on two 3-16 inch washers. When fastening it down it should be let a little loose, and a drop of oil be placed between the washers so as to act as a swivel. The other one is set directly on the base. A large brass washer or pillar is next procured; with a hole in it to pass an 8-32

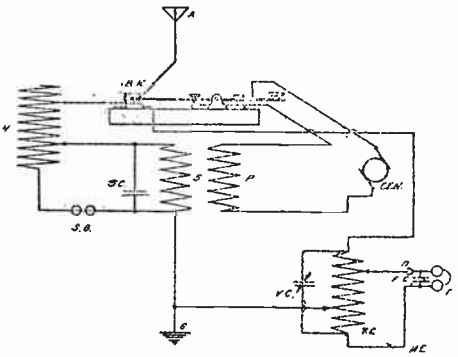



machine screw. It should be ⅝ inch high and ½ inch in diameter. A hole is drilled in the side, just deep enough to get a few 8-32 threads in it. A small piece of threaded brass rod fastens it on the binding post. However, it should clear the top by about 1-16 inch so as to revolve in a semicircle freely. Both the rods are of 5-32 inch brass, threaded 8-32 at both ends. The spring should be rather weak, fine phosphor-bronze wire is best. I think the drawing explains the other points. Fig. 2, is the small piece which allows the copper pyrites cup to revolve in a small arc. It is cut out of 1-16 inch brass sheeting, and the holes bored about ¼ inch apart. The size is dependent on the size of the cup used. The pressure on the minerals can be varied by moving the zincite mineral backwards or forwards. It may take a little while to get used to this detector, but it is very sensitive, and there is no possible adjustment which cannot be made; it being possible to reach every point on the zincite. Also, when sending, instead of shorting the detector, the minerals are disengaged, thereby saving them from being burnt out.

Contributed by
GEO. W. KELBY, JR.

## BREAK KEY.

Here are directions for making a break key. The material required is as follows: One ordinary key, a piece



of fiber 1¼ inch long and ¼ inch wide; three pieces of brass, one, 2½ in. long, the other 1½ in. long and the last ½ in. long. All of the brass is ¼ of an in. wide. Three binding posts can be obtained from the E. I. Co. very cheap, and if the base on the key is large enough a new base is not required.

The brass ½ in. long is bent around the piece of fiber and a piece of wire, size 22, is soldered to the brass and passed down to the binding post as in figure No. 1.

The fiber should next be fastened to the key as in figure No. 1. The brass for the contacts should be bent as in figure No. 2, the biggest piece of brass being on top. They should then be fastened on to the base as in figure No. 1.

The hook-up is very easily mistaken as the sending set must lead from the top binding post.

Contributed by ARTHUR SKAALE.

## HUMAN BATTERY.

One evening while sitting, studying and holding the chain of my glasses in my hands, I accidentally touched the filling in my tooth with the chain. Immediately after that it came to me that it must be very unpleasant to get a stroke of lightning on the nerve of a tooth, judging from the shock I got.

Now when anything like that happens I like to investigate it further, so I tried it again, and could taste the effect of the current. Not satisfied with this, however, I tried holding one tip of my receiver between thumb and finger of one hand (moistening fingers), and touching other tip to filling in tooth, being careful of course not to short-circuit it through my other hand.

The clicking was quite loud and I think it has some advantages over the receiver tester I read about, which was formed of a dime and a penny and a wet blotter.

I have never heard of this novel battery being used before, and hope this will be interesting.

Contributed by

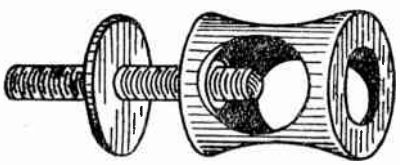
L. R. PHILLIPS,

This fellow has been reading about my stunt in which I used my gold tooth for a wireless receiver. I wonder if it made his teeth click? If he got a stroke of lightning on the nerve of his tooth he would discover that he had died a sudden and painless death.

"FIPS."

## MINERAL HOLDER.

Here is a simple mineral holder that can easily be made by any one having



M.E.

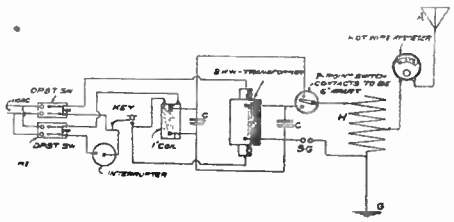
a lathe. It may be made of brass, copper, or zinc, and forms a quick and easy mounting for small crystals.

Contributed by

H. C. HUTTEBALL.

## COMBINED HIGH AND LOW POWER SET.

The accompanying diagram shows how to work a 2 k.w. transformer and a 1 inch coil on the same helix, spark gap and hot-wire ammeter with one key for operating both transformer and coil at will. By throwing the switches shown



in diagram you can operate either transformer or coil without discharging both at the same time.

I have been using this hook-up for over a month and I find it works with success.

Contributed by

CHESTER E. WATKINS.

## FINDING POLARITY OF ELECTRIC WIRES.

The polarity of wires can be found by placing the ends of the wires in a common white potato cut into halves. The wires should be placed a small space apart, the distance depending on the voltage. The positive wire of a direct current circuit will turn the potato green and the negative side will remain uncolored. Both ends of the wire on alternating current will turn the potato green.

This method can be used in finding the polarities of current from one dry cell up to 500 volts direct current, the only difference is that with very low voltage the wires should be placed in the potato closer together than with higher voltage. In using 110 volts, the time necessary to determine the polarity is about 10 seconds and with a current of 210 volts, about one minute.

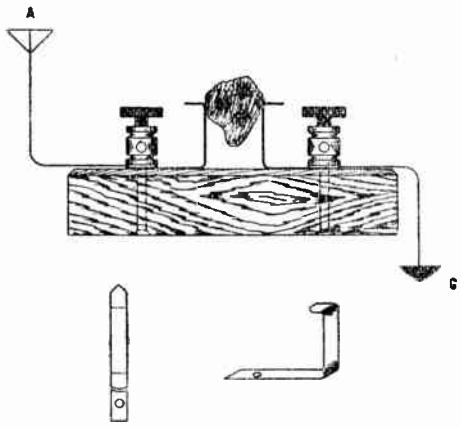
Contributed by

F. ELLSWORTH SICKELS.

## A SIMPLE MINERAL DETECTOR.

The parts of the instrument are mounted on a hardwood base, 5x2x1

inches. The edges may be bevelled to give it a nicer appearance. Next procure two binding posts about 1½ inches high (nickel-plated are the best) and attach them to the base by means of the screws supplied with them. On the




top of these screws place a thin washer (cut out of the same material as the prongs); next cut out two pieces of thin brass as shown in Fig. 2 and bend them at the dotted lines with a pair of pliers so that they correspond with Fig. 3. Now under the binding posts and on top of the washers place these two pieces so they will stand upright in the form of two prongs. When you have gotten the detector assembled it should be shellaced and varnished.

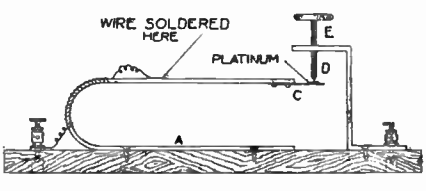
The mineral, as you will see in Fig. 1, is lightly placed between the two prongs. It should be cut in the shape of a rough triangle—silicon gives the best results.

Contributed by

C. W. BURNS.

## A SIMPLE FLASHER.

Here is a simple and cheap flasher for use on battery circuits, for flashing small




battery lamps or any other purpose that may suggest itself to the experimenter. It should not be used on the 110 volt lighting circuit because the arc will rapidly burn up the contacts.

A, is a piece of steel ½x1-16x8 inches. B, are wood screws, C, a piece of thin brass, D, platinum contacts, E, a set screw for adjusting the device. The winding is composed of about eight feet of No. 36 single silk covered wire, one end connected to the binding post, and the other end soldered to the spring as shown.

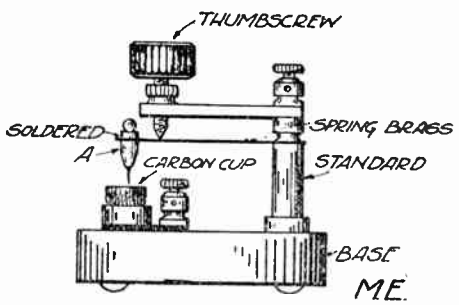
When more than 1½ amperes flow through the fine winding the latter heats up and causes the spring to bend so as to break the circuit at the contacts. When it cools off the spring straightens out again and closes the circuit.

Contributed by

FRANK E. STIER.

## IMPROVED ELECTROLYTIC DETECTOR.

In no wireless instrument have makeshift methods been more often resorted to than in the electrolytic detector. Designs for such detectors by men admittedly experts in the field display most amateurish crudity. The stumbling block has been, of course, the attach-




ment for holding the delicate Wollaston wire. Amateurs become disgusted with fingering minute screws and discard a most excellent detector for a more convenient, if not so efficient, type.

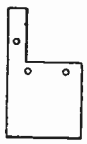
The detector shown overcomes the difficulty in a novel way. *A* in the drawing is nothing more nor less than a tie-pin guard which may be obtained at any jewelry store, slipped through a suitable hole in a piece of spring brass and soldered thereto. By this method, putting in the Wollaston wire is made an easy matter and the principal objection to the electrolytic detector is removed.

Contributed by

LEWIS C. MUMFORD.

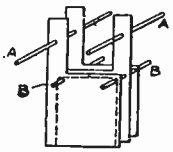
## SIMPLE AND EFFICIENT METHOD FOR HANGING AND SEPARATING STORAGE OR OTHER BATTERY PLATES.

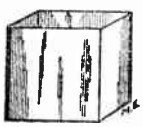
The following method of hanging or supporting battery plates in a jar, does away with the necessity of having a supporting block in the bottom of the jar which always tends to short circuit through the accumulation upon them of metallic particles shed from the plates.



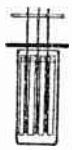
-FIG. 1-

-FIG. 2-



-FIG. 3-



-FIG. 4-

While it is true that some storage battery plates have lugs by which they are supported on the edges of the jar, it adds an inactive weight to the battery and does not provide for the support of proper separators for the plates.

The rods AA and BB in Fig. 3 and the U-shaped piece in Fig. 2 are made of glass tubing or rod, although there is no objection to using hard rubber, paraffined wood or other insulating acid impervious material.

Fig. 1 shows where holes are to be bored in the plates of such a size that the rods AA and BB may be easily slipped through them.

The best way is to lay the positive and negative plates of each cell one upon the other in their proper relative position and clamp them together and then bore the holes through them all. This will ensure that the holes will all be concentric when the plates are assembled in the jar.

The U-shaped piece as in Fig. 2 is made out of glass tube and bent to that shape after heating over an ordinary flat flame gas jet. It should be of such width as to easily slip over the rods BB and hang upon them with the ends reaching to the bottom of the plates, as shown by the dotted lines in Fig. 3. A U-shaped piece should hang on the rods BB between each plate, thus keeping them out of contact with each other.

The rods AA are of sufficient length to rest upon both sides of the jar and pass through the plates at such a point as to support them in the jar without their touching the bottom. The rods BB are made only long enough to pass through all the plates (when the U separators are in position) and to slip in between the sides of the jar.

Fig. 4 shows the plates hanging in the jar on the rods AA before the U separators are slipped into place between each plate.

Fig. 3 shows the plates assembled and ready to hang in the jar.

In practice it is found that glass tubing of medium wall and 3-16 inch diameter answers very nicely for supporting three lead plates in a jar just wide enough to hold them; the total weight of the three plates being eight and one-half pounds.

The same method answers very well for supporting and separating the plates of electrolytic rectifiers.

Contributed by R. V. WILSON.

## AN IDEAL CIGAR LIGHTER.

A simple cigar lighter can be easily made by first taking a piece of pine wood about 8 by 3 inches and two blocks of wood one inch square and nailing, the blocks on the base, about one inch from

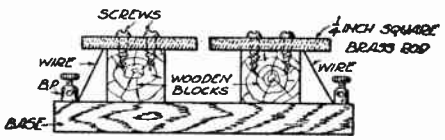



FIG. 1

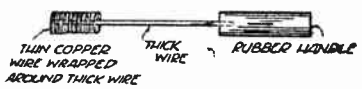



FIG. 2

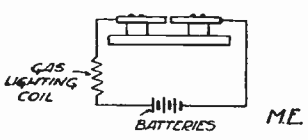



FIG. 3

the edge. Next get two pieces of ¼ inch square brass rod, each 3 inches long. Drill two holes in each piece of

brass and screw them to the blocks, so as to form a gap of ⅛ inch between the two pieces. Then put a binding post on each end of the base and connect the rods with the binding posts as in Fig. (1). After this is finished take a piece of thick wire and on one end put an insulated rubber handle and on the other end wind some uninsulated copper wire, as in Fig. 2. Obtain an electric gas-lighting spark coil, which will not cost more than sixty or seventy-five cents, and three good dry batteries. Connect the coil and batteries as in Fig. (3), and dip end of the lighter itself, shown in Fig (2), in a little alcohol. Then place the end of the lighter on both the pieces of brass rod, in the gap, and by doing this the copper end of the lighter will close the circuit, and when taking it away it will make a spark, which will ignite the alcohol.

Contributed by
FRANK GREENFIELD.

## A FIXED CONDENSER.

Make a board three-quarters inch thick by 5¾ inches long by 3 inches wide.

Make another board three-quarters inch wide, by 5 inches high by 4¾ inches wide, nail or screw them together as shown in Figs. 1 and 2. Procure two

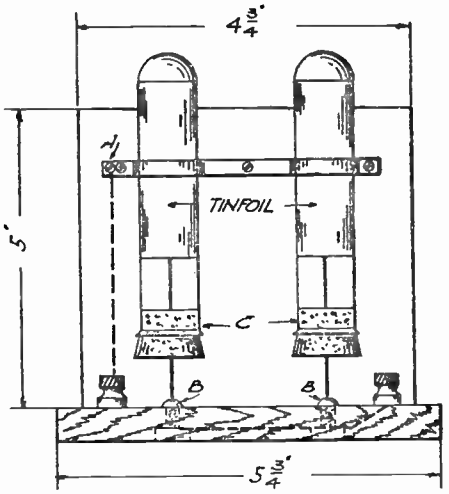



FIG. 1

test tubes seven-eights inch by 6 inches, coat the inside and outside with tinfoil 4 inches wide. When this is done, procure two pieces of No. 14 copper wire about 6 or 7 inches long, solder to one end of each wire some fine copper wire taken from lamp cord. Then run them through corks that just fit the test tube, C, Fig. 1. The fine wires are to make contact with the inside foil, Fig. 4.

The tubes are held to the base by the battery binding posts, B, and the strip

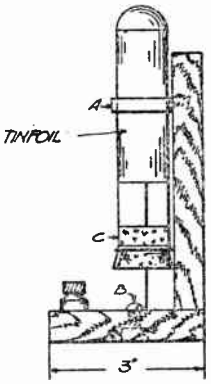



FIG. 2


FIG. 3

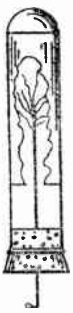


FIG. 4

of brass, A. I think the drawing will explain any other questions.

Contributed by B. CARLSON.

## SEALING STORAGE BATTERY TERMINALS.

Most amateurs who use storage batteries in connection with their wireless stations find that sooner or later, the composition around the terminals becomes loosened, and the acid creeps up causing a bad connection.

A cheap and effective way to remedy this is as follows: Mix equal parts of benzine and asphaltum and apply generously around the terminals. Then with the vent caps removed apply a lighted match to the mixture and allow it to burn not longer than 30 seconds. This melts the composition and the asphaltum mixes with it and forms a tough elastic surface which will not crack easily. It is important that the vent caps be removed so that any hydrogen can escape, else your battery would be liable to explode.

Contributed by
EDWARD HUTCHINSON.

