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MODERN ELECTRICS

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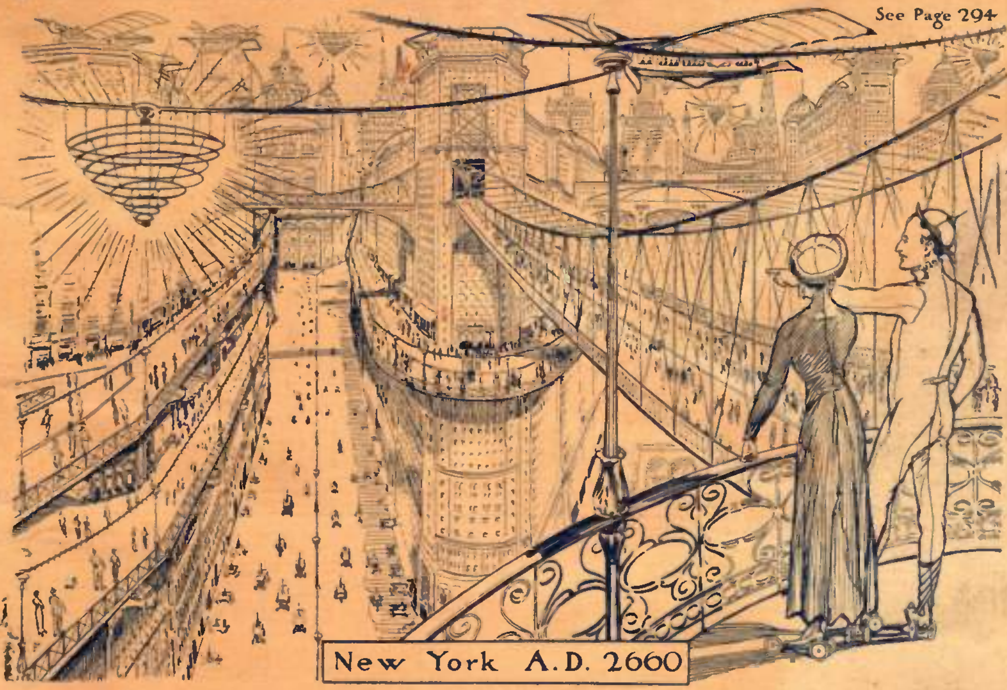

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Contents

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Modern Electrics

VOL. IV. AUGUST, 1911. No. 5.

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 I.—Continued.

CHEMICAL PROCESSES.

The rise of the E. M. F. is found in the action of two chemical processes:

The decomposition of the zinc and the oxidation of the eliminated hydrogen gas by the nitric acid. This is a combination of nitrogen (N) and oxygen (O), which, like common acid, has the peculiarity to decompose readily by giving off oxygen. The hydrogen gas burns it to water under the formation of nitrous oxide (NO), which chemical combination, however, takes oxygen from the air, thereby forming a new combination: acid of nitrogen (NO_2), which makes itself known by red-brownish vapors which have a choking smell.

Fig. 43 Grove Battery

The chemical action near the zinc is:

$$Zn + H_2SO_4 = Zn\ SO_4 + H_2$$

Zinc + Sulphuric Acid = Sulfate of Zinc + Hydrogen (goes off).

The chemical action near the carbon is:

$$H_2 + 2\ H\ N\ O_3 = 2\ H_2\ O + 2\ NO_2$$

Hydrogen + 2 Nitric Acid = 2 Water + 2 Nitrousperoxide (becomes free).

Consequently it will be seen that zinc is decomposed and water $2H_2O$ and acid nitrogen NO_2 is formed, or else:

$$C+2HNO_3+H_2SO_4+Zn=C+NO_2+2H_2O+ZnSO_4\ (C=Carbon).$$

The carbon plates can be made more active by using the following process:

Around the carbon a narrow strip of cotton is wound in spiral form. This is then dipped in chloride of platinum and the plate is then heated to a red heat in seclusion of air, and the pores of the carbon absorb the platinum, which is highly conductive and thereby makes the carbon more conductive.

34. FILLING AND EMPTYING A BATTERY; ACIDS.

One arranges the vessels in one or two rows or in a circle, or square, all depending upon the space one has; then each vessel, before it is put in its place, is equipped with its zinc, porous cup, carbon, and connector, which is connected at once with the zinc, or the previous element; the connector and wires, however, should not be in the way when the acid is finally filled in. Now begins the filling in of the nitric acid, which must be done quickly so that all porous cups are well moist on the outside, when one commences to fill the diluted sulphuric acid. The acids are filled in by means of a pitcher and funnel, but one may also use a syphon.

Procure a soft rubber tube, having on one end a piece of glass, or hard rubber, which should be somewhat flat, so that one can introduce it easily between zinc and side of the container. At the other end of the tube there is

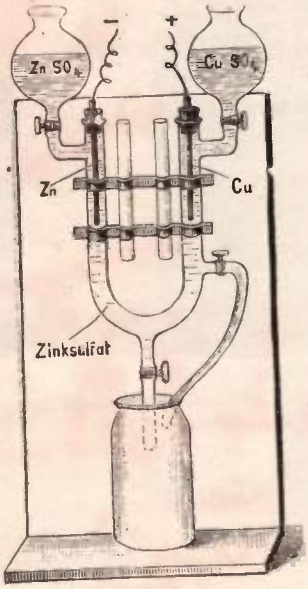


Fig. 44.

a rubber piece, to which a heavy lead disk is attached so that this end of the tube sinks at once to the bottom of the draining vessel. This latter is to be placed about three feet higher than the batteries; this arrangement acts as a syphon, the flow of the acid is terminated merely by pressing the rubber tube. The tube, in order that one does not need to suck the air out of it, is best filled with clear water, and then closed at both ends with the fingers. Then the one side with the lead disk is sunk in the large vessel containing the acid, and the water will flow out of the tube as soon as the other end is opened. When the water has run out, the acid, of course, starts to flow. After using, the tube is washed out with water containing a trace of ammonia.

ACIDS. The nitric acid can be used again, if one mixes with it a little fresh acid or a little concentrated sulphuric acid. The latter will extract the water from the old acid.

35. THE WOLKER BATTERY.

A porous cup containing a carbon plate besides a mixture of carbon and sulphur powder. A layer of pitch is then poured on top. The porous cup is surrounded with a zinc cylinder. This is placed in a solution of salammoniac and cooking salt, or in diluted muriatic acid. When in action the sulphur acts as a depolarizer in such a manner that it becomes, in connection with the nascent hydrogen, hydrosulphide (H_2S). This latter, through the dissolution of the zinc, produces chloride of zinc ($ZnCl_2$) on the formation of muriatic acid (HCl) which latter regenerates the thus freed ammonia (NH_3) to chloride of ammonia (NH_4Cl). As soon as the salt of the element is decomposed, hydro-sulphide is liberated and this shows that it is time to renew the battery.

36. NORMAL BATTERIES.

The Daniell battery furnishes a constant current, but same varies with the different materials which are used in such a battery. The E.M.E. varies on account of the difference in the solutions of the copper and zinc sulphate from 1.07 to 1.14 volts. When using solutions of equal density or plates, or rods of chemical pure zinc and copper, the E.M.F. is 1.104 volts. This value is increased with the strengthening of the density of the copper sulphate solution. The E.M.F. is reduced on the other hand by increasing the density of the sulphate of zinc solution; the E.M.F., however, is affected very little by ordinary changes of temperature. The resistance, of course, changes with the cross section of the electrodes, with the distance separating the electrodes, and with the construction of the porous cup.

In a cell about three inches high, the resistance is about 1/3 ohm. With smaller electrodes, it may rise up to 10 ohms. If a very steady current is wanted, the porous cup must be eliminated and sulphate of zinc should be used. In the so-called normal battery these requirements are usually fulfilled.

Figure 44 shows Flemming's normal battery. The unamalgamated zinc rod Zn is placed in a solution of sulphate of zinc, $ZnSO_4$, of a specific weight of 1.2. The pure copper rod, CU, is placed in a solution of sulphate of copper, $CuSO_4$, of the specific weight of 1.1. At ordinary temperature this battery furnishes 1.075 volts, and must only be used with an extremely high resistance of about 100,000 ohms.

Such batteries as this are used for measuring, calibrating, etc., where one wishes to have a very exact knowledge of a certain unit.

37. PHOTO ELECTRIC BATTERY.

This is an invention of Mr. Borgmann. A U-shaped glass tube contains acidulated water and strips of silver covered with iodine. If now a light ray falls on one leg of the glass tube, a sensitive galvanometer will show an electric current. Instead of the silver, tinfoil strips may be used.

Hirson covers two copper plates with a film of oxide made by heating the plates for a long time in a Bunsen burner till they take a black-brown coloration; then the plates are plunged in a solution of common cooking salt. Such batteries, if enough are used, give quite a little current.

38. RESISTANCE OF THE GALVANIC BATTERY.

It is composed 1°— of the resistance of the two electrodes. 2°— of the resistance of the liquid or the liquids. 3°— of the resistance of the porous cup, if such is used. These three resistances together from the resistance of the battery.

The resistance of the same battery is also subject to the following: 1°— if the electrodes are separated more or less from each other. 2°— according to the concentration and density of the solution. 3°— according to the size of the electrodes. 4°— according to the time of the current supply, as the resistance rises on account of the chemical changes in the battery.

39. CALCULATION OF BATTERY CURRENTS.

1. A Bunsen battery with an amalgamated zinc of a height of 20 cm. in a solution of sulphuric acid, 1/20, and with carbon in strong nitric acid has a resistance of 0.11 ohms and an E.M.F. of 1.8 volts. How much current does this battery furnish?

$$C=\frac{E}{R};\ C=\frac{1.8}{0.1}=18 \text{ AMPERES.}$$

2. A Daniell battery with an outer zinc cylinder of 19 cm. high and 9 cm. diameter charged with sulphate of zinc, and short-circuited with a wire of extremely low resistance, gives an E.M.F. of 1.1 volt and has 0.8 ohms resistance. How much current does it furnish?

$$C=\frac{1.1}{0.8}=1.375 \text{ AMPERE.}$$

3. A telegraph battery has an E.M. F. of 0.95 volts and a resistance of 9.5 ohms. How much current does it furnish?

$$C=\frac{0.95}{9.5}=0.1 \text{ AMPERE.}$$

4. A telegraph instrument which has two electro magnets of 608 ohms, works very well with 4 batteries as described under 3. What current does it require to operate it?

$$C=\frac{4X0.95}{608}=6 \text{ MILLIAMPERE.}$$

For telegraphic work one uses currents from 16 to 18 milliamperes. For Morse registers, 25 milliamperes. For medical purposes currents from 2 to 20 milliamperes.

Most batteries are built for a certain purpose but the experimenter usually loses sight of the fact for what purpose most batteries are built, and usually draws too much current from batteries which are not supposed to be used with heavy currents. Most of the time the batteries are blamed whereas the blame lies with the experimenter. The following table will give an idea how to use certain batteries if they are to be used for steady work.

Crawford batteries—0.1 amperes.
Daniell batteries—0.2 amperes.
Leclanche batteries—0.15 amperes.
Dry Cells—0.5 to 0.6 amperes.
Copper Oxide batteries (according to size) 1 to 8 amperes.
Bunsen battery (according to size) 1 to 4 amperes.

40. DIFFERENT USES OF BATTERIES.

1. For electroplating, etc.: Daniell, Bunsen, Lalande and Bichromate battery with 2 solutions.
2. Charging of storage batteries: Bunsen battery, Bichromate batteries with acid circulation, large type Crawford battery, and Lalande battery.
3. Induction or spark coils: Bunsen battery, storage battery and Lalande battery.
4. Laboratory work: Large size Bichromate battery, Bunsen battery, Leclanche battery, Daniell, Lalande and storage batteries.
5. Telegraphy, bells, and telephony: Dry cells, Lalande, and storage batteries.
6. Small motors: Bichromate, Bunsen, Lalande, and storage batteries.
7. Electrical measurements: Normal batteries, Lalande, and storage batteries.
8. Transportable apparatus: Dry cells.
9. Closed circuit: Crawford, storage batteries, and Lalande.

41. REQUIREMENTS OF A GOOD BATTERY.

A good battery should comply with following:

1. It should give a high and constant E.M.F.
2. It should have a very small internal resistance, which should not vary too much.
3. The battery must be cheap and should use little material.
4. No current should be consumed when battery is not in use.
5. Battery should be easily put together and maintained, and should not develop obnoxious fumes.

It sometimes happens that a battery does not give the expected results and this may be on account of the following:

1. The solutions are used up, the materials used to make the solutions are not pure, or, are not mixed in the right proportion.
2. The connections with the metals or carbons are not clean, wires may be broken inside of the insulation, the screws may not be screwed up tight enough, or there may be a short-circuit of one or more batteries.
3. Some of the containers may not be quite filled.
4. Internal short-circuit, as, for instance, in a Daniell battery where the wall of the porous cup is filled with copper; this may short-circuit with the zinc; also the zinc may be broken.
5. The carbon may be filled up with the salts and if such is the case, it should be boiled out to get the required results.

42. UNITS OF GALVANIC CURRENT. OHMS LAW.

In a galvanic current, as we saw before, three points must be considered.

1. The E.M.F. E is represented in volts.
2. The internal resistance, Ri, is represented in ohms; these two units are called the constances of the battery and change a great deal with the materials used, or the size.
3. The external resistance, Ra, or the resistance in the wire, which is connected with the battery.

These units are combined through Ohm's Law.

$C = \frac{E}{R}$; 1 AMPERE $= \frac{1 \text{ Volt}}{1 \text{ Ohm}}$; $C \times R = E$; $R = \frac{E}{C}$

For a single battery the current intensity in amperes is therefore

$$C = \frac{E}{Ri + Ra}$$

(To be Continued)

SILENT AEROPLANES.

M. Henri Farman, the well-known French aviator and designer of flying machines, has recently perfected a silent aeroplane. This is an important step in the combining of wireless telegraphy to aeroplanes, inasmuch as there has been considerable difficulty in the past experiments to receive any appreciable distance with the loud noise of the engine. With this objectional point overcome, there seems no obstacle in the way of receiving long distances while aloft. The improvement is in the Renault gasoline motor, which has been successfully muffled, while not detracting from its splendid working qualities. It is a modest prophecy to state that 50 miles will be readily covered by wireless in this latest of aeroplanes before the year has elapsed.

Multiple Tone Wireless Stations

By Dr. Alfred Gradenwitz.

WIRELESS stations arranged according to Marconi's principle, that is for a limited number of spark discharges (about 30-100 sparks per second) could not possibly be used for the transmission of musical signals. In fact, the number of discharges was too small to set up a musical sensation in the human ear listening at the receiving station. Nor could the minimum frequency of 300 per second necessary to this effect, be obtained by using metal gas spark gaps.

It will be remembered that the adoption of what are called impulse vibrations first allowed musical sounds to be produced in the receiver. The spark gaps used in this connection are de-ionized immediately after the impulse, thus allowing a discharge frequency of the order of 1,000 per second.

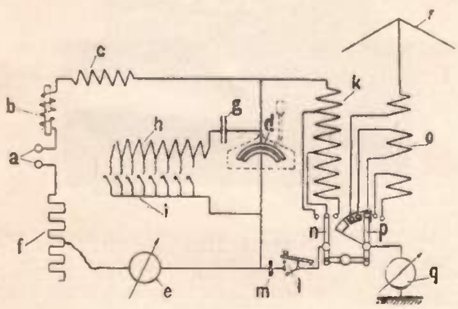
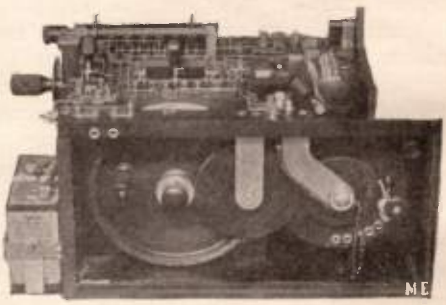


Fig. 1.

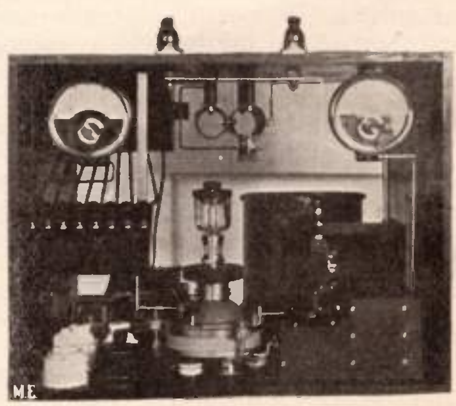
As, however, the arrangements so far used in this connection do not lead themselves to an instantaneous alteration of the discharge frequency and accordingly to a sudden variation in the pitch of the sound, H. Rein at the laboratory of the C. Lorenz, A. G., of Berlin, in conjunction with Dr. E. Nesper, developed the following scheme in connection with which the spark gap is connected in parallel, not to one, but to two vibratory systems. One of these systems is tuned to a low frequency in accordance with the pitch of sound desired, and controls the frequent impulse group of the second or impulse system which is coupled to the antenna.

In the schematical view reproduced in Fig. 1, *a* are the terminals supplying either continuous or low-frequency alternating currents; *b* is a choking coil with a core of sheet iron, *c* a choking coil wound on a pasteboard cylinder, *d* is a discharging gap, *e* a hot-wire galvanometer and *f* an adjustable resistance.

The self-induction *b* and *c* as well as the resistance *f* in conjunction with the con-



denser circuits mentioned below, serve to produce a train of waves corresponding to the pitch of the sound. Parallel to the discharge gap *d* is the Duddell circuit *d, g, h, i, d* and another circuit *d, k, n, l, m, d*. The Duddell circuit comprises a large condenser *g* and a coil *h* with branches according to the number of sounds wanted, each branch being connected to contacts *i* for inserting parts of the coil either temporarily or permanently. All these parts of coil *h* are tuned with condenser *g* for a given fre-



quency (pitch). Compared with the high-frequency and the impulse circuit, the vibrations thus produced have a low frequency.

The impulse circuit is composed of a coil *k* which by means of branches and a switch *n*, allows a number of definite wave lengths (say 3) to be generated, a key with short-circuiting device *l* and a condenser *m*. The waves produced in the impulse circuit when the discharge gap is short-circuited, should correspond as far as possible to the waves radiated from the antenna. As, however, the size of the condenser *m* must necessarily be above a given minimum, there is generally only a very small self-induction left for coupling the antenna. A single handle allows the wave length to be controlled both in the impulse circuit and in the antenna. The dimensions of the self-induction, resistances and capacities are so designed that the following vibration phenomena are observed: Being much smaller than the sound circuit condenser, the impulse circuit condenser is charged much quicker than the latter, the more so as the self-induction of the impulse circuit is so very much smaller than that of the sound circuit. The discharge takes place in the form of numerous discharge impulses, the discharge gap being arranged for frequent impulse discharges. In the meantime the large sound circuit condenser has been charged so that the vibrations in the sound circuit may now commence. These vibrations are, however, of a secondary nature on account of the dimensions of the various parts composing the circuit and of the discharge gap which can produce arc vibrations. The intervals between the trains of impulse vibrations and accordingly the pitch of the sound, are varied by altering the number of periods. In other words, the impulse circuit is controlled by the sound circuit. The impulses produced in the impulse circuit are transmitted to the antenna and this by its vibrations gives out single waves in accordance with its damping. This arrangement is quite suitable for wireless telephony when inserting a microphone into the antenna circuit.

