PRICE 10 CENTS DECEMBER, 1911

VOL. IV. No. 9.

MODERN ELECTRICS

THE SPACE FLYER

See page 394

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

Month

Buys This Visible Typewriter

he typewriter world:

3 Oliver—The machine with nakes the "write-in-sight" prin-le children learn to operate it in t—so strong a shrewd business l.

So Easy—it's a shame to do without it.

It—until you try it in your home or office, then you ice or hurry you—if you keep it own way thereafter.

L161—O-1096

nths, Only $50 in All—no interest —no chattel mortgages—no collectors—no publicity—no delay. Positively the best typewriter value ever given—the best selling plan ever devised.

If You Own a Typewriter Now—

trade it in to us as first payment—we will be liberal with you.

Send your name and address on coupon and we will tell you more about this unusual offer—more about this splendid typewriter—it won't cost you anything and you will be under no obligation—we won't send a salesman.

Tear out the coupon now—you might forget.

Typewriters Distributing Syndicate
159 ME N. STATE STREET
CHICAGO

Typewriters Distributing Syndicate
159 ME N. State St., Chicago

You may send without placing me under any obligation, further information of your typewriter offer.

NAME.....

ADDRESS.....

My old machine is a.....No. .....

[74]

Modern Electrics

VOL. IV. DECEMBER, 1911. No. 9.

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

55. CONSTRUCTION OF SOME ACCUMULATORS.

Faure Accumulator.

FIG. 62 shows this battery. It was constructed first by Mr. Faure in 1881. Two lead plates about 1-16th of an inch thick by seven inches high and 40 inches long are placed from 10 to 15 hours in a solution made of one part of nitric acid, two parts of sulphuric acid, and seven parts of water. These plates are then placed on a flat table and one plate is covered with a boiled mixture of Red Lead, (Oxide of Lead) (Pb_3O_4),

Fig. 62

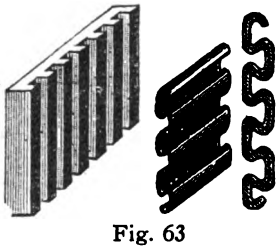


Fig. 63

Sulphuric Acid and water. The other plate is covered with a boiled mixture of litharge, (lead oxide) (PbO), Sulphuric acid, and water. Each mixture is spread over the plates in a thick paste about one-eighth of an inch to a 3/16th of an inch thick. After drying, the first plate is laid between two heavy pieces of natural felt, the other plate is then placed on top of the felt and this plate in turn is also covered with the strip of felt. The two plates with their felts are then rolled over a cylinder about 2 inches in diameter which will give the appearance as shown in Fig. 62. One or two stout rubber bands hold the elements together. The finished elements are then sunk in a glass vessel containing one part of sulphuric acid and nine parts of distilled water. Each plate of course should have a connecting strip from which connection is made. To form this accumulator four to five charges and discharges are required. The red lead takes up the oxygen and is changed into lead peroxide ($Pb_3O_4+O_2=3PbO_2$). This changes the red color of the red lead into a chocolate brown. The litharge gives off its oxygen and leaves spongy lead.

Disadvantages of the Faure Accumulator. Due to the charging and discharging of the storage battery the lead plates expand and contract but the oxide films, unable to follow these changes soon break and the formation has to be started over again. For this reason this kind of battery has been discontinued. A better way to form plates is as follows: Punch the lead plates full of nail holes and mix on a glass plate a paste made by using red

lead and a solution of one part of water and two parts of sulphuric acid. This paste must be quite thick and must never flow. This paste develops a gas smelling like ozone and takes on a brown color inasmuch as superoxide is formed. Let the mass stand for twenty-four hours and smear it over the lead plates which should be scraped very clean before the application of the mass. A better way than punching the plates is shown in

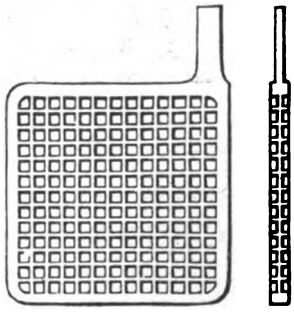


Fig. 64

Fig. 63. After several days when the mass has hardened and set to a hard cement, the plates are combined as elements in such a way that there will always be one more negative than the number of positive plates. The plates are separated by wooden laths or better perforated rubber separators such as bought in the open market. The plates are then formed in an electrolyte which should have a specific gravity of 1,100 degrees. The charging current should be weak enough so that all the gases are absorbed by the mass, else the latter will crack. To charge such a storage battery, large Crowfoot cells may be used. When using plates as shown in Fig. 63 the mass should be filled in such a manner that it comes flush with the surface of the lead. Such plates as shown can be cast by the

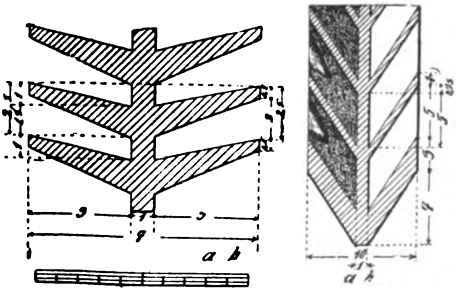


Fig. 65

experimenter himself by using wooden sticks shaped in the form of the white spaces shown in the illustration. Lead is then melted and poured around the sticks, and when cooled the sticks may be withdrawn resulting in plates as shown.

Fig. 64 shows the Volkmar plate invented in the year 1881. In these squares the active mass, prepared as already explained above, is pasted and locks the mass fairly satisfactorily.

Many inventors have busied themselves a great deal on these plates and the main idea is that a plate shall be constructed that locks and holds the mass firmly, in such a manner that it does not become dislocated. This has been accomplished in various manners and many patents have been taken out as well as a great deal of ingenuity displayed. It would be going too far to show all these designs, but we will illustrate a few to show the student what has been accomplished. Figs. 65 and 66 show two very good ideas widely used today. Fig. 66 shows a very ingenious manner to lock the mass (which is shown in black,) effectively and this is one of the best plates ever constructed. Fig. 67 shows another ingenious method that is very much the same as the foregoing one.

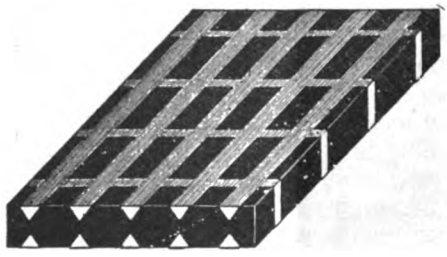


Fig. 66

Reckenzaun's accumulator plate shows a radical departure from other types and is shown in Fig. 68. Mr. Reckenzaun takes the active mass and forms it under hydraulic pressure in round or oblong sticks. These sticks are then placed in a mould and the lead is poured around the sticks, as shown in the illustration. However, such plates are no longer used extensively, and today the majority are pasted plates with the locked active mass.

Tudor in 1884 devised a novel manner to suspend the plates which is shown in Fig. 69. The plates P which have projections as shown, are hung on glass plates G which in order to rest easy have at their lower end on a piece of soft rubber S.

56. CONNECTION OF THE CELLS.

In Fig. 70 between 3 negative plates two positive plates are hung as shown. The positive plates are all connected together the same as the negatives. All the connections in this instance are soldered together. It will be seen in Fig. 70 that AD and BC are connected in series while AB and CD are connected in multiple.

57. RULES, FORMULAS, AND CONSTANTS.

Voltage. An accumulator with lead plates and sulphuric acid, no matter how small or large furnishes an average voltage of 2. During the charge the E.M.F. rises rapidly from 0 to 2 volts, and then slowly to 2.2 volts, when the cell begins to "boil," giving off gas. If the charge is continued the voltage rises up to 2.5 volts. Once the voltage has reached this point it is useless to continue the charge inasmuch as it would only be a waste of current. When discharging, the voltage

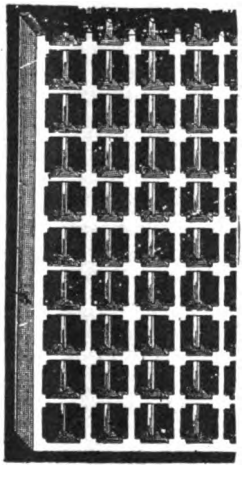


Fig. 67

falls steadily from 2.2 volts to 1.8 as shown in Fig. 71. From this point on the voltage falls rapidly; furthermore at this point the discharge should be discontinued inasmuch as if it is carried on below this the plates will quickly sulphate which in time will spoil the plates.

This sulphate which is white in color is only formed when the discharge is carried below 1.8 volts and forms a thin film which is a good insulator and which consequently decreases the surface of the plate, which in time makes it unfit for use.

If the plates have been sulphated but

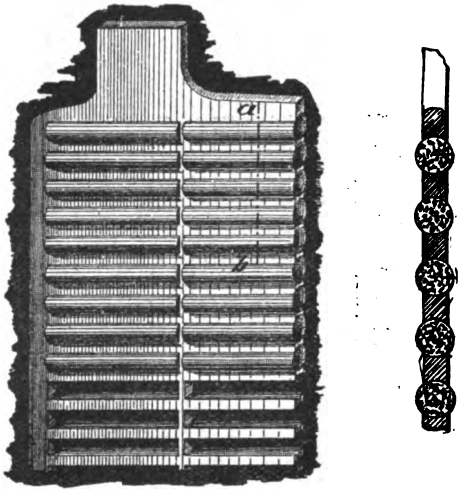


Fig. 68

little, the sulphate may be broken down by overcharging the battery for some hours. The violent gassing which takes place when the battery is overcharged tends to break off the sulphate and thus the plates are again as good as before. However, if the sulphate film has grown too heavy and has entered into the pores of the plates, they usually may be regarded as spoiled.

The internal resistance in an accumulator is made up of the cross section of the electrolyte between the plates and also between the plates and the electrolyte, because there always is a certain amount of sulphate on the surface of the plates forming a resistance, which resistance the current must overcome.

Current density is the amount of current distributed over the plates. In a

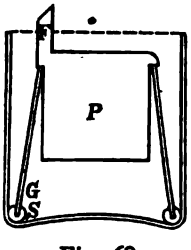


Fig. 69

well formed accumulator a square yard of positive plate surface furnishes about 60 ampere hours i.e., a current of 60

amperes for one hour or a current of 30 amperes for two hours, or a current of 1 ampere for 60 hours. This of course only holds good if the plates are connected in parallel or multiple.

If the cells are connected in series, for instance five cells, and in each cell is a positive electrode of ¼ square yard, the battery will give a current of 5x2=10

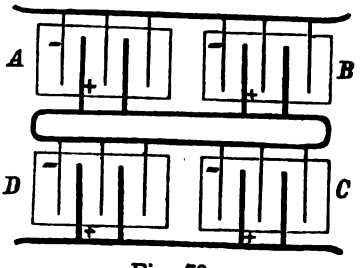


Fig. 70

volts, and 60÷4=15 ampere hours. If, however, these cells were connected in parallel we would have a current of 2 volts and 5×15=75 ampere hours.

WHEN CONNECTED IN SERIES THE CAPACITY OF AN ACCUMULATOR IS PROPORTIONAL TO THE SURFACE OF ONE CELL; WHEN CONNECTED IN MULTIPLE IT IS PROPORTIONAL TO THE SURFACE OF ALL CELLS.

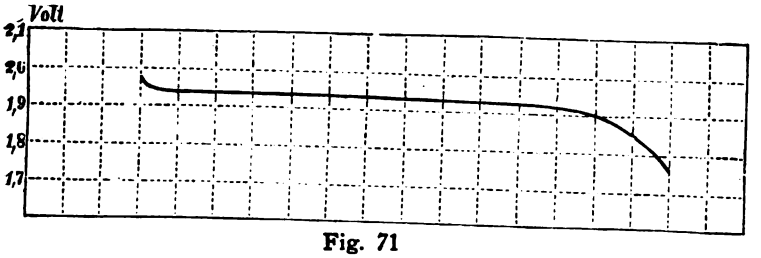


Fig. 71

The amount of electrical energy accumulated in one cell can also be determined from the weight of the electrodes, inasmuch as this electrical energy is proportional to the amount of the active mass and consequently to the weight of the plates. In practice one figures from 6 to 10 ampere hours on 2 pounds of formed plates. A cell weighing two pounds will therefore give for 6 hours a current of 1 ampere, or during 12 hours a current of 0.5 amperes. This cell therefore has a capacity of 6 ampere hours. If one expresses the product current or amperes × volts in volt-amperes (Watts) and the time in hours, the electrical energy is found in WATT HOURS.

(To be Continued)

THOMAS A. EDISON ANSWERS A FEW QUESTIONS.

Waldo P. Warren in a recent interview with Thomas A. Edison, obtained interesting answers to a series of questions asked of the great inventor. Mr. Warren, knowing how difficult it would be to talk with Mr. Edison, on account of Mr. Edison's slight deafness, prepared a list of typewritten questions, and presented same. Edison looked over these and replied, "You have some hard ones here." Then he procured a fountain pen, and began to answer the questions as follows:

Q.—Do you believe that inventiveness can be taught?

A.—Yes, if the person has ambition, energy and imagination.

Q.—At what age is one most likely to respond to such instruction?

A.—About twelve years.

Q.—What method of instruction would be most valuable?

A.—Problems to be solved.

Q.—Should it be done through schools and books?

A.—Books and actual demonstration.

Q.—What of the advantage of ordinary shop experience?

A.—Great advantage to have actual personal knowledge of how things are done.

Q.—What do you think of instruction by correspondence?

A.—The cheapest and best way for a poor man, if the college is reputable.

Q.—What frame of mind helps to bring ideas?

A.—Ambitious.

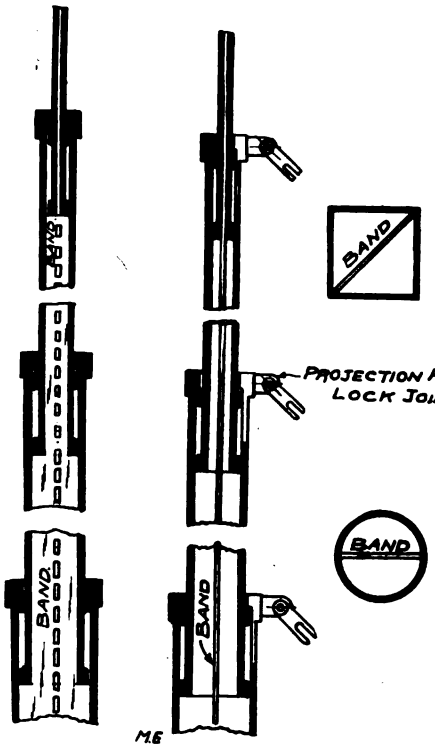
Q.—Is it true that an inventor has to be more or less abnormal?

A.—Abnormal persons are never commercial inventors.

(Continued on Page 619)

The "Comet" Portable Mast

THE demand for portable masts of suitable construction in connection with field wireless sets, has set a number of inventors on the problem of designing such a device. The nearest approach to the perfected type is the "Comet" mast,



-FIG. 1- -FIG 2-

which is of German design and construction.

This mast consists essentially of a number of telescoping sections of steel, which are extended by means of a perforated steel band, driven by a windlass. Each section is fitted with shoulders so that when the maximum length of extension is reached, the collar on that section prevents it from rising further, which is plainly noticed in Fig. 1. The steel band varies in width corresponding to the particular size of the tube into which it slides, exerting an equal upward force on all the sections. Fig. 2 illustrates the edge view of the steel ribbon and the top cross section view of both the square and round masts may be noticed.

Fig. 3 illustrates the windlass driving the steel band and operated by means of the large handle and crank. Teeth engage into the perforations of the steel band. A very clever means of releasing each section in turn is employed, which consists of a steel pin fitting through a hole bored in all the sections. This steel pin is fitted on a worm gear so that it moves just the correct speed to release the sections in their proper turn. Fig. 6 illustrates the 45 meter mast before being extended, and the windlass portion may be seen as well as the steel band.

As the sections arise, they are automatically locked together, so that the entire mast will present one substantial structure. This is accomplished by means of the band B fitting around the split top of the sections, and forming a tightening

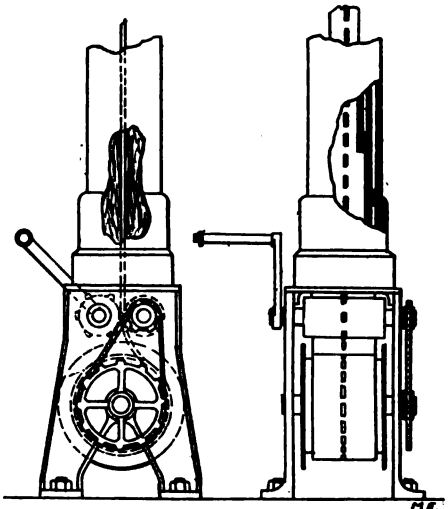


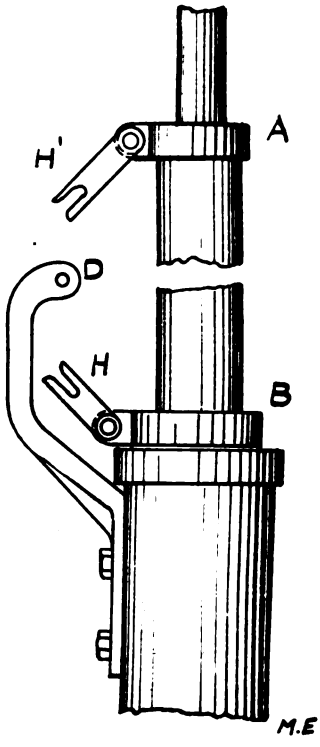
Fig. 3

ring. The projecting arm H will hit against the arm D causing it to draw the band on the split section top. In descending, the reverse of this action is the result, the arms hitting in succession against the projection D which unlocks all the section rings.

Fig. 5 illustrates a man carrying the 25 meter mast (about 80 feet) weighing

but 84 kilogrammes or 185 pounds. For the smaller masts a number of stay wires are necessary, but if desired these may be done away with by using a larger diameter mast, which in itself possesses sufficient strength against the wind.

This type of mast will undoubtedly prove a great help to military wireless stations in the field. During war operations, a station must be erected probably to get a single message to headquarters, and then taken down and transported to another place.



-FIG. 4-

At the present time the United States Army Signal Corp employs a mast for its trunk sets made of either aluminum or steel tubing. The sections are perfectly smooth with plugged ends or with caps fitting over the ends. Smooth sleeves hold the sections together, no clamping device being used. The method of erecting this mast is to have one soldier pushing the tube sections upwards while another soldier places the next section under the one being raised with the sleeve between. With this crude arrangement it is possible for the trained men to erect a

Fig. 5

pole within a few minutes without difficulty. No doubt, however, in view of its

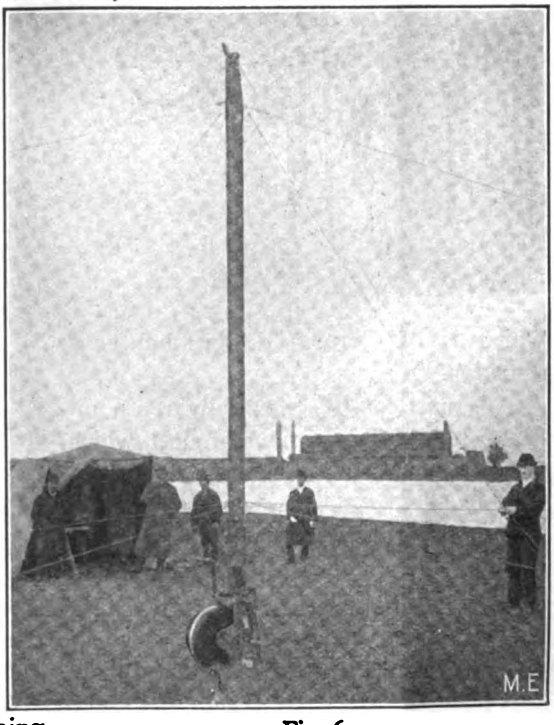


Fig. 6.

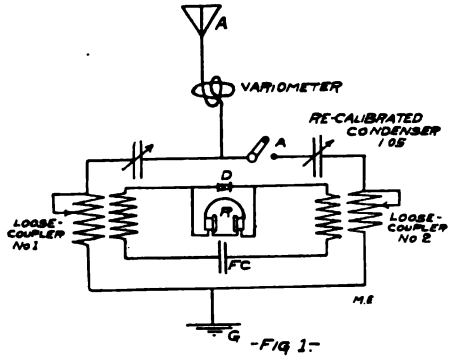
extreme simplicity and advantages, the "Comet" mast will rapidly replace the other masts being used at present for portable purposes.

The Fessenden Interference Preventer

By Eberhardt Rechtin.

Undoubtedly the readers will be pleased to read a few paragraphs on the Fessenden Interference Preventer. This apparatus has already been briefly covered in previous numbers, but the writer will endeavor to go into details regarding the construction and operation of such apparatus.

The hook-up is given in Fig. 1. The first things to consider are the loose-couplers. Two couplers of the same design and construction are screwed side by side on a base of wood, fibre or hard rubber. The two secondaries are joined by a strip of fibre so that they move in and out of the primaries together. The sliders of the primaries are next joined so that they

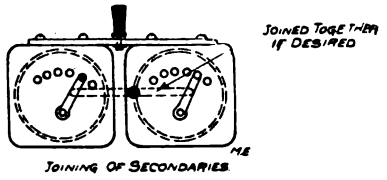


-FIG 1-

too move together. If the couplers are of the type having switches controlling the secondary these too should be joined, although this is not absolutely necessary. This is all shown in Fig. 2.

There are two methods of securing the needed difference in capacity. One is by calibrating the condensers in such a manner as to allow for it. The other is to connect the variables in a number of different mechanical ways so as to make the allowance automatically.

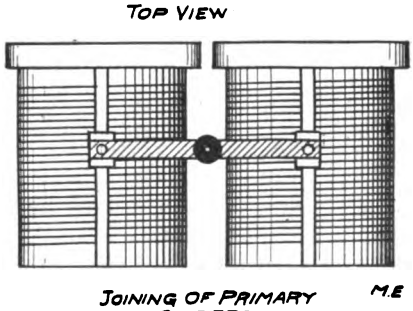
The calibrating method is the simplest. For a rotary type condenser two scales are made, one being divided into 180 degrees. The other is made by taking each point on the standard scale and joining it with the point marked zero by a straight line. The length of this line is carefully taken and then multiplied by 1.05. This new figure is used to determine the length of a line which will place the corresponding point on the second scale, so as to make correct allowance for the difference in capacity needed



-FIG 2-A-

in the two circuits. This calibration should not be carried on beyond the point marking 171 degrees as it then becomes inaccurate. Calibration may also be done from the point marking 180 degrees. This will be accurate to as a low a point as 1 degree. Of course the point zero is so placed that the indication will be zero when the condenser has its minimum capacity. This calibrating can be done on slide plate condensers by making a pointer to slide on a scale. Every point on the scale of the one condenser is 1.05 times farther from zero than the corresponding point on the other condenser.

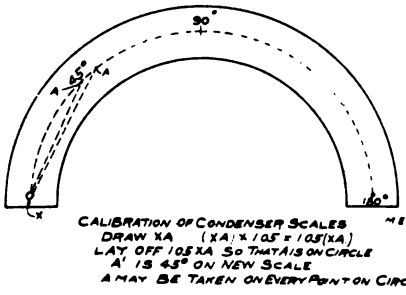
To automatically make this allowance, the two condensers should be of the rotary type. The handles or knobs of both are taken off. Two wood or



-FIG. 2-B-

fibre pulleys are made. One must be 1.05 times as large as the other. The shaft of the one is lengthened and allowed to project beyond the case (Fig. 4). This instrument requires only one adjustment, but it is not accurate be-

yond about 170 degrees. If this capacity is enough it may be used very successfully.



-Fig 3-

The operation of the set is as follows: Switch "a" is opened and the set is tuned to the desired wave length. Both condensers are set at the same number on their respective scales. Any interference is cut out by closing "a" and a little judicious manipulation of

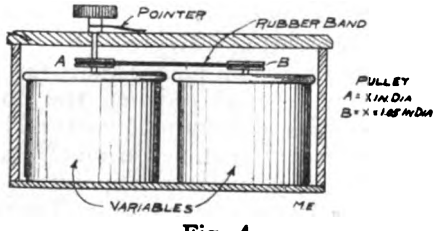


Fig. 4

the variometer. Silicon was used for the detector. As yet the writer has used no other, although any detector of the rectifying type may be used.

A NEW SYSTEM OF WIRELESS TELEPHONY.

By Charles Proner.

The writer having had the pleasure to witness a wireless telephone conversation recently given by Mr. Samuel Wein of New York, will tell in clear and concise language how he performed this experiment.

The conversation was held from Mr. Wein's home in New York City to Getty square, Yonkers, a distance of approximately 12 miles.

The voice in every instance of the whole conversation was clear and understandable.

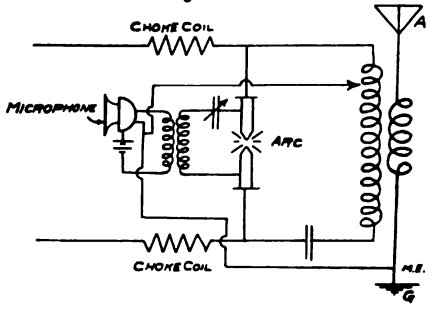
This system used by Mr. Wein is his own original invention and embodies several new and novel features.

The difficulties encountered heretofore in wireless telephony were that the arc did not work steadily and the microphone could not carry the current. These difficulties have practically been overcome by Mr. Wein.

The speech was carried on over several hours and was astonishing to the many electrical engineers present at that particular test.

The arc lamp used is a great help to his system. It is made on the principle of the quenched spark type. The arc which is quenched, does not require any feeding during the whole conversation and does not heat as in other cases, but is immersed in a vat of oil; this keeping it cool and keeping the arc steady.

The microphone employed is entirely on a new principle and can hold as much as 220 volts and 7 amperes without undue heating. This is constructed on the principle of one pipe fitted within the other and employing compressed air which is held in a tank. When words are spoken into the mouthpiece of the microphone, the diaphragm fluctuates in unison with the words spoken and allows about three pounds of the air to escape, this making a second diaphragm to move and causes the arc to fluctuate in the usual manner. The inductance used has about 5.3 milli-henrys. An electrolytic detector is used throughout the whole test.



The mode of connection used by Mr. Wein is shown in the diagram respectively.

Patents are pending on this new system of communication of wireless telephony.

If a man sees a smart child it's a sign that he is the child's father.

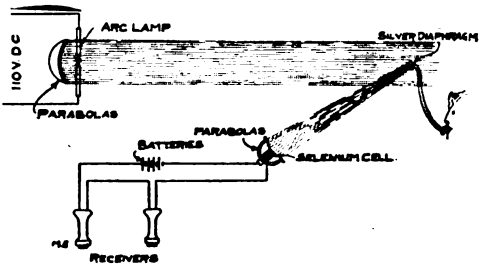
Selenium and Its Extraordinary Characteristics

By Charles Proner.

SELENIUM, the most puzzling of elements ever known to the scientific world, has not only baffled the discoverer of its extraordinary property, but scientists of modern times, with their latest instruments of chemical analyzation.

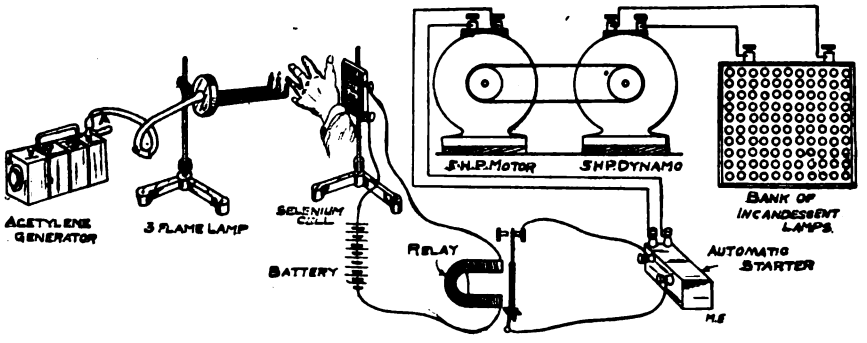
What an age of miracles would be brought back if this wonderful mineral could only be utilized properly! Such miracles could be performed as: Seeing through a wire; transmitting speech through a searchlight for twenty or thirty miles; transmitting music over a telegraph or telephone wire from one city to another; blow a whistle or ring a bell or set the brakes automatically on a locomotive the instant when a danger signal is displayed; firing a gun automatically; record a patient's heart and lungs through an electric chronograph; automatic signal from a burglar's searchlight could be given to the nearest police station when the intruder would be examining a lock or mechanism of a safe, and before he could make his escape, the building would be surrounded by police, cutting off every avenue of egress; stopping a five horsepower machine by a mere wave of the hand. These and other similar miracles are the proper application of the selenium cell.

group and has neither taste nor smell. In commercial form it exists in pencils resembling black sealing wax. A small stick of this mineral represents a resistance equivalent to the length of a wire stretching for about 250,000 miles. Its chief peculiarity is that it



The Bell Radiophone.

is a non-conductor of electricity in the dark, but when exposed to light, it becomes a conductor of the electric current. This amazing phenomenon has been based upon several theories. One is the formation of conducting selenides, under the action of light. Another, the formation of conducting crystals. Still another, that it is due to electrolytic action, and finally, but perhaps best of all, the electronic theory, which assumes the releasing of negative electrons due to resonance in the atom.



