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MODERN ELECTRICS

See page 689

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

Modern Electrics

VOL. IV. JANUARY, 1912 No. 10.

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 II.—Continued

57. CHANGE OF ACID DENSITY DURING CHARGE AND DISCHARGE.

THE chemical action during the charge and discharge do not leave the solution unchanged. By the decomposition of the sulphate of lead during the charge, a certain amount of sulphuric acid is formed, on the other hand during the discharge, water is formed. Such changes in the acid are proved by the Hydrometer, Fig. 72.

In a Tudor accumulator the specific gravity rises from 1,115 to 1,145. In a modern American storage battery, a discharged battery will show about 1,200 degrees, when fully charged 1,250 degrees.

The acid density is also less in the upper layers of the battery than on the bottom of the jar; the difference between the surface and bottom of the jar amounts to about 2.5 per cent.

EFFICIENCY OF STORAGE BATTERIES. The efficiency of a storage battery is obtained as follows:

Divide the ampere hours obtained during discharge, by the ampere hours stored into the battery during charge; thus the efficiency of a good accumulator should be 91% to 95% of the ampere hours; 77% to 84% for the watt hours.

EXAMPLE: Charging with 5 amperes during 10.16 hours with an average tension of the cells of 2.15 volts; consequently,

5 x 10.16 x 2.15=109 watt hours.

Discharging current was 6.5 amperes

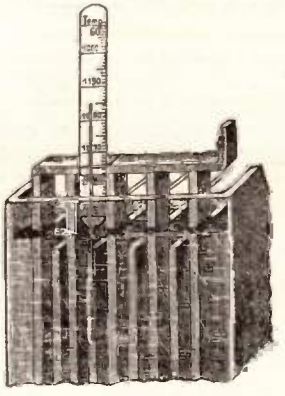


Fig. 72

during 7.35 hours with 1.88 volts; therefore 6.5 x 7.35 x 1.88=90 watt hours.

Efficiency =90÷100=0,826 or 82.6%.

The life of an accumulator is the time during which its plates are in use. It depends upon the thickness of the plates, the elasticity and strength of the active mass, the purity of the acid, from the amount of expansion the positive

plates can follow, and especially upon the treatment which the accumulator gets.

For charging the following rules hold good:

The charging current in amperes, (1 ampere for each pound of positive plates) should be 25% less than the discharging current (1 to 2 amperes for each two pounds of plates); the charging current, however, should be at least 25% higher in voltage. By charging with galvanic batteries, they should be connected in series, the accumulators in parallel. When discharging connect the accumulators in series. With copper sulphate (Daniel or Crawford batteries) the batteries are charged quickest, when the number of batteries connected in series is at least four times that of the number of the storage batteries connected in series. Little storage batteries are charged quickly from the house lighting (*direct*) current, by putting one or two incandescent lamps in series with the accumulators. The first charge is finished when the voltage has risen to 2.55 volts for each cell, measured *while the charging current is still on.*

The charging current should be as constant as possible in order that the E. M.F. should never fall lower than the E. M.F. of the accumulator because in this case the current from the accumulator would flow back against the charging current; this not alone would result in loss of the accumulated electricity but if batteries are used, they may be spoiled.

58. A CHARGING SWITCH FOR ACCUMULATORS.

Every good installation of accumulators necessitates a charging switch if the accumulators are to be charged by batteries or other low voltage source of current. Thus during the charge, the accumulators are connected all in parallel or multiple, and during the discharge they should be connected in series, without it being necessary that during this operation a lot of time be lost.

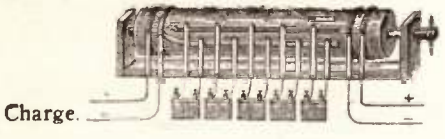


Fig. 73

Fig. 73 and 74 show such a charging switch made as follows:

The apparatus is made mainly of wood. The wooden base has two uprights as shown, screwed to the base board. These uprights carry a long wooden cylinder about 1½ to 2 inches in diameter. At each end of this cylinder two copper rings, made of strip copper, as shown, are tacked; the rings being about ¼ of an inch apart. Four stiff brass springs

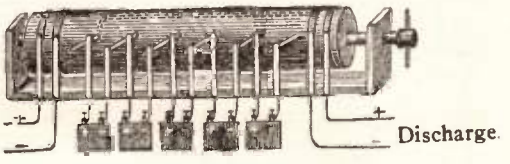


Fig. 74

are fastened to the base board and two of these springs make contact with each set of the two copper rings. The one set of these springs brings the charging current to the rings and from here the current is distributed by means of the long strips to the cells as shown.

As will be seen all the positive poles go to the upper metal strip, all the negative poles to the lower strip. By carefully looking at the sketch it will be discovered that the upper strip goes to the left outside ring and is carried *underneath* the second ring without, of course, making contact with the second ring. This is quite important, or else the charging current would be short circuited.

When the charge is terminated the wooden cylinder is turned about its axis for 180 degrees as shown in Fig. 74. The springs are then connected by diagonal strips fastened to the cylinder as shown.

The discharging current of the storage battery is taken off at the right side as will be observed by studying the illustration. Thus the storage cells are all connected in series. When the discharge is terminated the wooden cylinder is again revolved one-half turn and the apparatus is then ready again for the charging. During this time it was not necessary to either touch the connections or the storage batteries or the primary batteries, if such are used for charging purposes.

59. PLACING OF ACCUMULATORS.

The following precautions should be taken with storage batteries:

1. They should be placed in a cool dry place so that little evaporation is

had and the jars do not become conductive by moisture.

2. If over ten cells are used they should be placed on a dry wooden rack painted with a good oil paint.

3. All cells should be placed with air space between them, so that each cell can be readily inspected.

4. If the voltage of the entire battery is more than twenty, each cell should rest on porcelain insulators.

5. Connections should be soldered preferably, as mechanical connections are sooner or later destroyed by the acid.

60. MAINTENANCE OF STORAGE BATTERIES.

On this point the well known authority, Herr W. Kohlrausch, gives the following advice:

1. After filling the cells with acid, charging should begin at once.

2. After discharging, a recharge should follow with all possible haste; to leave the storage battery stand in a discharged condition gives rise to sulphatation, and this must be avoided if possible. As a rule if a cell is faulty, it will soon be detected because the development of gas does either not occur at all or else only very little gas is developed.

3. The voltage should rise from 1.9 to 2.55. One should count on 80% of the charging energy. The acid should cover the plates entirely and must be the best obtainable.

4. An ammeter should always be connected in series with the storage battery and the specific gravity of the acid should be taken from time to time by means of a hydrometer.

5. The smaller the amperage of the charging current is, the higher the capacity of the storage battery will be. On the other hand, a complete discharge with weak current should be avoided. During a prolonged rest, even after the battery had been fully charged and not used, it should be charged fully for best results.

6. When filling acid in storage batteries one should always take Hydrometer readings. It is a well known fact that it is not the acid that evaporates, but only the water. For this reason as a general rule, acid need not be filled in a storage battery; only distilled water need be used. The acid in a fully charged storage battery should under no circumstances be poured off, as the electrodes oxidize in the free air; thereby becoming exceedingly hot; for this reason a new battery when freshly filled and charged, never gives the expected amount of ampere hours, but will do so if the battery has been overcharged for a few hours.

7. For charging storage batteries a shunt wound machine should be used in connection with a certain resistance and in series with an automatic current interrupter.

8. For charging and connecting a battery of storage cells for various volt-

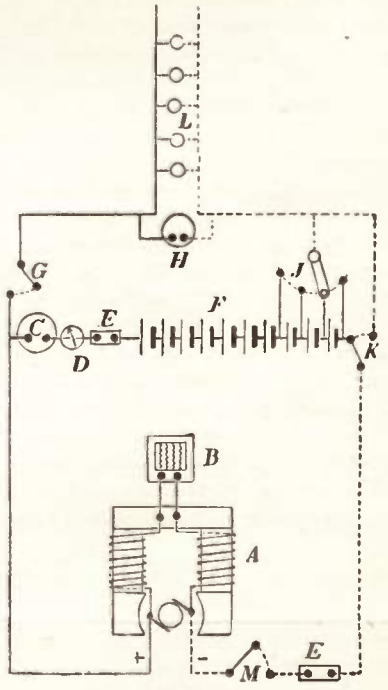


Fig. 75

ages a switch board as outlined in Fig. 75 should be constructed. The explanations of letters in Fig. 75 is given herewith:

A, shunt dynamo; B, shunt regulator; M, automatic interrupter; E, E^1, lead fuses; C, ammeter; G, switch for meter; K, switch for dynamo; F, storage battery; J, end cell switch; H, voltmeter; L, light circuit; D, meter to show direction of current.

The switch at J is for the purpose of adding one or more cells for the light circuit as soon as the voltage of the battery F falls about two volts. It must

(Continued on Page 680.)

Edison and the Copper Industry

Photo N. Y. Edison Co.

At the opening of the electrical exposition of 1911 in New York City, the copper producers and consumers of the United States presented Mr. Thomas A. Edison with a solid cubic foot of copper.. In the photograph the famous inventor is seen with his gift, upon the sides of which are engraved the names of those largely interested in the production and consumption of copper. Another side bears the inscription that at the time of Mr. Edison's first invention, October 13, 1868, the output of copper was 877,664,000 pounds, while on October 13, 1910 the amount purchased was 1,910,608,000 pounds. The gift represents the appreciation of the copper industry for its growth due to a very large extent to the numerous inventions of Edison in electricity.

The mass which weighs almost half a ton had to be cast several times before success was obtained. Mr. Edison remarked jokingly at the presentation of the cube: "This ought to make a fine paperweight!"

A REMARKABLE ELECTRIC SIGN.

Photo N. Y. Edison Co.

One of the most interesting signs along the "White Way" of New York City is that of the Monotuck Silk Company, of Florence, Mass. This firm manufactures the well known "Corticelli Spool Silk" which employs for a trade mark the head of a kitten holding a spool of silk.

The Corticelli sign is made up of 1,062 lamps, the chief letters being seven feet in height, and the kitten is thirty feet high. While Broadway has a larger number of electric signs than any thoroughfare in the world, this sign has become one of the most popular both for its originality and the execution of the idea. The kitten is seen playing with a spool of red silk thread until he becomes entirely entangled in the silk.

The moving of the cat's paws and tail is quite lifelike and is a source of constant enjoyment to children as well as grown ups.

The Marconi Multiple Tuner

THE Marconi multiple tuner represents one of the highest types of perfected tuning apparatus at the present time in commercial wireless work. It is the outcome of years spent in experimenting, and the experience gained in commercial operating. It is used in connection with the magnetic detector in most of the Marconi stations, and operates upon the well known principle of having a number of separate but inductively connected circuits, often named "weeding-out" circuits.

In Fig. 1 will be seen the principal connections and apparatus used, the many switches and other minor parts not being shown. The condensers are of the rotary type, but the working parts are entirely original and the basis of two United States patents. Unusually high capacity is obtained with this form of condenser compared with the compact dimensions.

The aerial and ground are connected at A and E, which lead to the primary of

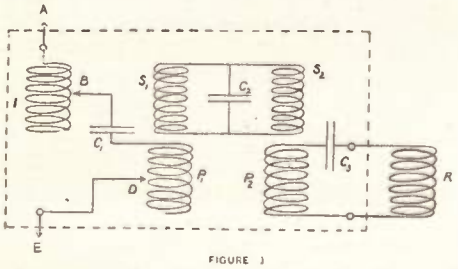


FIGURE 1

a loose-coupler P 1, and the loading-coil I, both of which have their turns connected to two multiple point switches at intervals. The inductance can therefore be varied by means of the switches, while the finer tuning may be accomplished by means of the variable condenser. The primary P 1 reacts on the secondary S 1 which is located in the intermediate circuit with the other secondary S 2 and the condenser C 2 which is connected across both of these. This condenser is known as the "intensifier" and is so marked on the condenser handle. The condenser in this instance plays a very important part in the tuning of the circuit to a remarkable degree. The secondary S 2 reacts upon the primary P 2 which is connected in the detector circuit. The condenser C 3 is used for tuning the detector circuit in which R represents the detector. The loose-couplers may all be adjusted with suitable handles so that the degree of coupling is variable.

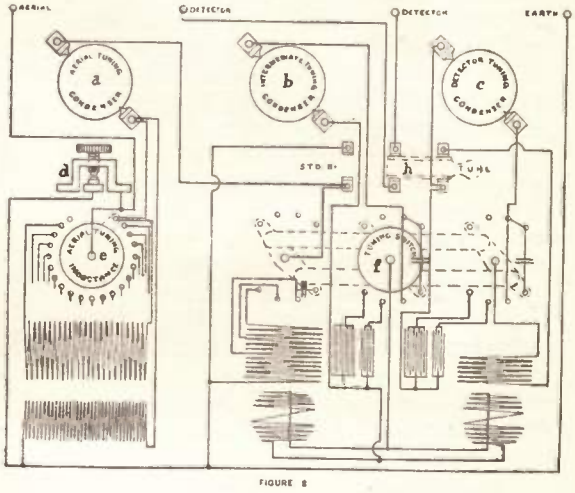


FIGURE 2

In addition to the parts shown in the diagram, the apparatus also contains a micrometer spark gap which is connected across the aerial and the ground terminals. This serves the purpose of preventing the accumulation of static currents on the aerial. This spark gap is furthermore shunted by an inductance of about 80,000 microhenries. In Fig. 2 will be found a complete diagram of the actual connections, in which all the parts are shown.

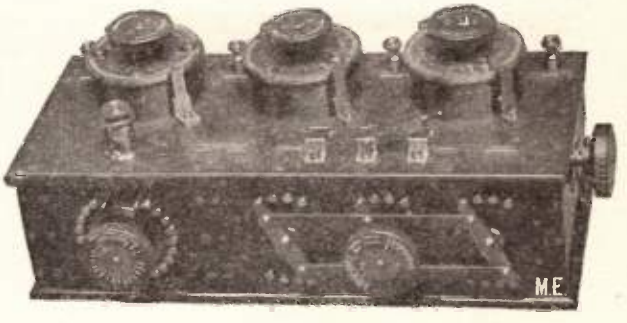


Fig. 3. Marconi Multiple Tuner.

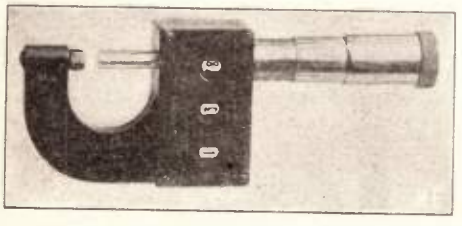
The multiple tuner is very unique inasmuch as it can perform other valuable duties besides the tuning of the receiving set. It can be used for determining the wave-length of a signal, and also de-

termining the distance over which a certain signal is being received. A special chart is furnished for determining distances, and by following the directions, ranges can be figured accurately to within 10 or 15 miles. Of course, the same operator must make the test, for the human ear varies on different individuals, and two separate readings of the same signals at different distances are necessary to figure the range. The intensifier condenser is used for this test.

The complete tuner has been photographed in the accompanying cut. The three condensers may be readily noticed as well as the many switches. On the left may be seen the micrometer spark gap which resembles a large binding post. The instrument fits into a plain wooden traveling case measuring 1 foot 9 inches, by 11 inches high, and the total apparatus weighs 32 pounds complete. It is suitable for receiving all wave-lengths from 300 to 8,000 feet.

A DIRECT READING MICROMETER.

A novelty in micrometer calipers is the product of an English firm, illustrated in the accompanying cut. The caliper contains a number of small gear wheels which have dial rims with figures printed on them. On turning the



handle of the micrometer, the gear wheels move and indicate the exact reading in thousandths of an inch. This form of micrometer represents many advantages over the usual type, in which direct readings are not obtained. The manufacturers furnish the dials to read in any terms desired, such as the metric or other systems.

New York City has now over 350,000 telephones, which amount is more than all the telephones in France. Besides the telephone service in New York is said to be the quickest and best the world over.

AN ORIGINAL ELECTRIC HEATER.

By Frank C. Perkins.

An English firm has placed on the market an original type of electric heater, which is in the form of a round metal plate, decorated with artistic designs. The heating unit is placed in the center, while the metal plate serves

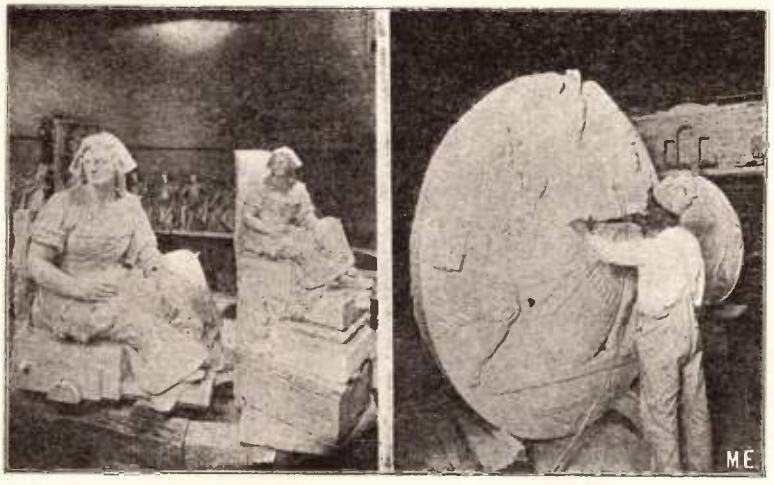
not only the purpose of adding to the ornamental value of the heater, but to radiate the heat as well. The apparatus is known as "Ferranti Sun" electric heater.

THE PRACTICAL ELECTRICIAN.

(Continued from Page 677.)

always be remembered that when a storage battery begins to discharge, it gives about 2.1 volts. For 55 cells this would give 115 volts. When half way discharged these 55 cells would only show 1.95 for each cell. Consequently, the total voltage at this period would be about 107 volts. Thus it will be easily understood that it becomes necessary to add a few cells in the circuit in order to keep up the same voltage and consequently the brightness of the lights in the circuit L. In practice the end cells are held in reserve and are only used as the current in F falls.

Sculpturing by Electricity



Finished Work.

Photo N. Y. Edison Co.
Electric Compressed Air Tool in Operation.

Today, the age of electricity, when almost every line of industrial activities has adapted the electric current with the resulting saving in labor, we find that one of the oldest arts, sculpturing, has followed the example of the younger trade.

In former years sculpturing was a matter of hard labor as well as a talent for the sculpturer. Great masses of marble had to be chipped roughly into shape by means of an iron tool and mallet, this process usually taking one man about seven days. The present day process of roughing out a statue is accomplished by means of a rapid compressed air drill, an electric motor being used to operate the air compressor. A row of holes several inches deep are drilled where the split is desired, and wedges inserted. These wedges are driven by hand until the piece drops off.

Formerly after the statue has been roughened out, the surface had to be finished with hand tools, taking many days and requiring skilled labor. At present, after the statue has been roughed out, an electric-compressed air tool is employed to reduce the surface to a smooth one to form the finished statue. By means of the compressed air tool it is possible for the sculptor to devote his whole mind to the art without being obliged to perform the actual work of cutting the stone. Greater varieties of finishes are obtained and better statues are the results.

The two accompanying photographs were taken in the Piccrilli Brothers studio at 142nd street, New York City. These brothers are said to be the largest sculptors in America, and undertake contracts for the most important work in all parts of the United States. Both the quality of the work, and fairer prices are directly due to the application of electricity in this up-to-date establishment.

WIRELESS COMMUNICATION BETWEEN FEZ AND PARIS.

On November 16th, for the first time the station at Fez, in Morocco, communicated directly with the Eiffel Tower station at Paris, at nine o'clock in the evening. It was only after great difficulty that it was found possible to even communicate with the stations on the coast of Africa, owing to the depreciation in transmitting efficiency in this tropical climate. After the Minister of War releases the use of the two stations for official despatches requiring several hours each day, the stations will be open for public business.

A NEW ELEMENT OF PLATINUM GROUP.

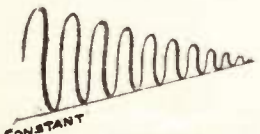
Announcement has been made by A. G. French of the discovery of a new metal of the platinum group, which he has named "canadium." The mine from which the new element was taken is in British Columbia. The metal occurs native, can be melted with the blowpipe, but cannot be oxidized.

Tuned Waves

By F. M. Doolittle.

CONSIDERABLE emphasis has been laid, of late, on the necessity of sharply tuning wireless stations. This is particularly applicable to amateur stations in cities where there are commercial and government equipments. Although there are difficulties connected with tuning a small set with any degree of accuracy, if the experimenter has a clear idea of what is necessary, it should enable him to approximate the desired results.

To briefly review: An electric oscilla-



-FIG. 1-

-FIG. 2-

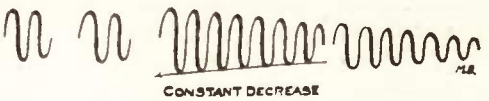
tion is an alternating current of extremely high frequency. If the strength of the various current values A1, A2, A3, etc., Fig. 1, decrease, the oscillation is said to be damped. If, however, they maintain a constant value, it is termed an undamped oscillation. The fact that the former is an intermittent while the latter is a continuous phenomenon should be observed.

The antenna used in wireless work is said to possess a fundamental oscillating period, by which is meant the oscillatory period of a discharge across a spark gap, in series with a wire, from the antenna to the ground. The length, height, size and number of wires partially determine this period. It is also affected by the angle the wires make with the ground and the location of the antenna. This oscillatory period determines the wave length of the antenna.

Our aim then is to tune our transmitting apparatus so that it will oscillate at the same period as the antenna. This unfortunately is difficult, because the damping in the antenna is not as great as in the condenser circuit. Let us consider the reason.

Practically every set of connections used in wireless work is the same in as much as they all comprise an oscillating circuit, i.e., a spark gap, condenser and helix connected in series. In most cases this circuit is connected, inductively, to the antenna through some form of oscillation transformer. Assuming then that we have the two circuits in tune, if the condenser is charged by some means such as an alternating current transformer, an oscillation takes place the first few alternations being of great intensity, after which a long train of weak slightly damped alternations occur. Fig. 2. But the antenna circuit which is bound inductively to the condenser circuit must imitate it. This gives rise to two separate periods. One is the period of the oscillating circuit Fig. 2, and the other is the result of the first intense alternations, which we assumed to be in tune with the natural period of the antenna, setting up a separate oscillation which continues to oscillate at the natural period of the antenna. Both of these are however damped somewhat, so that to a nearby station which is capable of receiving the less intense part of the oscillation, the radiated wave seems a perfect valley of waves increasing in intensity at two points. These two points are called the humps of the wave.