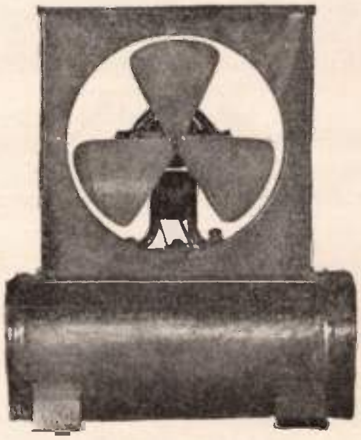
ELECTRIC SIGN FOR CHURCH.

Trinity Chapel, in West Twenty-fifth Street, New York, just off Broadway, it is announced, will have an electric sign to advertise to all who pass that a chance for prayer and meditation is offered.

AN ELECTRIC PERFUMER.

Among the many novel and useful applications of electricity, the latest example is that of an electrical perfumer, shown in the illustration.

This is a very simple device, consisting of a small motor driven by a dry cell. Perfume of any particular odor, is placed in a receptacle of the apparatus, and the wind generated by the fan, serves to distribute the fragrancy throughout the room. The whole outfit is exceedingly compact and light. Owing to the fact that it is operated by a cell contained with-



in the base, the apparatus is entirely self-contained, and does not require outside connections or accessories. With proper use, the cell should give service for periods covering six months.

This apparatus should be very popular at banquets, or other public places where large groups of people are assembled. Its use is particularly encouraged in theatres, to dispel the foul odors, and to circulate the air as well.

OZONE AND THE FLY.

One of the interesting claims made to further the use of electric ozone-making machines is that the use of ozone in deodorizing the air is of distinct value in the campaign to abolish the common house fly on the score of health. It is pointed out that the fly usually seeks the place where offensive odors are present, apparently attracted by the odor, and as ozone is a deodorant the ozone machine helps to make conditions unfavorable to the flies.

The Mystery of the Ether

By Owen Ely.

THE first important theory of the ether was developed by Green and others, in the early part of the nineteenth century. The ether was regarded as a kind of incompressible jelly, easily set a-quiver by the motions of the molecules and able to transmit this motion, through its vast bulk, to the ends of space. And yet, for any motions of matter other than the molecular, the ether was thought to act as a perfect fluid. This provision was necessary to limit the ether to transverse vibrations. Owing to the increasing demands which new discoveries in optics made upon the theory, it was abandoned and now retains only historic interest.

"One of the most prominent theories which have been brought forward was that connected with Maxwell's electromagnetic theory of light. The ether was assumed to be a turbulent fluid the particles of which oscillate, revolve, or in some way change their condition, causing the rapidly alternating 'polarizations' which Maxwell used to explain his conception of the electromagnetic wave. . . . But 'polarization' is still little more than a name, and there is yet some discussion as to whether it involves any bodily displacement of the ether.

"The ether having been regarded as a solid and a fluid, it remained to treat it as a gas. This was attempted by several, among them Mendeleef, the chemist. But the results did not seem very satisfactory. Evidently, the ether needed properties of each state of matter, solid, fluid, and gaseous. Rigidity and elasticity of some sort were required, that light should travel in a straight path; the freedom of movement of a perfect fluid was necessary, since apparently there was no friction between matter and ether; and finally its inertness, its failure to affect matter of itself, pointed to a lack of cohesion or activity among its particles. For these reasons, apparently, modern physicists have generally ceased trying to picture ether in terms of matter, but rather are inclined to explain matter in terms of ether. Thus Prof. Osborne Reynolds, who has worked upon his theory for many years, regards the ether as a system of finely packed grains . . . piled up like billiard-balls through the universe; but here and there is a crack or separation, and this vacuum is matter! The encounters of the cracks make up the phenomena of the cosmos.

"Larmor's concept seems somewhat similar, for he regards electrons as 'nuclei of permanent ethereal strains in rapid motion.' Kelvin and his school lay emphasis upon an explanation of the ether's perfect elasticity. Kelvin's famous theory of the ether makes its elasticity 'due to rotational motion—intimate, fine-grained motion throughout the whole ethereal region—motion, not of the nature of locomotion, but circulation in closed curves, returning upon itself—vortex motion, of a kind far more finely grained than any waves of light or any atomic or even electronic structure.

"Perhaps nothing has contributed so much to the possible development of a theory of the ether as the electron theory, which has done so much to reduce phenomena to the interplay of the electro-static, magnetic, and inductive forces of charged atoms. These forces, together with matter, which may be simply their source in the ether, and gravitation, which is probably an electro-static effect, constitute the whole problem of the ether. The ultimate task is to explain them as varieties of motion in the fundamental stuff.

"To sum up, it is apparent that the problem of the ether, the greatest enigma of all time, can not be solved by one group or generation or class of scientists. It claims the work of specialists in many fields. While each may see the task from his viewpoint alone, it is worthy of attack from many standpoints. To analyze and classify a nearby infinite variety of phenomena to reach the root-causes of nature, requires the genius of the investigator.

(Continued on Page 307.)

A Static Machine

By Norman Barden.

EVERY boy who has ever been interested in electricity has, at some time or other, wished that he had an induction machine. But induction machines are too costly for the average student, and so an attempt will be made to show how anybody can construct a static electric machine, large or small, at a comparatively small expense. The machine to be described here has been found

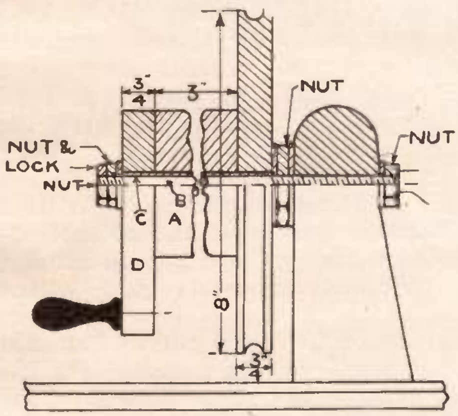


Fig. 1

to be very valuable in a number of different experimental lines.

To begin with we will first make the base. For the machine to be described, the base will have to be made 14 x 30 inches and ¾ inch thick. For this, kiln dried white oak is very suitable. The glue joints, if there have to be any, should be given extra pains, as the base will at times, have to be clamped to a bench or table top. In finishing the base, fill it on both sides with wood filler of the desired color, after it has been sanded to a smooth, clean surface. Then give it three or four coats of shellac, lightly sanding each coat and rub the last coat in pumice and oil. If rotten stone be used instead of pumice, a table top finish can be had, which adds beauty to the appearance of the machine.

In making the pulley, which should be about seven or eight inches in diameter, care should be exercised to select some fine grained wood that will not be easily split. The writer found that birch was good, as well as walnut. The pulley is lathe turned and has a rim three-quarters of an inch wide. In the rim, there is a half round groove for the belt to run in. No spokes are made in the wheel. Finish the wheel the same as the base. To relieve the pulley of the back and forth strain that a person imparts to it while turning, the bearing shown in Fig. 1 was designed. The wooden sleeve, A, should be carefully fastened to the pulley with four screws, using washers with the screws and putting glue between the pulley and the sleeve. The crank, D, is to be fastened to the sleeve in the same manner. In making the bearing, have the brass tube, C, fit tight to the sleeve, so that it turns with it. Then the axle, B, is made of a steel or iron rod just small enough to easily slip into the brass tube. As for the threading and assembling, the drawing in Fig. 1 shows clearly what to do.

For the disk holder, A, Fig. 7, wood is alright, but the parts that touch the disk must be of hard rubber. These parts are 1, 2 and 3 in Fig. 7.

In Fig. 2 is seen a drawing of the bearing of the revolving disks. The axle, A, is made from a one-half inch steel rod, threaded as shown and must have a very smooth finish on it. The sleeve and pulley, B, is of brass and is made in the fol-

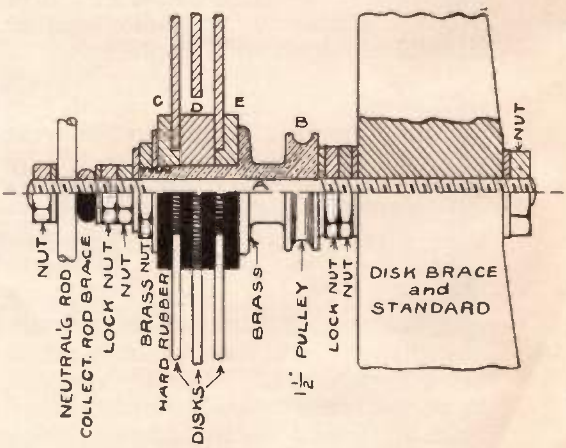


Fig. 2.

lowing manner: The brass stock is first drilled clear through with a one-half inch drill. Then a lathe dog is clamped on the end where the pulley is to be, and the piece put between centers and the stock is roughed out until about one-sixteenth of an inch too large. The piece is now put on a mandrel and finished. If you have a half-inch reamer, an excellent finish can be put on by reaming out the bore after drilling through with a 15/32-inch or a 31/64-inch drill. The hard rubber pieces, C, D and E, are lathe turned and finished. To finish hard rubber, sand it with fine sandpaper and then rub it with pumice stone and oil. The construction is simple and Fig. 2 shows all the parts in proportion, so that no trouble ought to be had in making and assembling the various parts. The figure shows the bearing for use with two revolving plates. It will be noticed that the bearing does not in any way touch the stationary plate.

For the glass disks, a glass that contains no metal must be used. The best way to get this is to go to some large glass dealer and tell him just what you want the glass for and he will give you the right kind of glass. If window glass is used, it must be thoroughly cleaned and given three or four coats of shellac. Cutting the glass is sometimes difficult and the amateur is advised to have the dealer do it and also have him cut the holes in the centers of the disks. As a rule it is very hard for the amateur to even drill the center holes so no space will be given to cutting and boring glass. The disks of the machine being described are 17 and 18 inches in diameter and are of double strength glass.

The brass buttons on the front revolving disk are one and one-half inches in diameter and the center is embossed. The embossing can be done by spinning or hammering, or the same effect is had by soldering on sections of brass spheres. The buttons are made of thin sheet brass and can be stuck to the glass in the following manner. A little Canada balsam is heated until it boils, and a thin layer of it is smeared on the button which has been previously heated. The button is now pressed tightly against the disk. There are six of these buttons and are arranged only on the front side of the front plate, as shown in Fig. 7. These buttons are called "carriers."

On the back of the stationary plate, two

Fig. 3.

Fig. 4

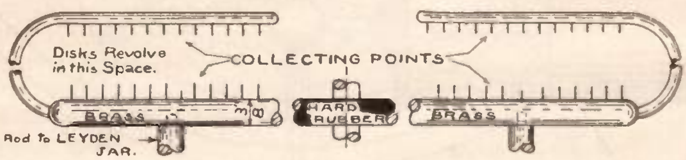


Fig. 5.

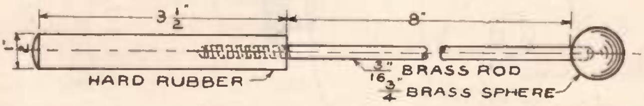


Fig. 6.

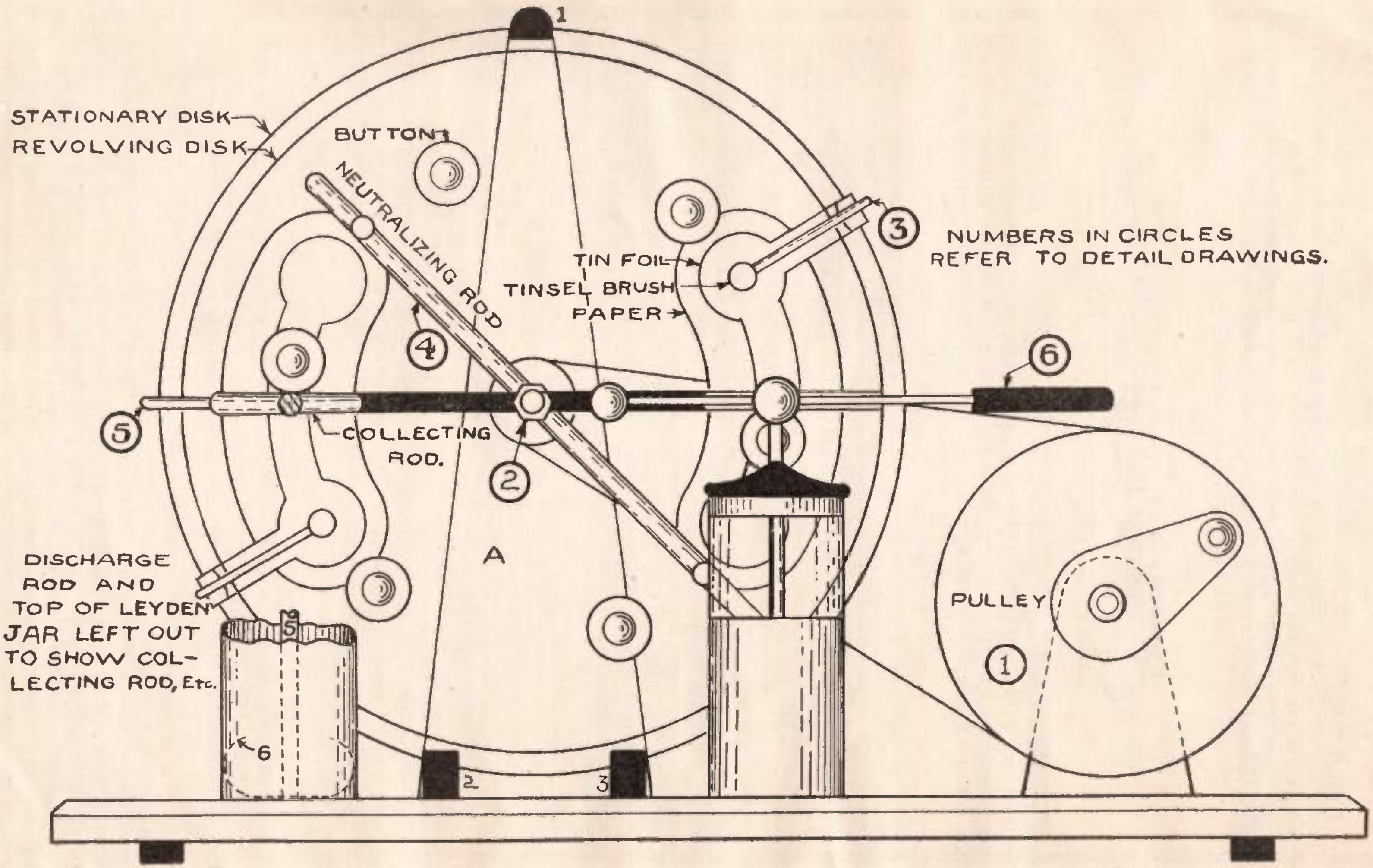

1
STATIONARY DISK
REVOLVING DISK
BUTTON
NEUTRALIZING ROD
3
NUMBERS IN CIRCLES REFER TO DETAIL DRAWINGS.
TIN FOIL
TINSEL BRUSH
PAPER
4
6
5
COLLECTING ROD.
2
A
DISCHARGE ROD AND TOP OF LEYDEN JAR LEFT OUT TO SHOW COLLECTING ROD, Etc.
5
6
PULLEY
1
2
3

Fig. 7.

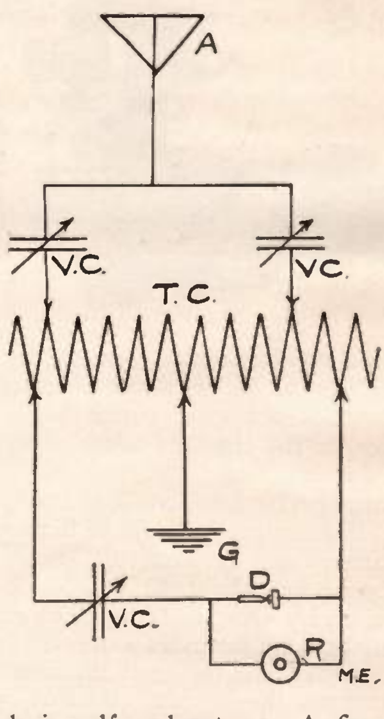
pieces of tinfoil are pasted. Their shape and size can be found by consulting the drawing of Fig. 7. These tinfoil pieces are called the "inductors." Over the inductors are pasted paper pieces as shown in the figure. Also there are fastened to the stationary plate, two copper rods that are in connection with the inductors. These rods reach around in front of the carriers and each has a tinsel brush which touches each carrier as it goes by. The rods can be made from heavy copper wire. See Fig. 3. The neutralizing rod is 5/16 inch in diameter and is made of brass. At each end there are sharp pointed teeth set in. For teeth the sharpened ends of lath nails will suffice. There is also a tinsel brush at each end of the rod and they are located so that they touch each carrier as it passes by. See Fig. 4.

For the collecting rods, three-eighth-inch brass should be used. These rods have teeth like the neutralizing rod, except that there are no tinsel brushes. Notice how the rods are bent around to collect from the back plate. The two collecting rods are braced by a hard rubber strip which is fastened to each and to the axle. See Fig. 5. A short brass rod connects each collecting rod to its Leyden jar. These are not shown in Fig. 7, but are partly shown in Fig. 5.

The discharge rods are made of 3/16-inch brass rods and are eight inches from sphere to handle. Each discharge rod slides through a brass sphere, which is placed at the top of the rod which leads from the Leyden jar. At the inner ends of the rods are placed three-quarter-inch brass spheres. The spheres are shrunk on so that there is no chance of them working loose. The handles are of hard rubber and are tapped to fit the threaded ends of the rods. For details see Fig. 6. As every amateur electrician is familiar with the Leyden jar, it will not be described here. Attention is called to the method of connecting the brass rod 5 (Fig. 7), to the inner coating of the jar. The strip, 6, is of spring brass and gives the rod a firm support. The jars are set into the base about a half inch to give them a firm support. It is also convenient to provide a switch for the connecting of the outer coatings of the Leyden jars. The switch should be put under the base. To finish with, four hard rubber feet are put on the base. If the foregoing instructions are followed, any amateur electrician or mechanic can construct an induction machine that will be found useful in a great many ways and will last for years if properly cared for. Such a machine as described, will give a seven-inch spark at a speed of about 150 R. P. M. The machine should always be kept free from dust. Carbon collects on the disks and this should frequently be cleaned off. And lastly, the machine must be kept well oiled in order to have a machine of high efficiency.

ELIMINATION OF INDUCTANCE DISTURBANCES.

A clever method has been suggested and found to be successful in practice, for the elimination of sounds in telephone receivers, produced by neighboring power lines. This method, set forth by S. G. Brown, the well-known British wireless investigator, is shown in the diagram



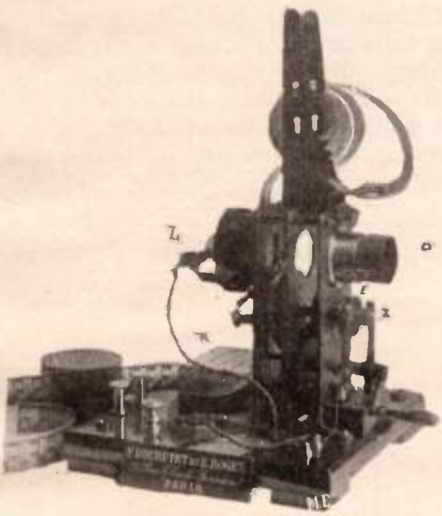
which is self-explanatory. A five-slide tuning coil, three adjustable condensers, detector, and telephone receivers are necessary. Probably a three-slide tuning coil will fulfill the purpose if the end connections on the coil are used in place of two of the sliders.