Mr. Hammer's Apparatus.

This peculiar mineral was discovered in 1871, by Berzelius, an eminent Swedish scientist. He found it as a product of the manufacture of sulphuric acid from iron pyrites. It is a non-metallic element of the sulphur

The weird property of selenium allows the construction of selenium cells, which when interposed in electrical circuits can be made to send signals, run machinery, fire guns, transmit pictures and perform other won-

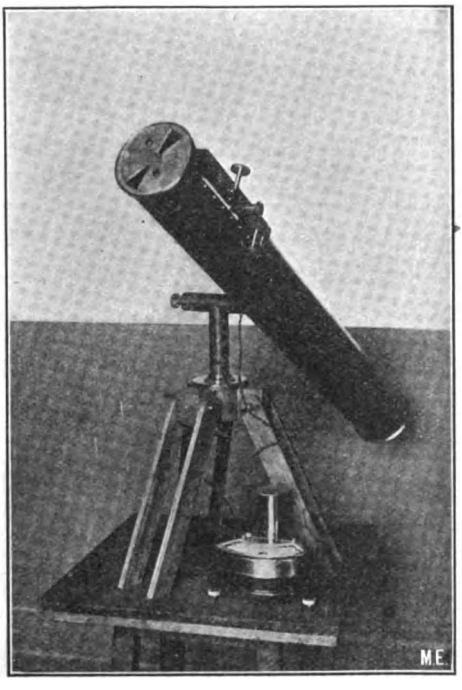
(Continued on Page 612.)

Paris Letter

A SUN CALORIMETER.

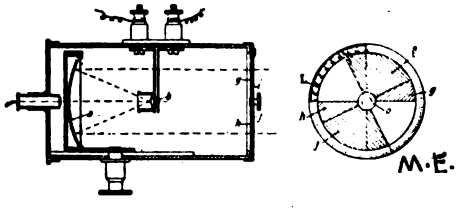
In the November issue of *Modern Electrics,* there appeared an article on an instrument invented by Prof. Chas. Féry of Paris for determining the heat of the sun.

We present below another photograph and sectional diagram showing



The Sun Calorimeter.

another form which he has also designed and used. In this instance we find the sun's rays entering through the shutter openings as shown by the



dotted lines. The rays are reflected by the parabolic reflector unto the thermo-pile B, which in turn generates a current which is conveyed to a galvanometer by the binding posts on top. The eye hole in back serves to focus the rays exactly on the thermo-pile, as well as the adjusting screw on the under side which focuses the mirror by moving it forward or backwards.

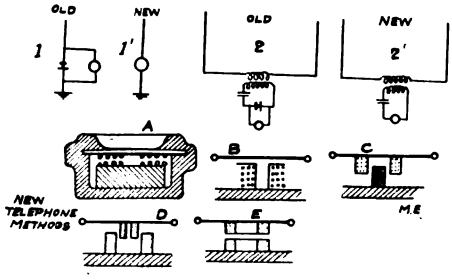
While using this apparatus on Mount Blanc, Switzerland, Prof. Féry figured the temperature of the sun's rays at 6,000 degrees C.

USING TELEPHONE RECEIVERS WITHOUT DETECTORS.

The well known wireless experimenter, Bellini, has recently designed a few interesting telephone receivers which may be used directly on a wireless receiving set without the use of a detector.

In Figs. 1 and 2, we have the old method, employing the detector, while 1^1 and 2^1 illustrate the new method without the use of a detector.

It is admitted that the telephone receivers in ordinary cases vibrate at high frequency, but cannot be heard as the rate is too high for the ear to distinguish. Again, when using groups of waves, the group has zero action, for the total effect of each group is zero, so that no sound is made at each group or set of waves. The new method uses a telephone which is independent of the direction of the current. Such can be made in various



ways. Thus the diaphragm during and at the end of each group, is like a stretched spring, and in the interval between two groups it goes back to rest, thus we hear a sound. This corresponds to the number of groups per second.

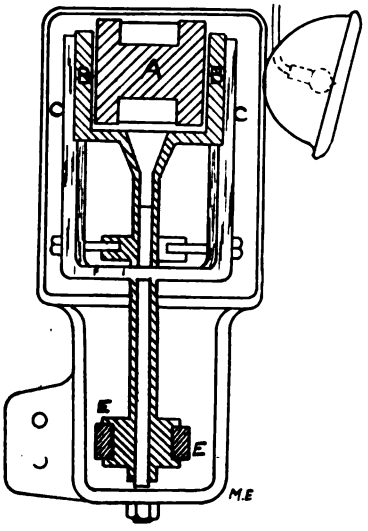
In the non-polarized telephone, Fig. A, the usual diaphragm has a flat coil fastened to it, as well as another coil under it, thus allowing the attraction between the two coils to be heard. In B, a single selenoid and iron diaphragm is used to obtain a similar result.

In C, there is a selenoid on the diaphragm, while a laminated core is held below it. In D, each carries a selenoid, while E, is the same principle but used in a slightly altered manner.

A BICYCLE LAMP GENERATOR.

A dynamo capable of maintaining a steady voltage at varying speeds has been designed using a simple principle.

The armature is fixed and does not revolve, being shown in the diagram at A, with its windings. B, is an iron pole piece fitting close to A, but revolving on the shaft which is operated by the friction pulley E pressing against the bicycle wheel. C C are two U shaped permanent magnets which are normally drawn against the iron



pole pieces B B. However, on the revolving of the shaft E, the permanent magnets are spread further apart from B B by centrifugal force. In proportion to the increase of speed, the magnets tend to draw further away from the pole pieces and less magnetic lines of force effect the armature, producing less voltage. Thus, the voltage is maintained at a fixed point for all speeds of the bicycle, avoiding the danger of burning out the lamp.

ACTION OF RADIUM ON PLANTS.

Professor Hans Molisch, of the Radium Institute of the Vienna Academy of Sciences, has recently conducted a series of interesting experiments on the action of radium on plant life. We have herewith a set of three photographs, showing the wonderful results obtained.

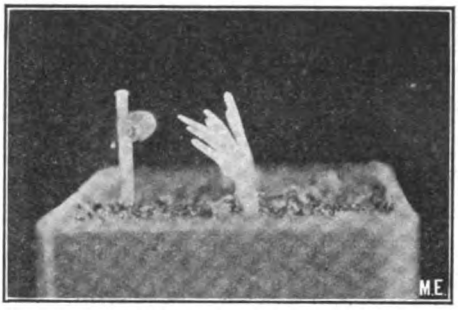


Fig. 1

In Fig. 1, a few sprouts from oat seeds are seen after 48 hours under the radium rays. The radium salts are placed in a small vial which is held on the small stick to the left of the photograph. The sprouts show a

Fig. 2

marked tendency to lean and grow towards the source of radium rays.

In Fig. 2 we have the same plants as in Fig. 1, but the photograph is taken from above instead. Otherwise, it is the same in every detail.

In Fig. 3, we have another variety

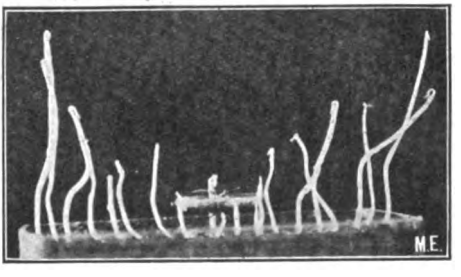


Fig. 3

of plants, which are not attracted by the radium rays, but quite to the contrary, are repelled. It will also be noticed that the plants nearest the tube are dwarfed.

In some instances, it has been

found that radium rays prevent the growth of plant life, while in other plants, the growth is faster and the plants grow towards the source of the rays. All of these photographs have been taken in a dark chamber by means of a flashlight exposure, for the plants are confined to places where there is no daylight.

THE WIRELESS EQUIPMENT OF THE "OLYMPIC."

Among the latest installations of the Marconi Company, the station aboard the S. S. "Olympic" of the White Star line presents an interesting example. This vessel is at the present time the largest one afloat.

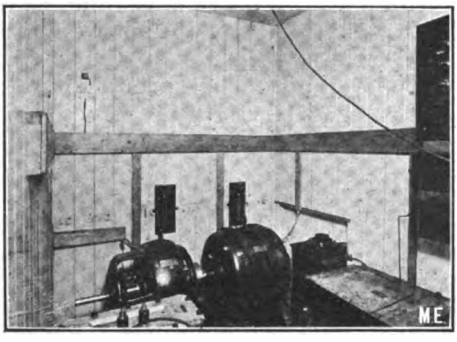


Fig. 1

In Fig. 1, a photograph of the generating set is shown. It consists of a standard 1½ k.w. motor generator

Fig. 2

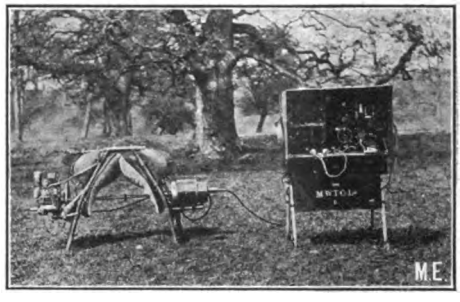
power plant. Lamps with straight filaments connected to the ground are used with the motor and generator to protect them from the induced static currents in the primary leads.

In Fig. 2, the complete station itself is shown. To the right will be seen the switchboard, and also the rheostats and starter for the generating set. On the wall may be noticed a magnetic detector, with the tuning condensers of which there are three, mounted on a box below. To the left of this, is another tuning apparatus, and an audion detector. The pipes on the right of the photograph, are the pneumatic tubes leading to the various parts of the vessel for conveying messages if desired.

THE MARCONI CAVALRY PACK SET.

The accompanying cut illustrates the latest production of the English Marconi Company in the line of military portable sets. It is a cavalry pack set, and is comprised of a complete sending and receiving set.

Mounted on a special saddle, will be noticed a small generator on one side, and a gasoline engine on the other, driving the former by means of a shaft. The saddle is equipped with a steel frame so that it may be placed on the ground in the least amount of time. Leads from the generator connect with the transmitting set. The receiving set consists of the standard



Cavalry Portable Set.

magnetic detector and telephone receivers, besides the tuning instruments. The apparatus has proved satisfactory in use for reasonable distances.

A SOLAR THERMO PILE GENERATOR.

An experimental thermo-pile generator employing the sun's heat has recently been produced, and comprises a large number of small cell units.

One of the units is shown at Fig. 1, and consists of the casing C, the thermo-element proper, A, which is imbedded in the material B, and three panes of glass 1, 2, and 3. These are used to retain the heat which is formed by the sun's rays upon the thermo-

pile. Through the bottom of the cell, a current of cold air is brought in through the air tube, and comes in contact with the bottom portion of the

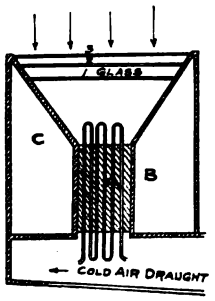


Fig. 1

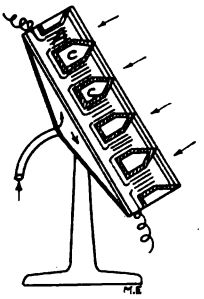
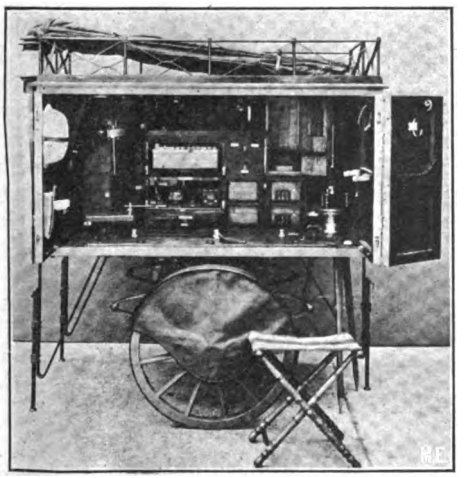


Fig. 2

thermo-elements, thus creating a difference of temperature, and likewise the difference in potential, creating the electric current. A number of these cells are used together as shown in Fig. 2, proving quite efficient in experiments.

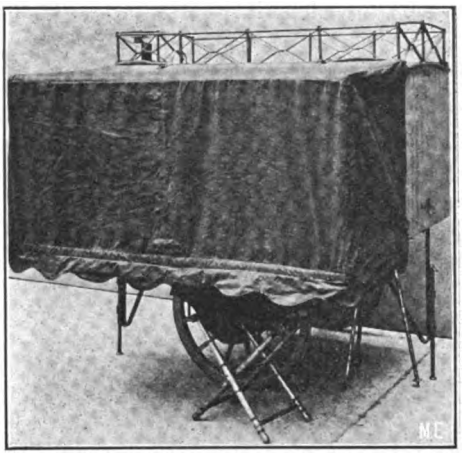
PORTABLE CABLE TESTING APPARATUS.

At a first glance, the wagon in the illustration might be taken for a portable wireless station, but on closer inspection, it will be seen that a number of testing instruments are in the wagon. It is in reality the portable cable testing station of the Siemens & Halske firm of Berlin. Among the



Wagon Opened.

many instruments there is a reflecting galvanometer for measuring the insulation resistance of cables to the right, and is mounted on the tripod which passes through a hole in the wagon and stands firmly on the ground. To the left is the lamp and the scale in connection with the use of the galvanometer. All the other instruments such as Wheatstone Bridges, etc., are included with this station.



Wagon Closed.

In the other illustration, the wagon is completely closed and ready for transportation.

A NEW MARCONI RECORD.

On November 19th, the following message was sent from the new Marconi station at Coltano, near Pisa (Italy), to the Glace Bay (Nova Scotia), station, a distance of approximately 4,000 miles in an air line.

To the Editor of The New York Times:

My greetings transmitted by wireless telegraph from Italy to America.

G. Marconi, Pisa.

5.47 P. M.

The Coltano station has been built for the Italian Government so that it may be in wireless communication with the Massowah station in Africa. The New York Times has always displayed a great interest in wireless, patronizing the Clifden and Glace Bay stations for its trans-Atlantic press messages.

Owing to the large Italian population in Argentine Republic in South America, the Marconi interests have been planning the erecting of a high powered station in Buenos Aires, which will be in direct wireless communication with the station at Coltano, the distance being about 7,000 miles.

MODERN ELECTRICS

A Magazine devoted entirely to the Electrical Arts.

H. GERNSBACK, Editor
A. C. LESCARBOURA, Assistant Editor

O. J. RIDENOUR, Business Manager

Subscription Price: For U. S. and Mexico $1.00 per year, payable in advance.

New York City and Canada, $1.25.
Foreign Countries, $1.50 in Gold.
Stamps in payment for subscriptions not accepted.
Checks on out of town Banks cannot be accepted unless the usual exchange is added.

SINGLE COPY, 10 CENTS

Forms close the 20th of the month preceding date of publication. Advertising rates on application.
The Editor will be pleased to receive original contributions of timely interest pertaining to the electrical and the afiliated arts. Articles with good drawings and clear photographs especially desired. If accepted, such articles will be paid for on publication, at regular rates.
No manuscripts will be returned unless return postage is enclosed.

Address all communications to:

MODERN PUBLISHING CO.
233 Fulton Street, New York, N. Y.

Chicago Office: 1106 Trude Bldg.
Paris Office: 12 Boulevard Arago
Brussels Office: 23 Rue Henri Maus

THE MODERN PUBLISHING CO.

H. GERNSBACK - - - President and Secretary
O. J. RIDENOUR - - Vice President and Treasurer

Entered as second class matter March 31, 1908, at the New York Post Office, under the Act of Congress of March 3, 1879.

Vol. IV. DECEMBER No. 9

EDITORIAL.

WE herewith announce the results of our contest for a cover design for this magazine.

All told, 246 designs were submitted and out of these the ones enumerated below were thought to have points of merit:

The first prize goes to Mr. F. A. Zumwalt. (If this gentleman will kindly send us his address we shall be glad to forward check to him. No address was given on the drawing submitted.) Mr. Zumwalt's design incorporated all the necessary points considered to be vital in this contest, namely, great artistic value, striking effect, great originality and technical correctness. Lack of space does not allow us to publish this design, but we will very likely use it soon.

Second prize goes to Mr. Gindele, 255 Seneca place, Clifton, Cincinnati, Ohio.

This design, while quite artistic and beautiful in execution, lacks some of the other points, but all in all it is considered as a very fine piece of work.

Drawings which are considered artistical as well as original and which were awarded honorable mention are the following:

Mr. Chas. H. Roop, Aurora, Ill.; J. Emerson Crowley, Atlantic City, N. J.; W. Walden Fountain, Elizabeth, N. J.; Harry R. Springer, Denver, Col.

Designs showing a great amount of originality but lacking some other necessary points were submitted by the following:

Earl H. Swanson, Jamestown, N. Y.; Roger Nutt, Cliffside, N. J.; Harry King, Brooklyn, N. Y.; E. Jay Quinby, New York City; Emil A. Kern, West Hoboken, N. J.; two designs by Geo. H. Kahn, New York City; W. F. Guidotti, San Jose, Cal.

Special mention is given Mr. A. L. Eubank, of Austin, Texas, who submitted very original designs for the words "MODERN ELECTRICS." Each letter was made of a different piece of electrical apparatus or machinery.

The humorous element was, of course, not lacking, and Mr. M. Bryant, of Nyack, N. Y., gets first prize by spanking a cat whose head is attached to an aerial, the tail to the ground, the idea being to send a message by means of the cat!

Mr. W. D. Davis, of Johnstown, Ohio, runs a close second by having Uncle Sam who stands on the earth holding up an aerial in his hand while the other end of the aerial is fastened to a tower stationed somewhere in the universe. The Planet Mars has an aerial stretched all across its face and is busy sending flashes.

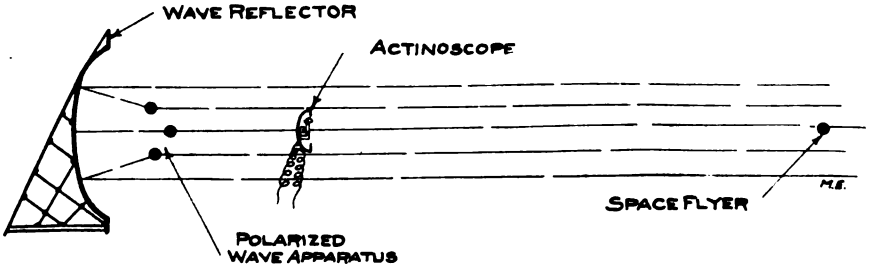
Ralph 124C 41 +

(Continued.)

By H. Gernsback.

AT first thought it might be considered a difficult feat accurately to locate a machine thousands of miles distant from the earth, speeding in an unknown direction somewhere in the bottomless universe. The feat, while remarkable, is easy to accomplish by any up-to-date scientist. As far back as the year 1800 astronomers accurately measured the distance between the earth and small celestial bodies, but it was not until the year 2659 that the famous scientist 124C 41 succeeded in accurately determining the location and distance of space flyers, far out in space, where not even the most powerful telescope could follow any more.

It has long been known that a *pulsating polarized ether wave,* if directed on a metal object, could be reflected in the same fashion as a light ray can be reflected from a bright surface or from a mirror. Moreover, the reflection factor varies with different metals. Thus the reflection factor from silver is 1,000 units, the reflection from iron 645, alomagnesium 460, etc. If, therefore, a polarized wave generator were trained towards the open space, the waves would take a direction as shown in diagram, providing the parabolic wave reflector was used as shown. By manipulating the entire apparatus like a searchlight, waves would be sent over a large area. Sooner or later, if the search is kept up, these waves must come in the direction of a space flyer. Then a small part of the waves would strike the metal body of the flyer, and these waves would be reflected back to the sending apparatus. Here they would fall on the



Actinoscope (see diagram), which records only the reflected waves, not the direct ones.

From the actinoscope the reflection factor is then determined, which accurately shows from which metal the reflection comes. From the intensity and the elapsed time of the reflected impulses, the distance between the earth and the flyer is then accurately calculated with but little trouble.

The reflection factor of magnelium (the metal of which Fernand 60O 10's machine was constructed) being 1060, Ralph located his rival's space flyer in less than five hours' search. He found that 60O 10's machine at that time was about 400,000 miles distant from the earth and that the abductor of his sweetheart apparently was headed in the direction of the planet Venus. A few seconds' calculation showed that he was flying at the rate of about 45,000 miles per hour. This was a great surprise for Ralph and it delighted him at first. He knew that 60O 10's machine was capable of making at least 75,000 miles an hour. This was certainly as strange as it was puzzling. Ralph reasoned that if he were in his rival's place, he certainly would speed up the flyer to the utmost. Why then was 60O 10 flying so leisurely? Did he think himself secure? Did he think that nobody could or would follow? Or did he have trouble with the *Anti-Gravitator?* Ralph could not understand it. However, his mind had already been made up. He would of course chase his rival, head him off, and, if necessary,—yes, he would kill him.

He gave sharp and quick orders to his attendants and ordered his space flyer, the "Cassiopeia," to be made ready within one hour. Provisions sufficient to last for six months were put on board and Ralph himself brought a large number of scientific instruments to the flyer, many of which he calculated might turn out to be useful. He also ordered a large amount of duplicate parts of the flyer's machinery to be put on board in case of emergency, and he then bade farewell to his family.

Although this was, of course, not the first time he journeyed into space, the members of his immediate family were greatly concerned,

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

as they had guessed by this time that Ralph's rival was a formidable foe, one that was not easy to subdue. They knew it would be useless trying to dissuade Ralph from his project; they knew his inflexible will too well. But one member of his family, who perhaps more than any one desired Ralph to stay, thought of a little ruse, which was shortly to give the young inventor a big surprise.

Everybody of course thought that he would take at least Peter, his faithful butler with him, but to everyone's astonishment he announced that he would go alone. He said that if his rival had no man companion, he certainly would not want any. The fight was to be man to man, brain against brain. As Ralph put it:—

"To-day it is not the man that counts. I will show this dog what an up-to-date scientist can accomplish. I will demonstrate to the entire world that crimes of this kind are no longer necessary nor tolerable."

He said this in front of his space flyer, which by this time was in readiness on the platform of his tower. He then shook hands all around and bade everyone adieu, mentioning that he would be back within at least ten days. He was already on the running board of his flyer when the surprise came, in the shape of a government aero-flyer. A smartly uniformed young man jumped on the platform beside Ralph, before the aeroflyer had even stopped. In a flash the uniformed government official had produced a transcribed telegram which he handed Ralph with the officious words:

"Message from the Planet Governor!"

Ralph, turning slightly pale, broke the seal of the wrapper, and unfolded the document. It read:

Unipopulis, Sept. 34th, 2660..

Planet Governor's Capitol.

Sir:—

I have just received the sad intelligence of your misfortune.

Allow me to extend to you my sincere sympathies.

I will this afternoon place at your disposal six Government space flyers, which you may use as you see fit.

I must, however, caution you not to enter into the pursuit in your own person.

As Planet Governor it is my duty to advise you that you have not the right to place your person in unnecessary danger, your life being considered too valuable to society.

Allow me furthermore to point out to you that under the law "+" scientists are not allowed to endanger their lives under any circumstances.

For this reason I command you not to leave the earth without my permission.

I have ordered your space flyer to be guarded.

You will not touch it as long as my private standard flies over your machine.

In high esteem,

WILLIAM KENDRICK 21K 4,

The 18th Planet Governor.

To

Ralph 124C 41+,

New York.

Ralph read the radiogram twice in succession, then he folded it slowly and deliberately thrust it in his pocket. He seemed greatly annoyed and to all appearance did not know what to do.

He then slowly withdrew his hand from his pocket, and extending it to the government official, said:

"Well, I suppose I have to obey orders."

The official took the proffered hand, and no sooner had he grasped it than he stiffened up and became as rigid as a stone.

With one bound Ralph jumped into his machine and cried to the stupefied little audience:

"Don't worry about him. I pricked his hand with a little *Catalepsol*, in fifteen minutes he will be all right again."

With that he slammed the door of his space flyer shut and simultaneously the machine rose as if shot from a cannon, with a terrifying speed, and in ten seconds was lost to all sight.

A few words as to the space flyer mentioned in this narrative will perhaps interest some of the readers who have not had a chance to read up on the subject.

Ever since the dark ages of humanity, men have had a powerful, singular longing to leave the earth and to visit other heavenly bodies. Towards the end of the twenty-first century, when atmospheric flying had become general, men began seriously to think of constructing machinery by means of which man could leave the confines of the planet to which humanity had been chained for ages.

Towards the beginning of the twenty-second century economic conditions had become acute and the enormous population of the earth, which at that time already had passed the twelve billion mark, clamored for an adequate outlet which the planet itself could no longer furnish.

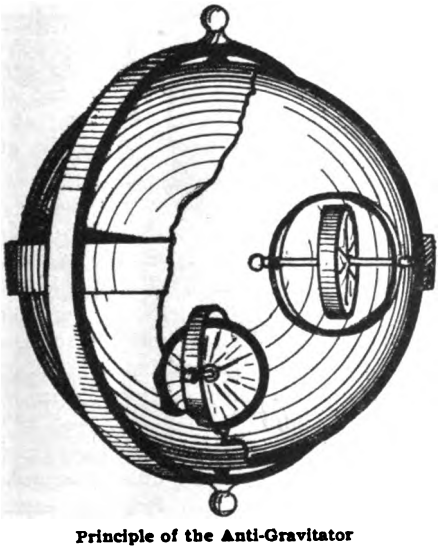
The moon was regarded with longing eyes, and although that body was known not to have any atmosphere and also was considered sterile, the up-to-date scientists and engineers could in a few years time make the moon habitable, without any doubt.

Atmospheric flying machines were of course totally unsuited, as they could never even reach the boundary of the earth's atmosphere, which is but forty miles from the surface of the earth.

Obviously to reach the moon or other celestial bodies, it was necessary to invent a machine which could overcome the enigmatical force known as the earth's gravity, which chains all bodies to the planet.

A multitude of inventions and suggestions were made, but none proved to be of any value until the *Anti-Gravitator* was invented by the American 969L 9 in the year 2210.

This scientist had made extensive studies on the gyroscope and he had finally evolved a



Principle of the Anti-Gravitator

machine which when set in motion would rise freely into the air, and continue to rise as long as power was supplied.

The action, moreover, is purely gyroscopic. The principle in short is as follows:

969L 9 took a large hollow sphere (the rotor) in the inside of which he built a number of independent gyroscopes, all of which traveled in certain orbits. The large sphere which hung in a gyroscopic frame was made to spin around its axis at an enormous speed. This sphere now acted the same as the flywheel of a gyroscope and as such was not influenced by the so-called *horizontal gravity*. As in the case of an ordinary gyroscope, its axis would always be in a vertical line as long as the spheric rotor was in motion.

If now, however, the independent gyroscopes in the inside of the sphere were set in motion by means of electrical current, the *Vertical Gravity* (weight) would be overcome at once —the entire contrivance would rise into the air, its rising or lifting speed to be directly proportional to the speed of the enclosed gyroscope rotors.

The anti-gravitators in the course of time were greatly perfected, and to-day it is possible to lift a weight of 1,000 Kilograms with an anti-gravitator weighing but 12 Kilograms, strange as it may seem.

Space flyers for a good reason have from six to twelve large anti-gravitators attached at various points over their shell, all of which work in unison, or, if desired by the operator, only certain ones are operated in order to "steer" in a different direction.

Let us now return to Ralph, after our little scientific excursion.

As the space flyer rushed through the atmosphere, the friction of the machine against the air made the interior of the flyer uncomfortably hot for a short while, although a space flyer has triple walls, the spaces between the walls being filled up with the best heat insulating materials.

After the flyer, however, had left the atmosphere, the stellar cold soon cooled off the machine.