## ELECTRIC TIME RECORDER.

It is often necessary to have a private watchman in addition to the police protection. To eliminate the necessity of relying on the honesty of the watchman to make his tour of in-

spection at the appointed hour, the time recorder described below can be made, at a cost of about one dollar, and a few hours' labor, which will record the time the watchman arrives. Secure an old battery bell, push button, bell wire, and a small piece of old typewriter ribbon. Remove gong from bell and fasten the bell as (A) Fig. 1 to a wood carriage that will slide (B), Fig. 1, having a screw with a wing arranged, (H), so that the carriage with the bell can be clamped in place. Remove the case from the alarm clock, also minute hand, alarm hand and second hand if there should be one, leaving nothing but the clock movement, printed dial and the hour hand and the winding key. If the dial on the clock measures four inches (J), arrange clock movement (C) on block of wood (D) so that the recording paper dial (E) Fig. 1, nine inches in diameter will clear the slides (B) Fig. 1. This will bring the pinion with the hour hand (F) in a line with the hammer of the bell (G) Fig. 1. Place a piece of wood 2½ inches by 1 inch about 1-16 of an inch in back of the paper dial (S) Fig 3 on to which a piece of metal has been fastened so that it will be right in back of the hammer of the bell, also fasten a strip of thin metal (T) Fig. 3 just a little wider than the typewriter ribbon, so as to keep the ribbon from interfering with the revolving paper dial. Sew the typewriter ribbon to a stiff wire attached to the carriage (L) Fig. 2, so that the hammer of the bell will strike about the center of the ribbon, the other end of the ribbon should be attached to a spool (M) Fig. 3, which will give the ribbon free movement and held taut by a rubber band (P) Fig. 3. To make the paper dials, secure some fairly stiff bond paper or manila wrapping paper, and with a compass take the radius of the clock dial from the center to the outside edge, then add to this radius 2½ inches and with this draw a circle on the paper to be used for the dials. This circle is to be the size of the dial when cut out. The circles for the division of the days, the first for Sunday will be one-half inch from the outer edge of the dial and the others for the remaining days one-fourth inch apart, next divide the dial into 12 equal parts, which can be done with a 30° and 60° triangle. Number these divisions counter clockwise as shown in (W) Fig. 2. Cut a small hole in the center of the dial so that it will slip over the hour hand and around the pinion. Set clock to the time of the day. To set the dial if the hour of the day were 12 o'clock, the hour hand

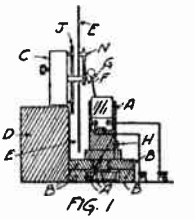


FIG. 1

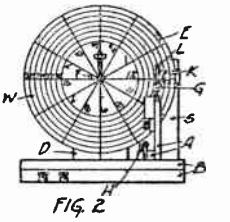


FIG. 2

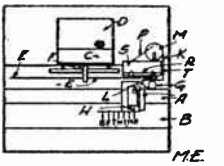


FIG 3

should be pointing to 12 on the clock dial and number 12 on the paper dial should be directly under the hammer of the bell. Fasten the dial to the hour hand by pasting a small piece of paper, over the hour hand, to the paper dial as in (N) Fig. 1. The carriage with the bell is to be moved each day so that the hammer strikes in the division marked for that day. Put the push button in the place you desire to have inspected most by the watchman, and connect up just as you would an ordinary house bell. When the button is pushed by the watchman in his tour of inspection it will make the bell hammer clatter against the typewriter ribbon and mark, the time of his arrival, on the dial. Contributed by

J. O. E. DIETERICH.

## SQUIRRELS DESTROY INSULATION.

Trouble with the electric lights at Krug Park in Saint Joseph, Mo., has been traced to the gnawing propensities of the squirrels. The electric-light wires were brought into the building through a cage built for winter quarters for the squirrels. In was found that one of the squirrels had eaten all the insulation off the wires, with the result that grounds and short-circuits were frequent.

DAFFY NUMBER

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Vol. OX14 April No. 016

## IDIOTORIAL

**Our Editor.**

On account of taking his semi-yearly bath the editor-in-chief found it impossible to write his usual elevating editorial howl and the "Screech" is compelled to go to press without it.

**NOTE.**

On account of the very superior daffyness of the "Screech," we find it necessary to reduce the price of this sheet to 5 untuned waves, beginning with the next issue. We have made arrangements with the ten greatest living dead-ones to furnish us with Kale, and have also made arrangements with the aforesaid ten gents NOT to furnish their mugs on a genuine photogravuhr, as a monthly supplement, and thus we can well afford to reduce the subscription price. We hope our readers will appreciate our supreme efforts.

## FOUR DIMENSIONAL SPACE.

A number of readers wish to have a good explanation of 4 dimensional space and we have gone to considerable expanse to secure the dope. The following account has been prepared by Professor Percy Bellyaker:

"Suppose you take a trip with me into 4 dimensional space. Presto, here we are. Nice country, is it not? Now please don't ask daffy questions, I will explain all. Kindly sit down and watch me.

"You see this egg? Very well. I am going to open it, turn it inside out, **without breaking the shell or disarranging the contents of the egg.** Now watch closely . . . . . see it is quite easy in 4 dimensional space. Now I am going to turn it back again, . . . . . see, there we are, as easy as apple pie.

"We have here an ordinary electric motor. In three dimensional space it could of course only run in one direction at a time. But now watch. I turn on the current . . . . . **see it runs in both directions, all at the same time.** It is quite simple.

"Here we have an ordinary incandescent lamp. I turn on the switch. You see it lights up. Now watch . . . . . you see I turn it inside out, glass, filament, socket and everything, even the vacuum, and you see it is lighted up still. You also note that **I did not break the glass or the filament to do the trick, nor did I disturb the vacuum.**

"What did I hear there? Did that young bonehead over yonder say that if I turn the vacuum inside out, the ether would drop out? Yes? Well you piffle-faced shrimp, step over here. That's right.

"Now watch closely, gentlemen. You see I take this young bonehead's 'Koko' and I turn it inside out, without scalping him or cracking his fossilized dome. You see why he asked such a foolish question? There is no brain inside, or outside his skull. No wonder he is foolish. Now please hand me yonder encyclopedia in 16 volumes. You see **I take out all the printing from all of the pages without disturbing the printing or the volumes or the paper.** Now you see me compress all the printing. You see I apply it to the skull of our friend. Now watch close . . . . . I turn his skull back again, leaving the printing of the encyclopedia inside the skull where there was emptiness before. Presto, there we are. Now, my friend, you are the best informed mortal. It did not hurt a bit, did it? You are now a walking encyclopedia, I congratulate you.

"The next bonehead will now step up, please."

## ALF 12B 40.

By Fips.

(Concluded.)



HE could see himself and his assistants working over the wretched canine with a fine-toothed comb and insect powder, and how suddenly the dog had shown signs of life and a violent desire to scratch himself, and how finally he had been brought back from the valley of the shadow.

He could see himself surrounded by the famous men congratulating him on his unheard of, wonderful success, and he could hear himself making the little speech in which he had said:

**"What I have achieved with this dog can be achieved with my poor "Valise."**

All this passed through his brain with lightning rapidity—a light ray in the utter darkness.

But could it be done? For the first time in his life he began to doubt his ability. He was almost afraid. What if he failed? He knew he could not live without his betrothed; only the solemn vow he made then and there, to die if she could not be brought back from the Beyond, finally gave him sufficient courage to act.

In a second he was himself again, not the lover, but the cold scientist. He instinctively felt that if he were to be successful he must not let his feelings interfere with his work.

A most important task was now before him. He had to pump an antiseptic solution through the veins of "Valise," and after that the blood vessels had to be filled with a weak solution of Radium-K Bromide, which, taking the place of the blood, has the important property of restraining the body from undergoing physical and chemical changes.

After this task had been completed to his full satisfaction, Ralph returned to the laboratory to fetch down the insect powder.

When, however, he came to examine the steelonium bomb, labeled "Insect Powder," he found that for unknown reasons the powder had escaped.

He had all he could do to keep from collapsing. His head swam and he had to sit down to keep from falling to the floor. This last blow was almost enough to drive him out of his mind. After he had had a reasonable assurance that "Valise" could be brought back, everything had been snatched away from under his very hands.

He became so despondent that he broke down completely and wept like a child. Without the Insect powder he knew he could never hope to save his dead sweetheart, as there was nothing to keep the dead body from disintegrating.

Can you imagine what the poor young man's feelings were, on his flight back to Earth? Imagine yourself enclosed in a metal flyer, all alone out in space, millions of miles from anywhere, with a dead French cow as sole company, with the chances ten to one that you will bury her on your arrival home. It is not very cheerful.

(Note. On account of lack of space we can't conclude this thrilling narrative in this issue. We will positively complete it in the next number. To our lady friends who have read this story with breathless interest we would say that the story finishes alright. Alf will positively fetch back to life the dead cow. It's going to be excitingly thrilling. Order your copy now.)

## Wireless Contest.

**First Prize (300) Wavelengths.**

The accompanying flashlight photo was taken in the evening but the flashlight refused to work. This accounts for the photo being rather indistinct. If it was a clear picture you would see the following:

To the right is my 69 inch spark coil made entirely by myself by means of a rat trap, too milk bottles and four tomato cans. I obtained the wire for it from our neighbor's fence. The core made of a common

Mr. Munchheimer's Station.

apple core, is insulated with two layers of straw and linoleum. The secondary was made entirely by the second hands of a dozen second-hand alarm clocks. This spark coil gives a fine 69 inch spark every time the lightning hits it.

On the center of the table is my loose coupler made entirely by myself by means of an old barrel, a discarded barn door serving as base. The primary (the barrel) is wound with ordinary barrel hoops, spaced 1-16 inch apart. The secondary, (a small sugar barrel) is wound with chicken-screen spaced 1-100 inch apart. The insulation is of best fertilizer throughout. For binding posts I use hitching posts. They make handy connectors. For slider I use a common rake, running on ball bearings on a discarded piece of street car rail. The secondary slides back and forward on a telegraph pole which, in order to work easy, is greased.

As the parts of this loose-coupler are somewhat large, I do not personally adjust the coil when tuning. A rope from the secondary goes to a wiudlass which has another rope wound upon it. This second rope is hitched to a horse. Now when I desire the secondary to be pulled out from the primary, I say "Gidd up" and the horse operating the windlass pulls out the secondary. If I catch a message I simply yell "Whoa" and the horse stops. As the entire loose coupler is on an incline, I can bring the secondary back simply by telling "Bossy" to back up and thereupon the secondary slides back, down hill as it were. The slider is operated in a similar manner by another horse. It's quite exciting to tune into a message, but after the horses are drilled in more accurately I hope to do very quick tuning. I am now working on a steam-heated telephone headgear, to keep my ears warm on cold nights when receiving. I intend to use the same phones with ice water in the summer to keep comfortable.

I will shortly send you a picture of my variable, rotary high speed condenser, which I am building now out of the parts of an old threshing machine, a discarded millstone, a worn out wash boiler, a broken cuckoo clock, and a pair of blacksmith's bellows.

I figure to use the bellows to air cool the condenser, while the cuckoo of the clock will jump out of the side of the condenser, everytime a message comes in, announcing the fact by "Cuckoo!" I like Modern Electrics immensely and when I have read it I use it as breakfast food, with cream and sugar.

**ANANIAS MUNCHHEIMER.**
**Ohgosh, Wis.**

## The Orattle.

In the first place the "Orattle" should be published only on April 1st. But as we cannot accommodate all fools, we are forced to publish it other months as well, to give the benefit of the doubt to the rest of the daffies. **We question only 3 answers at one time.** If you have no paper handy to write answers, write them on a barn door with chalk, BUT USE ONE SIDE ONLY, then send the door by mail. If a quick reply is wanted, seud 15 bones, but omit the answer. We Knead the Dough and haven't the time to reply to crazy answers. Always forget your name and address in your letters, it's simpler for us.

### RECEIVING DISTANCE.

(0199.) R. E. Lay, Oweewee, France, groans:

Q. 1. Give definition of a loose-coupler.

A. 1. A loose coupler as its name implies is loose,—unchained. If you chain it to a hitching post it is a fast-coupler.

Q. 2. How far can I receive with the following set: 1 kw. transformer, energized with a flash light battery, four spark gaps connected in multiple, a stock ticker, a set of 6 ohm receivers and six nickel plated staples?

A. 2. You ought not to experience much trouble to receive an urgent call from the nearest daffyhouse in your neighborhood.

### POLARIZED WAVE.

(0198.) A. N. Tenna Lone Hound, Miss., wires:

Q. 1. What is the parallel Decrement of a single polarized wave, 1691⅛ meters long, with the transverse value of, say 69; also does the syntonic capacity of a quenched spark give a greater logarithmic value if its plane is inclined 46 degrees to the ecleptic?

A. 1. It depends. Off hand we would say perhaps yes, but at second thought, perhaps not yes. Also it would appear, that all things being equal, or nearly so, that considering, but notwithstanding otherwise, and contrary to the adopted methods of reasoning, it could be possible in direct juxtaposition of the integrating values, that the prevailing factor of the correct results thereby obtained and in so far as their natural period is concerned, could easily be ascertained, without necessarily taking recourse to the apparent retrogressive direction of the aforementioned natural period.

# WHAT OUR READERS WANT

As announced last month, we publish below the result of the voting contest. As will be seen from the table, we have received about four thousand ballots on which our readers have indicated their preferences. In addition to the tabulated questions, the suggestions were both varied and numerous; and, during the coming year we will be governed largely by what they have indicated through their ballots.

Owing to Mr. Gernsback being in rather poor health at present, we will not immediately publish another serial story by him, but hope to be able to do this later on.

| | |
|---|---|
| I like Modern Electrics the way it is | **1580** |
| I do not like Modern Electrics the way it is | 1580 |
| I like "The Practical Electrician" | **2732** |
| I do not like "The Practical Electrician" | 1265 |
| I would like longer installments of "The Practical Electrician" | **1170** |
| I like scientific articles | **3273** |
| I do not like scientific articles | 680 |
| I like popular articles | **3256** |
| I do not like popular articles | 448 |
| I like articles "How to make Things" | **3765** |
| I do not like articles "How to make Things" | 82 |
| I would like more articles on Wireless | **3634** |
| I would like less articles on Wireless | 379 |
| I like Mr. Gernsback's serial story | **3005** |
| I do not like Mr. Gernsback's serial story | 1074 |
| I would like another serial story by Mr. Gernsback | **2520** |
| I like short stories | **2155** |
| I do not like short stories | 1387 |
| I like the Experimental Department | **4030** |
| I do not like the Experimental Department | 161 |
| I like the Aeronautical Department | **1496** |
| I do not like the Aeronautical Department | 2440 |
| I like the "Wireless Telegraph Contest" | **3240** |
| I do not like the "Wireless Telegraph Contest" | 552 |
| I like the Department "With the Inventor" | **2910** |
| I do not like the Department "With the Inventor" | 1080 |
| I like the "Paris Letter" | **2255** |
| I do not like the "Paris Letter" | **1326** |
| I like the "Oracle" | **4001** |
| I do not like the "Oracle" | 130 |

## NEW EXPERIMENTAL WIRELESS STATION.

A new experimental wireless station is being erected for Mr. John Hays Hammond, Jr., at Gloucester, Mass., and will be one of the most completely equipped stations in the country.

There will be no less than eight complete transmitting sets for both wireless telegraphy and telephony. These include two 2 K. W. 100,000 cycle sets and a ½ K. W. 250 volt arc set for telephony, and two 5 K. W. 1,000 cycle, one 3 K. W. and one ¼ K. W. 120 cycle, and a 2 K. W. 60 volt D. C. induction coil set, all for telegraphy.

The aerial is to be 350 feet long, and supported on towers 340 feet high.

Mr. Hammond intends to use the station for experimental and research work in wireless telegraphy and telephony and the control of wireless dirigible torpedoes.

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The North American Indian had just spied Christopher Columbus.

"Wait a minute," he cried to his squaw, "maybe there's a camera man in the party!"—*M. P. News.*


# The Kite as an Aid to Portable Wireless Sets

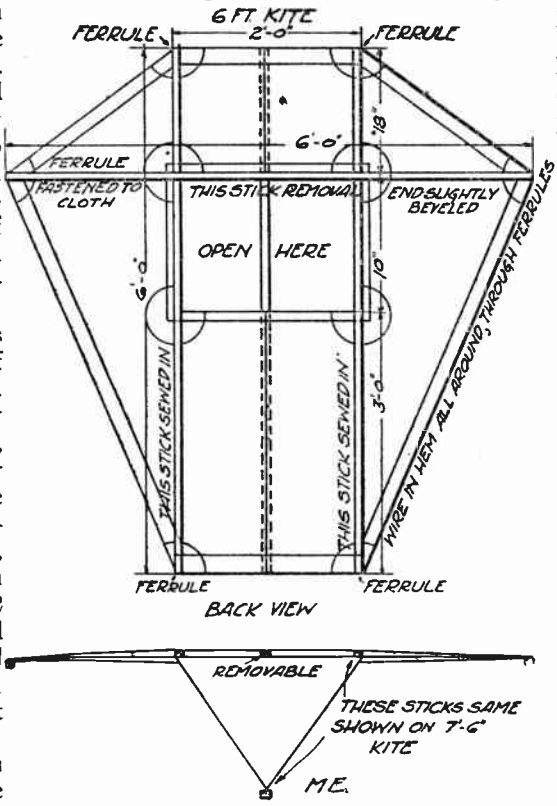
By Bruce L. Reis.

Many who have portable wireless sets are troubled when they come to raising the aerial wire.

Box-kites are best suited for the purpose although Eddy-kites are sometimes used. The Blue Hill box-kite is not very difficult to construct and still it has quite a lifting capacity if constructed with the following dimensions.

The sticks should be made of straight grained wood, which may be either spruce, bass-wood or white pine. The longitudinal corner spines A, A, should be ¼ inch square and 42 inches long, and the 4 diagonal struts should be ¼ x⅜ inch and about 26 inches long.

Two cloth bands should be made to the exact dimensions given in the sketch and fastened to the four longitudinal sticks with 1 oz. tacks. It is well to mark the positions of the sticks on the cloth bands with a soft lead pencil or crayon, in order to have the four sides of each band exactly equal. The ends of the bands should be lapped at least ½ inch and sewed double to give extra strength and the edges should be carefully hemmed making the width exactly 12 inches. Probably the best cloth for this purpose is nainsook, although lonsdale, cambric, or light weight percaline, will answer nearly as well.

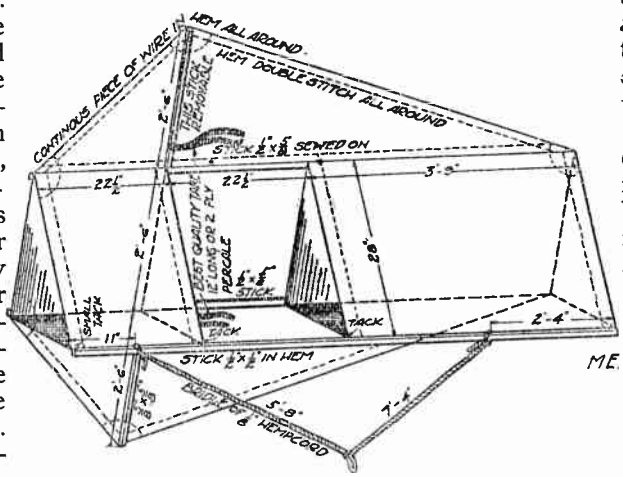



The diagonal struts B should be cut a little too long, so that they will be slightly bowed when in position, thus holding the cloth out taut and flat. They should be tied together at the points of intersection and the ends should be wound with coarse harness makers' thread, as shown at C, to prevent splitting. The small guards D, are nailed or glued to the longitudinal sticks to prevent the struts from slipping out of position. Of course the ends of the struts could be fastened to the longitudinal strips if desired, but if made as described the kite may be readily taken apart and rolled up for convenience.

