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# MODERN ELECTRICS

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MAY 1912


"THE ELECTRICAL MAGAZINE FOR EVERYBODY"



N.S.E.

# MODERN ELECTRICS

"THE ELECTRICAL MAGAZINE FOR EVERYBODY"

Edited by H. Gernsback

Volume V | MAY, 1912 | No. 2


# CONTENTS




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Modern Electrics

VOL. V. MAY, 1912 No. 2

# The Practical Electrician

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

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

## CHAPTER III.

(Continued)

### 72. EXPERIMENTS WITH A VERY SENSITIVE GALVANOMETER.

1. DIP a piece of zinc to which a copper wire, connected to the galvanometer, is soldered, into plain water, then dip the end of the other copper wire, also connected to the galvanometer, in the water, and the needle of the galvanometer will be deviated.

2. Stretch two insulated copper wires in such a way that one runs parallel to the other and that one is separated from the other from one to two inches, the ends of one wire are connected to the galvanometer, and ends of the other, to a battery. When the battery current is closed and opened a momentary current will be observed on the galvanometer.

3. If you have two wire spools one of which can be placed inside the other and if the outside spool is connected with the galvanometer, a momentary current will be registered in the latter instrument, if there is a current sent through the inner spool.

4. Connect a copper wire loop with the galvanometer and bring a strong magnet near to the distant loop of the wire. A current will be registered as the magnet is moved.

5. If the two connecting wires coming from the galvanometer are stuck into a boiled potato, a current will be observed.

6. Place the two copper wires successively into different acid solutions. Each acid will give a different deflection.

7. Instead of using copper lead wires, use steel lead wires, which dip in mercury.

8. If the ends of the connecting wires, leading from the galvanometer are touched, a deflection should be noted, if the instrument is sensitive enough.

9. Take the two copper wires leading from the galvanometer in the two hands and press the wires strongly. A current will be observed which is the result of the so-called muscle current.

10. The same can be observed in the following experiment:

Place the ends of the copper wire in water in which ordinary cooking salt has been dissolved and move one or several of the fingers.

11. Four persons form a chain by clasping their hands together. The first person touches a copper wire, the

last a zinc wire which two wires are connected with the galvanometer.

12. Place the copper wires leading to the instrument in the mouth and pull one or the other out, and a current will be observed.

13. Heat one end of the copper wire and touch it with the other end leading to the instrument. The needle will be deflected.

14. Dip one of the copper wires in water, heat the end of the other wire and plunge it in the vessel containing the other wire. A strong deflection should be the result.

**73. VERTICAL GALVANOMETER.**

Fig. 98 shows the construction of this instrument.

Over a card board tube, to which two wooden ends are attached as shown, from six to eight layers of single cotton covered magnet wire (No. 30) are wound. The two ends are connected to the binding posts as shown. The pieces to act as bearings, $aa^1$, are glued onto a cross piece which holds the two end pieces of the spool together as clearly indicated in illustration.

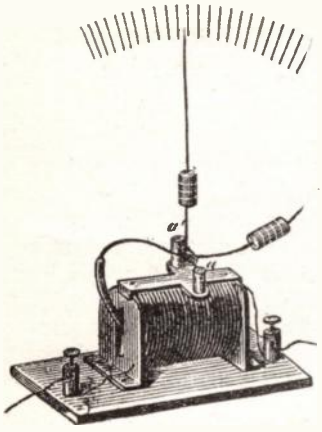

Fig. 98.

Now take a strong sewing needle and pierce a piece of cork with same. This needle is to be used for the axis.

A piece of stiff wire is wound around this cork and on the left side this piece of wire is fitted with a thin piece of iron or steel which enters the inside of the spool without touching any part thereof.

The balance is regulated by another piece of cork shown on the right. By moving this backward or forward, a balance is easily obtained. The indicating hand is formed from another needle, the hand moves in front of a dial as shown in illustration.

The bearings in which the horizontal needle turns, may be of glass or metal. This is a fairly good instrument for experimenters and is quite sensitive.

This instrument, to work well should be covered with a glass cover so that air drafts do not influence it.

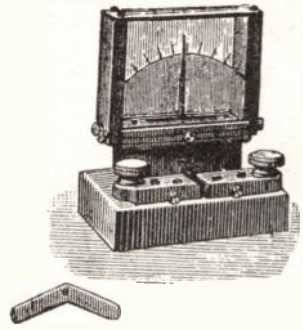

Fig. 99.

If this instrument is wound with very fine wire, for instance No. 40, we will have a galvanometer.

In Fig. 99 is shown a model used by the German Post Office in which the convolutions run horizontally around the needle. The magnet is bent in a peculiar manner as shown in the separate sketch and the needle carrying this piece rests in glass bearings.

**74. MULTIPLICATION METHOD.**

To strengthen the effect of a very weak current on a differential galvanometer needle, close the circuit for a short period; this makes the needle swing backward and forward. Now, the instant the needle starts a backward swing, close the circuit again, but in the opposite direction to the first. This increases the oscillation of the needle a great deal. If this opening and closing of the circuit is done at the right time the needle will finally oscillate over the maximum range.

**75. GALVANOMETER; COMPARISON OF RESISTANCES. SUBSTITUTION METHOD.**

Form a continuous current circuit by means of a rheostat, Rh, the resistance

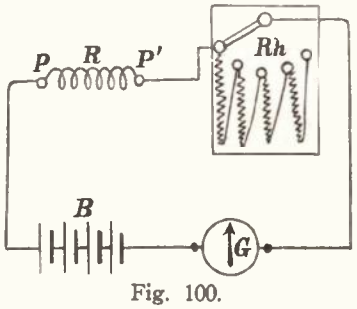


Fig. 100.

to be measured, R, galvanometer, G, a constant source of current, B, (Daniell Battery); Fig. 100.

Observe the deviation of G when the resistance is all cut out. Now dis-

connect R, and between the two binding posts, P and $P^1$, place a conductor of very little resistance, such as a heavy bar of copper, and then cut in a portion of Rh, such that the needle shows the same deflection. The resistance of R is then equal to the portion of the rheostat resistance in circuit.

### 76. GALVANOMETER; COMPARISON OF E. M. F.'S; ZERO METHOD.

In Fig. 101 a current, i, flows from M to N. Let MN be a piece of German Silver Wire No. 10 or No. 12 B. & S., of uniform resistance, and from one to two yards long. The difference

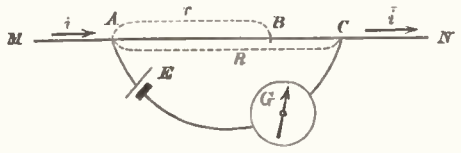


Fig. 101.

in potential between A and C, is, from Ohm's Law $e = i \times R$, and between A and B, $e = i \times r$.

If the battery, E, and the galvanometer, G, is placed in circuit between A and C, in such a manner that the currents are opposing each other, when G. is at zero the EMF of $E = i \times R$. Taking another battery $E_1 = i \times r$; therefore

$$E : E_1 = i \times R : i \times r = R : r.$$

E and $E_1$ may, therefore, be compared without knowing the value of i. It is sufficient to know the lengths, R, and r.

### 77. TANGENT GALVANOMETER, WHICH AT A 45° DEFLECTION SHOWS 10 AMPERES.

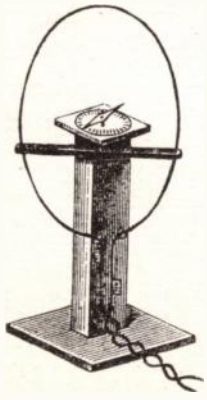

Fig. 102.

Take about 230 cm. (90.5 inches), of very heavy wire, (No. 6 or No. 8 B. & S.), which should be of soft copper, and form, as nearly as possible, a circle in the manner shown in Fig. 102. The diameter should be 62.8 cm. (24.7 inches), and the circumference of the circle $62.8 \times 3.14 = 197.2$ cm. (77.7 inches). The rest of the wire is carried down on the wooden stand and is connected to the two binding posts as shown.

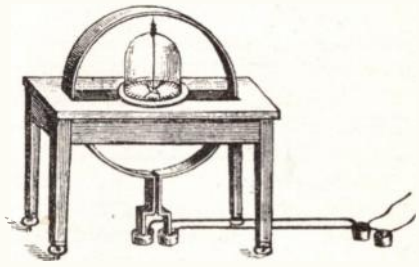

Fig. 103.

The stand is made in such a manner that the small square board which carries the galvanometer needle, which may be an ordinary compass needle, comes in the exact center of the ring or circle. A deviation of 45° by the needle corresponds to a current of 10 amperes flowing in the wire.

Fig. 103 shows another method of making an excellent tangent galvano-

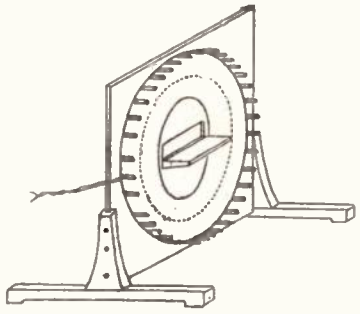

Fig. 104.

meter, in which, instead of using heavy wire, a strip of heavy copper is used as shown. The two ends are bent underneath the table and dipped into mercury cups. From these cups, the connections are made. The diameter of this circle should be the same as the one shown in Fig. 102.

Fig. 104 shows another simple tangent galvanometer which may be made by any student.

A board about 15 inches square is equipped with feet, as shown, and on the middle of the board is glued a small shelf which carries the compass. In order to bring the compass in the exact center of the board it is necessary to cut a square hole directly above the shelf so that one-half of the compass extends through the board. A

circle is drawn which almost reaches the edge of the board, and brass nails, or wooden pegs are driven in around the circle. Around these nails or pegs an insulated wire (No. 30 or No. 32) is wound. The ends of the wire are twisted together to keep it from coming loose. One or two cells of battery may be used with this instrument.

### 78. TANGENT GALVANOMETER; PARTS AND DEVIATION ANGLE.

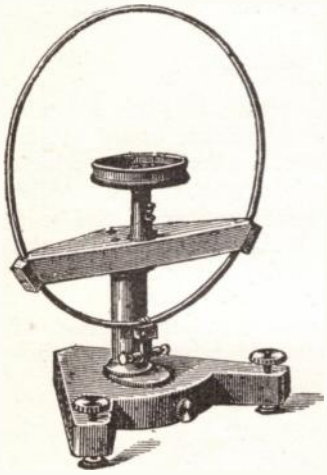

Fig. 105.

A tangent galvanometer, from what we have seen above, and as shown in Fig. 105, comprises the following:

1. A compass, with a magnetic needle which swings over a circular scale.

2. The current circuit or the ring, which may be of one or more convolutions.

3. The stand.

The size of the angle of deflection is dependant upon the following:

1. The size, or the diameter, of the turn and the number of convolutions on same.

2. The horizontal strength of the terrestrial magnetism at the point of observation.

3. The resistance of the instrument.

To make the latter as small as posble one should use very heavy wire or copper ribbon.

(To be continued.)

## USES OF THE ELECTRIC FLASH LIGHT.

Considering its humble character, it would be hard to find any electric device which has become of greater use to its owner since the advent of the small tungsten lamp, than the ordinary pocket flash light. It would not be difficult to cite literally hundreds of applications of this extraordinarily convenient little appliance, every one of which illustrates the superiority of electricity over all other competitors. There is room for a sale of these equipments passing all belief, and aside from the profit attending the marketing of the apparatus, there is inherent in its use an advertising tribute to electricity which is but little realized. Whether the device is used in telling time in the small hours of the night; in guiding late comers to their seats at the opera; in following the score of a musical creation; in taking notes at a lantern-slide lecture in a darkened hall; in lightening the responsibilities of parenthood by enabling the anxious mother to see whether her latest idol has become uncovered to the winter chill, without interrupting the little one's slumbers; in speeding up the delivery of packages by deciphering door numbers after dark, or in shortening the labors of the Biblical personage seeking the lost piece of silver, it impresses the flexibility, cleanliness and safety of electricity upon the user in a way that no one can realize who has not been the possessor of this handy little pocket piece. It is doing more to popularize electricity than is realized, and every man should carry an electric flashlight as an indispensable part of his personal equipment.—*Elec. Review & West'n Elect'n.*

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The International Wireless Telegraphy Operators' Union has adopted a new title, which shall succeed the former, and which appears upon the organization's books thus: The American Federation of Licensed Wireless Operators. Its jurisdiction embraces all waters and countries of the world. Membership is free in accordance with the new by-laws proposed and adopted by the board of directors. Every licensed operator should investigate the insurance plan of this Federation. Others did. They joined and are highly satisfied with the methods of the Federation. For information address the president, 1526 Signal street, San Pedro, Cal.

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Figg—"Don't you wish you could live your life over again?"

Fogg—"Well, I should say not. I've got a twenty-year endowment policy maturing this month."—*Boston Transcript.*

# Modern Wireless Instruments—A New Pattern Variometer

By R. E. Stark.

Let us go back and study the tuning to resonance of the circuits of the sending instruments. We will find that we get the most out of our "transformer coil" when the primary and the secondary circuits of the coil are brought exactly into syntony. This is accomplished

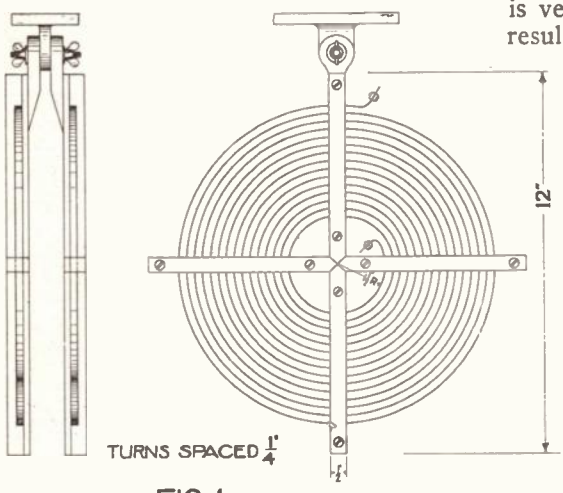


FIG. 1

by the proper use of the adjustable choke coil previously described in this series of articles.

Again, the secondary of the transformer and the first oscillation circuit should be properly balanced to each other; and again, the turns of the helix must be so proportioned to the condenser that the maximum current flows in the first oscillation circuit, viz., through the condenser, helix, and gap.

The second oscillation circuit comprises the aerial and that part of the helix connected between the aerial and the earth.

The aerial has a certain capacity and a certain inductance. The turns of the helix which are connected in this aerial circuit have a certain value of inductance. Thus if we add together both the inductances and we know the capacity of the aerial wires we find that the wave length is given by the following formula:

Wave length $= 59.6 \sqrt{LC}$ where L is in centimetres, and C is in microfarads. If L is in microhenries, the formula becomes

Wave length $= 1885 \sqrt{LC}$.

Suppose the second oscillation circuit is not exactly in resonance with the first: what will happen? We shall find the result is that a double wave-length, which is very objectionable, is produced. The result is that the aerial currents are actually diminished owing to the interchange of energy between the two oscillating circuits as explained in the article on "The Quenched Spark" in the February issue of *Modern Electrics*.

If we have too much inductance in the aerial circuit we can take one or more inches less of the helix, but we do not get nearly so perfect a coupling as though we had an adjustable inductance or a variometer in series with the aerial circuit and above the helix. A condenser will be described later with which the emitted wave length of the aerial may be shortened.

The variometer is made as follows. As copper strip about 5-16 x 1/8 inch is not always easily obtained by the experimenter and as bare copper wire of No. 8 gauge is procurable almost anywhere, a tinsmith's rollers are all that is necessary to make the wire into strip.

First, anneal the wire by heating about fifteen feet of size No. 8 B. & S. copper

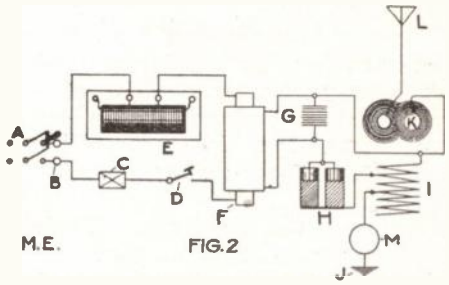


FIG. 2

wire in a light fire until it is red hot. Be sure and not let it continue heating long after the fire shows green. Next, plunge the coil immediately in cold water when it will be rendered very pliable. Take a seven foot length, straighten out the wire making it true in all directions. This may

be done by two persons slapping it on the floor.

Now, run a seven-foot length through the rollers with only a slight pressure. You will notice that the copper becomes longer as well as becoming flattened. Put it through several times until it is of the required thickness.

It might be well to polish the strip, being careful not to twist it in any way, and the winding is best done by holding the first end between two boards with a small circle of wood three inches in diameter between them and of a thickness equal to the width of the strip. The whole thing is now revolved, thereby winding a uniform flat spiral. When 23 or 24 turns have been wound, dismount the spiral and separate the turns by about ¼ inch and in some well seasoned white pine sticks 12x½x½ inch cut a set of slots leaving 3 inches at the centre free and the size of the strip when edge on. The strips should be halved together at the center and made into a cross. Set the strip in the slots and then screw on another flat piece of pine on top. See Fig. 1 for details.

When this spiral has been completed make up another just like it. The mountings are now to be made. This is best done by fitting each with a ball and socket clamp joint at the top so that rotation as well as lateral movement may be had. If a ball and socket movement is not feasible, the next best thing will be to mount the spirals as the diagram shows so that they slide past each other fan-like.

The connections are made by clips with wooden or ebonite handles, and the number of turns and the coupling may be varied to suit the wave length and the aerial.

The wood work should all be well sandpapered, stained and varnished before putting the copper ribbon in place.

It might be well now to follow the diagrams and the connections of the instruments in the circuits. For this see Fig. 2.

A is a D.P.S.T. switch, B the fuses, C the safety switch preventing sending while receiving, D is an ordinary Morse key, E is the choke coil previously described, F is our coil or transformer, G is a multi disc "Quenched Spark" gap H, the condenser; I, the helix, and K, our new pattern "Variometer." L and J are respectively our "aerial" and "earth." M is a hot wire ammeter.

## A SERVICEABLE HOT WIRE AMMETER.

This is made from the parts and case of a discarded aneroid barometer.

It would be well to have as large a case as possible as the greater the length of our "hot wire" the more sensitive will be the instrument.

First of all, remove the works from the case and then fit two binding posts on opposite sides, being careful to insulate both from the case with washers and bushings of ebonite or of mica. We next proceed to remount the spindle and the multiplying lever, having removed the circular drum, and which is the part probably out of order. We cannot use all of the multiplying arrangements, but only the arm from the end of which there is a chain or a silk cord attached. This cord or chain winds around the spindle to which is attached the pointer.

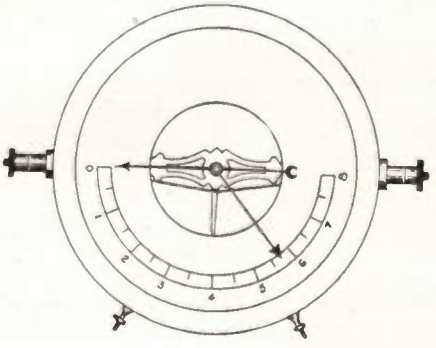

FIG. 1

It might be well at this point to have a look at the "weather glass," aneroid barometer, in your front hall and the following will be more clearly understood.

On the multiplying lever, is the aforesaid arm which is about ¾ inch long (see figure 2b). To the center of this arm solder, using the least possible amount of solder, a small loop of No. 36 bare wire. Next proceed to thread a small piece of German silver wire or some good "hot wire," ammeter wire, size about No. 36 B. & S., from one binding post to the other, being careful nothing is in the way to stop movement of the wire when it lengthens with the heat due to the current. From the center of the wire attach a small piece of fine silk cord. This cord is, in turn, threaded through the loop of No. 36 copper wire and is made fast, care being taken that at least one turn of the cord or chain is round the spindle to which the pointer is affixed.

The last operation is somewhat of a tedious process, but the rest is easy. A small spring should be coiled out of a piece of about No. 28 or No. 30 steel or brass wire, obtainable from any watch-

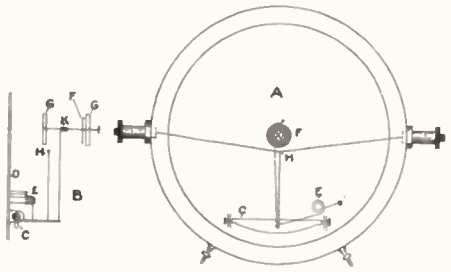


FIG. 2 M.E

maker, and this should be fastened in the case so that the uncoiling spring tightens up both the "hot wire" and also the chain connected with the pointer. The spring should not be too strong nor too weak. Several trials will show what is needed and the strength should be just slightly greater than that of the hairspring against which it pulls.

A new paper dial should now be fitted over the old dial, and graduated to show the relative strength of current passing through the hot wire. It will be sufficient for a start if we divide one-half of this

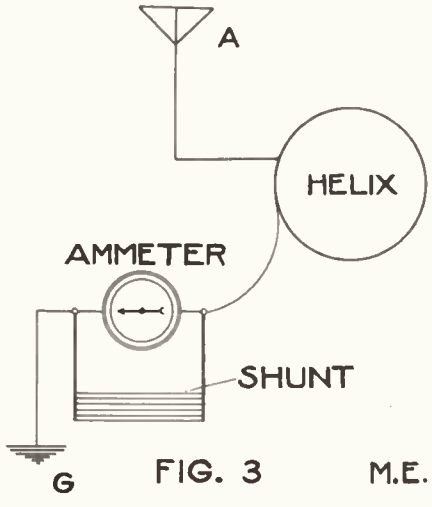


FIG. 3 M.E.

paper ring up into 16 parts, numbering the divisions from the left hand side down around the bottom. (See diagram and Fig. 1).

Place the dial on square and then put on the pointer so that it is opposite O on the scale. The glass is next placed in position and the retaining ring shoved home. The pointer, which is worked from the front of the glass, is very handy when we are tuning and when we wish to find our maximum current this pointer is shifted by hand to whatever the maximum indication is.

For wireless use, the ammeter should have a "shunt," consisting of as many short lengths as practicable of the same wire as that in the meter. These should be soldered to a heavy wire of copper at each end and the length should be approximately that of "hot wire" inside the meter. The number of wires in parallel depends upon the power used in the station. If the ammeter is to be used for other work than for registering the current of oscillations a very heavy piece of resistance wire may be used instead of a number of fine wires, but for good wireless work it is imperative that the shunt be made up of a number of fine wires, (see diagram 3 for connection of ammeter and shunt).

The zero variation with this instrument is so small that it is negligible.

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## CROSSED WIRES.

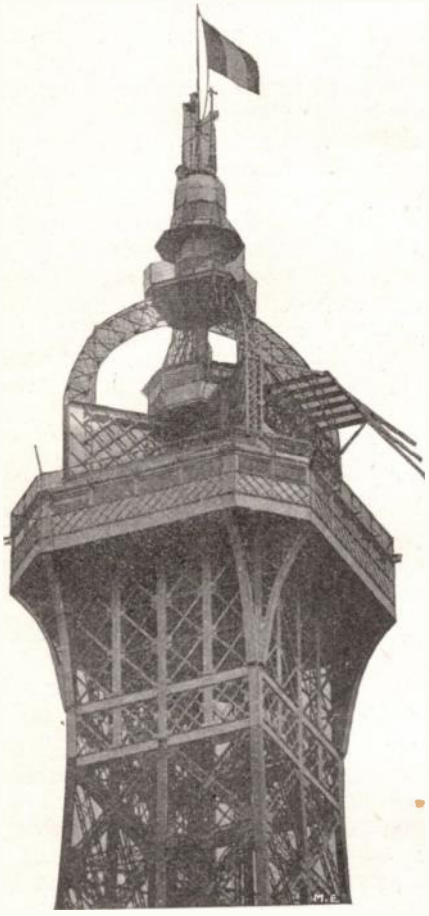
Mr. George H. Criss, of the Westinghouse Electric & Manufacturing Company addressed the Manufacturers and Contractors' Club of Pittsburg on the subject of "Crossed Wires." He said:

"Many of the fires which originate from unknown causes are ascribed to crossed wires, whether or not there are any wires at all in the vicinity of the fire's origin. A case of this kind happened here recently, and the stereotyped cause, as given to the public, was crossed wires. The attention of the electrical men was called to the matter and it was found that there were no wires at all within 12 feet of the closet in which the blaze started.

"We want to get in touch with the architects and contractors with a view of having a standard set of specifications drawn and standard material used in construction. This will benefit the electrical workers and protect the public. The Electrical Boosters have named a committee to confer with the fire underwriters and the Bureau of Electricity on standardization, with a view of bettering conditions and lowering fire losses."

## TOP OF THE EIFFEL TOWER.

The accompanying photograph shows the top of the Eiffel Tower, at Paris. At the very top is the meteorological apparatus of the weather bureau. The dome shaped structure just below this is the great searchlight, which may be seen for miles around in all directions, while lower down, to the



right, may be seen, the attachment of the insulators for the wireless aerial. From each of these insulators, a wire is carried down and fastened to an anchor pillar at the ground level. Leading in wires are attached to the middle point of the inclined aerial wires and brought down to the wireless station which is underground.

## MR. TESLA ON THE FUTURE

On Tesla Day, at the Northwest Electric Show, held at Minneapolis, Minn., March 16th to 23rd, Mr. Tesla sent, through Archbishop Ireland, the following message to the people of the Twin Cities and the Northwest:

New York, N. Y., March 18, 1912.