Paris Letter

A NEW METHOD OF OBTAINING BRILLIANT LIGHT.

Working on the well-known fact that over-voltage on electric lamps causes brilliant illumination, the firm of Ducretet & Roger have brought forward a novel method of employing this principle.

In the photograph we notice a mechanism identical to that used in moving picture apparatus for projecting the film images on a screen. At "L" is a small electric Tungsten Lamp, "O" is the tube containing the powerful projecting lense, at



"I," is a rotating contact actuated by the handle, and at "E" is a centrifugal governor which opens the circuit when the rotation of the crank is below a certain fixed speed.

When operating the crank, the lamp receives intermittent impulses of high voltage current and as Tungsten lamps are employed, they light to candle power within a very short interval. The result is that the lamp furnishes extremely high candle power, and owing to the intermittent current, the harmful effect of over-voltage is greatly reduced. With the outfit illustrated, a demonstration was given at the Academy of Sciences, where the pictures were projected on a screen 13 feet square, which is as large as the average size used in commercial practice. The governor, "E," serves to protect the lamp from dangerous currents, should the handle be turned too slow for the safety margin pre-determined. Only a 20-watt lamp operated on cells was used for the demonstration.

AN ELECTRICAL RESEARCH LABORATORY.

This photograph is taken in the electri-

cal laboratory of La Sorbonne, Paris. It gives the reader a good idea of the tables, fixtures, and apparatus used for demonstrations. Several Leyden jars and two static machines may be noticed on the table, while there are several galvanometers and bridges on the table in the foreground of the picture.

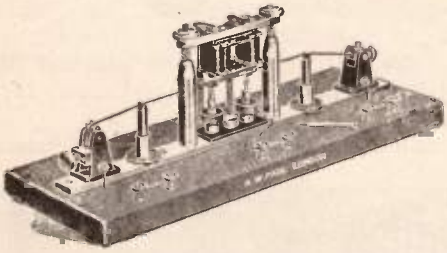
AN ELECTRIC ARC FURNACE.

Herewith illustrated is the electric arc furnace used at La Sorbonne, Paris, for researches in connection with extreme heats. This is the furnace which was employed by Prof. Moissan in his success-

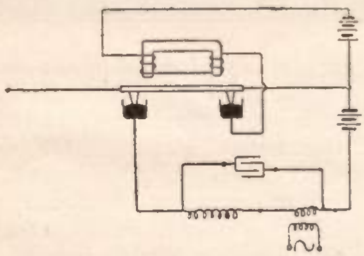
ful production of small artificial diamonds recently startling the scientific world. By the size of the leads conveying the current to the arc electrodes, a faint idea may be obtained as to the heavy amperage employed.

INTERRUPTER FOR HIGH FREQUENCY.

To meet the demand for a mechanical interrupter capable of giving perfect interruptions of exceedingly high frequency, the apparatus shown in the adjacent cut has been produced. This is the in-



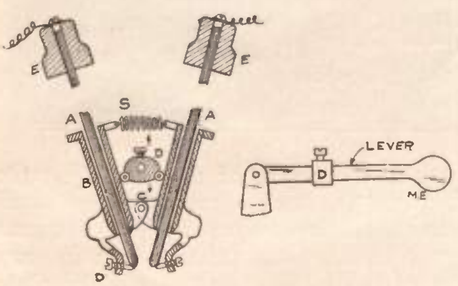
vention of B. S. Cohen, and while simple in operation, it will interrupt circuits from 20 to 500 periods per second. A separate mercury contact is provided for feeding an oscillating circuit, giving peri-



odicities from 500 to 3,000 by varying the capacity. By studying the illustration the principle may be easily understood. A tightly stretched steel wire carries the armature and the two contacts which dip into two pools of mercury.

AN ARC LAMP FOR AMATEURS.

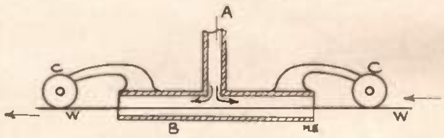
A very clever self-feeding lamp is shown in this diagram. It is unique inasmuch as there are no magnets and



clutches to operate the carbon rods. Carbons, A A, feed down in the tubes, B B, against screws, D D. Weights are placed on top of the carbons to give the proper feed. Spring, S, acts together with pivot C, to work the carbons when it is necessary to "strike" the arc. The handle, D, is to actuate the apparatus by hand when it is necessary to start the arc. This should be ideal for moving picture machines, for it would overcome the disadvantage of the hand-fed arc, and in conquence eliminate the troublesome flicker in the projected pictures.

INSULATING ALUMINUM WIRE BY CHEMICAL MEANS.

The aluminum wire, W, is given a

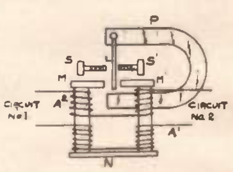


hard coat of insulation in a unique manner. In the tubes, A, B, there is a solution for the most part composed of Sodium Carbonate. Electric current is sent into the wire, W, at a sufficiently high voltage to overcome the resistance of the thin oxide covering the wire. This voltage is anywhere between 220 and 440 volts. This forms a layer of aluminum oxide on the wire by electrolytic action, which is very hard and acts as an insulating covering.

A NEW SIGNAL DEVICE.

We have herewith the diagram for a new signal device, which may be used to announce a train at a grade crossing.

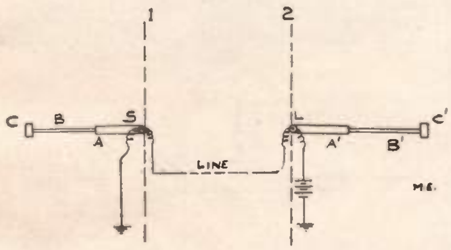
The case of magnet, N, is of soft iron,



but steel poles, M M. Pivoted armature is kept polarized by a permanent magnet and it works between M and M. The coil, A1, is excited when approaching train pushes a pedal contact on the track, thus armature is attracted to pole, M, and makes the electric bell contact at L S. Keeps closed and bell rings until train having passed grade crossing now pushes a second pedal for A2 circuit, by which the magnetism is reversed in the core and the poles, thereby breaking the contact, L S, off.

TELEVISION.

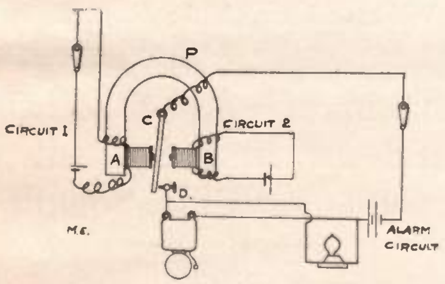
The image for transmission is formed at 1—1. It is explored by the selenium cell "S." This is mounted upon a vibrating tongue, "A," so as to take a horizontal vibration. "A" is in turn mounted on a tongue, "B," which vibrates vertically. Both vibrations are thus combined and the whole image is covered. At the receiving end, the lamp, "L," goes through the same movement and reproduces the image.



(This sounds good on paper but I would like to see it doped out in reality. "Fips.")

THE LATEST IN BURGLAR ALARMS.

When the double-walled safe is drilled by a midnight intruder, the circuit No. 1 is closed. This depolarizes magnet, A, and allows, B, to attract the armature and work contact, D. This in turn rings a bell and lights the lamp. But D prevents an (iron to iron) contact at B, so that by opening a restoring switch in circuit of B (circuit 2), the armature is released and goes to A, as the permanent attraction of B is not enough to retain it.



A NEW TELEPHONE MICROPHONE.

A new departure from the general practice in telephone transmitters is demonstrated in the drawing shown. Here we have Carbon Diaphragms, A A, on the outside, with the diaphragm, B, inside, which are perforated so as to make a cavity for the carbon grains, C. Washers W, serve to keep the plates separated.

THE ELECTRICAL HOUSE.

THIS is what the housewife has been dreaming of! Every task in household duties done by electricity, without the help of the servant! Well, let us start by the first picture, which is the battlefield where many a domestic row with the cook begins!

In the electrical house, every operation

in the kitchen is performed by the electric current. The meat is chopped, the coffee ground, the sauce stirred, the water sterilized, the butter churned, the dishes washed and dried, the stove heated, and other similar operations. Monday, the proverbial wash day, losses its terrors to the wife, for electricity handles the clothes.

The next photograph is the dining room, showing the tables. From the kitchen, the meals are conveyed to the dining room by means of the small ele-

vator in the centre of the table. At the right of the photograph is the small switchboard from whence the movements of the elevator and other apparatus may be controlled. By this control, the plate may be brought up from the kitchen and laid right in front of the person seated

(Continued on Page 307.)

A 100 Watt Step-Down Transformer

By Howard S. Miller.

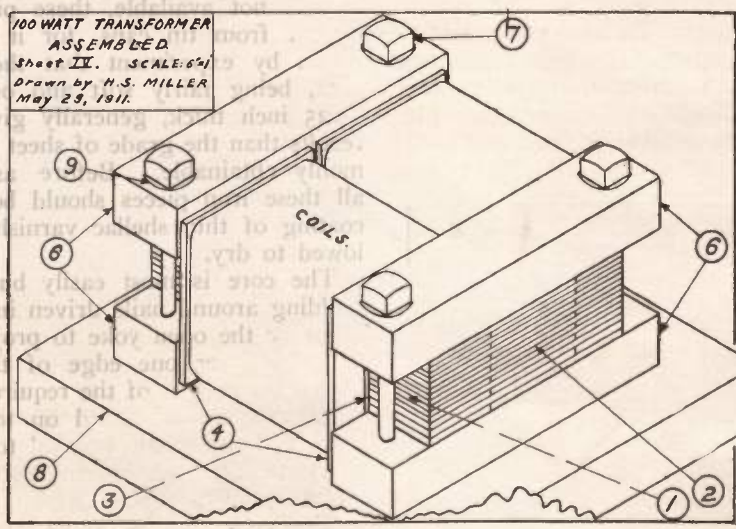


Fig. 4.

THE accompanying drawings give all the data necessary for the construction of this transformer, but the following notes may prove useful to the novice.

To make the spools on which the coils are wound, cut out 2 pieces, No. 3, from 1-16 inch fibre, soak them in hot water, and bend into square tubes over a piece of hard wood 1¼ inch square. Make the joints in the tubes come on the middle of a side, and not on an edge. Cut out the spool ends, No. 4, and place one on each end of the square tubes.

Put the fibre tube on a 1¼ inch square wooden arbor, place it between the lathe centers, and wind on 7 layers, 70 turns per layer of No. 20 B. & S. D. C. C. copper wire. Over this place the fibre tube No. 5, holding it in place with a few turns of string until the secondary winding is started.

On top of this insulating tube wind the secondary, putting on 2 layers, 25 turns per layer of No. 10 B. & S. D. C. C. wire. Bring the ends of these windings through holes drilled in the heads of the spools. These holes should all be on the side of the spool which is to be *outside* when the spools are in position on the core legs, to avoid interference with the clamping bars and the core. The two spools are both exactly alike, and when assembled, the primary coils, and the secondary coils on each are connected in series, so that the current flows in opposite directions on the two legs.

If various voltages are desired from the transformer, taps may be brought out from the secondary winding at the proper points. Every ten turns on the secondary give an E. M. F. of about one volt. An arrangement of taps which gives 20 different voltages from ½ to 10 in steps of ½ volt is; taps on the following turns: 20, 40, 60, 80, 85, 90, 95. These taps may be brought to a row of binding posts, or the beginning

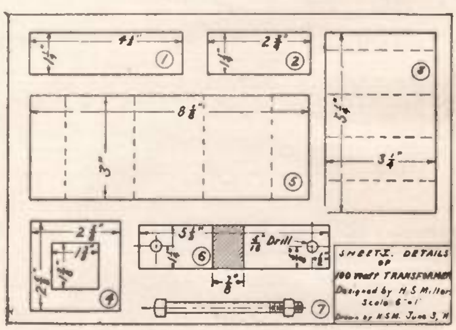


Fig. 1.

of the secondary and the first 4 of the taps may be connected, in order, to the contacts of a five point switch, and the last three taps and the end of the secondary connected, in order, to the contacts of a four point switch. A wire is then connected to each switch arm, and these form the low tension terminals. Number the contacts of the five point switch 0, 2, 4, 6, and 8; and those of the four point, 8½, 9, 9½, and 10. Then to obtain any given voltage set the switch levers so that the number of the contact used on the four point switch minus the number of the one on the five point switch equals the desired voltage. Fig. 5 makes this information clear.

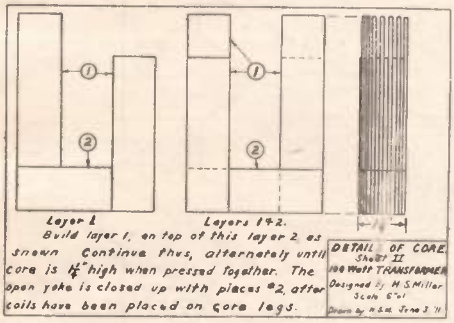


Fig. 2

If a constant secondary voltage other than 10 is desired, wind the primary as above, but for the secondary use a new size of wire found as follows: divide 100,000 by the desired voltage. The quotient is the size in circular mils of the wire which will safely carry 100 watts at the desired voltage, and the corresponding gauge number can be found from any wire table. Put on ten times as many turns of this wire as you wish volts, winding half the turns on each spool.

BILL OF MATERIAL

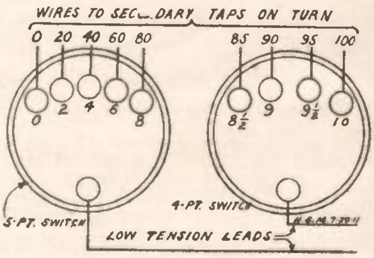
NO.	NAME	MATERIAL	No. Req.	REMARKS, SIZES, ETC
1	Core leg	Soft sheet iron		Enough to make a pile 2½" high
2	Core yoke	" " "		" " " " " " "
3	Spool tube	Hard Fibre 1/16"	2	Bend into a square tube, 1¼" inside
4	Spool end	" " 1/8"	4	Put 1 on each end of spool tubes
5	Insulator	" " 1/32"	2	Bend into a square tube, 2" inside
6	Clamp-bar	Hard Wood	4	
7	Bolt	M. Steel	4	Standard 5/16"x4" square headed bolt
8	Base	Wood	1	Make to suit requirements
9	Washer	Copper	8	For bolts no 7
10	Wire	Copper		570 feet no 20 B&S, D.C.C., for primary.
11	Wire	Copper		77 ft no 10 B&S, D.C.C., for secondary.

100 WATT STEP-DOWN TRANSFORMER
Primary Voltage, 100-110 Primary turns, 980.
Secondary " , 10-11 Secondary turns, 100
Sheet III. Frequency 60 ~. Approved—H. S. M. June 9, 1911.

Fig. 3.

The core is built up as shown in sheet II, using 2 No. 1, and 1 No. 2 pieces in each layer. If desired, instead of using the three pieces for each layer, a piece might be cut which would have the shape of the three assembled as shown. A piece of such shape would be more difficult to cut from the sheet iron, but would have the advantage of being easier to assemble, and of allowing less magnetic leakage. If regular transformer iron is not available, these pieces may be cut from tin cans, for it has been found by experiment that the iron in cans, being fairly soft and only about .0125 inch thick, generally gives better results than the grade of sheet iron commonly obtainable. Before assembling, all these iron pieces should be given a coating of thin shellac varnish, and allowed to dry.

The core is most easily built up by building around nails driven in a board, allowing the open yoke to project about 2 inches over one edge of the board. When the core is of the required height, another board is placed on top of the core, and the whole pressed together in a vice. The spools which have been wound may then be pushed on the projecting core legs as far as possible, and the vice released slightly to allow a little



CONNECTION OF SECONDARY TAPS.

Fig. 5.

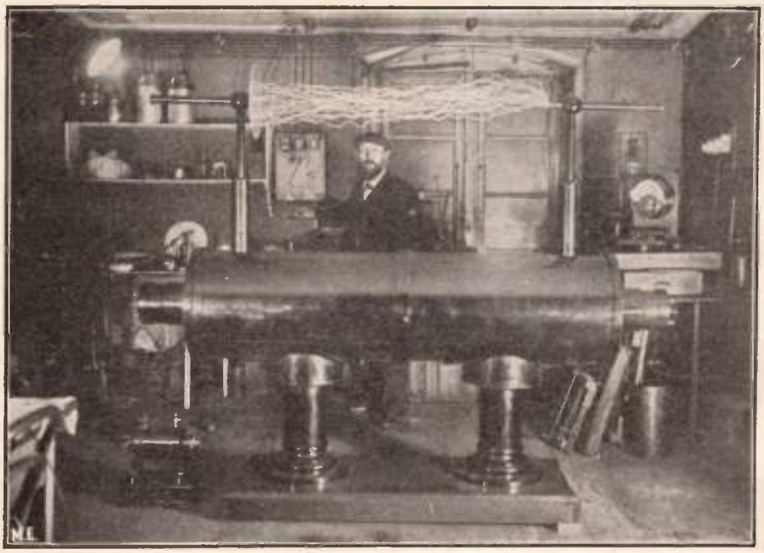
more of the board to be pulled out. The vice is then tightened and a piece of the board split off with a chisel, allowing the spool to be pushed further on the leg, and continuing thus until both spools touch the closed yoke. Then the open yoke is closed up with pieces No. 2.

The clamping bars may then be placed on the yokes, and the core drawn together with the bolts, which also pass through, and secure the whole to the base.

The primary and secondary terminals, and taps, if any are used, may be brought to binding posts, terminal blocks, switches, etc., and proper fuses inserted in primary and secondary circuits, according to the individual needs or desires of the builder.

If desired, the whole transformer may be immersed in transformer oil contained in a sheet iron box.

A Powerful Induction Coil



In the accompanying photograph, will be seen a large induction coil, built by F. Klingelfuss, of Basel, Germany, for use in the electrical laboratory of the Kaiserliche-Technische Hochschule, of Vienna, Austria. This coil, operated by an electrolytic interrupter on an ordinary power circuit, will give a heavy discharge of 120 c.m. in length. When it is remembered that approximately a potential of 800,000 volts is required to break down a 100 c.m. gap, the reader may obtain a clearer idea as to the potential of this coil on the full spark discharge. Needless to say, the insulation is of the very best to withstand these high potential strains.

NEW INSULATING MATERIAL.

A recent British patent (9858, May 11) of Mr. W. J. Reid describes a new insulation material. The method consists in treating with paraffine wax a mixture of from forty to sixty parts of finely powdered cork and from sixty to forty parts by weight of linseed oil, which has been subjected to a temperature usual in preparing boiled oil for painters' use for such a time that it becomes viscid and will draw into threads when becoming cool. This mass can be molded while hot into any shape, and when hardened can be exposed to the air at a temperature of 100 deg. Fahr.

THE DISCOVERER OF RADIUM.

This is an excellent photograph of the late M. Curie, the discoverer of Radium, taken while he was lecturing on the mysteries of Radium at La Sorbonne. Though through the death of M. Curie the scientific world was deprived of the services of a valuable factor, yet nevertheless, his

wife has continued with great success, the researches along the same lines.

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The Editor will be pleased to receive original contributions of timely interest pertaining to the electrical and the afiliated arts. Articles with good drawings and clear photographs especially desired. If accepted, such articles will be paid for on publication, at regular rates.

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Vol. IV. AUGUST No. 5

ANNOUNCEMENT.

It is with great pleasure that I announce that *Modern Electrics* has made a change for the better.