The bridle knots E, are shown in detail at H, and J-H, is a square knot

which may be easily loosened and shifted to a different position on the bridle, thus adjusting the length of F, and G. A bow-line knot should be tied at J, as shown, to prevent slipping. If the kite is used in a light wind loosen the square knot and shift nearer G, thus shortening G and lengthening F and if a strong wind is blowing shift towards F, thereby lengthening G, and making F shorter. In a very strong wind do not use the bridle but fasten the string securely to the stick K.

In flying a single kite the old fashioned method is employed, except that it is unnecessary to go to the summit of a hill or to the top of a building as is generally done. An open space is selected where the breeze is blowing steadily in one direction, and is not effected by cross currents of air caused by buildings or other obstructions. The operator sets the kite on the ground on end. Holding it upright by the cord, he gives a vigorous jerk and at the same time walks rapidly away. This motion is generally enough to start the kite upward. As it ascends the operator allows the cord to slip through his hands until the end is reached or the kite is high enough to keep it from sinking. (Usually 200 feet are enough to keep it in the air.)




If one kite does not possess enough supporting power, two or more may be sent up in tandem. This requires considerable skill, but it may be done if the operator is careful. Proceed as follows: First, a large Eddy-kite (bow-kite) is sent up as an aerial rudder to steer the others and keep them in the right positions. As soon as it is high enough to allow the breeze to sustain it, another is started and allowed to ascend the same distance. The cords connected with both are tied to a small iron ring and to this is also knotted the main or trunk cord which is usually piano wire. The two kites are raised from 200 to 300 feet higher, the reel is fastened and another independent kite started up until it will sustain itself and the cord to which it is attached is fastened to the main line. The reel is unfastened and 200 or 300 feet more put up and another kite fastened on as before. Thus seven or eight kites may be connected with the ground by the same cord. The aerial wire is fastened at the point where the last kite branches off as it might be called. The upper kites are of the bow or Eddy variety while the lower ones are of the box variety as it is found that this combination is better and steadier than if all were of the Eddy or vice versa.

When a tandem of six kites is flying in a breeze of ten miles an hour it requires a strong man to pull in the line even a few inches. Care must be taken to send up the leaders in the face of the breeze and that the others are added at equal distances, otherwise they may get tangled. If properly put up, the kites appear as if they were merely floating on the breeze.

Aluminum wire may be used if too many kites are not sent up at once, such may be too much of a strain on the wire. *CAUTION must be used when using aluminum or piano wire, because when the wire reaches an altitude of* 1,000 *or* 2,000 *feet powerful shocks are obtained.*

Another excellent kite is the "King Kite" which is now being used by the U. S. Signal Corps.

The wireless antennae being carried aloft by 2 large kites, one being 6 feet and the other 7½ feet.

## FRAME.

The frame is made of straight grained spruce, free from knots, cracks and other imperfections and secured in position by means of phosphor bronze cord.

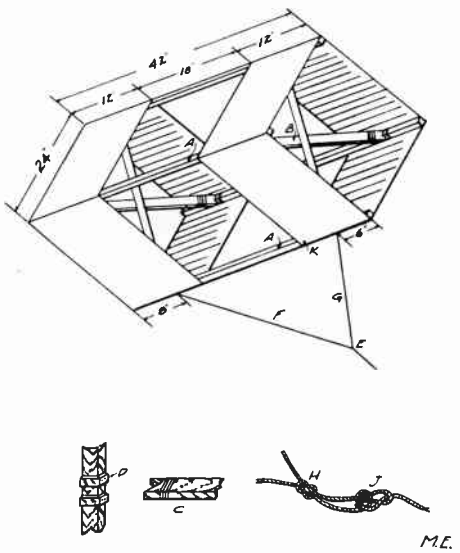
The dimensions are shown in drawing No. 1.

### ANTENNAE.

The antennae comprises the connection from the bridle to the operator of the kites. It is made up of 600 feet of phosphor bronze cord.

### COVERING.

The covering of the kites is the best




Blue Hill Box Kite.

quality percale, light slate color and all seams are doubled and corners reinforced.

### BRIDLE.

The bridle is of best quality hemp cord ⅛ inch in diameter and should be made to dimensions given in drawing No. 2.

When flying the Blue Hill Box-kite you must be careful not to get the kite going to one side as this often causes diving and sometimes destruction to the kite.

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## A WIRELESS SAFETY NET.

The use of the wireless as an aid to saving life at sea never before has been so thoroughly and often tested as during the last four months off the Atlantic seaboard. No week has passed that has not brought its tale of at least one shipwrecked crew claimed from death through the agency of the wireless either as an appeal for help or as an order from Washington to warship or revenue cutter to act as rescuer. The Government proposes to add to its resources in this field of humanity by requiring all naval ships off our coast within the range of naval wireless stations to send regular "position reports" to the Navy Department giving the position of the vessel at the time the message is sent, her course and rate of speed. With such information on file the department will be able to locate any of its vessels on or near the home stations, and thus will be able to send one to the relief of a ship in distress at the least possible notice.

This will inclose our coastal waters in a kind of wireless net, under the meshes of which officers and men in the merchant marine and passengers on liners will feel much safer than they have in the past.

This extra step toward making life at sea more secure should point the way to Great Britain to change her naval rules regarding the use of the wireless. Then there never need be such a shocking affair as the wreck of the Delhi and the rescue of members of the royal family by French sailors simply because the wrecked vessel could not signal to Gibraltar for relief, the Admiralty prohibiting merchantmen from communicating with England's ships-of-war or naval stations.—*N. Y. Press.*

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## SUES THE MARCONI COMPANY.

On March 27th, the National Electric Signalling Company, which controls the Fessenden Patents, brought suit in the U. S. District Court against the Marconi Wireless Telegraph Company of America for the alleged infringement of a patent secured by Fessenden on August 12, 1902, the apparatus covered by the patent having been invented in December, 1899.

It is claimed that in spite of the N. E. S. Co.'s claims having been upheld by the Circuit Court of Maine in their suits against the United Wireless Telegraph Company, the Marconi Company has continued to make and sell the apparatus covered by the patent.

A perpetual injunction and accounting of profits are asked for.


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

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

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

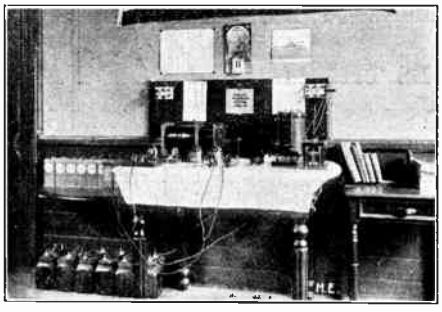
This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

## FIRST PRIZE THREE DOLLARS.

This station is the result of two years of study, and experimenting. I made half of the instruments and the others I bought. The instruments are mounted on a black walnut table.

The receiving instruments are placed on the left side, and my transmitting instruments are at the right.

The receiving instruments are: Loose-coupled tuning coil, fixed condenser, two variable condensers, two detectors, (one



Ziegler Station

silicon and one perikon), and a pair of 3,000 ohm receivers. The transmitting instruments are: Two inch spark coil, spark gaps, helix, sending condenser, and key. The transmitting instruments are run by twelve dry batteries and twelve wet batteries. I have them connected so I can use either the dry or the wet cells.

The aerial is 50 feet high at one end, and 30 feet high at the other end. It is 50 feet long, and has 6 wires No. 12 gauge, two feet apart.

For the ground I use a water pipe. With this set I am able to receive, Fire Island, N. Y.; Cape Elizabeth, Maine; Newport, R. I., and Portsmouth, N. H. I also receive messages from ships at sea, and many land stations.

With the transmitting set I am able to transmit 15 miles.

My call is AZ.

ALFRED A. ZIEGLER, Jr.,
Massachusetts.

## HONORABLE MENTION.

This is a photograph of my wireless set.

For sending I use the following instruments: Large set; ¼ k.w. closed core transformer, glass plate condenser in oil, large zinc spark gap, helix, wireless key with large contacts, secondary spark gap, pilot light, and hot wire ammeter; small set: 2 inch spark coil, Leyden jars, key, electrolytic interrupter, and spark gap.

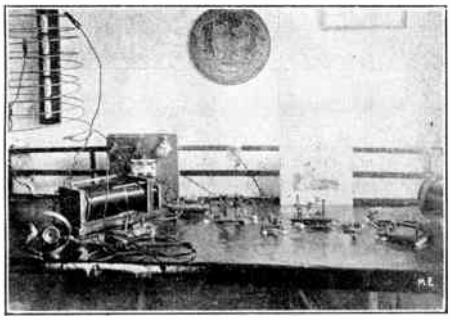
The following are the receiving instruments: loose-coupler, loading-coil, variable condenser, three fixed condensers, silicon detector, galena detector, and 1,000 ohm Western Electric headphone.

I also have a buzzer tester for the receiving set. The table is the regular navy size and the instruments are mounted in the regulation way. All instruments are mounted on porcelain

cleats and all wires pass through porcelain tubes. A large heavy D. P. D. T. quick action switch is used for changing from sending to receiving or vice versa.

The large transformer, condenser, spark coil, Leyden jars, and the fixed receiving condensers are not shown in the picture as they are mounted under the table.

My aerial is made of five copper wires 100 feet long, on eight foot spreaders and is 65 feet high at one end and 40 feet at the other.



Greulich Station

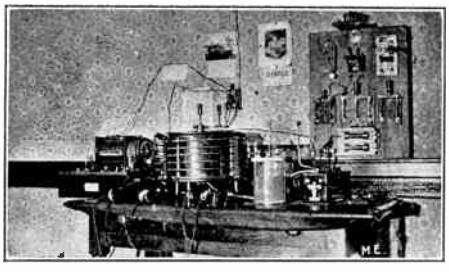
I am obtaining fairly good results with this outfit. I made some of my instruments from the many helpful suggestions found in *Modern Electrics* of which I am a constant reader.

Ohio. GERALD G. GREULICH.

## HONORABLE MENTION.

The photograph shows my wireless telegraph outfit.

The receiving set consists of large loose-coupler, fixed condensers; silicon, zinc pyrites, and molybdenite detectors,



Ford Station

and Brandes 2,800 ohm head set, also E. I. Co. 2,000 ohm set.

For sending I use: I inch spark coil, copper tube helix, muffled gap, also brass wire auxiliary helix, Leyden jar condensers, and telegraph key. The sending set is at the right and the receiving set at the left of the picture. The current used for the coil is 110 volt alternating used in conjunction with electrolytic interrupter.

The switch board controls the current and lights, also a motor generator on the floor.

My aerial is composed of four strands of No. 16 copper wire, 150 feet long, 75 feet at one end and 40 feet at the other.

Since the photograph was taken, I have added a rotary gap, also doubled the capacity of the condenser.

I have obtained excellent results with this set, can hear Washington, D. C., easily, also Cape Cod, Metropolitan Tower, New York, Portsmouth, N. H., etc.

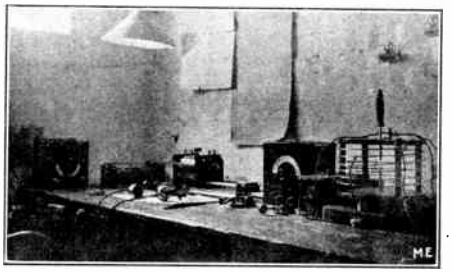
I am seventeen years old and have been experimenting for two or three years.

I have obtained much help from *Modern Electrics*, and believe it to be the best magazine for amateurs.

Massachusetts. WARREN A. FORD.

## HONORABLE MENTION.

Enclosed is a picture of my wireless station. The receiving set consists of two variable condensers, a loading coil



Smith Station

of my own construction, a tubular fixed condenser, a Murdock loose coupler, a pair of Brandes improved navy phones and a galena detector from which I get excellent results. The sending set consists of a wireless key, a double speed key, and a one inch coil which is run by eight dry cells. The condenser and helix with the spark gap in the center are of my own manufacture. At the time the picture was taken I was using another spark gap as you can see by the wires leading to it and that is why the gap in the helix is so far apart. My aerial is four strands,

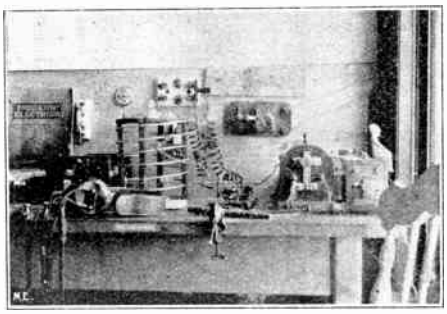
one hundred and fifty feet long. It is about 65 feet high at one end and about 45 feet high at the other.

New Jersey. CHESTER W. SMITH,

## HONORABLE MENTION.

The photograph shows my wireless equipment.

For sending I use E. I. Co. one half inch coil and E. I. Co. one-fourth inch. I use Manhattan Co. key, E. I. Co. spark gap and home-made helix. For receiving I use a double slide tuner, twelve



Plummer Station.

inches long, two inches in diameter, and wound with No. 22 B. & S. enameled wire.

I also use a loading coil with which I can do close tuning. In front of the loading coil is its electrolytic detector, and in front of the helix is a mineral detector which I made myself. At the extreme left of the picture is a dynamo which I use to run my coils. Above the spark gap is a telegraph sounder which I have connected with a neighbor. I have all the necessary switches for the above named apparatus.

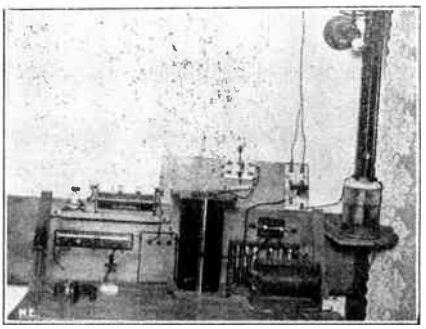
New Jersey. J. PLUMMER.

## HONORABLE MENTION.

Here is a flashlight of my wireless station. My transmitting outfit consists of the following instruments:

A two inch Electro Bull Dog spark coil, Electro adjustable condenser, spark gap, Electro sending helix and key. I use 110 V. A. C. to work my outfit, with this I use a Gernsback electrolytic interrupter. The D. P. S. T. switch block with fuses is used to turn in current. The D. P. D. T. switch is used to turn in either transmitting or receiving set.

Receiving set consists of a 1,000 ohm receiver, junior fixed condenser, fixed condenser, Electro tuner, potentiometer and peroxide of lead detector. In this I use peroxide of lead, silicon, molybdenite



Svoboda Station.

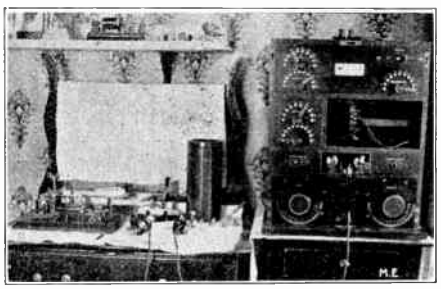
and carborundum. The switch on table is used to throw in battery current for receiving.

My aerial is 46 feet high and consists of four strands of No. 14 aluminum wire 80 feet long.

Iowa. LUMIR SVOBODA,

## HONORABLE MENTION.

Herewith find photograph of my receiving station, this set consists of an inductively coupled transformer, perikon and silicon detectors, potentiometer, (testing buzzer which is inductively linked with the secondary), two variable air condensers, one for the primary cir-



Brownlie Station.

cuit and the other for the secondary circuit, extra inductance which will give me any wave length up to 5,000 meters and a pair 2,000 ohm adjustable head phones.

My aerial is number 18 copper wire running in several directions about 200 feet long and 45 feet high in places.

I have taken messages from the following stations this winter: Guan-

tanamo, Cuba; Key West, Fla.; Washington, D. C.; Norfolk, Va., and most all the New York stations.

Mass. ROLAND BROWNLIE.

## ALLOYS FOR PERMANENT MAGNETS.

(Continued from Page 20.)

tivity of 9,200 and the fair coercive force of 39.0. In the quenched condition there was practically no change in any of the carbon free alloys. But in four cases where carbon was present the quenching resulted in physical hardening of the bars, and they became very fine materials for permanent magnets, with exceptionally high retentivities and very good coercive forces. In one case a bar with 4Mo and 0.6V attained a good coercive force; whether this was due to absorbed carbon is problematical. If the magnetic hardening took place without the aid of carbon it would indicate that the proper condition of temperature, etc., might have the same effect on the other molybdenum alloys. This is merely conjecture, however, and the tabulated results showed no hardening effect of vanadium, such as was noted for the chromium alloys.

## ELECTRIC COOKING IN DOMESTIC SCIENCE

(Continued from Page 13.)

dirt, smoke, heat, danger of fire are avoided. The electricity necessary to do the cooking costs from $8.00 to $12.00 per month for a two year period.

Everything is convenient, placed at a convenient height and easily accessible. This comfort is actually obtained at less cost than the discomfort attendant upon the use of the range. This is a hint to the housewife.