The cause for the sudden diminution in intensity of the alternations in the oscillation of the condenser circuit, is usually found in the spark gap. The spark heats the air around the gap and allows the first few alternations, because of the lowered resistance, to become very quick-



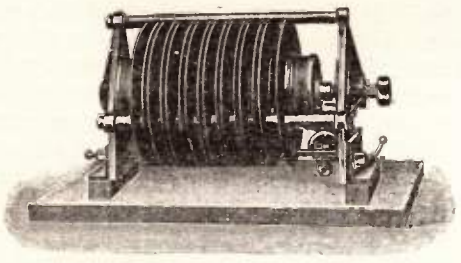
-FIG. 3-

ly damped, while the fact that the resistance is low, allows the remaining small energy to oscillate for some time. This is shown in Fig. 2.

It follows that the ideal gap is one which maintains its original resistance. Great headway has been made in the last year in producing such a gap. One form comprises a number of very small gaps in series with a blast of air to keep the electrodes cool. The discharge from the con-

denser after the first few alternations is quenched because of the maintained high resistance. Fig. 3. The antenna is now supplied with a store of energy which serves to keep it oscillating at its natural period, until the next "push" occurs and the process repeats. This gives trains of slightly damped oscillations which oscillate at the natural period of the antenna, thus producing one very sharply defined hump.

Another advantage is evident. Since the period of the antenna can be changed by placing inductance in circuit, the wave length can be varied with considerable efficiency. It is hoped that



Telefunken Quenched Spark Gap.

this type of gap will be developed and given practical application more generally by both commercial and amateur stations as it will undoubtedly give greater selectivity and increased efficiency.

ELECTRICAL USES OF SODIUM.

The most generally used metal for conducting electrical current at the present time is copper. However, the expense of copper is quite high, and there have been many researches devoted to the developing or discovering of a cheaper substitute, which will be as efficient.

Silver possesses the highest conductivity of any metal known. The next best conductor is copper, with aluminum taking third place, and gold the fourth. Aluminum, in view of its extreme lightness, has been given serious attention, and adopted on a large scale in practical power transmission. Being much lighter than copper, a greater diameter can be used to obtain the same conductivity as a copper cable of less diameter but far greater weight.

At the present time, the attention of the electrical profession has been called to what appears to be a possible solution of the conductor problem. The metal sodium, is the material under consideration, and is manufactured at slight cost by electrochemical means. The specific resistance of the metal sodium is approximately three times that of copper, but, the weight is only one-ninth that of copper. It therefore follows that, if sodium is less than three times as expensive as copper, it will be cheaper than the latter for electrical conductors. At the present time sodium is sold at 25c a pound, and therefore the question of its use in preference to copper deserves careful consideration.

The one great disadvantage, however, which must be overcome before the adoption of sodium conductors, is the fact that this metal has the characteristic of spontaneous combustion when in contact with the atmosphere. It is therefore evident that proper means must be devised to render the use of sodium possible in air. One idea which has been advanced, suggests the use of sodium in seamless iron tubes. On direct current this idea would probably prove satisfactory, but on alternating currents, the action of the iron would prevent its being used. As the question stands at the present time, it offers a valuable idea for any experimenter to work upon, for sodium will probably be the future metal used for conducting the electrical currents for power and lighting purposes.

GREATEST TELEPHONE CENTERS.

Los Angeles has the distinction of having more telephones per capita than any other town in the world. For each 4.3 inhabitants there is one telephone. Following is a list of other towns of the world:

	Inhabitants for 1 'Phone.
Stockholm	4.7
San Francisco, Cal.	4.8
Spokane, Wash.	5.3
Portland, Ore.	5.5
Omaha, Neb.	5.7
Dallas, Tex.	6.1
Des Moines, Ia.	6.2
Kansas City, Mo.	6.5
Columbus, O.	6.9

Paris Letter

ELECTRO-MAGNET FOR EYE OPERATIONS.

The illustration represents a special form of electro-magnet designed by Prof. O. Haab, of the Zurich eye hospital in Switzerland, and built by the Oerlikon firm. The apparatus has a powerful electro-magnet, which is furnished with current through a foot

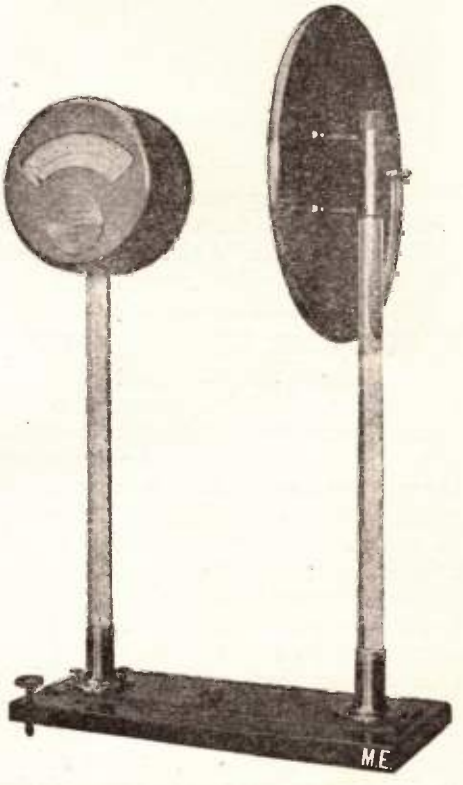
Magnet in Action. Different eye pieces on left.

pedal switch. Special pole pieces of varied designs may be screwed in place as desired. The apparatus replaces the permanent magnets formerly used by doctors for removing steel particles from the eye, and is claimed to be flawless in operation.

A NEW TYPE OF ELECTROMETER.

The photograph represents a new type of electrometer designed by two Paris scientists, Abraham and Villard. This instrument may be used for measuring potentials of from 200,000 to 800,000 volts, and gives direct readings on a scale. No special precautions are required, nor does heat affect the accuracy, the instrument being as practical as those used for the commercial lighting currents.

The measuring instrument is supported on the glass rod at the left, while the brass plate at the right produces the electro-static influence which operates the meter. One pole of the current to be tested is connected to the brass disc, while the other pole is connected to the meter. On the right side of the meter may be noticed a small round disc, which is a small piston moving forward or backward in a tubular space. The action of the current is to cause an attraction between the small piston and the large brass plate, and by moving the piston the needle is likewise moved and indicates the voltage on the dial. The large brass plate may be moved closer to the meter if desired for lower readings. In the nearest position all readings



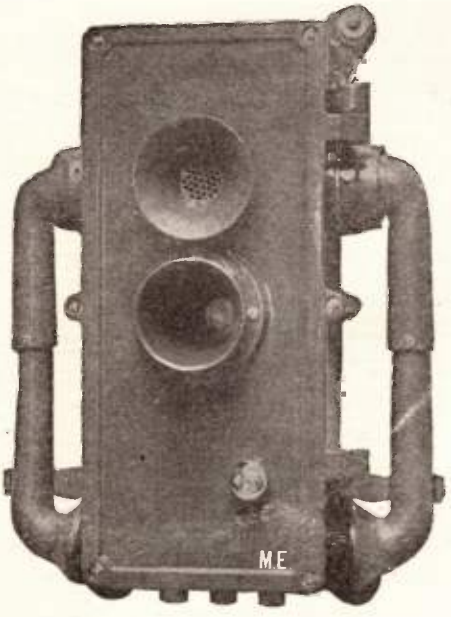
New Electrometer Operated by Static Influence.

from 30,000 to 100,000 may be taken, while in the second or furthest position all readings from 50,000 to 200,000 may be determined. The instru-

ment operates equally well on either alternating or direct current, and is manufactured by the Carpentier establishment at Paris.

A TELEPHONE FOR MINES.

The Adnil Electric Co. of London, England, has produced a perfected type of gas and water-tight telephone, which is especially adapted for mine work. All the sensitive parts are completely encased in a cast iron cover, which is coated with rain-proof paint and varnished. The moving parts pass through the walls of the case, and re-



New Mine Telephone.

volve in gas and water-tight compartments filled with vaseline. The transmitter has a water-tight double diaphragm and interchangeable microphone, all the parts being of very heavy design. The receiver has a gilt rust-proof diaphragm as well as the pole pieces of the magnets. All the metal parts are heavily nickel-plated.

The apparatus contains a few original details which are not employed on the usual type of telephones. The calling is done by simply depressing the receivers and pushing the button, but no bell is used for a signal. Instead, a loud screeching telephone operated on high frequency current from a buzzer or other source, replaces the bell signal. The telephone is of the loud speaking type, while the high frequency calling system enables calling at 200 miles with but two cells of battery. In a subsequent issue we hope to describe the high-frequency converter in detail which is employed with this system.

A LARGE CAPACITY ELECTRIC COFFEE GRINDER.

In the usual type of electric coffee grinders in general use, the rate at which the coffee is ground is out of proportion with the size of the grinder, and it has therefore been the intention of various inventors to perfect a type which would have a larger capacity within compact dimensions.

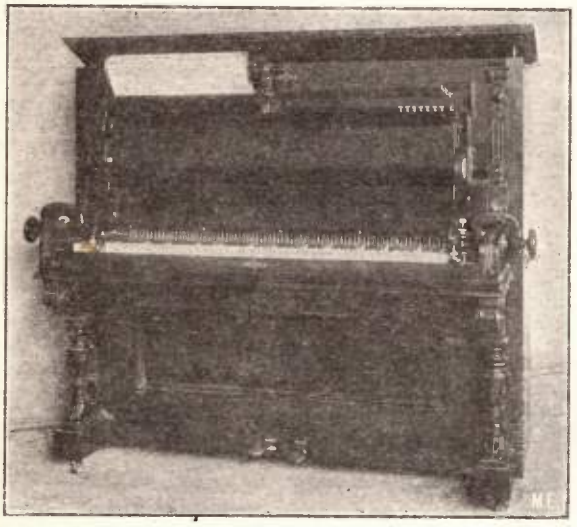
The problem seems to have been solved in the electric grinder shown in the illustration, which is made by the Oerlikon firm. A small electric motor is placed within the large body and directly connected to the revolving portion of the grinder. An extra handle is provided for instances where the motor or current fails so that the ap-

Unique Electric Coffee Grinder.

paratus may still be operated. The amount of current used is very slight, while the machine occupies but little space.

AN ELECTRICAL PIANO.

The piano illustrated in the accompanying illustration, is the invention of a Swede, Mr. J. P. Nystrom. Contrary to the piano players generally seen, this piano will both play from rollers, as well as make rollers from

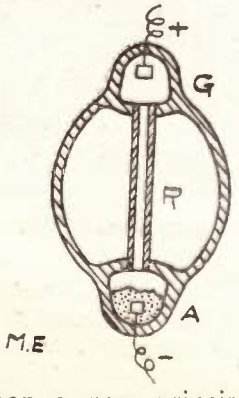


This Electric Piano makes its own records.

pieces played on the piano, so that these rollers may be used on any other piano of a similar design to reproduce the identical piece rendered on the roll. A vertical row of strikers above the keys actuate the recording apparatus. This invention places the electric piano on the same footing as the phonograph, inasmuch as pieces may be recorded as well as rendered.

A NEW MERCURY VAPOR LAMP.

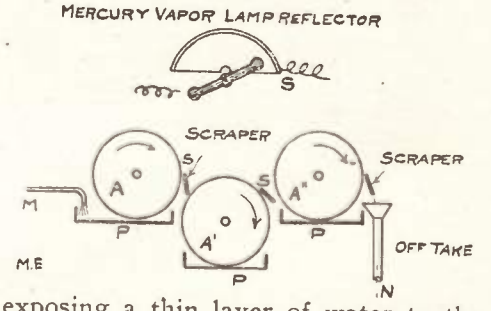
The accompanying sketch illustrates a new type of mercury vapor lamp op-



erating upon a new principle. The tube R is of lime or magnesia boron, or boron carbides and is rendered incandescent by the passage of the vapor coming from the discharge in the tube. The discharge takes place between the mercury cathode A, and the magnesia electrode G, thus going through the entire length of the tube.

LATEST APPARATUS FOR STERILIZING WATER.

Prof. V. Henri, of the Paris University, is still conducting his researches in the sterilizing of water. His latest apparatus is so arranged that a thin layer of water will be exposed to the action of the ultra-violet rays from a mercury vapor lamp, thereby gaining more thorough sterilization, through the better penetration of the rays. Cylinder A dips in the pan P which gathers the water from the inlet M, and the scraper S removes the water from the cylinder A to bring it to the second pan, which in turn is taken up by the cylinder A^1 and again scraped off into the next pan. This is an effective method of

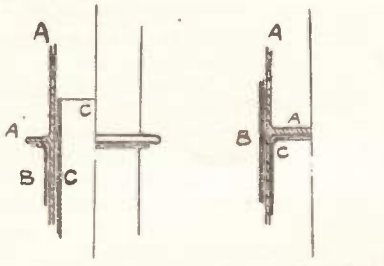


exposing a thin layer of water to the action of the light rays. The outlet is situated at N where the treated water is removed.

AVOIDING BREAK-DOWNS IN CONDENSERS.

The break-downs in condensers are due to the strain at the edges of the metal foil covering the glass. In the sketches are represented two methods whereby this strain may be removed, enabling thinner glass to be used. In Fig. 1, A is the glass dielectric surface, while B and C are the metal foil coatings. The glass A is moulded with a rim at A^1, while no ridge is moulded on the other side. The metal

foil coating B is therefore brought around this ridge to remove it from the other coating, and thus effectively removes the electrical strain. Fig. 2 illustrates the same principle, but with the ridge on the opposite side. The

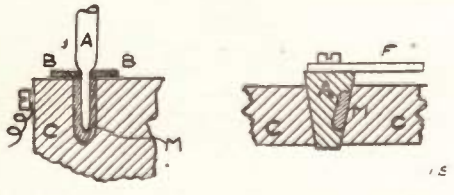


-FIG. 1- -FIG. 2-

method is exceedingly simple, yet proves very efficient in preventing break-downs.

PERFECTED MERCURY CONTACTS.

The sketch illustrates two interesting methods of using mercury for contacts and in such a manner as not to spill should the apparatus be turned. Fig. 1 illustrates a means of contact between the moving shaft A and a base C. M is a pool of mercury, while B is a plate to hold A in position. The cavity of the mercury is very small, and the capillary action is sufficiently powerful to retain the mer-



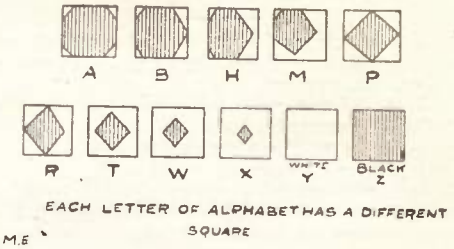
-FIG 1- -FIG. 2-

cury in place no matter how the apparatus is handled. Fig. 2 illustrates another method, in which F is a moving arm, while A is a metal plug fitting and making contact with C. The depression M in piece A is filled with mercury, and makes an excellent contact with C. The machine work being perfect prevents the mercury from leaking from the cavity in which it is held.

IMAGE TRANSMISSION.

Our Paris Correspondent in his last letter mentions a new system of transmitting images by means of a prearranged code. The details are not very clear, but perhaps our readers may understand the method employed.

The image is first made in the shape of a half-tone, then enlarged and each square (or dot of image) evaluated according to a scale of sizes. A standard scale consists of a number of squares marked off for certain portions as shown in the sketch which contains a few of the characters of the alphabet. Each square of the scale has A, B, C, D, etc., so that the operator estimates the image dots and sends the Morse letters to show which

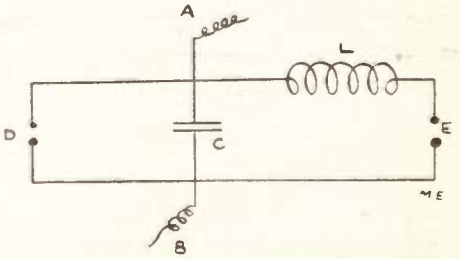


dot or square is to be used at the other end. Thus the image is received and composed in similar dots.

A NON-SPARKING CONTACT DEVICE.

A non-sparking contact used especially for high frequency interrupters has been devised as illustrated in the attached sketch.

The contacts A B are shunted by a non-inductive circuit with the switch D, which is shunted by the electrolytic condenser C, and the inductance coil L. This latter has a separate switch E. In practice, switch E is always opened or closed before D. The



electrolytic condenser consists of one or more cells, each cell containing two aluminum plates in a solution of sodium-potassium tartrate.

MODERN ELECTRICS

A Magazine devoted entirely to the Electrical Arts.

H. GERNSBACK, Editor

O. J. RIDENOUR, Business Manager

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Vol. IV. JANUARY No. 10

EDITORIAL.

IMPORTANT ANNOUNCEMENT.

BEGINNING with the new volume (the April number), the price of *Modern Electrics* will be changed to 15c a copy, $1.50 a year in U. S., $1.85 Manhattan and Canada, and $2.00 Foreign.

We have been forced to take this step on account of the increased cost of producing the magazine now, also because the volume of the magazine has increased 40 per cent. during the last year.

Only by taking this step can we produce a magazine that is a great deal better even than what we are offering now, and the reader understands perfectly that where the publisher receives a satisfactory price for his magazine he is well able to offer a great deal more than is otherwise possible.

While we have bettered the magazine and also increased the volume, we have heretofore refrained from increasing the price, believing in the popular price of 10c a copy. To-day this magazine is the only electrical journal of any consequence, selling at such a low price and if conditions were the same as years ago, we, of course, would maintain the price of 10c right along, but the high cost of paper and printing makes this course impossible.

We believe this magazine is well worth 15c to-day, in fact we have the word of hundreds of subscribers for this and we know that our readers will buy the magazine just as readily for 15c as when it sold for 10c.

This magazine to-day has the second largest circulation of any electrical magazine in the country and we firmly intend to make it the largest one published anywhere, and we have no doubt that we will make this possible.

During the coming year the magazine will be greatly enlarged and we hope that in a year from now, we will have a magazine between two and three times as large in volume as the present one. There will be a lot of novel features during the coming year and as heretofore we will only give our readers the VERY BEST and we will have the news before any of the other magazines the same as in the past. We will have a great many surprises in special supplements for our readers for the coming year and we are sorry that we cannot disclose them at this writing for obvious reasons.

We can say this much, however, that if you liked *Modern Electrics* in the past, you will like it doubly well in the future.

Up to April 1st the price of the magazine will stay the same as before, and any subscriptions received up to April 1st will be entered at the old price. However, not more than a five years' subscription in advance at the old price will be accepted. Thus we will not accept any subscription running longer than five years at the old price. This will give you a chance to subscribe for Modern Electrics at the old rate and get the advantage of the new magazine without paying the new price.

We trust that many of our readers will take advantage of this offer and we close with the sincere hope that our friends will help us to make *Modern Electrics* the greatest electrical magazine in the world.

H. GERNSBACK.

Ralph 124C 41 +

(Continued.)

By H. Gernsback

FOR some time Ralph sat very quiet in a daze. He could not comprehend the misfortune that had befallen him, his brain was in a maze. After spending so much time and effort, when the goal was within reach, nay, touched by his very hands, everything had been snatched away from him. It was maddening, agonizing.

Suddenly his full reasoning power and energy came back to him. He jumped up and ran down where Fernand lay still bound, the same way he had left him. Ralph applied to Fernand's neck a small electrical contrivance which he had brought with him, and in less than ten minutes his enemy had fully recovered from the effects of the Radioperforer.

Ralph cut the rope and jumped back. In his right hand he held the Radioperforer and his eyes were lit with intense hate. Facing his enemy he bellowed:

"You damnable, low-down cur, I want every question answered truthfully and as quickly as I ask them. If you try any tricks or if the full truth is not forthcoming, by God, I will blow you to eternity as sure as I live. Now then: Where is Alice?"

"I don't know, but let me explain and you will sympathize with me when you hear the story." Fernand was breathing hard, and was leaning heavily against the wall of the flyer. Only now did Ralph observe the careworn, hard drawn face of his enemy and instinctively he felt that he would hear the entire truth from him. A most amazing story it was that followed:

"Go ahead," Ralph said, "I am listening."

"First I wish to apologize for having abducted your fiancee. Only you, who love her, perhaps no more than I did, can understand my actions. I felt as if I could not live without her and I risked everything to conquer her. My mind was love-crazed, my actions, as perhaps you can understand better than anyone else, were like those of a drowning man coming up for the third time, trying to clutch a sun-ray with his hands. But I have come to my senses, I am happy to say, and you need not fear any interference from me, quite the contrary, I will try to make good whatever I have spoiled so far."

"Well, go on," Ralph urged impatiently.

"When I applied the chloroformal to you that night, I used the same drug on Alice, almost simultaneously, while my driver, who is a close friend of mine, chloroformed your driver. We then took Alice in my cab and returned immediately to New York. The space flyer which was already waiting for me with a maid on board, was located in the outskirts of New York, and we covered the distance in a few minutes. Alice was put on board, with the assistance of Lylette, the maid, and in a few seconds we were off, the flyer moving at top speed, 70,000 miles an hour. For the first few minutes my sole attention was directed to Alice, of course, trying to revive her. In this I was successful, and in less than ten minutes she was hereself again, which she fully demonstrated by soundly slapping my face, as soon as she found out where she was. She quite lost her temper and abused me for some time, so I thought it wise to retire to the instrument room. Only then did I notice that the wireless calling apparatus was ringing furiously, and after I had tuned-in, I made out a faint, gasping voice somewhere out in the ether. With difficulty I understood that there was another space flyer somewhere near us, with two gentlemen and four ladies on board, and that their oxygen supply was giving out rapidly. It seems their chemicals, used to produce oxygen on board, had become spoiled, or else run out, and the voice, in plaintiff, gasping tones, asked for a small supply to bring the doomed inmates of the flyer back to earth.

"Although I was in a hurry to get well under way, there was no denying such a demand, and I answered back that relief was coming at top speed. I ran up to the conning tower, and by means of the telescope soon located the other machine. I then promptly reversed the Anti-Gravitator machinery and in a few minutes I had drawn up close to the flver in distress. I quickly made fast and cleared the connecting tube between the two flyers. After the joints were stopped up air-tight I crawled through the tube into the other flyer. Just when my head reached the inside of the "doomed machine," two very muscular hands closed around my neck and I was jerked out of the tube with despatch. I looked up and who did I recognize? Llysanorh'! I made a desperate effort to wrench myself loose from his vise-like grip, but I might just as well have tried to shake

(Note.—This Novel started in the April Number. Back issues containing all installments will be furnished at 10c each.)

an elephant off, as that seven-foot martian.

"He never said a word, only his big horse-like eyes told volumes. He then locked me up in a room, after he had manacled my hands, but in about fifteen minutes he was back, a triumphant look in his eyes. He picked me up and pushed me through the connecting tube into my own machine, whither he followed me.