Ever since I started this magazine I have had to devote a large amount of time to the advertising department and it goes without saying that I would much rather devote my time to the editorial end than to the advertising department.

I am glad to say that this has been made possible at last.

Mr. Orland J. Ridenour, for the past three years and at the present moment, General Manager, and Advertising Manager of the Star Expansion Bolt Co. of New York, has been induced to devote all his future energies to the business and advertising department of *Modern Electrics.* Mr. Ridenour, who will start with us on August the 1st, leaves a very lucrative position and does so without regret, as he is convinced that *Modern Electrics* is bound to become the greatest electrical magazine of the world.

I have had these hopes for years, and now that I can give more attention to the editorial end, I feel sure that I can make *Modern Electrics* a vastly better magazine than ever.

We will shortly increase the size of the paper and we hope that by January 1st the volume of *Modern Electrics* will have doubled.

The name of our firm has changed and it is now: *Modern Publishing Co.* The new firm has been incorporated for $25,000.

I sincerely hope that you will help us to make *Modern Electrics* a big success. I pledge myself herewith to give you the best of everything, regardless of expense and energy; if you are glad now to see "M. E." each month, you will be doubly glad hereafter. I have a lot of good plans and novel ideas, that will make your heart glad, but I must have your co-operation. We want a larger circulation, to begin with. I know that you who read this, with very little trouble can induce one or more friends to subscribe to this magazine. If each one of you would do this, I could double the volume of the paper next month. I don't even ask you to go to this trouble for nothing. We offer premiums right along, which you can earn with but little effort.

The next important point to consider is: advertising. As I pointed out before, if it were not for the advertisements, *Modern Electrics* could not be printed. Advertisements are practically our only revenue, as our subscriptions do not even begin to pay for the office maintenance, not to speak of the cost to print, bind and mail the magazine, etc. Now then the advertiser has a right to ask for good returns if he pays $50.00 a page for his "ad.," and I think it's up to you to show him that his confidence placed in the "purchasing power" of "M. E." readers is not misdirected.

You know that the things you see advertised in our pages are all honest and well made and you know that you can trust our advertisers. For this reason you should patronize our advertisers, and when doing so, you should never fail to mention *Modern Electrics.*

I trust I can depend on your hearty co-operation, and you know from experience that I do not make idle promises.

H. GERNSBACK.

Ralph 124C 41 +

(Continued.)

By H. Gernsback.

SYNOPSIS OF PRECEDING INSTALLMENTS

Ralph 124C 41+ *living in New York in the year* 2660 *while in conversation with a friend at his Telephot, an instrument enabling one to see at a distance, is cut off from his friend and by mistake is connected with a young lady in Switzerland, thus making her acquaintance by Telephot.*

The weather engineers in Switzerland who control the weather decided to strike against the Government and turned on the high depression of their Meteoro-Towers, thereby snowing in a large district. An avalanche threatens to sweep away the house in which the young Swiss lady, Miss 212B 423, *lives and she appeals to the great American inventor, Ralph* 124C 41+, *to save her, which he promptly does by melting the avalanche by directed wireless energy from his New York laboratory.*

The inventor on the same afternoon is given an ovation by distance, in which the Telephot plays a great part. Afterwards he reads a "newspaper," the size of a postage stamp, and "writes" a lecture by means of the Menograph, an instrument by means of which words are made to appear on a paper tape by impulses from the brain acting on the apparatus. During the night his head is connected electrically to the Hypnobioscope, an instrument by means of which words and sentences are transmitted directly to the brain while one sleeps, in such a manner that everything can be remembered the next morning.

The great inventor, the next day, is visited by Mr. 212B 423 *and his daughter from abroad. Both arrived by means of the Subatlantic Tube, piercing straight through the earth from New York to Brest in France. In the afternoon in presence of his guests and twenty professors from all over the globe,* 124C 41 *brings life to a "radiumized" dog, who had been killed three years previous in presence of the twenty professors. The dog had been preserved with the rare gas Permagatol and Radium-K bromide, which latter occupied the blood vessels of the dog for three years.*

STRANGE to say, she had never been in New York before. 124C 41 could not understand it at all. In conversation with her it transpired that Miss 212B 423 had been over the greater part of the globe, but for some unknown reason she had never visited New York.

124C 41 took it upon himself to "show her around."

"You know," he said before they started, "we New Yorkers are strange birds. We only like our city when we are far away from it, or when we can take some stranger about to show him or her the marvels of the town. As a matter of fact the real, dyed-in-the-wool New Yorker hates the town and only stays in it because it has cast a spell over him which he cannot escape. New York is a gigantic vampire. It sucks the blood of the strongest; still, it gives us valuable experience and knowledge in exchange for it, so I suppose we have no right to complain. It has thus been for centuries and will be thus as long as the town exists."

By this time they had arrived at the street level of the building and 124C 41 bade Miss 212B 423 sit down on a chair in the vestibule. He pressed a nearby button twice and a servant brought two pairs of roller-skates—at least that is what they looked like.

In reality they were *Tele-motor-coasters.* They were made of alomagnesium and each weighed only about one and one-half pounds. Each had three small, rubber-covered wheels, one in front and two in the rear. Between the wheels was located a small electric motor—about the size of a lemon; this motor could only be operated by high frequency currents and, despite its small size, could deliver about one-quarter horsepower.

124C 41 explained the coasters and their use to his companion and after they had put them on by means of an ingenious clutch, whereby the coaster could be snapped onto the shoe in less than five seconds, they both went out into the street. From each coaster a thin insulated wire led up the wearer's back to the hat or cap. Here it was attached to the *collector,* which was a stiff pin about eight inches long, projecting half-way out from the hat or cap. This pin sucked up, as it were, the high frequency electricity and carried it to the small motors, which latter propelled the coaster. Ladies could use their usual headgear, but they attached the wires to one of their hatpins, which projected four to five inches into the air. To control the speed of the motor, one simply lifted up the front part of the coaster; this not only cut off the current, but automatically braked the two rear wheels.

When 124C 41 and his guest rolled out in the street, Miss 212B 423 at once remarked about the splendid condition of the roads.

"You see," 124C 41 explained, "for centuries, the city had to content itself with bad pavements, bad asphaltum, etc., till about fifty years ago it woke up and covered every street with steelonium.

"You will notice that there are no cracks nor fissures or the like. Steelonium, as you of course know, is unrustable and ten times as strong as steel. We now make our streets by putting down large slabs of the metal, six inches thick. After they are in place we weld them together electrically and the result is a perfect street composed of a uniform sheet of metal without cracks or breaks; no dirt nor germs can collect. The sidewalks as you perceive are made in the same manner.

"As a matter of fact, the Tele-motor coasters would not be possible were it not for the metallic streets. The flat spring which trails on the street between the two rear wheels must make continuous contact with the metallic "ground," else the current cannot flow."

"But where does the current come from?" interjected Miss 212B 423.

"You have perhaps noticed already the white slender posts at the edge of the sidewalk, and on their tops umbrella-like insulators which carry a thick spiked wire. This wire, as you will notice, is about fifteen feet above the curb and it carries the high frequency current which not only supplies our coasters with current, by way of our needle collectors, but it propels also all the vehicles which you see gliding so noiselessly."

They had now got well under way and rolled along at a speed of perhaps twenty miles an hour. They passed thousands of citizens all on rollers, all coasting at high speed. There was no noise but the peculiar hum produced by the thousands of motors, but this hum was in nowise annoying.

Each sidewalk was divided in two parts. On the outside only people going in one direction, on the inside only people going in the opposite direction could coast. Collisions therefore were almost impossible. If a person rolling on the outside wished to enter a store, it was necessary to go to the end of the block, then turn to left, which brought him in the inside of the sidewalk and he then would roll up to his destination. Of course, this was only necessary when the sidewalk was crowded, nothing preventing one to cross a sidewalk if but few people were on the block.

There were no trolley cars in the street, only electromobiles carrying either passengers or else freight. Each vehicle was equipped with a short collector mast by means of which the electrical energy was conveyed to the motors. The wheels of all vehicles invariably were rubber-covered. This accomplished two purposes: one to insulate the vehicle from the metallic street, the other to minimize the noise to the geratest extent.

Although Miss 212B 423 had a good scientific training, some of the wonders of New York kept her guessing and she, as strangers had done for centuries, kept on asking questions continuously, while her good-natured companion eagerly explained everything with a pleasure peculiar to a New Yorker, loving his town.

"What are those strange spiral wire affairs hanging high over all street crossings?" was one of her first questions.

"Those illuminate our streets at night," was the answer. "They are iridium wire spirals, about ten meters in diameter, hanging forty meters up in the air, at the intersection of all our streets; this evening you will see how the entire spiral will glow in a pure white light which is absolutely cold. The wire emanates the light and after sundown you will observe that the streets are almost as light as now. Each spiral furnishes over one-half million candlepower, consequently one is needed only where streets intersect, except on very long blocks, when a smaller spiral is hung in the middle of the block."

Presently, while crossing a large square they passed Meteoro-Tower No. 26, of the seventh district, and 124C 41 at once launched off in praise of it.

"While you in other countries of course have a good weather service, we in New York boast to have the finest climate of any town on the face of the globe. As you must be aware, our weather-engineers have difficult work right along, owing to the peculiar shape of the city, geographically as well as physically. The tall spires and buildings make the work doubly hard, as the air currents are extremely erratic over the city and extremely hard to control. We now have sixty-eight Meteoro-Towers, all of various power, in Consolidated New York. These are scattered over a radius of ninety miles from the *City Governor's Building* and control the weather as well as the temperature of New York's two hundred million inhabitants.

"You may look at a thermometer any time during the year and you will find it invariably pointing at fifty units.* There is never an excess of humidity in our air and life is made enjoyable for the hard-working city dwellers, thanks to our well-trained weather engineer corps.

"During the daytime rain or snow is unheard of. There is continuous sunshine three hundred and sixty-five days during the year. Between two and three each morning it rains for exactly one hour. This is done to freshen the air and to carry the dust away. It is the only rain New York ever gets and it seems to be sufficient for all purposes."

As it was near noon time 124C 41 invited his companion for lunch. They both entered a luxuriously fitted out eating place, which across its entrance bore the legend *Scientificafe*. "This is one of our best gustatory institutes and I think you will prefer it to the old-fashioned masticating places," he told the young lady.

Both entered the place and at once a deliciously perfumed, invigorating air greeted them.

They proceeded at once to the *Appetizer*, which was a large room, hermetically closed, in which sat several hundred people, reading or talking.

The two sat down on leather-upholstered chairs and perused a comic journal which was projected upon a white wall, the pages of the journal changing from time to time.

They had not been in the room for more than five minutes when Miss 212B 423 exclaimed:

"I am ravenously hungry and I was not hungry at all when we entered. What kind of a trick is it?"

"You see, this is the Appetizer," 124C 41 laughed, "the air in here is so invigorating and is charged with several harmless gases for the purpose of giving an appetite before you eat—hence its name!"

Both then proceeded to the main eating salon, which was furnished beautifully in white and gold only. There were no attendants and no waiters, and the salon was very quiet except for a muffled, far-off, murmuring music, too faint to cause annoyance.

They then sat down at a table on which were mounted complicated silver boards with odd buttons and pushes and slides. There was such a board for each patron. From the top of the board a flexible tube hung down to which one fastened a silver mouthpiece, that one took out of a disinfecting solution, attached to the board. The bill of fare was engraved right into the board and there was a pointer which one moved up and down the various food items and stopped in front of the one selected. The silver mouthpiece was then placed in the mouth and one pressed upon a red button. The liquid food which one selected would then begin to flow into the mouth, its rate of speed controlled by the red button. If spices, salt or pepper were wanted, there was a button for each one which merely had to be pressed till the food was as palatable as wanted. Another button controlled the temperature of the food.

Meats, vegetables, and other eatables, were all liquified and were prepared with utmost skill to make them palatable. When changing from one food to another the flexible tube, including the mouthpiece, were rinsed out with hot water, but the water did not flow out of the mouthpiece. The opening of the latter closed automatically during the rinsing and opened as soon as the process was terminated.

While eating one reclined in the comfortably upholstered leather arm-chair and one did not have to undergo physical exercise, like using knife and fork, as was the rule in former centuries. Eating had become a pleasure.

At first the scientific restaurants did not succeed well. Humanity had been masticating for thousands of years and it was hard to overcome the inherited habit.

However, people soon found out that scientific food prepared in a palatable manner in liquid form were not only far more digestible and better for the stomach, but they also did away almost entirely with indigestion, dyspepsia, and other ills, and people began to get stronger and more vigorous than of old.

The scientific restaurants furnished

*72° Fahrenheit.

only foods which were nourishing and no dishes hard to digest could be had at all. Therein lay the fine success of the new idea.

People at first did not favor the idea because the new way of eating did not seem as aesthetic even as the old and seemed also at first devoid of the pleasures of the old way of eating. They regarded it with a suspicion similar to a twentieth century European observing a Chinaman using his chop-sticks. This aversion, however, soon wore off as people became used to the new mode of eating, and it is thought that the close of the century will witness the closing of all old-fashioned restaurants.

It must not be thought, however, that the liquid scientific foods are absolutely liquid. They are, especially meats, in such forms that slight mastication is always necessary and desirable. This naturally does away with the monotony of swallowing liquids all the time and makes the food more desirable.

After lunch 124C 41 and Miss 212B 423 rolled uptown and the former explained the various sights as they progressed. On Broadway and 389th street, in a large square, an extinct petrified animal stood upon a pedestal. Miss 212B 423 desiring to know what it represented, approached and read this inscription, hewn in the stone:

> **Pete**
>
> The last Horse in Harness in the
> Streets of New York,
> Died on this Spot
> June 19th, 2096 A. D.

"The poor thing," murmured the young lady, "but I think the world is better off without torturing poor dumb beasts when electricity can well take care of all the work."

Her companion, touched by this feminine remark, smiled softly.

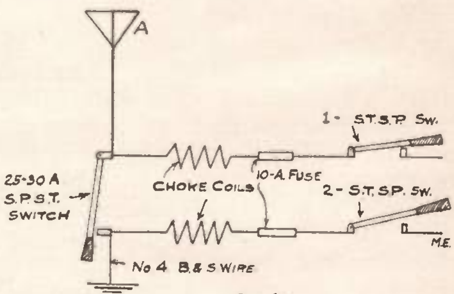
(To be Continued)

LIGHTNING PROTECTION FOR WIRELESS STATIONS.

By Philip Edelman.

THE average amateur gives altogether too little attention to the protection of his station from lightning. The aerial, which is usually the highest conductor in the neighborhood, becomes a particular target for lightning discharge, unless it is properly protected. The lightning bolt comes quickly and without warning. When it strikes it does it with a vengeance. Great holes are torn by the disruptive discharge and fire usually breaks out. This is often accompanied by a loss of life.

Let me cite a few instances. One operator of my acquaintance had his ears pierced by an atmospheric discharge while he was "listening in." Another had his house struck, the discharge coming down his aerial, and completely demolished the surroundings.



-FIG. 1-

Similar misfortunes have occurred in many other places. In every case the accident could have been avoided by having the aerial properly protected.

Many amateurs (either willingly or on account of parental orders) take their aerials down and put their instruments away for the summer because they are afraid of lightning. This is a foolish thing to do. With simple precautions a station can not only be made safe, but also becomes a protection for the neighborhood. A good example of this occurred in New York state last summer. A sensible fellow had properly grounded his aerial, which was 110 feet high. During a severe storm a one-story grocery store, one block away, was completely demolished, but his station and the immediate neighbors were unharmed. It seems to me that amateurs like this who protect the neighborhood could rightfully charge the neighbors for such efficient protection.

A lightning discharge is generally conceded to be a very high frequency, high voltage discharge. It must therefore be treated as such. Nearly all of the readers know that high frequency currents travel on the surface of the conductor and that large conductors are necessary for connections where high frequency currents (such as generated by Tesla coils) are used. The same rule holds good for lightning conductors. We also know that high frequency currents cause intense heat. A conductor which is too small would be liable to fuse. Again, a choke coil is more important and valuable for deflecting such a high frequency discharge than an insulator.

I hope that I have pointed out the importance of a properly protected station forcefully enough. I suggest the arrangement as shown in Fig. 1 as an efficient protective system. The ground wire should be No. 4 B. & S. This wire costs about twenty-five cents a pound, and runs about seven feet to the pound. It should be run as straightly as possible direct to the ground electrode (outside of the building) and a soldered connection made. It is important that a good ground electrode be used. It must be outside of the building, preferably independent from the regular wireless ground. It should be placed in moist earth at least ten feet under the surface. It should have plenty of capacity, otherwise it will be of little use.

I suggest the following for an efficient earth electrode. Dig a hole ten feet deep by ten feet square, and bury several old copper boilers in it. Connect the No. 4 wire to each boiler and solder the connections. Purchase five or ten pounds of calcium chloride and sprinkle it generously all over the electrode. Then cover with the dirt. The calcium chloride is very cheap—only a few cents a pound—and being a very deliquescent substance, insures a moist electrode for an indefinite time.

The ground switch should be a 25-30 amp. single pole one, and must be mounted on the outside of the building at the point where the aerial lead enters the room. The choke coils can be made by winding thirty turns of No. 6 B. & S. wire on a porcelain tube one and a half inches in diameter. Where this extra inductance is found harmful for the sending apparatus, it can be temporarily short circuited with single switches. The double pole switch will be all right for smaller stations, but two single pole switches widely separated should be used for larger installations.

This arrangement forms a very good protection The one disadvantage is that it must be disconnected by opening the switches every time the wireless apparatus is used and reconnected the rest of the time. The writer has recently perfected a compact arrester combining all of the good points of the above mentioned system, but which does not interfere with the other wireless apparatus. It can therefore be left in connection all the time. This device has been severely tested out and found to do its work efficiently: It consists of a condenser-like arrangement, safety gap, and ground switch. The choke coils, fuses, and switches are sold separately. These last are not necessary for small stations.

NOTICE.

The newly formed "Mowa Wireless Club" has applications opened for all who have wireless stations within five miles distance from the main station at 331 Pacific Street, Brooklyn, N. Y. The officers are: President, Chas. H. Gregory, Chief Operator, A. W. Sands, and Secretary, Ralph Burrel.

The object of this club is to get the wireless station owners in closer social friendship, and derive the many advantages which may be gained therefrom.

The only requirements for membership are that the applicant owns a wireless station and lives within five miles of the main station. All applications should be addressed to the President, Mr. Charles H. Gregory, care of Sands & Gregory, 331 Pacific Street, Brooklyn, N. Y.

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

NOTICE.

THE editor is obliged to call the attention of the many contributors to the fact that we are getting too much material for consideration which is of no value. To say the least, we have received 30 letters on helix clips during the past few weeks. The letters on universal detectors hold second place, and spark gaps also make a good display of quantity. However, strange to say, these articles all resemble each other, and must be termed as "old chestnuts" inasmuch as they are known to have been published long ago. We would almost have to employ a special wagon to remove the quantity of rejected manuscripts!

There are many other subjects which may be written about, besides spark gaps, helix clips, and universal detectors. Have you discovered or invented anything original in motors, lights, batteries, chemical experiments, high frequency apparatus, generators, or other subjects? Surely it is unnecessary to resort to those three worn out subjects enumerated above!