Ralph then took his bearing, after he had verified, by means of the polarized wave transmitter on board the machine, that 600 10's flyer was still going in the same direction as before he left the earth. He then locked the steering wheels and the space flyer continued its journey in a straight line towards the machine of his rival.

This done, Ralph then sent off a radiogram asking the Planet Governor's indulgence for disobeying the law and explained that he would rather have died than stay on earth without making a personal effort to snatch his fiancée from the hands of "that monster 600 10."

This accomplished, he took his first look at the earth, which, as he was moving at the rate of 80,000 miles an hour, had shrunk to the dimensions of a medium-sized orange. Inasmuch as he was flying towards the sun, the earth, being directly in line with his machine and the sun, was fully lighted and appeared like the full moon. The continents and the oceans were visible most of the time, but more often were hidden from view by mist or clouds.

The general aspect of the earth as seen from Ralph's flyer was that of a delicate faint

red ball with white caps at each of the poles. The reddish hue of the ball is due to the earth's atmosphere, the white caps are the snow around the globe's poles.

The brilliantly lighted earth was silhouetted against the inky black sky in a sharp contrast.* The moon, hidden behind the earth, was not in evidence, when Ralph first looked earthward.

The stars shone with a brilliancy never seen on earth; distant stars which ordinarily cannot be seen, except with a telescope, are plainly visible to the naked eye, in the outer space.

The sun shone with a dazzling brilliancy in a pitch-black sky, and to look directly into its rays was enough to blind one for life.

The heat of the sun in the outside space when striking objects is tremendous. If one holds one's hand against a glass window of the space flyer where the sun can strike it full, the hand will be burned in a few seconds.

There is of course no night in the outer space (within the bounds of our planetary system) the sun shines all the time, uninterruptedly.

Time is an unknown quantity. If it were not for the chronometer, reeling off seconds and minutes according to the earth's standard, time in a space flyer would stand still.

Wonderful as these things are to the man who never left the earth, the phenomena encountered inside of a space flyer in the outer space are still more wonderful and amazing.

We know that "weight" is synonymous with the gravity of the earth. The larger a celestial body, the greater its gravity. The larger such a body is, the more strongly it will attract its objects. The smaller the body, the smaller its force of attraction.

Thus a man weighing eighty Kilograms on a *spring* scale on the earth, would weigh but thirty Kilograms on the planet Mars. On the sun, however, he would weigh 2232 Kilograms, and so on.

In the inside of a space flyer, which has an infinitely small gravity, objects weigh practically nothing. They are heaviest near the walls of the machine, but in the exact center of the flyer, all *objects lose their weight entirely.* Thus any object, no matter what its weight, *will hang freely suspended if placed in the center of the space flyer.* It cannot fall up, nor down, it will hang stationary, motionless, like a balloon in the air, without any physical means of support.*

The occupant of a space flyer, being relieved of practically all his weight, moves around with astonishing ease. He almost floats around the machine. No physical labor is exerting. The biggest table is no heavier than the lightest match. The human body can perform an incredible amount of work without tiring in the least and without any apparent effort.

One can walk up the walls or walk "upside down" on the ceiling without any danger of falling, as there is no "up" or "down" in outer space.

Life seems too pleasant and beautiful to be true on board of a space flyer. The body, relieved of the great weight to which it is accustomed on earth, experiences a wonderful feeling of well-being impossible to describe.

One never can feel tired, no matter how hard one works physically, as nothing is hard to do, nothing having any weight, not even one's own body.

Sleep, in a space flyer is practically impossible. There being nothing to tire one, *sleep is unnecessary.* Dozing off is all one can do, and that can never last long, except after strenuous mental work.

As long as a space flyer is not too far distant from the sun (within the orbit of Mars, at least), little artificial heat to warm the flyer's interior is needed. The sun heats up one-half of the flyer's shell to a fierce heat, but the side turned away from the sun is exposed to the terrible stellar cold (absolute zero) and thus a fairly comfortable temperature is the result.

The air supply is manufactured by chemical means on board, but very little is needed, as the original supply taken from the earth is used over and over by working up the carbonic acid by means of automatic generators.

It is of course of the utmost importance that no porthole or doors leading to the outside be ever opened as long as the flyer is in the outer space. The result would be that the air would rush from the flyer instantly, resulting in a perfect vacuum in the inside of the space flyer, which of course would kill every living being almost instantly.

The steering of a space flyer is accomplished as follows:

The farther away the flyer is from a celestial body, the less its speed need be. There are of course exceptions to this. Thus between every two celestial bodies a point will be found where the attraction that one body

* In the outer space the "sky" is dead black; the blue color of the sky as seen from the earth is due to the atmosphere. The real sky is colorless.

* It is well known that if a shaft were sunk to the center of the earth, an object placed there would stay suspended.

(Continued on page 616)

New Electrical Appliances

THE ELECTRIC SPEEDOMETER.

A most interesting application of electricity is represented in the Hopkins Electric Speedometer, an instrument devised for denoting the speed of a vehicle.

This type of speedometer, consists essentially of two parts, viz: a direct current generator geared to the wheel of the vehicle, and a voltmeter connected to the generator.

The generator, shown in Fig. 1, has a permanent magnet for the field excitation. This magnet has been treated by the special process used in electrical instrument construction, in order to insure absolute permanency and accurateness, irrespective of age. The current is generated in the three coil armature, rotating between the poles of the permanent magnet. A three segment commutator built of pure

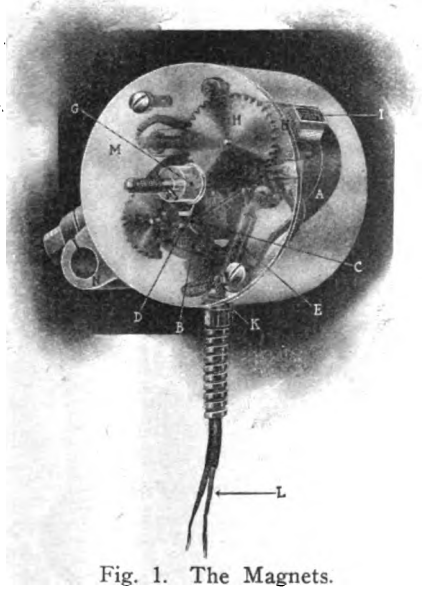


Fig. 1. The Magnets.

platinum, enables the current to be collected from the armature by 20 karat gold brushes, so that oxidation is eliminated, hence no variation in the resistance of the circuit is possible. Proper mechanical designing compensates for the wear of the parts, and accuracy is maintained at all times. The tungsten steel magnet is shown at A, the armature at B, the platinum commutator at C, and the brushes at D, the gold brushes being firmly pressed against the commutator by the springs E. The entire mechanism is contained in the phosphor bronze case M, which is waterproof.

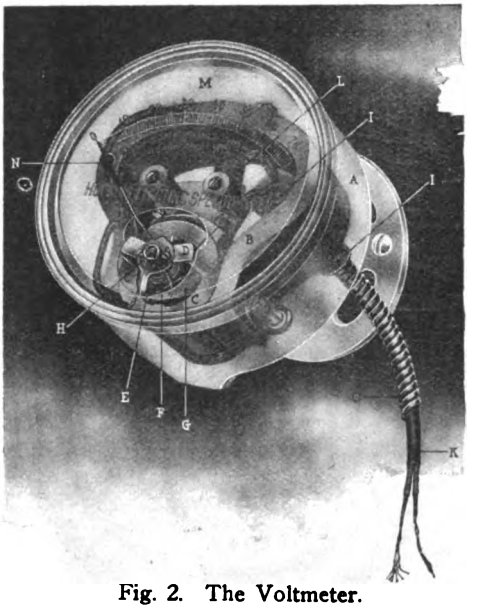


Fig. 2. The Voltmeter.

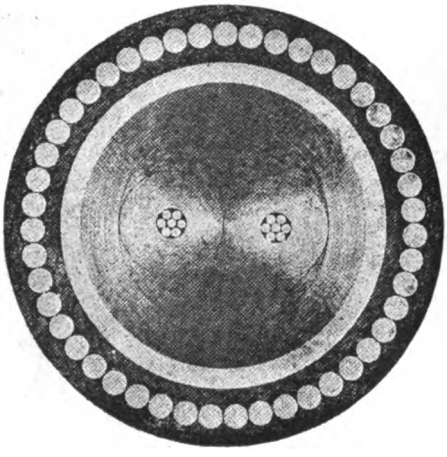
The voltmeter apparatus is illustrated in Fig. 2, and it will be noticed immediately that it is built along the well known standard of meter design. It consists of the permanent tungsten steel magnet B, carrying the pole pieces C, between which the moving element F turns, the moving section being mounted on sapphire bearings. The indicator N moves upon the scale, which in this instance is calibrated in miles per hour. By having a revolution counter on the magneto gearing, it is possible to keep a record of the miles traveled in a given period of time. The small spool L, contains a winding of fine resistance wire of zero temperature coefficient, which is the means of obtaining accurate calibration. The entire meter is encased in the polished brass waterproof covering, with the plate glass face in front.

The voltmeter may be calibrated in other terms if desired, such as revolutions per minute. It has been found unequalled in a number of uses, and many of these instruments are being

used by the Pennsylvania R. R. in their testing laboratories. The great advantage which this instrument possesses over other speedometers, is the lack of the troublesome flexible shaft, which the others employ.

A 130,000 VOLT CABLE.

The accompanying illustration shows a cross-section view of the high tension cable manufactured in England for the Clifton and Glace Bay stations of the Marconi Wireless Telegraph Co., Ltd. Describing the cable, the *"Electrical Review"* states in part:



130,000 Volt Cable.

"This cable was insulated with pregnated manilla paper, lead sheathed, and wire armored. It was designed to carry a current at 30,000 volts pressure to the transmitting house from the power station, the current being generated by series direct-current dynamos for charging accumulators. This cable was to have been tested with a pressure of 56,000 volts between cores and lead, as well as between core and core, as a large factor of safety was required.

"As above mentioned, in actual test the cable successfully withstood a pressure of 130,000 volts for 10 minutes, this high pressure being reached by gradual stages, without any interval of rest for recovery between tests. During the test the cable was bent in two places to a radius of seventeen inches. It is maintained that these results constitute a record for high tension cables, for during the first five minutes a pressure of 75,000 volts was applied, followed by 90,000 volts for a like period of time, when the pressure was increased to 100,000 volts and maintained for twenty minutes at that voltage. Another increase was made to 115,000 volts, the cable being subjected to this pressure for thirty minutes before the final test of 130,000 was made. It will thus be seen that the entire length of the test was more than an hour with the voltage applied 100,000 volts or higher."

A VARIABLE MERCURY CONDENSER.

Of the many types of variable condensers used at the present time in wireless telegraphy and telephony, there are few, if any, which present a satisfactory type from a combined mechanical and electrical viewpoint. The best of condensers for use in the oscillating circuits of wireless telephones often "break down" under the high tension strain. If these defects are to be avoided, the condenser while

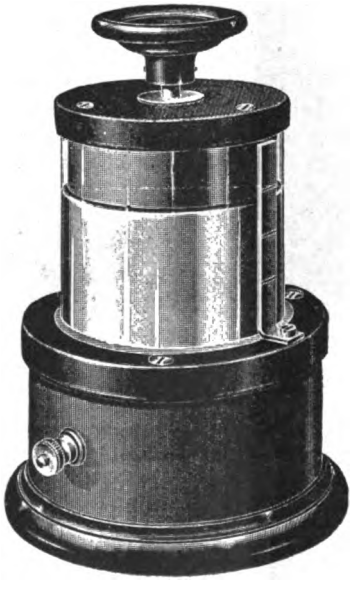


Fig. 1. The Mercury Condenser.

improving from an electrical standpoint, decreases in value from the mechanical point of view, by becoming too large and difficult to handle. Fortunately, a condenser of the variable type which evidently overcomes these defects has been placed on the mar-

ket by an English firm, a description of which is given below.

The variable mercury condenser, is the product of the Isenthal firm, and is illustrated in Fig. 1. Its principle is entirely new, and found to successfully meet all the requirements, so poorly met in earlier types. It has been the object to perfect a condenser with a large range in capacity, and to have the maximum capacity as great as possible within compact dimensions.

In Fig. 2, a diagrammatic view of the condenser is shown. A metal cylinder A, is fixed on the ebonite base B. The condenser is covered with a continuous coating of thin Mica (not

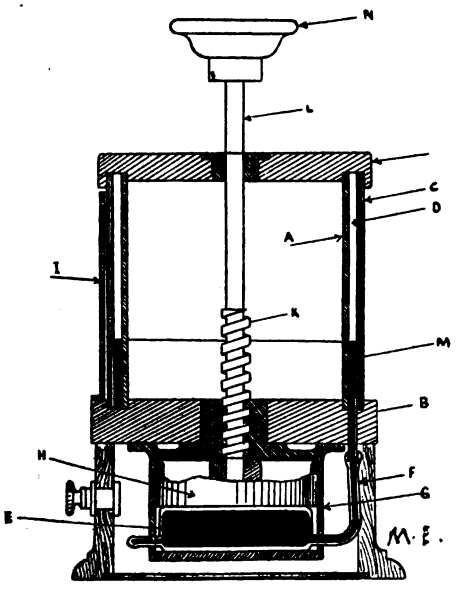


Fig. 2. Working Parts.

shown in sketch) and is surrounded by the glass cylinder C, which likewise is held on the base B. In the annular space D, between the cylinder and the glass, a quantity of mercury is forced, and the capacity of the condenser varies in accordance with the level of the mercury. An index I is provided at the side of the glass, so that the capacity may be read. The mercury is normally contained in a rubber bag E, which is connected to the space D by means of the rubber tube F. The bag itself is placed inside the metal cylinder G and is pressed upon by a piston H, which slides in the cylinder. This piston is actuated by the hand wheel N, fixed on the screw spindle KL.

It will be noted that, the more the handle N is turned in one direction, the greater the pressure on the rubber bag E, and the higher the level of the mercury, thus increasing the capacity.

The advantages of the new form of condenser are briefly:

It is extremely campact; its capacity is very high; it will not spark over; there are no adjustments to get out of order; and, it will retain the capacity for which it is set without special arrangements for securing parts in position.

AN IMPROVED TRANSMITTER FOR WIRELESS TELEPHONY.

Great interest has been attracted in the experiments of W. Dubilier, the youthful wireless telephony experimenter. Among the new features which make his system unusually successful, are the two heretofore stumbling blocks, namely, the arc and the telephone transmitter. We will give a general description of the telephone transmitter which he has designed.

Generally speaking, this transmitter might be termed a telephone relay, inasmuch as the voice is imparted in one cicuit, which in turn reacts upon another circuit handling the heavy current. Looking at fig. 1, we find two permanent horse-shoe magnets with bobbins wound to 2 ohms on each arm, B. These magnets are brought to act upon the two diaphragms of 1/28th inch thick at C.C. The round covering D is of ebonite and serves as a supporter for the inner apparatus, and to mount the diaphragms thereon. In fig. 2 we find the vital part of the transmitter, which consists of three metal cups, one within the other. The inner and the outside ones are used for the circulation of water, to cool the carbon grains contained in the middle portion. Water is continuously circulated through F and H. Contact with the carbon granules is accomplished with platinum rings J J, which are drilled with holes to allow the circulation of air as well as the inlet and outlet tubes for the water circulation. The contact is made in the center of the carbon

grains, and a mica disc is used to retain the grains in place.

In operating this transmitter, an ordinary telephone transmitter is connected with a few cells in series with the bobbins B B. When current is thus sent through B B, the diaphragms C C are affected, and in turn vary the resistance of the carbon grains, there-

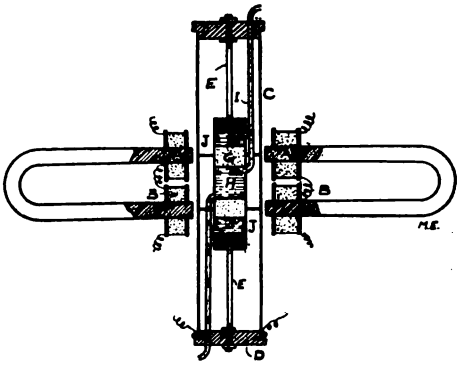


Fig. 1

by setting the variations in the aerial circuit of the wireless telephone set. The combined variation of the two diaphragms is said to be 1/8 inch, since each diaphragm moves 1/16 inch, and they both move in opposite directions.

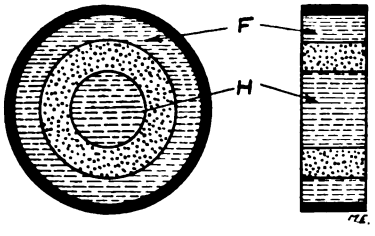


Fig. 2

The device has been used for relaying telephone land line messages with great success, and thus far is acknowledged as the nearest approach to the perfected heavy current transmitter.

WIRELESS ACROSS THE PACIFIC.

It is alleged that on October 5th, wireless messages were transmitted across the Pacific direct to Japan. A station in San Francisco performed the transmitting feat, which constitutes a world's record.

TWELFTH ANNIVERSARY OF WIRELESS.

November, 1911, marks the twelfth year of the inauguration of regular wireless service on an ocean liner. Judging from the development of the art and its commercial application, it is safe to state that it has advanced more rapidly than any other industry aside from aeronautics.

In 1899, the steamer "St. Paul" succeeded in transmitting a message sixty-six miles to the Needles in England, which was considered a remarkable record at that time. Today, amateurs with simple sets, most of the instruments in these sets being home made, readily receive messages from ships over one thousand miles away. The commercial stations communicate without difficulty to ranges in excess of five hundred miles. Commercial stations as well as government ones, dot the coasts from one boundary to the other, sending countless messages and safeguarding the lives of thousands of human beings on ship-board.

It is with deep regret that a number of unscrupulous men should have gained a footing in the wireless industry, and used it as a tool for extorting money from thousands of victims in promoting stock sales. This money has been used, not for wireless stations and service, but for the foundation of huge fortunes made by these men in their dishonest undertaking.

Today it may be said that the wireless industry is undergoing a state of purification, and will issue from this state, a clean and prosperous organization, its main financial income being secured as tolls for messages. The promoting stage is one to be passed by every new invention, and if that industry survives through this period of criticisms and abuse, its future success is certain.

NOTICE.

Will all the members of the Mowa Wireless Club kindly communicate with the President, as we wish to hold an election of officers, and also discuss the probability of a club house. Applications for membership are open.

CHAS. H. GREGORY, Pres.,
158 Fifth Ave., Brooklyn, N. Y.

A Unique Portable Electric Fountain

By Frank C. Perkins.

THE accompanying illustration shows the construction of a novel portable electric fountain, which is extremely simple and consequently, is not liable to get out of order. It consists of a specially constructed motor attached to a centrifugal pump, the latter placed in the interior of a metal basin. The pump gets the water directly from the basin and conveys it through pipes to a multiplicity of nozzles, which direct a large number of small streams over the dome. The water then flows down in the basin to be used over again by the pump.

An Electric Fountain.

This portable, electric fountain embodies all the gorgeous effects and artistic beauties that the combination of colored glass, flowing water and electric light can produce.

It may be stated that as a beautiful artistic decoration it is equally appropriate in a reception room, library, hall or conservatory. Either alone or in combination with the time worn stereotyped dining table decoration of ferns and flowers, the electric fountain may be used to greater advantage, not only on account of its beauty, but also for the delightfully soothing effect of softly falling water and ever changing colors. The electric fountain also furnishes, by evaporation, the necessary moisture to the atmosphere. It gathers the dust floating in the air and deposits it in a strainer, which can be cleaned out. The water used in the fountain may be scented and in a sick room the portable electric fountain not only proves a diversion to the patient, but by adding a mild antiseptic it will render the air sterile. This electric fountain is operated by the same current that operates a fan or incandescent light and no plumbing connections are required, as the water is used over again, merely replenishing that which evaporates. It measures in height 26 in. with a metal base 16 x 12 in. Its finish is verde antique and measures 24 x 21 in. while the glass catch basin is leaded. The figure is a metallized copper Psyche, and the entire weight of the fountain is 48 pounds.

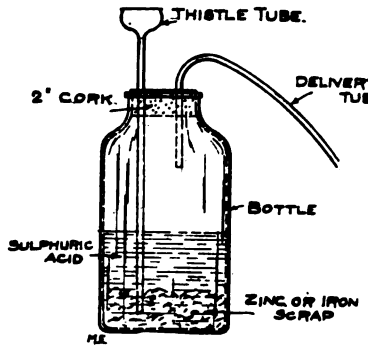
THE LARGEST ACCUMULATOR PLANT.

The accumulator plant of the Consolidated Gas, Electric Light and Power Co., of Baltimore, Md., is said to be the largest in the world. The total weight of the plant, when ready for use will be approximately 1,079,200 pounds. The output will be about 5,517 kw. or 7,395 hp. This output makes it possible to light 220,680—25 watt Tungsten lamps for a period of twenty minutes. The plant is being installed by the Electric Storage Battery Co. of Philadelphia, and is of the Exide type.

Simple Experiments in Chemistry.—Hydrogen

By Philip Edelman.

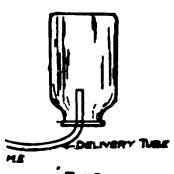
HYDROGEN is the lightest substance known. It is 11,000 times lighter than water, and is used in airships for this reason. It is one of the most interesting gases with which to experiment. It has no taste



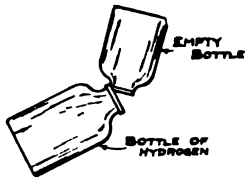
—FIG. 1.—

or color and if pure, no odor. It is insoluble in water.

Hydrogen may be prepared in several ways, the one shown in Fig. 1, being the simplest and cheapest for experimental use. Almost any shape of bottle may be used. Be sure that the cork is tight so that the gas cannot leak. You can use either zinc or iron scrap. The thistle tube is used as a safety valve. Be sure that it reaches below the surface of the acid. Take great care not to bring a flame near the generator, because hydrogen and air when mixed explode violently.



—FIG 2.—



—FIG. 3.—

The gas can be collected over water in the same way that the oxygen was collected, or it may be collected by upward displacement as in Fig. 2.

Collect several bottles filled with the gas.

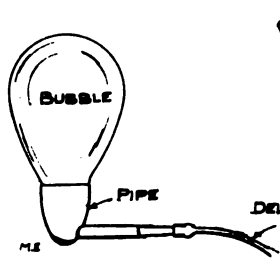
Bring one bottle full near a flame. It should catch on fire and burn with an almost invisible flame. Hydrogen alone does not explode.

Take another bottle full and hold it in the air for a second. Bring it near a flame. It will explode with a whistling sound. Hydrogen mixed with air is explosive.

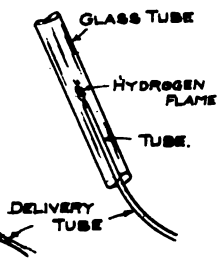
Hydrogen can be poured as shown in Fig. 3. It must be poured up. Hold a bottle of hydrogen beneath a bottle of air and the hydrogen will change places with the air on account of its lightness. It will rise into the other bottle.

To prove this, bring the upper bottle to a flame. It should either burn or explode. Do the same with the lower bottle. Nothing should happen because this bottle contains only air.

Fill some soap bubbles with hydrogen by connecting the pipe stem to the delivery tube of the generator. Shake the bubbles off and they will rise rapidly. Bring a lighted candle near one of these bubbles as it rises.



—FIG. 4.—



—FIG. 5.—

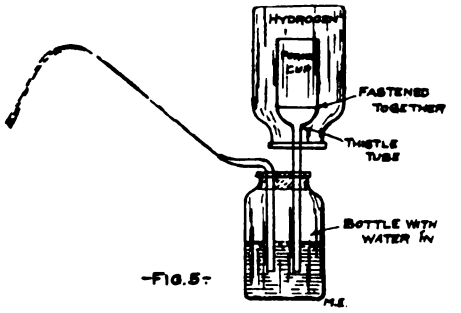
It will explode. This is shown in Fig. 4.

A very interesting experiment is shown in Fig. 5. Slip a bottle full of hydrogen over the porous cup and the hydrogen passes through the unglazed cup. It forces the air and water out of the apparatus, forming a pretty fountain. This experiment illustrates diffusion.

Light a bottle of hydrogen with a candle, as in Fig. 6. Insert the candle into the bottle and the candle is extinguished. Bring the candle back to the mouth of the bottle and it will light again. This may be repeated several times. The hydrogen is lighted by the candle, but when it is inserted in the bottle the candle goes out because hydrogen does not sup-

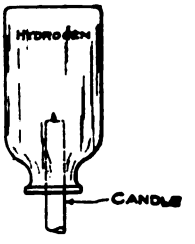
port combustion. Hydrogen will not let anything else burn in it. As the candle is withdrawn it is relighted by the burning hydrogen at the mouth of the bottle.

Make a burner from a piece of glass tubing as shown at (a) Fig. 7. Connect it to the delivery tube of the generator. If the generator stops gen-



-FIG. 5-

erating add more acid. This burner must be lighted with hydrogen. To do this, collect a test tube full of hydrogen (b) Fig. 7. Light the tube of hydrogen and then light the burner by bringing the burning hydrogen in the tube to it. This prevents an explosion and is the only safe way. This flame from the burner is very hot. It will heat iron or copper red hot, and melt lead or zinc, etc., very quickly. If a cold plate is held above the flame, little drops of moisture will collect on it. The hydrogen unites with the oxygen in the air and forms water.



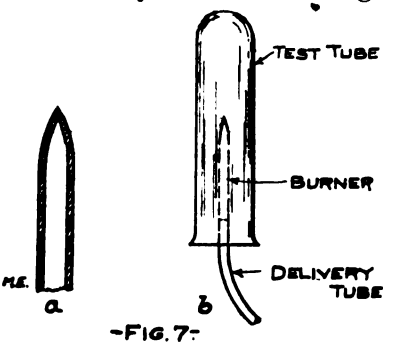
-FIG. 6-

Push this lighted burner up and down a piece of glass tubing, as shown in Fig. 8. The heated air vibrates and a musical tone is the result. It is called the "singing flame."

Hydrogen has many important electrical uses. It is liberated from almost every type of primary and storage battery.* It causes a great deal of trouble by collecting on the battery plates.

*See Chapter I, "The Practical Electrician," By Prof. W. Weiler.

It is used in speaking arc wireless telephones, to steady the arc. It is readily generated by electrolysis of water, the only drawback being the



-FIG. 7-

slowness and the cost. Oxygen is also formed by the electrolysis of water.

Hydrogen can be used to advantage as a flame detector for wireless telegraphy.

WELSH WIRELESS AMATEURS.

One of our Welsh friends calls our attention to the installation of wireless apparatus, in Cellygroes, Wales, England. The two young men, Arthur E. Moore, and his associate, R. Jenkins, have erected wires on poles held in tree tops. The village is located with mountains on every side. During the recent war operations of Italy and Turkey, these two young men were able to receive the news by wireless long before the bulletins were received over the land wires in the larger cities. One of these amateurs is still a school boy, while the other is an electrician at a local colliery. The greater part of the apparatus was made by the youths.

WELCOME WIRELESS ASSOCIATION.

The Welcome Wireless Association was organized on October 30th, 1911. The purpose of this association is to learn to its members how to receive and send wireless messages correctly, thereby developing them into a group of trained operators. Another equally important motive, is to have the individual ideas and experiences exchanged, so that a mutual benefit may be obtained from each.

Any boy from 14 to 16 years of age wishing to become a member, is requested to write to: Wireless, 185 Chauncey Street, Brooklyn, N. Y.

This department has been started with the idea to encourage the experimenter to bring out new ideas. Every reader is welcome to contribute to this department, and new ideas will be welcomed by the Editors. WHEN SENDING IN CONTRIBUTIONS IT IS NECESSARY THAT ONLY ONE SIDE OF THE SHEET IS USED. SKETCH MUST INVARIABLY BE ON A SEPARATE SHEET NOT IN THE TEXT. The description must be as short as possible. Good sketches are not required, as our art department will work out rough sketches submitted 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.

NOTICE.

It is with great pleasure that the editor expresses his appreciation of the many novel and interesting ideas which have been contributed in the last few months. This tends to prove that our little notice in the August issue served its purpose admirably, with the excellent co-operation of our contributors.

We are obliged, however, to make another suggestion at this time, and again look forward with pleasure and assurance, to its meeting with the same success as the previous one.