His Grace, The Most Reverend Archbishop Ireland:

I bespeak your Grace's far-famed eloquence in voicing sentiments and ideas to which I can give but feeble expression. May the exposition prove a success befitting the cities of magical growth, the courage and energy of western enterprise, a credit to its organization, a lasting benefit to the communities and the world through its lessons and stimulating influence as a bewildering, unforgetable record of the triumphant progress of the art. Great as are the past achievements, the future holds out more glorious promise. We are getting an insight into the essence of things; our means and methods are being refined, a new and specialized race is developing with knowledge deep and precise, with greater powers and keener perceptions. Mysterious as ever before, nature yields her precious secrets more readily and the spirit of man asserts its mastery over the physical universe. The day is not distant when the very planet which gave him birth will tremble at the sound of his voice; he will make the sun his slave, harness the inexhaustible and terribly intense energy of microcosmic movement; cause atoms to combine in predetermined forms; he will draw the mighty ocean from its bed, transport it through the air and create lakes and rivers at will; he will command the wild elements; he will push on and on from great to greater deeds until with his intelligence and force he will reach out to spheres beyond the terrestrial.

I am your Grace's most obedient servant.

NIKOLA TESLA.

## COST OF TRANSMISSION LINE TOWERS.

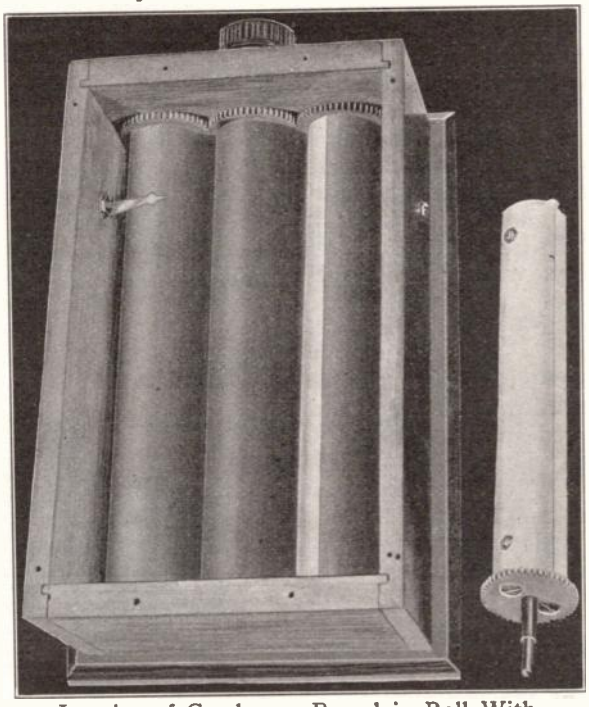
A recent order placed with an American manufacturer by a company in Spain, called for 1,350 galvanized steel towers for power transmission wires. These towers weigh, together, 3,500 tons and it is said the cost at the plant is slightly more than $250,000. This figures out at a rate of $71.40 per ton and as each tower weighs approximately 2.6 tons, the cost per tower is about $185. To this must be added quite a little for transportation and erection.

## HOUSE IN MIDDLE OF STREET.

Pittsburg, Pa.—Street car traffic in East Liverpool, O., was somewhat delayed last week when the motormen found a house standing on the tracks in the main street between Fifth and Sixth streets. The house was being moved over the tracks, and the rollers slid from under the structure. It was some time before they could be replaced, the house taken off the rails and traffic resumed.

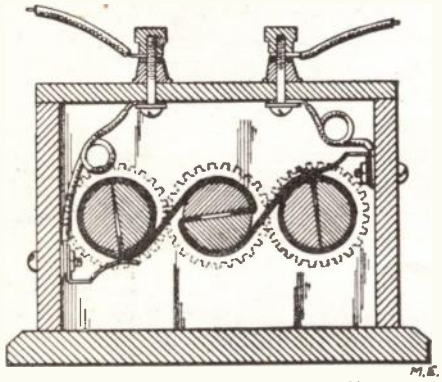
# Gernsback Rotary Variable Condenser

We present herewith, several illustrations showing the construction of the new Gernsback Rotary Variable Tuning Condenser. Up to the present time Mr. Gernsback has been reluctant to publish the details of his new condenser, on account of the patents being still pending, but we have had so many inquiries from *Modern Electrics* readers that he has consented to make the details public and we are therefore able to give them here.



Interior of Condenser Gear to Porcelain Roll With Right.

The working parts consist of three parallel rollers, made of porcelain, and connected by three fibre gears. The rollers are split, and each outside roller clamps the edge of a sheet of copper foil and a sheet of very thin varnished silk. The middle roller clamps the other edges of the two sheets of copper foil and the two varnished silk sheets.



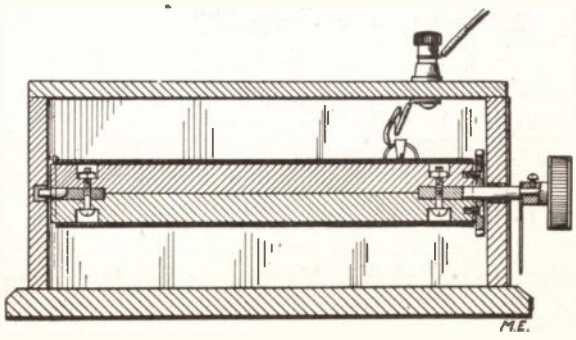
The spindle of the middle roller projects through the end of the case, and is provided with a suitable handle, which rotates the rollers and winds the copper foil and varnished silk onto the middle roller or onto the outer rollers, depending on which way it is turned.

When the material is all rolled onto the middle roller the capacity is a maximum, and when it is all rolled onto the outer rollers the capacity is zero.

Inasmuch as the metal sheets approach each other very closely, (0.001 inch), it is apparent that the capacity of the condenser must be very high despite the comparatively small size of this instrument.

Flexible springs connect the copper surfaces with the binding posts.

The mechanical construction is carried out quite successfully and the only difficulty encountered was found in the copper sheets. As ordinary copper would soon break at the clamping point, a special copper alloy had to be found which would stand up under the continuous bending back and forth. The alloy now used overcomes all these difficulties and the sheets will last for years.

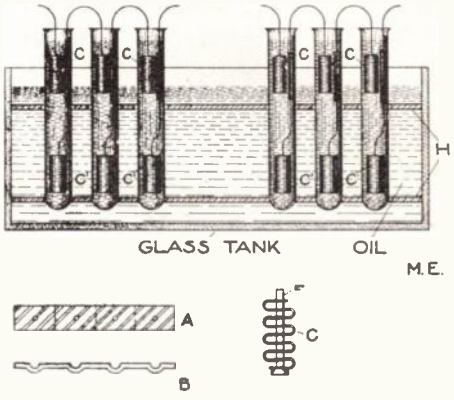


# Paris Letter

## HIGH VOLTAGE STORAGE BATTERY.

There is now in use at Mme. Curie's laboratory, at Paris, an interesting type of storage battery which is specially designed to give a very constant voltage, so that experiments on radium and other substances may be made with exact measurements. As the voltage required runs as high as 1700 volts a great number of cells is required. Each cell of this battery, which was made by M. J. Butaud, of Paris, consists of one positive and one negative element in a large test tube. Each element is made up of a lead strip having a row of holes punched down the middle, and grooves pressed in diagonally, as shown at A and B. The strip is folded as shown at C and a lead rod, F. runs through the holes and forms the connector between the lower electrode in one cell and the upper electrode in the

next. The rod is insulated by means of a glass tube where it passes the upper electrode. The elements are pasted and formed in the ordinary manner. The cells are supported by fibre racks, H, in glass tanks containing vaseline oil, to insulate the cells from each other. Each tank holds 44 cells. It is claimed that this battery maintains its voltage constant within 1/100 volt in 1000 volts. The glass tanks are placed




in a cabinet, and there is a connection panel at the top as shown in the photograph.

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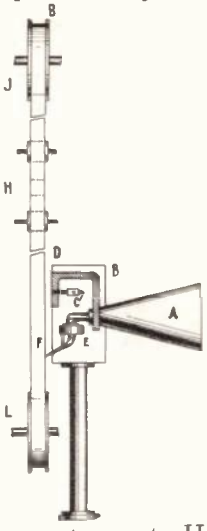
## TALKING PICTURES.

Here is a new method of producing the so-called talking pictures by the use of motion pictures combined with a talking machine record. The novelty of the method consists in making the record for the talking machine along the edge of the film for the motion pictures. By this means the record and the pictures are always in time with each other. In the illustration the upper reel of the picture machine is at B, the



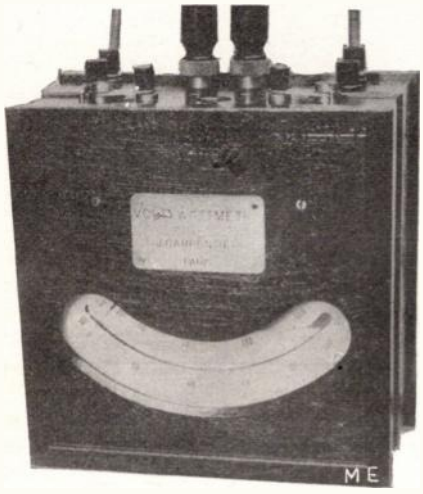

picture projecting apparatus, at H, and the take-up reel at L. Between the bottom sprocket of the picture machine head and the take-up reel, a reproducing point bears against the record on the edge of the film. This reproducing point may be connected directly to a sound box and horn attached to the picture machine or to the diaphragm of a telephone

transmitter which, in turn, may be connected electrically with one or more loud speaking receivers located wherever convenient.

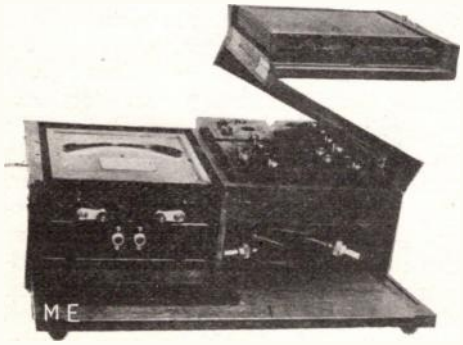
The device by which the record is made on the film is similar to the ordinary type, but has either a revolving cutter to engrave the record or an electrically heated point which impresses the record in the celluloid film.

## COMBINATION VOLT METER AND WATT METER.

This is a new instrument gotten up by Carpentier of Paris. In this instrument there is a fine wire coil pivoted




to swing and carries a pointer moving over a scale in the usual manner. Close to this coil is a main or current coil which is removable. Several of these




current coils are provided with each instrument, and are mounted in wooden block shaped pieces which fit into a recess in the side of the instrument in much the same manner as a drawer in a cabinet and are held in position by clamps. Each of the various current coils has a different current carrying capacity and thus the range of the instrument may be varied between wide limits by the use of different coils.

When the instrument is used as a volt meter the current coil is replaced by a high resistance fine wire coil.

One of the illustrations shows the instrument with the current coil in position, the latter being connected to cables by means of the heavy lugs shown.

The other illustration shows the instrument in its carrying case, together with several different current coils and a pair of heavy cable leads.

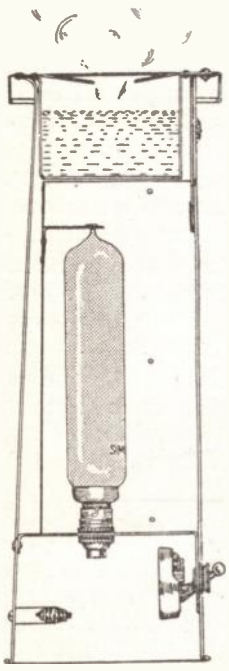
## THE JANDUS ARC LAMP.

In this arc lamp the carbons are enclosed in a glass cylinder the upper and lower ends of which communicate with the annular chamber, in the round casing at the bottom of the lamp. The outer surface of this annular chamber, being exposed to the air, is cooler than the closed cylinder surrounding the arc and the gas formed by arc circling round and round through the cylinder and this chamber deposits any sediment in the chamber, thus leaving the cylinder clear. The chamber may be cleaned out by removing the cap at the bottom. The feed of the carbons is controlled in the ordinary manner by the solenoid and dashpot in the upper part of the lamp.


## NEW SIMPLEX RADIATOR.

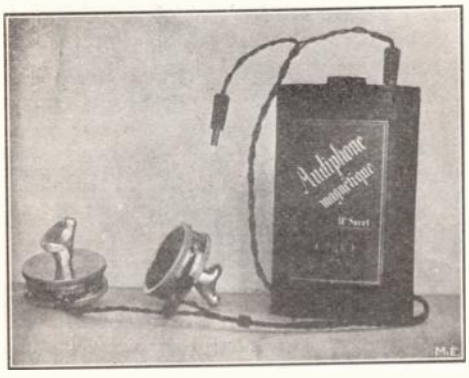
The accompanying illustration shows a section of a modified form of electric radiator, which is being introduced by Messrs. Simplex Conduits Ltd., London, Eng. As will be seen, it is furnished at the top with a water reservoir, located over the lamps, and therefore directly in the path of the ascending

heat waves. Whilst the radiator is in action this is sufficient to promote and maintain a rate of evaporation which keeps the air of enclosed spaces sufficiently humid, and prevents the uncomfortable feeling and unhealthy conditions incidental to a perfectly dry heated atmosphere. It is important to bear in mind that with electric heating the air is not depleted of its oxygen, and the rate at which the air in a room is changed when using this new type of heater need not be any higher than that for the ordinary ventilation required by human beings.



## FRENCH AUDIPHONE.

This device, gotten up by Dr. Soret, in France, is an apparatus to help deaf persons to hear. It consists of two small cases, one for each ear, which each contain a delicate microphone and




a sensitive telephone receiver. A small battery completes the outfit. Sounds striking the diaphragms of the microphones are magnified and reproduced by the receivers, which have tubes attached which enter the ear passages. This apparatus is quite different from the American devices for the same purpose, which usually consist of a small transmitter worn, under the clothing, on the chest, and connected to a sensitive receiver of the ordinary watch case type but smaller.


## N. E. L. A. TOUR.

In connection with the Annual Convention of the National Electric Light Association, which is to be held at Seattle, Wash., June 10-14, the Transportation Committee of the N. E. L. A., has arranged for a very attractive tour for eastern members attending the convention. Special trains leave from New York, Boston and Chicago, and visit, on the way out, the Grand Canyon, Riverside, Passadena, Los Angeles, Santa Barbara, Del Monte, San Francisco, and returning visit Portland, Ore., Yellowstone National Park, Salt Lake City, Glenwood Springs, Colorado Rockies, Colorado Springs and Denver.

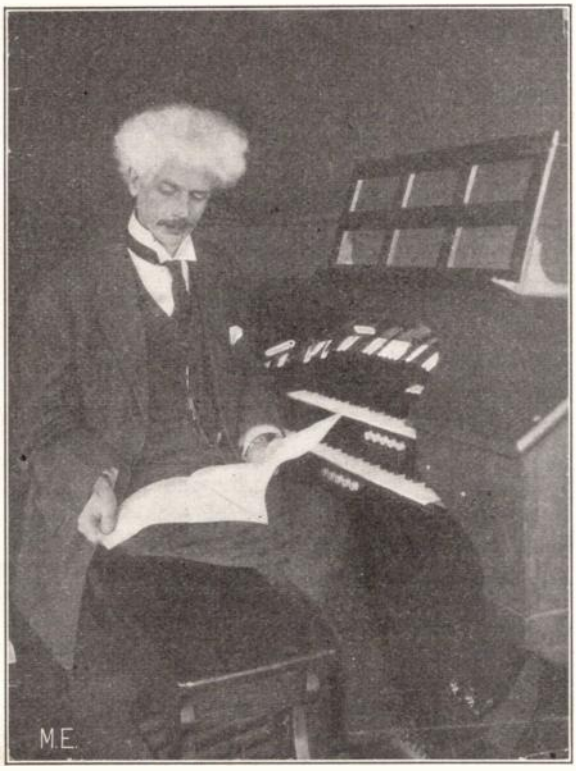
The tour is arranged on the all expense plan. That is the round-trip fare includes everything but hotel accommodations at Seattle during the convention, and as special rates have been obtained for this tour, it should be very attractive to those intending to go to the convention.

# The Hope-Jones Unit Orchestra

By Robert Grau.

The advent of the "One Man Orchestra" is the natural solution of the problems of science and artifice that began with the phonograph, the moving picture and the player piano, but it was not imagined that the day would ever come when an instrument simulating the effects of a symphony orchestra, would present itself as a rival of the moving picture in drawing crowds.

The sensation created by the Hope-Jones Unit Orchestra at the Auditorium, Ocean Grove, N. J., was such that the inventor and the manufacturer decided to test its capacity as a drawing attraction without outside aid, so the Baptist Temple, at Philadelphia, was secured for 16 days and recitals were given by the Hope-Jones Unit Orchestra at an admission scale of 25 and 50 cents. The Baptist Temple in the Quaker City seats 3000. At the first concert, about 300 persons attended out of curiosity. The attendance, however, grew so rapidly that near the close of the series the police had to be called out to disperse the crowds unable to obtain even standing room.




Robert Hope-Jones.
At the Console of the Unit Orchestra.

The Unit Orchestra is the life work of Robert Hope-Jones, of Liverpool, England. Being an expert electrician, with a passion for the organ, it was his dream that not only could an instrument be devised that would replace the large orchestra bodies, but he also believed that the musical value of this instrument could be made greater than that which has resulted from the efforts of musicians and their various instruments.

To describe "the Unit Orchestra" is not an easy task, they are made in all sizes—the largest being 36 feet wide and 18 feet deep. A large orchestra of musicians is too costly to provide, and occupies much valuable space, in these days of increased cost of theatre construction and limited seating capacity. It is, therefore, becoming the custom to provide merely a skeleton orchestra consisting of a single representative of a few of the leading instruments and omitting many of the distinctive tones altogether.

In view of the absence of the full complement of instruments every musical score attempted has to be mutilated and ruined, for instance a passage that is written for the full "brass," (where one expects to hear rich harmonies from the trombones) has to be represented by a single cornet, a passage for the "Wood Wind" is mutilated so that a suggestion of its beauties may be revealed by a single clarinet or flute or both,—and so on through all the various families of tone. It is very naturally impossible that five or ten instruments can produce anything better, than a sketch or caricature of a

(Continued on Page 214.)

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H. GERNSBACK, Editor

O. J. RIDENOUR, Business Manager

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**Vol. V. MAY No. 2**

THE sinking of the Titanic has again proved the tremendous value of Wireless in general, and during the two weeks following the great disaster, much has been written for and against Wireless in general.

As usual, the amateur has come in for more than his share of the blame, as is usually the case, when someone who cannot defend himself adequately, is blamed. However, in this particular case, the amateur has come out unblemished, as there was not a single case on record where the amateur has been blamed for having interfered or annoyed operators.

A great many newspapers commented upon Wireless editorially and while they differ more or less over the issue, all of them point out uniformly that there should be regulation, not alone for the amateur at large, but also that there should be adequate regulation of wireless ashore and on the high seas, to better safeguard vessels and passengers.

As a matter of fact the papers that have taken up the subject, are rather inclined to give the amateur his due, and hardly any one of them desires to have the activities of amateurs at large suppressed altogether.

In its issue of April 19th, the New York Evening World prints two columns under the following heading: "AMATEURS DO NOT HINDER WIRELESS, MARCONI AVERS." Among other things, Mr. Marconi is quoted as saying: "Private messages have been passing promptly and continuously. The Wireless situation in New York has been unusually active of course, but there was no serious interference with legitimate business."

During the excitement right after the Titanic Disaster, it became apparent that some law should be framed to safeguard vessels at sea, and also, to curb the activities of private stations in general. As a result of this the Alexander Bill, which was reported by us in the February issue, was re-drawn and is printed by us elsewhere. This bill in some form or other, very likely will pass at a not very distant date. The amateurs and experimenters, in general, are to be congratulated if this bill actually passes, as it is the very bill that amateurs want mostly, for it does not impose any hardship upon them. It will be seen, from this bill, that it regulates the stations in such a manner that only wave lengths up to 200 meters shall be used, which is exactly along the lines *Modern Electrics* has always striven.

Once the air is clear, and the amateur knows exactly where he stands, and what he can do, Wireless Telegraphy and Wireless Telephony, in this country, will receive tremendous stimulation; and we predict that Wireless will take an upward turn that not even the most optimistic of us can possibly foresee.

Amateurs, by this time, have come to the conclusion that Wireless Laws are needed, and are a necessity, and, contrary to the prevailing opinion, we might state that once laws are enforced, there will be a great many more people engaged in the art than is the case to-day.

Two hundred meters wave length is enough,

for all practical purposes, for the amateur; for he will not have any trouble in transmitting his messages, the same as heretofore; and we predict that the duplex aerial, suggested by Mr. Gernsback in 1908, will come into common use. The duplex aerial will become a necessity, inasmuch as most every amateur desires to receive messages from as great a distance as possible. For this reason, the receiving aerial should be much larger, and should have a greater capacity, than the sending aerial.

Dr. Rosa's idea, of having his Bureau publish complete data instructing the amateur and experimenter just what apparatus he should use, is very commendable, and deserves the highest praise. We are printing, elsewhere, an extract from Dr. Rosa's statement made before the committee on the Merchant Marine and Fisheries, and the amateur cannot but feel thankful for having the government tell him just exactly where he stands, what apparatus, and how powerful, he can use.

Summing up, the American amateur will no longer have to entertain any fears, as we are quite positive that everything will turn out best for everyone concerned.

# Bourne Wireless Bill

**S. 5334.**

IN THE SENATE OF THE UNITED STATES.

February 15, 1912.

Mr. Bourne introduced the following bill; which was read twice and referred to the Committee on Commerce.

## A BILL.

To regulate radio communication.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the receipt or transmission of radio messages or signals the effect of which extends beyond the exclusive jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a license, revocable for cause, in that behalf granted by the Secretary of Commerce and Labor upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radio messages or signals between points situated in the same State: *Provided,* That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of messages or signals from beyond said jurisdiction; and a license shall not be required for the transmission or exchange of messages or signals by or on behalf of the Government of the United States. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

Sec. 2. That every such license shall be in such form as the Secretary of Commerce and Labor shall determine and shall contain the restrictions, pursuant to this Act, on and subject to which the license is granted; that every such license shall be issued only to citizens of the United States or to a company incorporated under the laws of some State, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave length or the wave lengths authorized for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorize the use of any apparatus for radio communication in any other station than that specified. Every such license shall be subject to the regulations contained herein and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such license shall provide that the President of the United States in time of war or public peril may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorize the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

Sec. 3. That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labor. Every person so licensed for the operation of any radio apparatus on shore shall be a citizen of the United States. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States, or any one of them, shall, in addition to the punishments and penalties herein prescribed, suffer the suspension of the said license, and the same shall not be renewed for a period of one year from and after the date of his conviction of any such failure. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge of the use and operation of such apparatus,

and any person violating this provision shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court, for each and every such offense.

Sec. 4. That for the purpose of preventing or minimizing interference with signals or messages relating to vessels in distress, or of naval and military stations, by private or commercial stations, and to further the prompt receipt of distress signals by naval or military stations, said private or commercial stations shall be subject to the regulations given below and included in this section. These regulations shall be enforced by the Secretary of Commerce and Labor through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce and Labor may, in his discretion, waive the requirements of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce and Labor may grant special temporary licenses to stations actually engaged in conducting experiments for the development of the science of radiotelegraphy, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the receipt of distress signals or messages or with the work of naval or military stations.

In these regulations the naval and military stations referred to shall be understood to be such stations established on land or on vessels permanently moored, such as lightships.

REGULATIONS.

Normal Wave Length.

First. Every station shall be required to designate a certain definite wave length as the normal sending and receiving wave length of the station. This wave length shall not exceed six hundred meters or it shall exceed one thousand six hundred meters.

Other Wave Lengths.

Second. In addition to the normal sending wave length all stations, except as provided hereafter in these regulations, may use other sending wave lengths at discretion: *Provided*, That they do not exceed six hundred meters or that they do exceed one thousand six hundred meters: *Provided further*, That the character of the waves emitted conforms to the requirements of paragraphs three and four following.

Use of a "Pure Wave."

Third. At all stations if the sending apparatus, to be referred to hereafter as the "transmitter," is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed ten per centum of that in the greatest.

Use of a "Sharp Wave."

Fourth. At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

Use of "Standard Distress Wave."

Fifth. For the purpose of sending signals of distress every station on shipboard shall be so adjusted as to permit these signals to be sent with a wave length of approximately four hundred meters.

Signal of Distress.

Sixth. The distress call used shall be the international signal of distress

. . . — — — . . .

Use of "Broad Interfering Wave" for Distress Signals.

Seventh. When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

Distance Requirement for Distress Signals.

Eighth. Every station on shipboard shall be prepared to send distress signals of the character specified in paragraphs five and six with sufficient power to enable them to be received by day over a sea a distance of one hundred nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

"Right of Way" For Distress Signals.

Ninth. All stations are required to give absolute priority to signals and messages relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and messages relating thereto are completed.

Duties of Stations Hearing a Distress Call.

Tenth. In case a ship in distress adds at the end of a series of her calls the call letters of a particular station, the answer to the call shall be incumbent upon that station alone. If the call for assistance does not specify any particular station, every station hearing the call shall be bound to answer it, unless the silence signal, to be described in the following paragraph, is made by a Government station.

Government Silence Signal.

Eleventh. All stations shall recognize the silence signal, consisting of rapid repetitions of the letter i, which shall be reserved for the exclusive use of naval and military stations to indicate that communication with or relating to vessels in distress or the receipt of urgent Government signals or messages is being interfered with. On hearing the silence signal all stations shall refrain from sending until the station which emitted the signal shall indicate the completion of the urgent business in hand.

Reduced Power for Ships Near a Government Station.

Twelfth. No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress, or signals or messages relating thereto.