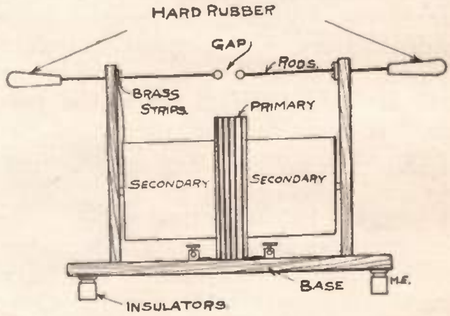
In the future, the editor hopes to see a gradual improvement in the ideas sent in for the Experimental Department. We would be pleased to branch out more into the electrical field, as wireless is greatly covered, and little remains to be done with the present systems used.

FIRST PRIZE TWO DOLLARS.
A LARGE TESLA COIL.
By Charles L. Whitney.

AS the writer has failed to notice a good article on the construction of a large tesla coil, he has written this article in hopes that a few experimenters will make one, and thereby procure no end of amusement at very little cost.

First make a base of hardwood, 18 x 8 x ¾ inches, and two uprights 18 inches long and 1½ inches square at the bottom, and tapering to ½ inch at the top. Now bore a 3/16-inch hole through same at about 1 inch from the top, and a ½-inch hole, 5¾ inches from the bottom. On one side fasten a brass strip about 1 inch long by ⅛ inch thick and ½ inch wide. The strip to have a 3/16-inch hole bored in the center so that when the brass rod is passed through, it will fit snugly.

Now make a tube of heavy cardboard 12 inches long by 7 inches in diameter and shellac well. Then wind 150 turns of No. 36 S. S. C. or D. C. C. wire, well spaced and shellacked, leaving about 12 inches of wire for leads. Wind over this another layer of heavy cardboard, which has been shellacked both inside and outside.

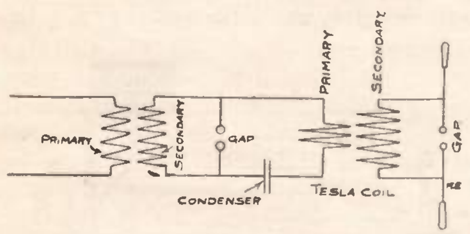


A hoop, for the primary, 11 inches in diameter and 2 inches wide is made of thin, pliable wood, well shellacked and wound with four turns of No. 14 rubber-covered or even common electric light (house-wiring) wire. This does not need to be shellacked, but must be held on with two or three turns of friction-tape at two places.

Now form two ends for the secondary and bore a one-half inch hole in the center of each end, then fit the ends to the secondary and fasten to the tube.

We are now ready to assemble the parts. First fasten the uprights to the base with 2-inch screws at a distance of 12½ inches apart. The primary is screwed or clamped to the center of the base. Next, the secondary is slipped in place and held by ½-inch dowels, which run through the holes in the upright and end of secondary. The Primary leads are brought to binding-posts on the base, and the secondary leads to the brass strip on the uprights. Brass rods with brass balls on one end and a hard-rubber handle on the other end are slipped through the holes at the top of the uprights.

Four telephone insulators form the insulation of the base, which are fastened on each corner, and the coil is ready for use. The writer has used this coil in connection with a ¼-kw. transformer,



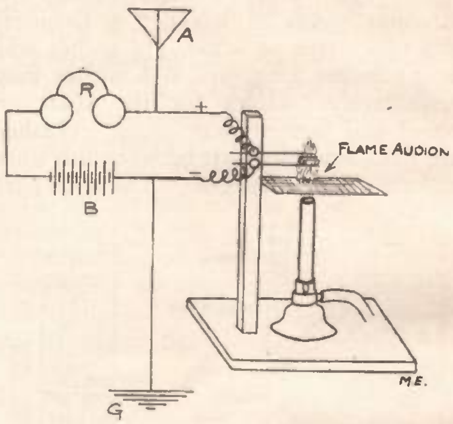
and has produced a 10-inch spark at the secondary terminals. The condenser has to be of the right capacity to get good results. This coil can be used with Geissler and X-ray tubes. A number of good experiments will be found in H. W. Secor's book, "Construction of Induction Coils and Transformers," which can be procured from the *Modern Electrics* Publication.

SECOND PRIZE ONE DOLLAR.

A FLAME AUDION.

The Audion as a receptor of Hertzian waves seems to have lost a place in the heart of the wireless experimenter. However, the following may interest a few, because it provides a good field for investigation. The object of all audions, is to get one of two terminal plates to throw off ions, which act as a relay to high-frequency oscillations that pass between the plates.

Bunsen burner is used to furnish the flame, A, and salt or any alkaline metal in the flame produces the ions. The salt is contained in a small trough of platinum, which is easily made by flattening and shaping a piece of platinum wire, since the trough is only three-eighths of an inch long and one-sixteenth of an inch wide. About one-sixteenth of an inch above the trough is placed another piece of platinum



wire. The trough is the cathode of the telephone circuit and the wire the anode.

This detector is so sensitive that the least flicker in the flame is registered as a sound in the receiver. So in order to produce a steady flame, a wire gauze is placed just above the burner, then, the flame produced is extremely steady. However, it should be provided with a mica chimney to protect it from the air currents.

The sketch explains the arrangement and construction. The base and pillar are made out of wood, or better still hard rubber. Binding posts are fastened to the pillar to take the trough and wire.

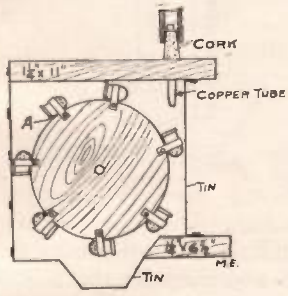
Eight dry cells, connected to a multiple point switch so that any adjustment from 4 to 12 volts may be secured, are placed in series with the detector and receiver. By keeping plenty of salt in the trough and carefully adjusting the voltage, a marvelously sensitive detector may be made.

Contributed by

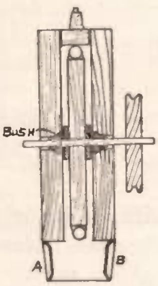
MEARLE MELLINGER.

A WATER MOTOR.

Although water motors are not electrical devices, yet they are useful in driving dynamos and static machines. The one herewith described, is very efficient and powerful. The principal part is the wheel which is sawed from wood and is 5½ inches in diameter. Around the edge are fastened small thimbles by means of tin strips and tacks. A tack driven at A, Fig. 1, will help to hold the thimble in place. The shaft may be made of brass or steel and is driven through the center of the wheel so as to run as true as possible. The "house" consists of two rectangular pieces of wood, 7 x 6 inches, and two strips of wood, 1¼ inches wide by 11 inches long, and 6½ inches long, respectively. Holes for the shaft are bored and bushed with brass. Washers are placed on the shaft between the wheel and the sides of the case. The open parts



-FIG. 1-



-FIG. 2-

which are left, not covered by wood are covered by tin, nicely cut and tacked. The outlet is formed of tin soldered at A and B, Fig. 2. The nozzle is made of a copper tube with an opening one-eighth of an inch in diameter and is fastened se-

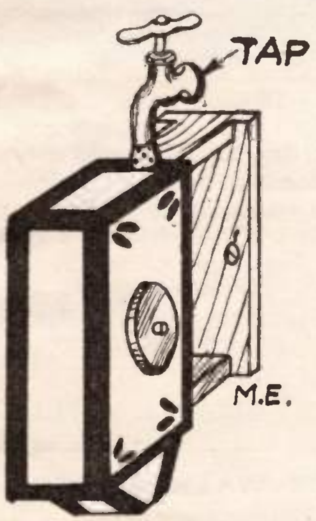


Fig. 3

curely in a hole at the top, so placed as to direct the water into the thimbles as they pass. A cork is placed around the tube and should fit snugly into the faucet. The strips of wood extend behind the motor and fit into another strip, forming a bracket, as shown in Fig. 3, which is screwed against the wall. Melted paraffin is poured into the case and allowed to run into all the crevices. The case is then filled with boiled oil to make it nearly water-proof. The motor is then painted white and striped black, presenting a very neat appearance.

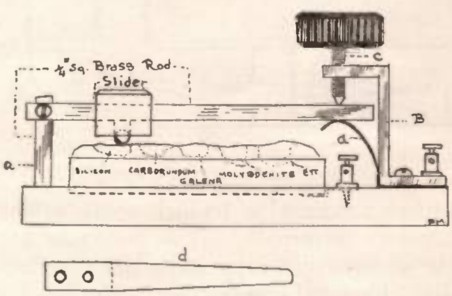
Contributed by

LOREN GAY.

UNIVERSAL DETECTOR.

An improvement over Mr. Hutchinson's detector in the May issue of *Modern Electrics* is shown in the illustration.

Instead of fixing the slider rod on two brass uprights it is pivoted on a bar, A, at one end, and at the other end is provided with an adjusting mechanism. This consists of an aluminum bracket, B, the kind E. I. Co. use on the "Electro"-lytic detector, and a thumbscrew, C. Be-



fore screwing the bracket, B, to the base, a spring, D, is cut from a one-sixteenth inch sheet brass, and drilled as shown. It is then fastened under bracket, B, as shown.

This spring is used to keep the slider rod up against the screw, C.

Contributed by

P. MERTZ.

A CORRECTION.

On page 574, Vol. 2, of this magazine, were directions "How to make a small transformer to obtain from 5 to 1,000 volts." With the amount of No. 24 D. C. C. wire mentioned, it would only be possible to get a little over 500 volts. In order to get the 1,000 volts there should be a little over 2 pounds used.

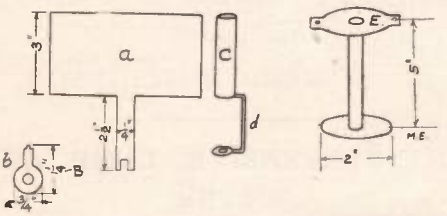
I trust this will explain the trouble to anyone who tried to construct same.

Contributed by

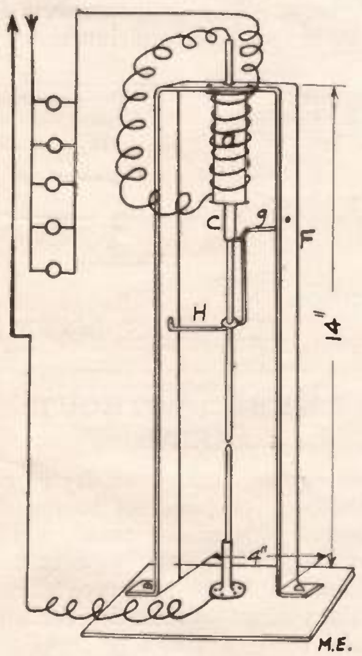
JOE BRAITH.

AN AUTOMATIC ARC LAMP.

Cut piece of tin as A, wide enough to fit around carbon, this depends upon size of carbon used. I woud recommend 3-ampere carbons. Cut a piece of one-sixteenth inch brass as B, hole in center just large enough to allow of easy passage of carbon. Bend A into shape C and hinge B to strip D, so B will swing of its own weight. Make brass spool E with hole large enough to allow C to pass in with ease, wind spool full of No. 14 magnet



wire. Make brass standard F and fasten to suitable base, bolt spool E into place on standard, fasten brass rest piece G into place high enough to allow about one-half inch of C to protrude from bottom of spool, bolt bracket H to standard, so that B rests upon it, allowing carbon to slip through and rest upon lower carbon, which may be fastened to base as per



drawing, connect one end of coil to 5, 32 C. P. lamps connected in parallel as per drawing or any suitable resistance will do, and fasten other end of coil to top carbon, which protrudes above the standards. When the current is turned on the carbons are touching, causing current to flow through coil which pulls C up into coil, B, catches carbon and pulls up causing the arc, when carbons burn away far enough to go out and break the circuit. Coil A lets C drop, H levels B, letting upper carbon drop onto lower carbon again, closing the circuit and the operation is repeated.

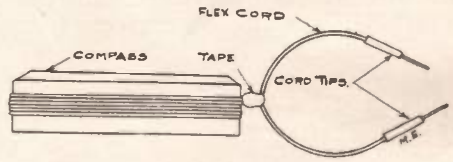
Contributed by

C. R. HAMPTON.

A SENSITIVE POCKET GALVANOMETER.

The diagram is for the most part self-explanatory.

Wrap about six turns of No. 18 D.C.C. wire around the sides of an ordinary magnetic compass. To this splice two separate pieces of flexible tinsel cords with



tips soldered on ends of each cord. Wrap a short piece of tape around the splash.

Contributed by

R. NEIL CALVERT.

ALUMINUM SOLDER.

I find that most amateurs have trouble in soldering aluminum aerial wire. I have found that the following solder works very efficiently:

Aluminum, 1 part;
zinc, 4 parts.

After the aluminum has been melted add the zinc, then a small quantiy of fat. The mixture should be well stirred, after which it may be poured into stick molds.

To apply, the wire should be scraped bright at place to be soldered and a little Venetian turpentine used as a soldering fluid. A thin shaving of the solder may then be placed around the joint and melted with a blow torch. The solder will be found to adhere firmly to the aluminum.

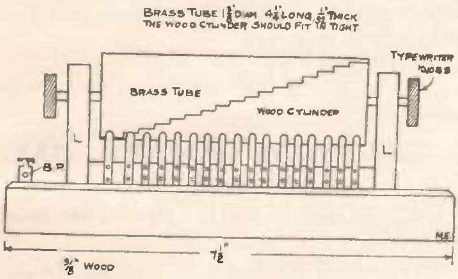
Contributed by

RAYMOND JENKS.

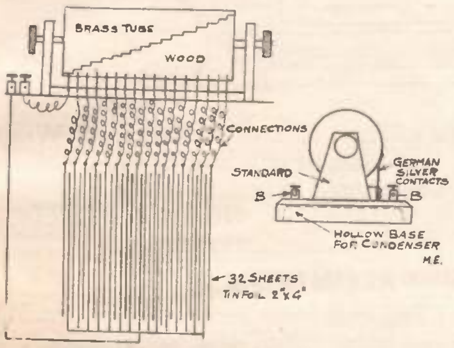
ANOTHER VARIABLE CONDENSER.

Enclosed herewith are some drawings that perhaps will interest some of your readers, on a variable condenser which I am using with good results. It is a fine looking apparatus when polished and finished, besides easily operated.

The wood is made out of oak, three-eighth-inch stock, and polished or stained with mahogany dye. The contacts are made of German silver and the knobs are



from a typewriter which can be gotten at any typewriter store. The condenser is made of tinfoil and paraffined paper, being sealed in wax after all connections are



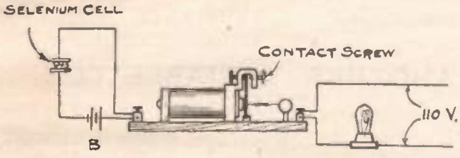
made in the base. The brass tube can be cut with tin shears and the edges filed until the contacts slide on easily.

The wires may be soldered onto the contacts and then run through the base. I think the rest is self-explanatory.

Contributed by

RUDOLPH W. ALSING.

Here is an idea representing better protection to homes which have been vacated for the summer, than burglar alarms. Burglars like to work where they think no one is at home, and a light burn-



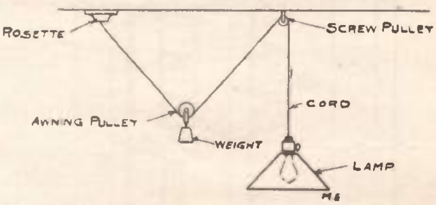
ing in a house at night naturally makes one think it is occupied. A high resistance relay, a good selenium cell, and two or three dry cells are the necessary articles. Change the contacts on the relay as shown, so it closes the circuit when the armature is against the adjusting screw. Place the selenium cell near a window and connect the instruments. As soon as it gets dark, the selenium cell becomes high resistance, and the relay ceases to attract the armature so it closes the lighting circuit. At dawn the light is shut off. This operation is likewise repeated throughout the summer.

Contributed by

EDWARD HUTCHINSON.

AN INEXPENSIVE LAMP ADJUSTER.

First secure from a hardware store a small screw pulley and an awning pulley (these should not cost over five cents each). Then remove the lamp socket from the cord and run the cord through the two pulleys. Screw one pulley into the ceiling about eight inches from rosette (or as far as wished) and attach to the other a weight which is heavy enough to balance lamp. This device answers for a much more expensive attachment.



Contributed by

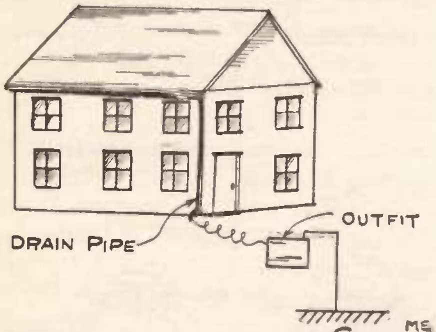
HAROLD S. BOOGER.

WIRELESS WITHOUT AN AERIAL.

While experimenting one day recently, I connected a portable set to the drain pipe on one side of the house, which is 55 feet long. The rain pipe is coated with paint. so I had to scrape same off to obtain a clean contact for the apparatus, and using a 5-foot piece of water pipe. I drove this into the ground the full length. I succeeded in listening to Milwaukee, talking to Chicago, which is a distances from 90 to 100 miles from here.

The set that made the record consists of double slide tuner (E. I. Co.), a silicon detector, a fixed condenser, and 1,000-ohm receivers.

This aerial is safe from lightning, while still allowing some long distance receiving.

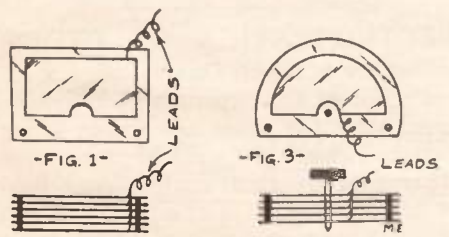


Contributed by

ED. EGLOFF.

A VARIABLE SENDING CONDENSER FOR ANY SIZE COIL.

Illustration is self-explanatory; full details may be obtained from sketch.



This is a good condenser for changing from a large coil to a small one.

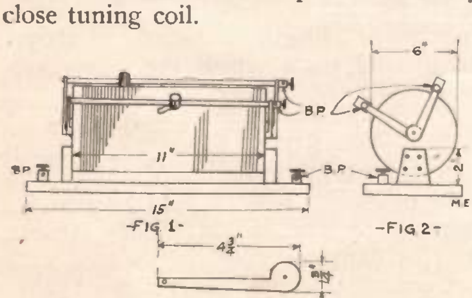
Dimensions and number of plates can be varied.

Contributed by

HARRY KING.

A CLOSE COUPLED TUNER.

We have herewith the plans for a very close tuning coil.



The coil is wound with No. 22 bare copper wire, and in such manner that the wire does not touch the next wire in any instance. (This can be done by winding a thread between the wires.) The brackets are put on so that they will move, but not enough that they may fall of their own weight. The connections are the same as any other double-slide tuner.

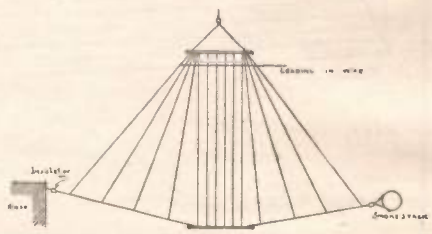
With this coil very sharp tuning can be done and it also replaces the small tuner usually used for sharp tuning.

Contributed by

HAROLD WOOD.

AERIAL EXTENSION.