"He then made his way into the machine room, where he dragged me too. He then picked up a large hammer and smashed the mechanism of six anti-gravitators, in order that the machine could not be steered, but would fly in one direction only. He also smashed all the reserve parts, to make sure I would not make any repairs myself. Then he spoke for the first time, a sneer on his face:

" 'Now, my dear little Fernand-kidnapper, you have adose of your own medicine. You are a naughty boy and I should really spank you, but I hate to hurt your poor feelings. As you undoubtedly guessed, Alice and her attendant are now on *my* machine, and in a few minutes we will leave to parts unknown. In order so that you will try no tricks, I destroyed part of the mechanism, so you won't go back to earth. I directed your machine toward Venus, merely as a safeguard.

" 'Our smart Professor Ralph, no doubt, will soon locate you and will follow *you*, if not, you will land on Venus, sometime in the future. If you should see Ralph, convey my greetings to him and tell him there are a few insects as smart as himself, among them, myself. Tell him also, if he inquires where I am going, that I am bound for the Milky Way, where I own a cow farm!!

" 'Now then, my friend, I bid you adieu, but in order that you don't get mischievous with the wireless you will do me the favor to smell a bit of this perfume!'

"Although I struggled and fought, he pressed a saturated cloth to my nose and that is all I know. I must have been unconscious for at least six or seven hours, and when I came to, it was two or three hours before I had worn off the effects of the narcotic. After that I was too weak to do much and dozed off, until one or two hours before your arrival. That is the whole story."

Ralph had listened to this amazing account with glistening eyes and he knew that it was true.

For a while he sat deeply engrossed in thought, then he jumped up and said: "While I should leave you to your fate, I feel charitably inclined. I will turn your machine around and direct you Earthward, so you will intercept the Earth in about thirty hours. Although you cannot steer, you can accelerate and retard the speed of your flyer and you will thus not run any risk of a collision with the Earth. Good-bye."

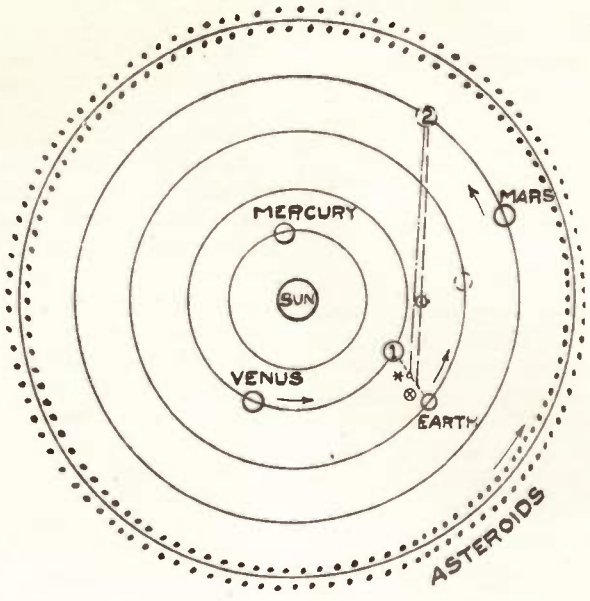
With that Ralph turned his back to Fernand and crawled through the connecting tube into his machine. He then turned Fernand's flyer around, disconnected his machine from the other and in a few seconds Fernand's flyer was lost to sight.

Ralph sat down dejectedly and began to think hard. He reasoned out that Llysanorh' could obviously not return to Earth. Where then was he bound for? Venus? Hardly. To begin with it was too uncomfortably hot there, besides nobody would or could marry him there, the inhabitants of Venus being mostly Terrestrials, who, of course, have the same laws as the ones on Earth. Consequently they would not marry a Martian to a Terrestrial.

Mars? That was doubtful too. For interplanetarian marriages the Martian laws are the same as those of the Earth. However, Ralph reasoned that Llysanorh' might have some friend in his sect who might perform the Martian marriage ceremony secretly. But what good would it do Llysanorh' even if he used force to attain his purpose? He could not settle down on Mars, nor on the Earth, nor on Venus. The boiling hot planet Mercury was out of the question. The two moons of Mars then? Impossible, for they have practically no atmosphere. Where then? Oh what a fool he was not to think of it before—the Asteroids, of course.

These little planetoids, revolving in an orbit between Mars and Jupiter are practically uninhabited, although they have a good atmosphere (at least the larger ones have), and a fair climate, considering their distance from the sun. Some of them are only a few miles in diameter and even the largest one measures only 485 miles in diameter. Thus an electromobile running at the slow rate of sixty miles an hour, can circle this entire world in 24 hours! The larger planetoids all have superb vegetation and as the gravity on these bodies is only a fraction of that on earth, the trees and shrubs are veritable giants, while colossal fruits and vegetables grow in abundance. These plants help to create a dense atmosphere, in spite of the small gravity of these planets and life is, in a great many respects, far more comfortable and pleasant on some of the larger asteroids than even on Earth or on Mars.

After Ralph had thought for a while over the subject, he became convinced that



-----ORIGINAL DIRECTION OF RALPH ---COURSE OF LLYSANORH'
* WHERE RALPH OVERTOOK FERNAND ⊙ POSITION OF LLYSANORH' WHEN
—— NEW COURSE OF RALPH IN PURSUIT RALPH OVERTOOK FERNAND
OF LLYSANORH' ① WHERE VENUS WOULD HAVE
② WHERE MARS WOULD BE AT END BEEN MET IF FERNAND HAD
OF LLYSANORH'S JOURNEY. CONTINUED HIS JOURNEY
⊗ WHERE LLYSANORH' ABDUCTED ALICE

Llysanorh' would try desperately to reach Mars, where he would get some one to marry him, after which he would rush off with his involuntary bride to some asteroid and laugh at Ralph and the rest of the Universe.

Ralph saw that there was not a minute to be lost. He must head off his new enemy and intercept him before he reached Mars. If he could not accomplish that, he felt that Alice would be lost to him forever. Llysanorh' would take her to some asteroid and let Ralph search for him. There are over 4,000 of these little planets in existence,* and it would be an absolute impossibility to search for the fugitive if Ralph did not happen to know on which Asteroid he was. Therefore immediate and speedy action was positively necessary.

After taking the necessary observations, Ralph found that it would take him at least thirty days to reach Mars, forcing his machine at the utmost, at the highest possible speed, namely 90,000 miles an hour. He knew that Llysanorh's machine could not possibly make more than 85,000 miles an hour and for that reason he calculated that if everything went well he would overtake his enemy at least in 120 hours. He knew that Llysanorh' had a handicap of at least 600,000 miles, and if Ralph gained on him at the rate of only 5,000 miles an hour, it would take about 120 hours or about five terrestrial days to accomplish it.

Ralph therefore turned his flyer towards the point in space where Mars would be after the end of thirty days, and he then began to search for his enemy's flyer by means of the polarized wave apparatus.

Who can describe his joy when, after a diligent search of four hours, he finally located the machine, he felt sure was Llysanorh's? But he also had a terrible setback, as his calculations soon revealed that Llysanorh's machine was making no less than 88,000 miles an hour. This certainly was distressing. At this rate, Ralph at present was only gaining 2,000 miles an hour. In other words, it would take at best thirteen to fourteen days to overhaul the enemy. However, it was unnecessary to become alarmed, as at best Llysanorh' could never hope to reach

*Up to 1911 over 650 asteroids had been discovered.

Mars sooner than in twenty-nine days and Ralph felt sure that he could overtake the fleeing machine, barring unforeseen accidents.

During the next few day Ralph observed the unique spectacle of passing midway between the Earth and Venus (see diagram). He ran almost parallel for a time with the two planets, Venus to his left, the Earth to his right. Although he was quite near to Venus, he could hardly see it, as it was almost directly in line with the sun, and consequently was a hard object to observe. A few days later, however, it had swung sufficiently far around to the left to afford occasional glimpses of this beautiful planet.

(To be Continued.)

WIRELESS TELEGRAPHY AND AEROPLANES.

THE applications of wireless telegraphy are now so widespread that much progress has been made in directions which, in the ordinary way, receive but little public recognition. One of these applications is in telegraphing from aeroplanes and airships. The advantage of being able to communicate with land or other stations was well exemplified in the case of the Wellman flight, and the gain to a military aeroplane scout in being able to send messages to his army is obvious. With the aeroplane the weight of the apparatus is important. A long aerial wire, though a necessity where distances of any length have to be covered, is almost out of the question. Many experiments have been conducted with long aerial wires trailing behind an aeroplane, and distances of a few miles have been covered by that means. In experiments carried out with Mr. McCurdy's aeroplane in the United States only one long wire was employed, the steel wires of the machine itself being used as a counter-capacity. The idea of employing the network of wires on the aeroplane is, however, impracticable, as they become "alive," and might give serious shocks to the pilot or passenger. Two long wires appear to be the simplest solution of the problem, but trailing wires present dangers in so many ways to a machine traveling at a high speed through the air that pilots might rarely consent to their use.

In a lecture before the Royal Institution, London, Mr. T. Thorne Baker passed in review some of the work already accomplished in the application of wireless telegraphy to aerial navigation and referred to some satisfactory results obtained by Mr. Farman by using two trailing aerials, each consisting of rather thin wire about one hundred metres in length. Those experiments were carried out some time after Mr. Baker had adapted a similar arrangement to a Bristol biplane in England. In the latter case no loose wires were used, and thus he had been limited to the amount of aerial that could be attached to the machine itself—about fifty feet. Instead, however, of using balanced aerials, he coupled them to each end of an inductance coil, and increased their effective length to the greatest extent possible without sacrificing efficiency. In the latest form of the apparatus he was using a 6-in. induction coil with a ⅝-in. spark gap, fixed at a considerable distance from the apparatus, so as to be away from the petrol tank. Two light brass rods extended from the coil well into the space between the two main planes of the machine, and to one side of the tank, and two ⅜-in. brass rods sliding over these and ⅝-in. apart formed the spark gap terminals. Shunted across the spark gap was a condenser of the Leyden jar type, and an inductance coil consisting of seven turns of No. 14 copper wire wound on a light ebonite drum. This inductance had sliding contacts so that the number of turns used could be varied in the usual manner, in order to tune the two circuits. The two aerial wires were connected to the two ends of the inductance in use, and the aerial circuit was brought into tune with the shunt circuit. A secondary battery of eight or ten volts supplied the primary energy, about fifty or sixty watts being required.

Two new arrangements have since been adopted, which should greatly enhance the efficiency of the plant. The chief of these is a long light brass

(Continued on Page 725)

New Electrical Appliances

THE SPEED-I-PHONE.

The accompanying illustrations are front and rear views of the Speed-I-Phone interior telephone system. In the construction of this system the manufacturers have departed very radically from old established methods, inasmuch as they use the typewriter key, which is pressed down instead of the usual button which is pushed in.

The instrument is built on the unit-type principle, that is each key and unit is individually mounted and are interchangeable, being removed in a moment. In the construction the use of coil springs has been entirely eliminated, excepting one coil spring on the switch-hook.

The German silver springs which go to make up the unit are the returning springs for the key as well as the contact springs.

The reset is automatic in its action and is operated by the switch-hook.

The wheel shown in the center is a selective calling wheel, which is used in connection with a single stroke gong and signals particular parties in any department.

Front of Speed-I-Phone. Note typewriter keys.

In connection with the instrument there is also a secret locked trunk, which is operated by the insertion of a key, which key is carried only by delegated parties. Inserting the key and turning it half way to the right connects the trunk which is also reset to normal by the operation of the switch-hook.

Back of Speed-I-Phone, opened.

The manufacturers are advocating the one style of telephone both for desk and wall instrument and in doing so are mounting the desk instrument on a free swinging arm, which arm also carries the intermediate connecting strips in the base, and nothing is attached to the desk. This permits of moving the desk around for scrubbing and sweeping and the instrument can be swung out of the way when not in use.

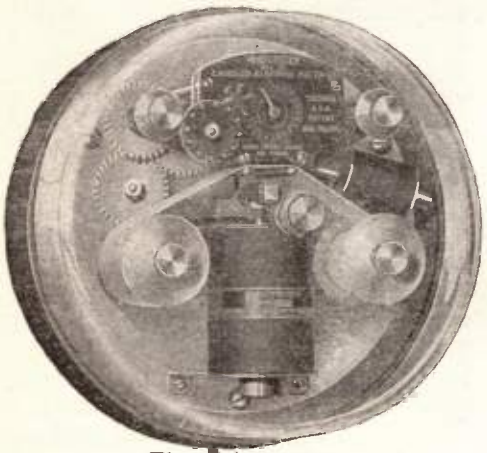
The case is made of pressed steel, handsomely finished in black enamel.

THE PRINTOMETER.

To eliminate the disputes which so often arise between the consumer and central station management, a new device known as the "Printometer" has been placed on the market. This instrument

prints figures for the current consumed on a paper tape at regular intervals.

The Printometer is not an integrating meter, but is is an instrument that may be used in connection with an integrating meter. The register of a meter to which the Printometer is to be attached, is forwarded to the factory where the commutator and binding screws are attached. The Printometer when attached to the meter by means of the conducting cords is electrically locked with the meter, and inaccurateness is impossible. The instrument contains a series of cyclometer type wheels which are moved in unison with the indicators on the electric meter,



The Printometer.

and print at regular intervals on a paper tape both the time and the meter reading, by means of a contact-making clock. In order to obtain the reading for current used during a certain interval of time, it is only necessary to subtract the last figures from those at the beginning of the period of time.

The base of the instrument is circular in form and entirely encases the works, with a glass front. The contact-making clock is likewise mounted in a dust-proof case and may be placed on the same backboard as the printometer. These instruments are also furnished in a portable form so as to be attached on meters being inspected.

ANOTHER LONG DISTANCE RECORD.

About 1:00 A. M. in the morning of October 17th the student operator in charge of the wireless station of the Los Angeles Polytechnic High School conceived the idea that he was able to raise the government station at Mare Island a distance of 386 miles away. Mare Island's call is NPH and he has been "in" handling business all evening. That student tuned up his spark to a fine even tone and commenced to call NPH and sign off his own signature HL. After the fourth call NPH answered and asked what was wanted. The school replied by asking if NPH would kindly take a message for an amateur in his vicinity. After getting his consent the school operator sent him an eight word message complete with time, date, check, and sig., etc. NPH OK'd the message without any repeating, said that it was no trouble to read him, and assurred him that the message would be forwarded at his earliest convenience. At 7:10 A. M. on the same morning NPH called the party whom the message was for and gave it to him. Comparison by mail showed that it was correct in all respects.

Without making any changes whatever in the sending apparatus, accurate measuring instruments inserted which showed that the amount of energy consumed was one hundred and ninety watts. This makes the wattage per mile, about one half, and establishes a record.

NOTICE TO AMATEURS OF THE PACIFIC COAST.

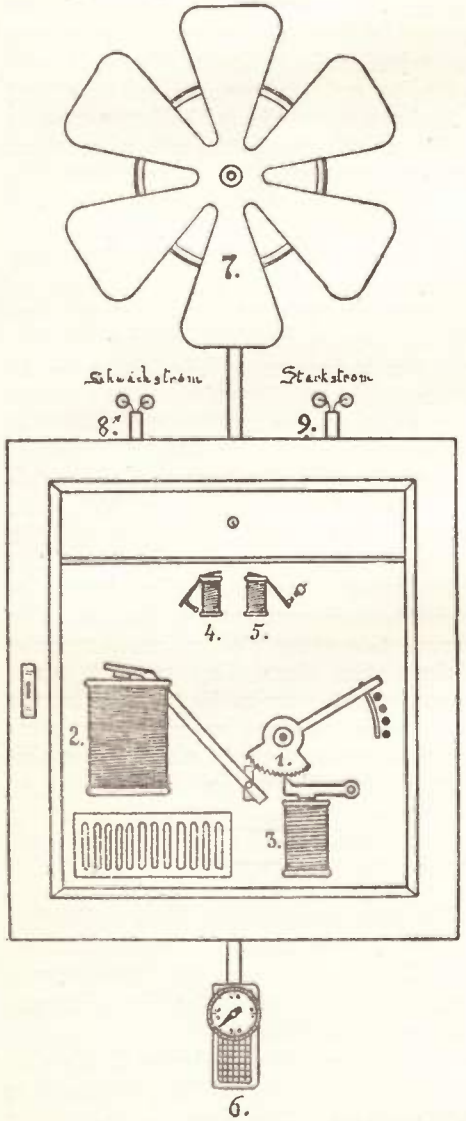
To bring the amateur wireless operators of the Pacific coast into closer relationship, we are forming a club to be known as the "All Pacific Wireless Club": there are no fees to be paid by the members, all that is asked is that each amateur wishing to join the club will send us a description of his or her station, viz: the power of transmitting instruments, the wave length of station, the operator's age and a stamped envelope or a two cent stamp. This envelope must be addressed or your address enclosed. The stamp or stamped envelope is to cover mailing expense of a list of all members, together with their address and description of station. We also ask that all wishing to join will send their application to us within one month of the publication of this issue so as to get the lists made out on time.

Address all applications to, Wireless Station, c|o Columbia University, Portland, Oregon.

A NOVEL AUTOMATIC ELECTRIC VENTILATING SYSTEM.

By Frank C. Perkins.

A unique arrangement for operating an automatic electric ventilating system may be seen in the accompanying drawing which also indicates how the apparatus switches automatically electromotors "on and off" driving the ventilators supplying hot or cold air in winter or in summer and controlled by a thermostat and regulating thermometer. The sketch



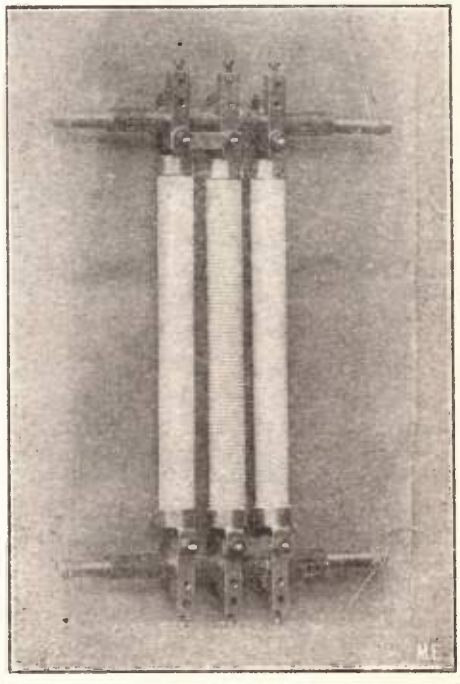
shows 1, as a segment with lever to switch on the electromotor and 2, is magnet through which 1, is moved while 3, is magnet with pawl the latter keeping 1 in its proper position. It will be seen that 4 and 5 are relays to operate 2 and 3 while 6 is metal thermometer with movable scale to adjust to the desired temperature.

For supplying the hot or cold air there is provided the ventilator with driving motor, while 8 and 9 are connections for current supply, in order to be able to ventilate automatically a large space at a certain temperature, say for instance 18 degress C., or 65 degress Fahr.

Invariably 4 will be attracted as soon as this temperature has been reached and relay 4 closes circuit for magnet 2 with the effect that segment 1 will by its lever be moved along until the motor of the ventilator 7 has been switched on to its full power. Then relay 5 will be attracted, as soon as the temperature has sunk again below 18 degrees or 65 degrees Fahr. It will be seen that relay 5 closes the circuit for magnet 3 with the effect that the pawl attracts and thus liberates segment 1, which will instantly jump back into its original off position by means of a spring, switching off the electric driven ventilator at the same time as the motor.

RESISTANCE UNITS.

The English firm of Allen-West have

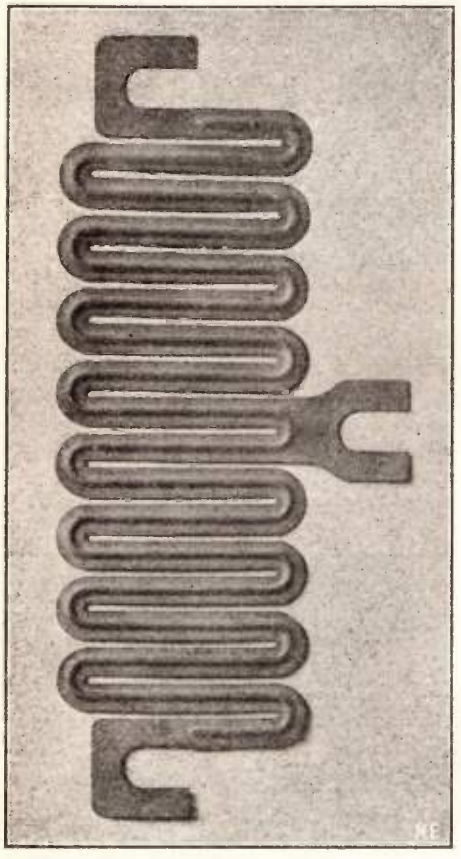


Tubular Unit.

lately produced ingenious and highly improved resistance units,

In Fig. 1, will be noticed the new resistance units used for rheostats where a reasonable amount of current is used. Each unit consists of resistance wire wound on a steel tube which has been covered with a special cement, imbedding the wire in same as well. The ends have heavy clamped terminals, which are far more preferable than the wire ends or strips usually employed.

In Fig. 2, we find a photograph of



New Resistance Grid.

the new resistance grid which this firm has produced. This form of resistance is used where the current is quite heavy, as in the instance of street railroad cars. The construction is very solid, and the grid never breaks. It is admirably adapted for rough usage or where an unusual amount of vibration exists.

HOW ELECTRICITY KILLS.

By R. D. Mock.

Ever since electricity was first used it has been known that under certain circumstances it was deadly, but just what these circumstances were and how electricity kills, took almost endless experimenting to find out. The mystery of electricity's deadly power seemed to be one of those unanswerable problems which deal with the question of life and death, but now, thanks to the tireless energy of scientists, the various results of their observations have brought the answer.

In the case of an electric shock, severe enough to kill, death usually results from one of two causes—either from paralysis of the respiratory organs, or from contraction of the muscular fibres of the heart. In the former case, the victim may occasionally be literally brought back to life by artificial respiration, but there is no known remedy in the latter case.

The effect of direct and alternating currents vary with the current strength, the duration of contact, and the path through the body. With alternating currents low frequency is generally more dangerous than high.

Lower animals are much more susceptible to electric shock than mankind, dogs being frequently killed by a direct current as low as 70 volts. The average man can take a direct current of 100 volts and scarcely notice it; 200 to 400 volts give rise to muscular cramp, while respiration is suddenly stopped at 550 volts. At 600 volts both contraction of the heart and respiratory paralysis ensue, but at 2300 to 4800 volts the effect is usually confined to the respiratory organs. The electrocution records of various American penitentiaries show that two to seven amperes at 1500 volts, 15 to 50 cycles per second, always stop the heart when continued 45 or 50 seconds, although, in this space of time, it may fail to kill.

NOTICE.