Application to Foreign Vessels.

Thirteenth. The requirements of the preceding paragraph shall apply to all foreign vessels within the territorial waters of the

United States on and after the first day of January, nineteen hundred and thirteen.

Division of Time.

Fourteenth. At important seaports and at all other places where naval or military and private or commercial shore stations are operating at the date of the passage of this Act in such close proximity that interference with the work of naval and military stations can not be avoided by the enforcement of the regulations contained in the foregoing paragraphs concerning wave lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first thirty minutes of each hour, local mean time. The Secretary of Commerce and Labor may, on the recommendations of the department concerned, designate the station or stations which may be required to observe this division of time.

Government Stations to Observe Divisions of Time.

Fifteenth. The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or messages only during the first thirty minutes of each hour, local mean time, except in case of signals or messages relating to vessels in distress or when official signals or messages of an extremely urgent nature are required to be sent.

Use of Unnecessary Power.

Sixteenth. In all circumstances, except in case of signals or messages relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

General Restrictions on Private Stations.

Seventeenth. No private or commercial station not engaged in the transaction of bona fide commercial business by radiotelegraphy, or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes at the date of passage of this Act, shall use a transmitting wave length exceeding three hundred meters, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce and Labor contained in the license of the station.

Special Restrictions in the Vicinities of Government Stations.

Eighteenth. No station of the character mentioned in paragraph seventeen situated within five nautical miles of a naval or military station shall use a transmitting wave length exceeding three hundred meters or a transformer input exceeding one-half kilowatt.

Limitations for Future Installations in Vicinities of Government Stations.

Nineteenth. No station on shore not in actual operation at the date of the passage of this Act shall be licensed for operation within fifteen nautical miles of a naval or military station, except under the limitations in regard to wave length and transformer input mentioned in paragraphs seventeen and eighteen.

Sec. 5. That every license granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not knowingly interfere, as in this Act provided, with messages relating to vessels in distress or with any naval or military station. Such interference shall be deemed a misdemeanor, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

Sec. 6. That the Secretary of Commerce and Labor shall have power to make regulations prescribing the form and manner in which applications for licenses under this Act shall be made and to grant licenses in forms suitable to secure the due execution of the provisions of this Act.

Sec. 7. That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the messages, signals, or other communications are sent or received.

Sec. 8. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call, or false or fraudulent signal, call, or message of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars, or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or message shall be a fine of not more than one thousand dollars, or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offense.

Sec. 9. That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the regulations herein contained, and for any breach of any such regulations the offender shall be liable to a penalty of not to exceed fifty dollars for each offense and to the forfeiture of any apparatus for radio communication used or operated on such ship. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

Sec. 10. That the trial of any offense under this Act shall be in the district in which it was committed, or if the offense was committed upon the high seas or elsewhere out of the jurisdiction of any particular State or district, shall be in the district where the offender is found or into which he is first brought.

Sec. 11. That this Act shall take effect and be in force on and after the first day of January, nineteen hundred and thirteen: *Provided, however,* That the fourth, fifth, eighth, and tenth sections of this Act shall take effect and be in force on and after four months after its passage.

# Smith Wireless Bill

## S. 5630.

IN THE SENATE OF THE UNITED STATES.

March 4, 1912.

Mr. Smith of Michigan introduced the following bill; which was read twice and referred to the Committee on Commerce.

## A BILL.

To regulate radio communication.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.* That all persons and corporations owning or operating apparatus for the transmission or receipt of signals or messages by wireless telegraphy or wireless telephony within the jurisdiction of the United States shall, on and after the passage hereof, observe and obey all of the regulations and requirements hereinafter set forth; or for failure to do so shall, for each and every such failure, be deemed guilty of a misdemeanor and, upon conviction thereof, shall be subject to the punishments, penalties, and forfeitures hereinafter prescribed.

Sec. 2. That the owner or owners of every station designated for the transmission or receipt of signals or messages by wireless telegraphy or wireless telephony within the jurisdiction of the United States, including all such as are or may be installed on vessels of the United States, before engaging in business or uttering or transmitting any signal or message, shall file with the Interstate Commerce Commission a sworn statement, showing its ownership, location, and construction. The said commission shall preserve a record of all such stations, and upon the filing of any such statement shall issue to the owner or owners of the station described therein a certificate, containing a designation or number by which such station shall be known and which it shall always use and employ when uttering signals or calls and when acknowledging the receipt of the same. And every such station shall, at all times, when operating or engaged in business as aforesaid, be in charge, or under the supervision, of a person or persons licensed for that purpose by the Interstate Commerce Commission. The owner or owners of any station which is operated or engaged in business except in conformity with the above requirements shall upon conviction thereof be punished by a fine of not more than one hundred dollars or imprisonment for not more than three months, or both, in the discretion of the trial court, for each and every such offense, and any person who shall operate any such station without being licensed as aforesaid shall upon conviction thereof be punished by a fine of not more than fifty dollars or imprisonment for not more than two months, or both fine and imprisonment, in the discretion of the trial court. Every person so licensed who, in the operation of any wireless station or stations, shall fail to observe and obey the regulations hereinafter contained or made under the authority of this Act, shall, in addition to the punishments and penalties hereinafter prescribed, suffer the suspension of his said license, and the same shall not be renewed for a period of one year from and after the date of his conviction of any such failure.

Sec. 3. That a shipboard station on a vessel in peril may utter a distress signal or call and continue the same as long as the peril remains imminent, without restriction as to wave length or character of radiation. During the continuance of any such distress signal or call no other station or stations within range thereof shall transmit any call or signal, except for the purpose of answering such distress signal or call, and the penalty imposed upon the owner or operator of any wireless station for violation of this regulation shall be a fine of not to exceed one thousand dollars or imprisonment for not more than one year, or both, in the discretion of the trial court, for each and every such offense.

Sec. 4. That the Interstate Commerce Commission is hereby authorized and directed to make from time to time such regulations with respect to the use of wave lengths and the character of radiation employed in radio communication as may be necessary or convenient for the efficient transaction of that business: *Provided*, That in such regulations it shall set apart for the exclusive use of the Government of the United States such range or ranges of wave lengths as may be necessary or desirable for the transaction of its business. Such regulations when and as adopted shall have the force and effect of law, and violations of the same shall be punished in the same manner as the violation of other regulations or orders of the said commission. The penalty for violation of the said regulations shall be by fine not exceeding one thousand dollars or by imprisonment for a term not exceeding two years, or both, in the discretion of the trial court.

Sec. 5. That no station or person or corporation within the jurisdiction of the United States, including persons owning or engaged in operating shipboard stations on vessels of the United States, shall knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call, or a false or fraudulent signal, call, or message of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars or imprisonment for not more than five years, or both, in the discretion of the trial court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or message shall be a fine of not more than one thousand dollars or imprisonment for not more than two years, or both, in the discretion of the trial court, for each and every such offense.

Sec. 6. That any messages received by a station other than the one to which they are directed shall not be divulged. The penalty for a violation of this regulation shall be a fine of five hundred dollars or imprisonment for not to exceed one year, or both, in the discretion of the trial court.

Sec. 7. That in time of war or public danger the President shall have authority to suspend the operation of any or all wireless stations within the jurisdiction of the United States.

# Radio Communication

There have been some interesting hearings before the committee on the Merchant Marine and Fisheries on the Alexander Bill, to regulate Radio Communication.

Anyone interested in the subject should procure the hearings on H. R 15357 from his congressman. It makes interesting reading.

We reprint below a few passages undoubtedly of great interest to our readers:

**Statement of Prof. Edward B. Rosa, Assistant Director of the Bureau of Standards, Department of Commerce and Labor.**

Prof. Rosa. The Bureau of Standards co-operates with the Bureau of Navigation at the present time, so far as necessary and so far as may be, in the enforcement of the law requiring ships to be equipped with wireless apparatus. And if this bill became a law, the bureau would co-operate in a similar manner in the administration of this law.

One of the ways in which that might be done would be for the bureau to issue a pamphlet, giving private operators information with respect to how to conform to the requirements of the law. It is suggested in the bill that the regulation of wave lengths should be made; that is to say, that the amateurs and private operators should have a certain range of wave length in which they could work which would not be a serious annoyance or interference to the commercial service or the service of the Government. It would be necessary for those amateurs to know how to meet that provision and how to arrange their apparatus so that it would conform to those wave lengths, and it is expected that the bureau could be of some service in that line, and would help them by showing them how to meet the law, rather than to try and prosecute them because they violate the law.

We received at the bureau not long since a letter from a young amateur in Chicago, in which he appealed to us to know what his rights were, and what he could do properly. He said he had been threatened with personal violence because of interference with certain commercial stations, and he wanted to know if he could do certain things and be within his rights, and not be threatened with personal violence.

It seems no more than right that the Government should say what rights amateurs have, and how to live within those rights; and what rights commercial companies have, and what the Government has, and at present there is no way of doing that unless those rights are defined in a general way by a law and then by regulations of the department which can be changed from time to time.

There are four parties interested. These three that I have mentioned—the amateurs and the commercial companies and the Government—and the other is the public. And it certainly would be the aim of the Department of Commerce and Labor to administer this law in such a way as to protect the interests of all concerned, by giving the public much better service, giving the Government better service—of course that means the War and Navy Departments both—and giving the commercial companies better opportunities, at least in certain particulars if not in all particulars. If the interference of amateurs is restricted it gives better opportunities to that extent, and at the same time it permits private operators or amateurs, as they are sometimes called, to carry on experiments either for pleasure or for scientific experiment, and enables everyone to live within the law, and make it perfectly clear when they are violating the law.

I do not think there is anything further I care to say.

**Extract of statement of Maj. George O. Squier, U. S. Army, in charge of wireless apparatus of the Army.**

Maj. Squier. I was speaking about a high-power station right close by. It is possible to select widely different wave lengths. For instance, amateurs have small apparatus, and I would suggest that they be required to use a wave length below 200 meters, for instance. Where you have to reach out a long distance, for instance, in Alaska, 1,200 or 1,600 meters, a station like Fort Myer should have 4,000 meters. So it is very easy to prevent interference unless the station is right close by and you try to receive while they are sending out an enormous amount of waves.

Mr. Stone. You believe high-power equipment will not interfere with the lower power ones?

Maj. Squier. No; not at all. The amateurs could go right ahead with their work.

Mr. Stone. And vice versa.

Maj. Squier. Yes. In fact, I suggest that in the rules prepared by the Department of Commerce and Labor that they shall give everything below 200 meters to the amateurs. That is all they need and would meet all their demands. The Navy Department could use 600 meters, about; then you have got the whole range of frequencies, you know. There is a very wide range. You could reserve to the Army and Navy a certain range of frequency.

**Extract of statement of Mr. John Bottomley, Vice-President and General Manager of the Marconi Wireless Telegraph Company of America.**

It is undoubtedly true that if similar wave lengths are used by different concerns in the same vicinity, that confusion is likely to arise, and as commercial business can not be regulated to given hours or periods of time, arrangements therefore should be made whereby the United States Government should adopt and keep exclusively for its own use a working wave

length which, either by special agreement or by statutory enactment, should not be infringed upon or used by any of the commercial companies, and to the commercial companies should be assigned such wave lengths as may be found necessary and as may be agreed on, which wave lengths should be used by commercial companies exclusively. In this respect it is assumed that for commercial companies the wave length adopted by the Berlin conference, namely, 300 and 600 meters in length, and which is now universally used for ship to ship and ship to shore work by all trans-Atlantic liners and by the majority of our coastwise boats, should be adopted.

Amateurs are said, by Government reports, to be nuisances and to be interferers with regular business, also to be aggressors in sending out false reports. **We admit, frankly, that amateurs, of which we are informed there are about 1,000 in and about New York, have never interfered with us, no fake report has ever been foisted on us, both of which circumstances we attribute to the class of operator which we employ,** as a skilled operator can readily, if provided with proper apparatus, cut out amateur interference, and the first touch of the key to an experienced operator will disclose an amateur sending.

I hope that I may be permitted to say at this point that a great deal of the trouble, in my opinion, and in the opinion of our chief engineer, is caused by the fact that the operators employed by the Navy who, although skilled engineers and excellent men in their own line, are not what are termed "skilled operators." In fact, during the past year we have examined many men whose term of enlistment had expired and who wished to join this company, but in only one instance have we been able to take on any of the men as skilled operators, and I may further remark that if the Government were to employ skilled operators many of their troubles would disappear.

We are strongly of the opinion that **amateurs, so far as they do not make nuisances of themselves, should be encouraged.** There may be a lurking Marconi or a Lodge among them, and they should have a chance to work out their salvation, but again the wave length comes in and the amateurs should be restricted to the use not only of very low-power apparatus, but also to the use of a very short and restricted wave length.

# Alexander Wireless Bill Amended

(H. R. 15357).

Union Calendar No. 193.

(The original Alexander Wireless Bill as reported in the February 1912 issue of Modern Electrics has been amended as printed below. There remains practically nothing of the original bill, in fact the entire 13 paragraphs have been struck out. Our readers will read with interest Paragraph 15 of the new bill, viz.: "General restrictions on private stations.")

**A Bill**

To regulate radio communication.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the receipt or transmission of radiograms or signals the effect of which extends beyond the exclusive jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a license, revocable for cause, in that behalf granted by the Secretary of Commerce and Labor upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State; provided, that the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a license shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce and Labor. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

Sec. 2. That every such license shall be in such form as the Secretary of Commerce and Labor shall determine and shall contain the restrictions, pursuant to this Act, on and subject to which the license is granted; that every such license shall be issued only to citizens of the United States or to a company incorporated under the laws of some State, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date

of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave length or the wave lengths authorized for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorize the use of any apparatus for radio communication in any other station than that specified. Every such license shall be subject to the regulations contained herein and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such license shall provide that the President of the United States in time of war or public peril may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorize the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

Sec. 3. That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labor. Every person so licensed for the operation of any radio apparatus on shore shall be a citizen of the United States. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States, or any one of them, in addition to the punishments and penalties herein described, upon conviction shall suffer the suspension of the said license, and the same shall not be renewed for a period of one year from and after the date of his conviction of any such failure. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court, for each and every such offense; provided, that in case of emergency the Secretary of Commerce and Labor may authorize a collector of customs to issue a temporary permit, in lieu of a license, to the operator on a vessel subject to the radio ship Act of June 24, 1910.

Sec. 4. That for the purpose of preventing or minimizing interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce and Labor through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce and Labor may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce and Labor may grant special temporary licenses to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

### Regulations.

### Normal Wave Length.

First. Every station shall be required to designate a certain definite wave length as the normal sending and receiving wave length of the station. This wave length shall not exceed six hundred meters or it shall exceed one thousand six hundred meters.

### Other Wave Lengths.

Second. In addition to the normal sending wave length all stations, except as provided hereinafter in these regulations, may use other sending wave lengths; providing, that they do not exceed six hundred meters or that they do exceed one thousand six hundred meters; provided further, that the character of the waves emitted conforms to the requirements of paragraphs three and four following.

### Use of a "Pure Wave."

Third. At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed ten per centum of that in the greatest.

### Use of a "Sharp Wave."

Fourth. At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

### Use of "Standard Distress Wave."

Fifth. For the purposes of sending signals of distress every station on shipboard shall be so adjusted, except on vessels of small tonnage unable to have plants insuring that wave length, as to permit these signals to be sent with a wave length of approximately three hundred meters.

### Signal of Distress.

Sixth. The distress call used shall be the international signal of distress

. . . — — — . . .

### Use of "Broad Interfering Wave" for Distress Signals.

Seventh. When sending distress signals, the transmitter of a station on shipboard

may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

**Distance Requirement for Distress Signals.**

Eighth. Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in paragraphs five and six with sufficient power to enable them to be received by day over sea a distance of one hundred nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

**"Right of Way" for Distress Signals.**

Ninth. All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are completed.

**Reduced Power for Ships Near a Government Station.**

Tenth. No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress, or signals or radiograms relating thereto.

**Intercommunication.**

Eleventh. Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

**Division of Time.**

Twelfth. At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations can not be avoided by the enforcement of the regulations contained in the foregoing paragraphs concerning wave lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce and Labor may, on the recommendations of the department concerned, designate the station or stations which may be required to observe this division of time.

**Government Stations to Observe Division of Time.**

Thirteenth. The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress as hereinbefore provided.

**Use of Unnecessary Power.**

Fourteenth. In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

**General Restrictions on Private Stations.**

**Fifteenth. No private or commercial station not engaged in the transaction of bonafide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes at the date of passage of this Act, shall use a transmitting wave length exceeding two hundred meters, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce and Labor contained in the license of the station.**

**Special Restrictions in the Vicinities of Government Stations.**

Sixteenth. No station of the character mentioned in regulation fifteenth situated within five nautical miles of a naval or military station shall use a transmitting wave length exceeding two hundred meters or a transformer input exceeding one-half kilowatt.

**Ship Stations to Communicate with Nearest Shore Stations.**

Seventeenth. In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. The station on shipboard shall then wait until such shore station shall be the nearest. If this can not be done the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

**Limitations for Future Installations in Vicinities of Government Stations.**

Eighteenth. No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations, to wit: Arlington, Virginia; Key West, Florida; San Juan, Porto Rico; North Head and Tatoosh Island, Washington; San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of nineteen hundred and six and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to, and shall fix the rates therefor, subject to control of

(Continued on Page 169.)

# An Adjustable Tesla Coil

By Moore Stuart.

Every so often there appears an article on how to make a Tesla coil, of approved construction. Not one of the many articles which the writer has seen to date has described a coil which is in the least adjustable, consequently the secondary voltage must be regulated directly from the primary of the high tension transformer, by regulating the voltage supplied, either by resistance or by means of an adjustable choke coil. Both methods are very wasteful of the current.

The writer has the coil described herewith in operation on a 1½ K. W. transformer and same is easily controllable, directly from the Tesla Coil primary. The output from such a coil may be varied within large limits.

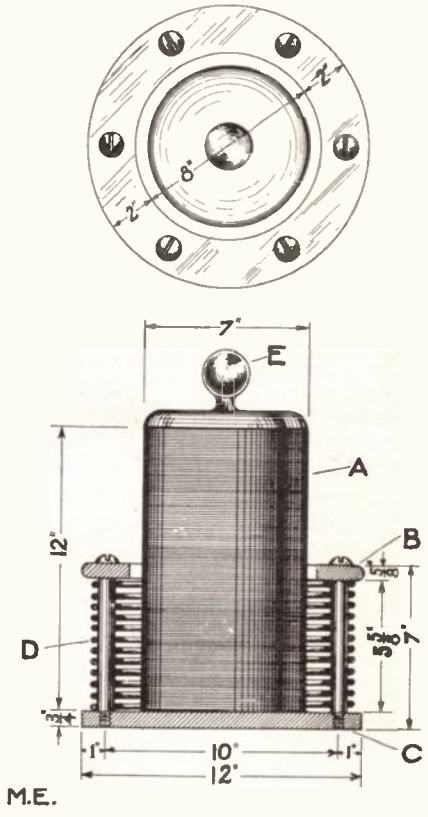
The core, A, must be of hard wood, thoroughly seasoned and varnished. Wound with as many turns as possible of No. 32, or thereabouts, enameled wire. If it is impossible to get the use of a lathe to turn this core out of wood, same may be made up of several thicknesses of heavy wrapping paper and thus forming a cylinder of the required size and thoroughly shellacking and drying. With this form of cylinder there is much more trouble in winding, as there is no way in which it can be placed on the lathe or winding machine. Winding the core is really the only difficult part in the making of this Tesla Coil.

The top flange of the Primary should be turned up out of ⅝ inch stock, in either mahogany or walnut and polished. It is 12 inches outside diameter, with a hole 8 inches in diameter in the centre for the Secondary Coil to pass through.

The Base, C, should be of the same material as the top flange and should be finished and polished the same. There is no hole in this base, as the core of the secondary is screwed directly to this. The rods, D, are also screwed to this by means of flat head wood screws, counter sunk from the under side of the base. Round head brass wood screws are used to hold the rods in position from the top for the sake of appearances, although flat head may be used with the same results as to strength.

The primary winding should be about 12 turns of heavy copper wire, approximately ¼ inch in diameter. About twenty-two feet will be required. The ends should be drilled to receive a small wood screw to hold the wire in position after once winding. The screws may be screwed into the rods at either end of the coil.

The ball, E, should be of metal, or if that is not obtainable a wooden ball may be turned and covered with tin foil. The top end of the secondary winding should




be soldered to this ball. A metal spike may also be used in place of the ball. The other, or lower end of the secondary winding may be soldered to the lower end of the primary winding, or may be taken out through the bottom, depending upon the use to which the completed coil will be put. Clips may be used to connect the primary winding with the secondary of the transformer. It will be readily seen that a connection may be made at any point of the winding after the manner of a wireless helix.

The completed coil should be mounted

on four insulators to insulate it from the earth.

This coil may be adapted to be used for wireless telephonic purposes by merely placing a slider upon the secondary for the adjustment of same. It will be readily understood that this winding should not be adjusted while working the coil, especially if used for wireless purposes with a large condenser, as the number of oscillations per second will be so low as to be dangerous to human life.

If used as a Tesla Coil, many weird and interesting experiments may be carried out. If used with a small condenser on a 1 K. W. transformer, with the entire circuit in resonance, an 8 inch spark may easily be drawn to the hand, if a small piece of metal is held in the hand, without any sensation whatever. However, it is not well to try and receive the current from such a coil unless one is experienced in the action and use of such apparatus, as there are so many factors to be considered, before the current from the secondary is not dangerous to life. Even though the voltage from such a coil be enormous, it will be remembered that but 250 milliamperes or ¼ ampere is generally conceded to be enough to destroy the heart action of a man in average condition, and sometimes very much less current will have the same destructive effect.

## THE TELEPHONE IN NOVEL ROLE.

An interesting story comes from Cincinnati of an entirely novel role assumed by the ubiquitous telephone, and this—its capacity as thief catcher.

As the story was given by those concerned, by imitating the voice of the man's dead wife, Detective Hall and Greer recently captured a negro murderer just 110 miles from where the slayer stood. The unique arrest was made over the long-distance telephone, and the prisoner was a Jesse Dearman, who shot and killed his wife in the Queen City.

In order to get the fellow, Hall and Greer had to beat the mail-train; the detectives having the best of the race, in the fact that their course lay over the telephone wires. Ever since the murder they had been searching for the woman's husband. They learned that Dearman, not knowing that his wife had died from the effect of her wounds, had mailed a letter out of Indianapolis, inquiring about her; and a reply was already on the way, possibly resting in a mail-bag on a train nearing the Hoosier capital. The officers learned of the address to which the reply was mailed, and calling up a point near it, over the long-distance telephone, arranged things so that the man was persuaded to answer the call in the belief that he was to talk to his wife.

Greer tried to get a negress to pose as Mrs. Dearman, but all shied at being the mimic of a woman already in the grave, and in desperation, Greer took the transmitter and imitated a woman's voice as best he could. Meanwhile, Detective Hall raced to another long-distance telephone and got the Indianapolis police on the wire, with instructions to catch Dearman at the telephone.

"Hello Jesse," squeaked Greer. "Did you think you killed me?"

"Seems to me your voice is mighty hoarse," returned Dearman.

"That's because I was under the window so long. I fainted after you shot at me," explained Greer, making another effort to raise his voice an octave.

Greer then went into a long conversation over petty things and held Dearman enthralled. Meanwhile the detective was growing uneasy over the fact that no interruption to Dearman's talk at the other end was in sight, apparently. He was at his wit's end, inventing telephone small talk that would keep the negro from becoming suspicious.

"Well now, I'll soon be down, and * * *" began Dearman, when the talking ceased, and from sounds coming over the wire, Greer knew the officers had arrived. A moment later this was confirmed.

According to word received by Detective Chief Crawford, Dearman, after murdering his wife, skipped to Indianapolis and was in ignorance of having slain her. Finally his curiosity got the better of him and he wrote a letter to friends here, asking if any of his bullets had taken effect. It is claimed that he had admitted, to the Indianapolis police, that he fired at his wife, after having lured her to his room. The couple had been separated for some time and Dearman was enraged because he heard that she was living with another man.

Thanks to this curious use of the telephone, Detective Hall left very shortly for Indianapolis to bring the fellow back.


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

## FIRST PRIZE TWO DOLLARS.

## THE CONSTRUCTION OF A ROTARY VARIABLE CONDENSER.

The following is a description of a rotary variable condenser that can be easily constructed by anyone without the use of many tools, and makes an efficient addition to any wireless station.

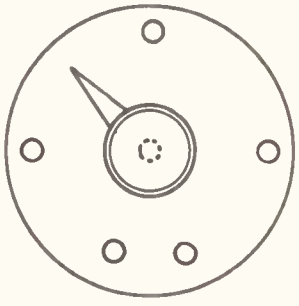
The accompanying diagrams give the necessary dimensions of the various parts. This condenser is built of a rather large number of small metal plates. This is done in order that it will not take up much room on the wireless table and still have a high capacity.

The condenser is chiefly used in connection with a loosely coupled tuning coil, as it's capacity is just about right for this.

Figure 1 shows a plan and elevation of the complete instrument. The top, shown in Fig. 2, is of hard rubber ¼-inch thick and 6 inches in diameter. Six holes are bored through it as shown. F is ¼-inch out of center and is ¼-inch in diameter. The three holes A, B, and C, are 90 degrees apart and ⅛-inch from the edge. The two holes, D and E, are for binding posts. All the holes except F are 3-16 inch in diameter.

The stationary plates, Fig. 3, are made of sheet brass 1-32 inch thick and are cut out to the shape of a semi-circle 6 inches in diameter. They have 3 holes bored in them to correspond with the holes A, B and C, in the top. Twelve of these plates will be needed.