It is maintained that electricity for consumption in the kitchen is obtained at about one third the cost of electricity for home use. This is, owing to the fact that this is strictly a "day load." It comes at a time when the consumption is at a minimum all over the system, and in no way affects the "Peak," load in the evening at the generating station. This condition will be found to be fairly general over the country and the above argument ought to gain better rates for school installations.

There was an objection raised to the use of electricity in the kitchen by people in the community who maintained that as long as the girls could not have electricity at home they ought not to be taught its use at school. The objection was proven groundless. The girls do take knowledge they get in the kitchen home and they apply it easily under the conditions existing in the usual kitchen. **The essential thing in cooking is the proper amount of heat properly applied.** By the use of the regulating cooking devices in the school kitchen they learn how much heat is required. When they come to use the range they know the amount of heat they want for the desired results, and they are prepared to use the stove intelligently.

It is held that the Telluride public schools were the first in the state to be fully and completely equipped with electrical cooking apparatus. The installation was regarded as a doubtful experiment by many, but the results secured at the end of two years of trying service have proven that it is the best, the cheapest and the most satisfactory of the available sources of heat.

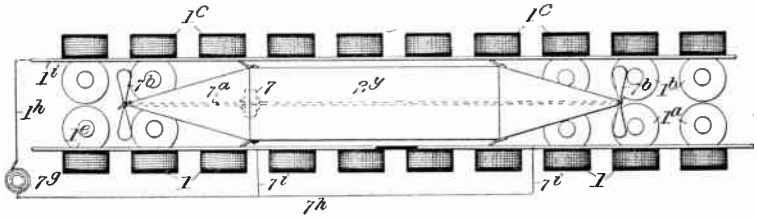
Of course cooking by electricity is in its infancy but if results secured in this electric kitchen are a reliable indication, it may be safely predicted that its general application to this part of the household's task is sure to come.

## NEW YORK TELEPHONE CALLS.

During the year 1911, the New York Telephone Company handled, approximately, 985,000,000 originating calls, of which about 470,000,000 were trunked to a second central office. These figures represent an increase of approximately 95 per cent. over last year, says the Telephone Review. On January 1, 1912, there were more than 795,000 subscriber's stations, a gain of upwards of 81,000 during the past year, and the estimated gain for 1912 is no less than 92,000 stations. The gross expenditures for plant, exclusive of real estate and central-office equipment, was about $12,500,000. The total expenditure for switchboards alone during 1911 amounted to about $2,000,000.


PATENT NO. 1,020,942, FOR LEVITATING TRANSMITTING APPARATUS, HAS BEEN GRANTED TO EMILE BACHELET, OF MOUNT VERNON, NEW YORK.

Our readers will doubtless remember the



electromagnetic train, also the electromagnetic elevator which was described some months ago in our serial story, Ralph 124C 41+, and perhaps most of them smiled at the idea that a train could move rapidly without touching rails. It appears that the very same thing has now been patented by Mr. Bachelet, and while the idea is not necessarily new, it goes to show that even the most fantastic things turn out to be true after all.

Mr. Bachelet in his invention employs the well known phenomena of levitation upon magnetic metal armatures if these are held over a coil through which passes an alternating current.

In his invention Mr. Bachelet provides coils to do this work continuously by having coils all along the road precisely as was described in our story some time ago.

While we do not think that the idea is very practical on account of the great cost involved in building such a railroad, it serves, nevertheless, to show what may be accomplished with such devices.

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MR. NOAH S. AMSTUTZ, OF CLEVELAND, OHIO, HAS BEEN GRANTED PATENT NO. 1,019,404 FOR ILLUSTRATIVE TELEGRAPHY.

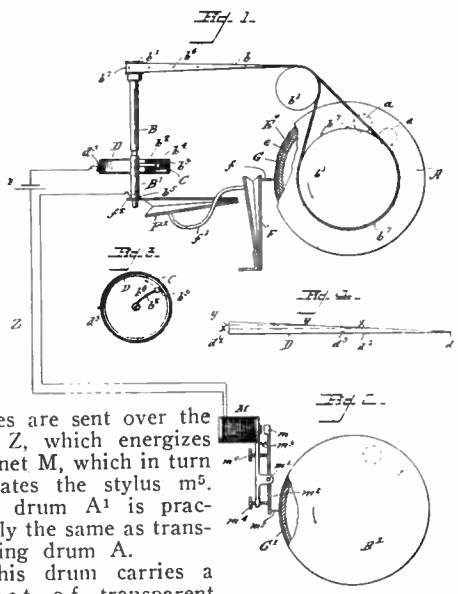
This invention relates to a simple method, whereby images may be rapidly transmitted and accurately received and reproduced at a distance.

The arrangement is quite ingenious and embodies the following points:

On the large drum A, a carbon print E is placed and the variations in the character of the profile are taken up by the point f, which is placed on a bellows F. This bellows is in communication with another bellows $F^1$, by the flexible rubber tube $f^1$. The large drum A is rotated by means of a belt b. which belt also drives the shaft B synchronously with the drum A. The stylus F is "fed" longitudinally the same as the stylus of a phonograph, and thus the stylus will pass successively above all parts of the surface of the print E.

Attached to the shaft B is a radial contact arm $b^2$, which carries a small weight $b^4$. This arm rotates within a short cylindrical box C of insulating material and the weight $b^4$ operates, by centrifugal force, to hold its tip $b^3$ in proximity to the cylindrical wall thereof. This is better shown in the accompanying Fig. 3.

By means of this arrangement contacts are made with the same ratio as the elevations and depressions of the print E and these impulses are sent over the line Z, which energizes magnet M, which in turn operates the stylus $m^5$. The drum $A^1$ is practically the same as transmitting drum A.

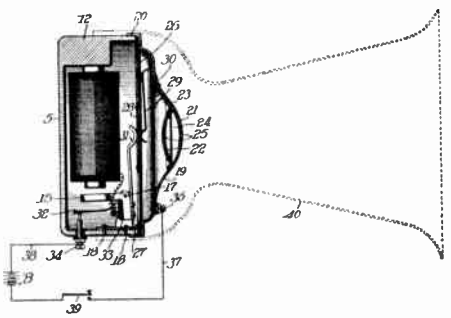



This drum carries a sheet of transparent material, such as celluloid, etc., and is covered with an easily removable coating g, such as deposited carbon. Then a picture which was transmitted on the drum A will be reproduced at the drum $A^1$.

While all these points are carried out pretty well, the inventor makes light of the fact of rotating drums A and A1. He says they may be rotated synchronously by any of the well known means. Unhappily this is a great drawback of all these inventions, as there is no device that can be absolutely relied upon to do this, and this is the reason why most of these devices are not practical enough for every day use.

## MR. CHARLES H. RETTMANN, OF CHICAGO, ILL., HAS BEEN GRANTED PATENT NO. 1,017,689 FOR AN ELECTROWHISTLE-ALARM.

Fig 1.



This apparatus is supposed to imitate a whistle and the idea should not be confounded with other similar devices which are called whistles, but really do not produce such a sound at all, but give a sound more or less like that of the automobile horn.

Mr. Rettmann's idea, which is quite original, overcomes this objection, and from the specification it appears that he has really invented an electric whistle in the truest sense of the word.

As seen in the illustration, the armature 15 is made to vibrate backward and forward very rapidly, the current being interrupted at the contact point 32.

When the electromagnet is energized the diaphragm 28 is made to vibrate at a high rate of speed by the arm 31 connected to the armature 15. This causes the air in the chamber in front of the diaphragm to be agitated very violently, causing a draft of air to be forcibly projected through the perforations 25, which produces a whistle-like note. When the electro-magnet is de-energized the diaphragm 28 is returned to its original position by the spring 29, which causes another draft of air to pass through the perforations 25, which produces another whistling impulse. Thus, when the device is operated, a continuous whistle is emitted by the apparatus.

This device is quite useful and should find a ready market.

## PATENT NO. 1,020,032, FOR SIGNALING BY ELECTROMAGNETIC WAVES, HAS BEEN GRANTED TO REGINALD A. FESSENDEN, OF PITTSBURGH, PA.

This is another new patent of Mr. Fessenden's and which has been in the Patent Office since July 27th, 1903.

The invention relates to transmission and receipt of the energy of electro-magnetic waves and more particularly to improvements in the antennae.

In Fig. 1, 5, 5 shows a horizontal wire or bundle of wires preferably of iron, insulated and of small diameter, for example No. 40 B. & S. gage. This wire or bundle of wires is extended horizontally as shown in Fig. 3, and is preferably supported at a short distance from the ground by the insulators 23 and 24.

When this form of antennae is used for receiving messages, coils 6 and 7 are wound around it, preferably near to the center and the terminals of the coils are connected to detector 8.

In the sending apparatus the idea is carried through similarly and is illustrated in Fig. 2.

Fig. 1. Fig. 2.

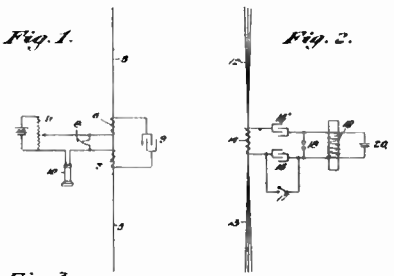


Fig. 3.

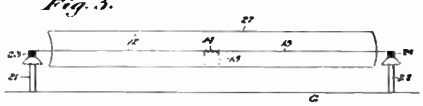
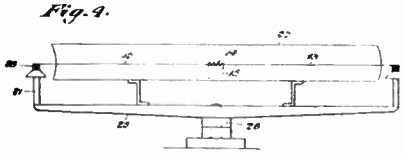


Fig. 4.



It will be seen that in the apparatus shown the magnetic or horizontal component of the electro-magnetic waves is utilized instead of the vertical or electro-static component.

It is found that a receiving antenna of this form responds only to waves impinging upon it laterally and is not responsive to waves

reaching it in the direction in which it lies, hence this form of antenna may be arranged so as to rotate about a vertical axis 26 as in Fig. 4, and be made unresponsive to impulses emanating from a given direction. This method is therefore of use for selective working, and for determining the direction from which the impulses are sent. By the use of a horizontal reflector 27, arranged parallel with the bundle of iron wire 12, 13, and supported on the wire support 25, as shown in Fig. 4, impulses may be received from one direction only, and this is specifically useful where it is desired to locate accurately the direction from which received impulses are sent. It may also be used for sending strengthened impulses in one direction.

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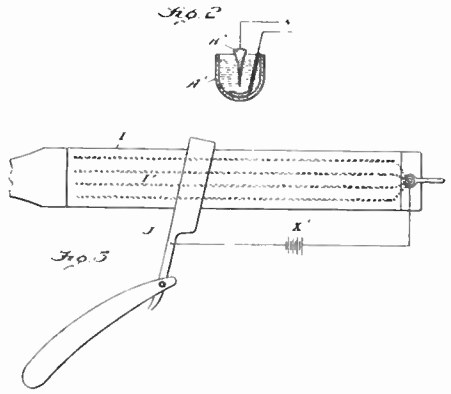
PATENT No. 1,017,671 FOR TAPERING METAL BODIES, HAS BEEN GRANTED TO CHARLES FRANCIS JENKINS, OF WASHINGTON, D. C.

This is a new invention for sharpening tools and other objects, and embodies quite a few novel points.

The invention is based upon the fact that an electric current causes acidulated liquid to




attack steel much more actively than if the current were not employed. The inventor has found that to secure this rapid electrolytic action it is not necessary to immerse the metal in a liquid bath, but that wherever the acidulated liquid is present and completes the circuit through the steel body there is, by reason of the current, more or less increase of effect upon the steel.

Our smaller illustration shows how a razor blade is sharpened electrically, but whether an actually sharp edge is obtained by this process is not known to us.

A most novel idea is shown in our second illustration, whereby a razor is sharpened electrically. The strop is saturated with a suitable electrolyte and the razor J, is electrically connected to the source X and stropped in the usual way. The inventor claims that a very smooth blade and a very sharp one will be the result.

It remains to be seen whether or not this invention will have a future.

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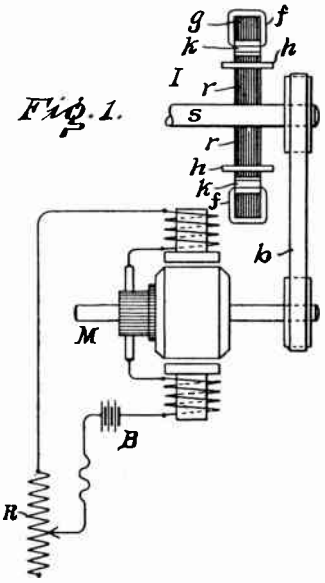
PATENT NO. 1,018,555 FOR SIGNALING BY ELECTRORADIANT ENERGY, HAS BEEN GRANTED TO CORNELIUS D. EHRET, OF ARDMORE, PA.

This invention relates to a signaling system and has for its object the transmission of messages by this means over greater distance than heretofore.

As is well understood in the electrical art, if an alternating current of a definite frequency be passed through the field winding or primary winding of an induction generator, and if the rotor or secondary be revolved at a speed above synchronism for that particular alternating current, the alternating current is boosted or reinforced, the mechanical energy consumed in driving the motor at a speed above synchronism being transformed, to a considerable extent, into the energy of an al-




ternating current whose frequency is that of the current passed through the field or primary winding. The induction generator is not self exciting and therefore the alternating current must be produced or furnished by some other means which may be known as a "frequency setter."

Another part of this invention embodies a combined magnetic hysteresis signaling receiver and induction generator. The alternator 22 in conjunction with winding 21 serves to cyclically magnetize the material of the stator 18 at a frequency which is low compared to the rate of succession of the transmitted wave trains. This slowly alternating current does not produce a note or sound in the telephone receiver T.

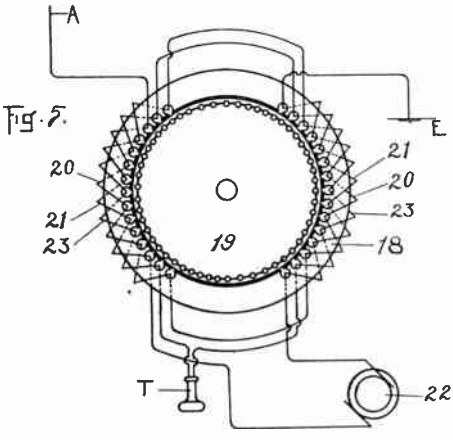


Fig. 5.

We have not the space to describe all the various points of this invention and anyone interested in this device is advised to procure a copy of this patent, which is admirably written and on which twenty-four claims have been allowed.

This was in the Patent Office since December 2, 1903.

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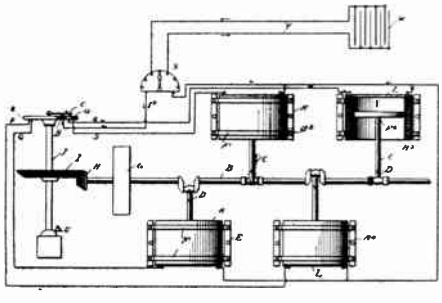
HARRY J. FORD, OF SAN QUENTIN, CAL., HAS BEEN GRANTED PATENT NO. 1,018,309 FOR AN ELECTROMAGNETIC ENGINE.



This invention relates to an electromagnetic engine and it is one of those inventions that had better not be made.

This idea of getting rotary motion by means of pistons moving backward and forward, in the solenoid A3, is at best a very crude idea and such an apparatus will certainly not work very smoothly. There are motors in existence which can be made at such a low cost that we really cannot see where the present invention would fit in.

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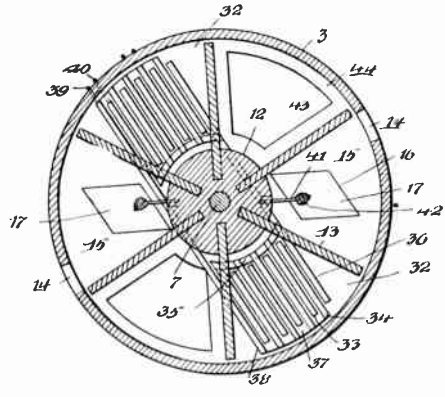
PATENT No. 1,017,875 FOR AN ELECTRIC TRAP, HAS BEEN GRANTED TO JANOS KLEMOVICS, OF HOMESTEAD, PA.

This invention relates to an electric trap, and is used particularly to exterminate rats by electricity.

When the rat enters the opening 14 to obtain the bait 42, the rat treads upon a movable platform 17, thereby depressing it and closing the motor circuit. When the motor circuit is closed, the hub 12 is operated, carrying the rotary conveyer therewith, the closing of the motor circuit will be maintained until the hub 12 has rotated a sufficient distance to bring the opposite notch into register with the pin 26, and thus allow the weight 25 to restore the platform, and hence the contacts, to normal position. At each actuation of the trap the conveyer is moved through a semi-revolution and carries the rat into one of the compartments 32 where the rat is electrocuted by contacting with the bars 33 and 34, and after it is electrocuted it is precipitated through the opening 43 into the pit or well 1, from which the rat can be removed by shifting the trap from over the pit or well.



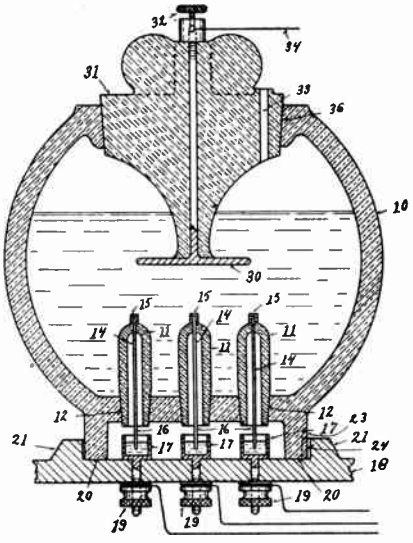

While this device is well carried through, we believe it far too complicated to be a commercial success.