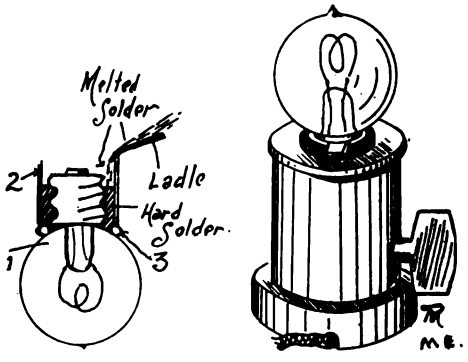
During the last few months, in particular, we have received numerous contributions, which, while lacking originality, have furthermore been published in previous issues of Modern Electrics. The most pronounced instance recently came to our attention, when a contribution was received in which the wording and the drawing coincided word for word, and line for line with the identical article published about a year before by the same author!

Would it not be an excellent plan to procure all the back numbers, or at least, the issues for one year back? It would avoid many hours of hard work preparing an article in which the idea has already been covered.

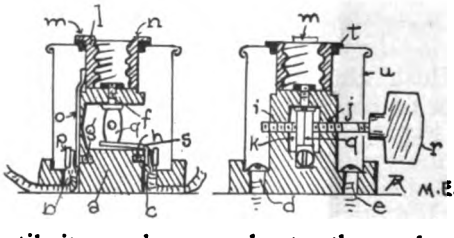
FIRST PRIZE TWO DOLLARS.

SIMPLE KEY SOCKET.

This socket may not seem simple at first, but it is really less complicated than most key switches now in use. It consists of a base, a, preferably of black fibre, through which the holes, b, c, d, e, f, g, h, i and j, are drilled, and the hole, k, is cut out with a chisel or burnt out with a red-hot iron.



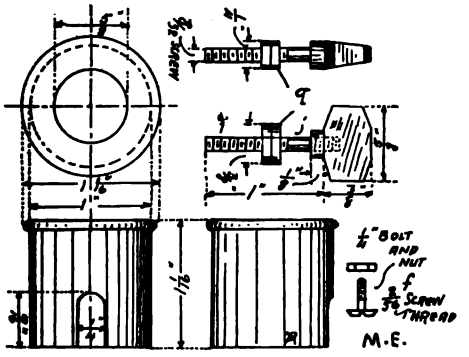
The screw-socket is now made as shown in one of the detail drawings. A lamp, 1, is placed base up and a packing ring, 3, placed over it. Then the tube, 2, is placed over the packing ring. Now melted solder is poured in



until it reaches nearly to the end of the base. As soon as the solder is cold the tube, 2, is trimmed to the required dimensions. The strip, o, is now made and soldered to 1 as shown. This strip is now screwed to a, by means of

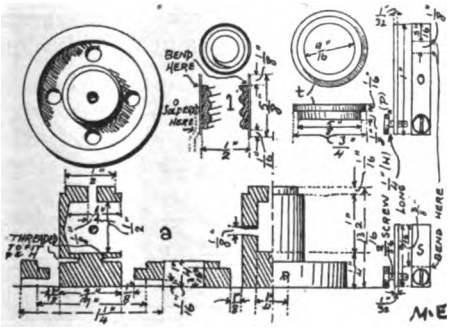
the screw, p, which also serves as binding post.

The part g is now to be considered. This consists of two pieces of one-sixteenth inch sheet brass shaped as shown, and so threaded that when they interlock on ij, they form one piece, as in the illustration. The screw, ij, is now gotten and the handle, r, made and fastened to it. The piece, s, now deserves our attention. It should be



cut and bent as shown, and the screw, h, fitted to it, which screw serves, like p, to fasten the strip and also to act as binding post.

The screw, f, is then to be gotten and put into place as shown. The ring, t, should now be cut from a piece of black fibre. U is a part of a small tin



can trimmed to the shape and dimensions shown.

The parts should now be assembled. After the rest has been assembled the cover, u, should be slipped over, and t put on top of it. Now the ears, m and n, are bent tightly over t so as to hold the cover securely.

If you have made a good job of this you will have a neat socket which will not easily get out of order. The above socket is adapted only for miniature bases; for candelabra or Edison bases the dimensions must be altered.

Contributed by

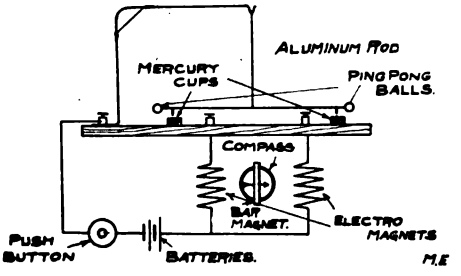
P. MERTZ.

SECOND PRIZE ONE DOLLAR.

AN ELECTRIC BAROMETER.

An accurate barometer may be constructed as follows: The material required is comprised of two celluloid balls, (similar to those used in the game of "ping pong"), three feet of No. 14 aluminum wire, a small quantity of mercury, two brass cups, two bell magnets, and one permanent magnet and compass.

Dismantle the compass and turn the white card plain side up, marking on same at one end "rain," in the middle "changeable," and at the other end "fair," all as shown in the assembly



-FIG. 1.-

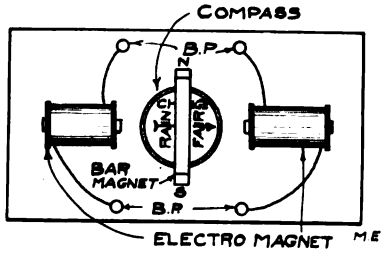
drawing. Cut a base 5x3x1 inches as in Fig. 2, and in the center cut a groove for the bar magnet so that it sets flush. Mount the two electromagnets on the same base as shown. Now set the compass in the exact center with the opposite readings on the card running the same way as the bar magnet, and connect the wires from the coils to B and P.

Cut a piece of aluminum wire 20 inches long and in the exact center bend it in the form of an inverted V. Now 6 inches from the V, loop the wire so that the balls fit snug. Do this on both ends. Now the balls must be air tight and to test, place them in hot water and if any bubbles arise, the seams of the balls must be plugged with hot wax or paraffine until they are thoroughly air tight. Punch a pin hole in one of the balls and mount them on the aluminum wire which in turn is suspended 2 in-

ches from the base on a fine copper wire.

Now on the base mount the two brass cups directly under and 1½ inch from the ends of the aluminum wire, and solder to the rod two pieces of wire 2 inches long, so that when the above rod is horizontal, the wires will be about ½ inch above the mercury pools, which are held in the brass cups. Make the connections to the binding posts as shown in diagram.

Place the instrument in Fig. 1, near an open window or any other place where it can come in contact with the outside atmosphere, but at the same time protect it from draughts, and lead the wires from the binding posts to the instrument in Fig. 2, which may be located at any convenient place. The wires must be connected so as to make the bell magnets' south poles point



-FIG. 2-

towards the compass when the circuit is closed either way.

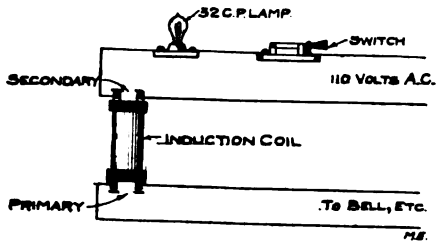
Those of the readers who have studied physical geography will understand how this apparatus works but for those who have not, the author will explain the mystifying action. The two balls are precisely the same weight when sealed, but when a hole is punched in one of these, either high or low pressure areas tend to affect the weight, as that of the sealed ball remains constant, while the punched ball varies. With a heavy pressure area it signifies clear weather for two days, and the ball with the hole is heaviest and falls, thereby closing the contact which causes the needle of the compass to point to "fair." A low pressure atmosphere causes the sealed ball to drop, and when the weather is unsettled, the rod remains horizontal, and the bar magnet pulls the needle to "changeable." Of course with a push button in the circuit, the needle will always be pointing to "unchangeable" until the button is pressed. If desired the batteries may be left in circuit continuously.

Contributed by

E. HUTCHINSON.

A STEP DOWN TRANSFORMER.

The sketch shows how I cut down 110 volts, alternating current, so I could use it to run a small electric engine, buzzers, bells, miniature lamps, etc.



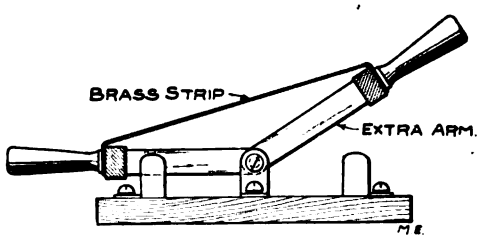
The principal thing needed is a small induction coil about the size of a telephone coil, which is connected as shown in the diagram. It must be noticed that the current goes through the secondary first. I don't think the lamp in the diagram is necessary, although I used it.

Contributed by

FRANK REARDON.

AN AERIAL SWITCH.

An excellent quick-throw aerial switch can be easily and quickly constructed as follows:



First procure a D.P.D.T. switch and a duplicate switch arm. Pivot both of these at the hinge post. Then procure a piece of 1-16 inch brass strip ½ inch wide and long enough, so that when the switch arms form an angle of 135 degrees, the brass strip will be long enough to connect them and have one inch left over. One-quarter inch from each end of strip drill a hole slightly larger than the screw passing through the handle. At one-half inch from each end bend just enough so that it will

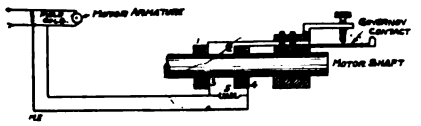
lay flat against cross pieces on switch arms. Then place between the said cross pieces and handles, and switch is ready for use.

The switch should not cost more than fifty cents and can be used even on a three inch coil.

Contributed by
FRANK H. BROOME.

A GOVERNOR FOR MOTORS.

I am sending you a drawing of a governor for a motor where a constant predetermined speed must be employed. The principle of this governor is the weighed spring which acts by centrifugal force to make a contact with an adjustable screw, when the speed of the shaft rises to a predetermined amount. This spring and its contacts are connected to two collector rings 1 and 2, on the motor shaft and connection is made to these by brushes 3 and 4. The closing of the governor serves therefore, merely to short-circuit the resistance 5, which is normally included in the shunt field of



the motor. The governor is based on the principle that the weakening of the field increases the speed. It acts to insert the resistance in series with the field winding when the speed falls, and this in turn results in restoring the speed to normal.

Contributed by
RICHARD THOMPSON.

A VARIABLE HIGH SPEED MOTOR INTERRUPTER.

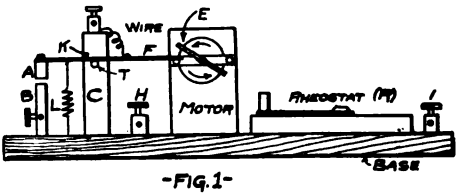
The interrupter plays an important part in the operation of an induction coil. It is a well known fact that the ordinary spring vibrator on a coil will not give a rapid vibration unless tightened up, and this takes a large amount of current. As a high speed interrupter is desirable because of the high frequency spark, then, it follows, that it will take a lot of current to operate the coil properly.

The following is a description of an independent interrupter, that will give a varied pitch to the spark regardless of the current supply. Of course the full rated current should be used so as to obtain correct results.

With a little care, any one can construct this interrupter.

The base (Fig. 1), is 10 inches long, 7 inches wide, and ½ inch thick. It is made of well seasoned oak, and is beveled to give it a good appearance.

A small motor that runs at a very high speed on two or three dry cells, is mounted in the center of the base,



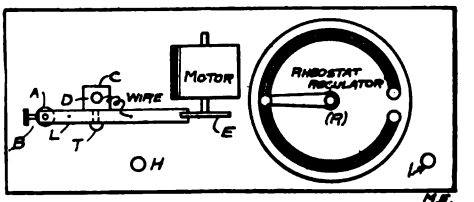
-FIG. 1-

(see Figs. 1 and 2). A piece of 1-16 inch round brass rod, 1 inch long; is soldered to the end of the motor axle, (E in Figs. 1 and 2).

In Fig. 1, C is a wooden upright and is fastened firmly to the base, 1½ inches from the motor.

F is a piece of spring brass. 1-16 inch thick, ¼ inch wide and 4 inches long. A round battery nut is soldered to its centre. This acts as a bearing and is supported to C by a brass headed tack, T.

A and B are two pieces of wet cell zincs. These are the contact points. B is stationary while A is fastened to one end of F.



-FIG. 2-

A binding post D is placed upon C and connected to F by a short flexible wire.

A coil spring L is arranged so as to keep A in contact with B. The two contact surfaces must be parallel and touch throughout.

A rheostat regulator R is placed on the base and connected in series with

the motor, to regulate its speed, and consequently vary the pitch of the spark.

Two binding posts H and I, connect to the motor.

A small nail K, keeps F from moving too far back.

Now as the motor revolves in the direction of the arrow, the two ends of E push down on F, and raise A. This breaks contact, the spring L draws A down again, making contact. The circuit is made and broken twice in one revolution of the armature.

As some of these small motors make from 3,000 to 4,500 R.P.M. then there is 6,000 or more interruptions per minute or 100 or more per second.

This gives high frequency oscillations in the secondary circuit and gives a clear, high musical signal.

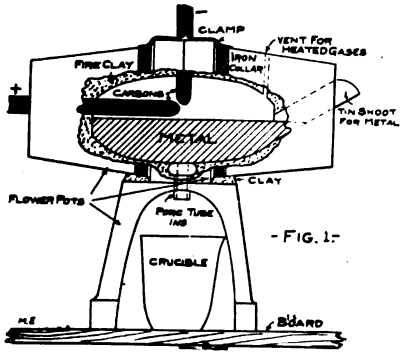
Contributed by

B. F. DASHIELL.

ARC FURNACE.

The sketches for this arc furnace seem to be self-explanatory, so a brief description will suffice.

Fill two flower pots with fire clay and mold with a jelly glass, leaving the clay thicker at the top than at the bottom. Make a hole at one end and at the top for carbons, but large enough so that they will slide easily. Next make a hole at the opposite end

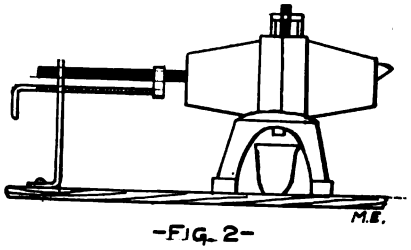


- FIG. 1.-

large enough to admit metal to be melted, and furnish with a lip, also a hole at the bottom for a porcelain tube insulator. After the clay has dried, clamp the pots together and mount as shown. The lower pot should be cut away so that a crucible may be slid under.

Fig. 2 shows the style of carbon holder used. If these brief instructions and sketches are followed carefully, the result will be a very serviceable furnace.

No dimensions are given, but of



-FIG. 2-

course the larger the carbon the more heat.

Contributed by

GRIFFIN KING.

THE RENEWAL OF EDISON FUSE PLUGS.

Many of our readers have doubtlessly (and correctly) thought that a considerable saving might be effected by inserting a new piece of fuse wire in a blown out fuse plug, and have tried to act upon that thought, with the result, perhaps, of melting the new piece of fuse wire in two while attempting to solder it in place. This job can, however, be successfully done, the only materials necessary being the new piece of fuse wire, a pocket knife, a piece of heavy iron wire bluntly pointed at one end and a means for heating it.

Remove the brass cover from the fuse plug by running the blade of a knife under the turned over edge, and remove the old fuse wire; leaving, however, the beads of solder which fastened it to the pin in the bottom of the plug and to the outer shell of the plug. Take a piece of fuse wire of the desired capacity and of sufficient length, and scrape the ends of it until the bright metal is exposed.

Now heat one end of your iron wire to a dull red, touch it to the bead of solder in the bottom of the fuse plug, withdraw it and instantly plunge one end of the fuse wire, which you have been holding in your other hand, into the middle of the melted globule of solder. If the wire was scraped clean, it will stick at once.

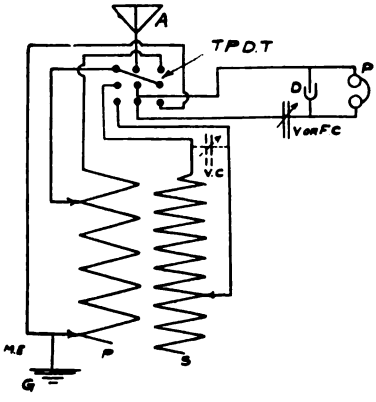
Now put the free end of the fuse wire through the hole leading to the outer shell of the plug, keeping it pushed as far from the bead of solder as possible. Again heat the iron wire, and touch it to the outer bead of solder, being careful not to touch the fuse wire. When the solder has melted, quickly bend the free end of the fuse wire into the melted solder, using a knife blade to push the wire where you wish it. This operation of soldering to the outer shell may be most easily accomplished by clamping the plug in a vice with the bead of solder upwards.

In this manner, after a few trials you will find that you can quickly and easily renew the wire in a plug, and have a fuse as good as new at a cost which is a fraction only of the price of a new plug.

Contributed by
HOWARD S. MILLER.

A CONVENIENT HOOK-UP.

The diagram shown below is entirely self-explanatory and was designed by myself for my personal convenience and use, but, after trying it out I found that it worked so well I decided to send it to *Modern Electrics* for publication.



With the blades in the left hand clips the system is loose coupled and with the blades in the right hand clips the system is close coupled, the primary of the loose-coupler being used as a tuner when blades are in right hand position.

Contributed by
SAM EVANS.

A BINDER FOR MODERN ELECTRICS.

Knowing that many *Modern Electrics* readers have no way to keep their magazines in good condition, I devised a plan wherein they can be kept from getting the covers torn off and otherwise mutilated.

Procure the covers of a loose-leaf book, the type in which strings are used for holding the contents, and also two bolts with nuts, about three inches long and threaded all the way to the head if possible. Take your copies of *Modern Electrics,* and with a large leather punch, make two holes to coincide with the holes in the covers. Place the covers on both sides of the copies, and pass the bolts through, drawing up the nuts to hold the copies tight.

This makes an excellent binder, which is equal to any other type.

Contributed by
DE LOS HAMMERS.

A CORRECTION.

While perusing a recent issue of *Modern Electrics,* I noticed that in answering a question in the "Oracle" pertaining to the welding of street car rails for trolley service, you state that they are welded in sections with spaces or openings provided at intervals to allow for the expansion and contraction of the rails.

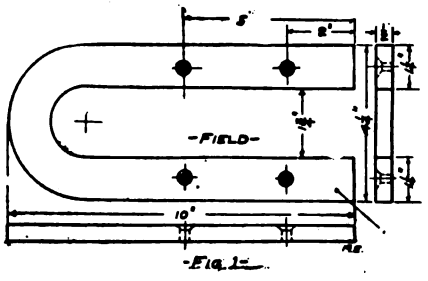
I beg to state that this is not the practice followed in regular work wherever the tracks are buried in the asphalt or street covering. It has been found that when so covered, the heat radiation is sufficient to care for the expansion and contraction of the steel rails without any openings being provided.

However, on suburban roads or in other locations where the rails are left fully exposed to the sun's rays and the cold, they cannot be left welded for any considerable length, without some provision being made for the severe contraction and expansion effects. In all city work, they are continuous, and welded at each joint by the Thermit process cast welding or electric welding.

I thank you for this space.
H. WINFIELD SECOR, E.E.

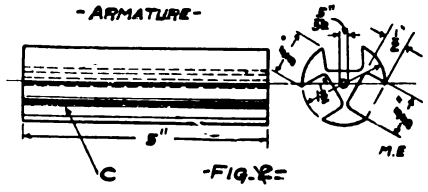
A POWERFUL GENERATOR.

Here are the diagrams and dimensions for quite a powerful generator:



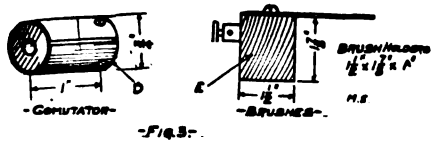
-FIG. 1-

Armature wound with about 8 oz. single silk of No. 24 B. & S. copper



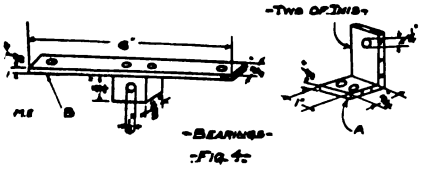
-FIG. 2-

wire. The field is a magnet 10 inches long, 4½ inches across; internal space



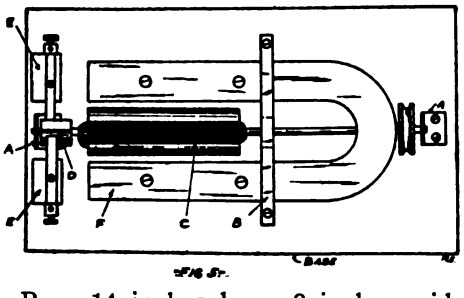
-FIG. 3-

should be 7 inches long and 1¾ inches wide, metal ½ inch thick, 1¼ inches



-FIG. 4-

wide, when magnetized minus the current it should lift ten pounds.



-FIG. 5-

Base 14 inches long, 8 inches wide, 1 inch thick; blocks on which the magnet rests, 1¼x1¼x7 inches long attached by brass screws. Bearings should be of brass. Armature can be made of either discs or solid metal. Commutator of maple ¾ inch diameter and 1 inch long with a ¼ inch hole for the shaft. Over this put a piece of ¾ inch brass tubing and cut into three commutators held in place by shellac. Brushes of narrow strips of thin phosphor bronze.

Make all threading eight-thirty-seconds except on the shaft where any suitable size can be used. Pulley can be made of maple ½ inch wide, 1½ inches in diameter held on the shaft by shellac or glue.

For other dimensions see diagram.

Contributed by

C. J. SEDLAK.

AN INTERESTING EXPERIMENT

It is probably well known that if you rub your feet briskly over a carpet on a dry, cold day and then touch any metallic object with your finger it will emit a small spark. The following amusing experiment may be done on the same principle.

Take any small piece of wire about two inches long and twist it around a gas burner. Have the tip of the burner about an eighth of an inch below the end of the wire. The wire must be just far enough away from the center of the burner to keep it out of the flame, or else it will melt.

Now get a friend to turn on the gas when you are ready for it. Go around the room once or twice rubbing your feet along the carpet. When you come around to the gas light, touch the point of the wire and if the gas is turned on, the light will flare right up as if it had been lit with a match.

This experiment cannot be done on a damp day or without shoes, and it works best in cold weather.

Contributed by

SAMUEL COHEN.

A GOOD CONNECTING CORD.

A first class and comparatively cheap connecting cord for your outfit can be made as follows: Get the required amount of flexible incandescent lamp cord, preferably No. 12. Untwist the two wires and straighten them. Boil them in clear water to remove as

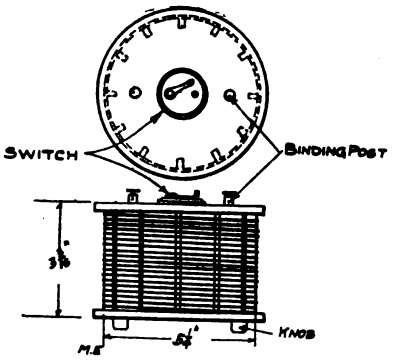
much of the original color as possible and dye them black with diamond dyes. Allow them to dry without rinsing and the result will be as fine a looking, flexible connecting cord as one could ask for.

Contributed by

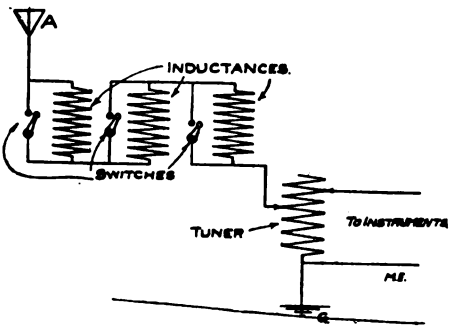
L. W. TELLER.

AN INDUCTANCE OR LOADING COIL.

Sometimes when you want to listen to a high powered station like Glace Bay you find that the wave length of the station is greater than the combined wave length of your antenna and tuning coil. If, however, an extra coil of wire is placed in the aerial circuit, the wave length is considerably increased.



To make this extra inductance coil, procure several wooden spools such as annunciator wire comes on, several hundred feet of enameled wire No. 22, B. & S. gauge, and five or six large binding posts. The spools will be found to measure about 5¼ inches in diameter by 3 3-16 inches high; this will allow about 55 turns of wire 18 inches long, the turns being nearly 1-16 of an inch apart. Cut 16 pieces of hard wood 3 3-16 inches by ⅛ inch by ¼ inch, round the corners with a knife, and fasten around the circumference of the spool with 1 inch brads equal distances apart. The completed frame should be given a couple of coats of varnish and allowed to dry before winding on the wire. Wind 55 turns of wire on, with the turns about 1-16 inch apart. Fasten two binding posts on the top of the coil and connect the two ends of wire to them. Over the hole in the center of the coil head place a battery switch (1 point) to be used for shorting the inductance when not needed; connect one pole of the switch



to each binding post. Give the whole coil a coat of varnish and while still wet place a piece of thin rubber around the wound part. This gives a finished appearance to the coil and helps to keep the wire in place. Mount on small porcelain knobs.

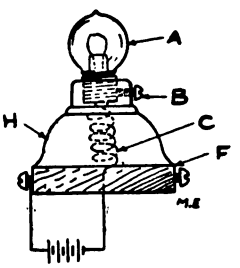
If your aerial and tuner are small several inductances may be required, and all must be connected in series. For details and wiring diagram see the drawings.

Contributed by

R. S. CRAWFORD.

A SIMPLE MINIATURE LAMP SOCKET.

A simple lamp socket for miniature lamps may be made by using the top shell of the standard Edison socket as shown in the drawing. A piece of wood should be placed in the bottom, of such size that it fits within the



shell. A spring should be mounted on this base, and connections made to this and the shell.

A socket thus constructed, is both simple and very satisfactory. The screw B may be tightened for holding the lamp securely. In the drawing, A is the lamp, C the spring, F the wooden base, and H the outside shell.

Contributed by

F. BLECHINGER.

SELENIUM AND ITS EXTRAORDINARY CHARACTERISTICS.

(Continued from Page 587.)

ders by exposing the cell to a beam of light.

Selenium cells are made by winding two German silver, nickel or other wires around a piece of slate, porcelain or mica, taking care to keep the wires separated and equidistant throughout their entire length. It is then necessary to give the wires a thin coating of selenium and then expose the cell to heat for a certain length of time. An excellent description of such a type is given in the November issue.

These cells vary in resistance from 2,000 ohms or more in the dark. This is increased or decreased according to the intensity of the light affecting the cell.

The accompanying diagram illustrates Alexander Graham Bell's radiophone, an important application of selenium. The mica diaphragm is enveloped in silvered foil and is used to reflect a ray of light upon the selenium cell placed in the focus of a silvered reflector. A pair of telephone receivers and a battery are connected to the selenium cell. In the back of the silvered diaphragm is a tube and a mouthpiece. When words are spoken into the mouthpiece, the waves cause the diaphragm to vibrate, thus sending pulsations of the reflected light upon the selenium cell and consequently producing similar variations in its resistance and reproducing sounds in the telephone receiver. This method of communication, although used for a short while, proved very successful.

Another stupendous phenomenon concerning selenium is the transmitting of a picture over a wire. This fact is performed by placing the individual in front of a camera and his image is focused on a ground glass plate. The ground glass plate is then replaced by a multiple cell consisting of a large number of units. The multiple cell is constructed on the principle of a fly's eye. In order to reproduce the original image a number of ingenious methods have been employed.

Still another wonderful experiment has been performed with the selenium cell by William J. Hammer, a prominent consulting electrical engineer of New York. The amazing feat accomplished by Mr. Hammer, was the stopping of a five horsepower machine by a mere wave of his hand, the writer being present at that occasion. The principal apparatus employed with the five horsepower machine were: the selenium cell, and an acetylene generator. The moment the operator placed his hand between the selenium cell and the three flame lamp, the machine was stopped. The explanation of this is, that the hand hindered the current from flowing through its circuit. If the hand were taken away, the light would instantly fall upon the selenium cell and the current would flow through its circuit, consequently putting the motor and generator in operation.

The writer predicts some great inventions connected with selenium in the near future, that will open a new electrical field, broader in prospects and immediate realizations.

THOMAS A. EDISON ANSWERS A FEW QUESTIONS.

(Continued from Page 582)

Q.—What of intuition and technical training? Which is the most prolific of ideas?

A.—Imagination supplies the ideas, and technical knowledge helps to carry them out.

Q.—Do you consider the end for which an instrument is designed or the immediate effect you wish to produce?

A.—Consider always if the public wants the invention—its commercial value.