The rotating plates are shown in Fig. 4. These are cut from 1-32 inch sheet brass, and have a radius of 2½ inches. A projecting lug, J, is left on and has a 3-16 inch hole in it. This hole must be ¼-inch from the straight edge of the plate. Eleven of these are needed.



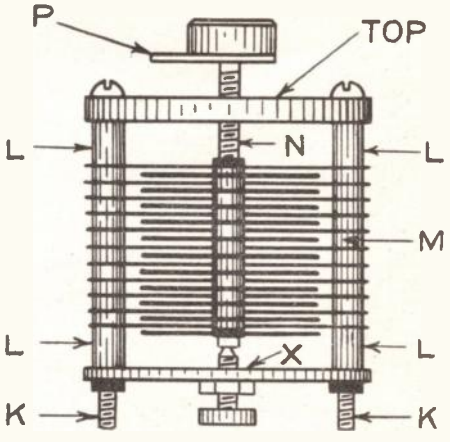
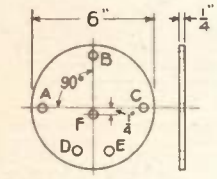


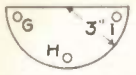

FIG. 1 M.E.

Fig. 5 shows the bolts and separators. The bolt, K, 8-32 thread, is of brass, has a round head and is 3¾ inches long. Three will be needed. L, is a piece of

brass tube that will slip over K and has an inside diameter 3-16 inch and an outside diameter of ¼-inch and is ⅜-inch long. Six of these will be needed. M, is a separator, which is 3-32 inch thick and ¼-inch outside diameter. It must



DETAILS OF TOP
FIG. 2

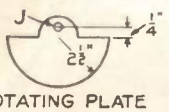


STATIONARY PLATE
FIG. 3 M.E.

be able to just make a firm fit on K Forty-three of these will be needed.

Fig. 6 shows the rotating pieces. N, is a piece of 8-32 threaded brass rod, 4 inches long and fitted with a hard rubber knob. The lower end of the rod should be hollowed out so as to fit over the point on the adjusting screw. O, is a piece of brass tube that is similar to L, in Fig. 5. P, is the pointer and is 2½ inches long, but its shape can be altered to suit the builder.

Fig. 7 shows the adjusting screw. It has a sharp point on the end and is



ROTATING PLATE
FIG. 4

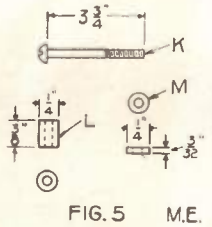


FIG. 5 M.E.

threaded with an 8-32 thread. It is 1 inch long and has a locknut. The piece of hard rubber, X, is similar to the stationary plate; but has a lug, similar to that on the rotating plates. A hole is drilled and tapped in the lug with 8-32 thread.

The assembling is done as follows. First take the stationary part. Force the piece, O, in the hole, F, of the top. Then place the three bolts, K, in the holes, A, B, and C, of the top. Slip a piece, L, on each bolt, then a stationary plate, then a separator, one on each bolt, then another plate, separators, etc. After all the plates are on, put on the three remaining pieces, L, then the hard rubber plate, X, and fasten all tight with nuts on the ends of each bolt, K.

To assemble the rotating parts, first take the rod, N, and screw a nut to within ½-inch of the upper end. Put on a plate, separator, another plate, etc., until all the plates are on. Then fasten all firm with a locknut. Put the end of N up through the hole, F, of the top, and turn the plates so that they interlock. Put the adjusting screw in place and fit it into the hollow end of N. Adjust the screw until the plates swing clear. Connect the bushing, O, to one binding post and the bolt, K, to the other post. Put on the pointer and hard rubber knob.

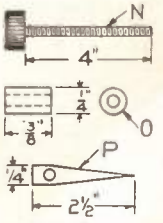
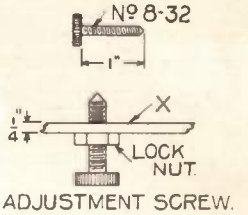


FIG. 6



ADJUSTMENT SCREW.
FIG. 7 M.E.

The top may be marked off in 180 degrees. At 0, the capacity will be nil, and at 180 will be the maximum.

The condenser can be mounted in a case with the top exposed, or left open, as desired.

Contributed by

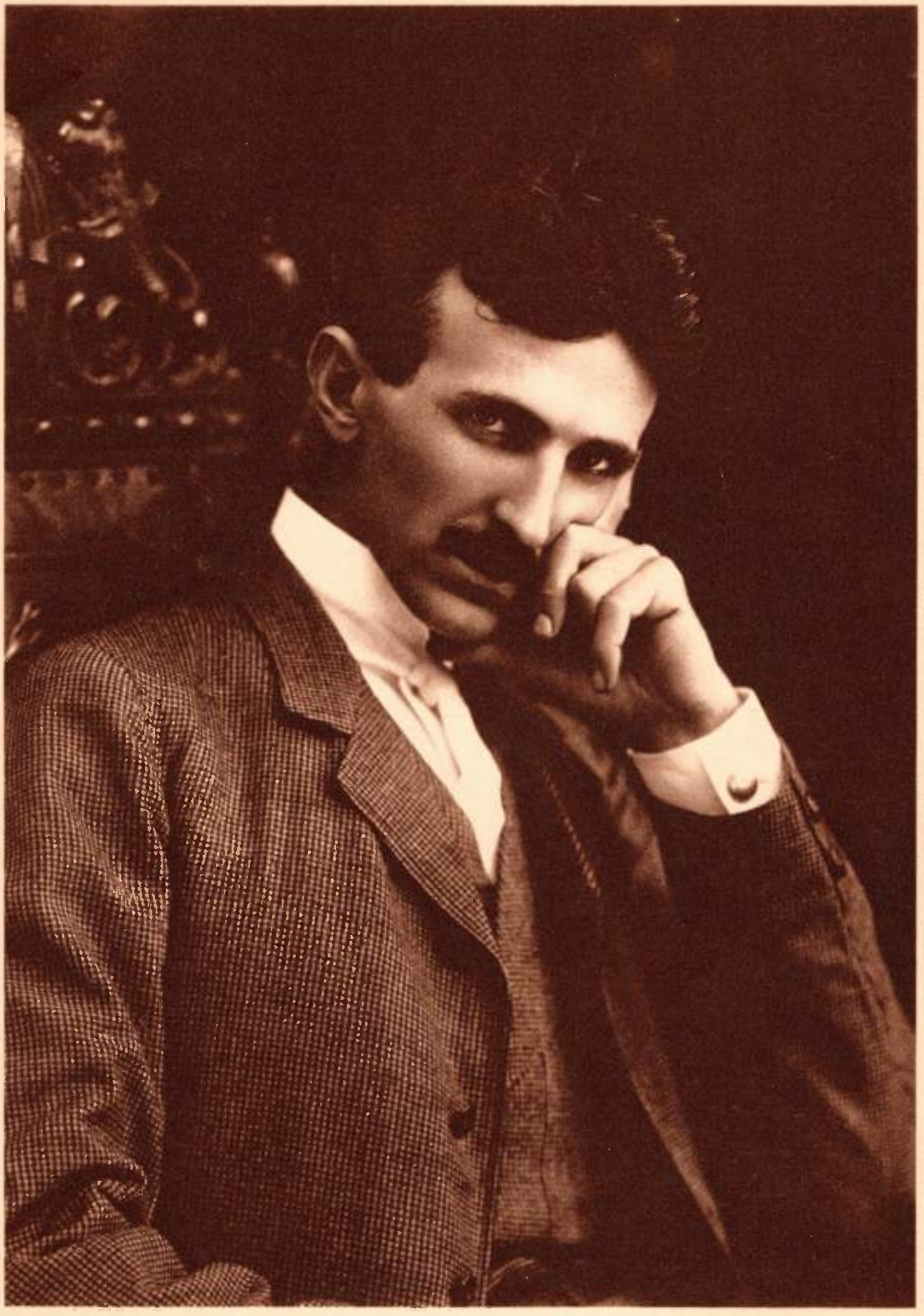
B. F. DASHIELL.

## SECOND PRIZE ONE DOLLAR.

## A CIRCULAR POTENTIOMETER.

The potentiometer here described is one which will, and does, give excellent results, and may be made by any one familiar with the use of tools in an hour's time at the cost of a few cents.

The dimensions are of small account, but the ones shown will be found to be very convenient. The base is turned from any hard wood, or hard rubber, if preferred, ½-inch thick and four inches in diameter. A groove is then turned in one side 3-16 inch wide by ⅛-inch deep and with a center diameter of 3½ inches. The holes are drilled nearly all around the groove 5-16 inch apart and large enough to admit 8-32 brass screws rather tightly. Then file the heads flat on enough screws to fill the holes and screw them in place. These screw heads should all be the same height,

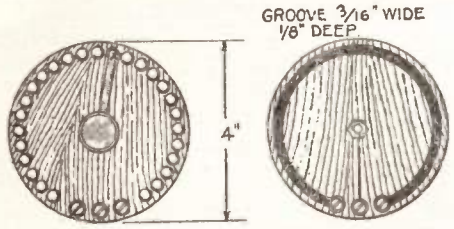


Nikola Tesla

*Supplement to Modern Electrics. May 1912.*

and the shanks should be a little less than ½-inch long. In the two holes at the end of the circle place two binding posts.

The groove is then filled with a paste made of lamp black and shellac. This will dry in a few days; and the resistance is about 500 ohms. If this is not enough it may be increased by




adding a little powdered slate to the paste. Another excellent substance to use is the graphite which may be purchased for greasing bicycle chains. This may be melted and poured into the groove.

A switch lever is then attached and connection made with the middle binding post. The other two being placed at the ends of the groove, make connections with the paste when it is applied.

The chief advantage of this potentiometer is that it overcomes the trouble caused by imperfect contact when a graphite rod is used with a sliding contact.

Contributed by
SIDNEY E. ANDERSON.

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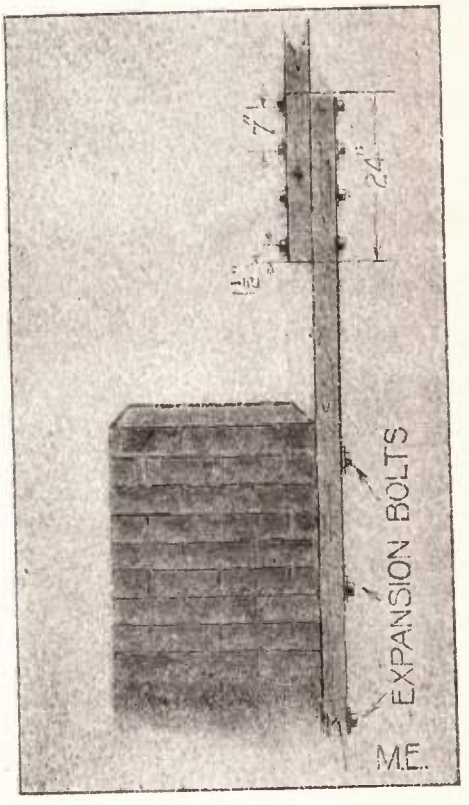
## ERECTING A FORTY-FOUR FOOT POLE ON AN APARTMENT BUILDING.

The following is a description of a forty foot wireless pole which can be both cheaply and easily erected.

The pole is made up of three sections which are bolted together with a 2 foot overlap. For the bottom section obtain a 16 foot 2x4 as free from knots as possible and drill three ⅜ inch holes, 7 inches apart allowing 1½ inches at each end of the splice. The next section, (the middle section of the pole), is a 2½ inch piece, 16 feet long. Three holes corresponding to the holes drilled in the first section are now drilled in both ends. The third and top section is a 2 inch piece, 12 feet long. Three holes corresponding to those drilled in the first and second sections are now drilled in one end and a hole drilled in the other end to take the bolt of a 2 inch pulley. The sections are now bolted together with ⅜-inch bolts, 5 inches long. The pole is now ready for the guy wires of which two sets are required, four in the middle and four at the top. No. 12 galvanized iron wire serves the purpose very well being both rust-proof and strong.

One of the greatest difficulties which the average experimenter confronts is the anchoring of the guy wires as it is usually difficult to find objects such as chimneys and pipes, on which they can be fastened.

A very good plan is to obtain a large sized box for each of the four sets of guys, and fill it with sand or some

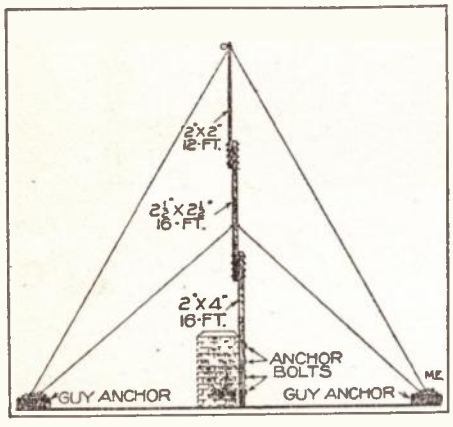



other heavy form of ballast as this will prove to be an anchorage of sufficient weight to withstand all strain on the guys. This pole can be erected on the roof of any ordinary apartment building, by two people without much trouble. With one helper I erected a pole

of the above mentioned dimensions, on a three story double apartment building, after trying many different ways.

I found that the following method was by far the easiest and quickest way of erecting the pole.

First lay the pole on the roof with its base against the base of the chimney or water tank which you have chosen to act as the base support; and take one of the center guy wires and pass over the above mentioned chimney or water tank in the opposite direction from which the pole lies on the roof. Your helper now takes this center guy wire and walks back about thirty feet and pulls while you start at the opposite end of the pole and raise it by walking under it until it stands flush against the side of the chimney or water tank where it can be held temporarily by wrapping with




guy wire until the guys are made fast. The base may be made fast to the chimney with anchor bolts or by binding tightly with guy wire. This pole is about the right height for a pole on the average apartment building, being comparatively light to handle and yet capable of withstanding great strains.

Contributed by

JESSE H. JAY.

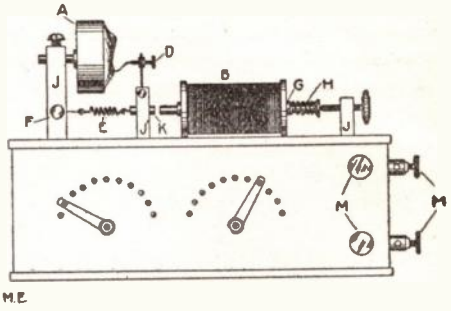
Note: In the drawings Mr. Jay shows four bolts in each splice. Two ⅜-inch bolts are sufficient in each case.—Ed.

## ELECTRICALLY ADJUSTED DETECTOR.

Here are directions for building a sensitive detector stand. Galena is the best mineral to use in it.

No exact dimensions will be given, as these can be changed to suit the builder.

As can be seen from the drawing, L

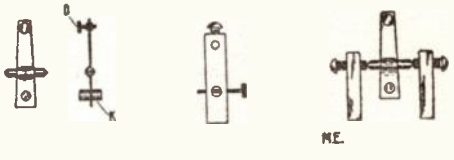



is a lever pivoted at the middle. At its upper end it has a small thumb screw, D, tipped with a piece of fine wire. On its lower end it carries a soft iron rod, K.

B is a magnet. It should be wound with fine wire on a small glass tube, G. C is a soft iron core, which slides easily into the tube. H is a spring which tends to keep the core against the thumbscrew I. E is a small spring to keep the point away from the mineral when it is not in use. F is a thumbscrew to regulate this spring.

Inside of the case there are resistance coils of German silver wire to regulate the current in the magnet. These coils are thrown in or out by switches located on front of case.

To use the detector, regulate screw F till the wire point nearly touches the crystal. Then throw in current into the magnet and regulate pressure of




point roughly by switches. To get finer adjustment use thumbscrew I.

One of the good points of this detector is that when sending, if a special contact is used on key, the detector will not be thrown out of adjust-

ment, because the lever pulls away from the crystal.

Contributed by

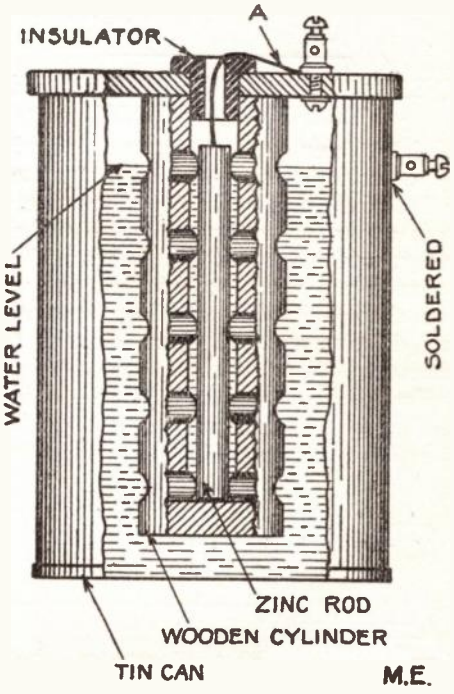
FRANCIS SPINGLER.

This is something like the one I built several years ago, only mine was operated by a storage battery, (in order to maintain a steady voltage on the coil), and I had a little dynamo to charge the storage battery. I had the special contact on the key too, and after getting the thing adjusted I would start sending and the detector opened up just as it was expected to; but when it closed again the wire touched the crystal in a different place and I had to adjust it all over again. By the time this had been done, the other fellow had finished sending. Then I had to open up again to ask him what he had said while I was busy with the detector; and then adjust the blamed thing again. Then I threw the whole thing out the window and it landed on an old man's head and I got into all sorts of trouble over that. Now I have a simple detector that does its work fine. Maybe I will tell you about it sometime. "FIPS."

## A CHEAP RHEOSTAT.

The products needed are: A gallon molasses can with the head cut off; a wet battery zinc; a short piece of half inch board; a wooden cylinder and a short porcelain insulator.

Take the wooden cylinder and bore four or five 5/8-inch holes in the sides. Do not bore any in the bottom. Bore a 5/8-inch hole in the middle of the piece of half inch board, and slip the insulator into it. Then fasten the zinc to a short piece of No. 14 wire and put the wire up through the insulator. Now nail the cylinder, with the zinc inside, firmly to the board. The zinc may then be lowered until it just touches the bottom of the wooden cylinder and then fasten the wire to a binding post mounted on the board. Next a binding post is soldered to the outside of the can. The board with the cylinder which contains the zinc is then laid across the top of the can and the can is filled with water. For obtaining 3 or 4 volts from 110 volts nothing need be put in the water, but for higher voltages salt will have to be added until the required voltage is obtained. This rheostat works well and there is very little chance for a short circuit in it. I had used them with the same construction, with the exception of the wooden cylinder, and had burned out battery lamps because the



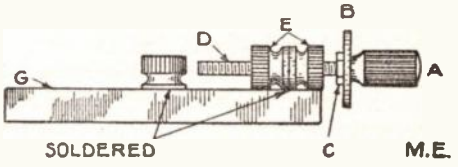

zinc rod would work over or be jarred and touch the side of the can, until I thought of enclosing it in a wooden cylinder, to avoid this.

Contributed by

CHARLES G. BERNARD, JR.

## CHEAP MICROMETER.

The drawing herewith, shows how I constructed a micrometer which gives fairly accurate results; and is very




handy to measure the thickness of glass, paper, etc.

The drawing is nearly full size. G, is a 1/4-inch square brass rod. E, is two screws from dry batteries soldered to the rod G. The screw D is taken from a dry battery and should have 32 threads to the inch. A, is an electrose

knob. The washer, B, has 4 notches filed in the edge. By unscrewing the screw one full turn from the anvil you get 1-32 inch, ½ of a turn 1-64 inch, or 2 full turns 1-16 inch, etc. Anyone making it will be well repaid for the time spent.

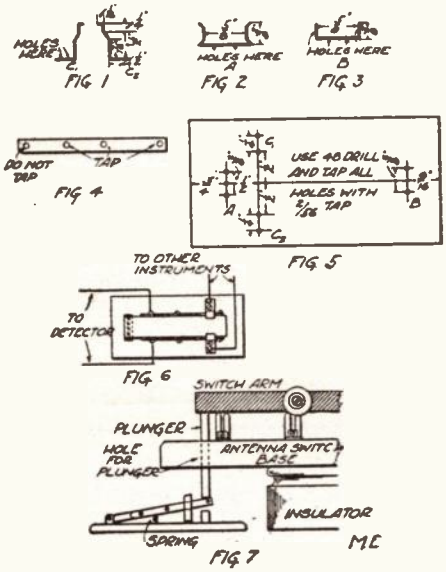
Contributed by

ARLO CASE.

## DETECTOR ADJUSTMENT RETAINING SWITCH.

I have been very much troubled with my detector getting out of adjustment so I devised this switch to disconnect it from my other apparatus and short circuit it while I send. It is worked by the antenna switch so that but one motion throws in the sending apparatus and disconnects and short circuits the detector.

*Hard Rubber* or *Black Fibre*—¼ inch thick, base 2x4 inches, arm ⅝x3 inches. Phosphor bronze 1-64 inch thick, one




strip ¼ inch wide by 12 inches long. R. H. brass machine screws, 14 screws 2-56 size. Eight small washers to go with these screws. Four brass nuts 2-56 size. One brass pin ¾ inch long. One 2-56 tap. One each of 42 and 48 drills. Short length of open spiral brass spring.

*Bronze*—Two strips 2½ inches long drilled ⅛ inch from each end and in middle. Two strips 1½ inches long. Holes ⅛ and ⅜ inch from *one* end. Bend to shape as in Fig. 1. One strip 1¾ inches long. Drill 11-16 inch from each end. Bend as in Fig. 2. One strip 1½ inches long. Holes ⅛ and 9-16 inch from each end. Bend as in Fig. 3. All holes in bronze are 42 drill.

*Rubber Arm*—Drill with 48 drill on ¼ inch edge ⅛ inch from each end, ⅝ inch from one end and 1¼ inches from other end. Tap the three holes so indicated in Fig. 4.

*Rubber Base*—Scratch centre line on *bottom* of base and mark out holes to drill as in Fig. 5, with 48 drill. Tap all holes.

*To Assemble*—Put flat strips on each side of arm by three screws each. Screw parts A, B and C, to their respective positions on the base and the switch is complete after placing a spring between arm and base. To do this it is necessary to countersink a hole a trifle larger than the spring is round, in the arm and base.

Connections and operation shown in Figs. 6 and 7.

Contributed by

TALBOT WARD.

## A SUBSTANTIAL COMMUTATOR

The amateur is usually handicapped in his work by lack of the necessary equipment of tools and machinery, so he must resort to makeshifts, instead of making things as he would like to have them. To meet the needs of the average amateur a design must not only be simple but it must be one that can be carried out with few tools and still work successfully.

The writer has had these troubles many times in his efforts toward the construction of small motors and dynamos; and after trying out the various methods of construction usually suggested, he has found a method that overcomes the greatest trouble, i.e., that of mechanical weakness.

First efforts were directed along the line of fastening the segments to wooden or hard rubber cylinders but centrifugal force was too much for such construction to stand, so the following method was adopted.

First secure a piece of fiber tubing ¾-inch inside diameter, and having an outside diameter of 1 inch. Saw off a piece of 1 inch long. Then take a piece of sheet copper at least 1-16 inch thick and ⅞-inch wide, and form a ring that will go completely round the fiber tube. This ring must

be just one inch inside diameter as the accuracy with which this is done will make the finished commutator either a good one or a poor one.

Now shellac the inside of the copper ring and the outside of the fibre tube; then force the ring onto the tube so that the latter projects 1-16 inch on either side of the copper; and allow the whole thing to dry thoroughly. The shellac is only used for a temporary binder but if care is taken in the succeeding operations it will not be broken loose, and will be of considerable advantage.

Then beginning at the seam in the copper ring lay off the desired number of segments with a pair of dividers. Great care in this is not essential, though the finished commutator will look much better if some pains are taken.

When the marking is done, considering that part of the segment at the ends of the fibre tube as the ends, drill a one-sixteenth inch hole through each end of each segment and on through the fibre tube. Countersink both on the outside and on the inside. Then use copper rivets and rivet the copper to the fibre; but take care not to distort the tube from its cylindrical shape.

Very good rivets for the purpose can be made by clamping No. 14 wire in a vise, with about 3-16 inch of the end projecting above the jaws, and hammering it down all around to form the head of the rivet. Be sure to make a good flat head that will go into the countersink inside the tube.

Now turn, or whittle, out a wooden core ¾-inch in diameter, and cut off a piece 1 inch long. This core must be a tight fit in the fibre tube. Apply shellac to the outside of this wooden block and to the inside of the fibre tube and force the block into the tube. After the shellac is dry find the centres at each end and bore holes into the block from each end, using a drill about one half the size of the shaft on which the commutator is to work.

If the holes meet truly proceed to ream out to the required size. But if they do not meet truly then you must carefully remove the "hump" and ream out as before. If this work is carefully done the commutator should run truly enough without turning up the surface on a lathe. Should there be some irregularity it can be removed by taking a light cut in a lathe or by careful filing.

Next finish the outside surface smooth with sandpaper, under no circumstances use emery cloth or emery paper, for the emery will sink into the copper and give trouble by cutting out the brushes.

It may be necessary to space off the segments again, then take a hacksaw with a thin blade and cut the segments apart taking care to remove all the copper but not to cut the fibre tube. This method gives an airgap between the segments. Then solder the wires

FIBER TUBE
FIG. 1

COPPER RING
FIG. 2

FIG. 3

SLIP RING
FIG. 4

to the proper segments but use as little heat as possible so as not to char the fibre.

For commutators with less than four segments two rivets should be used in each end. This will put one at each corner and give the increased strength necessary.