The experimenters and those interested in wireless telegraphy at the H. H. Raschig School of Cincinnati have organized a club known as the Experimental Club of Cincinnati.

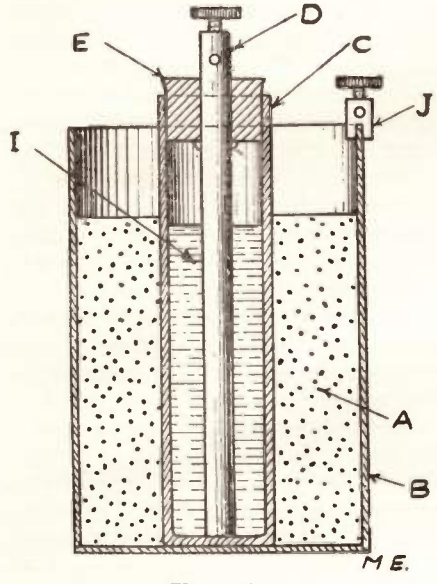
The officers are as follows: C. Fender, President; Wm. G. H. Finch, Secretary; A. Geickiecen, Treasurer.

All persons wishing to join are requested to communicate with the secretary, Mr. Wm. G. H. Finch, at 1714 Jackson Street, Cincinnati, O.

Something About Batteries

By H. W. H. Stillwell.

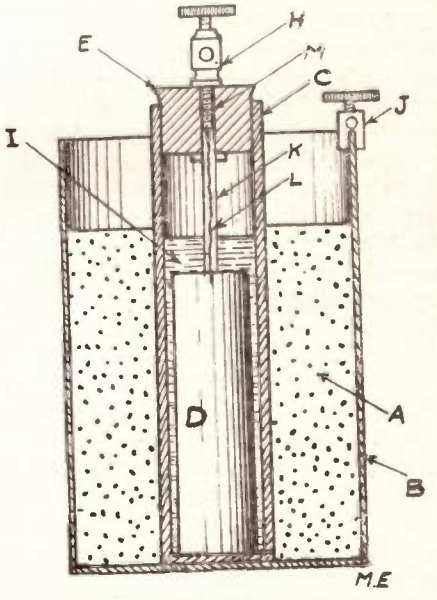
So many batteries have been described from time to time in the many magazines, that it seems almost impossible to offer anything in this line that will be interesting. There are many experimenters these days who have large ambitions but an extremely



-FIG. 1-

small pocketbook and anything in the line of apparatus or instruments that will give good and efficient service and at the same time not be of too expensive a character, will be more than welcomed. The battery shown in Fig. 1 is a good little cell and one which is often called "The Tomato Can Battery," but no matter what it is called, if it will give service, and good faithful service, that is all that any battery can do even if it had elements of gold and silver.

A strong tin can may be used for the jar of the battery, such as an old tomato can which is not rusted and well soldered at the joints. If there are to be a number of cells in the set, it is best to gather cans of one size, as the appearance of the completed set will be greatly improved. Porous cups will be required, and if the expense of purchasing the ordinary white porcelain variety which cost but a few cents apiece is not too much, they may be obtained from any dealer in experimental materials. There are earthenware pots sometimes to be found about a pottery, which are not glazed, these will be just the thing for our purpose if they are not too large for the jars. It is important that the porous cups be dipped in something to stop the creeping of the salts, the cups should be dipped about one-third their length in a dish containing melted paraffine and the dipping should be done so that the paraffine is on the upper end or that which is to remain out of the solution. The space between the porous cell and the outer edge of the battery is to be filled about three-quarters or seven-eighths with iron turnings, it is possible to secure these turnings from any machine shop or if they cannot be had conveniently, small pieces of iron, iron wire, nails, sheet iron, etc., which are cut very small, or the efficiency of the finished battery will not be as



-FIG 2-

great. Care must be taken that no pieces of brass, copper, or any galvanized ware be mixed with the iron as this will injure the battery or ruin it altogether.

The inner porous jar is to be filled with the chemical, which is a solution of caustic potash or caustic soda. The former is preferable. The solution should be prepared and kept as far as possible in an earthenware receptacle, as the active properties will destroy cork, zinc and animal tissue, therefore under no circumstances must it come in contact with the skin, as painful wounds will result and one experience of this sort will be a lasting remembrance. It is this destructive tendency, however, which produces the desired result when acting upon the zinc plate or rod which should be secured and placed in the solution as shown in the drawing. The action of the chemical upon the zinc is the absorbing of the oxygen from the alkali and the liberating of hydrogen, thus forming an oxide of zinc. A thin tang or plate should be made to extend upward and out of the solution, this will not be necessary if the ordinary zinc battery rods are used, as they are conveniently provided with a binding post at their upper end. A cork or tight fitting plug to be fitted in at the upper end of the porous jar should be made, this is very important, as the action of the air upon the solution will injure same; the zinc rod should extend through this cork as shown at "D" Fig. 1, and should be surrounded with a little melted paraffine to prevent the creeping action already mentioned. The binding post "J" may be constructed by the workman himself, or purchased from any supply house and soldered in place as shown.

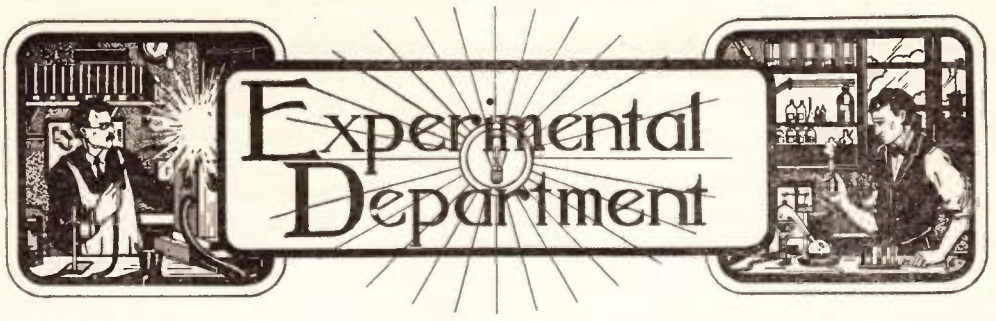
The second sketch differs from the first in but one thing and that is the arrangement of the zinc plate instead of a rod. The destructive action of the solution causes the zinc rod to eat away at the surface and this is often the cause of much annoyance and the resulting trouble of opening the porous jars to renew the zincs. This has been overcome to a large extent by using a zinc plate as shown at "D" Fig. 2, which should be completely covered by the chemical as shown. A wire "L" should be well soldered into the upper end of the plate and extend up through the solution and through the rubber tube "K" and be attached by any suitable means to the binding post "H" at the point marked "M"; after these connections are made, they should be well coated with melted paraffine. By constructing the zincs as shown and covering them with the solution, the metal will be found to give better service and last considerably longer. Brass wire or copper should be used in soldering to the zinc plate and the rubber tubing slipped down along the wire until it touches the zinc plate, the tubing is then filled around the wire with melted sulphur or paraffine which if properly done, the action upon the metal will be found to be only in proportion to the work performed by the battery. The zinc should be well amalgamated with mercury, and the rubber tubing extend well above the solution. As stated before, caustic potash or soda may be used in this cell, but caustic potash is much preferable, as the soda is liable to creep up the various parts of the cell and cause annoyance and a very dirty cell.

If these batteries are to be used permanently, it is advisable to have the outer jar of cast iron or heavy porcelain, well glazed, as the tin cans already described, will not be permanent, and were only described to reduce the first cost and for temporary experiments. Tin will give excellent service, but lapped and soldered joints are not to be depended upon for any lengthy period of use. These cells if desired for long and continuous use should contain porous cells of not less than 3 inches in diameter, by 6 inches in height and the charge of potash about six ounces to the cell.

A much stronger current may be obtained from the cells, if about one ounce of permanganate of potash be mixed with the iron borings and then filling in with the caustic potash solution. If the permanganate is not added, however, no caustic potash should be added to the borings, as enough will be found to filter through the porous jar to give the cells proper action.

In conclusion, it would be well to again caution the experimenter in the handling of the caustic potash or soda and to warn them of the destructive

(Continued on page 712)



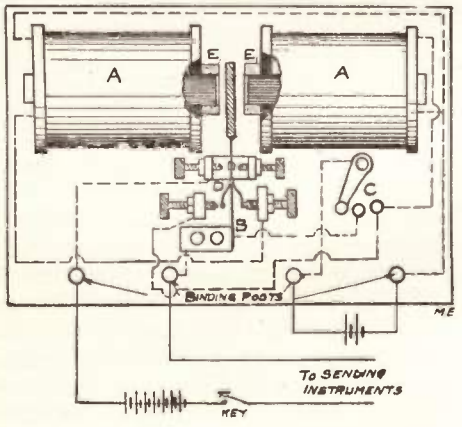
This department has been started with the idea to encourage the experimenter to bring out new ideas. Every reader is welcome to contribute to this department, and new ideas will be welcomed by the Editors. WHEN SENDING IN CONTRIBUTIONS IT IS NECESSARY THAT ONLY ONE SIDE OF THE SHEET IS USED. SKETCH MUST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

FIRST PRIZE TWO DOLLARS.

A HIGH SPEED INTERRUPTER.

In the accompanying drawing is shown an interrupter which has been used with very good results.

The interrupter does not have to be made in the dimensions but can be



made to suit the needs of the experimenter.

A-A are two magnets wound with No. 24 wire.

B is the armature from a bell with the tapper broken off, the small piece of bronze attached to the armature being lengthened with another piece of bronze. Platinum is preferable for the contacts but silver can be used. The small screws which make the contacts are taken from electric bells.

The switch C is placed on the base in the position shown. The brass tacks are placed about one-eighth inch apart. The 4 binding posts are placed on the base as shown. By looking at the figure closely one can easily understand it.

E-E are small rings of rubber to deaden the sound and to give the hammer an elastic effect.

Connect as shown; then adjust the screws very carefully.

To operate put the switch handle on the first contact and then quickly put it on the second, this starts the interrupter to buzz at a very high speed.

This kind of interrupter is much faster than the other interrupters because the rubber rings at E-E give the hammer a rebounding effect, and this together with the two magnets gives it a very high speed.

Contributed by "C. P."

SECOND PRIZE ONE DOLLAR.

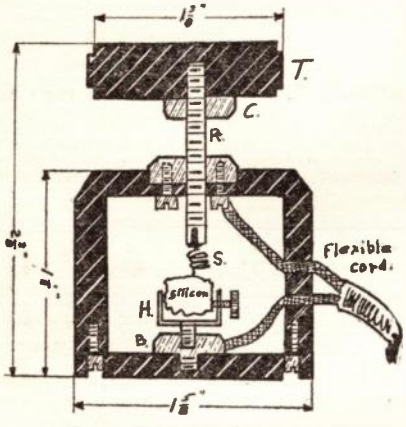
ENCLOSED COMBINATION DETECTOR.

The detector described in this article has been tried out on long distance receiving and holds its adjustment admirably. All parts can be made on a small lathe with little trouble.

Fig. 1, is a sectional view of the detector. The hard rubber case is turned from a piece of hard rubber 1¾ inches in diameter. The inside diameter is 1⅛ inches. The top edge is beveled so it will not have such a square appearance, the bevel is about 45 degrees. The draw-

ing shows a sectional view of the detector and is approximately full-size, so all the dimensions are not given as you can vary the dimensions to suit yourself.

The thumb screw and the case are turned from hard rubber. You will find the hardest part in turning out the inside



Cross Section of Detector.

of the case; the walls of which should be left at least one-quarter inch in thickness, so there will be room for the small screws that hold the bottom cover on. The cover should be fitted to the case after it has been turned out to the proper size. Rod (R) is threaded with 10-24 die, as well as the bottom part of the crystal holder. Check-nut (C) is screwed on to the rod to help out the appearance and also brace it on tighter to the thumb-nut.

Great care should be taken in threading any of the rubber parts as the tap

Finished Detector.

is apt to break the threads if screwed in too fast. On the end of the rod is soldered a comparatively fine steel spring wire that fits in a small hole bored in the rod. Holder (H) is made so it can hold any mineral by the use of the screw which clamps it in place.

Two holes are bored in the side of the case so as to let two leads of a flexible cord pass through, which are soldered, one to the small screw which holds the rod in place, and the other to the bottom of the crystal holder. The finished rubber case can be then buffed up and made to look very attractive.

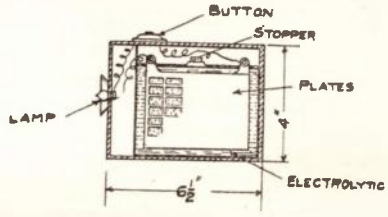
The photograph gives a much better idea of the appearance which this detector gives when it is finished. It is capable of very fine adjustment and can be used for any crystal. The length of the cord is made to suit the needs of the user, being in this case one foot long.

Contributed by

STANLEY E. HYDE.

STORAGE BATTERY FLASH LIGHT.

Make a small case of hard rubber, the dimensions of which should be 4 inches high by 6½ inches long by 1¼ inches wide. Make all the seams tight and when finished coat the inside with paraffine wax. Now 1½ inches from one end place a partition as shown, this forming the container for the



storage battery, and should measure 3½ inches by 5 inches. Now make the plates by first cutting two sheets of three thirty-seconds inch lead, 3¼ by 4 inches, leaving lugs as shown in the drawing. Countersink holes in the plates and fill these holes in one of the plates with stiff paste made of red lead and dilute sulphuric acid (1 part of acid with 2 parts of water). Let the plate dry for about 15 hours in a warm room. It is then placed in a strong solution of chloride of lime. When the action is complete wash the plate in clear water.

The negative plate is filled in with precipitated lead. Procure an ebonite separator ¼ inch thick to hold the plates apart. Now around the entire plates place a rubber band.

The electrolyte is now filled in, and

is composed of four parts of water to one of sulphuric acid. The water and acid must be chemically pure. The plates are then placed in the cell, with the lugs extending up through the top. A piece of hard rubber is then placed across the top of the cell and melted paraffin poured around the top, all as shown in the illustration. Fasten wires to the lugs, which should have small binding posts on same, and connect to the push button and lamp. The top should slide forwards and backwards, the cover being divided into two parts, one of which holds the push button.

The lamp is a 2 volt tungsten or tantalum filament. If desired, the lugs of the cell may be brought out to binding posts where they can be easily reached for charging. Two Bunsen cells may be used for charging.

Contributed by

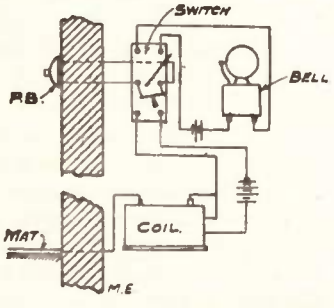
ALLEN A. GINN.

A CHARGED DOOR BELL.

In most places there are many boys who are only too fond of ringing door bells and running away. The writer has devised a scheme by which this can very easily be prevented and at the same time a great deal of pleasure can be had.

All that is required is a double pole double throw switch, a battery and a spark coil.

You will note by the diagram that the wires from the push-button are connected to the center poles of the switch, while the door bell is connected to one side and the shocking apparatus to the other. When the switch is up the bell will ring as usual, but when down the push-button



will be in series with the primary of the spark coil and the battery .One terminal of the secondary is connected to the push-button while the other runs under the door mat which is slightly moistened with water.

Now when a boy comes up to ring your bell throw the switch down and he'll do a dance that's as good as a vaudeville show. The strength of the shock can be regulated by adjusting the sparking distance.

Contributed by

CARL RAQUE.

PLAYING CHECKERS BY WIRE-WIRELESS.

To play checkers by wireless, or in any way where the two players are separated by distance, it is necessary

A		B		C		D	
	E		F		G		H
I		J		K		L	
	AA		BB		CC		DD
EE		FF		GG		HH	
	M		N		O		P
Q		R		S		T	
	U		V		W		X

to mark your checkerboard like diagram. If the other player moves first he lets you know his move, and you move for him at your station. Then you move and announce to him, and he moves for you and then for himself. One player may be called Y and the other Z, or the regular calls may be used.

Contributed by

J. C. S. TOMPKINS.

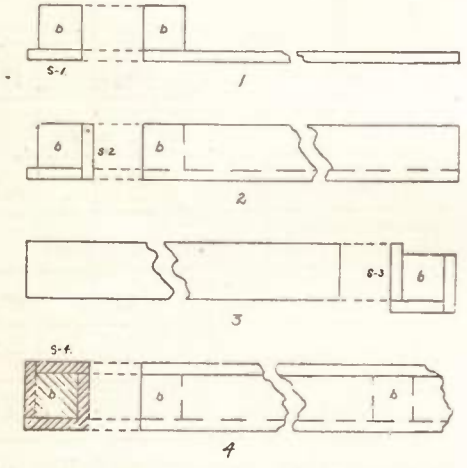
A HOLLOW AERIAL SPREADER.

There are a number of unique features about this type of aerial spreader, the main ones being strength, rigidity and light weight; a sixteen foot spreader weighing only four (4) pounds.

First procure from your lumber dealer 8 strips of white pine or spruce pine or other light wood 1⅜ inches wide, one-quarter inch thick by 16 feet long. 34 blocks 1⅛ inches by 1 inch square and one-quarter pound of three-quarter inch brad nails (wire).

And from your hardware dealer 8 eye bolts with 3-16 inch shank.

Now for the construction: First lay one of the strips out and nail one of the blocks on one end as in Fig. 1, so that one side is flush with the edge of the strip and the edge of the strip overlaps (S-1 on drawing). Then nail another strip on the side of the block and edge of the strip as in illustration 2. S-2 shows the strip in place. Next place a strip on the opposite side of the block so as to build this side out with the projecting edge, (see Fig. 1, S-3). Measuring one foot from the first block, nail another block to the three sides in the same manner as above. Place nails every few inches



to strengthen and make tight joints where the strips meet. Repeat the above the length of the spreader, using plenty of nails.

When this has been completed you will have a three-sided box containing seventeen blocks spaced one foot apart. When this has been accomplished the fourth strip (S-4) is put in place on the open side and securely nailed to each block and strips forming a section as in Fig. 4. Then the spreader is turned over and nailed so as to catch the last or third strip on its edge.

To attach the eye bolts to the finished spreader, drill holes in the spreader two inches from each end and then measure three feet and eleven inches from these holes, and drill another hole. You now have four 3-16 inch holes into which the bolts fit and are screwed up tight.

When the spreader has been finished it should be given a good coat of asphaltum varnish, which will render it water-proof and prevent the metal from rust. You now have a spreader ready for the bridle and aerial wires, which is very strong and light.

Not only spreaders but small poles, as well, can be made in this way.

Contributed by

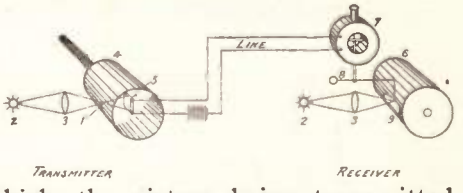
FRED B. POLHAN.

TELEPHOTOGRAPHY.

The accompanying diagram illustrates a new system for the transmission of photographs by wire. It is simple and practical, there being nothing about it that requires extreme accuracy of adjustment.

The transmitter consists of a glass cylinder 4, on which is wound a photographic film bearing the picture to be sent. This cylinder is arranged to be revolved helically the same as a phonograph record. Inside the cylinder is a selenium cell 5, which is acted upon by a strong light 2, focused on the film at a point 1, by the lens 3.

It is obvious that when opaque or transparent portions of the film pass the point of focus, there will be a corresponding change in the amount of light reaching the selenium cell and consequently a variation in its resistance. This cell being connected to the line this change in resistance is indicated at the receiving station by the galvanometer 7. The receiver also consists of a drum 6, arranged to be revolved in the same manner and in synchronism with the cylinder 4. The drum 6, carries an unexposed film on



which, the picture being transmitted, is recorded. Another light 2, and lens 3, are used to expose the film. Between the beam of light and the film is a screen 9, which is supported by the arm 8, which is carried by the moving element of the galvanometer 7. This screen is the novel part of the apparatus. It is made from a strip of

celluloid or mica and is rendered opaque at one end, gradually shaded off to its original transparency at the other.

Now the amount of light passing through this screen and acting on the film will be governed by the position of the screen, which in turn is dependent on the angle of deflection of the galvanometer. We already found this deflection would be in direct relation to the amount of resistance in the line and that the resistance would be proportionate to the density of any certain spot in the picture.

Therefore we are able to transfer the entire picture, spot at a time, in its true lights and shadows.

(This reads all right, but how about the synchronous moving of the two drums?—Ed.)

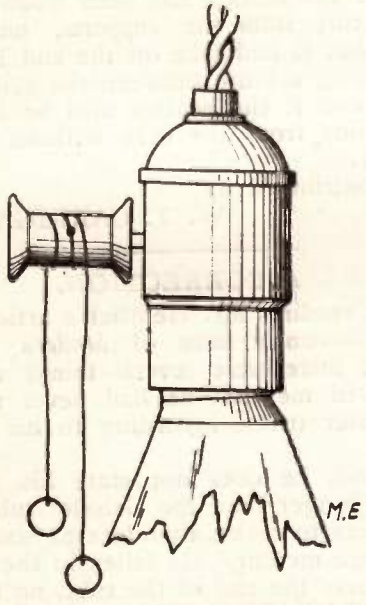
Contributed by

E. DICKEY.

A SIMPLE PULL CHAIN SOCKET.

You may have had considerable trouble in reaching some of your electric lights. By this attachment difficulty is overcome.

Crack off the hard rubber thumb piece on the socket and in its place put



a small spool. Around this wind three or four turns of cord and fasten the middle one with a small tack. Allow the two ends to extend down to the desired height. To the end of these attach two knobs, buttons or any convenient article.

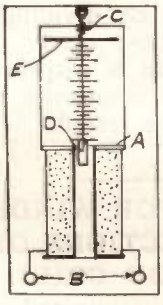
By looking at the figure the working will be easily understood.

Contributed by

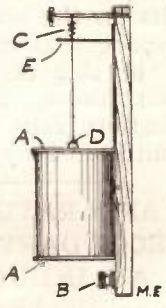
MAX K. MILLER.

EASILY MADE BATTERY VOLTMETER.