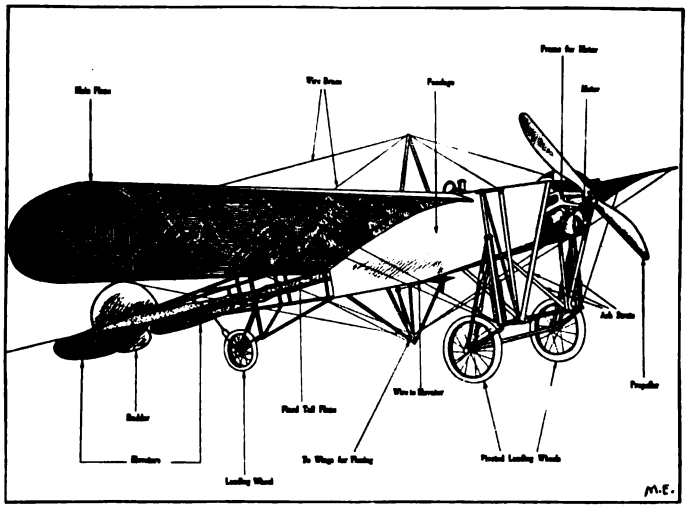
Q.—What is an inventor's chief inspiration?

A.—If he is a good inventor, it is to make his invention earn money to permit him to indulge in more inventions. If he is a one-idea inventor the incentive is generally money only.—*Century.*

Ask a bachelor for a pin and ten to one he'll produce a safety pin.

Girls should take the remarks of a fresh young man with a grain of salt.

The Bleriot Monoplane



The Bleriot monoplane illustrated on these pages, is of a later type, and known as the XI-2 bis. It differs only in the general structural details, for the landing chassis, engine, fuselage, wings, control, and the other items incorporated in the monoplane remain the same as in the XI model which has made its appearance in all parts of the world. This type of machine which we are about to describe, was used by Count Jacques de Lesseps, while flying at Belmont Park in the latter part of October, 1910. It has also been designated as the "pigeon tailed" Bleriot by the American press.

Through the courtesy of "The Automobile Journal," we are enabled to publish the set of drawings shown on these pages, as well as the data.

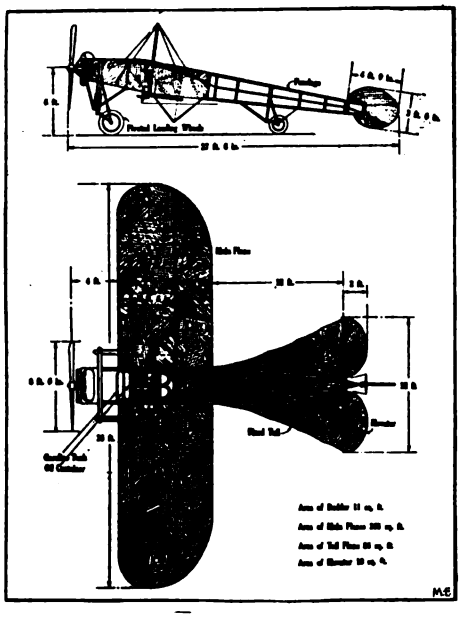
The craft has a considerable width of main aerofoil with rounded ends, the leading edge having a short radius while the trailing one is much larger. The wings are double surfaced with Continental fabric, spread over formed ribs of pine. The latter are secured to the main spars of ash by brass screws where the harder wood in channel sections passes through. The front spar is about a foot back of the leading edge which is covered with sheet aluminum, while the rear one is about twice that distance from the trailing edge with two subsidiary spars between. The former is secured to the body by a socket formed by a steel tube across the frame in front of the pilot, while the latter is held by screws only.

The box girder body is made from Oregon pine, similar to all previous and later machines of this make, the four main booms running the entire length from motor to tail. These have struts at intervals of about 19-20 inches and diagonal wire bracing between.

A peculiarity noted in both plan and perspective views is the fixed tail's shape. This spreads out like a fan, beginning at the sides of the fuselage

just at the trailing edge of the main aerofoils and reaching its greatest width at the steel tube which forms the pivot for the elevators. Four cross ribs stiffen this construction, while its position is at the vertical centre of the fuselage.

At the front, the booms widen out to form the driver's compartment forward to the engine supports. The latter are hollowed out steel, fixed at the ends to the vertical struts, and carrying the forward bearing at the middle. Diagonals from the four corners to the bearing stiffen the whole. The seats

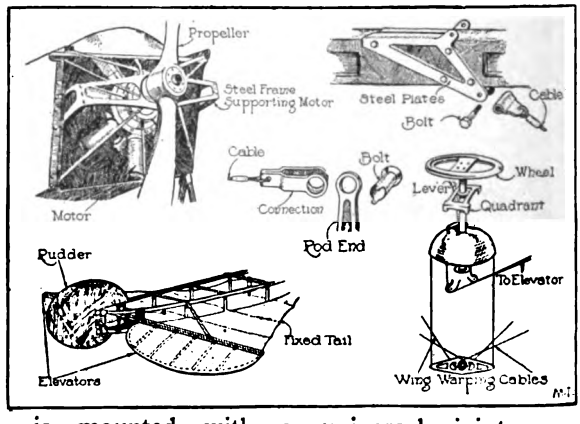


are arranged side by side, as compared with earlier types in which one was situated behind the other.

The vertical rudder resembles nothing so much as an artist's palette, its area being about 11 square feet. As compared with this, the two half-oval elevators have a total surface of 18 feet, while the fan shaped tail adds 86 feet to the supporting surface. The aerofoils present 263 square feet, so that adding the tail plane, the enormous supporting area of 349 is obtained. With this, it is small wonder that the craft has proven so stable among monoplanes.

The landing chassis has two stout diagonal ash struts which run from the engine to the lower cross bar and two more from the back of the body meet it at the same point. When alighting the wheels pivot to the back about a radius piece, the upper connecting guide arm rising with the sleeve. This motion is restrained by the elastics. The arrangement is such that the wheels can turn about the arms mentioned, so that alighting from the side is as easy as a direct front landing. The rear portion of the gear is formed by a third wheel, placed below the centre of the fuselage, midway between main plane and rudder. This is free to rise in a curve, a similar arrangement to that at the front being utilized.

The control is most interesting. It consists of a vertical post with a fixed wheel at the top and an aluminum bell shaped base. The latter surrounds the pivot on which the whole



is mounted with a universal joint. To this member, the control wires are attached and lead to a star shaped device below. The horizontal arms of this connect with the leads from front and back of the bell, while the two verticals have cables which attach to the elevators. The forward and back movement of the whole column thus raises or lowers the planes at the rear.

On the right side of this same member is fixed an arm which connects to a bar on a rocker shaft, by the partial rotation of which wing warping is effected. A sidewise motion will move the arm and thus warp the main planes without moving the elevators. Below the hand wheel are placed the two engine control levers.

The power plant consists of the Gnome 7 cylinder, 50 h.p. motor, acknowledged as the peerless gasoline aviation engine. It is of the rotary type, the gas being supplied to the

cylinders through the shaft, upon which the cylinders revolve. A Chauviere Integrale propeller is regularly supplied, except if another type is ordered.

As compared with the Nieuport monoplane, the Bleriot is superior in several points, while inferior in others. The Nieuport construction and general structural strength is far greater than the Bleriot. The latter is often wrecked through a tip of the main plane catching in some obstacle on the ground, whereas the Nieuport will often land on a wing without serious, if any damage. Another point to the disadvantage of the Bleriot, is that in landing it has a tendency to turn over on its nose and bury the aviator below the monoplane. The Bleriot has a large number of stay wires, which if broken while in flight, will result in a serious calamity, while the Nieuport has practically no stay wires, as we have noted from the description in the October issue. The good features of the Bleriot monoplane are numerous, however, and among the most important is the excellent landing chassis, which to this day remains the same as in the earlier models. It permits landings on the roughest ground without great difficulty, while as much cannot be claimed for the Nieuport landing device. The Bleriot "bell" control is superior to the Nieuport control, and one of the most successful ever devised. As a cross-country aeroplane, by virtue of its splendid landing chassis and other features, the Bleriot is usually a victorious mount, irrespective of biplanes or monoplanes. The victories of Andre Beaumont, whose actual name is Lt. Conneau of France, in the Paris-Rome, International Circuit, and the tour of England, in the earlier part of this year, against the pick of the world's aviators and aeroplanes, is probably the best proof of the Bleriot's excellency.

A WING BENDING DEVICE FOR MODEL AEROPLANES.

By W. T. Carrigan.

To amateurs building model aeroplanes, the writer will describe a simple and effective means of curving the wings of the models, which is a necessity for good results. If the instructions are faithfully followed, success can be the only outcome.

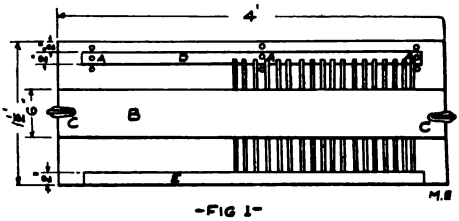
Obtain four pieces of wood of the following dimensions: One piece, four feet long, by one and one-half feet wide, and one inch thick.

Two pieces, three feet, four inches long, by two inches wide, and one inch thick.

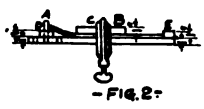
One piece, four feet long, by six inches wide, and one inch thick. Also obtain two wood clamps.

Upon the large board fasten one of the strips as indicated at E, Fig. 1.

In the other strip bore holes as indicated, one inch from each end and at the middle. Through the large board bore holes, corresponding to those in strip D, so that D can be moved nearer or farther from E.



-FIG 1-



-FIG. 2-

These holes should be bored with about a one-half inch bit and in such a position as to keep D parallel to E.

Fit pegs A to these holes so that they can be withdrawn to move D.

The small sticks to be used for the wings are steamed or soaked in hot water until they become flexible enough to be bent into the shape desired.

When the sticks have been cut the desired length soak them in boiling water for about twenty minutes. When they have become flexible enough, take them from the water and lay them as shown in Fig. 1, so that the ends project across D about one-half inch, as shown in Fig. 2.

Next place the board which has been cut four feet, by six inches, by one inch, across the sticks so that the edge facing D will fall on the place at which they are to be bent. (Fig. 1.)

Place a clamp c, c, at each end of the board and screw down until the sticks are in the position as in Fig. 2.

Leave the sticks in this form for twenty-four hours at the end of which time they will be thoroughly dried and will stay in the desired shape.

RALPH 124C 41+

(Continued from Page 596)

exerts on the other is zero. If the flyer is brought to this point its gyroscopes can be at rest, as the machine will not be attracted by either body. It will "hang" between the two the same as an iron ball will hang between two powerful magnets if carefully balanced. Give it the slightest push, however, and the ball will fly to either of the magnets.

The same is true of a space flyer, between two bodies at the "zero point." If it moves over that point it is immediately attracted by one of the bodies, and if its gyroscopes refuse to work, the flyer will be dashed to pieces against the attracting body.

If, however, the space flyer comes to rest at the "zero point" it will begin to turn around its own axis, at the same time it will move in an elliptical orbit around the sun—*our space flyer has become a tiny planet,* and as such is subject to the universal laws of the planetary system.

From this it will be easily understood that it is not hard to steer a space flyer; the nearer it comes to a celestial body, the faster the gyroscopes must work, the further it draws away from a celestial body the slower the gyroscopes must work.

After Ralph had thoroughly inspected the entire flyer he devoted his full attention to the course of his rival's machine. At the rate at which he was flying he calculated that he would overtake Fernand 60O 10, in ten hours, providing the latter did not in the meanwhile increase his speed.

His rival, when Ralph left the earth, had a handicap of 400,000 miles. He was moving at the rate of 45,000 miles an hour, Ralph's machine had made 80,000 per hour since its start from the earth. Thus if everything went well he would overtake his rival in about ten or eleven hours.

As there was nothing else to do, he busied himself in the laboratory near the conning tower in the top of the flyer, and the hours went by rapidly.

At the end of the ninth hour he finally spied 60O 10's machine through his telescope. He then tried to signal by wireless to the other flyer, but his rival either did not hear or else did not care to answer.

At the end of the eleventh hour since his departure from earth, his machine drew up within a few hundred meters of his rival's. After careful manoeuvering he brought the machine still closer to the other one, and looking through one of the heavy plate windows he saw the strangely drawn up, ghastly white face of his enemy.

Ralph moved a few levers and then closed a switch. A hissing sound was heard, and Fernand 60O 10 could be seen falling backwards, the window through which he had just looked turning green at the same time.

Ralph had struck his enemy senseless by means of his *Radioperforer.*

In a few minutes he had anchored his flyer to the other one by means of a powerful electro-magnet. He then pushed the enclosed connecting tube of his flyer into the tube-joint of 60O 10's machine. With great care he made the joint air-tight and then he opened the porthole and in high excitement crawled through the tube into the other flyer.

He was as happy as a school-boy; he had conquered his enemy and in a minute his sweetheart would be in his arms! Arrived at the other end of the tube, he made sure that the joint was air-tight before he moved on.

60O 10 lay on the floor and in a twinkling Ralph had bound him with the rope he had brought along.

In high excitement he bounded upstairs, where he knew Alice's quarters must be.

Arrived on the next floor he stood still for a moment and listened. There was no sound, except for the gentle purring of the gyroscope machinery.

He went from one room to another and finally found what he was sure must be Alice's room. The door was open. He entered with a strange feeling of dread. The room was empty. It furthermore appeared that the room had never been used.

In terror Ralph ran from one end of the flyer to the other, from the top to the bottom. He looked in every corner, in every closet. He did not see Alice nor her maid. Where were they hidden? To make sure he went all over the ground again in a more thorough manner.

After a most careful search he limply fell into a chair, and buried his face in his hands.

Alice was not on board the flyer!!

(To be continued.)

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.

HONORABLE MENTION.

Enclosed please find a flashlight photograph of my wireless telegraph station. My aerial is 45 feet high and has 4 strands 35 feet long. On the right are the sending instruments, all of which I have made with the exception of the E. I. Co. coil. I have a 1 inch coil, a 5 plate condenser, helix, and spark gap. My power consists of dry and wet cells. My receiving instruments consist of a large loose-coupler, a large tuner, variable and fixed condensers, a 1,000 ohm receiver, and a test buzzer for testing the crystals. I use a carborundum and silicon detector. I have made all but the telephone of the receiving set. The variable condenser and the loose-coupler were made after the photograph was taken, so cannot be seen in the picture.

I also experiment in electricity. I have 3 meters one of which I have made, 2 meters can be seen at the extreme right and on the left there is a large motor which is 1/6 h.p. I have many other instruments which are too numerous to mention. With my station I have had very good results with the help of *Modern Electrics* which is a very good and helpful magazine. I have experimented with electricity for about 3 years and with wireless 1 year.

EDMUND ZECHOWSKI,
Illinois.

HONORABLE MENTION.

Here is a photograph of our wireless station. We have just completed the construction of a high powered wireless set which is very satisfactory in all respects.

The sending apparatus consists of the following instruments:

A six inch spark coil, telegraph key with condenser, electrolytic interrupter, Leyden jars, twelve inch spiral helix, zinc spark gap, and the power used is obtained from the local 110 volt alternating current supply.

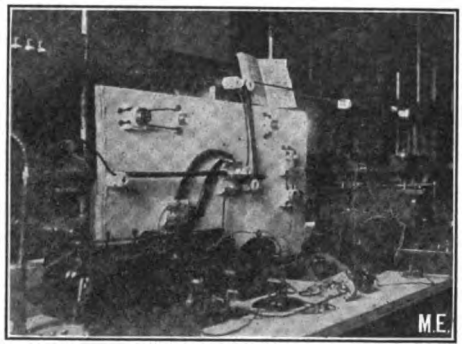
The receiving apparatus consists of:

Two one thousand ohm receivers, one two slide tuning coil, fixed condenser, variable condenser, potentiometer, silicon detector, electrolytic detector, perikon detector, ferron detector, necessary switches, and a complete coherer set.

The aerial which is seventy-five feet

high, consists of two pounds of aluminum wire made into four strands, each 125 feet long.

More than a year ago we started in the study of wireless telegraphy and at the present time the apparatus is set up in the Johnstown High School



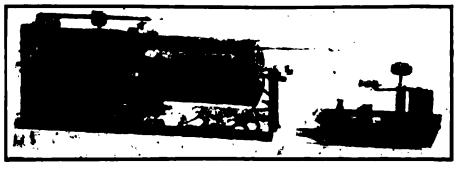
laboratory. The aerial is suspended between the two flag poles on the school building, and by means of a large single pole, double throw switch it may be grounded for protection against lightning.

The coherer set is not so efficient but nevertheless we receive messages from various other stations in this city on this set. For long distance receiving, it is of course necessary to resort to the regular system.

EVERETT K. BRIGGS,
EARL HODDER,
WILLIAM A. LIPPERT,
New York.

HONORABLE MENTION.

Enclosed find a photograph of my home made loose coupler and detector. I haven't a photograph of the complete apparatus, but have tested this



set over 2,700 miles, and only last Sunday received from Havana, Cuba. My sending set consists of a ½ kw. open core transformer, interrupter, key, helix, spark gap, condenser, and large choke coil.

The receiving set is my pride, however, as it consists of both loose and close-coupled systems. For all long distance work I use the loose-coupled connections. Receiving set consists of, loose coupler, double slide Murdock tuner, three detectors, four condensers, and a single 1,500 ohm Brandes receiver.

With the above set I have copied from—Boston Herald, Cape Cod, Brooklyn Navy Yard, New York City, Baltimore, Cape Hatteras, Colon, (Panama), and Havana, (Cuba), besides many other stations along the Atlantic coast, and the Great Lakes stations just roar in. Aerial consists of six wires, loop system, and is slightly directional, favoring Cape Hatteras.

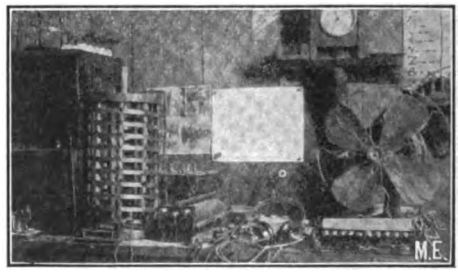
Although 1,200 miles away, "HA" comes in the loudest of any station, even including Congress Hotel, Chicago, only 75 miles distant.

The sending distance of my set is about 50 miles, and the receiving tested to 2,700. My call is "ART," and all amateurs are invited to call or write me. All letters answered promptly.

ALAN H. ARTHUR, Michigan.

HONORABLE MENTION.

Here is a photograph of my wireless station. My receiving set consists of



the following instruments: Pair 2,000 ohm pro. receivers, mineral and electrolytic detectors, double slide tuning coil of my own design. Murdock receiving transformer and variable condenser (not showing in picture).

For sending, I use a two kw. transformer which I constructed, helix variable condenser, and spark gap.

My aerial is composed of five No. 11 copper wires 150 feet long and 10 feet wide. Highest point is 105 feet and lowest point is 45 feet above ground. With this outfit I have excellent results.

I am a regular reader of *Modern Electrics* and have constructed all my instruments by its help.

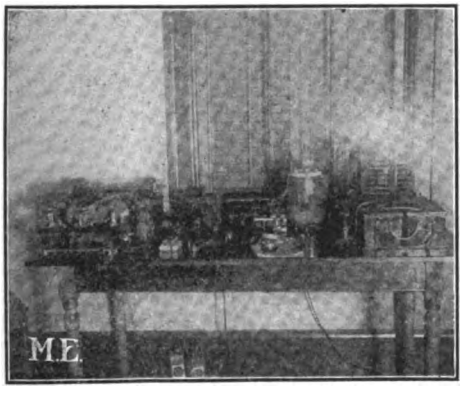
HARRY CARSON, California.

HONORABLE MENTION.

I am enclosing a photograph of my wireless outfit, taken by myself. The receiving set is the regular Electro Importing Co., 1,000 to 2,000 miles, consisting of large tuner coil, (600 meters) loading coil, high capacity variable condenser, three different style detectors, namely, silicon, electrolytic bare point, galena, and a potentiometer.

I have installed a three point switch, which enables me to change from one to the other in an instant, 2,000 ohm Electro Importing Co. phones; in addition to this I have a loose coupler and an extra variable condenser for the same, either the tuning coil or the loose coupler can be used at will, by means of double pole double throw switch.

My sending outfit consists of two half kilo-watt transformer coils, commercial spark gap, special sending



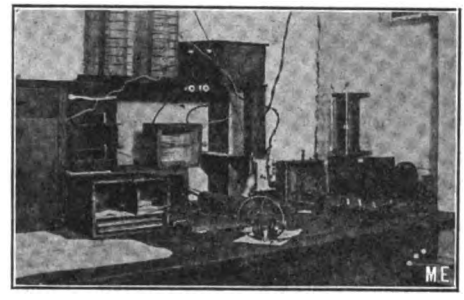
helix, with pilot light, high tension condenser, Gernsback electrolytic interrupter and double pole single throw switch block with two fuses, special extra heavy contact wireless key and condenser to absorb spark from key and large "Electro" antenna switch.

My aerial is 120 feet long made up of six No. 12 aluminum wires 18 inches apart suspended on fifty foot nicely painted poles, this outfit is located in one of the living rooms of my father's carriage house. Messages can be sent and received from great distances with satisfaction, I frequently hear Montreal and other large cities while the ocean plying steamers can be heard way out at sea.

THOMAS B. SIMPSON,
New York.

HONORABLE MENTION.

The reader will find herewith a photograph of my wireless station. My receiving set as seen on the right consists of a loose-coupler of about 2,500 meters wave length, a two slide tuning coil, an aluminum plate condenser, a



variometer, a set of 1,000 ohm receivers, and three silicon detectors.

My transmitting set consists of a one inch spark coil, a spark gap, a 7 plate glass condenser, a helix of which only half can be seen, a telegraph key, and the necessary switches. My aerial is 50 feet high, and 150 feet long.

I would call the attention of the reader to the switch for throwing on either the receiving or transmitting set. This consists of a wooden cylinder upon which the contact strips are mounted. It is a very handy switch, a slight turn of the handle sufficing to throw from one set to the other.

THOS. TOURNAT,
California.

HONORABLE MENTION.

I have herewith attached a photograph of my wireless station. My ap-

paratus consists of a loose-coupler tuner, a variable condenser, a detector, a two point switch and a pair of 2,000 ohm phones, for the receiving side.

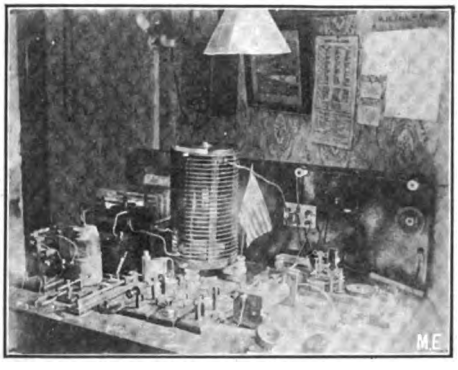
For transmitting I have a helix, condenser, spark gap, and a two inch coil.

I have made most of the apparatus myself, and obtain excellent results. I am a constant reader of *Modern Electrics* from which many of the descriptions of apparatus have been used in the construction of my set.

California. HAZEL SMITH,

HONORABLE MENTION.

Here is the photograph of my wireless station which consists of a sending and receiving set. In the sending set on the left is a magnetic key, ½ kw. coil, a plate glass condenser, spark gap, helix, an electrolytic interrupter used on 110 volt A. C. current, and a D.P.D.T. switch. The receiving set consists of an "Electro Junior" tuner, 3 detectors, namely: perikon, silicon and galena, a condenser, 4 point switch for detectors, potentiometer, 1,000 ohm receivers, Omnigraph and 14 records, testing buzzer, and on the right 2 keys, one for sending and one for the buzzer. I have a loose-coupler with a 10 point switch on the secondary which I just made and is not on the table yet. My switch board is mounted on

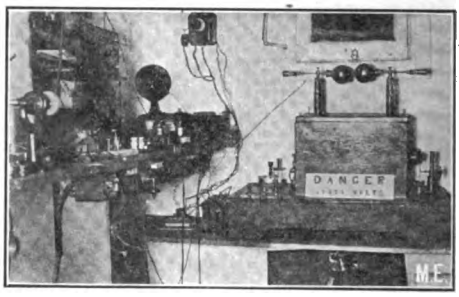


the wall. All of my instruments were made by myself except the spark coil, tuning coil interrupter, potentiometer, and the Omnigraph. I also have a portable set which I made. I am now making a rotary spark gap and a variable condenser from drawings in *Modern Electrics*. My aerial is 45 feet high and 60 feet long from which I obtain good results. My call is WF. I have 24 issues of *Modern Electrics* from which I have obtained many ideas and of which I am a regular subscriber. WILLIAM H. GINK,

Maryland.

HONORABLE MENTION.

The attached is a photograph of my wireless telegraph station.



For sending, I have a twelve, a three, and a one inch spark coil, helix, condenser, keys, spark gaps, etc.

For receiving, I have a double slide tuning coil, loose-coupler tuning coil, variable condenser, fixed condenser, and silicon, ferron, perikon and electrolytic detectors, potentiometer, and Mesco 2,000 ohm phones.

My aerial is composed of four aluminum wires, 2 feet apart, 75 feet high, and 200 hundred feet long. The lead-in is made of four strands of aluminum wire. For lightning protection, I have the necessary switches in a box outside my window.

I made most of my instruments with the aid of *Modern Electrics*.

Illinois. NED R. HILL,

AN UNUSUAL ACCIDENT.

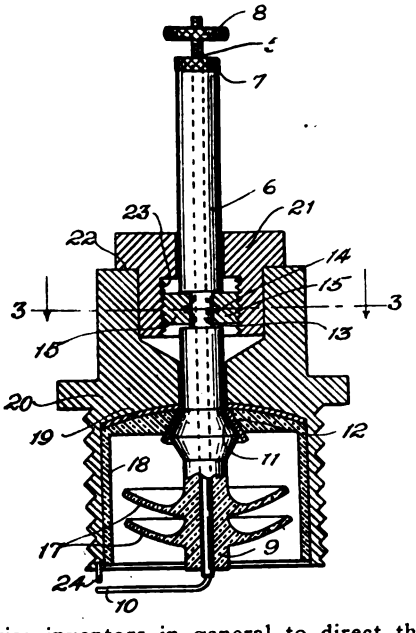
An unexpected accident, on the London, Brighton, and South Coast Railway, demonstrates the attendant danger in mixed electric and steam operated railroads. A fireman on one of the steam locomotives, discovering that the coal was too large to be used in the fire box, proceeded to take a large hammer and to break up the lumps in the tender. In lifting the hammer too high, it came into contact with the over-head conductor supplying electricity to the other type of cars. The shock threw him violently on his back, and he died within a few minutes.

It is noteworthy that so few accidents happen of a similar nature, inasmuch as there are many railroads operating joint steam and electric cars. This danger is especially magnified at yards, where the change from steam to electric is made.

PATENT NO. 1,008,219 ON SPARK PLUGS HAS BEEN GRANTED TO MR. WM. H. TIDMARSH OF ELGIN, ILL.

The spark plug runs a close second to the trolley wheel. There have been almost as many spark plugs invented as trolley wheels, and the end is not yet. It seems every inventor thinks that the right kind of a spark plug has not been invented as yet, and we frankly do not believe that the right kind will ever be invented to suit each and every individual engine, and to fire correctly in each and every mixture.

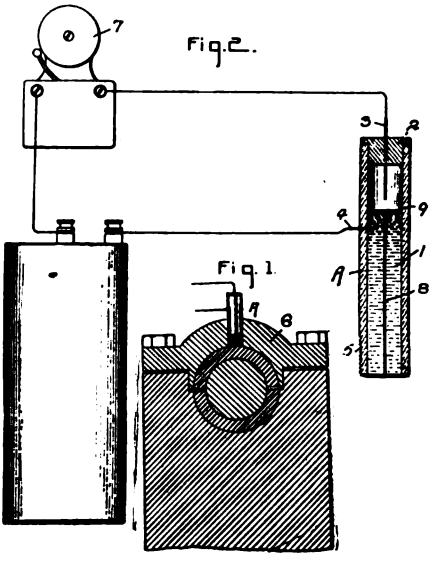
Mr. Tidmarsh in his specification says that his plug is simple and inexpensive of construction. We disagree with him in this respect, and while his spark plug possesses a few novel points, on the whole we do not think that it will be a success. As far as the electrical end is concerned, there is of course, nothing novel about it. We would



advise inventors in general to direct their energy towards inventing something better than spark plugs.

MR. RAYMOND L. JOBSON, OF KINSTON, NO. CAROLINA, HAS BEEN GRANTED PATENT NO. 1,007,574 ON HOT BEARING ALARMS.

This idea seems to us as being quite novel and should be welcomed by our railroads, providing it is found that the device is stable and "fool proof."