Should the amateur desire to make slip rings for A.C. work the ends of the copper strip should be mitred as shown in Fig. 4, to prevent any break in the current as the brush passes the joint.

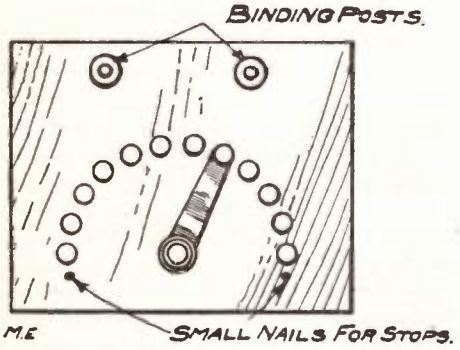
The figures show plainly the method of constructing the commutator; and since this method was adopted the writer has had no trouble with bursting commutators.

Contributed by

OREN L. GRUBBS.

## A COMPACT LOADING COIL.

Finding that the usual type of loading coil, such as described by Mr. Allen Dahlquist in the February issue of *Modern Electrics*, occupied too much space I devised a more compact one. Here it is:

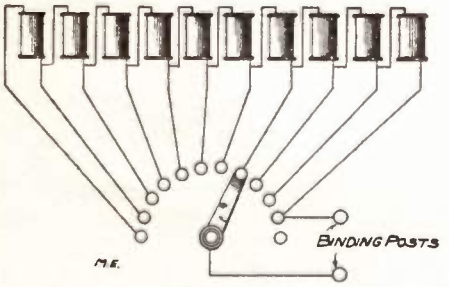



-FIG. 1-

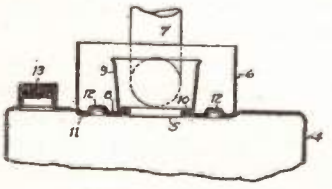
Make a box of some hard wood, preferably oak, having inside dimensions of 7x6x2½ inches.

On top of this mount a twelve point switch and two hard rubber binding posts at points indicated in Fig. I.

Next, from some ½ inch material cut ten pieces 2¼x6½ inches. Wind on each of these sixty feet of No. 24 enameled wire and place them in the box




-FIG. 2-



standing them side by side with a little space between each of them. A good way to insure against having them touch each other would be to slip a piece of cardboard between each one.

Figure II shows how the connections are made.

When all wiring is completed fill the box, containing the sections, with an insulating compound.

Screw the cover on with round headed brass screws.

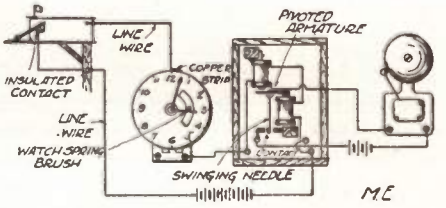
If this coil is carefully made it will make an attractive addition to any amateur's set.

Contributed by HARRY HAAS.

## MAIL BOX ALARM.

The following is a description of a mail-box alarm as made and used by myself. The main line or circuit consists of two No. 22 copper wires, forming a metallic circuit, strung on suitable poles from the house to mail-box which is about 250 feet distant. A switch in the box is so constructed as to close when the lid is pulled down or opened by the carrier.

This closes the circuit through bat-




teries and a relay made from the electromagnets of a 75-ohm receiver, as shown in the diagram.

The swinging needle of relay-armature in turn closes a circuit through batteries and an ordinary door-bell. I use the relay because too many batteries were necessary to ring the bell when connected directly to the main circuit, —the relay being much more sensitive.

I use condemned batteries from gas engines or autos on both circuits. I also have an arrangement on a Seth Thomas clock which automatically closes the main circuit at 1:30 p. m. and opens it at 5:00 p. m., the carrier always delivering the mail at some time between those hours. This prevents meddlers from ringing the bell, for a greater part of the time. One of the line wires after entering the house is connected to the clock face which is insulated from the works. A small strip of copper is riveted between I and V, and the hour hand being connected to the works has a small piece of a watch-spring riveted to it, which drags over the copper strip, thus allowing the bell to be operated

only during the proper hours. The circuit is completed onward from the works of the clock through relay, batteries, etc., as shown in diagram. The brass strip could of course be set for a different time. A 4-ohm Western Electric sounder gave good satisfaction as a relay when fitted with contacts, working better on new batteries than the relay described above.

Contributed by

ERNEST ELLIS.

## VARIABLE SENDING CONDENSER.

The sending range of many amateur stations is reduced, because of the energy lost on a poor condenser. Following is a description of a condenser that is giving satisfaction on a 1 inch coil, but it can be used on larger coils as well.

First make a frame, (Fig. 1), of hard wood, and give it a couple of coats of

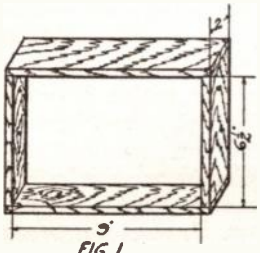


FIG. 1

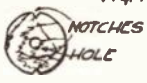




FIG. 3

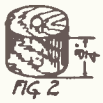


FIG. 2

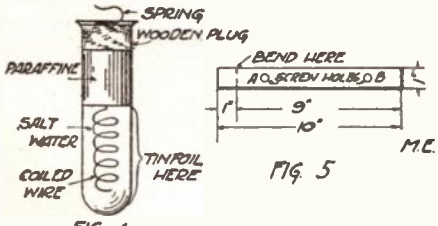


FIG. 4 FIG. 5

shellac and set it aside to dry.

Now get six test tubes 6¾ inches, that are free from flaws. Take a piece of S. C. C. (No. 18) copper wire about 3 feet long and remove the insulation, all but 3 inches on one end. Wrap the bare end on something round, making a spiral 3 inches long. Make a wooden plug, (Fig. 2), that will fit the tube tight and bore a hole in center and place a binding post off a dry battery in it, and attach the wire. Cut from some spring brass a piece ¼x1 inch and bore a hole in one end and bend as in Fig. 3, and place on binding post. Fill the tube half full of a saturated salt solution, and place wire in and push the plug in tight. Hold tube vertical and fill it full of melted paraffine through one of the notches. It will then look like Fig. 4.

Shellac the tube and before it is dry, spread tinfoil on smooth, leaving enough project over bottom to bend over the bottom of tube. Shellack the tube again, all but the bottom. Treat all tubes in the same way.

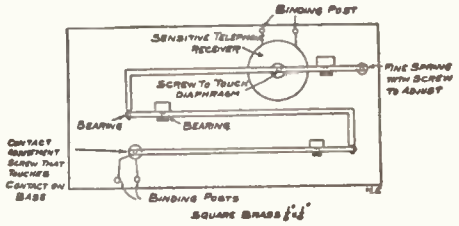
Now get a piece of brass or copper sheeting 10 by 1 inch, and bore two holes at A and B. Fig. 5. Bend one inch up at right angles and bore a hole to take another binding post. Place the metal strip on the inside of the bottom of frame and fasten with screws. Bore a hole in frame even with hole in metal and insert a binding post. Then bore 6 more holes in top of frame at equal intervals and insert binding posts, and connect all in series. The tubes can now be put in place by placing the condenser on metal strip and slipping the spring under the binding posts. Connections are made from one of the top posts and the bottom post.

Contributed by

KARL HASSEL.

## A TELEPHONE RELAY.

In the September issue of *Modern Electrics,* I saw a relay designed to be used with a telephone receiver.




It did not appear to me to be very sensitive, so I designed one that registers every sound and does it accurately. It works on the principle of levers, first lever magnifying the action to the next. I suggest if the amateur has two, 2,000 ohm phones, he use

them in series, one on head band, the other on the relay, working a Morse register. Take down the message by ear first, and then verify it with the record of the register.

I think the drawing fully explains it.

Contributed by
DE LOS HAMMERS.

## A HOME-MADE ANNUNCIATOR.

Here is a handy annunciator which is used in connection with a bell and two push-buttons. I use it for the front and back doors. All you need to make it, is a couple of bell magnets, a soft iron armature, a wooden box, with a piece sawed out near the top, to make the window, so as to see the pointer, and three binding posts. The wiring diagram shows how the annunciator bell and push-buttons are connected. If button (a) is pushed the pointer will point at (F) which means the person ringing the bell is at the front door. If (B)

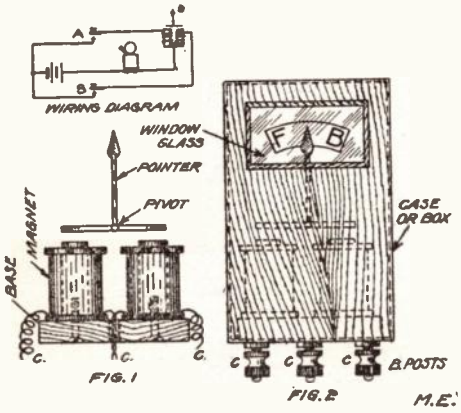


FIG. 1 FIG. 2 M.E.

is pushed it shows that the person is at the back door. Numbers can be used in the place of the letters, if the maker so wishes.

Contributed by
HOWARD H. KINNEY.

## A HINT TO COIL USERS.

My younger brother has an E. I. Co. ½-inch spark coil. He has been using it in connection with a Tesla transformer, with fairly good results, but suddenly the spark coil refused to work. I tested the secondary and found there was no break there, and no short circuit with the primary; so I decided it must be a break-down inside. I took off all nuts and washers on the secondary binding posts and carefully loosened them in the holes in the top of the coil box; then I removed the six brass screws holding on the cover. By gently raising the cover and at the same time pushing down on the binding posts, so as to place no strain on the wires, the cover was removed. A bend in one of the wires to the secondary terminals rested on the insulating compound, which covered the coil, and under the bend was a hole, with the edges blackened and charred. This hole was filled up with sealing wax, and the terminal wire bent in a new direction, and the cover replaced. The coil is now doing full duty.

Contributed by
CHAS. H. DUDLEY.

## AUTOMATIC TRANSMITTER.

Enclosed is a diagram and description of a sending machine which will prove very useful to anyone trying to learn telegraphy and having no one to send to him.

The reels, A, are made from tin, and one of them is turned by a small battery motor, B. D, is a brass standard over which the tinfoil strip, C, passes. E, is a brass standard with a lever on it which makes contact on the tinfoil. The lever is held down by a small spring. The tinfoil is painted with asphaltum and bare places are left for the dots and dashes as shown in Fig. 2. When the lever comes to one of these bare places it makes contact and closes the circuit.

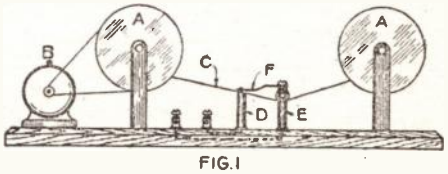


FIG. 1

RECORDER
FIG. 2 M.E.

Two binding posts are put on the base and the standards, D and E, are connected to them.

Contributed by
CLARENCE C. HESS.

# Simple Experiments in Alternating Currents

By P. Mertz.

As alternating current is coming into more extensive use, it is desirable that the young electrician should at least know the principles of alternating-current machinery. For the purpose of illustrating a few of these principles, a number of simple experiments that can be performed by any one are here described.

FIG.2

1. One of the most simple and useful pieces of apparatus that can be used for studying and experimenting with the alternating current is shown in plan in Fig. 1. It is made from a toy motor such as shown in Fig. 2, and is called by electricians a *rotary converter*. To make it from the toy motor it will be necessary to take out the armature, and make a new one, unless it already has an even number of commutator segments. The new armature is shown in front view in Fig. 3A. It can be sawed out from a solid piece of iron, or better, built up from laminations of the shape shown. The thickness should be such that when entirely wound, as shown at B, it will fit well into the motor, without crowding. The dotted lines in A show the space the wire is to occupy when the armature is completed. It should be wound with No. 26 S. C. C. magnet wire in the manner shown at C, and as much wire put on as possible without crowding. The commutator, D, should be of the same dimensions as the former one, and should have only two equal segments screwed to it, instead of three. These segments should be connected to the armature as shown at C. The slip-rings, E, should be mounted on a hub, F, of the same dimensions as the commutator hub, D. This hub has a hole drilled through it beside the one necessary for the shaft. Through this hole passes the wire which goes to the outer slip-ring. The slip-rings proper, G and H, should be made of the same sized tubing as the commutator segments, and of such a width that the two of them may be placed on the hub, with a sufficient insulating space between them. They should be connected to the armature coils as shown at C.

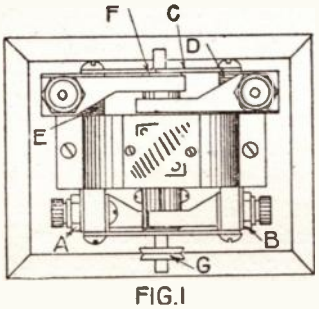
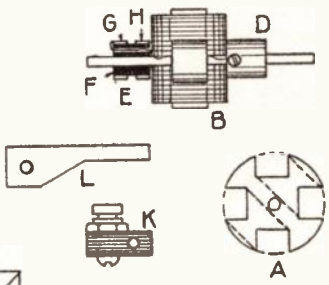



FIG.1



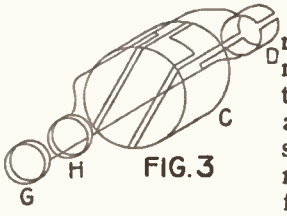




FIG.3

Having made this new armature, a few alterations should be made in the field, and brush rigging. The wires from the field coil should be disconnected from where they were and reconnected to the binding-posts on the base. Two hexagon nuts, A and B, Fig. 1, should be used to tighten the brushes, so the thumb-nuts may be used as binding posts. To make room for the slip-rings the bearing, C, should be separated from the field-poles by fibre spacers, D and E, which will also serve as brush-holders. One of them is shown in detail at K, Fig. 3, and one of the brushes which collect the alternating current is shown at L. A small fibre washer, F, is placed between the bearing, C, and the slip-rings to prevent the wire, connecting the outer slip-ring to the armature, from making contact with bearing and causing a short-circuit. The small pulley, G, can now be replaced on the shaft.

No dimensions are given here, as they would vary with every make of motor. No connections, except for the experi-

ments, should be made between either pair of brushes and the field-coil. When you have completed this piece of apparatus you can perform many interesting experiments in alternating currents.

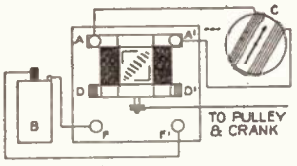


FIG 4

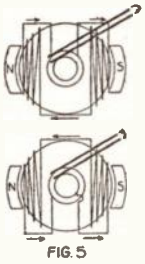


FIG. 5

2. If you connect a dry battery, B, Fig 4, to the field-coil binding-posts, which will hereafter be called FF¹, you will have what is called an *alternator,* or alternating current dynamo. The battery, B, is the exciter, and, by belting the pulley to a larger one, which you revolve by means of a crank, you have your motive power. In practice the exciter is generally a small direct-current dynamo belted directly to the alternator, and the motive power a steam or internal combustion engine. If the slip-ring brushes, which we will hereafter call AA¹, are connected to a few turns of wire wound around a compass, C, and the armature revolved, not too fast, the compass needle will turn, first to one side, then to the other, proving that an alternating current is generated. If you look carefully at Fig. 5, and follow the arrows, you will clearly understand why the current is alternating. In the drawing, the slip-rings are, for the sake of clearness, shown as if they were one inside the other, and not next to each other. Neither is the commutator shown, for it plays no part in this experiment.

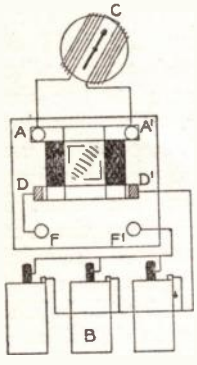


FIG. 6

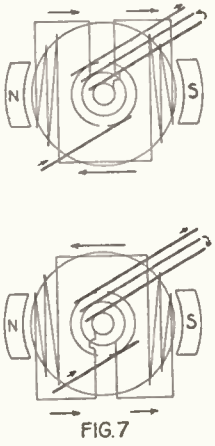


FIG. 7

3. When, however, a supply of direct current can be more easily obtained than a steam or gas engine, the *inverted rotary converter* is used to convert the direct to alternating current. If, as shown in Fig. 6, the dry batteries, B, are considered as the source of direct current, and connected as in the diagram to the rotary converter, this will act as an inverted rotary. When the ends of the wire around the compass, C, are connected to the binding-posts, AA¹, and the armature prevented from running too fast, by pressing the finger on the shaft, the same action of the magnetic needle observed in §2 will be here noticed, proving that alternating current is given out from the brushes AA¹. By referring to Fig. 7 you will clearly see the explanation.

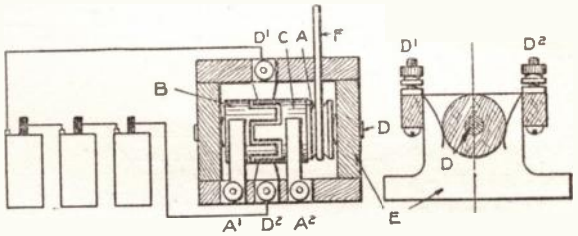


FIG. 8

As the current passes from the brushes to the commutator segments it divides, one part going to the armature and making it revolve, and the other to the slip-rings and binding-posts AA¹. By looking closely you will be able to see why the current is reversed at every half-revolution.

4. As you will want to use the rotary converter (§1) as a motor to be supplied with alternating current, it will be necessary to make a hand-operated mechanical converter to change your direct battery current to alternating current. A device for accomplishing this is shown in Fig. 8. It consists of a wooden cylinder, A, with two crown-shaped pieces of brass tubing, B and C, screwed to it. At one end a groove is filed for a belt, and a piece of dowel, D, is used as a shaft on which A turns. This dowel, D, is mounted on a frame, E. Four brushes, each clamped to E under a binding-post,

are made to bear upon different portions of the brass tubing and lettered $D^1$, $D^2$ and $A^1$, $A^2$. $D^1$, $D^2$, are also shown in

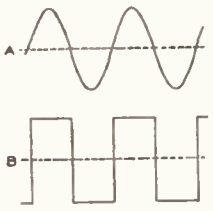


FIG. 9

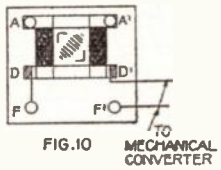


FIG. 10

side view, and must *always* bear upon teeth of *different* crowns, *never* of the same crown.

A belt, F, passes over another large pulley with a crank attached, so that when this crank is turned, A can be made to revolve pretty fast. To use the device as a converter the binding-posts $D^1$, $D^2$, should be connected to a few dry batteries, and the drum, A, rotated. At $A^1$, $A^2$, an alternating current will be given out. Instead of this apparatus a pole-changer, several types of which have appeared in recent issues of *Modern Electrics,* can be used.

5. It would now be interesting to compare the currents given by the alternator, §2, the inverted rotary converter, §3, and the mechanical converter, §4.

The alternator gives a current like that shown diagrammatically in Fig. 9A, that is, the current, starting from zero, gradually increases until it is at the maximum point, when it gradually decreases to zero again, and then increases to a maximum in the opposite direction

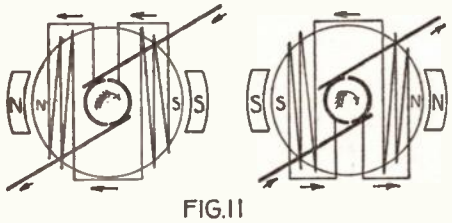


FIG. 11

and decreases to zero, this cycle of events is repeated as long as the machine is in motion. The explanation of this is, that the armature, when in the position shown in Fig. 5 is giving its maximum current, while at the next quarter turn it will be giving no current, and at the quarter turn after, will again be giving its maximum current, but which will flow in the opposite direction.

The mechanical converter gives a current shown diagrammatically in Fig. 9B, that is, the current abruptly changes its direction instead of gradually, as in the alternator.

The inverted rotary converter, when used with a battery, gives about the same curve as the mechanical converter. If the armature had a large number of coils and the commutator, a large number of segments the curve of the alternating current would approach, very nearly, the ideal form shown in Fig. 9A.

**Motors.**

6. By connecting the rotary converter §1, with the mechanical converter, §4, and batteries, as shown in Fig. 10, you will have one of the many types of A. C. motors.

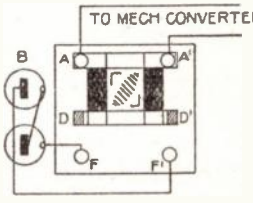


FIG. 12

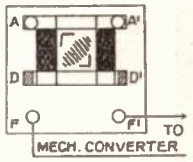


FIG. 13

The working of this motor is explained in Fig. 11. The field-coils are not shown, but the letters on the pole-pieces show the alternations of the poles. Since a current is made to pass through the armature, it is magnetized, and has poles; these are represented by the small letters in the armature. The shaft rotates in the direction of the arrow inside the commutator. You will notice, by looking closely, that the poles of the armature and field-magnets are always in the same relative position, viz., unlike poles separated from each other. Their constant attraction makes the armature turn around.

7. A *synchronous* motor is a motor which runs at the same speed as the alternator furnishing the current if they both have the same number of field poles; if they have a different number, the ratio between the relative speeds of the two machines is equal to the inverse ratio between the number of field-poles of each.

A type of synchronous motor, in extensive use, is demonstrated by connecting the rotary converter, §1, with the me-

chanical converter, §4, and a set of batteries, B, as shown in Fig. 12.

This motor runs like an ordinary direct-current motor, except that the armature current, instead of being constantly reversed by a commutator, is simply alternating current.

8. One of the most widely used motors of the A. C. type is the induction motor. This can be demonstrated by taking off the brushes, D $D^1$, of the rotary converter, §1, and winding a piece of bare copper wire around the commutator, short-circuiting the segments. Although not absolutely necessary, it would be better, for this experiment, to restore the three-pole armature to the toy motor. The binding-posts F $F^1$, should be connected with the mechanical converter, §4, as shown in Fig. 13.

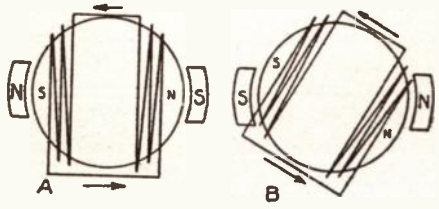



FIG. 14

The working of it is shown in Fig. 14. As shown at A, the magnetism of the pole-pieces induces a current in the armature in the same way as the core on an induction coil. This current magnetizes the armature in the manner shown. Now as this induction takes place just when the feeding current is reversing (exactly the same as in an induction coil), the relative position of the armature and field poles just after the current has reversed will be about as shown at B.

Then, since like poles are near each other, they will repel each other until the armature has gone half a turn, when the same things will take place as before. This keeps the armature running as long as current is supplied. In practice it is customary to use as great a number of poles as possible, to give the armature a more even, and less jerky, motion. It was also for this reason that the three-pole armature was advised to be used.

None of these motors is self-starting when supplied with alternating current for the reason that the alternating current is of the kind known as single phase. The motor must be brought up to speed by hand or other mechanical means after which it will run as long as the current supply continues. This is true of all single phase motors not provided with special windings or auxiliary starting devices. Polyphase motors are self-starting.

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## MELTING POINT OF ALLOYS.

### Tin, Lead and Bismuth.

| | | Rankine and Pouillet. |
|---|---|---|
| Tin 1, Lead 3..... | Pouillet. | 504 Fahr. |
| Tin 1, Lead 1..... | Pouillet. | 466 Fahr. |
| Tin 2, Lead 1..... | Pouillet. | 385 Fahr. |
| Tin 3, Lead 1..... | Pouillet. | 367 Fahr. |
| Tin 3, Lead 2..... | Rankine. | 334 Fahr. |
| Tin 4, Lead 1..... | Pouillet. | 372 Fahr. |
| Tin 5, Lead 1..... | Pouillet. | 381 Fahr. |
| Tin 2, Lead 0, Bismuth 1.. | Rankine. | 334 Fahr. |
| Tin 1, Lead 0, Bismuth 1.. | Rankine. | 286 Fahr. |
| Tin 1, Lead 1, Bismuth 4.. | Pouillet. | 201 Fahr.* |
| Tin 3, Lead 5, Bismuth 8.. | Pouillet. | 212 Fahr.* |
| Tin 3, Lead 5, Bismuth 8.. | Rankine. | 210 Fahr.* |
| Tin 3, Lead 2, Bismuth 5.. | Pouillet. | 212 Fahr.* |
| Tin 4, Lead 1, Bismuth 5.. | Pouillet. | 246 Fahr. |
| Tin 3, Lead 0, Bismuth 1.. | Pouillet. | 392 Fahr. |

*These are suitable for mounting detector crystals.

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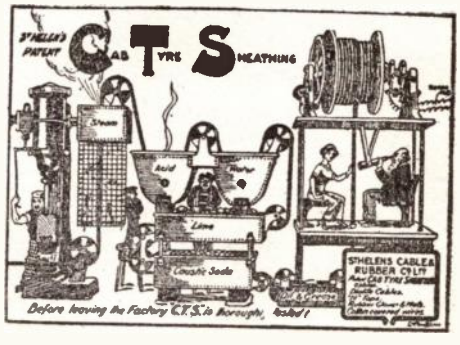
## HIGH SPEED ADVERTISING.

The attached advertisement, clipped from one of our British contemporaries, is intended to convey the idea that the particular brand of electric cable is thoroughly tested before leaving the factory. There are one or two points that are not quite clear. Are the rats helping the steam hammer or




the professor with his near sighted telescope? Also what is the young lady doing? Is she trying to smooth out the dents left by the steam hammer or is she just wiping the cable off so the professor can get a good look at it?