Secure a piece of brass tube 3 inches long that has about ¼ inch inside diameter. Put ends, A, 1¼ inches square and cut from heavy cardboard on this tube. Make a hole in the center of each cardboard just large enough



-FIG. 1-



-FIG. 2-

to allow the brass tube to fit tight. Put on two or three layers of stout paper around the brass tube and between the cardboard ends, wind evenly about 2 ounces of No. 26 cotton-covered magnet wire. Leave about 2 inches of wire on each end extending from the coil. Use a board ½ inch thick, 3 inches wide and 6 inches long for the base and fasten the coil to it as shown in Fig. 1. Bore holes for binding post, B, one on each side of the board, and connect the two wires from the coil to them. At the other end of the board and in the center drive a wire nail and attach a small spring, C, to it. The spring should be about 1 inch long. Take a small piece of soft iron, D, ½ inch long and just large enough to slip freely through the brass tube and solder a piece of copper wire to it; the other end of the copper wire being hooked to the spring, C. The copper wire must be just long enough to allow the piece of iron, D, to hang part way in the end of the coil and still hold the spring in place. A circular piece of cardboard, E, is slipped over the spring to where the spring joins the wire. This cardboard is to serve as the pointer. A piece of paper 1½ inches wide and

2½ inches long is glued to the board so that it will be directly under the cardboard pointer and fit snugly up against the top of the coil.

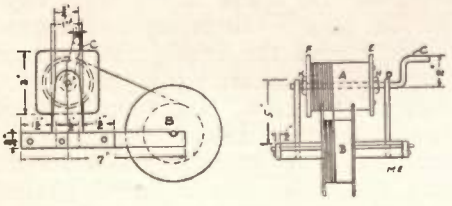
The paper can be calibrated by connecting one cell of battery to the binding posts. The iron plunger, D, is drawn into the tube and consequently the pointer is drawn nearer to the coil. Make a mark directly under the place where the pointer comes to rest.

At the place mark the number of volts the battery reads when connected with a voltmeter. Do the same with two or three cells and mark down the results on the scale. By dividing off the space between these marks, you may be able to obtain a surprisingly correct reading when connected with the battery cells to be tested.

Contributed by "C. P."

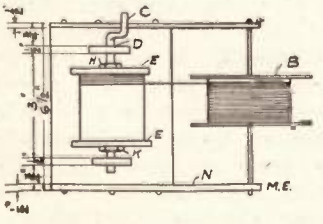
AN APPARATUS FOR WINDING SECONDARY SECTIONS OF AN INDUCTION COIL.

Those who have experimented with induction coils undoubtedly know



that a whole secondary can be ruined by a short circuit, and it is therefore desirable that a number of sections should be used in place of a continuous winding.

In the drawing is illustrated an apparatus for winding secondary sec-



tions so that they can be put on or taken from the primary at will. The construction of the base and uprights is made clear by the drawing, but the core and crank will need some explanation. The axle C is made of iron and can be obtained bent in the desired form, from any blacksmith, for a few cents. This rod should be threaded as shown and nuts fitted to it.

The core A is turned from wood, the diameter depending on the size of the primary over which the sections are to be placed. This core is tapered about ½ inch to every foot to allow the sections to be taken from it. Make it as smooth as possible with sand paper and then shellac or varnish to give a glossy surface. Cut the ends F and E from a thin piece of wood and drill ⅜ inch holes through their centers. Drill a ⅜ inch hole through the center of A and fasten the end E, to it with small screws. Screw the nut H on the axle. Slide A on the axle and put the end F in place. Now screw the nut K on the axle and tighten it against F, thus holding F tightly to A. Place the axle between the uprights by putting the end K through the hole and dropping the end H into the slot D. Wrap waxed paper around the core before winding the wire and the section will be found to slide from the core without difficulty.

B is a spool of wire placed on a round stick held by the supports M and N. After the section has been wound lift the core from the supports, unscrew the nut K and take off the end F. By wedging a knife between the coil and the end E the section will be found to slide from the core without difficulty.

Contributed by
W. T. CARRIGAN.

A CORRECTION.

In reading Mr. Heinrich's article in the November issue of *Modern Electrics,* there were several things which showed me that he had never made Geissler tubes, according to his process.

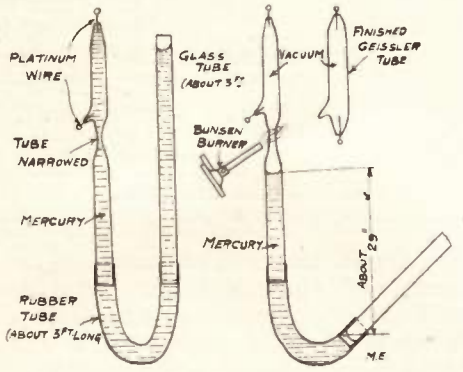
First, he does not state his glass tube longer than the Geissler tube he expects to make, therefore as soon as enough mercury has fallen in the dish to cover the end of the tube, no more would fall down. The reason for this is clearly shown in a barometer, where the mercury rarely descends more than 28 inches above the level of the mercury in the dish.

Second, I think he must have had a hard time sealing up his tube with-

out burning the rubber tubing and therefore letting in the air.

Third, I do not think that Mr. Heinrich could, with his tube, get the beautiful effects manufactured tubes give, as he does not inject any of the gases usually put in Geissler tubes.

Fourth, Mr. Heinrich uses copper wire for sealing in the tubes. If fine



wire is used, as he advises, it will melt before he can soften his glass, and it is known that only platinum can make a good fit for sealing in glass; the outside air would leak in through the joint between the copper wire and the glass.

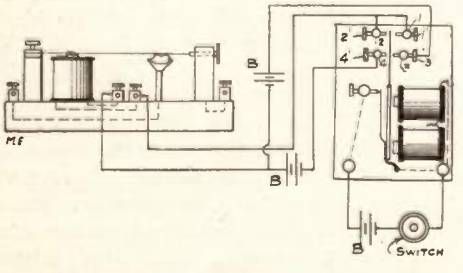
If an experimenter wishes to make Geissler tubes himself, I believe the apparatus shown in the sketch is about the best, although Geissler tubes made in this way will be far inferior to the quality of manufactured tubes.

Contributed by

P. MERTZ.

A POLE CHANGING DEVICE.

Here is a pole changing device which I have designed to be used with a silicon ticker, such as described in



the May and November issues of *Modern Electrics*. The materials required are:

One iron box bell with gong removed; four small binding posts 1, 2, 3 and 4; four screws to fit in unthreaded hole of binding posts 1′, 2′, 3′ and 4′; six dry cells, one base and two screws to hold bell on; one, one point switch.

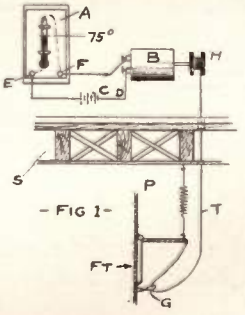
The parts should be assembled and wired as shown in the drawing.

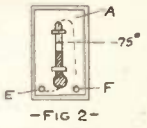
Contributed by

C. J. SEDLAK.

ELECTRIC REGULATOR FOR FURNACE.

The following is a simple plan to keep the temperature of a furnace the same at all times. It is worked directly by a thermometer hung in the room where the same heat is desired mostly. The thermometer A, as shown in Fig. 2, has a wire molded into the glass making connection with the mercury at zero end, while another wire passes through the opposite end making contact at 75 degrees (or the desired degree the room is to be heated





to). These wires should be molded into the glass at the same time the ends of the tube are closed. Two binding posts, E and F, are provided for connections, on the thermometer base. This is connected with two or three batteries and a strong battery motor B, as shown in Fig. 1. The motor is enclosed in a box—two binding posts, C and D, and an extra large pulley wheel, H, projecting. A strong length of twine, T, secured to the pulley wheel, passes through the floor, S, connecting to the draft door, Fr, on the furnace. This twine first passes through a pulley at G and then to the draft door which is held open by a spring P suspended from the ceiling—see Fig. 1.

The working is simple.

When the temperature of the room reaches 75 degrees the circuit is closed between E and F, thus starting the motor. The motor winds up on the twine, thereby closing the draft door, cutting

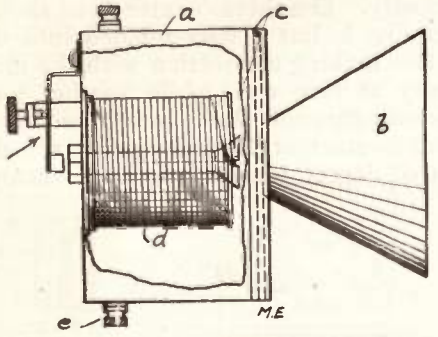
out all draft. It is held down by the current holding the armature steady, but when the temperature becomes lower the circuit is broken, releasing the door which is pulled open slowly by the contracting of the spring.

Contributed by
JOHN B. BRADY.

A SIMPLE ELECTRIC HORN.

In the accompanying sketch will be noted the simplest type of electric whistle constructed from readily obtainable materials.

A is a silver polish wooden box.
B is a tin or paper horn.
C is a thin disk of iron or tin.



D is a coil of No. 18 D.C.C. wire wound on a 3-16 inch bolt.

E are binding posts.

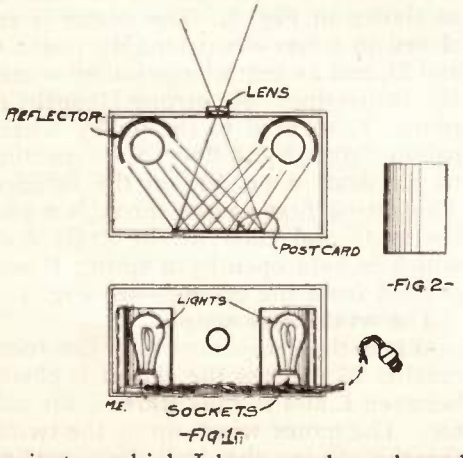
F is a medical induction coil vibrator.

Connections are made from the coil to the vibrator and binding posts.

Contributed by
JOSEPH H. VOEGELE.

A POST CARD PROJECTOR.

Here is a description of a post card projector which I have made and used with great success. Procure or make a box about 15 inches long and high enough to accommodate a 32 c.p. lamp and socket. The depth of the box will depend upon the lens used and will have to be determined by experiment. Buy two sockets and screw on the bottom of the box as shown in the diagram. Procure a round coffee can and cut it as shown in Fig. 2, and place as shown in Fig. 1. Procure a double convex lens, the one from a magic lantern will serve admirably. Make a back for the box and hinge it on.



-FIG 2-

-FIG 1-

Contributed by
EARLE KNEALE.

HOW TO MAKE AN ARC LAMP.

Make the frame of bar metal, ⅛ inch thick, and ¾ inch wide. Bend and weld it into the shape and size as shown in Fig. 1. A cross-bar L is made of the same material, and should be fitted and riveted to the offset in the frame. Holes are drilled and fitted with brass bushings H and J, these are the bearings in which a brass rod B slides, this rod should be ¼ inch in diameter. A brass curtain rod can be used, and

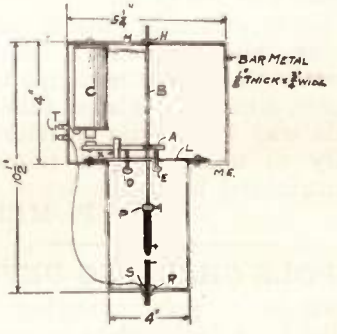


Fig. 1.

on one end is soldered a socket P, which is used to hold one of the electrodes. The armature A is made of brass ⅛ in. thick ½ in wide and 2 in. long. Through the armature is drilled a hole which is just a little larger than B, a soft piece of iron F is fastened to the opposite end, and it should be directly under the core of the magnet C. The armature may be kept from swinging around by means of X, which is a U-shaped piece of brass, which is fastened to L. The magnet C is made by wrapping No. 14 single cotton covered magnet wire around a soft iron core, when finished it should be about

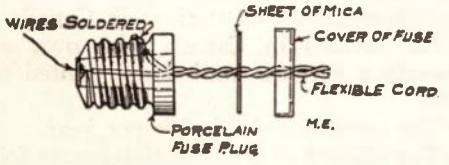
2½ inches long, and is fastened to the frame as shown in Fig. 1. The armature A, is adjusted by the two screws D and E. In the bottom of the frame is drilled another hole in which is fitted a hard rubber bushing R. In R is placed a brass ferrule which holds the lower carbon and also makes contact with it. One terminal of the magnet is connected to one of the binding posts T, and the other terminal is soldered to the frame of the lamp at the point M. From the other binding post a wire is run directly to the lower carbon. The top carbon should be connected to the + side of the circuit and the lower carbon to the — side. The binding posts should be well insulated from the frame of the lamp, and if the lamp is operated on a 110 volt circuit a resistance of some kind must be connected in series with it, preferably a water rheostat.

Contributed by

H. W. R.

"ECONOMICAL HOME-MADE ADAPTER."

Take an ordinary burnt-out fuse, remove the cover, taking care not to damage the sheet mica round, nor the cover itself. The hole large enough for the cord to pass through is made with the point of a pen-knife. Before soldering, the leads and contacts are to be cleansed with dilute sulphuric



acid. The manner of soldering is left to the maker. But a practical way, is to put a little "nokorode" on the contacts and to solder with an ordinary blower, in the usual manner. Then if desired, the fuse may be filled with hot paraffine or rosin, with plaster Paris, etc.

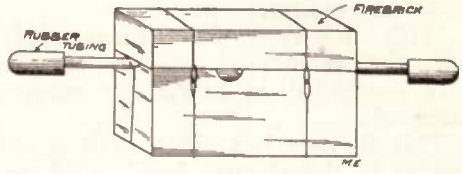
Contributed by

AMEDÉE A. BRASSARD.

ELECTRIC FURNACE FOR LABORATORY USE.

Following is a description of an inexpensive but practical electric furnace.

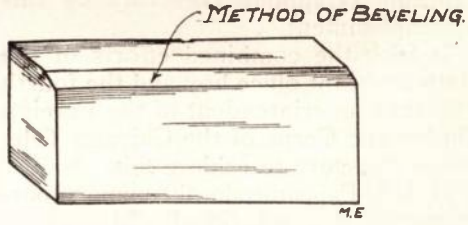
The materials necessary are three fire bricks (such as used in building fireproof structures), two carbon rods (such as used in ordinary arc lamps), two lengths of rubber tubing, each 2



-FIG 1-

inches long, which are to be put on the end of the carbon rods for insulation while adjusting them, and two pieces of No. 8 gauge steel wire about 25 inches long to be used in holding the bricks together.

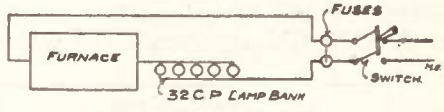
Bevel down one edge on each brick as in Fig. 2, so that when the three



-FIG. 2-

bricks are placed in position the carbon rods to be inserted, will slide easily back and forth.

On one brick used for the side of the furnace, chisel a groove in the middle 2 inches in diameter so that it forms a semi-circle when placed against the upper brick (see Fig. 1). This hole will be used for making observations of the reactions that take place and for the insertion and extraction of materials to be melted which are placed in



-FIG 3-

this groove between the ends of the carbon rods.

This simple furnace, when properly assembled and connected on 110 volt lighting current (as in Fig. 3), will develope such intense heat that some of

the following very refractory substances can be made:—

Calcium carbide (used in making acetylene gas by adding water).

Carborundum, one of the hardest substances—made by fusing silica (coarse sand) and carbon.

With such type of a furnace, Moisson, the celebrated French chemist first succeeded in artificially making diamonds.

This furnace has given satisfactory results in the electro-chemical laboratory of the writer and his brother.

Contributed by
SAMUEL C. MORRELL.

A NEW SUBSCRIBER.

At last Mr. Jas. J. Pappatheodorokoummountourgeotopoulos is in the directory of the Chicago Independent Telephone People. We congratulate the Chicago Telephone Directory on this accomplishment.

It took the combined efforts of the sixth assistant office boy and the fourth assistant superintendent of the Foreign Diplomatic Corps of the Chicago Telephone Directory to achieve this.

If Mr. Pappatheodorokoummountourgeotopoulos who is Greek, did not have enough telephone business in order to warrant using two automatic 'phones, the Chicago Telephone Directory would probably have gone without this illustrious subscriber. As it stands now, they held a war council and decided, that inasmuch as the new subscriber has two telephones, his name could be tied in a knot, and after a great ceremony, Mr. Pappatheodorokoummountourgeotopoulos now occupies two lines in the directory. Everything is possible in Chicago.

If the new subscriber had been in New York the New York Telephone Directory would have been less courteous than the Chicago people and would in all probability have abbreviated his name and business thus: J. J. Pap's; C'f'y' & R's't!

Mr. Jas. J. Pappatheodorokoummountourgeotopoulos's business card is reproduced herewith showing that the name is not a fake.

A QUEER TELEPHONE LINE.

By R. D. Mock.

One of the most peculiar telephone lines in the world is that running to the Meteorological Observatory on Mount Rosa. It is neither overhead nor underground. The line reaches an elevation of 14,600 feet above the sea level, and owing to the storms and high winds which prevail at these altitudes it was found impossible to run it on poles.

Underground cable construction seemed impracticable also, as the cable would gradually sink into the ice to such a depth that it would be impossible to make the necessary repairs. The problem was finally solved by simply laying the wire across the glaciers, thus depending upon the insaluting properties of dry ice and snow.

CANADIAN WIRELESS CLUB.

At a recent meeting of the Winnipeg Wireless Association it was decided to change its name into the Canadian Central Wireless Club.

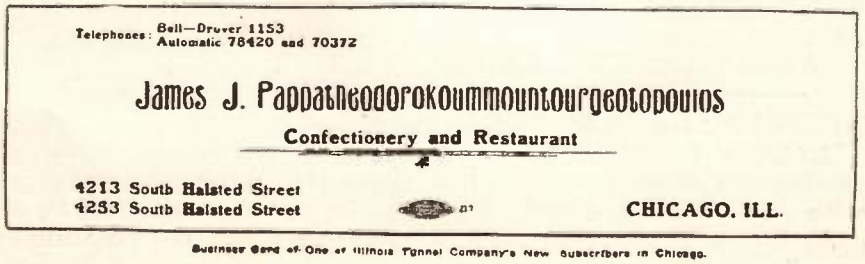
The purpose of this club is to advance the study of wireless transmission among the amateurs and bring together the unknown operators of stations in Canada.

All persons in Canada who own or operate a wireless station are invited to join.

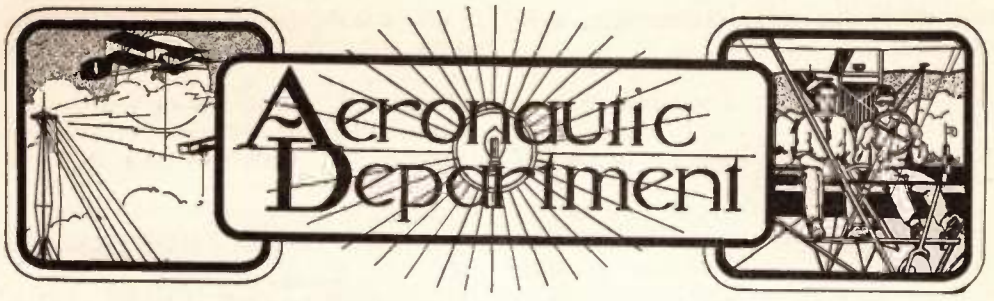
The admission fee is 50c per year.

The officers of the new club are as follows: president, Alexander Polson; vice-president, Stewart Scorer; secretary-treasurer, Benjamin Lazarus, P. O. Box No. 1115 Winnipeg Manitoba, Canada.

Any person wishing to join should communicate with the secretary.



Business Card of One of Illinois Tunnel Company's New Subscribers in Chicago.



The French Military Aeroplane Competition

OF the many wonderful events marking the progress of aviation in the elapsed year, the military aeroplane competitions held at Rheims, France, during the latter part of October, 1911, stand forth as the foremost in material benefit to the advancement of military aeronautics.

At the suggestion of General Roques, head of the aeronautical division of the

Fig. 1, Hanriot Monoplane.

army, a military competition was decided upon so that the relative merits of the various types of aeroplanes might be revealed, and the most suitable to be the basis of a large order from the military authorities to the respective manufacturers. A sum of $220,000 was offered in prizes, aside from the orders which would be awarded to the constructors of the winning machines. The machines admitted to the contests had to be built in France, but not necessarily by French citizens. The winning machine was to be purchased for $20,000 with an order for ten similar machines. The second machine was to win for its constructor an order for six machines at $8,000 each, while the third machine would be rewarded with an order to its constructor for four machines also at $8,000. For each kilometer in excess of the required 60 kilometers per hour, during the 300 kilometer flight required in the final tests, the constructor was to be paid a bonus of $100, this sum being added to the purchase price of each machine of that type. The machines were required to carry two passengers and one pilot, with sufficient petrol for a flight in excess of 300 kilometers, and a useful weight of 300 kilograms, which in war time would be utilized for carrying bombs or other offensive weapons. The machines were also required to land and start from ordinary plowed fields, and to be able to be rapidly dismantled so as to be hauled over the roads. The other conditions were of minor importance, and sub-divisions of the foregoing quoted ones.

The accompanying illustrations represent a few of the aeroplanes entered, and a brief description of each will undoubtedly be interesting to the reader.

Fig. 1 illustrates the Hanriot monoplane which was equipped with a 100 h.p. Clerget, four cylinder motor. Three places were arranged for passengers while the lateral stability was obtained by means of the warping of the wings. The motor was water-cooled, while the auxiliary tank was carried under the main body. The steering was done by means of foot pedals, and a useful weight

Fig. 2, Astra Biplane.

of 400 kilograms could be carried in excess of the passengers and fuel. The landing chassis consisted of heavy skids and extra heavy built tired wheels. This

machine did not prove a successful competitor.

Fig. 2 illustrates the smaller type of Astra biplane, there having been entered two others in the competitions which were of heavier build. Here the passengers are arranged tandem fashion, while the engine and tractor screw are located in front. The planes were about 38 feet in width and the length about 35 feet. A 6-cylinder, 80 h.p. Chenu motor, turning the screw at 805 R.P.M. was used. The useful weight which could be carried was exactly the same as the Hanriot monoplane, namely, 400 kilograms. The chassis consisted of one single skid with two small and heavy wheels mounted on each side on spring devices. The machine weighed 862 kilograms empty. None of the three Astra biplanes was successful, though they were among the most unique.

Fig. 3 represents the Paulhan monoplane, the constructor of which will be

Fig. 3, Paulhan Monoplane.

remembered as the little French pilot of the Farman biplane who visited the United States during the latter part of 1909 and the beginning of 1910, who also won the London to Manchester flight in England. Paulhan was represented by three machines, all of which were exceedingly unique. This Paulhan monoplane which is illustrated, was equipped with a 50 h.p. Gnome rotary engine, and a propeller in the rear driven by a long shaft from the engine which is situated in front of the pilot in the extended portion. The machine was about 26 feet long and 28 feet in width, weighing but 350 kilograms while empty. The landing chassis consisted of two rubber tired wheels with no skids. As might be expected, the machine proved entirely too lightly built to stand the strain of the tests, and consequently did not succeed in gaining a place.