We think that its greatest field of application will be found by railroads inasmuch as they need a good hot bearing alarm, which should be quite inexpensive and positive in its action.

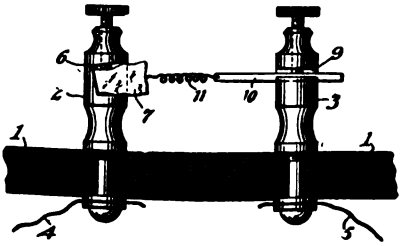
The idea is nothing but a modified thermometer where the mercury expands and pushes disc 9 up to make contact with 3, thereby closing the bell circuit. In figure 1 is shown how the alarm is attached to bearings.

Mr. Jobson in his specification advises the use of glass for the tube A which to our mind is of course a very poor idea. We believe that he will find moulded mica or a similar substance an improvement on his device.

THOMPSON H. LYON, OF BUTLER, PA., HAS BEEN GRANTED PATENT NO. 1,008,977, FOR WAVE DETECTORS.

The idea is that the element 7 is a piece of Cerusite ($PbCO^3$). This substance acts as a rectifier the same as silicon. No battery is required and Mr. Lyon claims that this substance does not lose its sensitive-

ness even after strong electric currents are passed through the detector; in other words, his detector needs no adjustment once it is set up, which if true, is quite important. The Cerusite or ore, is of a



metallic nature and has a low resistance, thus an ordinary low resistance telephone receiver may be used in connection with this type of detector.

PATENT NO. 1,002,051 HAS BEEN GRANTED TO REGINALD A. FESSENDEN, OF BRANT ROCK, MASS, ON ELECTROMAGNETIC SIGNALING.

The application for this patent was filed on December 23, 1907, and it took five years to go through the patent office. There are six claims to this patent. The main idea seems to be the insulation in the tower and Mr. Fessenden has laid great stress on the construction of same. In order that electri-

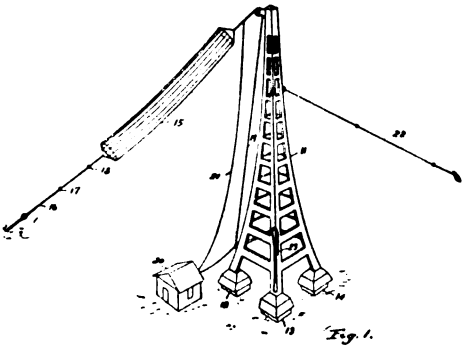


Fig. 1.

cal oscillation may be carried in the structure of the tower, the entire structure is insulated from the ground.

It is not known to us whether Mr. Fessenden, who stands pre-eminent in the art of wireless, has tested out this tower on a large scale.

PATENT NO. 1,002,052, HAS BEEN GRANTED TO MR. REGINALD A. FESSENDEN OF BRANT ROCK, MASS., ON ELECTRICAL SIGNALING.

This is another noteworthy patent of Mr. Fessenden and we quote herewith a few lines of his specification:

"The invention herein disclosed has for its object the securing of greater efficiency in the production of electrical impulses by means of slight changes of pressure, whether produced directly or indirectly by sound waves or by any other means.

"When certain classes of substances, for example **silicon and tellurium,** are used to form one element of a contact and are brought into perfect non-microphonic contact with another conductor, such as brass, the contacts so formed are capable of acting either thermoelectrically or as rectifiers, according to the amount of pressure used, and where a local battery is also used, according to the intensity of local battery used. With the majority of these substances the thermoelectric current produced is in the opposite direction to the current produced by the rectifying action. The writer has discovered that a sensitive telephone transmitter may be constructed by using such a contact and suitably adjusting the pressure, and where, a local battery is used, suitably adjusting the current from the local battery."

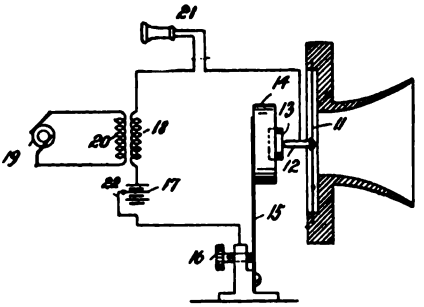


Fig. 1.

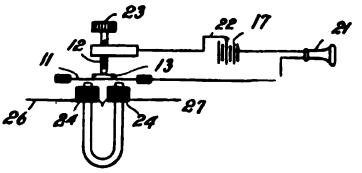
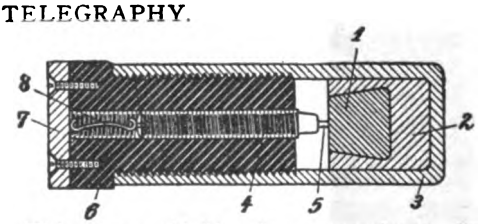


Fig. 2.

The rest of the idea will easily be understood by studying the diagrams. 13 is the silicon or tellurium button, 12 the brass point.

WILHELM SCHLOEMILCH AND PAUL FERNAND PICHON OF BERLIN, GERMANY HAVE BEEN GRANTED PATENT NO. 1,003,374 ON WAVE DETECTORS FOR WIRELESS TELEGRAPHY.



This is an old idea in a new dress. In this detector, the substance is copper pyrite and the contact point 5 is of platinum. The

idea seems to be to produce a very small detector which when once adjusted by means of screw 4 permanently holds its adjustment. The piece of copper pyrite, according to the inventors, is preferably embedded in tin 2.

CARL EMIL EGNER OF STOCKHOLM AND JOHAN GUNNAR HOLSTROM, OF SALTSJO-STORANGEN, SWEDEN, HAVE BEEN GRANTED PATENT NO. 999,019, FOR A COOLING DEVICE FOR TELEPHONE TRANSMITTERS.

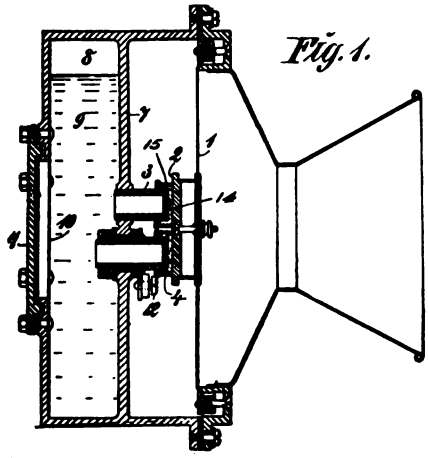


Fig. 1.

This is a device which has of late, been discussed quite extensively, especially in Europe, where it has been used with extraordinary good results on long distance overland wire telephony.

This is a very meritorious invention and is probably the only existing transmitter now that can take care of a strong current without overheating as the liquid 9 cools the carbon-grains 15 very effectively as shown. No explanation is necessary and the illustration describes the idea better than words. The inventors use pure alcohol, petroleum, oil and sometimes even distilled water as cooling liquid. This transmitter should prove of great help in wireless telephony.

R. VARLEY, OF ENGLEWOOD, N. J., HAS BEEN GRANTED PATENT NO. 986,033 ON INDUCTION COILS.

Here is a brand new idea and its inventor who is well known as a designer of various spark coils and spark coil appliances, seems to have found a way to make the ordinary spark coil much more efficient than has been the case heretofore. It is impossible to reproduce on these pages his excellent specification, and anybody interested in spark coils would do well to get a copy of this patent as it will enlighten him on a great many points on spark coils, which probably are not well known to many today.

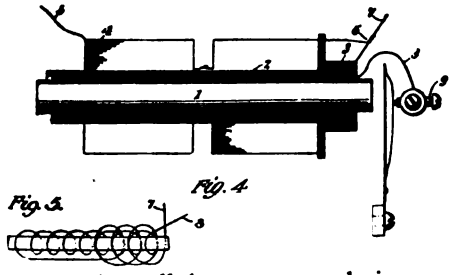


Fig. 4

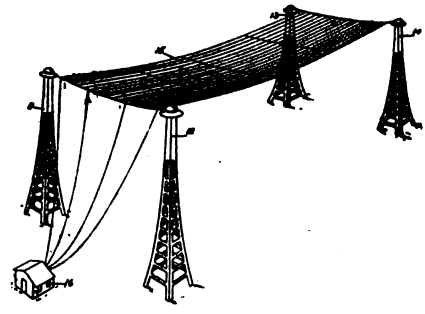
Fig. 3

The main idea of Mr. Varley's new patent is to have the small coil primary 3 wound at the end of the coil, as shown in separate diagram Fig. 5. As may be seen coil 3 has more convolutions than the regular primary which should never have more than two layers.

Mr. Varley finds that this device greatly improves the action of the vibrator, and this is only natural, inasmuch as a large amount of magnetism is obtained in this manner, to operate the vibrator. At the same time the extra convolutions do not interfere in any way with the working of the primary proper.

PATENT NO. 998,567, HAS BEEN GRANTED TO REGINALD A. FESSENDEN OF WASHINGTON, D.C., ON SIGNALING BY ELLECTRO-MAGNETIC WAVES.

This application has been in the patent office even longer than Mr. Fessenden's previous patent, described in this issue. The application on this patent was filed December 17, 1906.



Part of Mr. Fessenden's specification reads as follows:

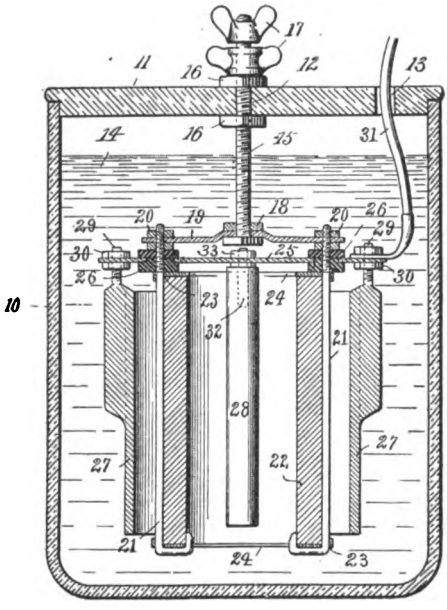
"In Fig. 2, 11, 12, 13, 14 are ferro-concrete structures supporting the antennae 15, and 16 is the station placed in the direction to or from which it is desired to send or receive the electro-magnetic waves. By thus placing the station in front of the ferro-concrete supports and aligned in the direction of the station to which it is desired to communicate, I have ascertained that the useless absorption of the waves is greatly reduced."

CHAS. B. SCHOENMEHL OF WATERBURY, CT., HAS BEEN GRANTED PATENT NO. 987,647 ON A PRIMARY BATTERY.

This is another idea to get high amperage from the copper oxide—zinc—caustic soda battery. There is of course, no new principle involved in this battery except the construction which shows how to get

a large surface, and this the inventor accomplishes admirably.

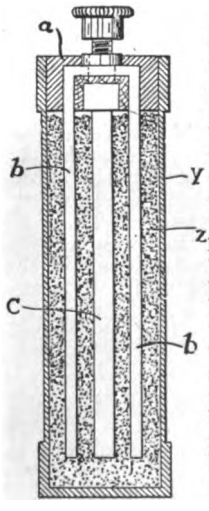
There seems to us, to be only one difficulty and this is the cylinder 22, which we



believe is not very easy to manufacture, inasmuch as copper oxide is not a good substance to be moulded, except, perhaps, in square plates.

PATENT NO. 985,368, HAS BEEN GRANTED TO MR. PARNELL RABBIDGE, OF NORTH SIDNEY, NEW SOUTH WALES, AUSTRALIA, ON AN ELECTRIC SECONDARY BATTERY.

Part of the specification reads as follows:



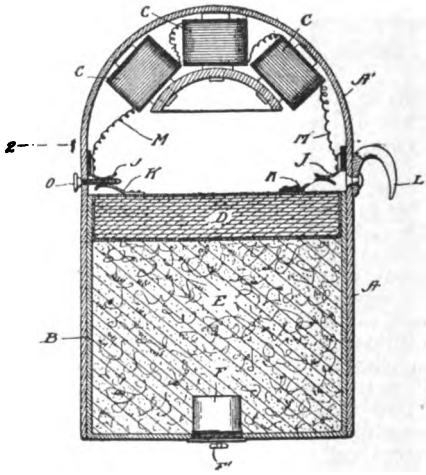
"In giving effect to the invention, an absorbent is used consisting of the residue from copra (the dried kernel of the cocoanut) from which the oil has been expressed. This residual copra is washed, dried, ground, and screened; it is then poured into the cell so that the pulverized material fills the spaces between and around the positive and negative plates, and is well shaken, so that the pulverized material is brought into close contact with the plates; diluted sulphuric acid, salammoniac, caustic potash, or other suitable liquid electrolyte is then poured into the cell until the dry material is fully saturated with the liquid so that the combination of the dry and liquid materials forms a kind of paste; the cell may then be closed and, if considered necessary, it may be sealed with wax or other suitable agent."

The main feature of this patent is that this filler is not destroyed by the action of the electrolyte and that it does not dry up easily. This seems to be quite a novel idea and if Mr. Rabbidge's claims are correct, it would certainly be a great improvement not alone on secondary batteries but other batteries as well.

MR. WALTER J. TURNBULL. OF NEW ORLEANS, LA., HAS BEEN GRANTED PATENT NO. 983,786 ON A TORPEDO OR BOMB.

This is another patent to show prospective inventors what **not** to invent. The invention described herewith has very little commercial value and is hardly practical at all. It is one of those patents that look good on paper, but when it comes to be used in practice, it will be found that the device does not come up to expectations.

The idea of this invention is that battery D is used for energizing magnets CCC which are located in a brass hood A-1 the idea being that these magnets through their magnetism will fasten the bomb to an iron



vessel, or boat (!!) A hook L is provided to attach the bomb by means of a chain or rope to the vessel itself. Evidently Mr. Turnbull personally doesn't think much of the magnetic device, because he suggests using a hook.

F 1, at the bottom is a time fuse to explode the charge E. Except for the magnetic device which is of no value whatever, the invention does not present anything new.

A man never finds out how mean he is until he runs for office.

A GREEN WRAPPER means your subscription expired. Better renew to-day and you won't miss important numbers.

Advice on Patents

GETTING ONE'S OWN PATENT.

(6.) J. A. R., of Freeport, Ill., writes: "When a person has a device which he thinks is patentable and which at the same time is very simple in design, would it not be advisable to make direct application at the United States patent office, instead of employing an attorney.

"In patents of a purely technical nature is not the inventor a better judge than the attorney? By studying the "Patent Gazette" one can find patents of the same general nature as one's own, obtain copies of same from the patent office, and frame one's claim from these. Thus the attorneys' fees might be saved. In making direct application in what form should the patent be and with whom is it filed?"

A. The first part of your question is answered in query No. 3, page 530 in the November issue of "Modern Electrics." We state therein that no inventor unless he has sufficient experience in filing patents, should try to draw up his own application, as he most assuredly will regret it. A patent attorney whose profession it is to understand even the most intricate designs, will find little trouble to draw up a patent in its best form. While of course, quite a few inventors obtain patents themselves, we do not favor the idea, as very seldom such a patent is of much value.

If however, you wish to secure your own patent, write to the Commissioner of Patents, Washington, D.C., who will send you details how to go about it and how to submit your specification.

NEW IDEA ON HELIX.

(7.) L. A. Reinhold, Lansdale, Pa., writes: "Enclosed find drawing of an idea combining a spark gap with a helix. In the ordinary helix (slider type) one movement is necessitated for regulation as in the spark gap. With my appliance the gap and wave length can be regulated separately or together. Kindly let me know if it is of any value and whether you think it ought to be patented."

A. After looking over your drawing, we find that while the idea is new and has not been used as far as we are aware, we would say that to our mind, there is absolutely no advantage in using this sort of a combination, as the price of construction would probably be greatly in excess of that of making a separate helix and a separate spark gap. As far as the workability is concerned we do not think that your device improves on the regular helix and spark gap.

Our opinion is that a patent of this kind would not turn out to be a money maker. In fact, we doubt whether you would get your patent fee paid back.

ELECTRIC PYROGRAPH.

(8.) Raymond Maxwell, Castle Rock, Col., writes:

"I would like to have your opinion and any suggestions you might have on the following idea.

"This is an electrical pyrographic outfit and is supposed to run on a 110 volt current with the rheostat in series to vary the heating."

A. Inasmuch as we consider your invention quite practical we refrain from giving further points, nor do we print the sketch. We think that if such an outfit can be sold cheaply, say for $1.50 or $2.00, you should be able to find quite a market for same, although it seems to us we have noticed something similar to your invention before, but do not know whether the construction is the same as yours.

The idea of the detachable burner seems to us to have some good points and we believe it would be worth while for you to spend $10.00 and have a patent attorney make a search in the Patent Office, whether a device of this sort has been patented before. This is always a good idea and it is better this amount for a patent search, than spending $75.00 or more to apply for a patent which might be rejected afterwards.

We have no further suggestions to make on your device and the idea seems to be carried out pretty well.

SEARCH FOR PATENTABILITY.

(9.) B. Miller, of Oakland, Cal., asks:

"I understand one can find out at small cost from the patent office whether a certain article has been patented already; in other words, I have been given to understand that before making a patent application, it would be a good idea to find out first whether the idea has been patented before by some one else. Will you be kind enough to give me a few points on this, as I cannot afford to spend much money on an uncertain thing?"

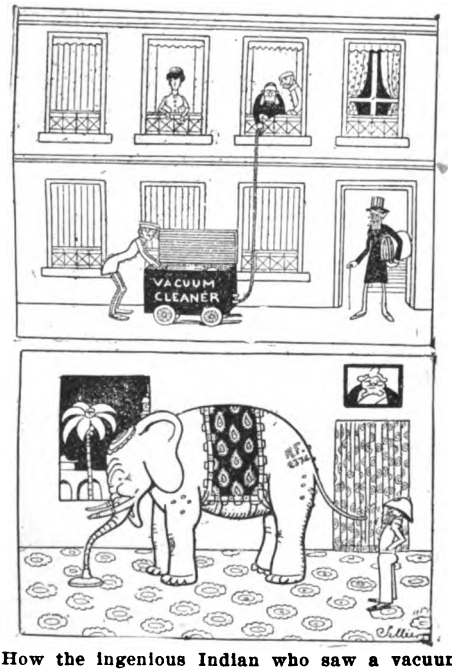
A. In part we refer you to previous inquiry. As a rule it is good policy for any inventor to have a search made through the patent office before applying for the patent itself. It is a well known fact that out of 10,000 patents, there are 9,999 on which similar patents exist already, if not identically the same. In other words, 9,999 new patents are only improvements on previous ones. If this was not so, such a patent would be a basic one and it is a very great exception in these days when the patent office turns out a basic patent which has absolutely no precedent whatsoever. For this reason it is always well for an inventor to find out what has been done before and for a small fee a patent attorney will undertake to make a search in the patent office, furnishing you with copies of patents having similar ideas as your own. Take, for instance, you think you have invented a new telephone transmitter. You can take it for granted that a great many points of your invention are already covered in previous patents and if you have a search made, the patent attorney will send you at least seventy-five or one hundred patents covering some points which your transmitter has.

By looking over these patents you can of course judge whether it would be worth while to make application for a patent yourself, and whether your transmitter would have sufficient novel points over the transmitters already patented.

We would advise every inventor to have a search for patentability made before actually applying for the patent itself. Many an inventor has not only saved by doing this but actually has improved his own invention by correctly informing himself as to what has been done in the same art before.

Flying Sparks

A NOVEL VACUUM CLEANER.

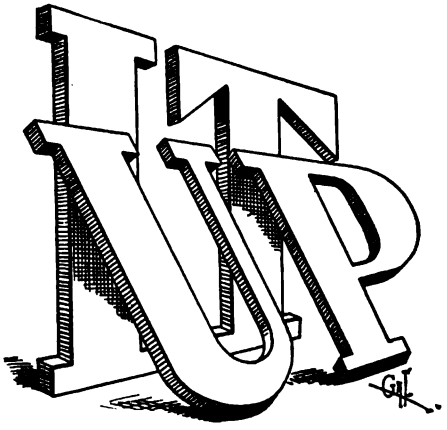


How the ingenious Indian who saw a vacuum cleaner in New York duplicated one for himself on his return to India.—Pêle Mêle.

Not His Doing.—HOWELL—"Edison says that we sleep too much."

POWELL—"Well, it isn't his fault; he has invented enough things to keep us awake."—*Life*.

ARE YOU?

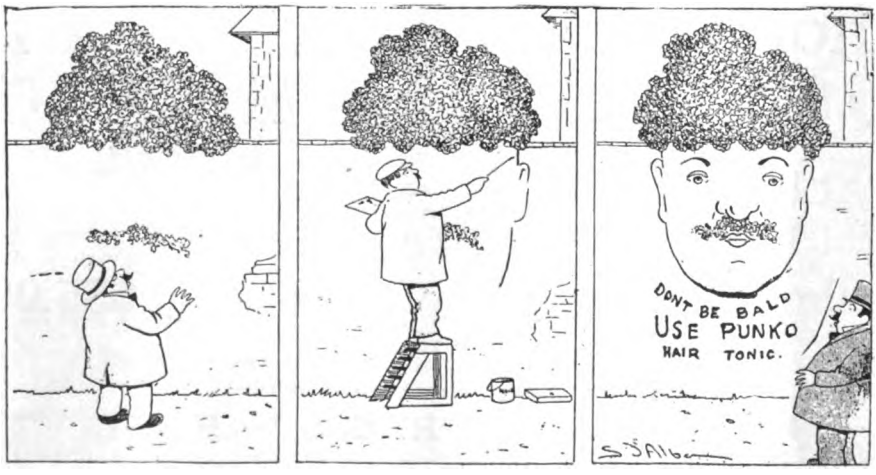


Up against it.—Judge.

HE COULDN'T SEE THE JOKE.

"Bill, I wish you would stop your kidding and listen to the story."

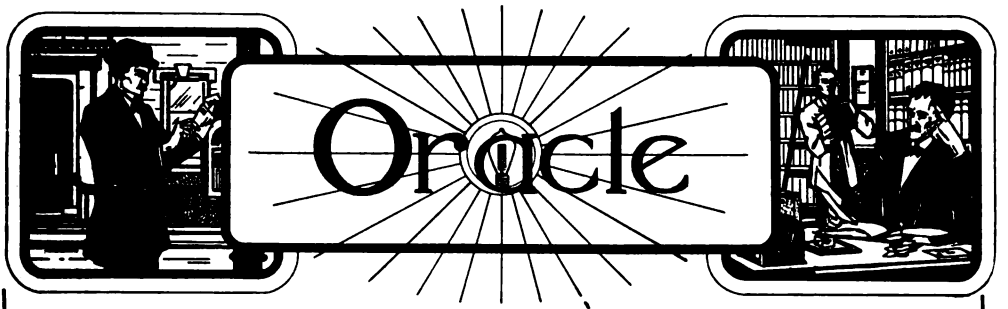
AN INGENIOUS STUNT.



This looks like a good space for advertising—

Suppose we—

Try it.—Pêle Mêle.



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.

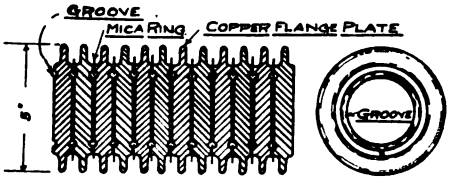
If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

SINGING SPARK SYSTEM.

(1070.) Frank J. Sudianek, N. Y., requests:

Q. 1. An explanation of the "singing spark" system, and whether one can be made for a 1 kw. or 2 kw. transformer.

A. 1. The "singing spark" system is known as the "Quenched Spark" method of producing electrical oscillations for wireless communication. The apparatus consists of the regular step up transformer or coil which raises the primary voltage of 110 or 220 volts at 500 cycles, to about 6000 volts. A high frequency generator giving a current of 500 cycles is necessary, which in itself prohibits the using of the system by most



amateurs. The high tension current is led into an oscillating circuit consisting of the condenser and the inductance, as well as a special spark gap. Contrary to the common zinc gap used in other systems, this gap is made of copper discs with silvered faces where the spark forms. The sparking surface in a 2 kw. set is about 1¾ inches. Usually five of these gaps are used at one time in series, but possibly eight or more form the gap with "shorting" devices placed between the units which are not desired. In this manner if the operator wishes to call up a near-by station, the voltage of the generator is reduced, and the series gaps all short-circuited with the exception of but one, giving a slight range which is just sufficient to reach the other station desired. These unit plates composing the gap are separated by a ring of thin mica, about the thickness of ordinary paper. The plates are so arranged as to have ridges resting on the mica, and the brush discharge reduced to a minimum. The diagram illustrates the cross-section of the plates. The result of using such a gap is that the sparks formed are very short and generate sharp impulses in the aerial circuit. The rapid succession of sparks causes an enormous amount of energy to be generated in the aerial circuit. In many instances the efficiency of the set is as high as 75 per cent. of the primary energy used, a remarkable percentage as compared with the ordinary spark system.

It is hardly possible for an amateur to contemplate using such a set unless he has access to the 500 cycle current. Possibly by using an electrolytic interrupter and this form of gap, good results could be obtained, and the editors would be pleased to see the experiment tried.

Q. 2. How many quart Leyden jars do I need for a 12 inch spark coil to get the best results?

A. 2. The term, "quart jars," does not represent a dependable factor for electrical calculation. Jars termed "quart jars" may vary to a wide degree, and therefore are only recognized in electrical calculations according to their condenser capacity which is determined by either calculation or calibration. However, for a 12 inch coil, we would suggest using 8,512 square inches of tinfoil on jars or plates, provided that the glass is about .05 inches thick.

Q. 3. What is the range of my apparatus consisting of ——, etc.

A. 3. We regret to state that in accord-

ance with the note which appeared at the head of the "Oracle" in the August, 1911, issue, we refuse to answer questions on ranges for the reasons set forth in that notice.

TRANSFORMER.

(1071.) A. B. Werner, Mo., asks:

Q. 1. Would you kindly let me know whether the following dimensions are correct, and the rating of such a transformer, viz: Core 13x18 inches, cross-section 2½x 2½ inches. Primary on one leg made of 6 layers of No. 12 D.C.C. with five taps. Secondary—20 pounds of No. 30 enameled, wound in 24 sections. To be used on 110 volts A.C. mains.

A. 1. We find that the dimensions are correct for about a 3 kw. transformer.

MINERALS.

(1072.) Albert Palmer, N. Y., writes:

Q. 1. Will you please let me know how many feet there are in a pound of No. 29 B. & S., S.C.C. copper wire, and how many feet in a pound of No. 22 B. & S. D.C.C. copper wire?

A. 1. No. 29 B. & S., S.C.C. wire contains 2,570 feet to the pound, while No. 22 B. & S., D.C.C. contains 461 feet to the pound.

Q. 2. Where can I obtain the minerals for a perikon detector, and which part of the aerial should be used for attaching the lead-in wires?

A. 2. If you will look over our advertising pages, you will find many firms selling the zincite and copper-pyrites required for the perikon detector.

As to your question regarding which part of the aerial to tap for the lead-in wires, we would state that different conditions govern the decision. Mechanical considerations would definitely make the lead-in wires tap on to the end of the aerial nearest the station, or in the center if necessary. However, usually wave length is considered, and if the aerial happens to be over 200 feet long, it is tapped in the center. If it is very short, then it is advisable to take the lead-in wires off one end nearest the station.

Q. 3. Where shall I apply for the operator's certificate required to be a wireless operator?

A. 3. The examinations are held at the navy yards, which in your case would be the Brooklyn Navy Yard. These examinations cover a complete test on the applicant's knowledge of motor-generator sets, of the apparatus, and aerials. He must also be capable of taking messages in both codes at a very fast speed.

ALUMINUM SOLDER.

1073). Claude Peters, N. Y., asks:

Q. 1. Will you please publish directions for making a solder for aluminum wire joints?

A. 1. A description covering this solder is given on page 301 of the August, 1911, issue.

DETECTORS.

(1074.) Ray C. Armstrong, Ill., inquires:

Q. 1. Would one Leyden jar made of a Crawfoot battery covered with tinfoil be large enough for a one inch coil?

A. 1. Yes.

Q. 2. Which of the following detectors requires batteries: Peroxide of lead, silicon, galena, molybdenite, perikon, and carborundum?

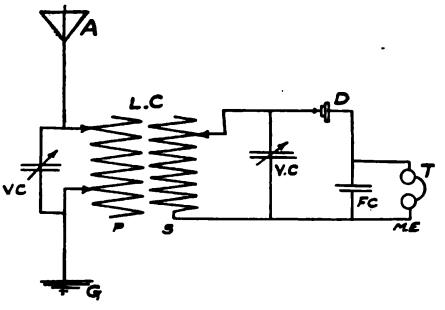
A. 2. Peroxide of lead, carborundum, and perikon require battery current for best results. The latter, however, is used largely without batteries, but will give the best results when used on .01 of a volt, with the correct polarity on both minerals. All the others you have mentioned work without batteries.