The idea of the electric motor to rotate some of the parts, whereby the killed rat is discharged into a pit underneath the trap, makes the entire apparatus too complicated and too costly.

PATENT No. 1,020,698 FOR AN ELECTROLYTIC INTERRUPTER, HAS BEEN GRANTED TO JOHN ROBERT KELLEY, OF COVINGTON, KY.

This invention shows a new construction of the electrolytic interrupter, and while several novel points are embodied, there is nothing absolutely new in the invention. The only good feature about this interrupter is that in one of the designs as shown in our illustration, where the active points 15 are below the negative plate 30, this doubtless diminishes gas insulation at the points 15.

Mr. Kelley employs platinum or gold for the points 15, but we think that inasmuch as there is no regulation to be had, they will wear out soon and the tubes 11 will have to be replaced.




Mr. Kelley seals the wire 14 right into the tubes 11 and he seems to think that this greatly lengthens the life of the interrupter tubes, which, however, we doubt. Of course, his tubes can be readily exchanged for new ones, but it seems to us that this is more or less troublesome.

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MR. EDWARD ALFRED GRAHAM, OF BROCKLEY, ENGLAND, HAS BEEN GRANTED PATENT NO. 1,020,898 FOR A TELEPHONIC APPARATUS.

This invention relates to a loud speaking telephone apparatus.

Mr. Graham accomplishes his purpose as follows:

The permanent magnet 19 is energized by the electro-magnet 67 and a lever 64, attached to the diaphragm 18, causes same to vibrate energetically, which produces increased loudness and clearness of tone, which the inventor claims has not been possible to do heretofore.

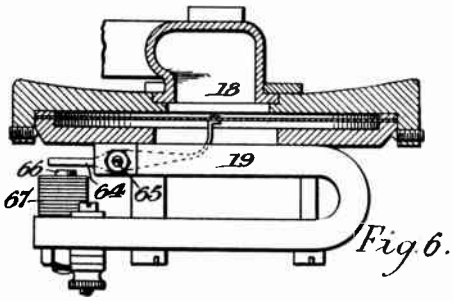

Fig. 6.

There are several other points about this invention which seems to be carried through fairly well, and it would be worth while for our readers to obtain copy of this patent with a view of studying the invention.

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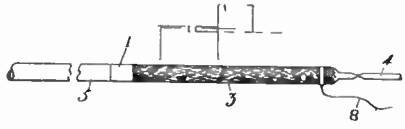
DANIEL McFARLAN MOORE, OF NEWARK, N. J., HAS BEEN GRANTED PATENT NO. 1,020,109 FOR AN ELECTRICALLY - OPERATED VACUUM-TUBE.

This is a new patent of the well known inventor.

As is well known, ordinary vacuum tubes, even the ordinary Geissler tube, when used for a considerable period, gradually deteriorate under the action of the electric current and thus lose their capacity of giving out light.

Mr. Moore's invention overcomes these defects as he introduces into the tube a chemical compound which is so disposed within the




tube that the electric current which flows between the electrodes gradually releases an element suitable for use in a gaseous condition. Mr. Moore finds that organic compounds, or substances, preferably those of the hydrocarbon class, such as come under the head of benzine, are especially suitable. Mr. Moore also uses ansic, benzoic, hippuric acid and benzamid (with nitrogen) $C_{23}$ $H_{18}$ $N_2$ $O_2$ Into the tube, the substance to be treated is introduced and this effectively prolongs the life of the tube and its light giving qualities.

The student interested in vacuum tubes should by all means get a copy of this patent, which we consider a classic.

# Insulating Materials

By Kurt R. Sternberg.

In an interesting paper read before the Association of Railway Electrical Engineers, by Kurt R. Sternberg, a brief description of different insulating substances was given. While the following is an abstract of the original paper with much of the detail omitted, a good idea of the various materials may be had.

Hard rubber is a very good moulded electrical insulation. It has high dielectric resistance and sufficient mechanical strength, can be easily worked, cut, sawed, etc., and can be polished very nicely, but hard rubber has some properties which make it impossible for use in certain cases. It is not heat-proof, but softens at about 70° C., will flow at 80° C., is not fireproof in the demands of the Fire Underwriters, and is excluded by them wherever danger of fire is a possibility. It should not be used for single and double petticoat rings, as it expands when warmed up. It also breaks down by its own fatigue and shows age quickly, as air, as well as heat, influences it. The brilliant black which it shows first slowly changes to an olive green. This is due to sulphur which is used while vulcanizing hard rubber and which cannot be bound sufficiently during the process of vulcanization.

The price of hard rubber is high, and due to this fact and reasons just stated many chemists have tried to invent good rubber substitutes.

The dye factories of Fr. Bayer & Co., A. G., Elberfield, in Germany, have been and are still working on a process of making artificial rubber synthetically. The main question at first is to make the isophren, the proper 'rubber producer,' which may be separated easily from the natural rubber. It has been found that this may be obtained from vapors of turpentine passing through red-hot iron tubes. In scientific circles, however, the opinion predominates that turpentine in itself is a pretty dear product, and ought to be replaced by a cheaper material. According to a new process, invented lately by Dr. A. Pleinemann, a mixture of azetylen and enthylen is heated to a temperature of red heat. Thus a new stuff is formed, which is transformed by methylchloride into isophren, the essential constituent of India rubber. This new process, however, has not been developed sufficiently as yet for any industrial application. Nevertheless, it must be noticed that azetylen is more suitable for making artificial rubber than turpentine, the latter being more or less a product of speculation. Azetylen is produced at present on a large scale, whereas turpentine is subjected to international speculation, the market being especially high last year. After all, however, it looks as if the German scientists will succeed eventually in making artificial rubber fit to be used in the industry, thus freeing themselves from the 'India-rubber yoke.'"

As a rubber substitute, here and abroad, some manufacturers are using shellac as a binder, with fillers such as ground mica, cotton, asbestos and others, with coloring as wanted. These make good insulations, but soften at comparatively low temperatures, and are always brittle. These insulations are made in this country by many firms who are striving to do the best, meeting certain commercial conditions, and some of them have succeeded in getting upon the market insulations, based upon shellac of good merits.

The so-called iron gummi or Iron Hard Rubber is made from guttapercha by the General Electric Company, and the United Isolatoren-Werke in Berlin, and withstands 100° C., at least, but it is not as good so far as its dielectric resistance is concerned. This dielectric resistance was tested up to 88,000 volts at a thickness of 5mm. Hard rubber of the same size and thickness was found to withstand 97,000 volts.

Isolast is made also from guttapercha, but is more heat-proof. It is made by Dr. Heinrich Traun & Sons, and has less dielectric resistance than iron gummi. A plate of 5mm was

pierced at 79,000 volts, but it can be worked nicely.

Vulkanasbest is made by the General Electric Company in Germany and is mostly a mixture of asbestos fibre with gutta-percha. The asbestos is dried so that it is very little hygroscopic, the gutta-percha is cut with benzine and a dough is made of this binder, together with the asbestos, and worked under pressure and heat.

Stabilit is also made by the General Electric Company in Germany and is the strongest German insulation material, but it takes the temper out of the steel, as it is very hard to work. It is also not exact as to size. It is made in red, brown, black and gray colors.

Tenacit is also an invention of the same company and is used on telephone and telegraph parts. It is a very good insulator, but it does not present a good finish. It is made in quality A, B, C, and D, of which qualities C is most interesting, as it resists all climatic influences.

Ambroin is made by the United Isolatoren-Werke in Berlin. Silicate of sodium and asbestos, copals, etc., by the adding of alcohol, are made to a dough, mixed in.

We further have Galalith, named after the Greek word for milk stone. Galalith is made of skimmed milk, from which the water parts are extracted, and which then is subjected to a heating process, so that we get the stone-like product casein, which is treated in an acid bath. This gives an amber-looking mixture, which is placed into forms by pressing, and is used more for combs than for moulded electrical insulation, as it is very highly hygroscopic and, therefore, not very good for certain electrical insulation purposes. It can be worked by tools and bent into forms after softening it in water. When worked with formaldehyde some better results have been obtained.

Pulvolit is very strong, but its dielectric resistance is not high; it withstands heat up to 100° C. A plate of 8 mm. thickness was pierced at 20,000 volts. Pulvolit is made by the Isolatoren-Werke Pulvolit, Frankfort-on-the-Main, recently taken over by the Isolatoren-Werke, of Munchen, Germany.

Rhadoonit is made by the Rhadoonit Works in Dohna, near Dresden, in Saxony, and is said to contain four-fifths minerals, to which under pressure and under sulphur vapors a binder partly of organic, partly of inorganic nature, is added. This mixture is pressed in hydraulic vulcanizing presses under high pressure and heat. It is very heavy, between 20 per cent. and 25 per cent. heavier than marble.

Impregnated paper cartons are hardly to be mentioned under this heading, though they are used for spool boxes and other parts quite often. They are pressed into these special shapes.

Prespan is used for insulation material in transformers, and is mechanically very strong. It can be bent, and comes in light brown, dark brown and medium brown colors. It is impregnated and boiled in clean linseed oil thinned by benzine. The time required for boiling varies with thickness from 0.5 mm. of 12 hours to thickness of 1 mm. of 12 hours.

Leatheroid is similar to Prespan, but is mechanically stronger.

## THE BIGGEST STEAM TURBINE.

The largest steam turbine which has ever been constructed has been contracted for by the Transit Development Company, affiliated with the Brooklyn Rapid Transit Company. It will be built at Pittsburgh and will have a capacity of 24,000 kilowatts. It will be installed in the Eastern District Brooklyn Rapid Transit power house. It will be completed and running by December 1 of this year.—*Elec. Review & West'n Elect'n.*

An express train in the New York Subway traveling downtown in the morning rush, usually carries, eight hundred to one thousand people, at a conservative estimate; enough to start a small town.

# Flying Sparks

HOW THE THIEF WAS FOILED.

—Meggendorfer Blaetter.

**DOESN'T SOUND RIGHT, SOMEHOW.**

Mr. Coopah — "Could you lemme look in yo' dictionary a minute, kuhnel! Jest want t' find a couple of words to add to mah lodge-office title what Ah was elected to last night. They dun chose me Grand High Most Worthy Exalted Imperial Plenipotentiary, but it strikes me dat sounds jes' a little bit cheap!"—Puck.

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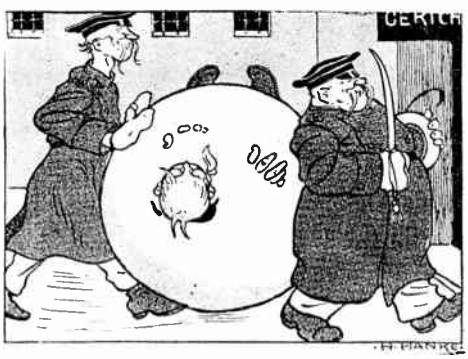
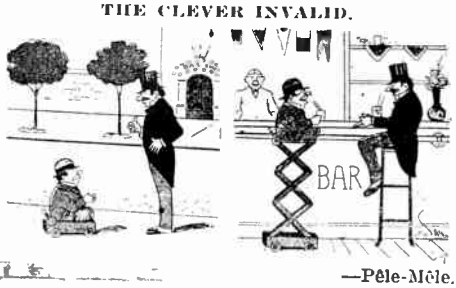
(The Tall one)—"I am awfully sorry, old chap, that I cannot invite you to a lemonade."—




THE CLEVER INVALID.




—Pêle-Mêle.

**A GOOD MIXER.**

"Bixby is a good mixer, isn't he?"

"You're right he is. I saw him passing his individual sanitary cup around in the crowd yesterday."—Cleveland Plain Dealer.

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**STRANGE.**

"I suppose you find living less expensive since you took to gathering your own mushrooms?"

"A little," replied Mr. Growcher. "We don't save anything on the mushrooms, but all our friends have quit accepting invitations to dinner."—Washington Star.

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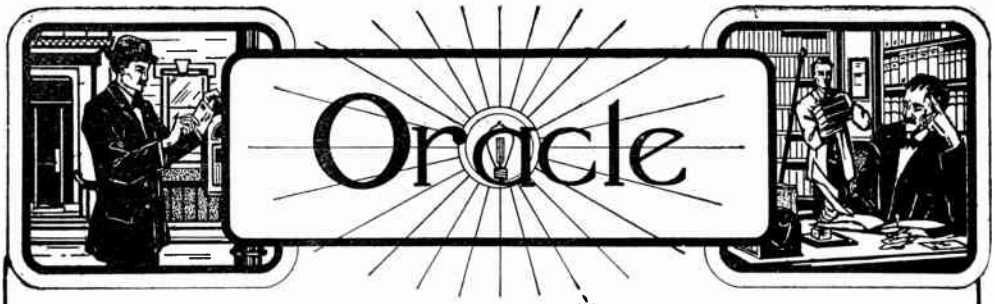
(The legless one)—"Oh that's all right, old boy, I can manage quite well —see!!"




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.

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.

Common questions will be promptly answered by mail if 10 cents to cover expenses have been enclosed. We can no longer undertake to furnish information by mail free of charge as in the past. There are as many as 150 letters a day now and it would be ruinous for us to continue acting as a free correspondence school.

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 renumeration. THE ORACLE has no fixed rate for such work, but will inform the correspondent promptly as to the charges involved.

NAME AND ADDRESS MUST ALWAYS BE GIVEN IN ALL LETTERS. WHEN WRITING ONLY ONE SIDE OF QUESTION SHEET MUST BE USED; DIAGRAMS AND DRAWINGS MUST INVARIABLY BE ON A SEPARATE SHEET. NOT MORE THAN THREE QUESTIONS MUST BE ASKED, NOR SHALL THE ORACLE ANSWER MORE THAN THIS NUMBER. NO ATTENTION PAID TO LETTERS NOT OBSERVING ABOVE RULES.

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

## A CORRECTION.

On page 820 of the February number, in answer to Mr. Harold Sachs's third question the following formula appeared in part of the edition:

$$3 \times 10^8 \ (4 \ LC)$$

this formula is incorrect and should have read as follows:

$$3 \times 18^8 \times 4 \ (LC)^{0.5}$$

this unfortunate error was due to the inability of the printer to set up the formula in its original form on the Linotype Machine. The mistake was discovered before the entire edition was run off, and this notice is inserted for the benefit of those of our readers who may have received copies containing the incorrect formula.

## LOCATION OF AERIAL.

(1957.) Frank Schneider, Ohio, writes:

Q. 1.—I live in a house, on the roof of which, I intend to put an aerial for a wireless telegraph outfit; but on one side of the house is another building which is ten feet higher than ours, and on the other, a building which is seven feet higher than ours. Would this affect my aerial if I put it between three foot poles on our roof?

A. 1.—Yes. Get your aerial as high up into the air as possible. If possible, get permission to put up poles about twenty feet high on the two buildings alongside your house and stretch your aerial between them.

Q. 2.—What sized spark coil would you recommend for a transmitting set to send six miles or over; and what company do you recommend?

A. 2.—Use a 1½ or 2 inch coil. For coil makers we refer you to our advertising columns.

## LIGHTNING PROTECTION.

(1958.) Ervin W. Eppley, Ohio, asks:

Q. 1.—Will there be any danger of lightning striking our buildings if I have my aerial fastened to a 25 foot aerial support on top of a 40 foot barn and a 65 foot mast, 160 feet away? The aerial is made of 4 No. 14 aluminum wires spaced 3 feet apart. The lead-in is a cable made of 4 No. 14 aluminum wires, one wire being connected to each aerial wire. The lead-in is taken from the barn end and goes down the side of the barn to a knife switch in a box, where it can be connected to instruments in the barn or to a ground made of a 50 foot piece of one inch iron cable. The cable leads to an old 14 foot well, 15 feet from the barn. The end of this cable is coiled up in the bottom of the well.

A. 2.—No, you should have no fear of lightning striking your barn if you have the aerial grounded during thunderstorms. Your outfit seems to be very well installed. The only improvement we could suggest would be the use of a heavy stranded copper cable instead of the iron cable.

Q. 2.—Would this aerial and ground protect the buildings any, the same as lightning rods?

A. 2.—Yes, better.

Q. 3.—Does the cable in the well make a good ground and is the four wire lead-in heavy enough?

A. 3.—Yes. See answer to your first question.

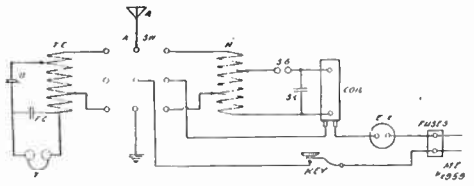
## HOOK-UP AND HELIX.

(1959.) H. A. Pulliam, Kentucky, desires:

Q. 1.—The best hook-up for a one inch coil, electrolytic interrupter, zinc spark gap, helix, sending condenser, DPDT switch, receiving condenser, 2000 ohm phones, silicon detector, and a double slide tuning coil.

A. 1.—Here is your hook-up.

Q. 2.—Is my helix, which is made of No. 8 bare copper wire, with twelve turns,



on a seven inch frame, too large?

A. 2.—No.

### FLEMING OSCILLATION VALVE AGAIN.

(1960.) Edward B. Duvall, Maryland, wants information concerning Fleming Oscillation Valve.

A.—See answer to (1956).

### TRANSFORMER DATA.

(1961.) William P. Tilley, Indiana, says:

Q. 1.—Kindly give data on a ½ k.w. transformer coil, and method of assembling and connecting the sheets of a suitable condenser for same.