Fig. 4 illustrates the Sommer biplane which was 48 feet long by almost 65 feet in width, and with the exception of the Farman biplanes, was the largest of the biplanes at the competitions. This biplane carried without difficulty

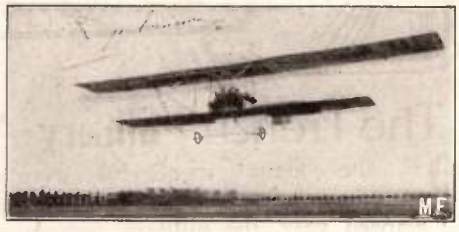


Fig. 4, Sommer Biplane.

five passengers besides the pilot, and is the exact type in which Sommer has carried over fourteen passengers in his past record breaking flight. The motor is a 75 h.p. Gnome, connected to a propeller behind the passengers. The machines of Henri and Maurice Farman were practically the same as the Sommer, the only exceptions being that in the Henri Farman the passengers and pilot were seated on a little extension frame-work situated to the front of the planes, while in the Maurice Farman, the passengers are seated within an enclosed body thus being protected from the wind. In both the Farman brothers' biplanes, the wings were arranged so that the upper wing was placed a few feet ahead of the lower wing, with slanting struts connecting both, this method being claimed as a great help in gaining greater speeds.

Fig. 5 is of the Paulhan Triplane which was piloted by Paulhan with fair success. It was about 40 feet in width and about 30 feet long, being driven by a 75 h.p. Renault motor connected to a 6 foot

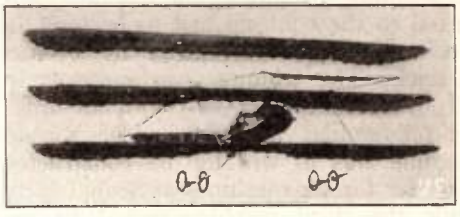


Fig. 5, Paulhan Triplane.

propeller. The entire triplane was constructed of steel tubing, representing the strongest construction. The landing chassis was of the Farman type, consisting of two long skids and four heavy

rubber tired wheels. The entire weight with two passengers and the pilot was 700 kilograms.

Fig. 6 illustrates the Breguet biplane which failed to reach the expectations of the constructors, though it has been a very successful machine in various other competitions. The three seats were arranged in tandem, one passenger facing the pilot and the steering wheel being arranged between them, so that the both might drive. It is claimed that steering with the pilot facing the rear of the machine is far easier than in the general way employed. The Breguet military biplane was equipped with a 140 h.p. Gnome motor of 14 cylinders, and weighed 1,100 kilograms when ready to leave the ground with the three men. The spread of the wings was almost 52 feet, and the length 29 feet. The propeller had three blades which were joined to the hub so as to spread out when the full speed was reached, and thus relieve the strain from the individual blades.

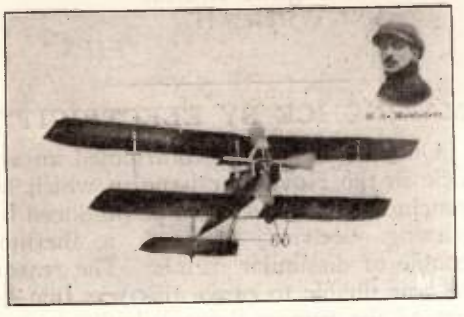


Fig. 6, Breguet Biplane.

The two first machines to meet all the requirements and win the first and second orders were respectively the Nieuport and the Deperdussin, the former being described in the October, 1911, issue of *Modern Electrics,* and the latter being a monoplane which we hope to describe in a succeeding number. The Bleriot firm had three machines which failed to meet with any success, though piloted by one of Europe's foremost aviators, Andre Beaumont. The Antoinette concern had the largest machine of all, which failed to even lift itself from the ground although under the skillful control of Latham, owing to the very small motor for such a huge weight. The results have probably awakened all the nations to the importance of aeroplanes in military operations, and we may look forward to other similar tests in the near future.

NEW AEROPLANE APPARATUS.

Among the numerous obstacles encountered in cross-country aeroplane flights, the keeping of a straight course is one of the greatest difficulties, even with a compass to guide the aviator.

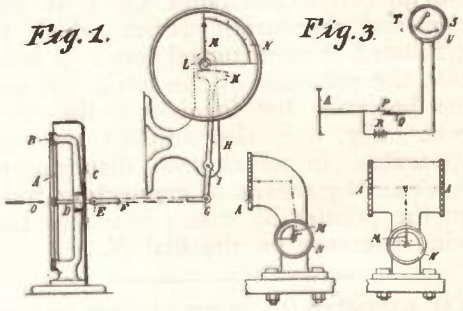


Fig. 4

This difficulty is greatly augmented at night and in fogs. Any small departure from the straight course means a great error in the direction at the end of a few minutes' flight. Inventors have been engaged in perfecting an instrument to enable the aviator to know whether he is traveling in a straight course, or whether the aeroplane is drifting to one side.

Messrs. Poulalion and Armage, of France, have invented three interesting types, each of which has proven satisfactory in use. Fig. 1 illustrates the most practical type, in which A is a thin diaphragm held in the frame B. D connects through E, F, G, I, H to K, which engages the gear wheel L moving the hand M over the indicator. Thus with the wind O, blowing

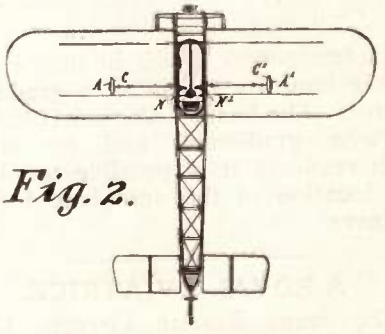


Fig. 2.

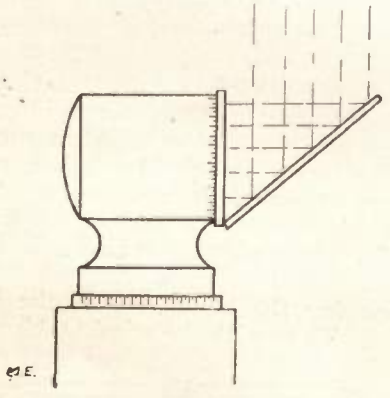
against the diaphragm A, the needle indicates the pressure of the air on the side of the aeroplane to which the apparatus is turned. Two of these instruments are used, one on each side

as shown in Fig. 2, where A and A^1 are the diaphragms and N, N^1 the instruments, connected by rods C and C^1.

Fig. 3 illustrates an instrument on the same principle but using electricity instead of connecting rods, which renders the apparatus more practical. A is the diaphragm while P is a contact moving on a resistance Q, T is the electrical measuring device which is graduated in aeronautical terms to indicate the pressure of the wind. R are the batteries for furnishing the current. Fig. 4 is the simplest type of apparatus, in which two diaphragms A, A act by means of connecting rods on the pointer M which indicates the wind pressure on the dial N.

AN AEROPLANE SEARCHLIGHT.

A clever attachment to an ordinary searchlight has been devised in France for the purpose of detecting and obtaining the location of aeroplanes at night. An inclined mirror is placed in front of the searchlight so as to reflect the rays of light skywards, and is held



by a frame-work which in turn is held to the lamp by means of a graduated mirror. The base of the searchlight is likewise graduated, and by taking both readings it is possible to obtain the location of the aeroplane for the gunners.

A ROYAL AVIATRICE.

The young Russian Princess, Chakhowskoi, who has obtained her pilot's license a few weeks past at St. Petersburg, is leaving for Tripoli to join the Italian Army. The princess proposes to carry a passenger in her aeroplane who can drop bombs over the enemy. She is alleged to have stated "Knowing that I will die in an aeroplane accident, I will accomplish a good feat before dying."

THE AVIATRICE.

In former years,
Through many fears,
She, satisfied,
The ground did ride.
But, look today
At her in play
Through sun or rain,
Driving her 'plane.

A. C. L.

THE ETHERATRICE.

In former years,
Through many fears,
She, satisfied
A plane did guide
But look ahead,
My hat I bet:
She'll glide tireless
Via Wireless!!

"FIPS."

MAKING ICE BY ELECTRICITY.

One of our friends contributed an article in the November issue in which he concluded that cold could be produced by passing electricity through a thermo-couple of dissimilar metals. The reason he was unable to prove this was that he passed the current through in the wrong direction.

If a plate of antimony and one of bismuth be laid touching each other and a current passed through from the bismuth to the antimony, the junction will be cooled enough to freeze a drop of water placed on it. This ice can then be melted by reversing the direction of the current so that it flows from the antimony to the bismuth, as this produces heat.

E. DICKEY.

(Continued from page 698)

properties of these chemicals. *Never, under any circumstances, allow it to come in contact with the skin.* The writer of this article had an experience of this sort, and the remembrance is indelibly stamped upon his memory.

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.

Here is the photograph of my wireless station. The majority of the instruments I have made myself, and consist of:

Receiving—loose-coupler, loading coil, three variable condensers, fixed condenser, potentiometer, two silicon detectors, Perikon detector, 3,000 ohm phones. With my present aerial I can easily receive

McCurcan Station.

Suva station (1900 miles). The aerial is 80 feet high. Sending—small set; One inch coil, helix, Leyden jars, and spark gap. Large set: One and a half kw. rotary converter run from 240 dc. to 50 cycles, 1 kw. oil cooled transformer, rotary spark gap, glass plate condensers in oil, and helix.

With the small set, using 12 volts, I have sent messages 64 miles to a ship at sea and I really think I could have done 20 per cent further had the operator on the ship been willing to stay out of bed a little longer. With the large set the furthest I have done is approximately 300 miles but up to the present I have not had a favorable opportunity to fully test it. CHAS. MacCURCAN,

Sidney, Australia.

HONORABLE MENTION.

At the left of the table can be seen the receiving set, which consists of a large double slide tuner, wound with bare copper wire, No. 20 and insulated with thread; fixed condenser, silicon detector and E. I. Co.'s 1,000 phones with headband.

The transmitting set is on the shelf, above the table, and is composed of a Morse key, a one and a half inch spark coil, zinc spark gap, adjustable condenser, (only one of the eight tubes being used when the picture was taken), helix, wound with eight turns of No. 8 aluminum wire 10 inches in diameter, and a double pole double throw switch.

Graf Station.

A dynamo and storage battery supplies the current for sending.

My aerial is a four wire aluminum compromise type, 60 feet long and 40 feet high. All the instruments are of

my own construction with the exception of the head phones.

I have been a reader of *Modern Electrics* for two years, and think it is, without a doubt, the best magazine of its kind published.

WILLIAM C. GRAF. New Jersey.

HONORABLE MENTION.

Herewith is a photograph and description of my wireless station.

The sending set is on the right and consists of the following, one inch spark coil, helix with spark gap, and glass plate condenser, on top, hot wire ammeter, (on top of helix also), two keys, one for spark coil and one for testing buzzer, one electrically operated switch to change from sending to receiving, which I made from an old sounder. Both switch and spark coil run on dry batteries.

For receiving, I use double slide tuning coil, loose-coupler, and loading coil, with two silicon and one perikon detectors which are seen at the left, one

Buckman Station.

four point switch for changing detectors, one two point switch (for changing loose-coupler and tuning coil), fixed and variable condensers, and a pair of 2,000 ohm receivers.

My aerial is 100 feet long, 60 feet high at one end and 35 feet at the other, with five strands of copper wire. I made everything myself except spark coil, keys, and receivers. I subscribe to the *Modern Electrics* and think there is none better.

F. EVERETT BUCKMAN, Mass.

HONORABLE MENTION.

Enclosed please find photograph of my wireless telegraph station, which I wish to enter in your wireless telegraph contest.

Beginning at the left of the picture is a dry battery, in front of which is a fixed condenser.

To the right of the condenser are the switches for controlling the receiving instruments.

To the right of the battery is a three-slide tuning coil which I constructed myself with the exception of the sliders and rods, which are of the Electro Importing Company's manufacture.

In front of the large tuner is a small loading coil which I also made.

Wilder Station.

Before the small coil are the detectors, one of which I made after directions found in *Modern Electrics.*

The phones are wound to 1,000 ohms each.

The aerial switch which is in back of the phones I made from the parts of a D. P. D. T. switch and a S. P. S. T. switch.

The sending apparatus which is at the right of the picture I made myself following the directions given in *Modern Electrics.*

It consists of a key, spark gap, variable sending condenser, and a small spark coil, the secondary of which I obtained from the Electro Importing Company.

By using an aerial fifty feet high I have heard Duluth, Minn., as well as vessels on the Lakes.

I owe a great deal of the success of my outfit to *Modern Electrics,* to which I have been a subscriber for some time.

WILLARD S. WILDER, Wisconsin.

HONORABLE MENTION.

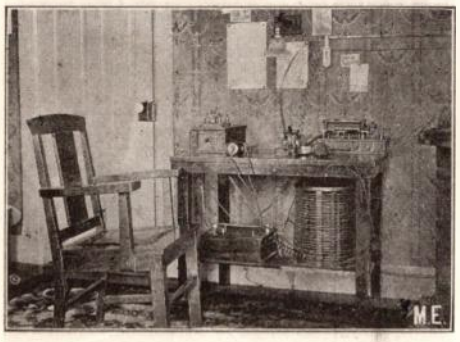
The accompanying illustration shows results obtained in an endeavor to construct a practical and compact wireless set.

With the exception of telephone, the

set is of my own design and make. Receiving set is of cabinet form, consisting of loose-coupler, two silicon detectors with switch, also switch for short circuiting same. Loading coil with variable and fixed condensers which are inside of cabinet.

Sending set consists of one-quarter kw. closed core transformer with series spark gap mounted on top, variable plate condenser, copper wire helix consisting of 80 feet of No. 6 wire.

Key with antenna switch is of unique design and both are mounted on marble base. Am using loop aerial, consisting of six strands of copper wire 150 feet long supported by two 80 foot poles.



Simmons Station.

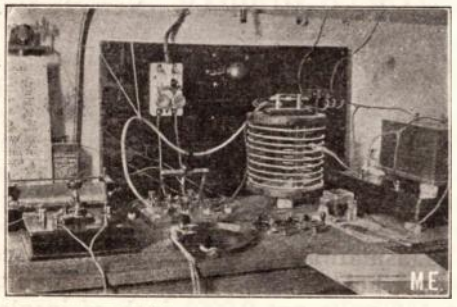
Instruments and table are all of golden oak highly polished. With this set I am having excellent results, hearing Cape Cod nearly every night. I communicate regularly with a friend in another village twenty miles distant.

Although not a subscriber I am a constant reader of *Modern Electrics* from which I have obtained information which has enabled me to construct my set.

DORR SIMMONS. Michigan.

HONORABLE MENTION.

Attached is a photograph of my wireless set from which I have obtained excellent results.



Murray Station.

The instruments are all of my own make with the exception of the variable condenser and the telephone receivers.

The sending set consists of a one quarter kilowatt closed core transformer, a helix made of eleven turns of No. 8 copper wire spaced 1 inch apart, and 15 inches high. The condenser is made of 12 plates 9 inches long by 8 inches wide.

The receiving set consists of two pairs of phones, one of which is a Brandes 3000 ohm pair, while the other is an E I. Co. Also a loose-coupler, single slide tuning coil, fixed condenser, variable condenser, silicon, carborundum, and electrolytic detectors.

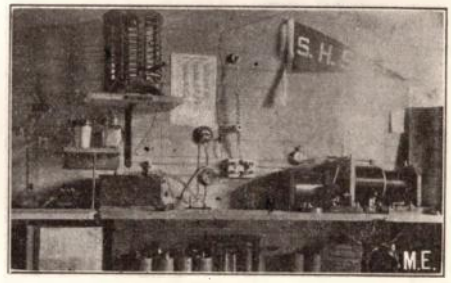
My aerial is 60 feet high and consists of four No. 18 copper wires and two No. 10 copper wires which are 100 feet long.

JOHN N. MURRAY California.

HONORABLE MENTION.

Here is a photograph of my wireless station.

First I will say that I would not have had a wireless station if I hadn't had *Modern Electrics* to encourage me. My sending set consists of a one inch coil, condensers, helix, zinc spark gap and key. Helix and



Graves Station.

condensers were made at home. For receiving I have the following: loading coil, a home-made loose coupler, electro 1,000 ohm receiver, variable and fixed condensers, and three detectors, silicon, carborundum, and peroxide of lead. I have best results with carborundum. My aerial is forty feet high and forty feet long on six foot bamboo spreaders. My station is about 1,100 feet above the sea-level. I have only been at this interesting work for two months but have had good results.

WM. S. GRAVES. New Hampshire.

HONORABLE MENTION.

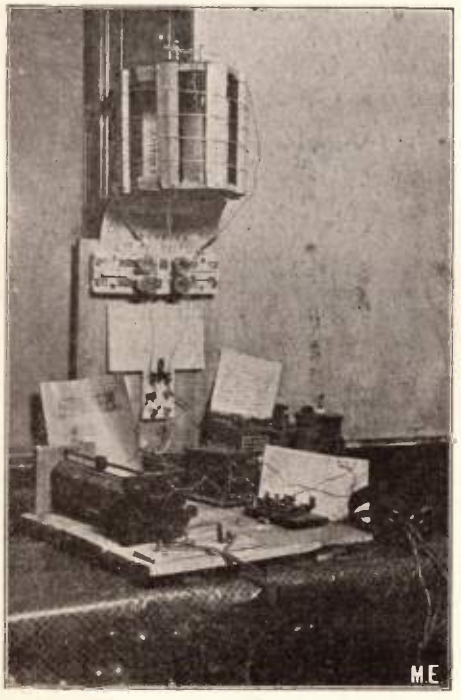
The photograph illustrates the apparatus which I am using in conducting wireless telegraph experiments.

It consists of one telegraph key, one quarter-inch spark coil, one home-made helix, one D.P.D.T. switch, one zinc spark gap, and dry and wet cells.

For receiving I have one home-made detector for galena, one home-made tuning coil, two receivers wound to 75 ohms, and a home-made head band.

I am a constant reader of *Modern Electrics* and it has helped me to a great extent in erecting my wireless set. I have found no other magazine like it in regard to the information given to reader which is of practical value. With my set I have succeeded in hearing Key West twelve times. I also hear every evening Cape Cod, Cape Hatteras, New York, and other land stations, besides all the ships. I have a friend up in South Orange with whom I communicate every evening at 8.30 o'clock.

My aerial is 250 feet long and 85 feet high, composed of three wires spaced a



Dye Station.

foot apart. My call letter is LD.

Contributed by
R. LOWELL DYE,
New Jersey.

HONORABLE MENTION.

I have shown herewith my station which has enabled me to obtain excellent results in wireless telegraphy.

For receiving I use a two slide tuning coil, universal detector, fixed con-

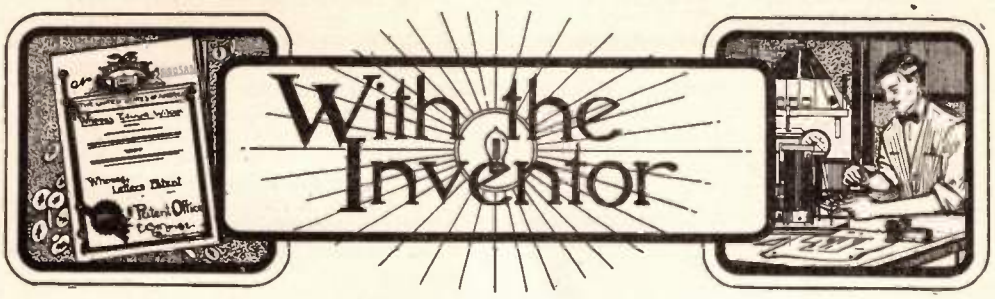
Murray Station.

denser, and a pair of 2,000 ohm receivers. For sending I use a one-half kilowatt transformer, glass plate condenser, helix, zinc spark gap, heavy wireless key, and electrolytic interrupter. My aerial is 75 feet high, composed of four aluminum wires 90 feet long.

I have found *Modern Electrics* a good help to me in the work, and recommend it whenever possible.

CHARLES MURRAY. New Jersey.

That enamel wire is more suitable than other insulated wires for coil winding was proven by a recent fire. An electromagnet was found completely charred but with the insulation of the wire unharmed. The resistance of the spool remained unchanged, and the insulation resistance was increased by the heat of the flames, from 75 volts to 170 volts per 0.0001 inch of insulation depth.



PATENT NO. 1,009,354 HAS BEEN GRANTED MR. ALEXANDRE TREPREAU, OF JOINVILLE-LE-PONT, FRANCE, FOR APPARATUS FOR HEATING WATER.

This invention deals with heating water rapidly by an apparatus to be used directly on a water faucet.

Mr. Trepreau overcomes a well known difficulty of such devices which very often offer a shunt through the water mains thereby losing a lot of current, if the water gets in contact with any of the resistance wires used in such devices.

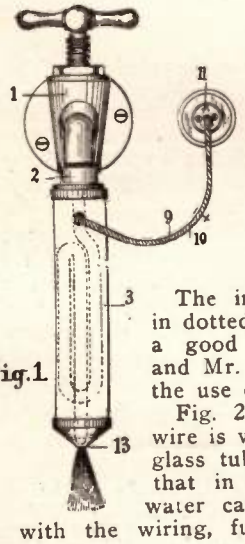


Fig. 1.

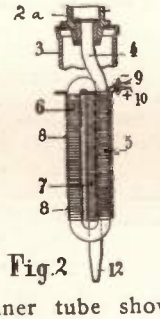


Fig. 2

The inner tube shown in dotted lines is made of a good insulating body and Mr. Trepreau advises the use of glass.

Fig. 2 shows how the wire is wound around the glass tube. It is evident that in this manner no water can come in contact with the wiring, furthermore, rapid heating is had.

It seems to us that glass is not a very good substance to use as the heat sometimes will cause it to crack. We think that the use of a micanite or a moulded mica tube would perhaps improve the apparatus a great deal.

MR. WM. CROWLEY OF PHILADELPHIA, PA., HAS BEEN GRANTED PATENT NO. 1,009,285 FOR A PORTABLE BURGLAR-ALARM.

This is a portable burglar alarm which is to be used presumably by travelers and all those wishing to be secure against burglars. While the construction of some of the parts are novel there is of course nothing altogether new contained in this patent.