WIRELESS CONNECTIONS.

(1075.) Joseph Ballentine, Ky., writes:

Q. 1. Kindly favor me with a diagram of the following instrument connections: One two-slide loose-coupler, with one slide on the secondary, two variable condensers, one detector of the contact rectifying type, one fixed condenser, one set of head receivers, and the aerial and ground.

A. 1. We comply with your request below.



AN OLD QUESTION.

(1076.) Chester I. Hendricks, Mo., asks:

Q. 1. If I connect a piece of wire across the blades of a 600 volt, 25 ampere switch, would it double the voltage carrying capacity as well as the ampere rating?

A. 1. This question requires a little thought, and we would answer it as follows: If the distance between the blades and the jaws when the blades are pulled back does not exceed, when both are added together, the distance across the two switch blades, then nothing is gained in voltage, for the current will spark from blade to blade directly. As for the amperage, it remains approximately the same, being a little less if anything.

SPARK COILS.

(1077.) Edwin Meyer, Ill., inquires:

Q. 1. How can I use a number of induction coils which are intended for ignition purposes, each coil having three binding posts with vibrator and ½ inch core.

A. 1. These coils are not convenient for wireless telegraphy, for the reason that the primary and secondary are connected together in one place causing high tension currents to flow through the primary circuit. However, the simplest manner of using these coils will be to connect them in series and use in connection with an electrolytic interrupter. Care will have to be taken that the ground is connected on

the right binding post of the coils, for otherwise the secondaries will be short-circuited by having the aerial current travel through the lighting current mains and to the ground.

AERIALS.

(1078.) Charles Caldwell, Okla., asks:

Q. 1. Are there any wireless stations in Oklahoma, and if so where can I obtain a list of these?

A. 1. There are quite a number of stations in your state, including government installations. You will find a list of amateurs in the Blue Book which is sold at 15 cents, post prepaid. This book contains a complete list of government and commercial stations, as well as an excellent list of amateurs.

Q. 2. Will two wires 125 feet long be sufficient for receiving 1000 miles?

A. 2. Under average conditions, these wires would not be sufficiently long, and a greater number should be used. However, there are many amateurs that succeed in obtaining ranges in excess of 1000 miles with even shorter aerials.

Q. 3. What size wire should I use on the above aerial?

A. 3. If you desire the best, and price is no object, we suggest the use of phosphor bronze wire. Excellent results may be obtained from No. 12 aluminum wire, if the foregoing is not obtainable.

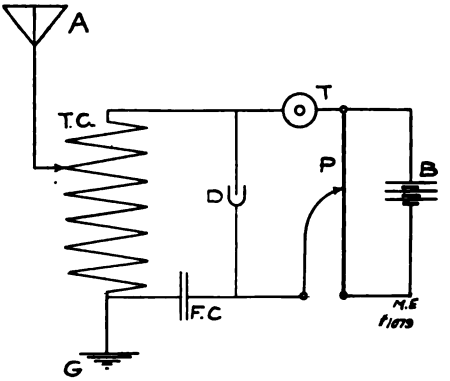
CONNECTIONS.

(1079.) A. Patterson, Ill., asks:

Q. 1. Will you kindly give me the following information? I have a wireless receiving set consisting of one 1000 ohm receiver, one fixed condenser, one single slide tuning coil, one electrolytic detector and one potentiometer. Which is the best diagram of connections for this set?

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

Q. 2. Which code is used the most on the Great Lakes?



A. 2. The Morse code.

TUNGSTEN LAMP.

(1080.) C. J. Sedlak, N. J., inquires:

Q. 1. Can tungsten wire as used in the tungsten lamps be wound in a spiral and used in a lamp?

A. 1. Your question is not very clear. If you mean whether tungsten lamps are manufactured with spiral filaments, we

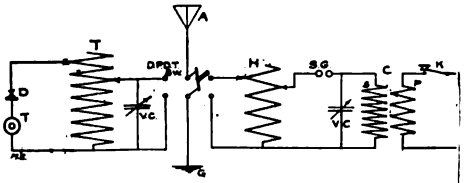
would say that probably the lamp manufacturers do make tungsten lamps with these filaments for stereopticon purposes. At the present time, the filaments are pressed to the desired shape while still in a plastic condition, so we do not see any obstacle towards using spiral tungsten filaments. However, such a device would be very frail.

DIAGRAM.

(1081.) Frontier Wireless Club, N. Y., asks:

Q. 1. Kindly favor us with a diagram for the connections of the following instruments: Silicon detector, double slide tuner, variable condenser, phones, spark coil, upright helix, variable transmitting condenser, and D.P.D.T. switch.

A. 1. We are giving you the diagram below.

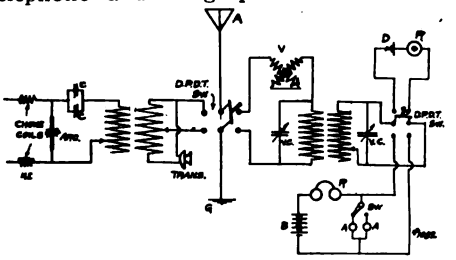


WIRELESS TELEPHONY.

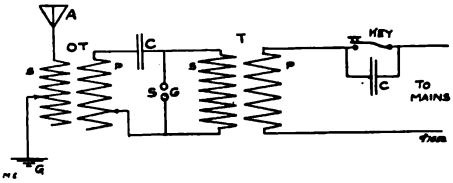
(1082.) Rymond, N. Y., writes:

Q. 1. Please publish in the "Oracle" a hook-up for the following instruments, for wireless telephony and telegraphy: 3 kw. open core transformer. L. M. Erikson microphone, 2 keys, loose-coupled helix, ammeter, arc lamp, 4 variable condensers, 2 fixed condensers, loose-coupler, variometer, 2 audion detectors, 1 silicon detector, rheostat, and rotary gap, besides two sets of head phones.

A. 1. We are giving you a diagram below, showing the connections for such instruments as are needed for two complete telephone and telegraph sets.



Wireless Telephone Connections.



Wireless Telegraph Connections.

CHOKE COIL.

(1083.) Richard Borneman, Ill., states:

Q. 1. I would like to know the size of core and amount of wire to use on a choke coil which is to be used on a ½ kw. transformer on 110 volts A.C.

A. 1. For such a transformer, we would suggest that the choke coil be made with a soft iron wire core 2 inches in diameter by 14 inches long, and wound with five layers of No. 10 B. & S. wire. Each layer should be thoroughly shellacked if D.C.C. wire is used, which is recommended for the coil winding. A tap should be taken from the end of each layer, and brought to a battery switch having as many points as taps from the coil.

Q. 2. Would enameled wire be satisfactory?

A. 2. Yes.

WATER RHEOSTAT.

(1084.) James Walker, Wash., asks:

Q. 1. Would you kindly inform me the quickest way to make a water rheostat?

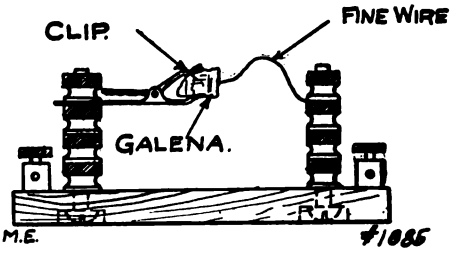
A. 1. We refer you to the answer No. 1044, given in the "Oracle" section of the October, 1911, issue.

GALENA DETECTOR.

(1085.) Harold Bernard, Vt., writes:

Q. 1. I have tried to use galena in a detector and find it very sensitive but cannot make it hold its adjustment. Can you inform me of some means of holding it and making the contact on the surface?

A. 1. Galena should never be soldered in a cup, as by so doing, the sensitiveness



is lost. It is also difficult to make a detector which will work well with this mineral. However, a very simple detector which will be found very useful, may be made by using the following materials: A helix clip having flat jaws, such as are used for holding magazines on stands, 2 brass screws, about 1½ inches long, and a number of battery nuts. The material is assembled as shown in the diagram, and a fine piece of wire inserted between two of the battery nuts. This wire may be obtained by taking a single strand of the wire from a piece of lamp cord. While the adjustment of this detector is extremely crude, it fulfills the purpose of receiving messages very well. It may be adjusted by tapping the clip holding the crystal with a pencil until the signals are heard loudest. It will hold the adjustment for days at a time.

ONE-QUARTER INCH COIL.

(1086.) Karl Hassel, Pa., desires:

Q. 1. Directions for making a ¼ inch spark coil with condenser.

A. 1. Length of core 3¼ inches, diameter of core, ⅜ths of an inch. No. of primary wire, 18, layers in primary 2, No. secondary wire 34, weight of secondary wire ½ pound. No. of secondary sections 1, No. of tinfoil sheets for primary condenser, 45, size of sheets 2x1½ inches, wall of insulating tube 3-64th of an inch. The secondary condenser should contain about 120 square inches of tinfoil with a glass dielectric not thicker than .05 inches.

Q. 2. What apparatus is needed to receive with an indoor aerial?

A. 2. For short distances, a double slide tuner, galena detector, phones, and fixed condenser, connected as shown in question No. 1028 of the "Oracle" section in the September issue.

1 KW. TRANSFORMER.

(1087.) R. F. Smith, Iowa, asks:

Q. 1. Please state the number of pounds of secondary wire required for a one kilowatt transformer?

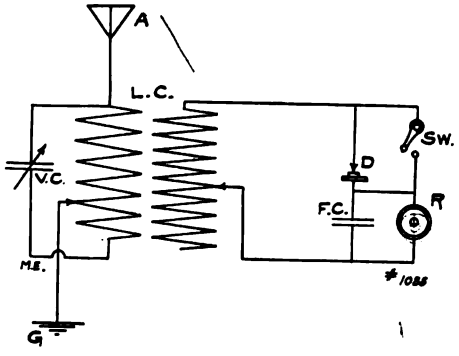
A. 1. You do not state open or closed core. For open core 12 pounds of No. 32, and for closed core 11 pounds of the same size.

DIAGRAM.

(1088.) Louis Bogart, N. Y., asks:

Q. 1. Wiring diagram for the following instruments: Loose coupler, condenser, variable condenser, silicon detector, head receivers and one switch.

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



Q. 2. What is my receiving range with the following aerial, etc.

A. 2. Kindly refer to our answer in question No. 1070, A.3.

NERNST LAMP.

(1089.) L. Batcheller, N. J., inquires:

Q. 1. What is a "Nernst" lamp, and how does it operate?

A. 1. The Nernst lamp is a form of the incandescent electric lamp using certain rare earth oxides for forming its filament, or "glower" as it is called. These "glowers" are formed from the oxides, and baked in order to form a suitable conductor. However, when cold these filaments will not conduct the current, and must therefore be heated by other means. "Heater tubes" are mounted above the "glowers" and consist of a porcelain tube with fine platinum wire wound around it, the whole being then covered with paste which hardens later, protecting the wire from possible oxidation and detoriation. When the

current is first turned on, it flows through the heating coils, which in turn warm the "glower." After the "glower" has become conductive, the heating coils are automatically cut off by means of an electro-magnetic switch, for otherwise they would soon be destroyed from being continually in circuit. The lamps usually require but a few minutes to light, and shed a soft and pleasant illumination at an economical consumption of current.

Q. 2. What is the meaning of "Short-shunt" and and "long-shunt" when applied to motors or generators?

A. 2. In a short-shunt machine, the leads from the shunt field are connected directly to the armature, either one of these or possibly both. In the long-shunt, the leads from the field are brought to separate binding posts and then connected to longer wires which lead to a switchboard where the regulating of the machine is performed.

Q. 3. Is there any instrument besides a calibrated spark gap for determining high tension voltage?

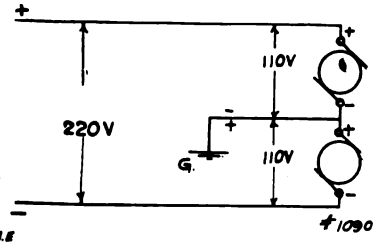
A. 3. Yes, there is a type of voltmeter known as the electrostatic voltmeter. The principle of its operation is based on the fact that two opposite charged bodies attract each other. The instrument contains two plates, one of which is stationary while the other is mounted upon a pivot so as to move and indicate with a pointer the voltage. These meters cannot be used with accuracy on lower than 50 volts, but are extremely valuable for the measuring of high tension voltages.

THREE WIRE SYSTEM.

(1090.) Edgar Solvay, Md., writes:

Q. 1. While experimenting on an electric light wire, it accidentally came in contact with a water pipe, and blew the fuse on the circuit. How is it that the fuse can be blown when using only one wire of the circuit?

A. 1. Undoubtedly you were experimenting on the type of transmission wiring known as the Edison three-wire system. We are giving below a diagram in which you will note that two dynamos are



connected in series across two lines, while the third, or middle line, carries current from the wire connecting the two armatures together. In this manner it is possible to obtain either 110 or 220 volts as desired. However, in city circuits, the middle wire known as the "neutral" is grounded, so that if one of the other leads touches a ground connection, there will be a short-circuit.

SPARK COIL.

(1091.) Charles Pearce, N. Y., asks:

Q. 1. Will you kindly advise what core and primary to use in making the best possible wireless coil with eight or ten pounds of No. 29 B. & S. for the secondary, and what battery current will be required? Also the dimensions of condensers for both primary and secondary.

A. 1. You can make a three inch coil with 10 pounds of the No. 29 wire. The dimensions would be: Length of core 12½ inches, diameter of core 1⅜ inches, No. of primary wire 14, layers in primary 2, and the primary voltage should be about 12 volts for the best results. The condenser for the primary should be composed of 180 sheets of tinfoil, 9x7 inches each. For the secondary condenser, one made from 18 plates of glass, 8x10 inches coated on both sides with tinfoil 6x8 inches will be found satisfactory. This condenser is of the one unit multiple connected type.

CABLE TELEGRAPHY.

(1902.) George Hapgoods, Nev., asks:

Q. 1. I have been told that cable messages are received in a darkened room and that a beam of light is reflected on a screen and swings from one side to the other, denoting the dots and dashes in this manner. If so what apparatus is used for producing the beam of light?

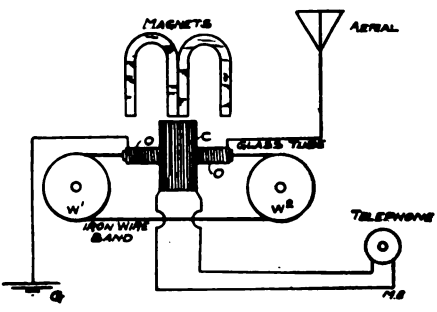
A. 1. The method of receiving you refer to is only used on cables of minor importance. All the more important cables use the Kelvin syphon recorder, which marks faint lines on a strip of paper, not unlike the usual Morse register. Formerly a reflecting galvanometer was employed, which reflected a beam of light on a screen so that the movements could be noticed.

DATA ON THE MAGNETIC DETECTOR.

Experimenters who contemplate making a magnetic detector, will find the following information of value.

In the diagram, the coil O is usually wound with 3 yards of No. 36 wire. Only one layer is needed. If No. 28 is preferred to the size suggested, 4 yards should be used. Coil C is usually wound with 100 yards of No. 40 wire, but in this instance the length may vary without any marked depreciation in results. To obtain the best results, however, it is very important that the resistance of the winding be equal to that of the telephone receivers. The spool should be very narrow, and about 1½ inches in diameter.

The pulleys W1 and W2 are made of fibre or hard rubber if possible, though wood will suffice. The iron



wire band, should be made of about ten strands of No. 36 s.s.c. *iron* wire. It will also be noted that the magnets are so placed that the like polarity is brought together.

METHOD OF BLACKENING BRASS.

A good dead black, that, in fact, used on optical instruments, can be had by brushing the cleaned brass surfaces with a solution of platinum chloride. This solution is prepared by mixing two parts hydrochloric acid with one part nitric acid, and dissolving in this mixture as much platinum foil as possible. It will be found that one-half ounce of nitric mixed with one ounce of hydrochloric acid will dissolve about thirty grains of the platinum foil. But in order to surely neutralize the acid it is best to have

a surplus of the platinum. The articles when brushed evenly with this solution will become a beautiful dead black, which will wear well if polished and cleaned only with a soft cloth. Another and somewhat cheaper method is to brush or immerse the parts in a fifty per cent. solution of copper nitrate, and then heat them slowly until dry. They are then immersed in or brushed with a solution of potassium sulphide 10 parts, water 100 parts, and hydrochloric acid 5 parts. They are then again heated until dry. Immersion produces much better results than does brushing. The latter heating process must not be continued longer than is necessary to reduce the whole of the green salt which forms on drying into the black copper oxide. This latter finish is very durable.—*Motor Print.*

WIRELESS NEWS FROM SOUTHERN CALIFORNIA.

The number of commercial and amateur stations are constantly growing. Poulsen has erected in the center of the city of San Diego, a station by which long distance work is done in day time.

The Navy is erecting a larger and more powerful station at Point Loma, (N P L), which was the first station to talk with (N A R) Key West from this coast. With the new set they hope to hold better communication with Key West.

The Mexican Government is erecting four modern stations in Lower California, at Ensenada, San Quentin, San Jose Del Cabo, and Magdalena Bay.

LOCAL NO. 233.

Local No. 233, of the Wireless Association of America, has been formed in Fort Worth, Tex., on May 28th, 1911. The following officers were elected: J. A. Hybarger, Pres. and Secy., Francis Kilander, Ch. Operator, and J. Dean, Asst. Ch. Operator. A service identical to regular commercial practice is being used, and all messages are recorded and reported at 8 p. m. each evening. While the association is known as Local No. 233, it is also recognized as the Fort Worth Local Wireless Amateurs.

$100.00 REWARD!

Mrs. Edith Dunham, of 516 West 111th Street, New York City, has requested us to call the attention of our readers again to the disappearance of her son on June 12th, 1911. We have already called the attention of the readers in previous notices, and with partial success. Mrs. Dunham realizes that *Modern Electrics* is one of the best mediums to reach the attention of her son or his acquaintances, inasmuch as he is deeply interested in electricity and wireless telegraphy. She makes this final appeal, offering **$100.00 reward** to anyone supplying her with information which will result in her finding her son, Donald Dunham.

Donald Dunham, whose photograph is shown herewith, is 5 feet 6 inches tall, weighs about 120 pounds, has medium brown hair and eyes, small and uneven teeth, and a round dimple on his chin. At the time of his disappearance he wore a dark blue suit with a fine white stripe.

The editor joins his appeal to that of the grief-stricken mother, and trusts that these words will come to the attention of someone who is in communication with Donald Dunham, or that the son himself will relieve the anxiety of his heart-broken mother.

THE LAW AND WIRELESS AMATEURS.

In the September issue, there appeared an interesting article by Stanley McClatchie, under the title of "The Legality of Wireless Tapping." Probably all readers will be interested in securing further information as to the outcome of the trial wherein the amateur's rights are seriously questioned. We have taken a few abstracts from "The Tribune" of Los Angeles, which gives complete details regarding the affair.

We are giving herewith a Chronology of the wireless expose of newspaper combine and the indictment of Edwin T. Earl.

July 29—Three youths, Kenneth Ormiston, Harry V. Roome and David M. Smith, amateur wireless telegraph operators, while at their wireless apparatus, overheard message being sent by Managing Editor F. H. Webb, of Los Angeles Herald, to General Manager F. F. Peard, of same paper, at Avalon.

July 30—Authenticity of message, as submitted to Edwin T. Earl, owner and publisher of The Tribune, by youthful wireless operators, investigated and substantiated.

July 31—Wireless mesage is reproduced in The Tribune.

Note.—To F. S. Peard, Avalon.—General suggests over phone that we make reproduction of Examiner Earl expose in Herald in mornii g. Suggestion sounds good to me and will follow it unless you wire to the contrary. Both phone ordinances passed the council and were signed by Mayor this afternoon. Now is the opportune time for reprint.
(Signed) WEBB.

August 1—Conferences are held at district attorney's office in effort to find some way of wreaking vengeance on The Tribune's publisher.

August 4—Edwin T. Earl indicted for "disclosing" contents of this wireless message under a statute dealing only with "telegraphic messages." Is served with warrant and released on his own recognizance.

August 8—The Tribune's publisher is arraigned before Judge Walter Bordwell and asks court for speedy hearing. Because prosecution is not prepared, case is postponed two weeks.

August 9—Grand jury drops so-called "telephone investigation," exonerates Tribune's publisher in official report and scathingly denounces slanderous newspapers which had printed libelously false accounts of Mr. Earl's efforts to have telephone rates made equitable.

August 22—Counsel for Mr. Earl file motion with Judge Bordwell to quash indictment on ground that district attorney, his deputies, Grand Jury Foreman Charles Wier and Secretary J. L. Matthews, of that body, with other grand jurors, were moved by ma-

lice, hatred and ill-will for defendant to form conspiracy to secure his indictment.

August 23—Court holds that, even though allegations of bias and prejudice are true, these do not constitute legal grounds for setting aside indictment and overrules motion of defense.

August 23—Attorneys representing defendant file demurrer to indictment, alleging facts set forth are not sufficient to constitute a public offense and that real facts were concealed in wording of indictment.

August 24—Arguments are concluded on points involved in demurrer and court takes matter under advisement until August 28.

August 28—Court announces it is not prepared to voice decision on demurrer and asks counsel to present any further arguments they may wish concerning mischief intended to be corrected by statute under which indictment was drawn, and persons against whom law was directed.

August 30—Judge Bordwell sustains demurrer to indictment, thus setting aside latter, in lengthy opinion in which he holds that the statute invoked was intended to apply only to those persons in the employ of a telegraph company. Prosecution gives notice of an appeal to the circuit court of appeals.

Among many interesting points brought forth are those in which the definition of a word or term is questioned. The meaning of a "telegram" brought the following controversy:

"Counsel for defendant called attention to the fact that a message telegraphed by the wireless method is not called a 'telegraph message,' or a telegram, but merely a 'wireless.' 'Whoever heard,' say counsel, 'such a message called by any name other than a 'wireless'; and urge with emphasis, that, in view of the fact that such a message is usually (or always) called a 'wireless'; therefore, the message is not a 'telegram' or 'telegraphic message.' The argument cannot be accepted. The word 'wireless,' used to describe a message received by the wireless telegraphic method, is but an abbreviation or corruption of the term 'wireless telegraphic message.' In the same way the word 'wire' is often used in common parlance as meaning a telegram received by wire."

The admissions of the district attorney were to the effect that the case at hand was uncalled for, and that no direct laws enabled him to present his side of the question. It is evident that all his arguments and points were merely the questioning of the extent covered by the laws used in connection with wire transmission. The following not only states the attorney's views, but likewise the outcome of the case.

"The district attorney freely concedes that one not connected with the service who reads a wireless message not intended for him with apparatus owned by him, or under his control,

does not commit the offense commonly known as 'wire tapping.' And there is no doubt that this admission is due and just. The elements necessary to constitute the offense of wire tapping are wanting in such a case.

"Having possessed himself with knowledge of the contents of a telegraphic message without committing any offense against the law, why may one who has thus acquired the information not disclose it?

"What has already been said here shows that the only persons who incur the penalty provided by law for disclosing the contents of a telegraphic message are those who are connected with the telegraphic service and those who commit the offense of 'wire tapping,' and those who clandestinely and wrongfully acquire knowledge of the contents of such message.

"The law does not apply to those who have acquired the information without violation of the written law. And from this discussion it seems to follow, of necessity, that one who has, without violation of law, possessed himself of the contents of a wireless telegraphic message, may disclose it without incurring the penalties as provided in section 619.

"That is all the court has to say on that subject. It remains now to consider the question of practice, and I regret that I did not ask counsel to discuss that more fully. I would inquire of the district attorney if you still insist that, notwithstanding these views, the court may not sustain the demurrer because, as you stated in your oral argument, the indictment charges an offense in the language of the section."

"No, I think, from your honor's views of the situation," replied the deputy district attorney, "that the indictment lacks the necessary allegation there that the defendant was, at the time of the offense, as alleged, connected with the telegraph company in some fiduciary or official capacity, or in the capacity or agent or any other capacity indicating that he was connected with a telegraph company.

"I am inclined at first blush, to the impression that the indictment now, under your honor's views, does not state facts sufficient to constitute a cause of action."

"Well, of course, I am not going to suggest that you ought to consent to the sustaining of the demurrer," said Judge Bordwell. "I leave that entirely to your own judgment as to what you should do.

"There is still a question in my mind," continued the court, "whether the indictment should declare that the defendant was not a person connected with the telegraphic service, or whether that is merely a matter of proof."

At this juncture Attorney Edwin A. Meserve, who, with Thomas E. Gibbon, Shirley C. Ward and W. H. Anderson, represented Mr. Earl in the proceedings, said:

"May I make a suggestion, if the court please, that the law of 1911 gives to the district attorney the power to make an amendment."

"I know it does," replied Judge Bordwell, "but I want to hear from the district attorney first."

"I think the clerk might make that amend-

ment in the indictment," offered Attorney Meserve as he resumed his seat.

The deputy district attorney agreed that the indictment could be amended in the manner suggested, but added:

"However, it occurs to me that the only thing for your honor to do, in view of the opinion indicated, would be to sustain the demurrer on the general ground, regardless of special grounds that have been urged in the demurrer, because, in my humble opinion, the indictment does not state facts sufficient to constitute a cause of action, for the reason that it lacks a very necessary and essential allegation with reference to the character or capacity of the defendant in the charge as alleged."

"And one that might not be cured by amendment?" asked Attorney Meserve.

"One which," said the deputy, "I am frank to say, could not be cured by amendment or by resubmission to the grand jury for the purposes of an amendment or for the return of another indictment. I am confident, from my knowledge as a citizen, that this defendant was not connected with the United Wireless Telegraph Company in any fiduciary capacity or in any capacity as an employe. I am confident we could not make any proof in that regard, and consequently it would be unnecessary labor to refer it to the grand jury again, or for your honor to order its amendment in that particular, as we never could make proof of the facts necessary to meet such an allegation."

"Well, in view of what you say," said Judge Bordwell, "an order will be made sustaining the demurrer."

The deputy district attorney then gave notice of appeal which, under the law, must be made within five days. Before the expiration of that time, he stated, he would file with the clerk of the circuit court of appeals a petition stating in general terms the points relied upon for appeal, which, in this instance would be, he said, that the law contemplated making the disclosure of the contents of a telegraphic message by any person in the world aside from the person it was addressed to, without obtaining the addressee's consent, a felony.

Classified Advertisements

Advertisements in this department 5 cents a word, no display or any kind. Payable in advance, by currency, check, money order or stamps. Count 7 words per line. Minimum, 4 lines.

5% discount for 3 insertions
10% discount for 6 insertions
15% discount for 9 insertions
20% discount for 12 insertions
within one year.

With 52,000 subscribers we have over 250,000 readers of MODERN ELECTRICS, which makes it one of the cheapest high grade classified mediums in the United States.

Advertisements for the January issue must be in our hands December 20th.

Modern Electrics,

233 Fulton St., New York.

Gentlemen:—While we are writing you we believe it fair to announce the results from the ad we inserted in your magazine. Although only a classified ad it has several times paid for itself, and we still receive returns from it. You will hear from us shortly, as we will insert a quarter-page ad, knowing that it will mean big returns for us, we remain,

KRAEMER WIRELESS DIRECTORY CO.
Charles M. Kraemer (Signed).

AERONAUTICS

COMPLETE PLAN drawn to scale with full instructions for building the only Wright 3-ft. Bi-plane Model that is absolutely guaranteed to fly. 25c postpaid.

Drawing and directions for three-foot model Bleriot Monoplane, 15c. Stamp brings most complete, interesting and instructive illustrated catalog published. Ideal Aero Supply Co., 86-88 W. Broadway, New York, N. Y. *(1)

THE "CELLULOSE TURBINE." "The Internal Combustion Turbine," now ready for the model builders. Delivers ⅛ horsepower, from 1 to 3 minutes. Complete plant ½ pound. Price $3.50. Correspondence invited. Co-Operative Aero Association, Muncie, Ind.

AUTOMOBILES

AUTOMOBILES. Save dealer's profits, buy direct from the owners. I have all makes runabouts from $50 up; touring cars from $100. Don't purchase any car until you get my prices; all guaranteed for one year. M. E. King, Automobile Broker, 213-217 West 125th St., New York City. (1)*

AGENTS WANTED

MAGIC FLOWERS: 10c for one dozen, bloom instantly. Klein, 1193 Broadway, New York City.