A. 1.—See answer to (1937), in the February issue. A transformer needs no condenser.

Q. 2.—Is a helix 12 inches in diameter, 11 inches high, wound with No. 10 copper wire suitable for same?

A. 2.—No, the wire is too small. Use No. 8 or No. 6.

Q. 3.—Which would be best for receiving: a two slide tuner 13 inches long, 3 inches in diameter; a loose coupler primary 3 inches in diameter, 3 inches long, secondary 2½ inches in diameter, 2 inches long, with 6 point switch; or a 3 slide tuner, 6 inches in diameter and 6 inches long?

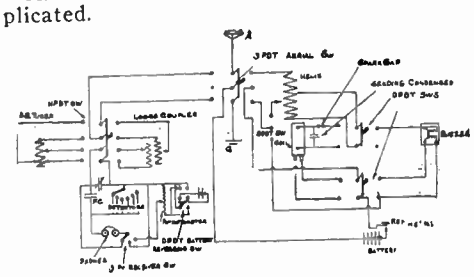
A. 3.—The 3 slide tuner is the best of the three.

### SOME HOOK-UP.

(1962.) William A. Bennett, Jr., Massachusetts, writes:

Q. 1.—Please tell me how to connect up the following instruments with the necessary switches, for receiving: Loose coupler with one slide on primary and one on secondary, 3 slide tuner, silicon, perikon, carborundum, electrolytic, and galena detectors, fixed condenser, variable condenser, and phones. For sending: batteries, 1 inch coil, key, condenser, helix, change over to buzzer, key, helix, condenser, and batteries, when wanted. I suppose it is pretty complicated, and would like your help.

A. 1.—Here it is William, it sure is complicated.



### LOOSE COUPLERS.

(1963.) Laurence Rice, New Hampshire, asks:

Q. 1.—Are two loose couplers better than one? Why? They have one slide on primary and one on secondary. Please give diagram.

A. 1.—Yes. For reason see article on Marconi Valve Receiver in the February issue.

Q. 2.—Will a two inch coil work as a one and one half inch coil with the same number of batteries needed to run a one and one half inch coil?

A. 2.—We don't know. It depends on the coils. Probably it will.

Q. 3.—How many times farther will an aerial 70 feet high send than an aerial 40 feet high? Both are the same size.

A. 3.—About three times as far.

### OSCILLATION TRANSFORMER.

(1964.) John C. Platt, Oregon, wants to know:

Q. 1.—How should a large oscillation transformer be connected?

A. 1.—Same as a small one. Connect one coil to aerial and ground, other coil to condenser circuit.

Q. 2.—What should be the diameter of the points on a rotary spark gap, to be used on a ten k.w. transformer?

A. 2.—About ⅜ inch.

Q. 3.—How should perikon be used in a detector?

A. 3.—A piece of zincite is mounted in one cup by means of Woods metal. The grain of the crystal should be up. In another cup mount a pointed piece of either chalcopyrite or bornite. Use in a suitable detector stand so that the pyrite or bornite is pressed against the face of the zincite, using a very light pressure.

### OPEN CORE TRANSFORMER.

(1965.) Norman E. Blackie, Massachusetts, writes:

Q. 1.—I am making an open core transformer as follows: core, No. 22 annealed iron wire 2 x 14 inches; primary, 2 layers No. 12 DCC wire; secondary, No. 30 SCC wire, 40 sections ⅛ inch thick, 4½ inches outside diameter. Red fibre tube over primary with ⅛ inch walls. Is that the right thickness?

A. 1.—No, the tube should have walls ⅜ inch thick.

Q. 2.—What is the rating of this transformer, to be run on battery current?

A. 2.—We don't know. On 60 cycle 110 volt current it would be rated between ½ and ¾ k.w.

Q. 3.—How far will it transmit with, etc.

A. 3.—We can't answer that. See notice in the August issue.

### RECEIVING TRANSFORMER.

(1966.) R. Ancelin, Texas, wants to know:

Q. 1.—Why is it, that a receiving transformer is more efficient than a tuning coil?

A. 1.—On account of the better adjustment of the aerial and detector circuits and their relation to each other. Almost as good results may be had with a three slide tuner.

Q. 2.—How can a receiving transformer receive, there being no connection between the secondary and primary?

A. 2.—It's action is similar in this respect to any other transformer, in which the two windings are not connected.

### I. K. W. TRANSFORMER.

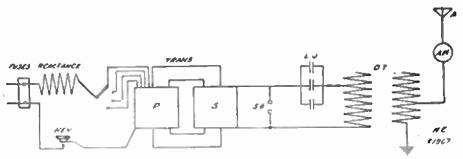
(1967.) Willard H. Conklin, New Jersey, says:

Q. 1.—Please give data for a one k.w. closed core transformer, for use on 60 cycle, 110 volt current, with a four point switch on primary for variations. Can the E. I. Co.'s block secondaries be used for secondaries of above transformer? If so, how many will be needed?

A. 1.—Core 15 x 8¼ inches O.D. Core legs 2 x 2 inches. Weight 41 lbs. Primary: 4 layers 10 inches long, No. 10 B&S DCC wire (11.3 lbs). Take a tap from the end of each layer. Secondary: 24 pies ¼ inch thick, each 1,611 turns No. 32 B&S DCC wire. Opening in pie 2½ inches square. Length of secondary: 9 inches, weight 11 lbs. Secondary voltage 12300 to 24800. Efficiency 94 per cent.

Q. 2.—Give hook-up for the above transformer, spark gap, key, one 1 gallon and two half pint Leyden jars, oscillation transformer, hot wire ammeter.

A. 2.—Here it is. Your sending condenser is not large enough.



Q. 3.—Give data for oscillation transformer to be used with above set.

A. 3.—Make up two spiral coils of copper or brass strip. Make diameter of outside turn 15 inches and space turns ½ inch apart. Mount on hard rubber frames, with means of adjusting distance between coils.

### AUTO COIL AND ELECTROLYTIC INTERRUPTER.

(1968.) Paul N. Jacobs, Nebraska, asks:

Q. 1.—What is the sending area of this outfit: One inch spark coil, etc.?

A. 1.—We cannot answer questions on sending and receiving ranges. See notice in the August, 1911, issue.

Q. 2.—Can a Gernsback interrupter be used with a Splitdorf auto coil without harming it?

A. 2.—Yes, it may be used if you connect a resistance or reactance coil in series with it so as to limit the primary current to from two to five amperes.

### POLARIZED BELL.

(1969.) Robert F. Adams, Texas, is making a 2,500 ohm polarized telephone bell and asks:

Q. 1.—What size wire should be used? Magnets are ⅜ x 3 inches.

A. 1.—Use No. 36.

Q. 2.—Would you advise the use of enameled wire?

A. 2.—Yes, but silk-enameled would be better.

Q. 3.—Should the magnets be wound in the same direction as in an ordinary electromagnet?

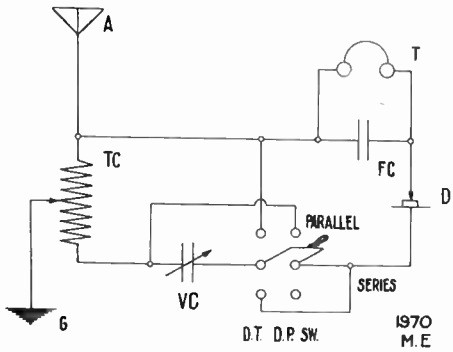
A. 3.—This magnet should be wound the same as an ordinary magnet, but the two coils are wound in opposite directions as you face the pole ends, and not in the same direction as you state.

## HOOK-UP AND GROUND CONNECTION.

(1970.) George W. Day, California, wants to know:

Q. 1.—What is the best connection for the following instruments: 2000 ohm head set, one variable condenser, one ferron detector, one single slide tuner, and a DPDT switch?

A. 1.—Here is your diagram:




Q. 2.—If I bury a 1½ inch pipe (galvanized iron) 12 feet long in the ground, lengthwise, with a joint in the middle and another piece of pipe leading up out of the ground, and fill them with water, will this make a good ground?

A. 2.—Yes, this would make a pretty fair ground. Several like this would give better results, though.

Q. 3.—Are there supposed to be two leads from the ground to the instruments?

A. 3.—Not necessarily. One is plenty if it is big enough. Ground wire should be equivalent to at least No. 8 B. & S.

## CHOKE COIL.

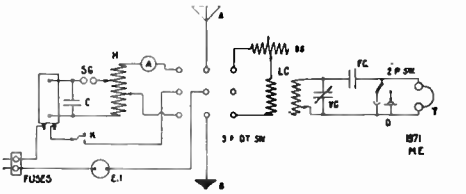
(1971.) A. M. Hunter, Vermont, asks:

Q. 1.—What is a choke coil and how is it made?

A. 1.—A choke coil is simply a coil of insulated wire wound on a laminated iron core or a core made up of a bundle of soft iron wires. The issue of June, 1910, contains a description of a good choke coil. We can furnish a copy if you want it. The price is ten cents.

Q. 2.—Please give hook-up for the following: Loose coupler, double slide tuner, fixed and variable condensers, electrolytic interrupter, electrolytic and universal detectors, two thousand ohm phones, E. I. Co.'s one-half KW transformer coil, helix, glass plate condenser, ammeter and spark gap.

A. 2.—Here it is.



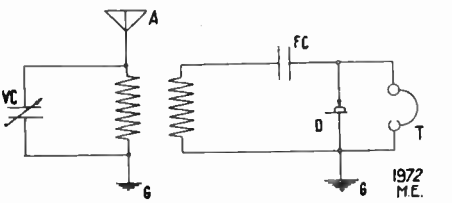

Q. 3.—How can a tuning coil be wound with bare wire so as not to short circuit the turns?

A. 3.—Wind another wire or a cord in between the turns and remove it after the winding is all on.

**SECONDARY CIRCUIT GROUNDED.**

(1972.) Edward Hutchinson, Michigan, writes:

Q. 1.—I made the discovery that one side of the silicon detector was grounded, signals come in 50 per cent. clearer when the following hook-up is employed:




I was able to hear some station sending quite plainly which I could not get before I tried the above scheme. If anyone can explain this phenomenon I should be glad to hear his theory.

A. 1.—You have no variable condenser in your secondary circuit, neither have you any means of varying the inductance of the secondary of the loose coupler. When you put the ground on it acted as a condenser and brought your detector circuit better into tune with the received signals than it was before.

**ROTARY SPARK CAP.**

(1973.) Philip T. Brown, Maine, inquires:

Q. 1.—What is the theory of the rotating spark gap?

A. 1.—When used with an induction coil and batteries it acts simply as quenched spark gap as explained in the article on the Quenched Spark in the February number. When used with a transformer and alternating current it not only acts as a quenched spark gap, but it gives a musical note to the spark which carries much better than the low frequency spark.

Q. 2.—Which counts most in transmitting, amperage or voltage, and please state why.

A. 2.—In transmitting it is energy, and not voltage or amperage alone that counts. Voltage or amperage alone will do no work except to break down insulation or to heat up the conductors; but voltage and amperage together and acting at the same time constitute power and this is what counts.

Q. 3.—What is the theory of the helix and condenser?

A. 3.—This is too long to be handled in detail here. Briefly it may be said that a circuit in which there are inductance (helix) and capacity (condenser) will oscillate (that is, the current in it will oscillate) at a definite frequency or number of times per second. These oscillations, when confined to a closed circuit are very powerful; and when this circuit is properly coupled to the open, or aerial circuit, more energy will be radiated from the aerial than if these instruments were not used.

### GROUND CONNECTION.

(1974.) Raymond Campbell, Connecticut, writes:

Q. 1.—There is a spring in our cellar, the water in it is two feet deep and three feet wide. There is a lead pipe connected to it with a pump at the other end. Would this spring be a better ground for long distance wireless work than an outside ground five feet deep?

A. 1.—It all depends on how much surface the outside ground has. As a rule grounds in water that is nearly pure are not very good unless they extend over considerable surface.

Q. 2.—Please give dimensions for a tuning transformer to pick up stations of 1500 metre wave-length, the aerial being 50 feet high at one end, 45 feet at the other, four wires eighteen inches apart.

A. 2.—Make the primary 4 inches diameter, 5 inches long, wind with No. 24 enameled wire. Secondary 3½ inches diameter, 5 inches long, wind with No. 26 or 28 enameled wire. Put slider on primary and a six point switch on secondary.

Q. 3.—Is galena as sensitive as perikon and ferron?

A. 3.—Perikon is regarded as being the most sensitive.

### DUPLEX WIRELESS TELEGRAPHY.

(1975.) A. E. Hapeman, Connecticut, asks:

Q. 1.—Is it possible to connect two receiving sets to one aerial in such a way as to receive two different stations at the same time?

A. 1.—Yes, it is possible.

Q. 2.—How does one commercial station start to call another, i. e., does it give the call of the station it wishes to communicate with, then its own call?

A. 2.—Yes, the call of the wanted station is sent out several times in succession and then the call of the calling station. This procedure is repeated until the station called answers or the calling station gives it up.

Q. 3.—What signal does a station make when it makes a mistake? Does it start at the beginning of the last sentence?

A. 3.—Most operators simply use the question mark to indicate a mistake: others use the abbreviation MSK, while others use Bk. In starting over after a mistake the usual practice is to repeat the last word spelled correctly.

### SPARK COIL VOLTAGE.

(1976.) Nelson M. Theodore, Massachusetts, writes:

Q. 1.—Please tell me whether I can use

crowfoot cells on an open circuit with success.

A. 1.—No, these cells are intended for closed circuit work, and require that current be drawn from them at least half the time in order to keep them in good condition.

Q. 2.—How many volts come from the secondary of a one-inch spark coil?

A. 2.—This depends on the length of the spark gap. It requires about 20,000 volts to jump one inch between needle points.

### REWINDING MAGNETOS.

(1977.) Ernest Ellis, Illinois, says:

Q. 1.—I have a Stromberg-Carlson 5-bar switchboard generator having an armature about 3½x1¾ inches, wound full of wire like the enclosed sample. Would it be practicable to rewind it to give a current suitable for a light on a motorcycle—the armature to be rotated by a tire pulley, and if so, what size of enameled wire, and how much must be used.

A. 1.—Use No. 20 B&S. This will give you about 4 volts. Weigh the wire now on the armature and use about the same amount.

Q. 2.—Please give dimensions, size, and quantity of wire, etc., of a tuning coil which would give good satisfaction in receiving from two miles up to about two hundred. I have 1½ pounds No. 22 enameled wire and 1 pound of No. 24.

A. 2.—The distance has no influence on the dimensions, winding, etc.—wave length is the governing factor. The dimensions, etc., included in your third question are O. K., diameter 6 inches, length of winding 13 inches, size of wire No. 22, amount required 1.4 pounds. Equip it with 3 sliders.

### HOT WIRE AMMETER.

(1978.) Joe Kisser, Minnesota, inquires:

Q. 1.—Will a hot wire ammeter improve a twenty mile sending set?

A. 1.—If you use a tuned sending set, yes—if not, no.

Q. 2.—How many feet of aluminum helix wire No. 6 B. & S. gage should I use with a 2½ inch coil, for sending?

A. 2.—This depends on how great a wave-length you wish to use. About thirty feet, wound on a frame ten inches in diameter with the turns spaced ¾ inch should be satisfactory.

Q. 3.—I live in a hollow. Would it be better to put up an inclined aerial with one end up one of the hills or to put up a flat topped aerial in the hollow?

A. 3.—Get your aerial up as high as possible. If you can't get both ends up, get one up. Have the low end toward the direction from which you desire to receive the greatest distance.

### RECEIVING CONDENSER.

(1979.) Edward P. Kennedy, Kentucky, asks:

Q. 1.—How many square inches of tinfoil should a receiving condenser contain?

A. 1.—These condensers contain from 50 to 150 square inches, depending on the capacity required.

Q. 2.—Could numbers 24 and 32 B. &

S. gauge wire be used successfully on the primary and secondary of a loose coupler?

A. 2.—Yes, these sizes would be suitable.

Q. 3.—Would a lead-in running under a tin roof affect my sending and receiving?

A. 3.—Yes, the roof would cut down considerably your range both for receiving and sending, especially so if the tin roof is grounded through the rainspouts.

### AUTO TRANSFORMER.

(1980.) Thomas W. Benson, Pennsylvania, says:

Q. 1.—Please give details for the construction of an auto-transformer for handling voltages from 10 to 110 in steps of five volts.

A. 1.—Our book "Construction of Wireless Instruments" contains, beginning on page 74, a description of such a transformer. The price of the book is twenty-five cents postpaid.

Q. 2.—I would like a formula for a varnish or stain giving a glossy black finish. This should have fairly good insulating properties, as I wish to use it on electrical instruments.

A. 2.—Black asphaltum varnish is a good insulator and has a finish like black enamel. If you don't want so high a gloss, black shellac (ordinary orange shellac mixed with lamp black) should be satisfactory. The first is better for metal work and the other is better for woodwork. Either may be had at any good paint or hardware store.

### METAL AERIAL MASTS.

(1981.) Cha Sing, Hawaii, writes:

Q. 1.—I had my aerial supported on two iron pipe masts on top of a wooden building. A friend told me that by using iron pipe for masts I would lose a part of the energy, because the iron pipe would absorb part of it. Is he right?

A. 1.—Yes, he is right. The effect of the iron pipes may be lessened to some extent by insulating the poles from ground and by breaking them up into short sections by means of insulating joints. The guy wires should also be broken up by means of insulators.