The inventor uses a buzzer and also a lamp so that either the device can be operated acoustically or else silent and luminous. This

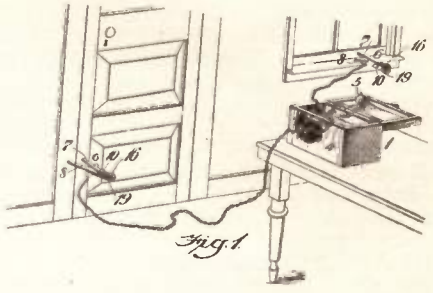
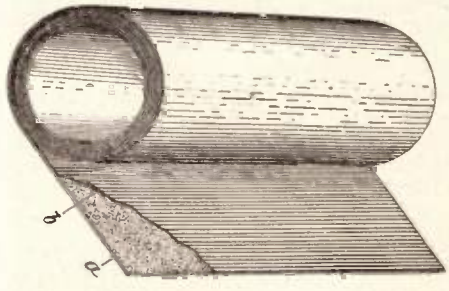


Fig. 1

alarm of course, can only be used when the inmate of the room is inside of the room itself, as the trap could not be set, for obvious reasons, from the outside.

May we suggest to Mr. Crowley that he may, as a supplement, use an automatic phonograph which may be started electrically, and as soon as the burglar opens the door, the phonograph will yell at the top of it's voice: "MURDER, HELP"!!

MR. MAX MEIROWSKY OF COLOGNE-EHRENFELD, GERMANY, HAS BEEN GRANTED PATENT NO. 1,010,936, FOR AN ELECTRIC CONDENSER.



This is an old idea in a new dress, the main idea being to form a rolled condenser which should have air circulation in it's interior.

The strip of paper a, is saturated with shellac or resin and then rolled upon a spindle. As the sheet is being thus wound sheets of tin foil b, are interposed between the layers at regular intervals.

Mr. Mierowsky lays great stress on heating the paper a, during the rolling process, thereby forming an almost homogenous mass of the paper and tin foil; furthermore by winding the sheets under pressure a high capacity condenser is the result.

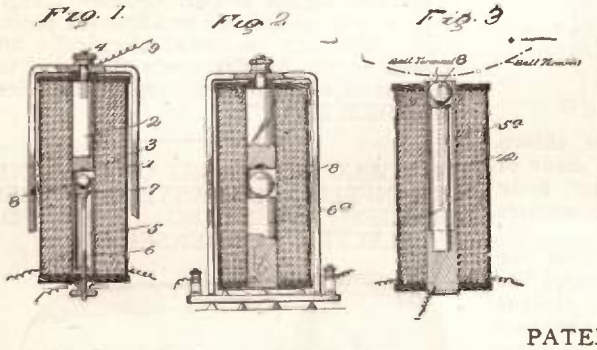
MR. STANISLAUS H. SAUVE, OF DENVER, COLO., HAS BEEN GRANTED PATENT NO. 1,009,345 FOR AN ELECTRO-MAGNETIC SIGNALING INSTRUMENT.

This is an admirable idea and is one of those little electrical schemes which are apt to make its inventor wealthy.

Mr. Sauve as shown in Fig. 1, uses a ball (8) which is operated electro-magnetically, by striking up and down rapidly thereby making and breaking the circuit. This is quite a novel idea and Fig. 3 shows the same idea in another manner, whereby the ball (8) is made to strike against a gong of a bell thereby acting as a clapper like an ordinary bell. Thus a very economical bell is produced which can be constructed at a very low cost and its efficiency is high.

Mr. Sauve in his patent does not state how he overcomes bad contacting, but we presume that by heavily silver-plating the ball at the points where the ball makes contact, this objection will be readily overcome.

An apparatus working as a sounder is shown in Fig. 2. It seems this ball movement can be applied successfully to many electrical apparatus and we have no doubt that this idea will come into extensive use within



the near future. The patent itself is gotten up admirably and all points are covered pretty thoroughly. It would be worth while for people interested in patents to get a copy of this particular patent.

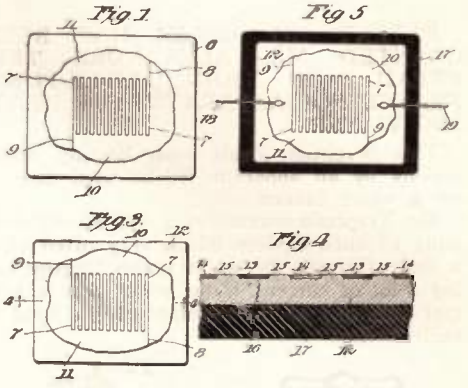
MR. OSCAR LINDER AND MR. JAMES B. REPLOGLE OF CHICAGO, ILL., HAVE BEEN GRANTED PATENT NO. 1,011,824, ON A SELENIUM CELL.

This invention will be of especial interest to our readers inasmuch as it comes close to getting an ideal selenium cell.

Fig. 1 shows the preliminary step in manufacturing this selenium cell. 6 is a glass plate. 10 a thin film of platinum deposited on the glass plate.

This film 10 is divided in two portions, 10 and 11, by scratching a very fine continuous zig-zag line into the platinum as shown. Plastic selenium is then pressed into these fine zig-zag lines and the selenium fills out the scratch completely. The platinum film adheres to the selenium and is now lifted off from the plate 6, and turned upside-down as shown in Fig. 3, where 12 represents the selenium.

Fig. 4 gives a cross-section of this, magnified many thousands of times. In fig. 4, 12 is the selenium and 15 also selenium, while

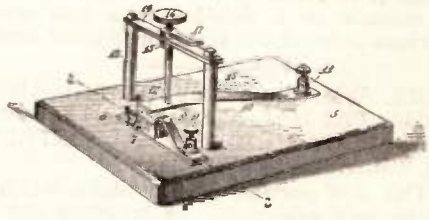


14 and 13 represent the platinum. The distances between 13 and 14, and 14 and 13 respectively show the fine scratch enormously enlarged. This results in an efficient selenium cell which has a comparatively low resistance, resulting in a very sensitive cell.

Fig. 5 shows the completed cell wherein 12 is the selenium while 17 is a block of rubber on which the cell is mounted and 18 and 19 connections to the platinum sections.

Six claims have been allowed on this patent.

PATENT NO. 1,009,317 HAS BEEN GRANTED TO MR. MAURICE BERNAYS JOHNSON, OF SAN ANTONIO, TEX., FOR A DETECTOR FOR WIRELESS SIGNALING APPARATUS.



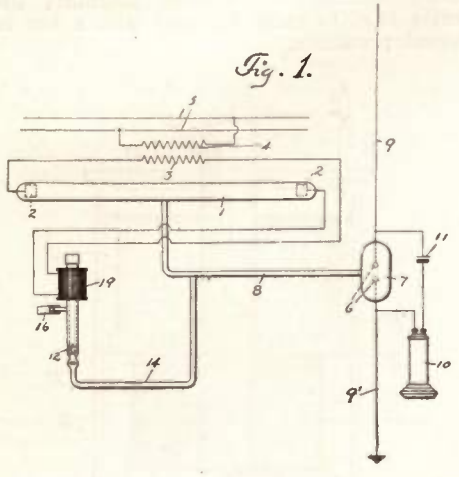
This is a detector stand and does not show any novel features ecept perhaps the clamping part 8, which holds down the mineral 7.

Very similar stands have been described in *Modern Electrics* and the patent as a whole does not evidence anything novel. It is one of those patents around which any constructor can go easily if he cares to do so. Patents of this kind offer very little protection to the inventor inasmuch as by changing minor details similar articles can be constructed without violating the original patent.

MR. DANIEL McFARLAN MOORE, OF NEWARK, N. J., HAS BEEN GRANTED PATENT NO. 1,010,669 ON WIRELESS TELEGRAPH APPARATUS.

This is another invention of the well known inventor and this patent has been in the patent office since 1906.

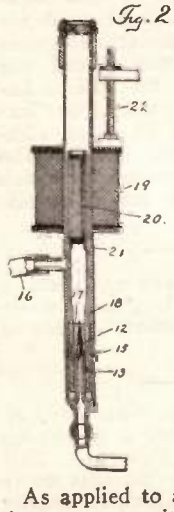
Fig. 1.



Mr. Moore uses a vacuum tube for wireless signaling either for sending or receiving.

The object of the invention is to provide means whereby the gas tension or density within the tube 14 may be kept constant by devices responsive to variations in the density and hence electrical resistance of the contained gas.

Fig. 2.



Another point of the invention consists in the use of a vacuum tube as detector. The gas fed into the tube is derived from a source or body of gas which is normally at greater tension or density than that within the tube, and is admitted in determinate regulated amounts through a feed valve whose action is automatically governed by changes in the gaseous tension or condition within the tube.

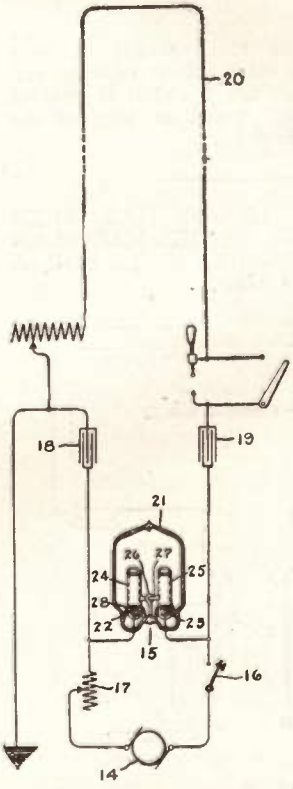
As applied to a wireless telegraph transmitting apparatus, it is very useful for regulating the degree of vacuum, and the length of the emitted waves may be exactly determined especially under conditions where the principle of syntonizing is used.

Fig. 2 shows the valve used whereby the part 12 is a rather dense arc light carbon in the chamber 15, a body of liquid such as mercury surrounding the mass 12.

The displacer 18 is worked automatically by means of the armature 20 which is moved up or down by the current variations of the electromagnet 19 thus automatically allowing the mercury to be uncovered and more or less gas will flow through the tube 14 as shown in Fig. 1. Thus the gas pressure is always automatically regulated, which overcomes a very great obstacle in such devices.

PATENT NO. 1,011,777 FOR WIRELESS TELEGRAPHY HAS BEEN GRANTED TO MR. JOHANNES HARDEN, OF SCHENECTADY, N. Y.

The application of this patent dates back to 1904 and while this patent shows several novel points we think that to-day it is rather antiquated in some of its points.



In the illustration Mr. Harden shows a vacuum spark gap 15. Mr. Harden made the discovery that if the electrodes are enclosed in silica tubes no deposits are formed as in mercury vapor tubes and the inventor finds that he can use such a spark gap for a very long period without material depreciation.

Inasmuch as it is impossible to fuse silica to the glass vacuum chamber, Mr. Harden supports the cups by means of the glass standard 26.

This patent, which is quite an interesting one, also contains several other novel features, but lack of space does not permit us to recite them here.

PATENT NO. 1,009,798 FOR PRODUCING MUSICAL TONES HAS BEEN GRANTED TO MR. MELVIN L. SEVERY OF ARLINGTON HEIGHTS AND GEORGE B. SINCLAIR, OF MEDFORD, MASS.

This as a rather novel device to produce musical tones in a purely electrical manner. Electromagnets 2 are placed in front of sonorous bodies, such as musical strings and these electromagnets are connected to other electromagnets 8. A set of toothed armatures with a certain amount of teeth 4 are made to revolve before the electromganets 8, thereby producing electrical fluctuations in 8 and 2 which in turn are transmitted to the strings 1, thus any kind of musical tones may

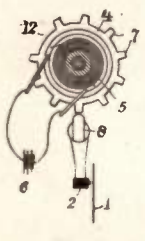


Fig. 2

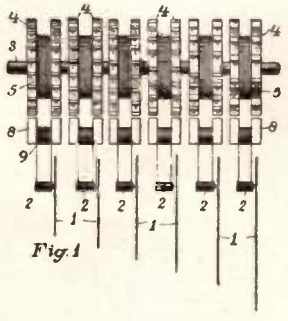
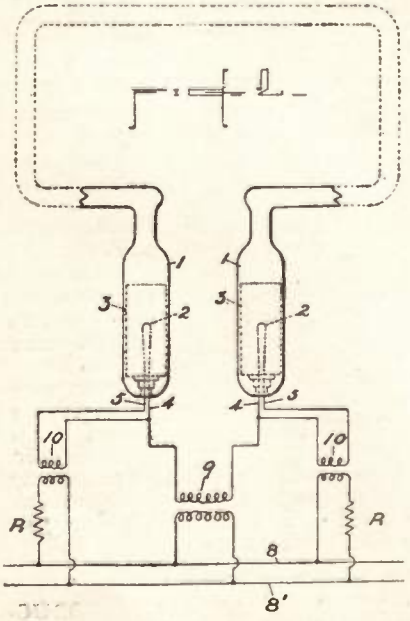


Fig. 1

be produced. These tones should be very clear and constant, inasmuch as nothing actually touches the strings 1 and it is obvious that the strings will sound as long as the armatures 4 are revolved.

PATENT NO. 1,010,668 HAS BEEN GRANTED TO MR. DANIEL McFARLAN MOORE OF NEWARK, N. J., FOR A VACUUM-TUBE LAMP.

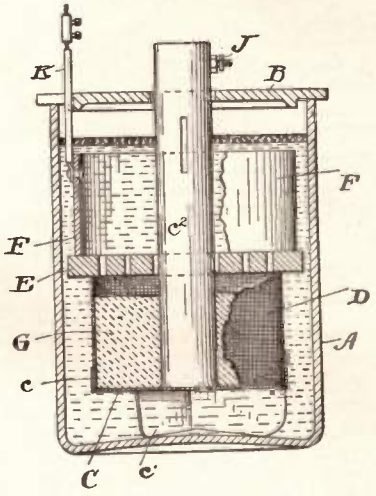


Everybody knows the Moore light which gives such pleasant effects and is known by its pink light. This invention, by the well known inventor provides electric lamp filaments 2, enclosed in the vacuum tube 3. Mr. Moore found that by employing such filaments a considerable lower voltage can be used to work the vacuum tube than when the filaments are not used. Another object is that one side of the tube acts as cathode, another as anode.

The heating electrodes are entirely independent of the discharge current passing through same, which seems a paradox at first glance, but is a fact nevertheless.

MR. EDWARD C. SMITH AND EDW. L. MARSHALL OF FREMONT, OHIO, HAVE BEEN GRANTED PATENT NO. 1,011,258, FOR A GALVANIC BATTERY.

This is another old idea in a new dress and the inventors cover a startling point by making a battery of very *high* internal resistance, contrary to all other inventors who strive hard to make batteries with a *low* internal resistance.



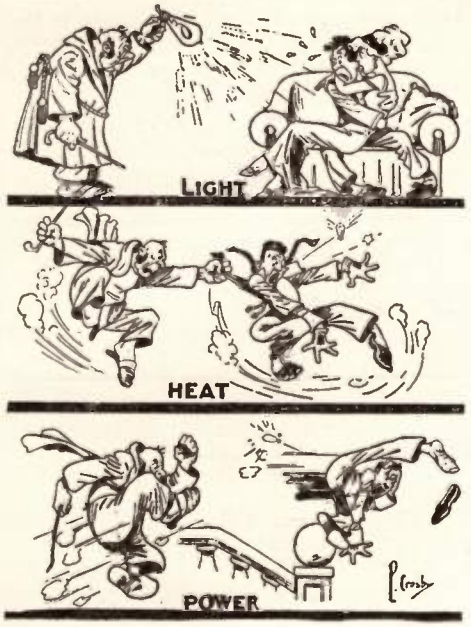
The inventors have a point in view however, that is the battery is to be used for automatic block signals and protective devices where strong currents are not needed nor wanted. This battery is of the Edison-Lalande type and the inventors use copper oxide G in a perforated vessel D, in an alkaline solution such as caustic potash. The zinc is shown at F. E is a porous plate which is interposed to increase the internal resistance.

But few steam locomotives can haul a train over a two per cent. grade, while many electric railroads negotiate grades of nearly seven per cent.

Dr. W. D. Coolidge of Schenectady, N. Y., has recently been granted a patent on a tubular tungsten lamp filament. This novel invention is claimed to possess many advantages over the solid filament usually employed.

Flying Sparks

THE NEW YORK ELECTRICAL EXPOSITION



As it struck the fancy of Cartoonist Percy Leo Crosby, of the New York Globe.

A POINT OF VIEW.

The Snail: "At last men are becoming civilized. There's one who has already one feeler."—Pêle Mêle.

NOT TO BE BLAMED.

(Near sighted old lady, to workman in manhole): "Little boy, you know if you don't stop smoking you will never grow up!"—Pêle Mêle.

HE KNEW.

The teacher asked: "When did Moses live?"

After the silence had become painful she ordered: "Open your Old Testaments. What does it say there?"

A boy answered: "Moses, 4000."

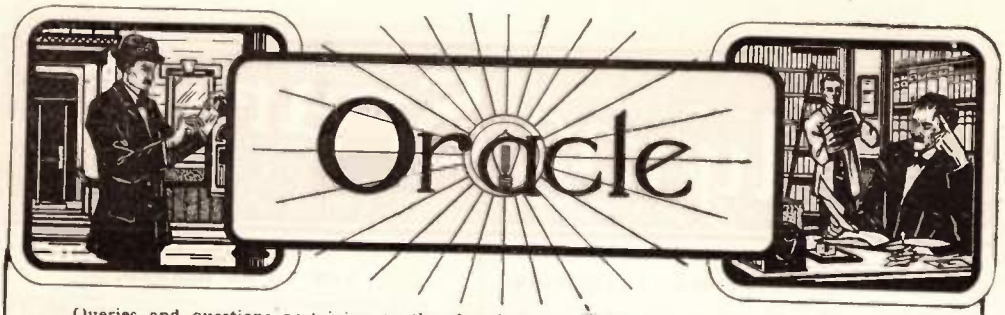
"Now," said the teacher, "why didn't you know when Moses lived?"

"Well," replied the boy, "I thought it was his telephone number."—Suburban Life.

DON'T ANNOY ANIMALS

Even if the dog does look secure—

there is no telling that you might be mistaken!—Le Rire.



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.

IRON WIRE FOR AERIALS.

(1903). Charles Horn, N. Y. asks:

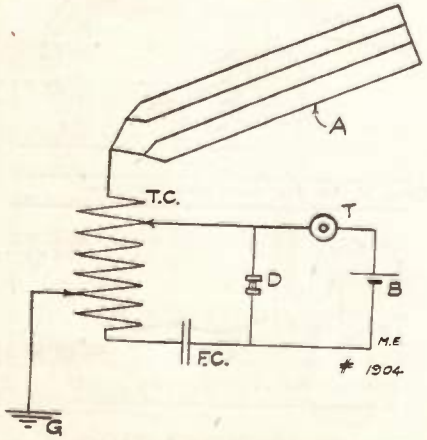
Q. 1. Kindly tell me whether it is possible to use No. 16 annealed iron wire for an aerial?

A. 1.—It is possible to use iron wire for an aerial, but the results will be very poor as compared with copper wire. It is well known that high frequency currents travel on the surface of conductors, and if the iron wire were copper plated, it would be an improvement. This plating can be done at a slight expense. However, iron has another magnetic effect on the high frequency waves which cannot be overcome by plating.

THE POULSEN SYSTEM.

(1904.) Milton Hartley, D. C., writes:

Q. 1.—Will you please give me the



hook-up for the following instruments: a 4 wire aerial, double slide tuner, peroxide of lead detector, 1000 ohm receiver, small fixed condenser, and gas pipe ground.

A. 1.—We are giving you the connection below.

Q. 2.—If my aerial is raised five feet higher will the results be better?

A. 2.—Yes, there will be a little improvement.

Q. 3.—Will you kindly explain the system used by the Poulsen people, and whether there is such a station at the present time around Washington, D. C.?

A. 3.—The Poulsen system employs an arc lamp burning in a hydrogen chamber. The arc is shunted by an oil condenser and an inductance. This inductance forms the primary of an oscillation transformer, the secondary being connected to the aerial and ground, with the key interposed in either the aerial or ground. Various positions have been used for the key, and perhaps many other improvements made on the latest sets, on which the editors have no data. The rapid oscillations set up by the arc transmitter can not be received with an ordinary detector and receiving set, inasmuch as the oscillations are far above the pitch to which the ear is responsive. As a result, it is necessary to use the "ticker," an instrument consisting of a contact making device. This device charges a small fixed condenser which discharges across the detector, allowing the high frequency to be thus reduced to a lower frequency by the charging and discharging of the condenser, so that the signals can be heard. This feature of the Poulsen system is very efficient, for it enables an operator to receive signals from the Poulsen stations while another spark station nearby cannot be heard. The tuning with arc transmitters

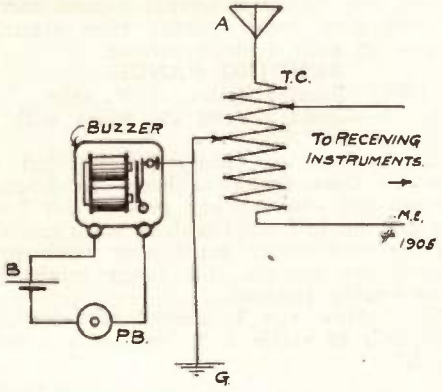
is very sharp, and greater accuracy can be obtained than with the spark method. We do not know of a station near Washington, D. C. of the Poulsen system.

BUZZER TEST CONNECTIONS.

(1905.) John Wilkes, N. Y. asks:

Q. 1.—Give diagram for connections of a buzzer test in the receiving set.

A. 1.—We are giving you the diagram herewith.



Q. 2.—If I send an article to your "Experimental Department" and it is published, do you pay for same, even if it does not take the first or second prize?

A. 2.—Yes, all contributions are paid for in that department.

Q. 3.—Is there any loss in the receiving side when the ground and aerial wires run parallel for about ten feet?

A. 3.—The loss would be so slight as to be hardly noticeable.

AN ELECTROLYTIC INTERRUPTER.

(1906.) Ernest Henderson Jr., Mass., writes:

Q. 1. I have made an electrolytic interrupter as described in the June issue. When connected to the D.C. mains it did not reduce the current at all. If the interrupter was constructed to work on A.C. could you tell me what kind to use on D.C.? If not, could you tell me what my trouble is?

A. 1.—The electrolytic interrupter described in the June issue, on page 171, is intended to operate on both alternating or direct current but preferably on direct. You do not state the type of coil you are using, but we presume that it is a vibrator coil, and that perhaps you fail to tighten the vibrator spring so that it does not operate. Perhaps you are under the impression that the current is reduced by the electrolytic interrupter and that the coil's vibrator should interrupt the current. If so, this is wrong, for the interrupter performs the purpose of interrupting the current. If correctly made and operated, it will give excellent results.

Q. 2.—If an interrupter operates better on A.C., should I use an instrument as described in the September issue for transforming D.C. into A.C.?

A. 2.—The electrolytic interrupter oper-

ating better on D.C. makes this apparatus unnecessary.

Q. 3.—Do you consider it practical to build a small automobile with a one horse power electric motor using small bicycle wheels?

A. 3.—Hardly; the weight of the batteries would make it hardly possible for such a size motor to be used. The most practical motor would be a gasoline engine such as used in motor cycles, which can be obtained very cheap if bought second hand. It will give better results than electric power on such a small vehicle.