The accompanying sketch shows how the operator of a commercial station extended his aerial to about twice its former capacity. The original aerial was a twelve-strand straightway. He was favored by a nearby smokestack on one side and a tall building on the other. As most amateurs do not have a smokestack in

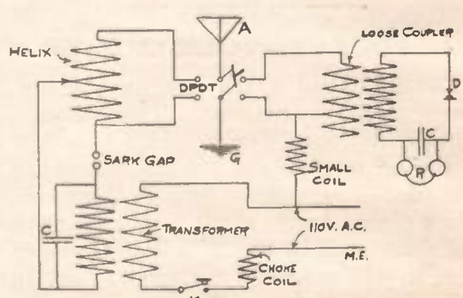


their back yard, a tree, house, etc., will do. The drawing is self-explanatory. Instead of insulating each wire from the spreader, the wires that suspend the spreader are insulated.

Contributed by

NORMAN E. BUCKLIN.

I have been an experimenter in wireless for about three years. During that time I have been bothered with a continual hum in my phones.



I have finally, after trying many ways, succeeded in stopping this hum without decreasing the signals in the least, and if anything, increasing them.

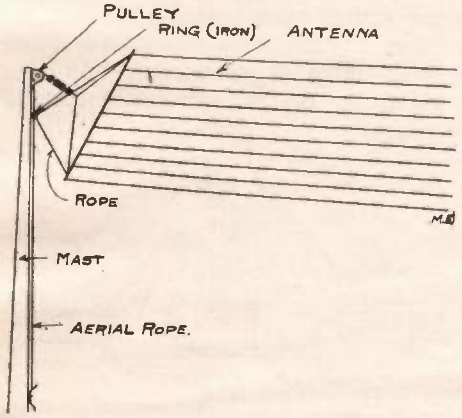
The drawing will explain itself. The coil does not have to be of any particular design, although I used an old tuner, wound with No. 24 S. C. cotton wire. I also find that it will cut out static to a certain extent.

Contributed by

PHILIP T. BROWN.

A HINT ON AERIALS.

I have a diagram of a plan of my own to keep the antenna from becoming twisted and tangled during a windstorm. The iron ring sliding on the aerial rope always brings the antenna right to the foot of the mast when lowering, which is very



handy if your mast is on the house. The ropes from the ring to the spreader must be made the right length by tests so that they will be fairly taut. This device will save lots of trouble and is very easily constructed.

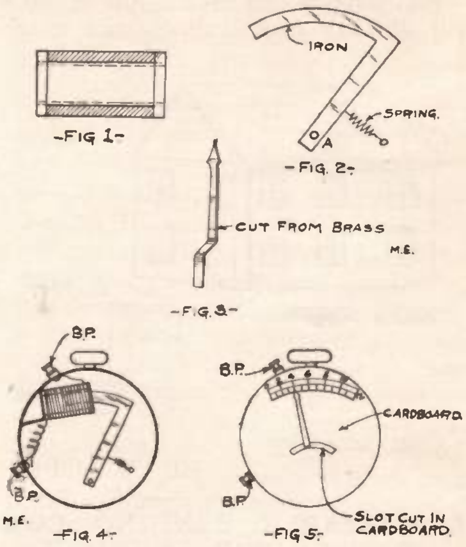
Contributed by

G. WESLEY PALMER,
Wanwatosa, Wis.

A .POCKET VOLT METER.

Obtain an old watch case for the container of the mechanism. Then procure a small iron core, Fig. 1, which is hollow in the center. Wind on this spool fine enameled wire. After this is done, obtain a piece of iron about 1/16-inch thick and shape it as in Fig. 2, a hole is drilled at A, to take the small nut screw. Obtain a fine brass spring and solder it on the piece of brass as in Fig. 3 and solder this on the iron.

The parts when assembled and placed in the watch case should look as in the Fig. 4. Fig. 5 shows the front view. Little explanation is necessary as the



drawings are self-explanatory.

Contributed by

C. CIERPIK.

ELECTRIFICATION OF CROPS.

A lecture in which Oliver Lodge gives an account of the experiments which he started some five years ago and in which he could increase the yield of crops some 30 per cent by electrification, was held not so long since. The expense is not great. A 2-hp engine is sufficient for a twenty-acre plot. Sugar beets seem to grow more sugary under electrical treatment and strawberries are brought to maturity earlier and are sweeter. It is principally the tops of plants rather than the roots which appear to be beneficially affected, although leguminous plants seem to be an exception. The lecturer explained the apparatus used for producing a suitable continuous current of positive electricity to be given off by wires stretched at a height of several feet above the ground upon which the crops are grown.—*London Electrician.*

Lightning Phenomena *

By Dr. C. P. Steinmetz.

IN the early days, lightning was explained as a discharge from the clouds. The clouds being positively and the ground negatively charged, a spark jumps from the clouds to the ground.

Speculations were made as to how the clouds became charged, and as then the only method of producing electricity was by friction, it was said it might be the friction of the vapor through the air, or the rain-drops through the air, or some other form of friction. That explanation used to appear satisfactory, but with our present knowledge of dielectric phenomena, it is not now satisfactory.

It was thought that lightning was the discharge from the cloud to the ground. That means that the electric field between the cloud and the ground must be beyond the breakdown strength of air. In a uniform field the breakdown strength of air is about 75,000 volts per inch, or nearly 1,000,000 volts per foot. Even if the cloud is only 1,000 feet above ground, this would require 1,000,000,000 volts. If there were an electrostatic field between the cloud and the ground of 1,000,000,000 volts extending over the whole area of the thunder cloud, this would represent such an immense amount of electric energy that it is inconceivable how any reasonable source of energy can produce it, and how it can exist without having a destructive effect far beyond anything known of lightning. Furthermore, a uniform field cannot well exist between clouds and ground on account of the unevenness of the ground surface.

Another conception is of, not a uniform electrostatic field, but an ununiform field, like that of the discharge between points. With long striking distances between points the average gradient is about 170,000 volts per foot. This would require only 170,000,000 volts between a cloud 1,000 feet high and the ground. This would be more reasonable. It would not require such an unreasonably vast amount of stored electric energy. But we know that in such an ununiform field the spark is preceded by a brush discharge covering more than half the distance. Thus, lightning should be preceded by a brush reaching down from the cloud and up from the ground for several hundred feet. Now, such an enormous brush has never been observed, and is inconceivable; the brush discharges occasionally observed at points during storms are only a few inches long. Furthermore, a 300-foot brush is inconceivable, because the resistance of the ground is not low enough to conduct the energy necessary to maintain such a brush discharge.

Furthermore, most of the lightning discharges are not between the cloud and the ground, but are internally in the clouds, frequently reaching the length of several miles. So one sees that the explanation of the lightning as a spark discharge similar to the discharge of the friction machine appeared plausible in the early days, but with our present knowledge it is not tenable any more.

The lightning discharge cannot be considered as a simple electric rupture, in the same way that an overloaded beam may break mechanically, but as an equalization of internal stresses, about as a piece of hot glass that is rapidly chilled, and thereby full of internal compression and tension strains, may suddenly break all over, by the internal stresses. So, with our present knowledge, we must consider as the most probable explanation—although not certain by any means—that the lightning discharge is the phenomenon of the equalization of internal electric stresses in the cloud, and is analogous to the splintering or breaking of an unevenly stressed brittle material like glass.

The question then is, how do those uneven electrostatic stresses originate in the cloud, and how do they reach such values as to cause internal equalization by rupture? If there has been produced a very highly unequal distribution of voltage in the electrostatic field of the cloud, it is easy to see how

*Abstract of paper presented before the Franklin Institute.

a discharge can pass along miles of cloud, without such unreasonably great potential differences as would be required for a direct discharge across space, just as from a scratch in a poorly annealed glass plate, cracks may run all over the plate, splintering it in all directions. Assume that the potential distribution in the cloud becomes very uneven. If then at some point the potential gradient becomes higher than the disruptive strength of air, at this point a local disruptive discharge occurs, perhaps only a few inches in length. This discharge equalizes the potential gradient within its path, and thereby increases the gradient at the end of the discharge. If this gradient is already fairly high, it rises beyond the disruptive strength of air, and thereby the discharge extends farther along the discharge path, but by the voltage equalization resulting therefrom, still further increases the potential gradient ahead of the discharge, and in this manner the equalizing discharge extends farther and farther, possibly for miles, side discharges issue from it or run into it, until finally cloud regions are reached where the initial potential gradient is very low and the discharge gradually tapers down.

But where does the initial voltage come from, and how does it become uneven?

It is not so difficult, at least to make a preliminary estimate of the building up to very high and uneven voltage distribution in the clouds, as soon as you have assumed some initial voltage. We do not know where the initial voltage comes from, but we must accept the fact that there is normally a voltage gradient in the air, a potential difference between different altitudes which may amount to 100 volts or more per foot. In the air 100 feet above the ground there may be a potential difference against ground amounting to thousands of volts. If you bring a wire up to there you do not carry a current down, you merely carry the ground potential up, but by a carefully insulated electrostatic voltmeter you can measure these potential differences. Possibly this potential gradient in the atmosphere may even be of cosmic origin, the earth having a high negative potential against our solar system, against the universe, which would mean that there must be a positive voltage gradient from the surface of the ground into space.

If condensation takes place in the higher regions of the atmosphere, raindrops form, minute drops at first, which necessarily must be at the potential of the air in which they form. That means they have a potential difference against the ground, and therefore an electrostatic charge against the ground corresponding to this potential difference. Assuming now that many of these minute rain-drops conglomerate to larger drops, it means, that many small condensers conglomerate to one condenser, which is somewhat larger in capacity than each component, but very much smaller in capacity than the sum of the capacities of its components. But it contains all the electrostatic charges of the rain-drops, and at the much smaller capacity the same charge gives a higher potential difference. Suppose 1,000 small rain-drops conglomerate into one large one. This has ten times the capacity but 1,000 times the charge, hence 100 times the voltage. Conglomeration of minute drops into larger ones thus must give a great increase of potential difference against ground.

The clouds are by no means uniform in density, and where the density is greatest conglomeration of condensed drops takes place to a much greater extent, building up to a much higher voltage, and thereby between the parts of the cloud of different density, the light and the dark portions, potential differences must appear and increase with increasing condensation, until somewhere the disruptive gradient is passed, equalization occurs by a lightning discharge, and then the same play repeats again and again.

Lightning discharges then are the result of the voltage unequalities produced in the clouds by the unequal rate of conglomeration of rain particles due to the unequal cloud density.

In agreement with this is the fact that heavy lightning strokes are usually followed by a heavy downpour of rain; in reality they are preceded and caused by it, but it takes time for the rain-drops to come down.

Let us assume now that the process is reversed, and after conglomerating to high voltages the rain-drops evaporate again. Since gases apparently do not carry electrostatic charges the rapidly dwindling rain-drop retains its entire charge, hence must rise in potential, and finally must discharge, and this progressive evaporation of the rain-drops must also result in the building up of potential differences, therefore the formation of lightning, and this may explain the two forms of lightning, that accompanying rainstorms and thunderstorms, and the so-called "heat" lightning.

The former is the result of condensation and conglomeration, the latter the result of evaporation of rain-drops.

THE ELECTRICAL HOUSE.

(Continued from Page 288.)

at the table! The entire control is ordinarily handled from the kitchen, and a periscope in the chandelier permits the man in the kitchen to see all the movements. Sound is conveyed to him as well, and with ordinary talking in the room he may hear every command and conversation. It is not necessary to have any ser-

vant in the dining room. When the elevator has reached the level of the table, it travels around, depositing the dishes, and then returns to the kitchen through a trap door, which may be noticed in the other photograph. This shows the illumination at night. Besides the many decorations, the track may be noticed. The electric lamps are placed in air current tubes, and the cold air passing through, removes the unpleasantness of the heat which would otherwise be generated. The other rooms are electrified to a more or less degree as well.

This Electrical House is one of the attractions of the Paris Boulevards. It is a unique example of its kind, and designed by M. G. Knapp. While there is an enormous expense attached to the electrification of a house to such a remarkable extent, yet it is safe to predict that the day will come when these applications will have become commonplace. At any rate, it is a splendid prophecy of the future homes.

THE ENIGMA OF THE ETHER.

(Continued from Page 281.)

To arrange the data in the most logical relationships requires the work of the theorists. To condense and reduce these relations to the simplest and most elegant form the brain of the mathematician is necessary. To appreciate the ultimate significance of those factors which the others use but as the material of their building, the philosopher is final critic. And to make the results of all the others of interest and value to the human race as a whole, the interpreter must picture them in simplest phrase and most apt illustration."—*Popular Astronomy.*

INDEPENDENCE WIRELESS STATION.

A wireless association has been organized at Independence, Kansas, bearing the above name. The regulations for membership are, that the applicant must live in the city, and possess a complete wireless outfit. All communications may be addressed to:

INDEPENDENCE WIRELESS ASSOCIATION,
Care of Boyce Miller, President,
401 S. 15th St., Independence, Kansas.

Correspondence

Modern Electrics Publication,
New York City.

Dear Sirs:

I want to thank the writer of "Galena" in a recent issue of this magazine, on account of the excellent results I have obtained by using his arrangement of the galena detector, whereby I am able to receive messages a distance of 1,500 miles, using a very simple set.

To all who are looking forth to receive wireless messages any appreciable distance, I can recommend most highly the use of the galena detector with an arrangement having a piece of No. 30 copper wire resting on said mineral.

July 11, 1911. EDGAR A. SMITH.

RAH-RAH NUMBER

The Wireless Screech

OUR MOTTO . . —— . . . . . —— .

THE ETHER: JAMMED AND NOISY

No. 129H 243X | AUGUST, 1911 | Price Ten Sparks

The Wireless Screech

A Loud Noise devoted entirely to the Wireless Sparks and other foolishness.

Published when we're let loose, by Lumiferous-Etherizing Pub. Co.

"Fips" Editor & Publisher

Subscription price in U. S. and other planets, 100 Sparks, payable when all your debts are liquidated.

Forms close, when the chickens say, "Oh rewohr." Advertising rates 35 cents a dozen, guaranteed freshly hatched.

The editor is so disgusted, that he will arrest the first yap who sends in a manuscript without 10 bones, solid hash. This is not a charity bungalow, if we have to print your stuff, why then come across with something — Oh-thank-you-ever-so-much.

If you want your rot back enclose a barrel and freight charges.

If you're convinced that your dope is rotten, send it to Boston, they make a specialty there to print "rots and spots."

ETHERIAL OFFICE

124X Ki-Ki-Ko Boulewar.

IDIOTORIAL

Our Editor.

Yes, Officer, he's in again. Thought the Editor had given up the "Screech?" No, sir, he's back.

Where has the Editor been? For one thing, down and out; so many fool questions were hurled at him by subscribers that it broke up his constitution and then some more. But the Editor came back for more. Especially since "Ralph" has appeared, he simply can't keep away. The Editor is ready to screech as of old and don't forget your subscription to the "Screech" has expired. Didn't you get a piece of *green* cheese with your last issue? Green cheese means you're expired. Renew at once. Price 100 sparks. For premium this month, we give two brand new wave lengths. Subscribe quick.

RALPH+ — x : — ! ?

By "Fips."

"HELLO, Ralph!!"

"Hello, Alf!!!"

Ralph put his proboscis into the *smell piece* of his *telephot* and took a long sniff.

"Punk," he said, "that cigar of yours smells terrible."

"That so?" chirped Alf; "next time give me a better one!"

"You don't mean to say that that is the cigar I gave you?" angrily demanded Ralph.

"Quite so," quietly responded Alf, "but I guess it smells queer because our telephot wire passes through your stable! Consequently, you smell my cigar plus the stable!"

"Darn it," muttered Ralph, "will you please. . . . . ."

At this juncture, by one of the pranks of Central, the two friends were disconnected from each other. For four minutes Ralph fumed and swore trying to get his friend back, and he was just going to hang up his receiver when a soft light appeared on the face plate of his telephot and immediately after the face of a beautiful young French cow appeared.

Ralph was so surprised at the beautiful sight that for a few minutes he could do nothing but gasp. By the soft light, lit up by a beautiful stable lamp, Ralph could see that she wore evening dress, i.e., none at all.

He finally managed to stammer.

"Pardon my intrusion, I assure you it was not intentional."

"Moo-ooh, moo-ooh!" came the answer, in a voice that went down deep in Ralph's heart.

"Aha, she's French," thought Ralph, "I'll fix that in a hurry."

He quickly turned the knob of his *language rectifier* to French, but somehow or other, the cow continued to say "Mooh-mooh!" which is the French for the English "Mooh-moooh."

For a minute or two the great inventor was stunned. He looked about himself and then looked again at the cow. The cow was moohing plaintively and looking closer through the telephot, Ralph could see that the cow stood in three feet of water. Ralph turned white.

"Heavens!" he muttered, "a flood! What can I do to save that poor cow? and she's a French cow, too, 4,000 miles distant!" He tore his hair in despair. He had never met such a difficult problem in his life. The water was rising rapidly and the poor cow was frightened out of the little wits she had. It was frightful, awe inspiring.

Note: So far the story is O. K. I like it but I must confess I got both Ralph and the cow into a tight position. If Ralph saves the cow, it is customary that he must marry her and that wouldn't be the story. If he don't save her he isn't as smart as I thought he was. Besides, I don't think he can save her anyhow, because the cow don't know enough to assist him. I am puzzled. It started so nice and easy and I had hoped to make a nice big story of it. I think I'll chuck it up and let you guess the rest. . . . . No—an idea! I got it! So here goes:

In despair Ralph looked on. Suddenly. . . .

(To be continued.)

The Grattle

This rattle is for chickens used to Boston style cooking. All questions are positively answered with baked beans. If you don't ask us, we'll answer anyhow, see the point? We guarantee that our experts who answer our "Queries and Answers" are at least six years old before we'll admit them to this stupendous job, so you know what you're getting.

WIRELESS QUERIES.

(244C+) A. U. Dion, Oshkosh, Del., yells:

Q. 1. Is it true that you can send a wireless **over** a wire?

A. 1. No. It'll go **under** it.

Q. 1. I have a peach of a detector—made by sticking two pins in a peach. The messages come in somewhat sour. What shall I do?

A. 2. Stew the peach!

HE'LL SEE IT.

(246E—) Si. Licon, Stock Yards, Chicago, howls:

Q. 1. Can you take the weight of a wireless message?

A. 2. No, but you often can wait for one.

Q. 1. What conducts electricity best?

A. 2. A street car conductor.

Q. 1. Can I possibly see electricity?

A. 2. You can, we won't. Grab a 500 volt line and you'll see it plain—stars, stripes, colors, everything. Quite delightful.

Wireless Telegraph Contest

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

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

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

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

FIRST PRIZE THREE DOLLARS.

Enclosed please find photo of my wireless station. To the left on table and on switchboard are found the receiving apparatus. The six-point switch throws in any desired detector, Ferron, Electrolytic, or Silicon. The push-button and buzzer operate the buzzer test. The snap switch in upper left-hand corner cuts in the current for primary of the coil.

On table to the left, is the receiving apparatus itself, consisting of E. I. Co.'s variable condenser, the three detectors already mentioned, two fixed condensers and two tuners, one single and one double

slide. A small switch between the tuners short circuits the 2,800-ohm Brandes phones.

To the right of the antennae switch a also of E. I. Co.'s manufacture are found the two single throw knife switches, which throw out secondaries of the two coils, as same spark gap is used for both. The double throw knife switch and lamp immediately to right of it are used for helix radiating test. The snap switch beneath gap is for the small coil. The three point switch immediately to left of snap switch is to cut in the different windings of the impedance coil. The position of the core of coil may be regulated by rod directly beneath table. The key also of E. I. Co.'s goods is found on table below switch.

The sending apparatus itself, which consists of an electrolytic interrupter, storage battery, Leyden jar condenser, helix, one-half inch coil and electro. One-half kw. transformer is found on bench beneath the table.