Q. 2.—I made a tuning coil 21 inches long by 6 inches in diameter, and wound with No. 22 enameled wire. How many metres, and is it too big for my station, which includes: This tuner, a variable condenser of 17 plates 1-16 inch apart, electrolytic detector, fixed condenser, potentiometer, a pair of 3200 ohm phones, and batteries? My aerial is 70 feet high at one end, 40 feet at the other and is composed of 6 No. 14 aluminum wires spaced 18 inches apart.

A. 2.—No, you should get satisfactory service from it with your set. The wave length of the coil is about 1500 to 3000 metres.

### NUMBER OF AERIAL WIRES.

(1982.) G. W. Harris, Massachusetts, writes:

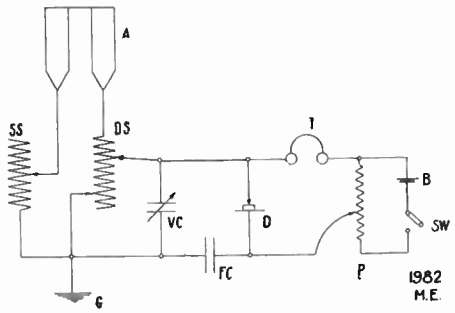
Q. 1.—I have an aerial forty feet long, fifty feet high at one end, and twenty-five feet high at the other end. It is composed of 4 aluminum wires arranged in a loop.

Would more strands increase the effectiveness of this aerial?

A. 1.—Yes, if you keep them the same distance apart as at present. If you put them on the same spreaders your aerial will not be so good.

Q. 2.—I have a double slide tuning coil, a single slide tuning coil, silicon detector, variable condenser, fixed condenser, potentiometer with one cell of battery, also a pair of 1500 ohm receivers. Please show me the best hook-up for this set.

A. 2.—Here it is.




## PETITION TO PRESIDENT TAFT.

(Continued from Page 28.)

concerns usually acquire nearly all important patents in their field, to the great damage of the nation because of the restraint of competition and because of the resulting tendency of such inventors to seek protection for their inventions by trade secrets or else to cease inventive work.

The opinion is expressed that efficient protection by patent of new and useful inventions would offer to the average American manufacturer one of the best methods of meeting foreign competition and would, in addition, improve quality, reduce first cost and stimulate fair competition, with resulting benefit to the entire nation.

The terms of the resolution concluding the above recitation are as follows:

"The Inventors' Guild, composed exclusively of independent and experienced inventor-patentees, does hereby respectfully ask the attention of the President of the United States to the urgent need of reforms in the Patent Office and also in the courts which hear and decide patent causes, and hereby requests the President to recommend to Congress the advisability of appointing a committee to confer with experienced and representative inventors with the object of promptly accomplishing such reforms as will result in more effectively carrying out the

(Continued on Page 82.)

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WESTINGHOUSE 3¼ K. W. Comp. Generator, 1125 R. P. M. 100-125 V. Best Condition, C. H. Field Rheostat, 24 ft. new Rubber Belt, Bargain. F. O. B. Newport, Cash. L. A. Scribner, Newport, N. H.

10,000 HAND DRILLS, 35c each, with five assorted drills in handle. Regular price $1.00 each. Postage 15c. Dealers get busy. Jobber, 3525 Broadway, New York.

FOR SALE—Perfect transmitting and receiving instruments, a bargain. Send for photos and prices. E. W. Cole, 2370 Vermont Ave., Toledo, Ohio.

FOR SALE—Complete set Murdock 1,000-ohm receivers, $3.50. One good tuning coil, 75c. Harry Myers, 402 W. Rensselaer St., Bucyrus, Ohio.

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3,000 ADVERTISING STICKERS $1.00. Everything low. Catalogue mailed. Walter's Printery, 35 Myrtle Ave., Brooklyn, N. Y. (10)

## HELP WANTED

LOCAL REPRESENTATIVE WANTED. Splendid income assured right man to act as our representative after learning our business thoroughly by mail. Former experience unnecessary. All we require is honesty, ability, ambition and willingness to learn a lucrative business. No soliciting or traveling. This is an exceptional opportunity for a man in your section to get into a big paying business without capital and become independent for life. Write at once for full particulars. Address E. R. Marden, Pres. The National Co-Operative Real Estate Company, L599 Marden Building, Washington, D. C.

ELECTRIC METERMEN wanted in every state —$900-$1,800 yearly. Rapid introduction of electricity creating new positions daily. We will fit you for a splendid position and assist you to get it. Booklet giving full particulars sent free. Write for it to-day. Fort Wayne Correspondence School, Dept. 50, Fort Wayne, Ind. (7)✠

WHY NOT PREPARE for Civil Service Examination? Teaching? Steuographer? Bookkeeper? Stationary Engineer? Electric Wiring? Electrical Engineer? Mechanical Engineer? Mechanical Draftsman? Electric Wiring? Matriculation, $5. Tuition free. Mail course. Address Carnegie College, Rogers, Ohio. (1)✠

FREE ILLUSTRATED BOOK tells about over 360,000 protected positions in U. S. service. More than 40,000 vacancies every year. There is a big chance here for you, sure and generous pay, lifetime employment. Easy to get. Just ask for booklet A947. No obligation. Earl Hopkins, Washington, D. C.

WANTED—Active man in each locality. To join this Society. Sick, accident, death benefits. And introduce our Memberships. All or spare time. $50 to $500 a month. Write for plans. Box AQ-293, Covington, Ky. (1)✠

I WILL START YOU earning $4 daily at home in spare time silvering mirrors; no capital; free instructive booklet, giving plans of operation. G. F. Redmond, Dept. A. G., Boston, Mass. (9)✠

EARN GOOD PAY copying addresses; particulars six stamps. Hinchey, 177, Middleport, N. Y. (2)

## GAS CONSUMERS

SAVE 50c to $5.00 ON YOUR GAS BILL every month with our Governor. A great invention. Write to-day for free circular. Specialty Supply Co., Desk E., Kewanee, Ill. (1)✠

## INSTRUCTION

PRACTISING ACCOUNTANT offers special introductory course of instruction, complete with books, in modern bookkeeping, $12. Easy payments. Clarke K. Hunter, Consulting Accountant, Box 132 Sta. "A," Boston, Mass.

FREE—Illustrated Book on Hypnotism and other occult sciences to all who send their address. Write to-day and learn how to influence and control others. M. D. Betts, Sta. 174, Jackson, Mich. (1)✠

LEARN VENTRILOQUISM at home. Particulars for stamp. M. Bailey, Box 253, St. Paul, Minn. (1)✠

## MACHINERY AND TOOLS

FOOT AND ELECTRICAL and power engine lathes; hand and power planers, shapers and drill presses; the most modern; the most practical; various attachments; supplies. Shepard Lathe Co., 134 W. 2d St., Cincinnati, Ohio. (7)

## MOTORCYCLES

MOTORCYCLES, save dealers' profits, buy direct from the owners. I have all makes on my lists. Indians, Marshes, $20.00 up, shipped freight prepaid and guaranteed for one year. Send for my list before purchasing. M. E. King, Automobile Broker, 213-217 W. 125th St., New York City. (1)✠

## PATENT ATTORNEYS

PATENTS OF VALUE. Prompt and efficient serivce. No misleading inducements. Expert in Mechanics. Book of Advice and Patent Office Rules free. Clements & Clements, Patent Attorneys, 719 Colorado Bldg., Washington, D. C. (1)

"MONEY IN PATENTS" tells the truth about the subject. It is free to inventors. Write today. Patent secured or fee returned. Herman A. Phillips, 1104 L. & T. Building, Washington, D. C.

INVENTORS—Send us a copy of your patent or invention and we will submit our liberal proposition to you. Atlantic Supply Co., Long Branch, N. J. (1)

SEND FOR FREE BOOKLET, All About Patents and Their Cost. Shepherd & Campbell, 500F Victor Bldg., Washington, D. C.

## PICTURES AND POST CARDS

EXCHANGE POSTCARDS with Ladies and Gentlemen. Largest and best club. Membership 10c. C. C. Club, 3935N, Tracy, Kansas City, Mo.

## REAL ESTATE

YOUR 25 WORD AD. FREE in our next issue if you return this ad. with 25c for one year's subscription to the Phildius Real Estate Monthly, New York. (1)

## STAMPS, COINS, ETC.

$7.75 PAID FOR RARE DATE 1853 Quarters, $20.00 for a Half-Dollar. We pay cash premium on hundreds of coins. Keep all money coined before 1880, and send 10 cents at once for our New Illustrated Coin Value Book; size 4x7. It may mean your fortune. C. F. Clarke Co., Coin Dealers, Dept. 16, Le Roy, N. Y. (1)✠

GET ACQUAINTED with the largest philatelic supply house in the South. See adv. on page 70. Special this month, 50 all different stamps from Central and South America, 25 cents. H. Leonard, 107 E. Ninth St., Jacksonville, Fla. (1)

OLD COINS BOUGHT AND SOLD. Buying Catalogue 10 cents. New 55 page 1912 Selling Catalogue to Collectors only, Free. William Hesslein, Halley Bldg., New Haven. Conn. ✠

24 VARIETIES CUBAN STAMPS 10 cents. List of 6,000 low-priced stamps free. Chambers Stamp Co., 111 L. Nassau St., New York City. ✠

## TYPEWRITERS

TYPEWRITERS: Caligraph, $6.00; Hammond, Yost, Densmore, Williams, $10.00; Remington, $12.00; Smith Premier, $15.00; Oliver, $24.00; Underwood, $30.00; all makes on hand; fifteen days' trial allowed, and a year's guarantee. Send for catalogue. Harlem Typewriter Exchange, Dept. M. E., 217 West 125th St., New York City. (1)✠

## WIRELESS

SPRING BARGAINS—A Radio-loose-coupler, $7.50; Radio Variometer, $7.50; Navy double head phone, $7.00; Western Electric double head phones, 2,000-ohm, $8.00; Single head phone, $4.00; Electrose, 10-inch insulators, $20.00; 700 ft. number 10, B3 bare copper wire, $3.50; Clapp-Eastham rotary condenser, $7.00; 600-volt D. C. voltmeter, $20.00. F. Faulkner, 618 W. Church St., Champaign, Ill.

WIRELESS STATIONS Hooked Up, Tuned, etc. Masts and Aerials Erected. Apparatus Built to Order. Charges reasonable. Arnold, 126 Alexander Ave., Bronx.

AT LAST—Step-down transformer to operate wireless coil—spark tone resembles rotary. Practical for coils up to four inches. Eliminates battery expense. Distance increased three hundred per cent. Particulars on request. P. O. Box 54. Bloomfield, N. J.

HOT WIRE AMMETERS—Are you building the one described in the February, 1911, MODERN? Use my Climax Wire. Number 36 for stations above ½ Kilowatt, send 10 two-cent stamps for two feet. Number 40 for stations 1 inch up to ½ Kilowatt, send 15 two-cent stamps for two feet. Milton Berel, 870 Longwood Ave., Bronx, N. Y.

CLOSED CORE TRANSFORMERS. Self-controlling, four variations. ¼ K.W., $10; ½ K.W., $15; 1 K.W., $25; 2 K.W., $50. Guaranteed. Sent on trial. Send stamp for circular. Phillips-Roadhouse, Shelby, Mich.

DETECTOR TROUBLES disappear when mineral is properly imbedded. A low melting alloy about 190 degrees must be used. That's mine. Price per oz. 20c. Special price to clubs in quantity. Climax Wire for hot wire ammeter, 2-foot lengths, No. 36 or 40, 15 cents. L. C. Apgar, Carleton Road, Westfield, N. J.

ATTENTION—Special for this month on Shop-worn goods. All guaranteed to be in perfect working condition: 110-V. Arc Lamps, $3.00; 110-V. 1/10 H. P. Motor, $5.00; 1¼-inch Spark Coils, $4.50; Coherer and Decoherer, 85c; Old Style Universal Detector Stand, 30c; No. 8486 Single Slide Tuner, $2.00; No. 12000 Single Slide Loose Coupler, $3.00. Send four cents in stamps for our new catalogue No. 10. Electro Importing Co., 233 Fulton St., N. Y.

WIRELESS OPERATORS!—My New Speed Chart will teach you to receive from the Fastest Operators. Morse, Continental and Navy Codes on one chart, 50 cents (no stamps). Fred Fulgora, Box 356, North Diamond Station, Pittsburgh, Pa.

WIRELESS EXPERIMENTERS in Canada save Customs Duty and money by buying your wireless instruments made in Canada. G. S. Crowther, 1414 Pembroke St., Victoria, B. C.

UNITED WIRELESS TYPE LOOSE Coupler, $8.00; also complete Radio Tel. Co. Receiving Outfit. Audion Detector, etc., bargains. Write, Moore, 126 Alexander Ave., Bronx.

ATTENTION AMATEURS—For a limited time we have special inducements to offer of special interest to all. Ask us for our proposition. Wireless Mfg. Co., Canton, Ohio.

FOR SALE CHEAP—Wireless outfit, both sending and receiving. Charles Weidner, 330 South 17½ St., Reading, Pa.

BASES, CHEAP, Ohio Wireless Co., West Lafayette, Ohio.

WANTED—Second-hand wireless instruments. Clapp-Eastham make, in good order. Edward Belknap, 67 Vine St., Hartford, Conn.

(Continued from Page 78.)

intention of the Constitution, and to supplement such recommendations by such executive action as in his judgment seems likely to assist in accomplishing the needed reforms."

# Wireless Association of America

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

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

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

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

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

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

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

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

The Association furnishes a membership button as per our illustration. This button is sold at actual cost. Price 20 cents.

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

On account of the heavy plating it will last for years and is guaranteed not to wear "brassy." Beautiful solid gold button, $2.00.

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

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

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

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

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

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

**SEND TO-DAY FOR FREE APPLICATION CARD**

## SPECIAL THIS MONTH

**On receipt of 30 cents cash, stamps, or money order, we will send you above Wireless Button and the Third Annual Blue Book. Order to-day.**

The Association Numbered April 1 1912 — **16,189** — The Greatest Wireless Association in the World.

**ADDRESS ALL COMMUNICATIONS TO**

## WIRELESS ASSOCIATION of AMERICA

**231 FULTON STREET**

**NEW YORK**

# Four Extraordinary Offers

**To make this our banner subscription month, we are willing to make the following FOUR WONDERFUL OFFERS. Frankly, we would like to see your name appear among the 55,000 readers, who are now regular subscribers to MODERN ELECTRICS, and in order to do so, are willing to go to an EXTRAORDINARY EXPENSE never before attempted by any magazine.**

## OFFER No. 1.

Send us $1.50 cash, stamps, or money order, and in return, we will send you:

| | |
|---|---|
| 1--Modern Electrics for one year (next issue free) | $1.50 |
| 2--Book, How to Make Wireless Instruments, cost | .25 |
| 3--Book, The Wireless Telephone, by H. Gernsback, cost | .25 |
| 4--Book, Construction of Induction Coils and Transformers, by H. W. Secor, cost | .25 |
| Total | $2.25 |

(If books are to be mailed add 6c. postage)

**Total Net Saving, $ .75**

## GREAT WIRELESS OFFER No. 2.

Send us $1.50 cash, stamps, or money order, and in return, we will send you:

| | |
|---|---|
| 1--Modern Electrics for one year (next issue free) | $1.50 |
| 2--Wireless Code Chart, cardboard, size 9x12 in., Morse, Navy and Continental codes | .10 |
| 3--Wireless Chart with 20 Wireless Standard "Hook-Ups" | .10 |
| 4--Join the Wireless Association of America, and Wireless Pin, including Official Wireless Blue Book, 32 pages, and 13x10 in. chart of U. S. stations | .30 |
| 5--Any one of the three books shown in offer No. 1 | .25 |
| Total | $2.25 |

(Mail charges for Items 2, 3, 4, 5, 6, 8c. extra)

**Total Net Saving, $ .75**

## OFFER No. 3.

Send us $1.50 cash, stamps, or money order, and in return, we will send you:

| | |
|---|---|
| 1--Modern Electrics for one year (next issue free) | $1.50 |
| 2--Linen Binder (automatic) holds 12 issues M. E., gold stamped | .50 |
| 3--Any one of the three books shown in offer No. 1 | .25 |
| Total | $2.25 |

(Mail charges for items 2 and 3, 15c. extra)

**Total Net Saving, $ .75**

## OFFER No. 4.

Send us $1.50 cash., stamps, or money order and in return we will send you:

| | |
|---|---|
| 1--Modern Electrics for one year (next issue free) | $1.50 |
| 2--Twelve Back Numbers of Modern Electrics, all consecutive numbers, all in good condition, each 6 1/4c. | .75 |
| Total | $2.25 |

(No mail charges necessary)

**Total Net Saving, $ .75**

**The offers as shown must not be changed nor can articles from any one offer be exchanged with any article of another offer. The selection is quite complete and we are positive that you will find a suitable offer among the four. IMPORTANT: For Manhattan and Canada, add 35c; Foreign, 60c.**

**MODERN ELECTRICS, 231 Fulton St., New York, N. Y.**

---

# A $1.00 Safety Razor FREE!


**WITH TWO YEARS' SUBSCRIPTION TO MODERN ELECTRICS**

**You Save 100%**

| | |
|---|---|
| RANDALL SAFETY RAZOR and 12 blades, | $1.00 |
| MODERN ELECTRICS, two years | 3.00 |
| Total | $4.00 |
| Our "GET ACQUAINTED" Offer, both for | 2.00 |

**SAVING $2.00**

**This RANDALL SAFETY RAZOR which retails regularly at $1.00, consists of:—**

**The Randall Razor Frame** which is made of brass, heavily nickel-plated.

**Twelve Blades** given **FREE** with each set, represent the highest perfection in manufacturing, being made of the highest tempered steel, skillfully ground and honed to the keenest edge.