BOOKS, BLUEPRINTS AND FORMULAS

FREE—"How to Run and Install Gasoline Engines." Greatest little book ever published on this subject, sent free with year's subscription to Gas Energy. Learn how to solve all knotty Gas Engine problems in few moments. O. L. Stevens, Ind., writes, Gas Energy is best magazine published. Send 50c for year's subscription. Book free. Gas Energy, 30 Murray St., New York *(1)

3,000 RECIPES, FORMULAS, and Trade Secrets. 368 pages, 25c prepaid. Catalog on Mechanics, Engineering, Electricity, Trades, etc., free. Box 311. Scientific Book Shop, Syracuse, N. Y. *

BOOKS, BLUEPRINTS AND FORMULAS

EXPERIMENTERS AND ELECTRICIANS—Enamel your own wire. It's easy. I furnish enamel. Write for particulars and sample. Jas. Smith, Jr., 123 No. Main St., Phillipsburg, N. J.

NEW ELECTROLYTIC INTERRUPTER. No tubes. No rods. Description for making working model, 25c. United Electrical Laboratories, 426 Ottawa St., Lansing, Mich.

"THREE LITTLE BOOKS FOR LADIES," postpaid in plain cover, 25c. They tell what you want to know. O. K. Pub. Co., Clerk 195, Decatur, Ill.

READ "THE MAIL ORDER MERCHANT," a monthly money making magazine. Special six months only 15c. H. I. Latz, Atlantic City, N. J. *(1)

PRACTICAL MECHANICAL BOOKS for home study, all trades, catalogue for stamp. Crescent Book Store, 329 S. Halsted St., Chicago, Ill. (1)

BUSINESS OPPORTUNITIES

FREE—"Investing for Profit" Magazine. Send me your name and I will mail you this magazine absolutely free. Before you invest a dollar anywhere get this magazine. It is worth $10 a copy to any man who intends to invest $5 or more per month. Tells how $1,000 can grow to $2,000. How to judge different classes of investments, the real power of your money. This magazine six months free if you write to-day. H. L. Barber, Publisher, R418, 20 W. Jackson Boulevard, Chicago. *(2)

I'LL SHOW YOU how to start a profitable Mail Order business of your own, quickly, inexpensively and sensibly without any advance payment, if honest. Expert, P. O. Box 1615-M, New York City. *(11)

ELECTRICAL APPARATUS

1000 guaranteed pocket ammeters for testing batteries. Handsomely nickelplated. Each instrument in a chamois leather case, 25c postpaid. Stamps taken. Auto Repair Co., 521-23 West 144th St., New York.

HOT WIRE AMMETERS—Are you building the one described in Modern for February, 1911? Use my No. 36 Climax Wire. Send 8 two-cent stamps for two feet; postage paid. Milton Berel, 870 Longwood Ave., Bronx, N. Y. City.

FOR SALE

FINE SET of mechanical drawing and drafting instruments for five dollars ($5.00). This set is usually sold for $8.00 or $9.00. We also have a few electricians' watches left, that are excellent timekeepers, these go at $2.00 prepaid; they are well worth $5.00 and are non-magnetic. F. Davis Co., 500 Houston St., Ft. Worth, Texas.

HAVE a fine 5-inch spark coil independent interrupter that I will trade for a good ½ K.W. transformer. Also have a 2 H.P. gasoline engine and a 1 K.W. dynamo for sale cheap. Make me a price on these. Robt. C. Denny, 135 Spruce Ave., Kansas City, Mo.

FULL BARREL LOTS well assorted, slightly damaged red, white-lined French and German cooking earthenware. Shipped any address direct from factory for $2; cookbook free. Send cash with order. E. Swasey & Co., Portland, Me.

FOR SALE

WILL TRADE a 25-foot partly completed speed launch with all hardware and material shaped to finish for a 110 volt 125 cycle ½ H.P. motor, or what have you? J. Zenus Cole, 1612 Main St., Niagara Falls, N. Y.

CLOSED-CORE TRANSFORMERS, self controlling, four variations: ¼ K.W., $10; ½ K.W., $15; 1 K.W., $25. Guaranteed. Sent on trial. Send for particulars. Phillips Roadhouse, Shelby, Mich.

COMPLETE electrical and wireless experimental laboratory equipment for sale or exchange cheap. Want 2 or 3 K.W. transformer, or what have you? M. O. Andrews, Coudersport, Pa.

SEVEN K.W. wireless set complete at bargain. This set has transmitted 2,400 miles. It is in perfect condition. Full particulars on request. A. H. Cox, 308 Boston Block, Seattle, Wash.

ONE AND ONE-HALF INCH COIL, Murdock head receivers, Perikon detector, aerial switch, 50-foot pole, insulators, wire at your own prices. Horton, 971 Putnam Ave., Brooklyn, N. Y.

ONE-HALF K.W. transformer sending set, 1½ inch spark coil sending set and a good receiving set for sale. For particulars address Charlie Daniels, Covina, Cal. Box 444.

FOR SALE: One ½ K.W. transformer coil, brand new, but displaced by transformer, excellent condition. Price $5.00. B. H. Clark, De Kalb, Ill.

MY COMPLETE 1 K.W. Clapp-Eastham transmitting set, almost new. Write for prices on what you want. J. B. Hyatt, Mt. Vernon, Ohio.

FOR SALE—Complete wireless receiving outfit, including aerial, price $10.00. Wm. Kaiser, 198 Mansfield St., New Haven, Conn.

FOR SALE: Moving Picture Film, 1c. foot; machines, $40. H. Davis, Watertown, Wis.

One No. 16 Direct Connected Dynamo and Water Motor, 80 Watts, 20 Volt. $10.00. T. Cryderman, Post Falls, Idaho.

HELP WANTED

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

ELECTRIC METERMEN wanted in every state—$900-$1,800 yearly. Rapid introduction of electricity creating new positions daily. We will fit you for a splendid position and assist you to get it. Booklet giving full particulars sent free. Write for it to-day. Fort Wayne Correspondence School, Dept. 50, Fort Wayne, Ind. (11)

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

EARN GOOD PAY copying addresses; particulars six stamps. Hinchey, 177 Middleport, N. Y. (1)

MACHINERY AND TOOLS

LATHES: Send for Free Circular showing bargains on small Screw Cutting Engine Lathes. S. B. Tool Co., Dept. B, South Bend, Ind. (1)*

FOOT AND ELECTRICAL and power engine lathes; hand and power planers, shapers and drill presses; the most modern; the most practical; various attachments; supplies. Shepard Lathe Co., 134 W. 2d St., Cincinnati, Ohio. (11)

MOTORCYCLES

MOTORCYCLES. Lowest prices, largest stock. Saves dealer's profits. Buy direct from the owners. I have all makes. Indians, $20 up; Marshes, $20 up. Don't purchase any Motorcycle until you get my prices. All guaranteed for one year. M. E. King, 213-217 West 125th St., New York City. (1)*

MUSIC

OLD FAVORITE SONGS, with music (Annie Laurie, Swanee River, America, Tramp, Tramp, etc.), 5c., six 25c.; Dream Books, 25c. Art Printing Works, Hamilton, Ohio. (1)

PATENT ATTORNEYS

PATENTS.—$15 down and $5 per month after application is filed. Send sketch for free report. Book free. Author of "The Electro-Magnetic Gun," November "Modern Electrics." Obed Calvin Billman, Main Office, Cleveland, Ohio.

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

FORTUNES for Inventions. Patents $55. Full particulars free. Alexander J. Wedderburn, Washington, D. C.

INVENTORS—Send us a copy of your patent or invention and we will submit our liberal proposition to you. Atlantic Supply Co., Long Branch, N. J. (5)

PHOTOGRAPHY

PHOTOISMS—A little magazine for the amateur or the beginner. The Little Things You Ought to Know, Photoisms for one year, a Wager Exposure Scale and "Photography in a Nutshell" for one dollar. Three months' trial, 25c. Photoisms, Suite 12, 26 John St., N. Y. *(1)

READ THE LABEL. Photographic Developer No. 335; new developer for plates or papers; absolutely controls over exposure; gives perfect prints. Saves its cost in waste; 50 cents by mail; Makes 100 ounces. Not poisonous. Keeps months. Joseph H. Brinton, West Chester, Pa.

PICTURES AND POST CARDS

25 BEAUTIFUL POST CARDS of Washington, D. C. Newest designs in colors showing views of Government Buildings and other subjects. Postpaid, 25c. Fred Mayer, 105 Pennsylvania Ave., N. W., Washington, D. C. *

THREE CARD TRICKS 10c. Bamberg Company, 1193 Broadway, New York City.

PRINTING

100 ENGRAVED STYLE VISITING CARDS 25c. 100 Neat Business Cards or Envelopes 40c. Retter (Box 142-H), Tippecanoe City, Ohio.

REAL ESTATE

FARMS Bought, Sold and Exchanged. Write Chas. A. Phildius, 388 Pleasant Ave., New York. (4)

SCIENTIFIC INSTRUMENTS

WE BUY, SELL AND EXCHANGE. Bargains in Microscopes, Telescopes, Field Glasses, Cameras, etc. Catalogue and Bargain List free. Kahn & Co., Established 1850. 26 John St., New York. *(1)

STAMPS, COINS, ETC.

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

TRICKS, JOKERS, PUZZLES

CACHOO (the genuine sneeze powder), sample 10c.; dozen, 80c.; hundred, $5. Catalogue Theatrical Wigs, Make-Ups, etc., free. Percy Ewing, Decatur, Ill.

NEW MAGIC POCKET TRICK FREE, including catalogue. Send 6c. stamps. Magic Co., Dept. 43, 270 West 39th St., New York. (1)

MAGIC BY MAIL: Prospectus and catalog, 10c. National Magic School, 1193 Broadway, New York City.

MAGIC AEROPLANE TRICK, 10c. Catalogue included. Bailey, Box 253, St. Paul, Minn. *(1)

CURIOSITIES

INDIAN CURIOSITIES—Price, free. Gilham, Highland Springs, Cal. (1)

TYPEWRITERS

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

WIRELESS

FINISHED SECONDARIES wound in sections waxed and taped for ¼ K W. Transformer $7.50, ½ K.W. $12 50 2 inch coil $6 50 Parts with secondaries wound for ¼ K.W. Transformer $11 50, 200 Watt Transformer $8.75. Secondaries wound to order. REGO MFG. CO., Arlington, Md.

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

A NUMBER of high class induction coils, 6-inch spark gap upwards, for sale at reduced price. State your requirements in regard to spark gap and we will quote you lowest price. We should be pleased to receive inquiries for condenser, of which we have large quantity in stock. Meyrowitz, 104 E. 23d St., New York City. (1)*

WIRELESS MATERIAL in Detroit. We carry a complete stock of Electro Importing wireless goods and sell at regular prices. Save time and express charges. Come to our store and select your needs. Cannot handle mail orders. W. J. Hartwig Co., 205 Jefferson Ave., Detroit, Mich. (3)

PURE ZINCITE CRYSTALS, iron pyrite, bornite, carborundum, galena; fresh from the mines. All tested for sensitiveness. Large piece each 35c. prepaid. Dr. Jenkins, 75 West 131st St., New York City.

LEARN WIRELESS—Expert instruction. Complete high power station. Receive practical experience. Rates low. Mail course if desired. Kenosha Wireless School, Mil. Ave., Kenosha, Wis.

The NEWEST THING IN WIRELESS is the new Perycarbon Detector. Send stamp for our catalog of the goods "that beats them all." Alden Wireless Co., Dept. M., Campello, Mass. (1)

FULL LINE OF E. I. CO.'S GOODS IN STOCK. Fill orders for Toledo and suburbs as E. I. Co.'s catalogue No. 9. No mail orders. P. & W. Electric Co., 1012A Monroe St., Toledo, Ohio. (3)

FULL SET receiving and sending outfit, 2-inch coil, 2,000 ohm receiver, cost $43.00, one month old, will sell $25.00. Write G. Coldicoll, 177 Sheridan Ave., City Line, Brooklyn, N. Y.

FOR SALE: Wireless transformers, spark coils, condensers, spark gaps, helix, tuning coil and detectors. Send for photos. G. S. Crowther, 1414 Pembroke St., Victoria, B. C.

WIRELESS BLUE PRINTS—Receiving Transmitting Circuits, 25c. Stanley Patten, 172 W. 96th St., New York. (2)

When writing, please mention "Modern Electrics."

THE BEST MBIA

AN ARGUMENT TO BATTERY USERS:

TO the average user of dry cells all seem to appear very much the same When he reads the advertisements of the various battery makers he is still at a loss which to select, because each claims superiority.

Everyone knows that all cannot be the best, so it is necessary to reason for a moment before spending money for cells.

There is only one battery that is best. That leadership is not gained by talking, but by a record for good service over a long period of years. Confidence must be established and maintained to hold this coveted place.

It is on this basis and the quality and service of Columbia that it long ago became leader and so is to-day.

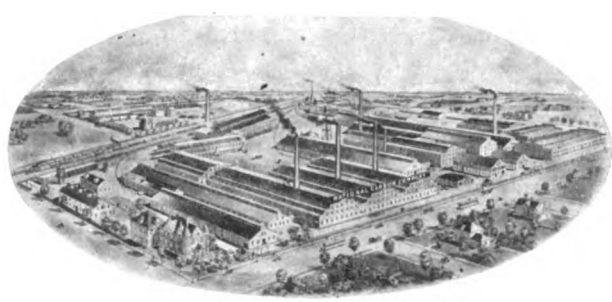
Make a test for yourself and you can see the difference. People may misrepresent, but a service test won't. Be your own judge, and in doing this remember that we are the exclusive manufacturers of Columbia, have been at the business for more than twenty years, and have greatest facilities and resources for making strictly highest grade products.

A laboratory force of over 100 skilled chemists and engineers are back of every battery we make.

You can't go wrong when you demand Columbia.

Try it by using Columbia, and you will be dollars ahead in the end, and free from battery troubles.

Buy Columbia from your dealer. If he does not carry it send us his name and we will help make it easy for you to get Columbia in future.



MAIN FACTORY AT CLEVELAND
Largest Battery Factory in the World—Over 30 Acres

only by

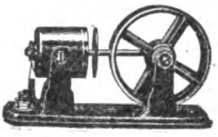
COMPANY, CLEVELAND, O.

Cleveland Sixth City

FREE PREMIUMS

We offer below a complete assortment of FREE Premiums, any one of which may be obtained by a little extra effort. You are now reading **MODERN ELECTRICS**, which means it must be good, then show it to your friends. Help yourself and help us to build up the biggest circulation of any electrical paper in the United States. You don't have to be a subscriber to take advantage of this chance to obtain a valuable instrument for nothing; it only takes just a few minutes of your time. Show the magazine to your friend, give him a few pointers on the magazine and nine times out of ten, he will subscribe. Get the subscription, send it to us and we will forward by return mail the premiums you select. Your own (NEW) subscription will count. Now get busy and get something practical FREE.

Junior Fixed Condenser. Used in all modern receiving sets. Special dielectric giving extra high capacity. Sealed in hard rubber base with binding posts, as shown. Sells for $0.50. (Add 6 cents for postage).
Given free for 1 subscription.



Wireless Engine. The Slickest little engine ever placed on the market. You cannot see a piece of wire. Has two fly-wheels and beautiful balancer. Cast iron base; works on one dry cell. The engine sells for 45 cents. (Add 14c. for postage)
Given free for 1 subscription.

Zinc Spark Gap mounted on hard rubber base. Electrodes fitted with rubber handles. Pure zinc rods. Used in all of the best stations. Spark gap sells for 60 cents. (Add 7 cents for postage.)
Given free for 2 subscriptions.

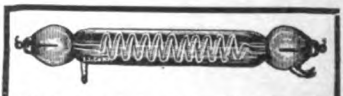
"Electro" Junior Tuning Coil. Slickest tuning coil on the market. Has solid hard rubber ends, bare copper winding, hard rubber sliders. Size, 8 x 3¾ x 3¾ in. Weight, 1½ lbs. The most beautiful and most practical coil made. "Electro" Tuner sells for $2.00. Sent by express only.
Given free for 5 subscriptions.

Pony Telephone Receiver. This is the receiver you have long wanted. The best one on the market. Hard rubber case. Single pole, powerful magnet. Hook can be screwed off. Standard resistance of 75 ohms. Receiver sells for 40 cents. (Add 7 cents postage.)
Given free for 1 subscription.

'Electro' Rheostat Rotary adjustment. Air cooled. Very useful to vary the speed of motors and small lamps. Wound with non-rusting wire.
Given free for 1 subscription.

"Electro" Medical Coil. A1 quality. No end of fun with one of these coils, besides its therapeutic properties. Complete with cords and handles. Medical Coil sells for 70 cents. (Add 12 cents for postage.)
Given free for 3 subscriptions.

"Electro" Amateur Phones, 2000 ohms resistance. Wound with No. 50 copper wire. Thin diaphragms. Leather covered adjustable headband. Weight 15 oz. 80 per cent. better than 75 ohm phones. Phones sell for $4.50. (Add 25 cents for postage.)
Given free for 10 subscriptions.



Six Inch Geissler Tube With Liquid. A fine tube; works on any spark coil. Gives the most beautiful, astounding colors. Tube sells for 50 cents. (By mail extra ten cents)
Given free for 1 subscription.

Areo-Flying Machine. A practical miniature aeroplane; byplane type. Guaranteed to fly 100 feet. A well constructed machine. Aluminum propeller; rubber motor. Sells for 75 cents. (Add 12 cents for postage.)
Flying Machine
Given free for 3 subscriptions.

"Electro" Lytic Bare Point Detector. Holds the world's record for long distance receiving. Mounted on hard rubber base. Finest adjustment. Increase your receiving range 30 to 40 per cent. "Electro" Lytic Detector sells for $1.25 (Add 12 cents for postage.)
Given free for 3 subscriptions.

One Inch Bull Dog Spark Coil. This is the coil that has sent a message 90 miles with a suitable aerial. None better made. None better looking. Has French vibrator and fibre casing. Sells for $1.50. Can go by express only.
Given free for 12 subscriptions.

Please understand that we have an invariable rule that premiums cannot be given unless you ask for them, when sending in the subscriptions.

We are sure you can get any of the above premiums by showing this magazine to your friends, doing a little talking. Then is your chance, get the subscription before the other fellow gets it. Strike while the iron is hot. Act Now. Don't delay, the offer is new now and lots of people will get busy at once.

This is the best season of the year for subscriptions. **Everybody reads. Everybody subscribes.**

Send money order, draft, express money order, cash or stamps; no checks please.

MODERN PUBLISHING COMPANY, 233 Fulton St., New York

MAGAZINES AT

For the benefit and convenience of our readers, we have prepared a number of attractive offers in combination magazine subscriptions. The offerings cover a selection of the leading publications in electricity, mechanics, aeronautics, photography, fiction and all topics which would be of general or particular interest to our readers. While our list is compiled to meet the general demand, any publications not listed can be quoted on by us, on request.

The prices given below are for American subscribers only. Periodicals sent to Canada and foreign countries are subject to the additional postage charges, which may

FOR THE ELECTRICIAN.

Modern Electrics.
Popular Electricity.
Electrician and Mechanic.

Regular Price $4.00
Our Price $2.90

FOR THE FICTION READER.

Modern Electrics.
Cosmopolitan.
Everybody's.

Regular Price $4.00
Our Price $2 65

FOR THE BOY.

Modern Electrics.
American Boy.
Boy's Magazine.

Regular Price $3.00
Our Price $2.20

FOR THE AERO ENTHUSIAST.

Modern Electrics.
Aircraft.
Fly.

Regular Price $3.50
Our Price $2.45

MODERN ELECTRICS Clubbed with

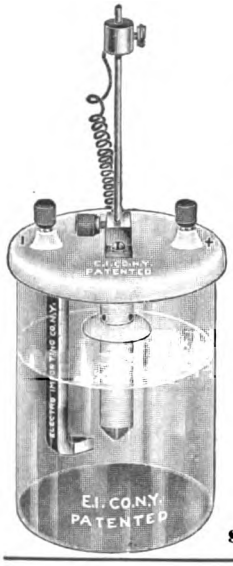
	Reg. Price	Our Price
Ainslee's	$2.80	$1.85
American Boy	2.00	1.45
American Journal of Mathematics	6.00	5.50
American Journal of Medical Sciences	6.00	5.80
American Journal of Science	7.00	5.80
American Machinist (Weekly)	5.00	4.50
American Machinist (Monthly)	2.00	1.75
Argosy	2.00	1.75
Auto Mechanics	2.00	1.60
Automobile Journal	2.00	1.40
Automobile Topics	3.00	1.70
Beach's Magazine	1.50	1.30
Black Cat	2.00	1.50
The Book-keeper	2.00	1.45
Boy's Life	1.50	1.25
Boy's Magazine	2.00	1.50
Boy's World	1.50	1.15
Camera	2.00	1.60
Camera, after Jan. 1, 1912	2.50	1.85
Chemistry	6.00	5.80
Collier's Weekly	6.50	5.10
Cosmopolitan	2.50	1.65
Cosmopolitan, Good Housekeeping, World To-day (all to same address)	7.00	3.50
Country Life in America	5.00	4.05
Current Literature	4.00	2.30
Cycle and Automobile Trade Journal	3.00	2.15
Electrical Review and Western Electrician	4.00	3.15
Electrical World	4.00	3.60
Electrician and Mechanic	2.50	1.90
Electric Journal	2.50	2.05
Engineering Magazine	4.00	3.80
Engineering News	6.00	5.65
Etude	2.50	1.80
Everybody's	2.50	1.80
Everywoman's Magazine	1.50	1.10
Farm and Fireside	1.50	1.15
Farm and Home	1.50	1.10
Farmer	1.75	1.30
Farmer's Wife	1.25	1.00
Farm Journal (2 years)	1.35	1.05
Farm World	1.25	1.05
Financial Review	3.00	2.15
Forest and Stream	4.00	2.90
Fruit Grower	2.00	1.35
Gas Engine	2.00	1.50
General Electric Review	3.00	2.40
Golf	3.00	2.40
Good Housekeeping	2.50	1.65
Hunter's Magazine	2.50	2.00
Happy Hours	1.25	1.00
Harper's Magazine or Weekly	5.00	4.30
Harper's Bazaar	2.00	1.50
Health	2.00	1.45
Horseless Age	3.00	2.40
Illustrated Review	2.00	1.45
Inventive Age	2.00	1.45
Iron Age	6.00	5.05
Isolated Plant	2.00	1.40
Journal of Electricity, Power and Gas	3.50	2.95
Judge's Weekly	6.00	5.90
Ladies' Home Journal	2.50	1.95
The Ladies' World	1.50	1.15
Le Bon Ton	4.50	3.90
Leslie's Weekly	6.00	5.00
Life	6.00	5.15
Lippincott's Magazine	4.00	2.35
Literary Bureau	2.50	1.90
Little Folks	2.00	1.50
Locomotive	1.50	1.25
Machinery	2.00	1.50
Magazine of Mysteries	1.25	1.00
McClure's	2.50	1.50
Metropolitan	2.50	1.50
Modern Priscilla	1.75	1.30
Motion Picture Story	2.50	1.90
Motor	4.00	3.40
Motor Boat	3.00	2.40
Motorcycle Illustrated	2.00	1.60
Motion Picture World	4.00	3.05
Musical America	3.00	2.40

Send today 2c stamp for our 32 page Magazine book giving complete list and prices of over 2000 American periodicals, the most complete book of this kind published.

When writing, please mention "Modern Electrics."

HOLIDAY

The Gernsback Electrolytic Interrupter



8000

PATENTED APRIL 4TH, 1911
1912 MODEL

This interrupter is too well known now to deserve any especial mention. However we have brought out a new style which has entirely overcome some of the slight difficulties experienced with our Interrupter heretofore. Our old style model used too much current and made the lights in the house dim down which was one of its objectionable features. The Interrupter also did not work very steadily for long periods.

ALL THESE DIFFICULTIES HAVE NOW BEEN OVERCOME WITH OUR NEW TUBE AND OUR INTERRUPTER WILL NOT USE MORE THAN FIVE AMPERES AT THE UTMOST.

It positively does away with the flickering of the lights and the Interrupter can be used for hours at a time without a single break occurring. This we fully guarantee.

The new tube has another important feature, **inasmuch as the frequency of the Interrupter has increased fully 50%** over that of our old Model. The metal rod is also consumed at a very much slower rate than heretofore and the Spark length is greatly increased at the same time.

You will be astonished at the working of our new tube and you would hardly believe it possible that an Interrupter could give such results until you have yourself tried it.

There is positively not the least bit of trouble experienced with our new Model Interrupter and to those having our old style, we suggest to secure one of the new style tubes for their present Interrupters which will give them practically the new Model.

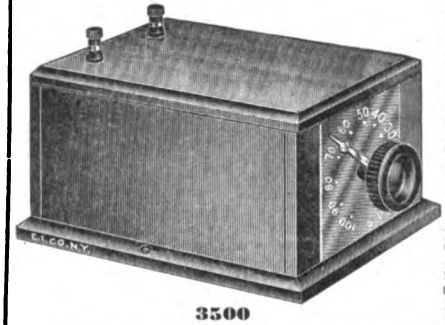
The price of the new tube is 30c., mail extra 6c.

The Gernsback Interrupter works on 110 volts D.C. or A.C. without any resistance. It is used with spark coils from 1 in. to 12 in. spark and will increase any spark-length 100%.

No. 8000. GERNSBACK INTERRUPTER..... **$2.25**
EXTRA TUBES..... **.30**
EXTRA METAL RODS..... **.15**

The Gernsback Rotary Variable Condenser

(Patent Pending)



3500

We confess that our line of wireless apparatus has failed to be as complete as we desired in the past, for we lacked a rotary variable condenser. Many of our patrons and our competitors wondered why we did not place on the market a rotary condenser using the regular intersecting plates, but we appreciated the disadvantages of these condensers, preferring to avoid selling them. The rotary plate condensers possess a landslide of faults, which may be briefly outlined as follows: They short-circuit when subjected to a heavy blow or jar; they lose their adjustment after long use and short-ciruit; they require constant mechanical attention, often jamming and becoming useless; owing to the air gap of sufficient size by necessity between the plates, the capacity is very low compared to the size; the plates being sharp edged, cause much leakage of the receiving currents with the corresponding loss of range; **cannot be used horizontally** which makes adjustment very crude and tiresome to the operator; and many others which are too well known to mention in this limited space. We use an entirely new mechanical principle of operation eliminating ALL the defects of the rotary plate type.

As will be seen by the cut of the rotary condenser, the working parts are entirely encased in a neat oak box, finished in the natural grain and highly polished. A large rubber handle is used for manipulating the condenser, while a pointer indicates the proportion of the total capacity in circuit, on a neat scale. Two of our hard rubber binding posts are used on top of the box to make the connection to the receiving set. The apparatus being entirely contained in the oak case, makes the condenser dust-proof.

As for the working parts, it may be stated that these are far simpler than condensers using intersecting plates. The parts work in perfect unison, with no friction or opportunity for wear. It is impossible for the condenser to get out of order in consequence.

The working parts do not intersect, and nothing can bind or drop its adjustment.

The conducting surfaces being separated by one-thousandth part of an inch of dielectric material, gives the condenser an extremely high capacity, which is guaranteed by us to be at least ten times that of any other variable condenser of equal dimensions.

The insulation is perfect, and no breakdowns possible. However, it must be understood that this is a receiving condenser and not to be used on a transmitting outfit or other source of high tension current. It will not break down under static currents from the air which flow through the receiving apparatus.

No plates with sharp edges being used, leakage is impossible.

Short-circuiting of the condenser is impossible under any circumstances.

The parts being simple and working with little friction or wear, give the apparatus a long life, far in excess of other condensers.

It is fool-proof, nothing being in sight or exposed so that it may be tampered with.

Our variable condenser will work in any position. We have made the apparatus with the handle on the side, so that the arm of the operator may be rested while adjusting the condenser, giving greater accuracy, and less effort in the manipulation.

No tightening screw or nut is needed to hold the adjustment at one place. **It is self regulating and holds any adjustment after the handle has been left at the point desired.** No amount of shaking or vibration can affect the adjustment.

Finally, it is the best condenser at any price on the market, and you cannot afford to use the others if you wish the maximum efficiency.

As usual we lead—others follow—and copy.

Size, 9½ x 6 x 4⅞ inches. Weight, 2½ lbs.

No. 3500. Gernsback Rotary Variable Condenser (patents pending)..... **$4.00**

READY DECEMBER 20th, ORDER AT ONCE