# Nikola Tesla

NIKOLA TESLA, whose name is familiar in every part of the globe where scientific research is conducted, was born in 1857, in Smiljan, Lika, border country of Austria-Hungary; the son of a distinguished clergyman and orator, and of Georgiana Mandic, a famous woman and inventor, whose father was also an inventor. His education began in the elementary school of his native place, continued four years in the public school in Gospic, Lika, four years in Lower Real school in Gospic, and three years in Higher Real school, Carlstadt, Croatia, where he was graduated in 1873. Originally destined for the clergy, he prevailed upon his parents to send him to the Polytechnic School in Gratz, where, for four years, he studied mathematics, physics and mechanics, following with two years of philosophic studies at the University of Prague, Bohemia. He started on his practical career in 1881, in Budapest, Hungary, where he made his first electrical invention, a telephone repeater, and conceived the idea of his rotating magnetic field; thence he went to France and Germany, where he was successively engaged in various branches of engineering and manufacture. Since 1884 he has been a resident of the United States, of which he is a naturalized citizen, and here his subsequent inventions originated.

Mr. Tesla is the author of numerous scientific papers and addresses, and honorary or regular member of many scientific societies, institutions and academies in the United States and abroad; he is a life member of the British Association for the Advancement of Science and a member of the Royal Institution of Great Britain, M. A. of Yale, L. L. D. of Columbia, and Doctor of Science of the Vienna Polytechnic School, the latter distinction being conferred upon him in acknowledgment of his discoveries of the rotating, magnetic field and principles of wireless energy transmission; the Elliott Cresson gold medal was awarded him in recognition of his original work first presented before the Franklin Institute and the National Electric Light Association in 1893, in which one of the most important chapters was devoted to a description of his wireless method. Mr. Tesla's rank among those who have led in advance in knowledge and appreciation of electrical forces is among the foremost.

Among his inventions and discoveries are: System of arc lighting, 1886; Tesla motor and system of alternating current power transmission, popularly known as two-phase, three-phase, multi-phase, or poly-phase systems, which have created a revolution in electrical engineering and are now universally adopted, 1888; system of electrical conversion and distribution by oscillatory discharges, 1889; generators of high-frequency currents and effects of these, 1890; transmission of energy through a single wire without return, 1891; the "Tesla coil" or transformer, which has proved an indispensable adjunct in many electrical arts, 1891; investigations of high-frequency effects and phenomena, 1891-93; system of wireless transmission of intelligence, 1893; mechanical oscillators and generators of electrical oscillations, 1894-95; researches and discoveries in novel radiations, material streams and emanations, published in a series of papers in the "Electrical Review," New York, 1896-1898, in which he announced all the salient phenomena later attributed to radium; high-potential magnifying transmitter, 1897; system of transmission of power without wires, 1897-1905; economic transmission of energy by refrigeration, 1898; art of Telautomatics, 1898-99; discovery of stationary electrical waves in the earth, 1899; burning of atmospheric nitrogen, and production of other electrical effects of transcending intensities, 1899-1900; method and apparatus for magnifying feeble effects, 1901-1902; art of individualization, 1902-1903. The development of his system of world-telegraphy and telephony and of the transmission of power without wires has engaged much of his attention since that time. A number of discoveries in the electrical field, made by Mr. Tesla, which he has not yet announced, he considers of greater moment than any electrical work he has so far done. His most important recent work is the discovery of a new mechanical principle, what he has embodied in a great variety of machines, as reversible gas and steam turbines, pumps, blowers, air compressors, water turbines, mechanical transformers and transmitters of power, hot-air engines, etc. This principle enables the production of prime movers capable of developing ten-horsepower, or even more, for each pound of weight. By their application to aerial navigation, and the propulsion of vessels, high speeds are practicable.

ODD NUMBER

# The Wireless Screech

OUR MOTTO ... — .. ... — .

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Forms don't close this month. Too hot. Bathing suits are better.

The Editor is appalled at the influx of undigestible M.S. Won't you please stop and spare him the reading of all that nonsense and rehash? We arrested six criminals last month for sending us delirious designs of Wireless apparatus. A design of a rotary spark coil giving 42,000 volts shocked the Editor greatly. He has not recovered so far.

When sending manuscripts use as much paper as possible. Write only one word on a sheet. That gives us more paper. We sold 2¼ tons of M. S. last month.

Address all communications to:
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## Idiotorial

Our Editor.

The Editor, who at present is sick a-bed with swollen hair, wishes to convey his thanks to all the daffies who congratulated him on account of our splendid April issue. The Editor is deeply touched by the many messages of good will and he authorizes us to tell all his friends that during the coming year the "Screech" will howl loud and lustily over the lands.

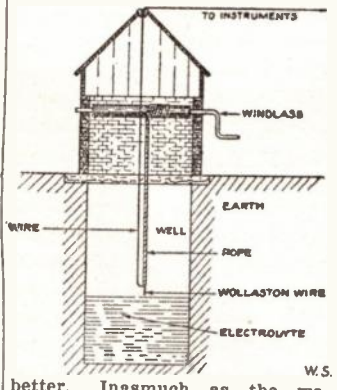
We will, beginning with the next issue, give the most overwhelming supplements that have ever been seen since the stone age. As usual we over-eclipse and beat to a frazzle all the other papers on land, on sea and in the air. Our originality is only surpassed by our impertinence and when we do a thing we do it in such a staggering, brain-reeling, incomparable manner that the whole world stands aghast and asks as if thunderstruck. "Who's next"!! As a tame beginner, we will give as a supplement with our next issue, a genuine pair of handcuffs. These are NOT intended for framing, but are supposed to be worn by those innocent, playful amateurs when tempted in sending out fake S. O. S. messages and other wireless fakes. We sincerely hope that humanity at large will thank us for our herculean efforts.

## Experimental Department

**FIRST PRIZE, TWO (2) SWIFT KICKS.**

**Simple Electrolytic Detector.**

I consider the following detector the simplest ever made. It works simply great: To make this detector you must have a well (see sketch) the deeper the




W.S.

better. Inasmuch as the water in most wells is not a very good conductor, pour about three barrels of best sulfuric acid in the well. To stir the mixture throw from 10 to 12 bricks in the well. For the anode, attach a fine piece of 0.005 Wollaston wire to the rope attached to the windlass. A flexible copper wire is riveted to the Wollaston wire; this copper is led up the rope, and goes to the telephone receiver and aerial. To adjust the detector operate the windlass till the fine wire touches the electrolyte. You will then get a click in the receiver; then regulate the potentiometer till messages come in loudest.

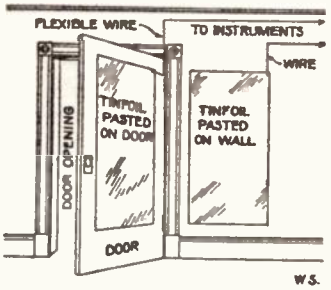
**NOTE. No ground is required with my detector, as it is grounded naturally.** (Mr. Editor, do you think I can get a patent on this?)

Contributed by
B. U. G. HOUSE.

**SECOND PRIZE, ONE (1) YEAR ON THE ISLAND.**

**Variable Condenser.**

You will agree with me that the following design is the simplest and most ingenious one that you have ever seen. Its capacity is enormous and the cost practically nothing. This condenser can be constructed by anyone in less than half an hour.




W.S.

On the inward side of the door paste sheets of tinfoil as shown in illustration. At the upper corner near the upper hinge, tack or screw a piece of brass on top of the tinfoil and to this brass piece attach a piece of flexible cord as shown. This flexible cord is necessary to make connection with the tinfoil and does not interfere when opening and closing the door.

Now open the door till it touches the wall of the room. Mark off the corners of the door on the wall and paste sheets of tinfoil on the wall as illustrated. The total surface of these tinfoil sheets should not be larger than that of those pasted on the door. A wire is attached to the tinfoil on the wall in a similar manner as described above. The two

wires are now led to the instruments.

When the door is closed the capacity of this condenser is zero. At an angle of 90° the capacity is still zero (0%). As the door is opened further the capacity gradually increases. The maximum capacity is reached when the door knob touches the tinfoil on the wall.

I equipped all the doors in our house with these condensers, and besides being quite ornamental, they add considerably to my wireless outfit.

Contributed by

A. D. AMLIAR.

---

**THE LATEST DAFFYDILLS.**

If the people elect Teddy, does Modern Elect-rics?

If a watch ticks twice each second, how often does the static?

If a man kites notes, what does the zin-cite?

If a "green goods" man "cons" a rube, whom does sili-con?

If a motor is 21 years old, is its ar-mature?

If water is $H_2O$, is Tantalum?

---

## Voting Contest

Always on the look-out to serve our readers best and give them the proper dope, we decided to start a voting contest, to see what our readers like best in this industrious paper. Fill in the "Chinese" voting ballot, by marking a star opposite the item you like or dislike. Cut out the blank, paste it on a barn door and mail it at once. P. S. Don't fail to put on the postage.

P. S. 2. Important: Read from right to left.

..... Fips like I
.....Fips like don't I
.....Cute is Fips think I
.....one him paste to like I
Alf story serial Fips' Mr. like I
..... 12B 40.
.....rotten is story the think I
.....grand just is Fips think I
lot open an on him catch I hope I
..."Screech Wireless" the like I
.....awful is it, think I
.....grandmother Fips' like I
.....him pulverizes she, hope I
.....smile Fips' ll'l love I
.....crack would face his wish I
..... suggestions Other

---

## The Grattle

This department has been startled to answer questions submitted by those having a rattled forecastle. Ask anything you like. We have an answer ready for anyone, on all topics. The more you ask the better we like it. Our sole purpose on this planet is to answer questions, especially those originating from "gazooks" with brainstorms and those "garunts" with a leak in the cylinder.

Don't send any money when asking information. We don't need it. We work for love and fame.

---

**An expAnsive aerial.**

(Z00002) Ananias Etherpusher, Ibszbourg screeches:

I have an aerial 65 feet and 6 inches high on the leeward side and 103 feet and 6¼ inches long on the starboard side. On account of expansion the aerial is about 8 inches longer in the summer than in the winter. From this you can easily figure out that my wavelength must be considerably longer in the summer than in the winter. Kindly suggest a remedy as it bothers my fine receiving.

A. At last something new under the sun. The remedy is simple. If the longer wavelength is wanted in winter, build a fire under the aerial, and the expansion caused thereby will lengthen the aerial. The same effect may be had by attaching hot water bottles on the aerial, spaced one foot apart.

If, however, a short aerial is wanted in the summer, place cakes of ice, one foot apart all along the aerial, or smear ice cream on the wire strands. This will contract the wires and the aerial will have the required shortage.

Now ask us something hard.

---

**WIRELESS DISTANCE.**

(Y0000 2/3). Ephraim S. Park, Gap, L. I., lisps:

I have the following wireless outfit: A sixty foot, 18-wire strand gold plated aerial, a beautiful mahogany finished detector with silver plated crystals, a gold plated set of phones, a cut glass variable condenser with French écru lace, a double slide tuning coil with shock absorbers and diamond studded sliders, a loose coupler with steam gauge on the primary and a gold plated carburetor on the secondary, a fixed condenser with movable searchlight, and a rotary potentiometer aircooled with steering attachment on the starboard side. What is my receiving distance?

Answer. It is with the greatest sorrow that we note your ignorance. A two-year-old child could answer your question, but since you don't seem to know, here goes:

According to Ohm's law we have $C=\frac{E}{R}$ where C= the Condenser, E= the Earth, R= the unknown quantity. Now then: Your wave length being $18\times4\times R\times\frac{E}{C}$ it follows that the capaciy of the condenser must be 42½ meters. But on account of the disturbing feature of the écru lace of your condenser, a damping effect will arise and allowing for this factor we find that the radius of the loose coupler will be $42.5\div R\times\frac{E}{C}$, equals 0.00069 Micro Henrys.

Bearing in mind, however, that the pressure of the steam gauge on the primary in turn reduces the wavelength, and substituting the unknown quantity R by X, we find by a simple logarithmic equation that $0.00069\times42.5\div X+43.6\times\frac{E}{C}=R=$ **Rummy (yourself.)** Hence $C=\frac{E}{R}=$ a Condenser, Earthed by a Rummy.

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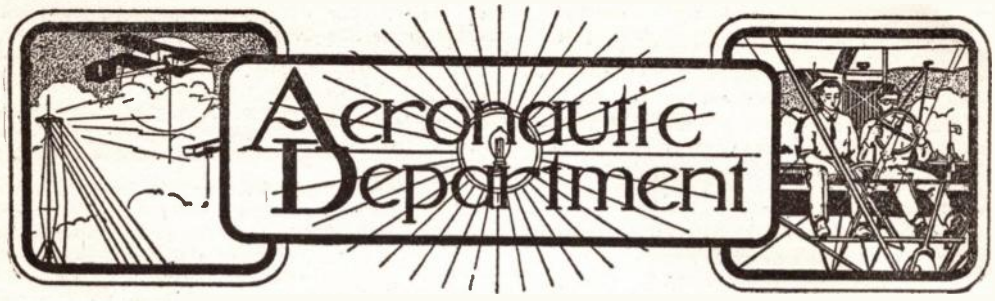
**"200 METERS WAVELENGTH FOR AMATEURS."**

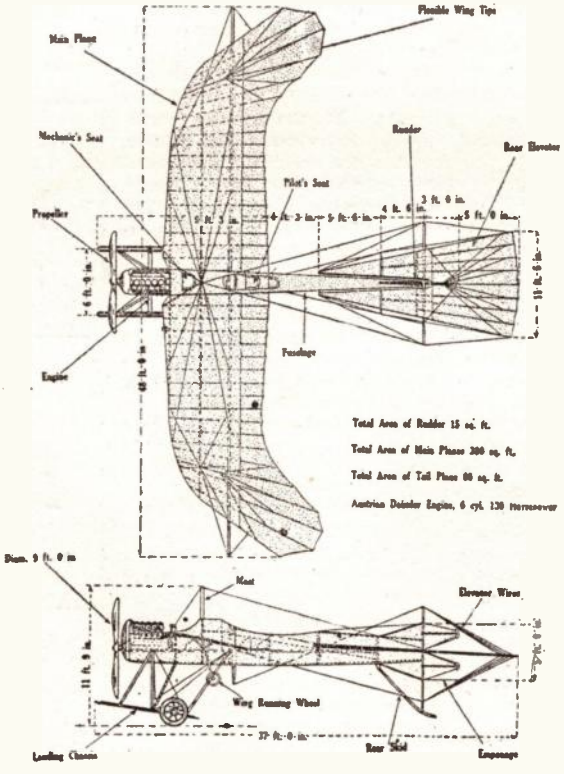
Little waves on water,
Little waves on land,
Make the little "wireless"
Hum to beat the band!!

"FIPS."




# The Etrich Monoplane

IN general appearance the Etrich resembles a bird. So much is this true that the Etrich-Rumpler, made under license in Germany, has been nicknamed the Taube (the Dove). The main plane consists of two wings, each of which is swept back so as in plan form to approximate the shape of a gull's wing. The angle of incidence is at its maximum at the point at which the wings join the fuselage, decreasing until, at the elbow, it is neutral. The extremity has a negative angle, because of the fact that the trailing edge is up-turned, and the effect is held to be the same as that of a negatively inclined non-lifting tail.



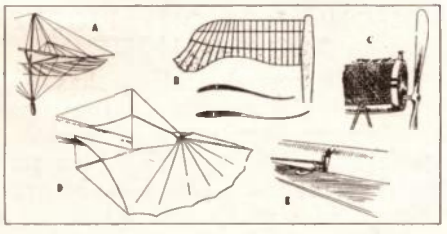

The fuselage is oval in section with the greater axis of the ellipse vertical. From the elliptical radiator mounted at the forward end, the body deepens and widens in the vicinity of the pilot's seat, and gradually tapers from this point to the tail, where it terminates in a vertical line. It is composed of steel tubing, supported at intervals by elliptical tubular steel hoops, and there also are a number of false wooden hoops introduced for the purpose of applying fabric. The covering in front is metal sheeting, while that aft of the pilot's cockpit is fabric.

The landing chassis or undercarriage has undergone repeated modification in the past, but that on the machine shown in the accompanying drawings is modelled on Henri Farman lines and has been used almost entirely during the past year. This consists of two long skids, each with a pair of rubber-suspended running wheels supported by spring radius rods. The struts leading to the forward part of the fuselage and engine mounting are of steel tubing. Steel guy wires also lead to the wing tips and empennage.

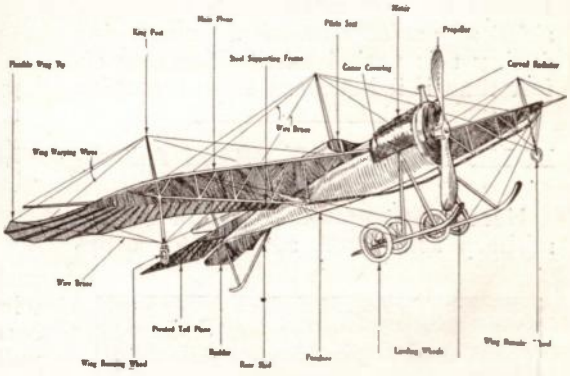
The empennage comprises two triangular vertical rudders, arranged as in the Antoinette monoplane and preceded by triangular fixed vertical fins top and bottom of the fuselage. The flat fan-shaped tail is movable as a

whole, and is pivoted so as to be balanced as nearly as possible, otherwise its large size might make its movement by the pilot a matter calling for some little strength. Two forward extensions are furnished with slide brackets, in which work the extremities of a crosspiece contained within the fuselage, and for the passage of which small tunnels are arranged on either side. This crosspiece works up and down a central vertical column against the action of strong coil springs. The whole is protected in landing by the usual skid.

Perhaps the greatest interest attached to the construction of the main plane, which is absolutely rigid, with the exception of the flexible wing tips and trailing edge. The spars are triangulated below the surface with a cross bracing of light steel tubing. This steel bracing is carried out in a most thorough manner, and it is claimed that the Etrich plane will stand a weight equal to six times that of the fuselage, landing chassis, engine, pilot, passengers, etc., when supported only at the wing tips. The front portion of each wing is surfaced on both sides with fabric. Behind the rear boom extend bamboo continuations of the ribs, which covered with a single surface of fabric form a flexible trailing edge. The camber is very slight, even at the point where the wings join the fuselage, and decreases with the angle of incidence toward the tip, which presents no incidence in the direction of flight.



The flexible wing tips are turned up at the rear so as to give the end of the wing an effective negative angle of incidence, and it is to this feature that the machine is said to owe its pronounced degree of natural stability. Lateral balance is maintained by raising either wing tip by means of a cable, which passing over a pulley located at the top of the kingpost divides up into eight wires connected with the flexible extremities. A cable passing over the lower end of the mast lowers the opposite tip a corresponding amount. A small running wheel mounted on the lower extremity of the kingpost protects the wing tip from contact with the ground. Control of elevation and lateral stability is by a rotatable hand wheel mounted at the top of a vertical column.



As standardized, the manufacture of Etrich monoplanes is in four models; a two-seated touring machine of 65 horsepower, a single-seated racer of similar power, three-seated touring with engine of 120 horsepower, and a racer of the same power for two. All utilize the Austrian Daimler engine, the larger power plant having six cylinders. In the two larger machines provision is made directly behind the engine mounting for a mechanician, whose duty it is to look after the needs of the motor, leaving the operator free to control the vehicle in flight. Communication is carried on between the two by means of a speaking tube connected to specially designed helmets.

## DOUTRE STABILIZER.

A remarkable record and which illustrates the demand for automatic stability in aeroplanes is the one mentioned herewith.

On May 6th, 1911, the aviator, Didier, equipped his Maurice Farman biplane with the Doutre stabilizer. In the eight succeeding months the same biplane traveled over 10,000 kilometers in all kinds of weather, without a sin-

gle accident. The biplane has often been driven to different places and then driven back to its original starting place under another aviator's control. The biplane's success which is without equal, is directly due to the Doutre automatic stabilizer, which enabled any aviator to drive the machine during this period with no greater effort than if it had been an automobile.

## BOMB DROPPING FROM AEROPLANES.

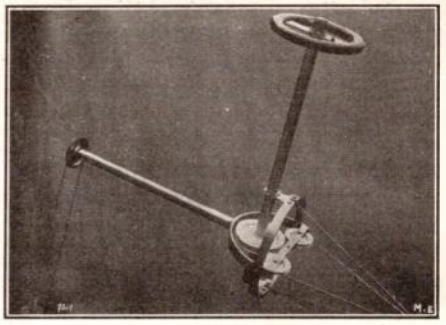
Here are two photographs of French military aeroplanes adapted for drop-

ping explosives over an enemy's camp. In the machine carrying two men, the one in the rear simply drops the bombs by hand. The aeroplane is provided with a sighting machine which takes into account the velocity of the machine. In the other aeroplane, which carries only the operator, the bombs are carried in a box under the main

plane, and are released, one at a time, by a lever operated by the aviator.

## STEERING DEVICE FOR AEROPLANES.

This apparatus provides for three movements, for vertical and horizontal steering, and wing warping. Pushing the steering wheel forward or pulling it back operates the elevating rudder;



rocking it to right or left warps the wings or operates the ailerons through cords or wires wound around the small pulley on the horizontal shaft; turning the steering wheel operates the rudder. The elevating rudder is operated through the wires attached to the top and bottom of the ring frame at the bottom of the steering wheel column.

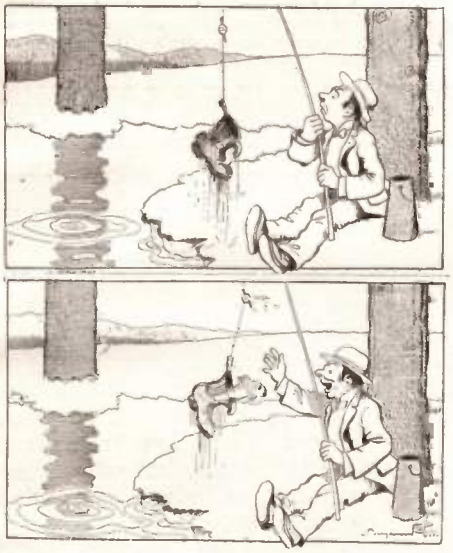

The steering rudder is worked through the other two wires.

## EDISON MOTION PICTURES FOR THE HOME.

Mr. Thomas A. Edison has developed his kinetoscope in the smaller sizes so that it can now be used in the home and club as well as in public meeting places. The film is greatly reduced in size so that 80 ft. of the new film contains as many pictures as 1000 ft. of the film used in theatres, the rate of exposure of the pictures being the same in the two cases; the scenes pictured and the total time of exposure are also equal. The home kinetoscope is lighted by means of either a Nernst lamp or a miniature arc lamp.

# Flying Sparks

### A DISAPPOINTMENT



sometimes turns out otherwise.

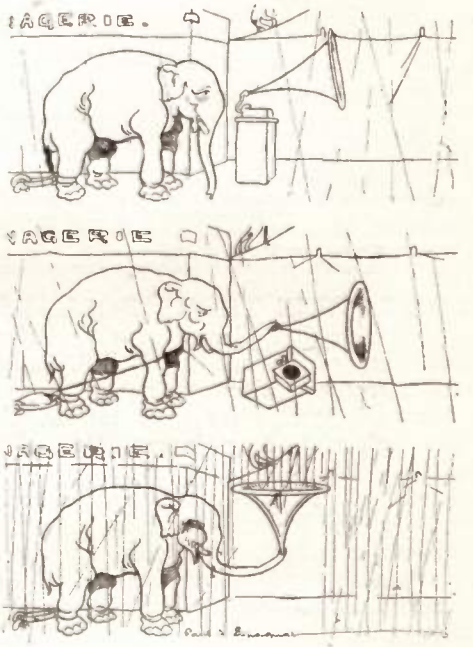
### THE INVETERATE SMOKER.

and how he got his smoke!

### STYLE.

Ev'rybody's doing it—why not they?

### THE THIRSTY ELEPHANT.




A story without words.

### A SLIGHT MISTAKE

or the mistaken umbrella stand.—Pêle-Mêle.


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.

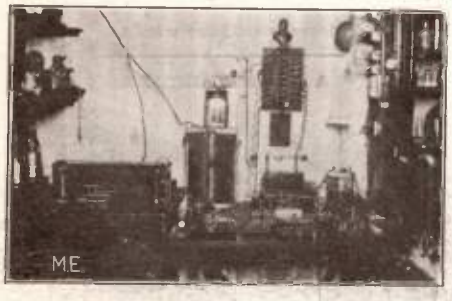
PLEASE NOTE THAT THE DESCRIPTION OF THE STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED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

Herewith find picture of my station consisting of ½-inch spark coil, helix, condenser, and zinc spark gap. I use Gernsback interrupter with 110 D. C., also bank of 3-32 c.p. lamps. Receiving set consists of 3 slide tuner, variable condenser, 5 detectors, including coherer and recorder to left. I also have a separate set consisting of tuner, autocoherer and phones connected to battery, called the Jack Binn's set as described in one



Dorsch Station.

of our leading evening papers (The Post). I organized the Jack Binn's Club of Cincinnati, which meets at the Cincinnati Post Editorial Rooms for which I answer all questions concerning wireless.

Contributed by
GEO. DORSCH, Ohio.

## HONORABLE MENTION.

The accompanying photo shows the operating room of the Kenosha Wireless School.

We have a fully equipped school with the following apparatus: One k.w. transformer, reactance regulator, key, solenoid or break-in key, plate condensers, rotary and ordinary muffled spark gaps, enclosed oscillation transformer with plug attachments, hot wire ammeter, variometer type loose coupler, three variable condensers, silicon and perikon detectors, phones of various makes, standard calibrated condensers and inductance coils, wave-meter and other apparatus used in testing. Our aerial is 350 feet long, elevated 110 feet at one end and 75 feet at the other, consisting of seven No. 12 copper wires spaced 2½ feet apart.