**The Case** is almost identical to those supplied with the standard safety razors sold at higher prices. It is of chase leather, with a special fastening device to lock it, and is lined with a rich plush.

**This Combination** has created what is to-day recognized as the simplest, most useful and practical safety razor yet devised irrespective of price, and is given with the **IRON CLAD GUARANTEE** that if it does not give satisfaction in every respect your **money will be refunded without a word.**

**This Razor Given Absolutely FREE with Two Years' Subscription to**

**MODERN ELECTRICS**

**MODERN ELECTRICS**

**"THE ELECTRICAL MAGAZINE FOR EVERYBODY.**

The Brightest and Most Interesting Electrical Magazine Published. With New Departments on "Aeronautics" and "With the Inventor," NEARLY FIVE YEARS OLD. Containing 96 to 128 pages monthly, written in a popular style to interest and to be understood by everybody.

**The Magazine to Read if you want to keep up to date on Wireless and progress in electricity. ACCEPT NOW this unusual offer and mail coupon TO-DAY.** Add 10c. for mailing and packing razor.

**15c per Copy**

**$1.50 per Year**

**SOLD ON NEWSSTANDS**

MODERN ELECTRICS, 231 Fulton St., New York, N. Y.

Enclosed find $2.10 (cash, stamps or M. O.), for which send me prepaid one **Standard Randall Safety Razor** on terms described in this advertisement and **Modern Electrics** for two years to the address below.

Name.....

Street.....

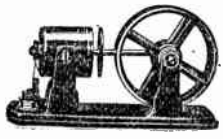
City and State.....

Note---For N. Y. City or Canada add 35c.; Foreign, 60c.

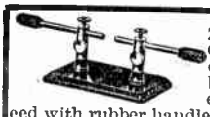
# FREE PREMIUMS

We offer below a complete assortment of FREE Premiums, any one of which may be obtained by a little extra effort. You are now reading **MODERN ELECTRICS**, which means it must be good, then show it to your friends. Help yourself and help us to build up the biggest circulation of any electrical paper in the United States. You don't have to be a subscriber to take advantage of this chance to obtain a valuable instrument for nothing; it only takes just a few minutes of your time. Show the magazine to your friend, give him a few pointers on the magazine and nine times out of ten, he will subscribe. Get the subscription, send it to us and we will forward by return mail the premiums you select. Your own (NEW) subscription will count. Now get busy and get something practical FREE.

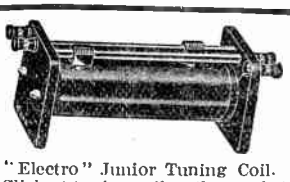
Junior Fixed Condenser. Used in all modern receiving sets. Special dielectric giving extra high capacity. Sealed in hard rubber base with binding posts, as shown. Sells for $0.50. (Add 6 cents for postage).
**Given free for 1 subscription.**



Wireless Engine. The Slickest little engine ever placed on the market. You cannot see a piece of wire. Has two fly-wheels and beautiful balancer. Cast iron base; works on one dry cell. The engine sells for 45 cents. (Add 14c. for postage)
**Given free for 1 subscription.**



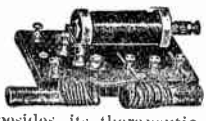
Zinc Spark Gap mounted on hard rubber base. Electrodes fitted with rubber handles. Pure zinc rods. Used in all of the best stations. Spark gap sells for 60 cents. (Add 7 cents for postage.)
**Given free for 2 subscriptions.**



"Electro" Junior Tuning Coil. Slickest tuning coil on the market. Has solid hard rubber ends, bare copper winding, hard rubber sliders. Size, 8 x 3¼ x 3¼ in. Weight, 1½ lbs. The most beautiful and most practical coil made. "Electro" Tuner sells for $2.00. Sent by express only.
**Given free for 5 subscriptions.**

Pony Telephone Receiver. This is the receiver you have long wanted. The best one on the market. Hard rubber case. Single pole, powerful magnet. Hook can be screwed off. Standard resistance of 75 ohms. Receiver sells for 40 cents. (Add 7 cents postage.)
**Given free for 1 subscription.**

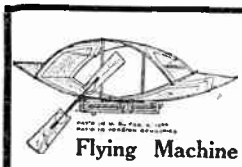
'Electro' Rheostat Rotary adjustment. Air cooled. Very useful to vary the speed of motors and small lamps. Wound with non-rusting wire.
**Given free for 1 subscription.**



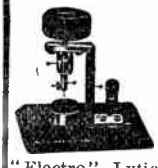
"Electro" Medical Coil. A1 quality. No end of fun with one of these coils, besides its therapeutic properties. Complete with cords and handles Medical Coil sells for 70 cents. (Add 12 cents for postage.)
**Given free for 3 subscriptions.**

"Electro" Amateur Phones, 2000 ohms resistance. Wound with No. 50 copper wire. Thin diaphragms. Leather covered adjustable headband. Weight 15 oz. 80 per cent. better than 75 ohm phones. Phones sell for $4.50. (Add 25 cents for postage.)
**Given free for 10 subscriptions.**

Six Inch Geissler Tube With Liquid. A fine tube; works on any spark coil. Gives the most beautiful, astounding colors. Tube sells for 50 cents. (By mail extra ten cents.)
**Given free for 1 subscription.**




Areo-Flying Machine A practical miniature aeroplane; biplane type. Guaranteed to fly 100 feet. A well constructed machine. Aluminum propeller; rubber motor. Sells for 75 cents. (Add 12 cents for postage.)
**Given free for 3 subscriptions.**



"Electro" Lytic Bare Point Detector. Holds the world's record for long distance receiving. Mounted on hard rubber base. Finest adjustment. Increase your receiving range 30 to 40 per cent. "Electro" Lytic Detector sells for $1.25 (Add 12 cents for postage.)
**Given free for 3 subscriptions.**

One Inch Bull Dog Spark Coil. This is the coil that has sent a message 90 miles with a suitable aerial. None better made. None better looking. Has French vibrator and fibre casing. Sells for $4.50. Can go by express only.
**Given free for 12 subscriptions.**

**Please understand that we have an invariable rule that premiums cannot be given unless you ask for them, when sending in the subscriptions.**

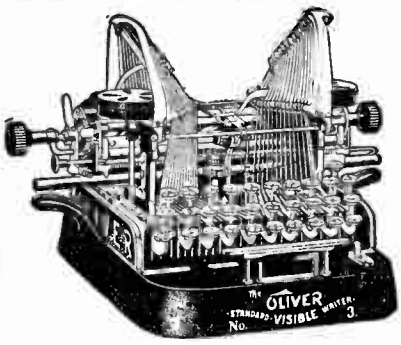
We are sure you can get any of the above premiums by showing this magazine to your friends, doing a little talking. Then is your chance, get the subscription before the other fellow gets it. Strike while the iron is hot. Act Now. Don't delay, the offer is new now and lots of people will get busy at once.

This is the best season of the year for subscriptions. **Everybody reads. Everybody subscribes.**

Send money order, draft, express money order, cash or stamps; no checks please.

**MODERN PUBLISHING COMPANY, 231 Fulton St., New York**

# $5.00 Per Month




## Buys This Visible Typewriter

Here is the offer that astounded the typewriter world:

**The Famous Model No. 3 Oliver**—The machine with the type bars that strike downward—that makes the "write-in-sight" principle mechanically practical. It is so simple children learn to operate it in ten minutes—so fast the experts choose it—so strong a shrewd business man insists upon it—The World's Standard.

**You Can Make It Yours So Easy**—it's a shame to do without it.

**No Cash Until You See It**—until you try it in your home or office, then you make your decision—no salesmen to influence or hurry you—if you keep it you pay only $5.00 down—it will earn its own way thereafter.

**Stop Paying in Nine Months,** Only $50 in All—no interest—no chattel mortgages—no collectors—no publicity—no delay. Positively the best typewriter value ever given—the best selling plan ever devised.

**If You Own a Typewriter Now—**

trade it in to us as first payment—we will be liberal with you.

Send your name and address on coupon and we will tell you more about this unusual offer—more about this splendid typewriter—it won't cost you anything and you will be under no obligation—we won't send a salesman.

Tear out the coupon now—you might forget.

**Typewriters Distributing Syndicate**
**159 ME N. STATE STREET**
**CHICAGO**

[74]

**Typewriters Distributing Syndicate**
**159 ME N. State St., Chicago**

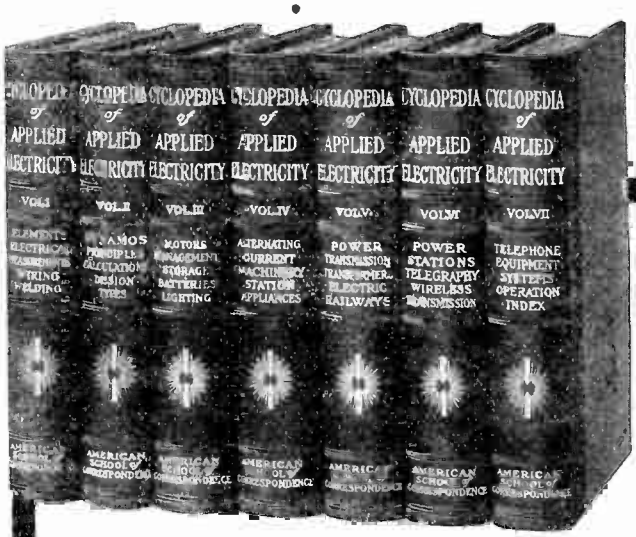
You may send without placing me under any obligation, further information of your typewriter offer.

*NAME*.....

*ADDRESS*.....

My old machine is a..... .....No. .....

When writing, please mention "Modern Electrics."




# SEVEN ELECTRICAL EXPERTS

Here is a set of electrical books published especially for the student, worker and expert—every chapter written by an expert in his special line—every subject brought down to date—an absolute authority on everything electrical from wiring to alternating current machinery—from motors to power stations, etc. Read table of important subjects below.

## The American School's Cyclopedia of

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is compiled from the instruction papers used in the regular correspondence work of the school; contains 3,200 pages; 2,600 full page illustrations, diagrams, formulas, etc., with a special cross index for quick reference. The seven large volumes are bound in half morocco and are printed in large, clear type on special quality paper.

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The complete seven volumes, not a sample volume, will be sent, express prepaid, for seven days' free examination; returnable at our expense if the books do not contain the information you want. If you keep the books, pay $1.80 seven days after receipt and then $2.00 a month until you have paid the special introductory price of $19.80.

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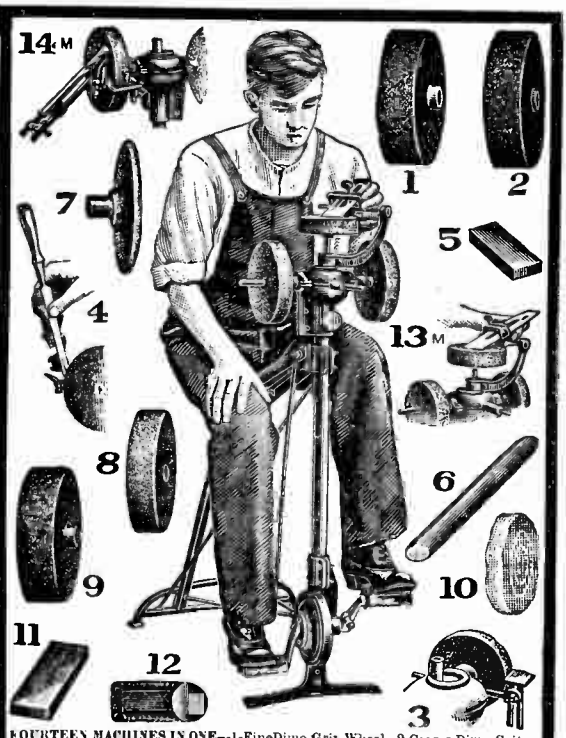


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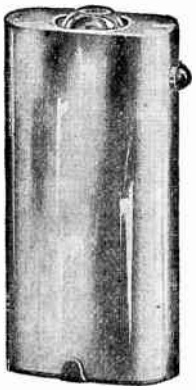
# Pocket Electric Lights

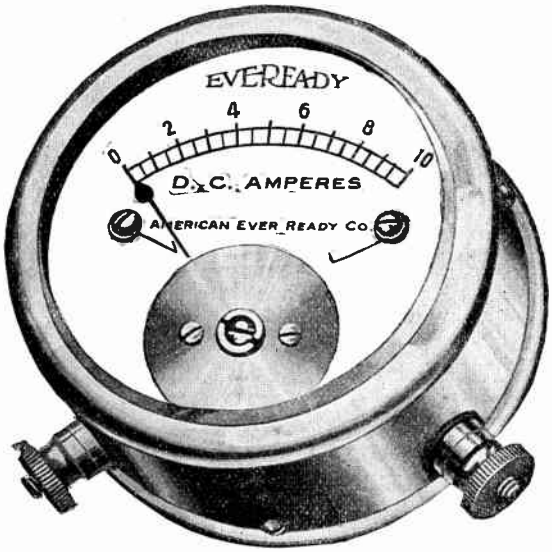


¶ You need an Eveready Flashlight. Outdoors in the wind or rain it gives a strong, steady white light that cannot be extinguished accidentally. Indoors it can be used without danger near the gasoline tank, in the corners and out of the way places, in the clothes closet—where a match would not be satisfactory nor safe.

¶ The American Ever Ready Company was the first to manufacture flashlights and from the beginning we have constantly been improving them. So rapidly has the development of Eveready flashlights advanced no imitator has ever been able to produce such reliable lights.

¶ The Eveready Tungsten Battery brought the Flashlights out of the class of novelties and made of it a dependable convenience with a long life. They are made in many sizes and shapes from the vest pocket size to the inspector's lantern. Let us send you our Bulletin No. 623 which shows not only our flashlights, but our portable electric house lamps, watchmen's lanterns, candles, electric lighted clocks, etc.

# The Exact Size




¶ Here is one of the types of Eveready meters. The illustration shows the exact size of the instrument. The Volt and Ammeters of this size are built on the same principle as the large Eveready switchboard meters. They are accurate and reliable.

¶ Every electrician sees the need for accurate meters as part of his equipment. They will cut out guesswork and show you exactly what voltage and amperage you are using. With the Eveready Volt and Ammeters you get an exact basis upon which to work.

¶ These meters are made in many sizes. The pocket size shown above is one of the latest types. And the prices are reasonable. Our Bulletin No. 630 illustrates some of the types and gives prices. We will gladly send you a copy upon request.

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# NEWS

## Bull Dog Spark Coils

On the market at **LAST**
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### QUALITY

We wish to emphasize the fact that the **Bull Dog Spark Coil** is specially constructed for use in Wireless Telegraphy and Experimenting, and under no consideration can be compared with the average **so-called Wireless Spark Coil of the box type,** which is in reality an automobile spark or ignition coil. To produce a spark which will create in the ether the necessary wireless phenomena, a spark coil is required which has been specially constructed for this work and in which the necessary scientific features are embodied.

**Bull Dog Spark Coils** have all the good features of the Rhumkorff, combined with other special features which we have discovered and upon which patents are pending. We guarantee these coils to give an exceptionally tense and powerful spark that we challenge any other coil of the same spark rating to duplicate.

Genuine **platinum contacts** and **not silver,** so often substituted. **Bull Dog Spark Coils** as shown by the cut present a neat, elegant and business-like appearance pleasing to the experienced eye and a credit to any Wireless Station.



### PRICES

| | | | |
|---|---|---|---|
| No. 4360. 1/4 inch Spark . . | **$2.20** | No. 1088. 1 inch Spark . . | **$4.50** |
| No. 1087. 1/2 inch Spark . . | **3.10** | No. 4366. 1 1/2 inch Spark . . | **6.50** |
| No. 1089. 2 inch Spark . . | **$9.00** | | |

**SPARK LENGTHS GUARANTEED**

**Bull Dog Spark Coils are wound with Enameled Wire** on the secondary, allowing the maximum amount of insulated turns to the inch. Other **so-called Wireless Coils** are wound with bare wire on the secondary.—**Don't buy such coils.** They may spark a gas engine, but to send Wireless messages you require a spark coil having insulated turns that come close together, which is only possible with enameled wire.

## The "ELECTRO" GENERATOR

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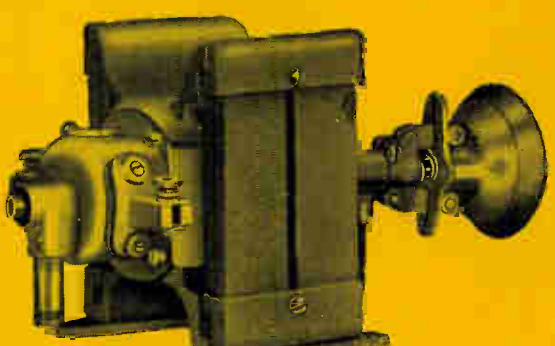

**OUR GUARANTEE:** We positively guarantee this Generator to do all if not more than we claim for it, and we will cheerfully refund your money if you are not absolutely satisfied with it.

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Two styles: "A" and "B." Type "A" will develop 16 to 18 volts and from 4½ to 5 amperes at 1800 R. P. M. Type "B" at the same speed develops 5½ to 6 volts and from 14 to 15 amperes. Type "A" will operate 6 to 7 18-volt Tungsten Lamps simultaneously, while the type "B" will satisfactorily operate 15 to 16 6-volt 2 c. p. lights.

Size over all, 10¼ in. x 4½ in. x 6 in. Net weight, 12 lbs.

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