SENDING RANGE.

(1907.) Stanley Patten, N. Y., asks:

Q. 1.—Could I send 2¼ miles with a half inch coil?

A. 1.—No, we hardly believe that it can be done under ordinary conditions, though this size coil can be used for 1 or one and one-half miles without much trouble. In the city where much iron work surrounds the station, this range might be considerably reduced.

Q. 2—How can I connect two one-half inch coils to obtain a ¾ inch, or a 1 inch spark?

A. 2.—Connect both primaries in series and use additional batteries, but only one interrupter of one coil, while the other interrupter should be screwed tight. The secondaries should be connected in series, care being taken that the secondaries do not oppose each other.

Q. 3.—What type of instruments does the "New York World" use in its station, and what is the call letter?

A. 3.—The station you mention is only of an experimental and temporary nature. It is only erected in special instances when experiments are to be conducted. The apparatus is of a composite type, and does not possess any original features to our knowledge.

A FIXED CONDENSER.

(1908.) Charles Cordes, N. Y., inquires:

Q. 1.—How many sheets of tin foil measuring 2 and a half inches wide and 3 and a half inches long should be used in contructing a fixed condenser?

A. 1.—Ten sheets of tin foil separated by empire or paraffined paper.

RECEIVING RANGE.

(1909.) Duncan G. Foster, Mass., asks:

Q. 1.—Can I charge a 2 volt, 60 ampere, storage battery with a 20 watt dynamo giving 10 volts?

A. 1.—Yes.

Q. 2.—What size aerial made of No. 14 aluminum wire would you suggest for the following instruments: two slide tuning coil, silicon detector, condenser, 75 ohm receiver, and necessary wiring and switches?

A. 2.—An aerial made of four wires 150 to 200 feet long will give excellent results if the wires are spaced 3 feet apart and the aerial supported a reasonable height from the ground.

Q. 3.—What should my range be with this apparatus and aerial?

A. 3.—Naughty! The "Oracle" will not answer questions on ranges in the magazine. Such answers at best are only good guesses. See the notice in the August issue.

THE ELECTROLYTIC DETECTOR.

(1910.) Husted Heincici, Calif., asks:

Q. 1.—What is the best substitute for the platinum wire in an electrolytic detector?

A. 1.—There is no satisfactory substitute for platinum wire except perhaps a fine carbon filament.

Q. 2.—Can a little Knapp type G motor be changed to a direct current dynamo?

A. 2.—This motor being very small could hardly be changed to a generator and give satisfactory results.

Q. 3.—Are big polished copper door knobs good for a wireless set?

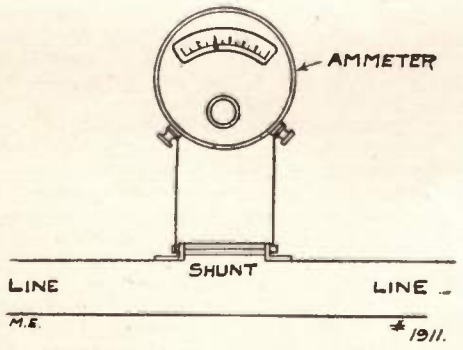
A. 3.—Yes, for either a small experimental or demonstration set.

AN AMMETER.

(1911.) W. C. Thompson, Conn., states:

Q. 1.—I have a 600 ampere General Electric meter and would like to know why it is that when I put an old dry cell on the binding posts, the needle flys over and hits the stop. The dry cells were afterwards tested with an ordinary ammeter and it registered 2 amperes. There is a permanent magnet for a field and the armature is wound with about No. 40 wire, with two adjustable springs on each side. I should think that it would register on dry cells, but is likely to burn out as it is at present. How are ammeters connected for regular 110 volt work on commercial switchboards?

A. 1.—All ammeters carrying a heavy current are furnished with "shunts," which consist of a heavy piece of metal or a number of pieces across which the ammeter is connected as shown in the illustration.



Different shunts are made for different ammeters, and the shunts are always stamped with the same number as the ammeter to which they belong, in order to insure accuracy. We would advise you to communicate with the General Electric Co., at Schenectady, N. Y., requesting them to quote you a price on a new shunt for the meter you have, and you must include the meter number so that they may identify it. In commercial installations, usually the shunt is

WIRELESS TELEGRAPHY AND AEROPLANES.

(Continued from Page 692.)

tube attached to, but insulated from, one side of the tail of the aeroplane. This acts as a counter capacity, or "earth," to a long aerial wire on the other side. This aerial starts from the nose of the machine, is carried thence to the extreme outer edge of the main plane, thence back to the tail, and thence to a loose extension, a length of sixty feet of copper wire trailing behind.

Much attention has been given to the problem of receiving wireless messages

(Continued on Page 729.)

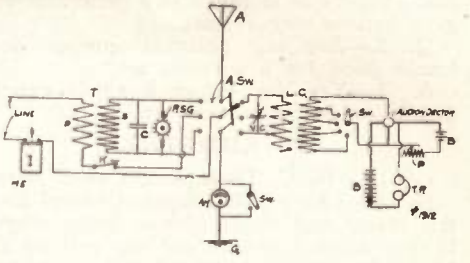
mounted on the back of the switchboard with the leads coming forward to the ammeter.

A COMPLICATED HOOK-UP.

(1912.) Samuel S. Kan, Wash., writes:

Q. 1.—What is the best way to connect the following wireless instruments: 2 kw. transformer, electrolytic interrupter, 6 Leyden jars, rotary spark gap, key, and hot wire ammeter. For receiving, Murdock loose-coupler, E. I. Co.. audion detector, E. I. Co. phones, variable and fixed condensers, potentiometer, and batteries?

A. 1.—We give you below the correct diagram.



ABOUT WIRELESS TELEPHONES.

(1913.) Lewis Wallace, Pa., asks:

Q. 1.—Kindly inform me how to make an oscillation transformer as used with the wireless telephone described by Victor H. Laughter in the July, 1911 issue.

A. 1.—We do not know the exact dimensions used by the system which you describe, but an excellent transformer may be made with the following dimensions. Primary on card-board tube 10 inches long, wound with No. 12 rubber covered wire which may be tapped for either a plug hole or switch point. The secondary on a tube fitting within this primary tube with a clearance of 1 inch, wound with a layer of No. 16 rubber covered wire, and also with taps taken at intervals to allow any combination. This data is given from a wireless telephone which has talked officially over 42 miles in this country.

Q. 2.—Would an arc composed of one carbon rod and one copper rod a half inch in diameter in a porcelain tube be efficient and if not kindly inform me what is better?

A. 2.—The combination you suggest would give results, but we believe that a better combination would be to employ a copper tube with a welded bottom, or better still, a pressed (one piece) copper vessel into which water is poured. The bottom electrode can consist of a carbon rod at least ¾ inch in diameter adjusted by an arm to the proper distance.

Q. 3.—Should city gas be employed with this arc?

A. 3.—With the above combination, no gases at all should be used, and the arc should burn in the air. One of the most successful systems ("Telefunken") uses an arc without any gases, and finds the flickering as scarce as in other more complicated systems.

RECEIVING RANGES.

(1914.) Eli J. Lilly, N. Y., asks:

Q. 1.—What is the receiving range of my apparatus consisting of the following instruments—etc?

A. 1.—The question is out of order. See answer to number 1909.

HOT WIRE AMMETER MATERIAL.

(1915.) Neill Martin, D. C., asks:

Q. 1.—Kindly state the name and address of a reliable firm where I can purchase climax wire used in constructing a hot wire ammeter.

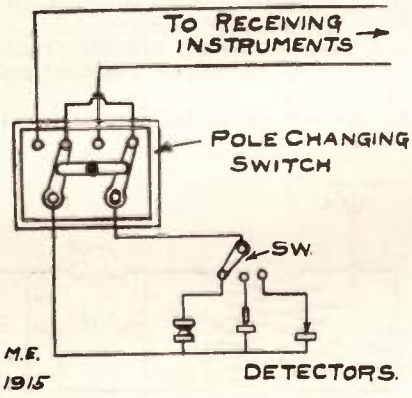
A. 1.—On page 390, this volume under the heading of Electrical Apparatus you will find the name of a party handling wire for hot wire ammeter purposes.

Q. 2.—As I know of no one in this city who has a hot wire ammeter, please inform me as to how I may calibrate my scale and when is my set radiating the most energy, when the pointer reads more, or when it reads less?

A. 2.—We do not know of a simple method whereby you could calibrate your meter. The most energy is being radiated when the pointer is at the highest point on the scale.

Q. 3.—Referring to query No. 1052 of H. Hancock, please give a diagram explaining how to use a switch on three detectors at the same time.

A. 3.—We are giving you below a diagram showing the connections which you desire. However, we fail to understand



why you should have three detectors in circuit all in parallel at the same time, and have therefore inserted a three point switch which is probably what you are using.

ABOUT A HELIX.

(1916.) P. E. Giltenan, Calif., asks:

Q. 1.—Why need a helix be made of such heavy wire, instead of being the same size as the aerial wires?

A. 1.—The helix forms part of the circuit for both the oscillating as well as the aerial circuit. The high frequency current travels on the surface, and it is therefore necessary to have large surface conductors. Being that the helix is in both circuits, it is necessary to have as good a conductor as possible so that the utmost energy will

be delivered into the aerial. On reaching the aerial, there are a number of separate wires in parallel, so that in fact the aerial conductors represent a better conductor than the heavy wire of the helix. If small wire is used for the helix, poor results will be obtained.

Q. 2.—Why is there no iron core? Would it not help inductance?

A. 2.—We are dealing with high frequency current in wireless telegraphy. Even one turn of heavy wire represents a high inductance value when dealing with such currents. Iron would have a depreciating value if used.

Q. 3.—To protect crystals of detectors, is it necessary to have the circuit broken, or to have the contact itself separated?

A. 3.—The best method is to disconnect both sides of the detector and to short-circuit same, as shown in the diagram of question No. 1915.

ABOUT WIRELESS.

(1917.) Allen Jansen, Wis., states:

Q. 1.—A friend and I are going to make a wireless set. If his aerial and mine slope toward the south will this make any difference if we are going to communicate with each other?

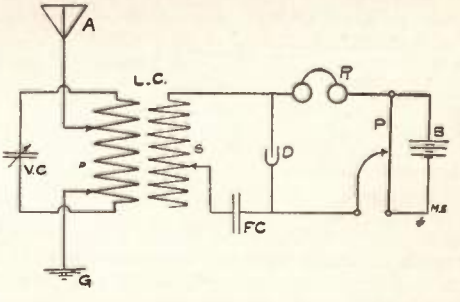
A. 1.—Yes, it will make some difference. Use horizontal aerials.

Q. 2.—Would an aerial 30 feet high at one end and 40 feet high at the other be better than an aerial 30 feet high at both ends?

A. 2.—Yes.

Q. 3.—Kindly give me hook-up for following instruments: loose-coupler (double slide), fixed condenser, variable condenser, potentiometer, electrolytic detector and 75 ohm receiver.

A. 3.—We are giving you herewith the hook-up.



BATTERY COIL ON 110 VOLTS.

(1918.) Wendell Snyder, Iowa, asks:

Q. 1.—Could I use an electrolytic interrupter on 110 volts A.C. with a 1 inch coil, and would I need lamps as resistance?

A. 1.—You may use a 1 inch coil directly on 110 volts A.C. with an electrolytic interrupter, provided the interrupter is properly designed. No lamps are necessary as resistance, but a choke coil as described in the June, 1910 issue would prove a great improvement in the steadiness of the spark.

Q. 2.—I have a helix made of No. 8

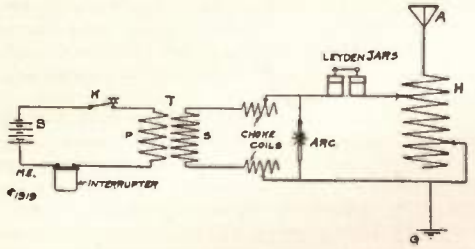
copper wire with 13 turns on an 8 inch in diameter frame. Is this the right proportion for a 1 inch coil?

A. 2.—It is a trifle large, but may be used with excellent results.

A WIRELESS TELEPHONE QUERY.

(1919.) Thos. W. Benson, Pa., requests:

Q. 1.—Please let me know through the "Oracle" if the enclosed diagram of a set will transmit and how far? Will it be more efficient if used with a motor driven break and a closed core transformer, in place of the method shown?



A. 1.—Your idea of a new transmitting set is certainly quite original, but in its present state we note many disadvantages. The most important of these is that the key is in the primary circuit, which would mean that every time it is manipulated, the arc will have to be struck again, making it impractical for telegraphing. If, however, you change the key to the aerial lead, placing it in series with the aerial and making it of such a construction as to withstand the high frequency current of the oscillation circuit, you may telegraph without disturbing the arc. Then again, while the idea of raising 10 volts to 110 might prove very practical on paper, we doubt whether you could obtain a sufficient amperage at the secondary terminals to feed a reasonable sized arc. A closed core transformer would be better, inasmuch as it would have a higher percentage of efficiency, and hence less loss in the stepping-up of the voltage. For such a transmitting set we recommend an oscillation transformer as described in answer to question No. 1913.

(Continued from page 725)

on aeroplanes. For an aeroplane scout to be able to communicate with his commanding officer is, of course, of primary importance, but it would be of immense advantage if he could exchange messages or receive commands. The chief difficulty is that of noise. A visible method of receiving must perforce be selected. Mr. Baker suggests an arrangement in which a coherer is fitted up to the aerials, with a tuning condenser shunted across it, and every two seconds the coherer is automatically decohered by a striker actuated by a magnet excited by a clockwork contact maker. A relay and

(Continued on Page 732)

When writing, please mention "Modern Electrics."

Advice on Patents

NEW IDEA ON FLASH LIGHTS.

(10.) Earl E. Becker, Tacoma, Wash., writes:

"Enclosed you will find a drawing pertaining to an experiment which I have been working at. The idea is to concentrate the rays given off by a flash light, without the use of a parabolic reflector.

Since the drawing is self explanatory I do not deem it necessary to go into detail, as the idea is very simple and yet quite effective. I would like to know if this idea is a good one, and if so would it pay to obtain a patent on it?

A. After looking over the drawing it appears to us that this idea has some good points but inasmuch as it deals a great deal with optics it is impossible to fortell how the light is going to work, and it is impossible to give an exact opinion. From all appearances, however, it would seem to us that a better light is possible with the lens arrangement than with other ones now in the market, and Mr. Becker will either have to send us a model for further investigation or else be his own judge.

In summing up, however, it seems to us that it might be worth while to get a patent on this device.

NEW BATTERY.

(11.) Mr. B. A. Vanderlip, Peoria, Ill., asks:

"After spending quite a lot of time on experimenting I have invented what I believe to be a good primary battery. This battery now gives 1.8 volts and about 22 amperes on short circuit. The battery's outside dimensions measure 11 inches high, 8 inches in diameter. There are no acids in this battery and it does not give off any offensive fumes and does not smell. I have tested it over a period of four weeks and find that after short circuiting for ten minutes the voltage drops down to 1.2 after which it recuperates quickly.

The materials used are cheap and the renewals don't cost very much. I think that the materials used in this battery are entirely novel and I would like to know whether it is worth while to apply for a patent."

A. The galvanic battery is a sore point to inventors. It is one of these elusive things which seem to evade and tantalize inventors constantly.

From the meagre description you give us it is impossible to tell what the battery would be good for. What we need mostly today is a battery that is constant, i.e., one that will give steady currents for very long periods. This is accomplished only in a very few batteries.

From the data you give us, it would seem that your battery polarizes rather too much. This is a bad feature. From what we can tell, your battery would only be good for

open circuit work such as dry cells and we most decidedly advise you against patenting such a battery as there is practically nothing new in this field and a great number of patents exist already.

As far as new materials and new chemicals go, you may rest assured that practically everything under the sun with very little exception has been covered.

The only battery which is really needed and which would mean much to an inventor, is one giving high voltage and high amperage for very long periods and should not be effected whatsoever by short circuits, even long ones.

Take for instance the Daniel (Copper sulphate class) while it only gives one volt it may be short circuited for days without hurting the battery, and this is of course, the ideal battery. Unhappily up to now no copper sulphate battery unless an unpractically large one, has been constructed to give more than four or five amperes. Most of such batteries do not even give one ampere.

The only other constant battery on the market today is the copper oxide (Edison Lalande). This battery is very constant and is not harmed by short circuits, but unhappily it only gives about .7 volts necessitating a large amount of cells which makes it in many instances less desirable than a copper sulphate battery.

Unless you are extremely well conversant with chemistry and electricity, we would not advise you to invent a new battery. Failure will almost certainly be the result.

NEW DETECTOR.

(12.) Mr. William Pearsall, Chicago, Ill., writes:

"I have discovered a new material for a detector which beats any similar material I ever tested. Kindly advise if it would pay me to get a patent on this material which, by the way, does not necessitate a battery but works similar to silicon."

A. If your material for your detector works on the thermo-electric principle there is no use in getting a patent because whether the material is new or not new it is already covered by Mr. Pickard's patent, which patent does not mention any particular mineral or substance but the patent is on the *effect produced*. Thus you will see that Mr. Pickard's basic patent on such substances covers anything imaginable and while you could undoubtedly secure a patent it would not be worth anything to you for two reasons: The first reason is that you could not exploit it commercially without the permission of the holders of the Pickard patent; secondly, even if you would be licensed to use the material and sell it for wireless purposes, it would do you no good because anybody could use it as soon as it becomes public that such a material is a good one to use for wireless and you could not stop the thousands of experimenters who would use the material without your knowledge. These people, would of course, not buy the material from

you and for that reason such a patent would offer absolutely no protection to you. It would be one of these elusive patents which are only good for the prestige it gives the inventor but good for nothing else.

NEW STORAGE BATTERY PLATE.

(13.) Mr. Raymond Freeland, Baltimore, Md., writes:

"I have invented a new storage battery plate (grid) of which I enclose drawing herewith. You will see from this that it is a very novel idea using very little lead (or composition lead,) consequently making a very light plate, on the other hand giving great conductivity to the active mass. Would it be worth while for me to obtain a patent on this?"

A. The idea seems to be a particularly good one but it will be necessary to cast such a plate under pressure as else the lead composition which does not flow very easily would not be able to run into the small interstices of the mould to cast the plate. However, most of the good plates to-day are cast under pressure anyhow, so this would really not matter much.

The idea of having the active mass connected together at all points, is a very good one, and there are very few plates existing today that cover this point. Also it seems to us that a particularly thin plate can be cast and such plates are in good demand for automobile batteries and other batteries where only little room is had.

(Continued from Page 729)

battery are connected in series with the coherer, and the local circuit of the relay is connected with another battery and electric lamp. Each time a signal is received the lamp lighted up—for one second in the case of a dot and for two seconds in that of a dash. These long signals are obviously necessary, but in spite of that a message can be sent with reasonable rapidity.

An alternative means of receiving on an aeroplane is to use an inker, and this method again requires the employment of the coherer. The inking apparatus is heavy, however, and requires fairly careful adjustment, so that it is rather unsuitable for use where there is much vibration. The question of vibration is a serious one

(Continued on Page 734)

(Continued from Page 732)

with the ordinary coherer, for if mechanical decohesion is very rapid, it might be impossible to make the coherer work long enough to get the local side of the relay to work effectively. The actual number of impulses per second in an aeroplane traveling thirty miles per hour, with a Gnome seven-cylinder engine, is on the average too great for the coherer to act. In that case it becomes necessary to employ an anti-vibration holder to take off the abruptness of the shock, or a coherer which is insensitive to the abruptness of the shock.

Wireless telegraphy from balloons and airships has reached a more satisfactory stage. Of first importance is the ability to suspend a long wire from the balloon, and next the weight-carrying capacity of the balloon itself. The apparatus used in the Beta military airship weighed roughly 100 pounds and signals had been transmitted, under favorable conditions, a distance of about fifty miles, so that the ratio of weight to distance of transmission was roughly two pounds to the mile. An ordinary induction coil and accumulator had so far been used in the experiments and one trailing aerial wire and a counter-capacity. In the counter-capacity what was required was superficial area to take the electrical charge, and hence as light a substance as possible might be chosen.

The form of the future wireless outfit for airships would, Mr. Baker suggested, consist of a two-cylinder petrol engine coupled directly to an alternating current generator, the output of the latter being about two kilowatts, an aerial wire about 350 feet in length, and a counter-capacity in the form of very thin metallic sheeting suitably disposed.

Attention has been directed during the last few months to the production of portable apparatus. The chief limiting factor in small receivers is in connection with the detector. The vacuum valve detector of Professor J. A. Fleming will probably be the most suitable in many respects, and next to that an electrolytic detector.—*Telegraph & Telephone Age.*

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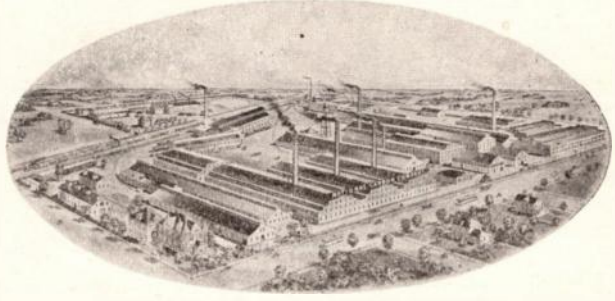

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Wireless Association of America

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

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

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

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

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

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

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

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

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

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

Most experimenters would rather spend their money in maintaining and 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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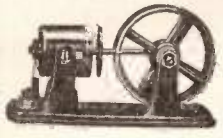

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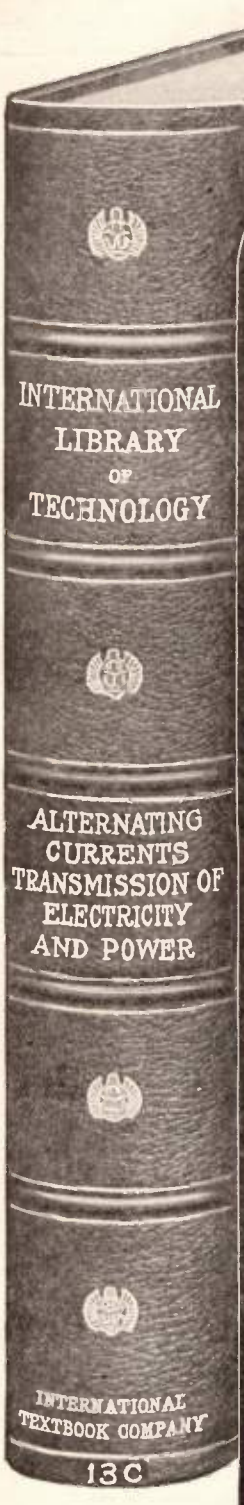

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