Being located on Lake Michigan between Chicago and Milwaukee, our sta-


tion is in touch with all the ships on the Lakes and there is always something doing, day or night.

In the evening our boys copy mes-

sages from nearly all the Atlantic coast stations, some of them come in as loud as the boats on the Lake.

R. M. LAMB, Wisconsin.

## HONORABLE MENTION.

The accompanying photograph shows my wireless station.

Most of my apparatus is home made. For receiving I use a silicon detector, loose-coupler, fixed condenser, and a pair of Murdock (Am) phones, 2000 ohms. For sending I have a double motor boat coil using but one vibrator, helix and plate condenser. I use a transformer stepping down from the 110 A. C. to furnish power for my coil. I have a marble switchboard which is connected with the 110 volts. I have an aerial


Blaikie Station.

85 feet long consisting of six wires two feet apart. I have been reading *Modern Electrics* for the past year.

My call letter is GM and is listed in the Harvard Wireless Club of Cambridge. I would be glad to communicate with all amateurs within five miles.

ROBERT BLAIKIE, Mass.

## HONORABLE MENTION.

Herewith please find photograph of my wireless station.

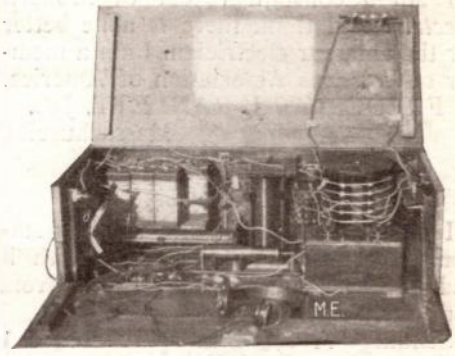
Neatly arranged and compact, it is easily portable. When the set is not in use the case is closed and locked, out of the way. It is connected to a lightning switch, and then to the aerial, which is 40 feet high, 65 feet long, and consists of five wires.

Receiving—Silicon and crystal detector, variable condenser, 2000 ohm receivers, double and single (slide) tuners.

Sending—Three inch Mesco spark coil, adjustable primary and secondary condensers, large helix, spark gap, and wireless key. Seven to ten batteries are used to furnish power for the coil.

A special instrument switch, connected to these sets, protects the receiving set from the sending current.

I made the wireless—case, helix, both




Huebel Station.

tuners, and the secondary condenser.

I am able to clearly pick up messages at any time, day or night. Can receive within a radius of several hundred miles, and also send far. Stations far away sound very clear.

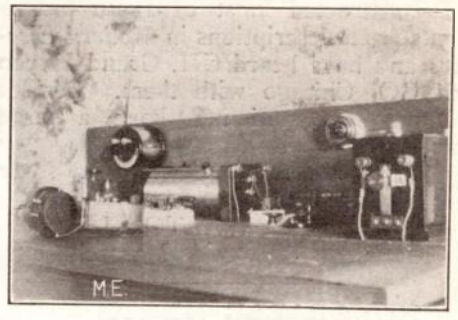
I think *Modern Electrics* is the best book printed for anyone experimenting in wireless telegraphy.

H. R. HUEBEL, New Jersey.

## HONORABLE MENTION.

Please find enclosed an amateur photograph of my wireless telegraph set.

Receiving Set—A double-slide tuning-coil, fixed and variable condensers, silicon detector, 2000 ohm head set, and buzzer for testing detector.




Ranlett Station.

Transmitting Set—One inch spark-coil, Murdock spark-gap, Morse key, and six dry cells to operate it.

Aerial—Six strands of No. 14 aluminum wire spaced 1½ feet apart, 60 feet long and 30 feet high.

I have a S.P.D.T. 100 ampere switch

and No. 6 weather-proof wire to connect it with lightning ground. This is to protect the house from lightning. There is also a D.P.D.T. switch to connect receiving and sending sets.

I am a constant reader of *Modern Electrics* and think there is none better for the amateur electrician. I am a member of Wireless Association of America.

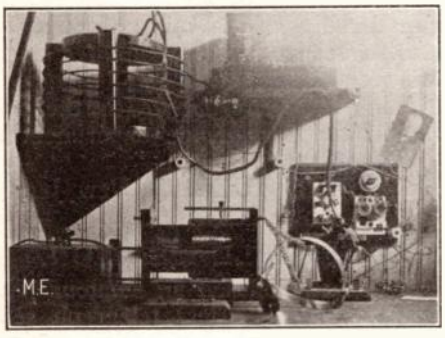
FREDERICK J. RANLETT, JR.,
Massachusetts

## HONORABLE MENTION.

I enclose a photo of my wireless station. I am having fine results with it and got most of my suggestions from your magazine.

Sending—A 1½ inch spark coil, a 1 inch spark coil, helix, sending condenser, spark gap, aerial switch, telegraph key.

Receiving—loose coupled tuner, variable condenser, silicon detector, 2 fixed condensers, 750 ohm Murdock phones.




Leon Station.

I constructed most of these instruments from descriptions in *Modern Electrics* and have heard GH, Grand Haven and GO, Chicago with them. Besides this wireless station I have a large amount of experimental apparatus. My aerial is composed of four wires forty feet long and fifty feet high.

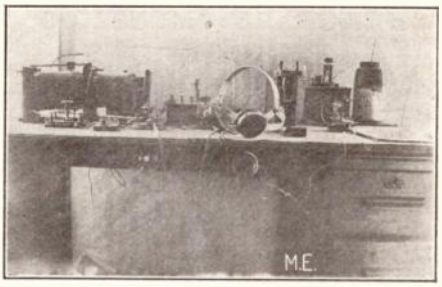
WALTON LEON,
Massachusetts.

## HONORABLE MENTION.

Here is a photograph of my wireless station.

The sending apparatus consists of an E. I. Co. one inch coil and a spark gap, a Leyden jar, which I made myself and a telegraph key. The receiving set consists of a set of 2000 ohm phones, a fixed condenser, a variable condenser, a loose coupler which I made, and three mineral detectors.

I also have a portable outfit which was successfully tested twenty miles out from the city.



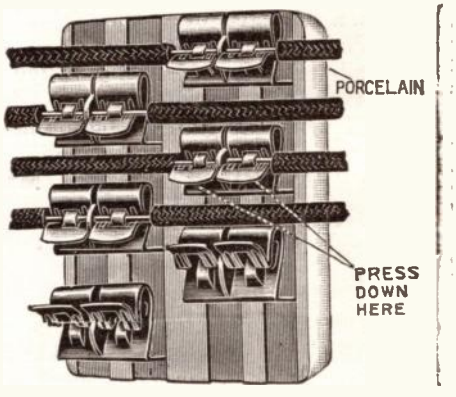

Schneider Station.

I take great interest in your magazine, and though I am not a regular subscriber, have not missed a copy for a long time.

ALEX SCHNEIDER,
New York.

## FAHNESTOCK CONNECTOR STRIP.

This cable terminal strip is made up with a porcelain base and the familiar Fahnestock spring connectors, with which no tools are required to fasten the wires. The wire in the cable is inserted in one clip and the wire which is to be connected to the one in the cable is fastened in the other clip of the pair forming one terminal. All that is necessary is to skin the end of the wire, press down the end of the brass spring, insert the wire under the little hook, and let go. To disconnect it is only necessary to press down the clip and pull the wire out. The strips can be obtained for almost any number of pairs, and with the brass clips either plain or tinned.



# Wireless Clubs

Until further notice we will publish here each month a list of wireless clubs. These notices are inserted free upon receipt of proper information. Notices of the organization of all new clubs, as well as any changes of officers, etc., should be sent to us promptly.

Allegheny County (Pa.) Wireless Association—Arthur O. Davis, President; Theo. D. Richardson, Vice-President; James Seamon, Leetsdale, Pa., Secretary-Treasurer.

Alpha Wireless Association—L. L. Martin, President; F. A. Schaeffer, Vice-President; G. F. Girton, Box 57, Valparaiso, Ind., Secretary-Treasurer.

Amateur Experimental Association—David Kirk, President, Cornelius Hobbs, Vice-President; Lewis Kobie, Spokane, Wash., Secretary-Treasurer.

Amateur Wireless Association of New Bedford (Mass.)—Chas. Kraihanzel, President; Chester Dahl, Vice-President; Wm. Isherwood, Treasurer; Edw. DeMello, 84 Dunbar Street., New Bedford, Mass., Secretary.

Amateur Wireless Association of Schenectady (N. Y.)—L. Uphoff, President; L. Beebe, Vice-President; L. Pohlman, Treasurer; D. F. Crawford, 405 Lenox Road, Schenectady, N. Y.

Amateur Wireless Club of Geneva (N. Y.)—Henry B. Graves, Jr., President; Chas. Hartman, Vice-President; Lawrence Reid, Treasurer; Benj. Merry, 448 Castle Street, Geneva, N. Y., Secretary.

Atlanta Wireless Association of Atlanta (Ga.)—Tye Sanders, President; Chas. E. Kruger, Vice-President; Roy Nichols, Treasurer; Howard Sawtell, 159 Capitol Avenue, Secretary

Berkshire Wireless Club—Warren A. Ford, President; William Yurkee, Vice-President; Chas. Hodecker, Treasurer; Jas. H. Ferguson, 18 Dean Street, Adams, Mass., Secretary.

Boise Wireless Association—Willard Herron, President; Stanard Fusten, Vice-President; Jeane Thrailhill, Treasurer; Wm. Balderston, 513 N. 6th Street, Boise, Idaho, Secretary.

Bridgeton (N. J.) Wireless Club—Joseph P. Cox, President; Arthur Riley, Vice-President; S. B. Ashmead, 275 Bank Street, Secretary and Treasurer.

Bronx Wireless Association—Chas. F. White, 500 East 165th Street, Bronx, N. Y., Secretary.

Brooklyn Wireless Club—Edward Joyce, 131 Ryerson Street, Brooklyn, N. Y., Chief Operator.

Canadian Central Wireless Club—Alexander Polson, President; Stewart Scorer, Vice-President; Benjamin Lazarus, P. O. Box 1115, Winnipeg, Manitoba, Canada, Secretary and Treasurer.

Cardinal Wireless Club—K. Walthers, President; F. Dannenfelser, Vice-President; Miss A. Peterson, South Division High School, Milwaukee, Wis., Secretary.

Chicago Wireless Association—John Walters, Jr., President; E. J. Stein, Vice-President; C. Stone, Treasurer; R. P. Bradley, Secretary; F. Northland, 4418 S. Wabash Avenue, Chicago, Ill., Corresponding Secretary.

Cincinnati Wireless Signal Club—A. J. Lyons, President; E. D. Achor, Vice-President; J. L. Anderson, 1839 Hopkins Street, Cincinnati, Ohio, Secretary-Treasurer.

Danver Wireless Association—Chester Robertson, President; Hollis Mickerson, Vice-President; Oliver Everett, Franklin Street, Danver, Mass., Secretary and Treasurer.

DeKalb Radio-Transmission Club—Bayard Clark, President; Bruce Sundberg, 304 S. Fourth Street, DeKalb, Ill., Vice-President.

Dorchester Wireless Association—Karl H. Kaiser, President; Ralph J. Sims, Treasurer; Richard F. Lufkib, 222 Harvard Street, Dorchester, Mass, Secretary.

East Buffalo Wireless Club—Bernhardt M. Zeufle, President; Arthur H. Benzec, 701 Walden Avenue, Buffalo, N. Y., Secretary-Treasurer.

East Tennessee Wireless Association—Servais Evrard, President; Burkhead McGowan, Vice-President; Edward Kelly, 723 N. Third Avenue, Knoxville, Tenn., Secretary-Treasurer.

Experimental Club of Cincinnati (Ohio)—C. Fender, President; A. Geickiecen, Treasurer; Wm. G. H. Finch, 1714 Jackson Street, Cincinnati, Ohio, Secretary.

Fargo Wireless Association—Kenneth Hance, President; John Bathrick, Vice-President; Earl C. Reineke, 518 Ninth Street, Fargo, N. D., Secretary.

Flushing Wireless Association—Samuel Christie, President; Melvin McKenna, Vice-President; Chas. Simmons, Treasurer; Louis Hartig, 24 Madison Avenue, Flushing, N Y., Secretary.

Frontier Wireless Club—Chas. Coxhead, President; Franklin J. Kidd, Jr., Treasurer; Herbert M. Graves, Buffalo, N. Y., Secretary.

Gramercy Wireless Club—J. F. Diehl, President; H. Green, Vice-President; J. Gebhard, Treasurer; J. Platt, 311 East 23d Street, New York, N. Y., Secretary.

Greater Boston Wireless Association—C. R. Eldredge, 41 Lawrence St., Wakefield, Mass., Secretary.

Guilford County (N. C.) Wireless Association—Hermon Cone, President; Ralph Lewis, Vice-President; Robins Tilden, Treasurer; Theodore Mans, Greensboro, N. C., Secretary.

Hamlin Wireless Association—Rolf Rolfson, President; H. Kunde, Treasurer;

Edw. G. Egloff, 2729 Noble Avenue, Chicago, Ill., Secretary.

Hannibal Amateur Wireless Club—Chas. A. Cruickshank, President; J. C. Rowland, Vice-President; William Nouse, Treasurer; G. G. Owens, 1306 Hill Street, Hannibal, Mo., Secretary.

Haverhill (Mass.) Wireless Association—Wilfred Vigneault, President; Riedel G. Sprague, Vice-President; Leon Westbrook, Haverhill, Mass., Secretary.

Hartford Wireless Association—P. S. Southworth, President; W. J. Hickmott, Jr., Treasurer; H. E. Chapman, 320 Wethersfield Avenue, Hartford, Conn., Secretary.

Independence Wireless Association—Boyce Miller, President; Ralph Elliott Secretary; Joseph Mahan, 214 South Sixth Street, Independence, Kansas, Vice-President.

Inter-Mountain Wireless Association—E. L. Bourne, President; J. G. McCullom, Treasurer; D. McNichol, 219 Fifth street, Salt Lake City, Secretary.

Knights of Wireless—F. S. Hager, President; William Pontius, Treasurer; I. M. Saunders, 1271 East 35th Street, Flatbush, Brooklyn, N. Y., Secretary.

Lexington Wireless Club—John S. Schlichting, 254 Sumner Ave., Brooklyn, N. Y., President; Edward Goetz, Secretary; Frank Wilson and John H. Schlichting, Chief Operators.

Long Beach Radio Research Club of California—Samuel Van Lieu, President; Wm. Shewan, Vice-President; George Brown, Treasurer; Bernard H. Williams, Secretary.

Madisonville Wireless Club — John Mackie, President; G. Howard Loeb, Vice-President; Raymond Wilson, Treasurer; Asbury Shumrad, 5609 Tompkins Avenue, Madisonville, Ohio, Secretary.

Manchester (N. H.) Radio Club—Earl D. F. McKewin, President; Clarence Campbell, Vice-President; Earle Freeman, 759 Pine Street, Manchester, N. H., Secretary-Treasurer.

Mowa Wireless Club—Chas. H. Gregory, President; Ralph Burrell, 331 Pacific Street, Brooklyn, N. Y., Secretary.

New Haven Wireless Association—Roy Wilmot, President; Arthur D. Seely, Vice-President; Russell O'Connor, 27 Vernon Street. New Haven, Conn., Secretary-Treasurer.

North Jersey Wireless Association, Paterson, N. J.—L. Spangenberg, President; C. Cruikshank, Treasurer; C. Berry, Hawthorne, N. J., Secretary.

Oklahoma State Wireless Association—Ralph Jones, Box 1448, Muskogee, Okla., Corresponding Secretary.

Oregon State Wireless Association—Charles Austin, President; Joyce Kelly, Recording Secretary; Clarence Bischoff, Lents, Oregon, Secretary and Treasurer.

Pacific States Wireless Association—Howard W. Lewis, President; W. N. Hickman, Vice-President; Earl C. Hanson, Recording Secretary; Stanley McClatchie, 288 Wilcox Avenue, Los Angeles, Cal., Corresponding Secretary.

Pacific Wireless Club of Oregon—Raymond Higgins, President; Rudolph Janesch, Vice-President; Lester White, Treasurer; Carl Braun, 405 East Market Street, Portland, Oregon, Secretary.

Plaza Wireless Club—Paul Elliott, President; Myron Hanover, 156 East 66th Street, Secretary and Treasurer.

Progressive Wireless Club of Seattle, Wash.—Hubert A. Davis, President; Edward Lachall, Vice-President; LeRoy Fetterly, Treasurer; Howard Hemen, Secretary.

Progressive Wireless Club—Geo. Holt, President; Silas Pace, Vice-President; T. E. Story, Poplar Bluff, Mo., Secretary-Treasurer.

Ranger Nautical Signal and Wireless Association—William E. Dickens, President-Secretary, Massachusetts Nautical Training School, State House, Boston, Mass., Jerome W. Hill, Vice-President-Chief Operator.

Rochester (N. Y.) Wireless Association—Edward T. Eastman, President; Merritt D. Mosher, Vice-President; Lawrence Hickson, Treasurer; Arthur F. Wright, Secretary; Floyd E. Wright, Rochester, N. Y., Corresponding Secretary.

Rockland County (N. Y.) Wireless Association—W. F. Crosby, President; Tracey Sherman, Vice-President; Marquis Bryant, Secretary; Erskine Van Houten, 24 DePew Avenue, Nyack, N. Y., Corresponding Secretary.

Roslindale (Mass.) Wireless Association—O. Gilus, President; E. T. McKay, Treasurer; Fred C. Fruth, 962 South Street, Roslindale, Mass., Secretary.

Sacramento Wireless Signal Club—F. Strader, President; L. C. Huber, Vice-President; C. B. Vard, Treasurer; E. Ratcliffe, 2119 H. Street, Sacramento, Cal., Secretary.

Seattle Wireless Association—H. Reed, President; W. Bonnell, Vice-President; C. Miller, Treasurer; E. Ferguson, Broadway High School, Seattle, Wash., Secretary.

Southern Wireless Association—B. M. Oppenheim, President; J. Fischel, 1435 Henry Clay Avenue, New Orleans, La., Secretary and Treasurer.

Springfield (Mass.) Wireless Association—A. C. Gravel, President; C. K. Seely, Vice-President and Treasurer; D. W. Martenson, 323 King Street, Springfield, Mass., Secretary.

Technical Wireless Association of Washington, D. C.; Ralph W. Brown, President; Edwin L. Powell, 1206 E. Capitol Street, Secretary and Treasurer.

Texas Wireless Association—Geo. Mackenzie Douglas, President; Roy M. Kinkaid, Vice-President; Otto G. Smith, 1212 Prairie Avenue, Houston, Texas, Secretary and Treasurer.

Tri-State Wireless Association—C. B. De La Hunt, President; O. F. Lyons, Vice-President; T. J. Daly, Treasurer; C. T. Cowan, Memphis, Tenn., Secretary.

Waterbury Wireless Association—H. M. Rogers, Jr., 26 Linden St., Waterbury, Conn., Secretary.

Waynesburg (Pa.) College Wireless Club—C. W. Frietage, President; James D. Thomas, Chief Engineer; John Meighn, Waynesburg College, Pa, Secretary.

Welcome Wireless Association, 185 Chauncey Street, Brooklyn, N. Y.

Westchester (N. Y.) Wireless Association—Stanley R. Manning, President; E. D. Moorhouse, 37 West Main Street, Tarrytown, N. Y., Secretary.

Western Division High School Wireless Association—Walter Peter, President; Arthur Riebe, Vice-President; Edwin Schmidt, Treasurer; Edwin Rauser, Milwaukee, Wis., Secretary.

Wireless Association of British Columbia—Clifford C. Watson, President; J. Arnott, Vice-President; E. Kelly, Treasurer; H. J. Bothel, 300 Fourteenth Avenue E., Corresponding Secretary.

Wireless Association of Buffalo—Harold Schoepflin, President; George Nicholson, Treasurer; George Phipps, 142 Dorchester Place, Buffalo, N. Y., Secretary.

Wireless Association of Canada—Wm. C. Schuup, President; Thomas Hodgeson, 189 Harvard Avenue, Notre Dame de Grace, Montreal, Quebec, Secretary.

Wireless Association of Central California—C. DeYoung, President; B. K. Leach, 860 Callish Street, Fresno, Cal., Secretary.

Wireless Association of Easton, Pa.—W. Ballenstine, President; John Q. Adams, Vice-President; Weikel Jordan, Treasurer; E. J. Sortor, Recording Secretary; James Smith, Jr., 123 N. Main Street, Phillipsburg, N. J., Corresponding Secretary.

Wireless Association of Illinois—Clarence C. Hess, President; Earl C. Brestow, Vice-President; John C. Rector, 303 N. Eighth Street, Marshall, Ill., Secretary and Treasurer.

Wireless Association of Milwaukee—A. F. Toepfer, President; Emil Koubeck, Vice-President; Frank Shroeder, 824 19th Avenue, Milwaukee, Wis., Secretary; Henry Zeuner, Treasurer.

Wireless Association of Montana—Roy Tysel, President; Elliot Gillie, Vice-President; Harold Satter, 309 South Ohio Street, Butte, Mont., Secretary.

Wireless Association of New Orleans—J. Nadau du Treil, President; Geo. Seibert, First Vice-President; H. Schluter, Second Vice-President; L. Reiss, Treasurer; P. Gernsbacher, 2022 State Street, Secretary.

Wireless Association of Pennsylvania—Howard Ratty, President; B. F. Rittenhouse, First Vice-President; C. H. Stewart, Second Vice-President; R. G. Mackendrick, Treasurer; Thelwell Russell Coggeshall, Odd Fellows Temple, Philadelphia, Pa., Secretary.

Wireless Association of Southern California—Joe Stearn, President; Howard Lewis, Vice-President; J. E. Hopkinson, Treasurer; Hallam H. Anderson, 935 Denver Ave., Los Angeles, Cal., Secretary.

Wireless Association of Woodbury—Louis Pime, President; George C. Eldridge, Vice-President; John H. Krimm, 28 Penn Street, Woodbury, N. J., Secretary.

Wireless Club of Baltimore—Harry Richards, President; William Pules, Vice-President; Curtis Garret, Treasurer; Winters Jones, 728 N. Monroe Street, Baltimore, Md., Secretary.

Wireless Telegraph & Telephone Association of U. S.—Sidney Wein, President; Louis Weber, Vice-President; M. Weber, Treasurer; Jack Sclacter, care of Boys' Club, 161 Avenue A, New York, N. Y., Secretary.

W. J. W. Wireless Club—Jack Wilgus, 780 Madison Ave., New York, N. Y., President; Frank Mercer, General Manager; Ralph Ingersol, Treasurer; William Woodcock, Secretary.

Young Edison Society—Harrie E. Torbett, Secretary, Rogers, Ark.

## ALEXANDER WIRELESS BILL AMENDED.

(Continued from Page 140.)

such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin convention of nineteen hundred and six and future international conventions and treaties to which the United States may be a party shall not be so established as to insure a constant service day and night without interruption, and in all localities wherever or whenever such service shall not be maintained by a commercial shore station within one hundred nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of governmental business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts from such radiograms shall be covered into the Treasury as miscellaneous receipts.

**Secrecy of Messages.**

Nineteenth. Every operator shall be obligated in his license to preserve, and shall preserve faithfully, the secrecy of radiograms which he may receive or transmit; and for failure to preserve such secrecy his license may be canceled.

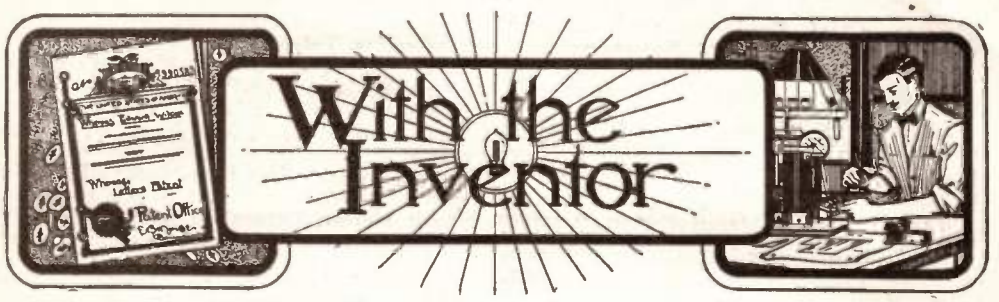
**Penalties.**

For violation of any of these regulations, subject to which a license under sections one and two of this Act may be issued, the owner of the apparatus shall be liable to a penalty of one hundred dollars, which may be reduced or remitted by the Secretary of Commerce and Labor, and for repeated violations of any of such regulations, which shall be deemed a misdemeanor, the license may be revoked as provided in section one.

For violation of any of these regulations, subject to which a license under section three of this Act may be issued, the operator shall be subject to a penalty of twenty-five dollars, which may be reduced or remitted by the Secretary of Commerce and Labor, and for repeated violations of any such regulations, which shall be deemed a misdemeanor, the license may be suspended as provided in section three.

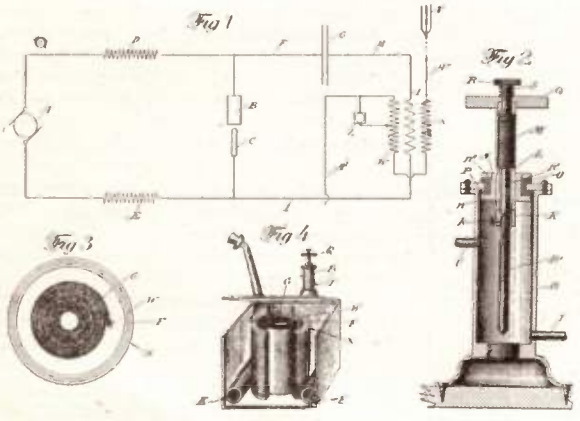
Sec. 5. That every license granted under the provisions of this Act for the operation or use of apparatus for radio communica-

(Continued on Page 210)




WILLIAM DUBILIER, OF SEATTLE, WASH., HAS BEEN GRANTED PATENT NO. 1,023,135 FOR A HIGH-FREQUENCY APPARATUS.