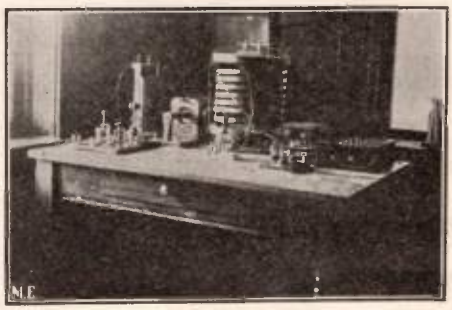
I am a regular reader and subscriber of your magazine and have received many valuable suggestions therefrom.

WALTER E. BERWALD,
Davenport, Iowa.

HONORABLE MENTION.

Enclosed please find photo of my wireless station.

Sending apparatus consists of 1-inch



spark coil, 6V 60AH storage battery,

key, glass plate condenser, helix made of copper ribbon), and zinc spark gap.

For receiving I have a single slide tuner, single slide loose coupler condenser, three detectors, 2 silicons, 1 perikon, and 2,000-ohm phones.

My aerial consists of six wires spaced 1 foot apart and forty feet from the ground.

All of the apparatus shown in the picture was made by myself with the exception of the key, aerial switch, phones and storage battery.

At present I am constructing a quarter kilowatt transformer, which I hope shortly to add to my station.

HUBERT KRASE,
Chicago, Ill.

HONORABLE MENTION.

Enclosed please find flashlight of my wireless telegraph station.

For sending I use a 1½-inch spark coil, zinc spark gap, adjustable con-

denser, helix and key.

For receiving, a double-slide tuning coil, non-inductive potentiometer, one silicon and two electrolytic detectors, fixed condenser and E. I. Co.'s 2,000-ohm head phones. I have a D. P. D. T. switch to throw in either set.

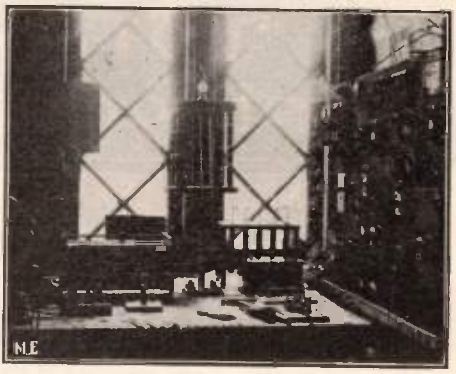
For experimenting I have a 1½-inch spark coil, small Telsa coil, spark gap, key, condenser, and several Geissler tubes.

The aerial for my station consists of four strands of No. 14 copper wire, seventy-eight feet long, and fifty-eight feet high at one end, forty feet at the other. There are no commercial stations near enough for me to hear, but I find a great deal of pleasure in communicating with other amateurs here in town.

EDWARD W. OEHMIG,
Chattanooga, Tenn.

HONORABLE MENTION.

I send you herewith a photograph of my wireless station. Most of the instru-



ments I have bought from the E. I. Co. There are very few stations in my vicinity, and I know of only one boy with whom I often talk "wirelessly," and who lives a short distance away. My apparatus may all be noticed on the photograph, and I don't believe that a lengthly explanation is necessary.

GERALD SHOLLAR,
Altoona, Pa.

HONORABLE MENTION.

Enclosed please find a photograph of my wireless set.

The receiving outfit consists of two double-slide tuning coils, one slide plate variable condenser, one fixed condenser, small loading coil, silicon, carborundum, and electrolytic detectors, buzzer test and 1,000-ohm phones.

The sending side consists of two one-

half-inch coils, zinc spark gap, glass plate condenser, two small Leyden jars, helix wound with No. 6 aluminum wire and a telegraph key.

My aerial is made up of four strands of aluminum wire, 69 feet long, and 50 feet above the ground.

I have obtained excellent results from this outfit.

CHARLIE HARRY,
Houghton, Mich.

HONORABLE MENTION.

My laboratory consists of experimental apparatus, the greater part of which I have manufactured. I have three dynamos, one of which is made by me. They are all driven by a machine, located under the table. I have many kinds of motors, a dozen all told, and about half of that number have been made by me.

The switchboard as seen in the photograph is very large and needs no description.

I have not yet constructed a wireless telegraph station, but the coil in the picture is one thing which I have in the line of wireless. It throws a three-inch spark. I have performed experiments in the line of wireless telegraphy but have not had

the chance to make a complete outfit. My battery is made up of Fuller and dry cells, arranged to give current anywhere from 2 volts and 10 amperes, to 30 volts and 4 amperes. The cells are located under the table, but not seen in the photograph.

ANTHONY JANOUS,
Edgemont, S. D.

HONORABLE MENTION.

I enclose herewith a photograph of my wireless station. My outfit comprises of the following instruments:

On the left are my receiving instruments, which are as follows: An electrolytic detector and a mineral detector. I use a two-point switch to throw in the detector which I wish to use. My tuner, which is of the loose-coupled type, has a wave length of 800 meters. The head receivers are wound to 2,000 ohms resistance. I have a variable condenser, which has a capacity of .0010 microfarad. There is also a fixed condenser and a jr. fixed condenser. I use a potentiometer to regulate the battery flow.

The sending instruments on the right comprise a spark coil, and spark gap,

large capacity glass plate condenser, sending helix, a Leyden jar and key.

The instruments of the outfit, which I made myself, are mineral detector, key, glass plate condenser, Leyden jar and all the switches.

The aerial is composed of four aluminum wires each two feet apart and 125 feet long. I have a sixty-foot mast which supports one end and the other end is supported by a tree, thirty-five feet high. I use a heavy S. P. D. T. switch for protection from lightning.

I have lately been reading *Modern Electrics,* and find it a most interesting magazine for the amateur.

Belleville, Ont. ARTHUR REDNER,

HONORABLE MENTION.

Enclosed please find photograph of my wireless station. My station consists of:

Transmitting: A one and three-quarter-inch spark coil, 6-volt 60-ampere hour storage battery, spark gap, plate glass condenser, and helix.

Receiving consists of loose coupler, fixed condenser, silicon and perikon detectors and a pair of Murdock 2,000 ohm receivers. Also buzzer test.

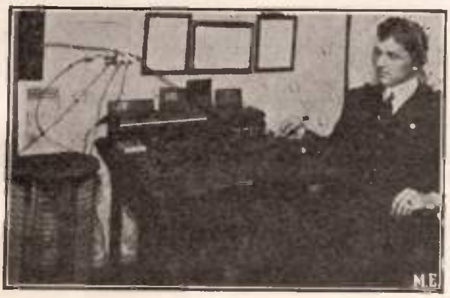
Aerial 50 feet long, 40 feet high, 6 wires 15 inches apart.

I get good results and also am a reader of "Modern Electrics."

JOHN W. SMITH,
New Jersey.

HONORABLE MENTION.

Here is a description of my wireless station, and also a picture which you may publish if you desire in *Modern Electrics*. Sending set consists of a 2-inch coil, spark gap, key, condenser, and helix, wound with 60 feet of No. 8 wire.



For the receiving instruments I have a 2-slide coil, 1 silicon, and 1 perikon detector, 2,000-ohm telephone set, with the necessary switches.

The aerial consists of four wires, 6 feet apart, and 35 feet long. I use the call MI, and have a wave-length of about 250 meters.

ARTHUR BATCHELLER,
Revere, Mass.

WIRELESS TELEGRAPHY FOR THE FALKLAND ISLANDS.

Situated on the South Atlantic, remote from the customary lines of ocean travel, the Falkland Islands are seldom visited and have only infrequent communication with the rest of the world. However, it is announced that a wireless-telegraph station is to be erected in Stanley, the capital of the islands, so that communication will be established with ships passing at considerable distances and possibly with some of the land wireless stations. Thus the use of this modern invention will go a long way to relieve the isolation of the Falklanders.

WIRELESS RANGES.

A note on a recent lecture of H. R. Sankey on the principles of wireless telegraphy is presented herewith. The author exhibited a complete portable wireless-telegraph set capable of being carried by four horses and designed for army service. The set consisted of a two-cylinder gasoline engine with an alternator mounted on a special saddle and carried by one horse; two masts, each 30 ft. high and made in five lengths, and the necessary transmitting and receiving apparatus, including the aerial, earth mat, etc. The set had a range capacity of about twenty miles. In connection with this latter point a table of the approximate range of different powers over sea and land is presented.—*London Engineering.*

		RANGE IN NAUTICAL MILES			
			OVER LAND		
Power Required. Kilowatts.	Wave Length. Meters	Over Sea	Flat	Hilly	M'nt'nous
0.31	300	100	77	30	13
	1200	100	95	73	52
1.5	300	220	170	67	28
	1200	220	210	160	115
3.0	300	280	220	84	36
	1200	280	270	200	145
5.0	300	340	260	100	43
	1200	340	325	240	175
10	300	470	360	138	59
	1200	470	450	330	240

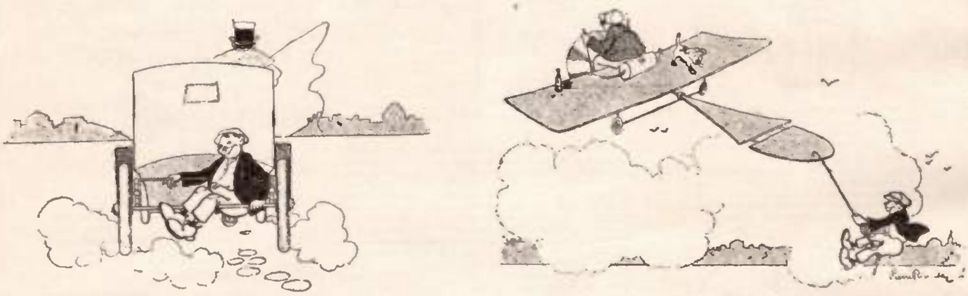
(The above table, compiled by an authority should prove of high interest to our amateurs, who forever are desiring to know their "range."—Editor.)

W. A. O. A.

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

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

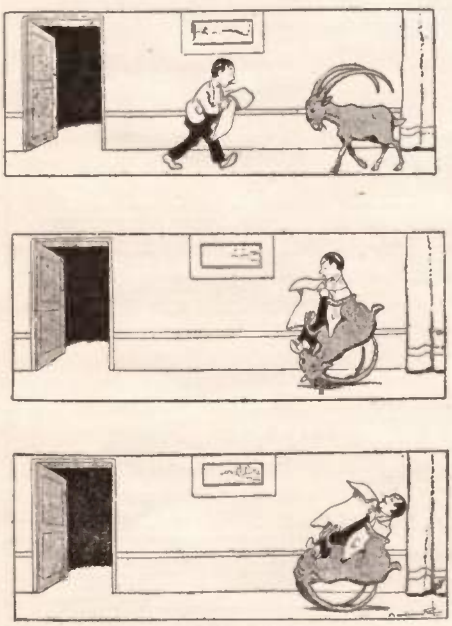
THE KID'S FREE RIDE.



In 1911.

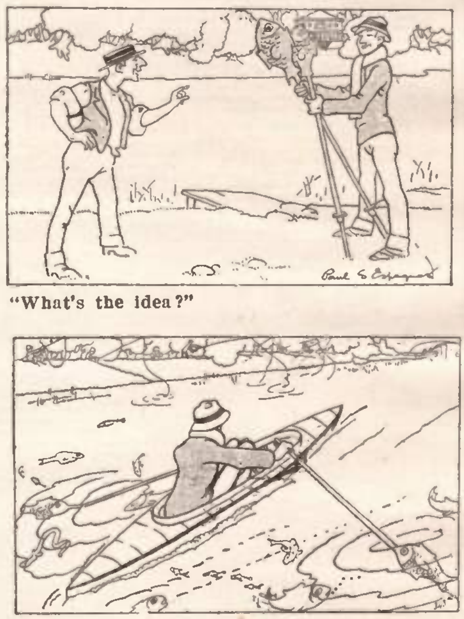
In 1920.—Pêle Mêle.

THE ROCKING CHAIR.



Patent applied for.—Pêle Mêle.

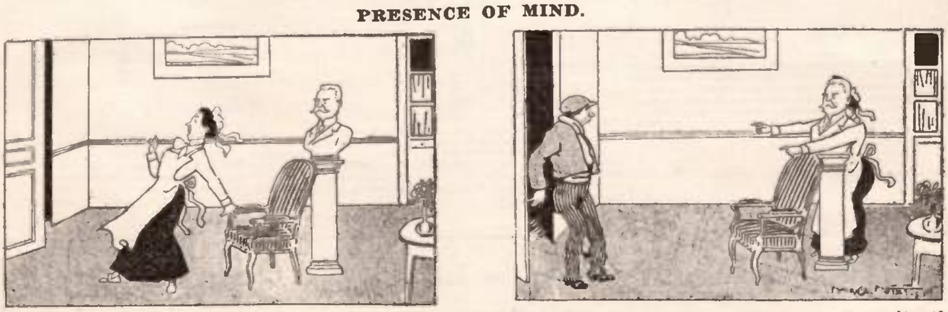
A TENDER SOUL.



"What's the idea?"

"So I don't scare the poor fish!"—Pêle Mêle.

PRESENCE OF MIND.

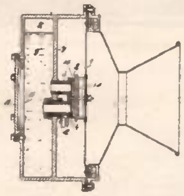


"Heavens! I hear a burglar——"

(The Burglar:) "Wow—I'd better beat it; this place is sure haunted!"—Pêle Mêle.

Electrical Patents for the Month

999,019. COOLING DEVICE FOR TELEPHONE TRANSMITTERS. Carl Emil Fonss, Stockholm, and Johan Gunnar Holmström, Saltsjö-Storängen, Sweden. Filed Nov. 2, 1910. Serial No. 590,334.



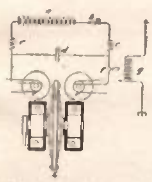
1. In a telephone transmitter, the combination of a receptacle containing a cooling liquid exerting great resistance to the electric current and electrodes in direct contact with the said liquid, substantially as described and for the purpose set forth.

996,714. FREQUENCY MEASURING INSTRUMENT. Robert Hartmann-Kempf, Frankfort-on-the-Main, Germany, assignor to The Firm of Hartmann & Braun Aktien-Gesellschaft, Frankfort-on-the-Main, Germany. Filed May 31, 1907. Serial No. 376,552.

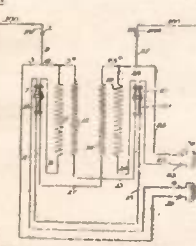
1. In an instrument for measuring the frequency of an alternating electric current, the combination, with an electromagnet adapted to be energized by the alternating current, of a plurality of resounding bodies in front of the poles of said electromagnet and adapted to be vibrated thereby, each of said resounding bodies being tuned to a certain natural vibration, and a permanent magnet exerting a constant force of attraction on said resounding bodies and counteracting the pull tending to move said bodies exerted by the magnetic impulses of one direction, a space of high magnetic resistance being provided between said permanent magnet and said electromagnet.

997,308. TRANSMITTING APPARATUS FOR WIRELESS TELEGRAPHY. Guglielmo Marconi, London, England, assignor to Marconi Wireless Telegraph Company of America, New York, N. Y., a Corporation of New Jersey. Filed July 15, 1910. Serial No. 572,070.

1. In a transmitter for wireless telegraphy, the combination in an oscillation circuit of a battery of low resistance, moving terminals therefor, arranged so that a gap is left between them, bridging pieces adapted to bridge such gap, and means for rapidly moving the bridging pieces past the gap.

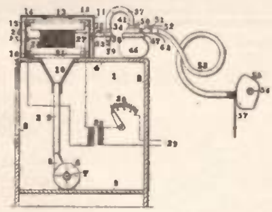


997,504. TELEPHONE REPEATER. William Anderson, Longdale, Okla. Filed Nov. 12, 1909. Serial No. 527,752.



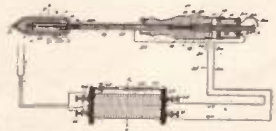
1. The combination with a telephone circuit of a repeater serially disposed in said circuit and automatically operative in either direction of transmission and comprising two transmitters, two receivers disposed in juxtaposition to said transmitters and two inductoriums, the transmitters being connected respectively with the primaries of said inductoriums and the receivers being connected respectively directly with each other and with opposite secondaries of said inductoriums.

997,550. COMBINED OZONE GENERATOR AND INHALING APPARATUS. Robert P. Guiney, Akron, Ohio. Filed Mar. 14, 1910. Serial No. 549,299.



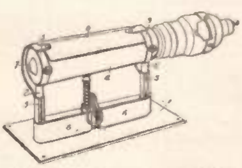
1. A device of the class described comprising a hollow cabinet provided with an opening in the upper wall thereof, a flaring discharge member positioned in said opening, a fan for creating a current of air, tubular means for conducting a current of air from said fan to said flaring discharge member, an ozone generator positioned over the opening in the upper wall of said cabinet, a casing for said ozone generator the bottom of which is open to permit said current of air to enter the interior of said ozone generator, tubular means for establishing communication between the interior of said casing and a mouth piece and an oil bath interposed in said tubular means for purifying the ozone driven from said casing, substantially as described.

997,044. ARC SOLDERING-IRON. Michael Danko, South Bethlehem, Pa. Filed Oct. 22, 1910. Serial No. 588,543.



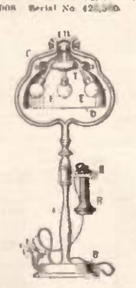
1. A tool of the character described comprising a head, a shell therein, means for insulating said shell from said head, and electrical means for producing an arc in said shell.

997,934. ELECTRIC PRESSER FOR NECKTIES AND OTHER ARTICLES. Jacob Bloch, Cincinnati, Ohio. Filed Oct. 17, 1910. Serial No. 587,537.



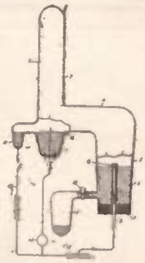
1. A presser for neckties and other articles comprising a presser cylinder adapted to receive an electric light bulb, an elongated curved presser plate extending along the cylinder and having its margins curved reversely to the curvature of the cylinder, and means for yieldingly forcing said cylinder and presser plate together.

996,770. COMBINED TELEPHONE AND ELECTRIC LAMP. Frederick J. Kessel, New York, N. Y. Filed Mar. 27, 1908. Serial No. 423,540.



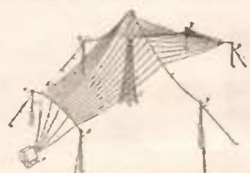
1. The combination with a symmetrical stand, of a symmetrical bell with a downwardly directed mouth supported by the stand, the axes of symmetry of the bell and stand intersecting at the line of connection, and a telephone transmitter communicating with the interior of the bell at a point above the mouth of the bell, substantially as described.

997,380. ELECTRIC FURNACE. Ezechiel Weintraub, Lynn, Mass., assignor to General Electric Company, a Corporation of New York. Original application filed July 2, 1906, Serial No. 324,399. Divided and this application filed May 13, 1908, Serial No. 432,565. Renewed Feb. 28, 1911. Serial No. 610,339.



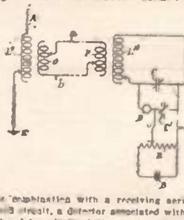
1. A vacuum furnace comprising a substantially exhausted envelop, a cathode therein, an anode of compressed powder in fixed relation to said cathode, means for rendering conductive the space between said anode and cathode to establish a heating arc therein, and means for concentrating the heating action of said arc on a limited portion of said anode.

998,567. SIGNALING BY ELECTROMAGNETIC WAVES. Reginald A. Fessenden, Washington, D. C., assignor to National Electric Signaling Company, Pittsburg, Pa., a Corporation of New Jersey. Filed Dec. 17, 1906. Serial No. 348,195.



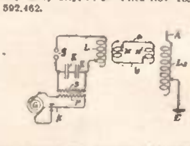
1. In apparatus for electromagnetic wave telegraphy, the combination with an operating instrument at the station, of an antenna connected thereto having a horizontal portion extending backwardly in the line of propagation of the message and supported by a metallic structure at its rear end, whereby the antenna protects the support from useless absorption of the waves.

997,516. RECEIVING APPARATUS. Harry Shoemaker, Jersey City, N. J. Original application filed Nov. 15, 1910, Serial No. 592,462. Divided and this application filed Jan. 12, 1911. Serial No. 602,186.



1. The combination with a receiving aerial conductor, of a tuned circuit, a detector associated with said circuit, and a signal translating instrument, said receiving aerial conductor and said tuned circuit being so remote from each other that their mutual inductance is substantially zero, and a link circuit inductively related with said receiving conductor and said tuned circuit, said link circuit having substantially no capacity and very low resistance.

997,515. SIGNALING APPARATUS. Harry Shoemaker, Jersey City, N. J. Filed Nov. 15, 1910. Serial No. 592,462.



1. The combination with a producer of high frequency oscillations, of a radiating conductor, a link circuit transferring energy from said high frequency oscillation producer to said radiating conductor, said link circuit having inductance and substantially no capacity.

Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending July 27, 1911

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

Queries and questions pertaining to the electrical arts, addressed to this department, will be published free of charge. Only answers to inquiries of general interest will be published here for the benefit of all readers.

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 TALK WITH OUR FRIENDS.

We are daily receiving numerous requests from our many amateur friends, requesting us to inform them as to the radius which they should cover with their outfits.

We believe that it is a timely moment to have a few words said, regarding this matter.

Probably few experimenters realize what a vague estimate may be made concerning the radius of any station from mere description. We have always made conservative estimates of ranges from the data which was supplied to us, yet fully realized that it was only a guess at the most. There are so many factors which enter into the effective range of a station, that our statement has reasonable grounds. For instance, mentioning a few, we will first consider the location. On the Atlantic Coast, conditions for Wireless Telegraphy are fairly good. On the other hand, in the Pacific Coast states, the conditions are excellent, probably due to the ideal weather. The other extreme is in the tropics, where a reasonable range can only be obtained with a tremendous expenditure of power. We have heard of cases where it was impossible to cover 100 miles using 8 kw. in the middle of the day. Taken for granted that the hook-up is correct and the apparatus is being used properly, we have again to figure on the aerial. Some aerials are figured from the ground of the building when the height should be figured from the tin roof of the building. This is very important, inasmuch that tin roofs are nearly always grounded and therefore the effect gained in the height of the building on which the aerial is located, is almost negligible. Aerials should always be soldered at the connections wherever possible, and the joints taped if aluminum wire is used and not soldered.

Surroundings have a great deal to do with the transmitting radius. A large steel structure near by may reduce the transmitting range to a marked extent, while not having such a marked effect on the receiving radius. The operator's hearing power should also be considered. Some operators can hear signals where others will only detect indistinct rumbles, or nothing at all. Doesn't this make an important factor in the receiving efficiency? The crystals used in detectors all vary to a marked extent. With some, a distance of 100 miles is the maximum, while with others this distance is mere play. There are probably 10 other factors equally as important which enter into the effective range of a station, so the reader can readily appreciate the ***uselessness of asking such questions regarding ranges.*** *We have always based our statements on the conservative averages obtained by other stations using similar apparatus.*

To sum up this matter, we would ask that questions relating to ranges or wave-lenths of outfits be avoided in the future. We can only give estimates on standard aparatus with standard aerials and conditions, and not individual inquiries.

MODERN ELECTRICS PUBLICATION.

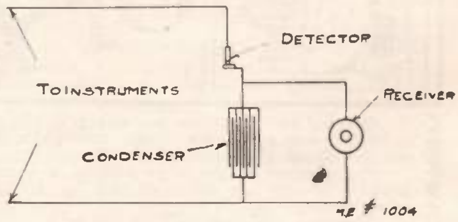
A FIXED CONDENSER.

(1004.) Louis Levy, N. Y., writes:

Q. 1.—Please tell me how I can make a fixed condenser for receiving.

A. 1.—For an efficient condenser for receiving, we recommend one made of ten sheets of tinfoil, separated by paraffined paper. This will make five sheets on each side of the condenser as shown in the diagram. This should be connected across the telephone receivers in connection with the crystal rectifying type of detectors.

Q. 2.—Please tell me how to make a double-slide tuning coil?



A. 2.—The description of the construction of a tuning coil would require a great deal more room than we have at our disposal in this department. We would advise you to read the excellent description given in the book "How to Make Wireless Instruments," sold at 25 cents, mail prepaid.

A HELIX.

(1005.) Harold Hinshaw, Cal., states:

Q. 1.—I have a quantity of No. 4 copper wire and wish to use it in making a helix for a ¼ kw. transformer. How wide should the end piece be, and how high should the frame be?

A. 1.—For a helix constructed with the size wire mentioned and to be used in connection with a ¼ kw. transformer, we would suggest to make the end pieces 12 to 15 inches in diameter. The height of the frame all depends on the number of turns, but we would state that the turns should be spaced ½ inch apart, provided that the voltage of the transformer is not over 20,000 volts.

Q. 2.—I have some 8 x 10 inch glass plates for a condenser. How many plates should be used and how much space should be allowed around the edges of the tinfoil?

A. 2.—We believe that sheets of glass 8 x 10 inches are too small for efficient results. The brush discharge around the edge of the tinfoil would consume far more energy in many plates than in a lesser amount of larger plates. However, if you desire to construct the condenser with the plates at hand, use 6 x 8 inches of tinfoil, and 24 plates, making the total condenser of the multiple series type.

Q. 3.—Could an E. I. Co.'s universal detector and two cups soldered to the top and bottom pieces, having zincite and copper pyrites therein make an efficient detector?

A. 3.—Such a combination would be an excellent example of the perikon type of detector, the efficiency and merits of which are universally recognized.

A CONDENSER.

(1006.) Frank Silsbury, Mich., asks:

Q. 1.—Please give data and diagrams for building a high frequency transformer to work with a ¼ kw. transformer.

A. 1.—Unfortunately the space devoted to answering questions is too limited to do full justice in answering this query. We would refer you to the book "Construction of Induction Coils," advertised elsewhere in this book, and you will find complete data given on the construction of Tesla coils therein.

Q. 2.—About how mny condenser plates will I need for a ¼ kw. transformer, the plates being 12 x 15 inches?

A. 2.—18 plates, connected in series multiple.

Q. 3.—When I send the lights get dim. Please give instructions for the making of a choke coil to remedy this.

A. 3.—Construct a choke coil with a soft iron wire core, 1½ inches in diameter, and 12 inches long. Upon this wind 3 lbs. of No. 12 wire, taking five taps at convenient points but at approximately the same distances apart, and connect as shown in the diagram, to a six-point switch. This will overcome the dimming of the lamps. For a description of a more efficient type we recommend the one described in the book "Construction of Induction Coils," sold for 25 cents, mail prepaid by this publication.

AN ELECTRIC AUTOMOBILE.

(1007.) Joe Scalco, Ala., inquires:

Q. 1.—What H. P. motor is used in an electric automobile? How many volts and amperes does the motor require?

A. 1.—There are such a variety of makes, each using its own individual system, that this question can only be answered in a general manner. The average electric automobile uses about 100-volt accumulators, having a capacity of 300 ampere hours. The motors on small runabouts are usually only from 3-5 H. P. and consume 10-35 amperes at 100-volt pressure under full load.

Q. 2.—Where can such a motor be obtained?

A. 2.—We refer you directly to the manufacturers, who will gladly quote you prices.

A BICYCLE BATTERY.

(1008.) Frank X. Keiling, Jr., N. J., asks:

Q. 1.—Could storage batteries of 10 ampere hour capacity be used on a bicycle provided most of the riding be done on good roads?

A. 1.—Yes, provided the corks are well fastened, and the cells are placed in a suitable box with padding around them.

Q. 2.—How long would a charge last if the bicycle lamp consumed 1½ amperes?

A. 2.—About 6½ hours.

Q. 3.—Do you think it practical, or wouldn't the battery stand the vibration?

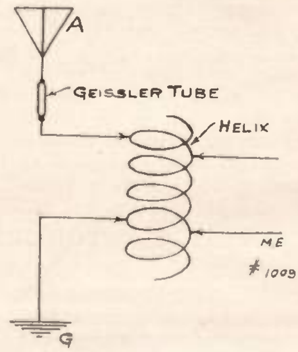
A. 3.—We consider the idea entirely practical, and furthermore, this is not a new application to the storage battery, for this system of bicycle lighting has been used for some time. As before stated, the cells should be well protected.

ABOUT GEISSLER TUBES.

(1009.) James D. Nunn, Texas, inquires:

Q. 1.—How is a Geissler tube used with the sending outfit to indicate the amount of energy radiated from the aerial? Please furnish diagram.

A. 1.—The Geissler tube is connected in series with the lead going to the aerial, and by the quantity of light emitted, the amount of energy going into the aerial may be estimated. Where the power employed is higher than a 2-inch coil, the tube should be connected in another circuit composed of several turns of heavy wire, which forms the secondary of an oscillation transformer, the primary being a few turns of the leading in wire. In this manner a degree of coupling may be obtained which will just give the tube sufficient current, and avoid the danger of "burning out." We are giving herewith a diagram of the regular plain



connections for the tube when used with a ⅜-inch coil. This is the Gernsback arrangement.

Q. 2.—Will an 8-inch tube be too large for a ⅜-inch coil, and if so, what size do you recommend?

A. 2.—Yes, much too large. A tube 3 or 4 inches should be obtained.

Q. 3.—How long a winding space should be used on a core 2½ inches in diameter, to make a 1,500 meter tuning coil, using No. 25 B. & S. S. C. C.?

A. 3.—Coil should be wound a length of 14½ inches. It is rather a small diameter for a coil to have such a long wave length, and therefore requires a great winding length.

CLOSED CORE TRANSFORMER.

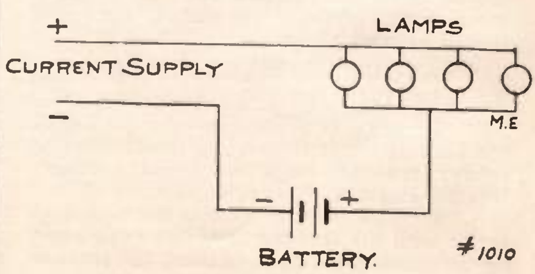
(1010.) Samuel F. Tyler, Mass., requests:

Q. 1.—Please inform me how many amperes are necessary to charge a 4-volt, 40-ampere hour accumulator? How long?

A. 1.—Charging current should be three amperes. The time consumed should be about fifteen hours under ordinary conditions.

Q. 2.—Please give diagram of connections, using 16 c. p. lamps for resistance.

A. 2.—We are giving you diagram herewith.



Q. 3.—I have an E. I. Co. ½-kw. transformer, and wish to convert it into a closed core transformer. Please give the size of wire and the core to use, for primary.

A. 3.—Core should be 1 inch square, and the frame 8 x 8 inches. On one leg of the frame wind 3 layers of No. 14 D. C. C. wire, carefully placing tape over the iron core and shellacking each turn.

Q. 4.—I have a type "S" dynamo and would like to run it on 110 volts A. C. as a motor, without the use of a rectifier if possible.

A. 4.—This may be accomplished by using four 32 c. p. lamps in series parallel with the current supply. The brush holders of the dynamo should then be disconnected from the shunt field leads, and short circuited with a piece of wire. The field leads must be placed in the circuit supplying the power. In this manner the machine will act as an induction motor.

RESISTANCE WIRE.

(1011.) Carl Marggraff, N. J., asks:

Q. 1.—Can I use copper wire for a potentiometer, and if not is there any other kind of wire besides German Silver which is suitable?

A. 1.—No, copper wire cannot be used for a potentiometer. While German Silver is the well-known resistance wire, there are others just as good if not better. "Climax" wire is recognized high efficiency resistance wire, and sold by most dealers of electrical supplies.

AUTOMATIC TELEGRAPH SYSTEMS.

(1012.) Rector Davenport, Ark., wishes:

Q. 1.—The name of firms manufacturing automatic telegraph transmitters.

A. 1.—This question is somewhat vague. If you mean transmitters for high speeds, we would state that the Telepost Co. is the only company in this country who have developed a high speed successful transmitter and actually operate different intercity wires. Their system consists of a strip of paper punched on a typewriter arrangement, and then whirled through an automatic transmitter at the rate of 1,000 words and upward per minute. The Sterling Debenture Corporation may be able to supply you with the full details.

Q. 2.—The name of firms manufacturing instruments for learning the code.

A. 2.—We would refer you to our advertising columns. The Omnigraph Co. manufacture apparatus for mastering rapidly the Morse code.

THE CHEMICAL RECORDER.

(1013.) Hewitt O. Fearn, N. Y., states:

Q. 1.—What is the action of the resonance relay and is it possible to construct one for the reception of long distance messages?

A. 1.—The action of the resonance relay is to impress upon a separate circuit from that containing the detector, the feeble oscilations from the aerial, by the principle of resonance. The data relative to its construction is more or less jealously guarded by the companies using same, and therefore we regret to be unable to give you the full particulars.

Q. 2.—While listening at my wireless yesterday, at about 7 p. m., I heard a loud shrieking noise, so loud that it could be heard all over the room. Cutting off the detector did not affect it much, but when the aerial was switched off, it stopped. It lasted for several minutes. Can you explain what it is?

A. 2.—If you had not mentioned the fact that the noise still continued after you switched off the detector, we would state that what you heard was a singing spark set of the Telefunken Co. There are a number of these on the battleships, and each produces a tremendous sound in the receivers. As it is, we believe that you must have had the induction from a motor in the neighborhood which was running at the time. This will produce a loud sound in the receivers, coinciding with that you experienced.

Q. 3.—Can you tell me of a solution to use on a chemical recorder tape? Can it be used dry?

A. 3.—Alcoholic Tincture of Tumeric Root, will give good results. The paper soaked with this solution will turn yellow. When the current is passed through it, the negative pole turns it red. It is impossible to use this paper dry.

A HOT WIRE AMMETER.

(1014.) T. E. Story, Ark., states:

Q. 1.—I have constructed a hot wire meter and have calibrated it to read ¼, ½, ¾, and 1 ampere. In sending, the meter registers ½ ampere. Is this the actual input into the aerial, and will the watts be equal to this figure times the voltage?

A. 1.—While the amperes registered are actual amperes, the watts are not figured by the product of this amperage times the volts. In this instance the rule for obtaining the number of watts does not hold good, for there is another factor to be considered, namely, the radiating resistance of the aerial. The figuring is very complicated, and the space does not permit a lengthly explanation.

CLOSED CORE TRANSFORMER.

(1015.) Percy D. Lowel, D. C., asks:

Q. 1.—In converting an E. I. Co.'s ½-kw. transformer into a closed core, one as described by Raoul Dubois on page 173 of the June issue, kindly state the wire that should be used in the winding.

A. 1.—See answer given in No. 1010, this issue.

WIRELESS TELEPHONY.

(1016.) C. A. Lockwood, Ore., asks:

Q. 1.—In the article which appeared on page 101 of the May, 1911, issue, on the construction of a wireless telephone, would this set be practical for longer distances if an aerial was used?

A. 1.—This set is of the induction type, and the introduction of an aerial and ground would be of no value.

ANOTHER WIRELESS TELEPHONE.

(1017.) Edward Blair, O., asks:

Q. 1.—What instruments will I need to transmit a distance of 5 to 7 miles with a wireless telephone?

A. 1.—A good microphone, two adjustable condensers of the rotary plate type immersed in paraffine oil, an arc lamp, two choke coils, an adjustable type of Tesla coil, an aerial at least 100 feet long and composed of 10 wires spaced three feet apart. Wireless telephony is still in its infancy and a range of 7 miles is quite an undertaking for an amateur.

Q. 2.—Are there any wireless telephone stations within 100 miles of Cleveland, or any ships on Lake Erie equipped with such apparatus?

A. 2.—We understand that in every city of importance on the lakes, wireless telephone stations have been established. Also that a number of stations are thus equipped. You might inquire of the companies and learn of the names of the vessels and land stations. An audion should be used for receiving.

A DOUBLE-SLIDE TUNER.

(1018.) Roger Nutt, N. J., asks:

Q. 1.—Kindly inform me whether a double-slide tuner is better than a single-slide, and if so, why?

A. 1.—In tuning we have two circuits, one which is the aerial circuit while the other is the detector circuit. With a two-slide tuning coil, it is possible to tune the aerial and detector circuits independently, thereby getting greater efficiency by having the two circuits in perfect resonance.

BLUE BOOK.

(1019.) E. J. Whitehouse, N. Y., asks:

Q. 1.—Kindly let me know whether there are any stations in my neighborhood.

A. 1.—We take it for granted that you mean amateur stations. We have no list of these stations on hand, but would refer you to our Blue Book, which has a very complete list of stations all over the United States. Unfortunately the publishing of this book had been much delayed by a fire of the printer.

½ K. W. TRANSFORMER

(1020.) L. M., Wis., asks:

Q. 1.—Kindly tell me what instruments and aerial will be required to transmit 50 miles with an E. I. Co. ½-kw. transformer coil? To transmit 100 miles?

A. 1.—A helix, spark gap, interrupter, key, condenser, and an aerial 75 to 100 feet long and 50 feet above the ground. For 100 miles range, the same apparatus may be used, but the aerial will have to be about 150 to 200 feet long, and 75 feet high.

Q. 2.—Would you advice me to buy this coil?

A. 2.—Yes; we know of no coil for the price asked which will give you as long distance as this coil.

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A revolution in spark coil construction. Our new "Bull-dog" coils mark the latest step in spark-coil advance.

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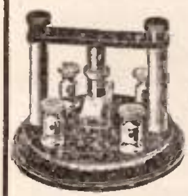

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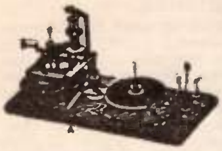

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Wireless Association of America

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 every day in the year under all conditions but they are all of the undivided opinion that Young America leads the rest of the world wirelessly.

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

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

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

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

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

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

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

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

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

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

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

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

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

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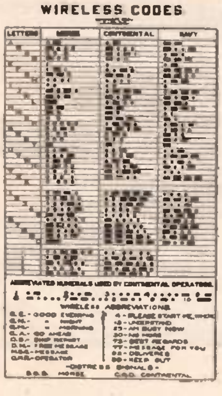

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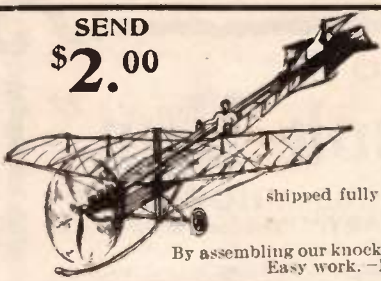

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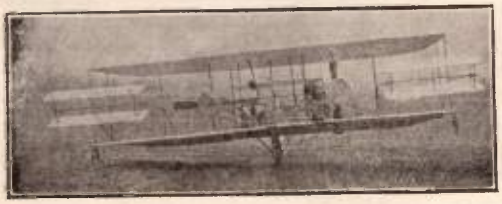

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