The specification of this invention provides an apparatus for producing high frequency oscillations and particularly such an apparatus which shall be capable of use in a wireless telephone, and which shall have, among others, the following advantages: That it shall be exceedingly compact; that it shall be simple; that it shall be inexpensive, and that it shall be highly efficient.




There is really nothing novel in this invention except the arrangement of making a very compact outfit. The arc lamp does not show any revolutionary features and has no other features except those of compactness. The only real feature of any consequence is the combination of the primary coil connected with the apparatus for superimposing sound and electro magnetic waves.

As will be seen the transmitter, Z, is made part of the circuit in the coil, W, which coil, W, is a secondary of a transformer, as is also the coil, X. The primary is shown at I.

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PATENT NO. 1,022,433 FOR A GARMENT FOR STAGE EFFECTS, HAS BEEN GRANTED TO ALDEN L. McMURTRY, OF SOUND BEACH, CONN.

This invention relates to a garment to be worn by a dancer for producing novel lighting effects, and its object is to provide a simple portable apparatus for this purpose.

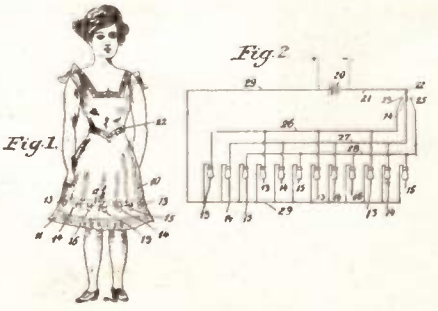
Part of the specification reads as follows:

10 designates a short skirt of a usual form which is preferably constructed of some opaque textile material. The lower edge of this skirt flares outwardly as shown at 11. Running horizontally around the inside of this skirt just above this flaring portion is a band 12 on which are supported several series of small incandescent electric lamps 13, 14 and 15. This band may be placed at such a height as to support the lamps a slight distance above the dancer's knees. The band 12 is also used to support certain electrical conductors which run to the lamps.

The inventor provides three series of lamps in such a manner that the dancer, by means of the switch 22 can switch on three rows of lights which, of course, may be colored in three different colors, such as red, white and blue.

We quote from another part of the specification as follows:

The dancer preferably wears white stockings and shoes, and can execute the movements of a dance in the usual manner. The stage lights may be lowered or entirely turned off during the progress of the dance. Then, at a desired moment, the small arm of the switch 22 is moved onto the stationary




contact 23, for example. Immediately circuits are closed through all of the white lights 13 and the dancer's stockings and shoes are brilliantly illuminated. The lamps can-

not be seen by the audience because of their position within the skirt, and because of the fact that at least a part of the skirt is of opaque material so that their rays do not penetrate it. A novel and pleasant effect is thus produced.

There is no doubt that quite pleasing effects can be had with such a device, and the only bad feature about it is the necessity for the dancer to be connected with an outside source of current, inasmuch as it would be impractical to light all the lamps in question by a portable battery, which not only would weigh down the dancer but would be impracticable, as the load on the necessarily small battery would be too great.

## WILLIAM MORRISON OF DES MOINES, IOWA, HAS BEEN GRANTED PATENT NO. 1,021,989, FOR A STORAGE BATTERY ELECTRODE AND PROCESS OF MAKING IT.

This invention relates to an alkaline electrolyte storage battery. The active material of the negative-pole electrodes is formed into cylindrical rods, externally supported by concentric tubes of heavy paper and woven asbestos, and by a wire wound helically upon the asbestos.

The active material of such electrodes is first enclosed in a sheath of vegetable parchment resistant to an alkaline solution, and then helically winding on the sheath a strip of wire gauze, with its adjacent edges overlapping or intermeshed.

*Fig. 1.*

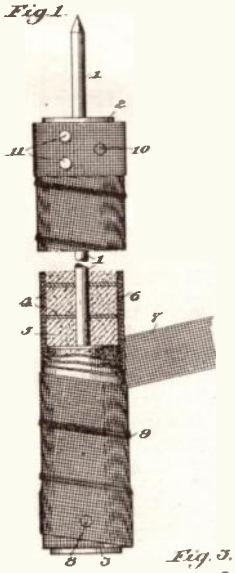
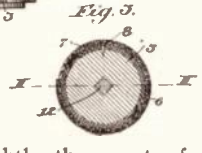



*Fig. 3.*




The active material 5, for example a mixture of zinc chromite, or other zinc-chromium-oxygen compound, and oxid of mercury, is a cylindrical body molded and compressed upon the central rod and washers.

The construction thus far described is that set forth in his specified earlier patent. In the present electrode, the active material is externally supported by a sheath 6 of vegetable parchment, for example, a rectangular sheet rolled tightly thereon to form three concentric layers, and by a strip 7 of wire gauze, preferably zinc-plated iron-wire gauze, wound helically on the sheath with its adjacent edges overlapping. In applying this strip, one end is first secured to the plug 3

by a tack 8. The strip is then rolled once upon itself and over the tack, is then wound helically, with engaged slightly overlapping edges 9, over the entire length of the active material, is passed onto and initially secured to the upper plug 2 by a tack 10, and is then rolled once around this plug and over the tack 10, its free end being then permanently secured by tacks 11.

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## ROBERT H. GALBREATH, OF DENVER, COLO., HAS BEEN GRANTED PATENT NO. 1,018,355 FOR A BATTERY FOR CLEANING TARNISHED METALS.

This invention relates to an improvement in batteries for cleaning tarnished metals.

The inventor employs a plate of zinc and a plate of tin, the two being connected together by a metal frame work, the device being equipped on opposite sides with a screen upon which the article to be cleaned may rest.

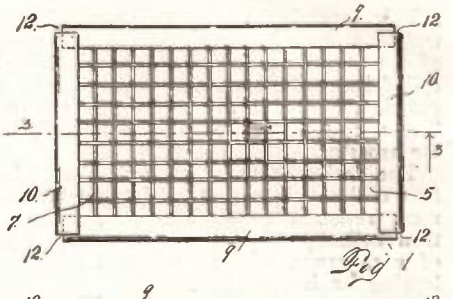


Fig. 1

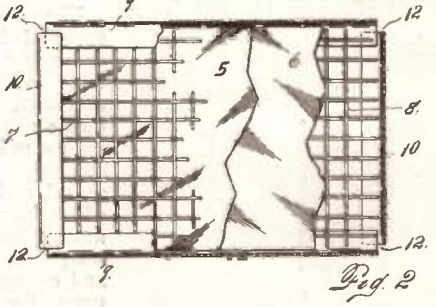


Fig. 2

5 is a zinc plate, 6 the tin plate, one being the anode the other the cathode. To the opposite sides of the plate structure is applied coverings 7 and 8 of coarse metal mesh fabric, thus making four metal layers.

In using this battery it should be placed in a receptacle containing enough warm water to cover the silver-ware or other article to be cleaned. A tablespoonful of common salt and an equal quantity of baking soda are placed in the water for each quart thereof. The water is then stirred for the purpose of dissolving the salt and soda.

The article to be cleaned is placed in this solution, resting on the battery, which is preferably placed with the zinc or anode plate uppermost. The article to be cleaned is left in the solution until it looks bright, and is then wiped with a dry cloth. Ordinarily, it only takes about a minute to perform the cleaning function, though the article to be cleaned may be left in the solution any length of time desired since it will not be harmed thereby in

any way. After the cleaning operation is over, the battery should be washed by pouring warm water thereon until the solution has been entirely removed therefrom. In order to facilitate the operation of cleaning the battery, the framework composed of two parts 9—9 and 10—10 is provided with openings 12 at the corners to allow the cleaning water to escape.

By virtue of this construction, it becomes practicable to completely remove all traces of the solution and prevent the corrosion of the device when not in use.

It will thus be seen that this apparatus cleans silver and other ware electrolytically and it seems the work is done a great deal better in this fashion than if done by hand.

This is one of these little inventions that probably will make the owner of the patent wealthy as this is a device which is decidedly useful, and we believe that a great market will be found for this invention.

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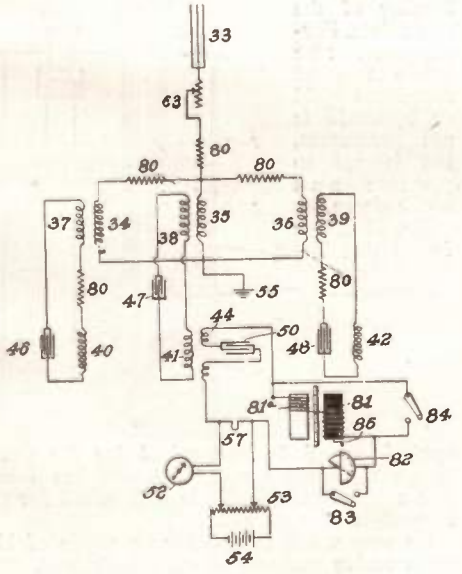
## PATENT NO 1,022,584 HAS BEEN GRANTED TO REGINALD A. FESSENDEN, OF BRANT ROCK, MASS., FOR METHOD OF DETERMINING FREQUENCY OF PERIODIC IMPULSES.

The present invention relates to the measurement of the electrical constants of electric circuits and more particularly to electromagnetic wave measurements.

The invention has for its object the measurement of the electric constants of electrical apparatus and electrical circuits. It is espe-




cially applicable to the measurement of the frequency of electromagnetic waves and the capacities and inductances of the various elements of circuits through which highly oscillatory currents are flowing.

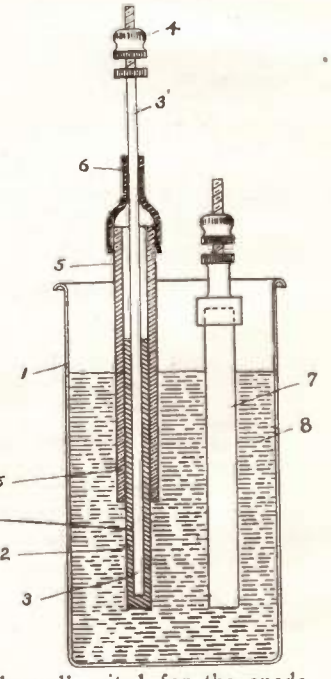
In practice Mr. Fessenden causes a tuned circuit, containing an indicating device, to be affected by oscillations from another circuit, and determine the quantities which it is desired to measure by adjusting one or more of

the elements of the circuit containing the indicator.

Mr. Fessenden prefers to use in connection therewith a variable inductance shown at 81 consisting of two cylinders one of nard rubber and the other, 81a, of electrolytic copper. The cylinder of electrolytic copper 81a acts as a closed secondary and neutralizes the self-induction of all the wire wound upon it. Hence, any desired self-induction may be obtained and may be varied continuously by turning the handle 86 instead of step by step.

## PATENT NO. 1,022,695 HAS BEEN GRANTED TO WILLIAM MORRISON, OF DES MOINES, IOWA, FOR AN ELECTROLYTIC RECTIFIER.

This invention is an asymmetric electrolytic cell for rectifying alternating electric currents. Various metals and solutions have been suggested for use as the anode and electrolyte of an asymmetric cell, but the combination which has heretofore been commonly employed is an anode of aluminum, with a cathode of carbon, lead or iron, in a phosphate, tartrate, citrate, or borate solution. It is however well known that the aluminum rectifier entirely fails when operated at a high temperature, that is, with current densities which cause much heating of the electrolyte. Furthermore, the anode film of aluminum oxid or hydroxid is not permanent, but is apt to puncture and break down.



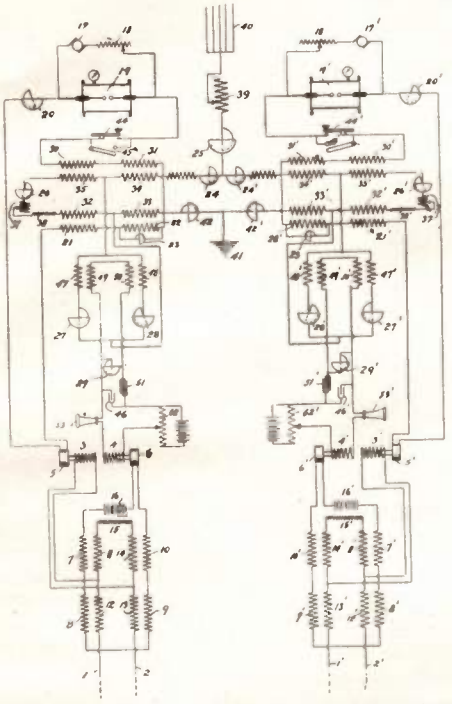

Mr. Morrison found that bismuth is especially well suited for the anode of an asymmetric cell. He also has found that a chromate solution is well suited for the electrolyte of such cell.

He uses a cell comprising an anode of bismuth and a cathode of carbon or lead.

The patent does not state the efficiency of this electrolytic rectifier, and it furthermore does not state how quickly the bismuth is worn away. This ought to be quite an important point inasmuch as bismuth happens to be a very expensive metal. The electrolyte used is preferably a solution of a chromium-oxygen compound, as for example, potassium chromate or dichromate. The solution may be neutral, or somewhat acid or alkaline.

PATENT NO. 1,022,540 HAS BEEN GRANTED TO REGINALD A. FESSENDEN, OF BRANT ROCK, MASS., FOR WIRELESS SIGNALING.

Mr. Fessenden's present invention relates to simultaneous sending and receiving of signals and more particularly to the simultaneous transmission and receipt of telephonic mes-



sages, and to multiplex telegraphy and telephony generally. Its primary object is the simultaneous transmission and receipt of one or more telegraphic or telephonic messages at a wireless station, and also the transmission of messages to and from a wireless station over wire lines.

This patent application was filed on April 5th, 1907, consequently has been in the patent office for five years. During this time a good deal of progress has been made in the art but notwithstanding this the present invention of Mr. Fessenden's covers a great deal of new ground. We regret that we have not the space to bring forward all the admirable points of this invention. Suffice it to say that the invention embraces the following:

The invention covers the simultaneous transmission and receipt of wireless signals without interference from signals being simultaneously sent at the same station.

Any student interested in this patent should do well to procure a copy of same.

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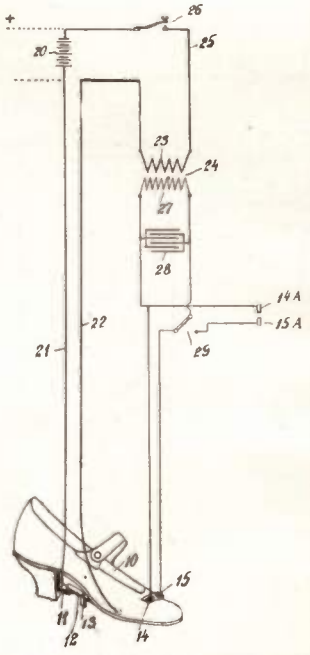
ALDEN L. McMURTRY, OF SOUND BEACH, CONN., HAS BEEN GRANTED PATENT NO. 1,021,787 FOR ELECTRICAL APPARATUS FOR STAGE EFFECTS.

This is another invention for obtaining startling, or in the language of the inventor, "sparkling" effects on the stage.

The invention relates to a simple portable device which is used to produce high tension sparks from the desired parts of the body.

The drawing shows a shoe and certain electrical apparatus adapted to be carried upon the body of a dancer. This apparatus and the connecting circuits are shown diagrammatically.




In the drawing, the shoe is designated by the numeral 10. On the heel of this shoe is a stationary contact 11. A movable spring contact 12 is shown affixed to the sole of the shoe projecting back to the stationary contact.

13 is a button affixed to the spring 12 and projecting from it a sufficient length to raise the spring contact from the stationary contact when the shoe is upon the floor. On the top of the shoe are two fixed electrodes 14 and 15 which are separated from each other to form a spark gap. This may be placed in the position sometimes taken by a buckle or bow, and may be arranged to have the appearance of an ornamental metallic buckle.

20 is a portable battery to be carried by the wearer of this apparatus. A conductor 21 connects one side of this battery with the stationary contact 11. The spring contact 12 is connected by a wire 22 with one of the terminals of the primary winding 23 of an induction coil 24. The other terminal of this primary winding is connected by a conductor 25 through a manually operated circuit closer 26 to the battery 20. The secondary winding 27 of the induction coil is connected with the two fixed electrodes 14 and 15. Between the two secondary leads may be interposed a condenser 28.

29 is a manually operated switch which may be used to change the connection of the secondary winding of the induction coil from the fixed electrodes 14, 15 on the shoe to other fixed electrodes 14a and 15a on some other part of the body of the wearer, such, for example, as upon the head or the breast or the waist, or upon a wand or staff carried in the hands.

If it is desired to obtain the electrical supply for energizing this apparatus from the external source the battery may be omitted and flexible conductors connected to the circuits as indicated by the dotted lines at + and —.

The operation is as follows: As long as the circuit closer 26 remains open, the apparatus is inoperative. But if the circuit closer 26 is closed, every time the foot on which is the shoe 10 is raised from the floor as in a dance, a circuit is closed at 11, 12, through the battery and the primary winding of the induction coil 24. This is preferably of the common vibratory type, so that as soon as the spring 12 remains upon the contact 11, a succession of high tension electrical impulses will be set up in the secondary winding 27, and these impulses will cause sparks to jump across the gap between the fixed electrodes 14 and 15.

The spring 12 is light and the button 13 upon it is of sufficient weight so that a kick while the foot is still raised from the floor will raise the spring from the stationary contact, and this will result in the temporary cessation of the sparks between the electrodes.

This invention is quite unique and some stage manager will no doubt adopt it. There is only one questionable feature about it and that is: if the insulation is not made very carefully, the dancer is liable to turn a somersault at any time on account of this, or perform other "sparkling and spectacular" contortions not mentioned on the program.

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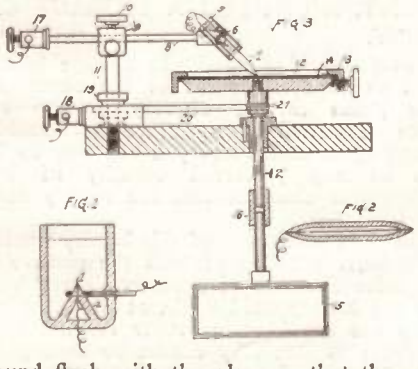
## PATENT NO. 1,022,539 HAS BEEN GRANTED TO REGINALD R. FESSENDEN OF WASHINGTON, D. C., FOR A RECEIVER FOR ELECTROMAGNETIC WAVES.

This is another Fessenden invention and was in the patent office since 1904, or over eight years.

The invention really pertains to electrolytic detectors, wherein the current flows through a minute cross-section of fluid, and the energy of the currents to be detected causes a variation in the amount of current in the local circuit.

The device shown in Fig. 2 is a small glass tube of an internal diameter of about 0.005 of an inch, with a platinum wire 0.0005 of an inch sealed into the ends and one end




ground flush with the glass so that the wire is exposed only on its end surface.

The glass tube at the flush terminal thus formed is shown in Fig. 3.

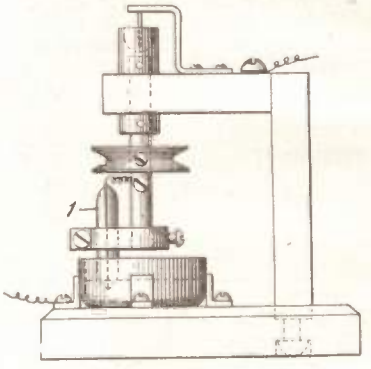
The ground off tip or terminal of the electrode terminal 1 is arranged adjacent to a disk 12 of conducting material, preferably brass, having clamped thereon by the clamping ring 13 a moisture-retaining covering 14,

preferably composed of an inner layer of absorbent material and an outer layer of soft material such as cotton velvet. This disk 12 is mounted upon a shaft $12^a$ driven by clock work 15 through an intermediate rubber coupling 16 to prevent transmission of vibration or shock from the clock work to the disk.

As an alternative form the glass tube containing the sealed electrode terminal may be mounted upon an arm on a vertical rod and revolved in a bath of solution so that here again the friction of the liquid against the exposed terminal will remove any gas which may form thereon, as shown in Fig. 5.

Fig. 1 shows a vertical section of another form of such a cell, where the electrode, 1, which is in the glass tube, is preferably ground off so as to be practically level or flush with the surface of the material, which in this case is glass.

FIG.5.




Thus a minute cross section of liquid contacts with the ground off cross section of the end of the conducting electrode.

PATENT NO. 1,021,900 HAS BEEN GRANTED TO JOHN L. SMITH, OF DETROIT, MICH., FOR A STORAGE BATTERY.

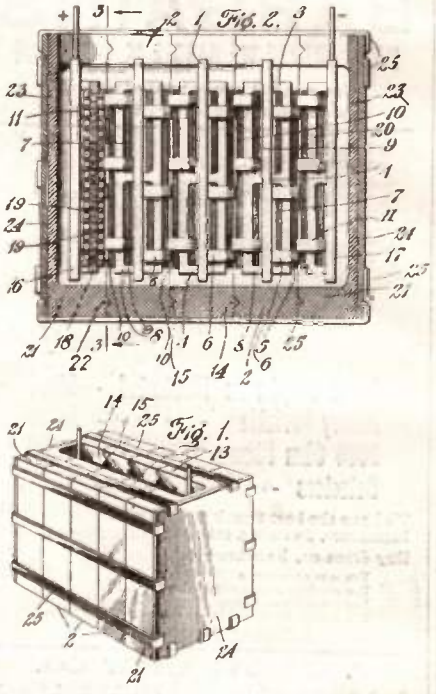
This invention relates to storage batteries and to an arrangement of the elements of the plates thereof whereby a very large area of wetted plate surface is obtained in small space and whereby a cell may be built up of any preferred capacity of interchangeable elements that are readily assembled.

In the construction of this battery the inner and outer surfaces of both the positive and negative elements of each couple are wetted by the battery fluid while, at the same time, they are sustained in proper relation by the support so that they cannot be dislodged or displaced.

There is really nothing very novel in the construction of this, and the only novel part is the container, 21, which the inventor claims can be made up in sections; and this is shown in cross section, in Fig. 2. The material used is supposed to be soft rubber or other elastic non-conducting material.

The inventor expects to get a water and acid tight compartment by clamping the container together in this fashion, but we are quite sure that any cell made in this fashion will leak sooner or later as the acid will force its way through the minute cracks formed in this fashion.

It is hard enough to get a storage battery jar liquid tight even by vulcanizing hard rubber. How much harder must it be to make




the cell acid tight in the method described in Mr. Smith's patent?

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PATENT NO. 1,023,599 HAS BEEN GRANTED TO ISTVAN TAKACS, OF BARBERTON, OHIO, FOR AN ELECTRIC TRAP.

This invention relates to an electric trap, practically designed, for exterminating rats and other rodents by utilizing electricity. Our illustration shows the device in full and the object of this invention is supposed to provide, in the language of the inventor, a simple, durable and inexpensive trap that can be used in connection with an ordinary electric light circuit of 110 volts, for shocking and electrocuting rats.

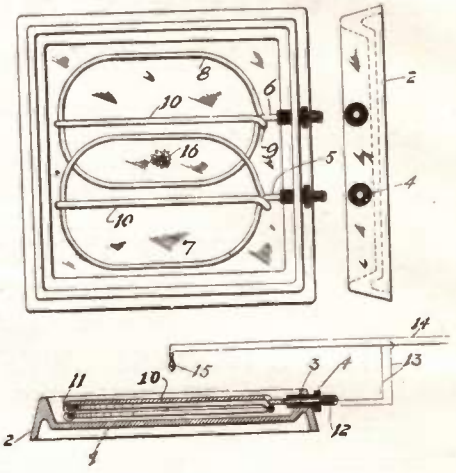
This is one of those inventions that look alright on paper but are a failure in practice. The inventor has evidently forgotten several important points as follows:

First of all when the rat steps on the device in question, thereby closing the circuit with its own body, there is no doubt that, providing a good contact is made, the rat is electrocuted immediately. But the drawback is, that the rat stays right on the wire loops, and it will not take much time for the current to set the carcass to smouldering, and not to mention the disagreeable smell that

would result, an arc is liable to be struck at any time, making the whole contrivance an extremely dangerous proposition. All this, however, would not be so bad were it not for the fact that if other rats see the body of the dead rat, even assuming that it is not consumed by fire, they will surely not step on the trap until the dead rat has been removed.

Most of the rat traps so far have been a

FIG 1 FIG 2




failure for the reason that they make no provision for removing the dead body of the rodent after it has been killed.

## HARVARD HIGH-TENSION LABORATORY.

The Harvard Graduate School of Applied Science has received an anonymous gift of a high-tension electrical laboratory which is planned to make one of the most complete installations of its kind ever built. The structure will contain facilities for investigations of high-tension phenomena, including the study of corona effects, insulating materials, insulation of wireless telephone and telegraph equipment, and the fixation of atmospheric nitrogen. The apparatus will include a transformer capable of delivering an emf of 1,000,000 volts and appliances by which 100,000 volts can be obtained for direct-current experiments. Researches will be conducted by Prof. H. E. Clifford in the field of corona losses and insulating materials; Prof. C. A. Adams will take up special instrumental and machinery design. Prof. G. W. Pierce will conduct investigations in wireless telegraphy, and Dr. A. E. Kennelly will take personal charge of telephonic investigations.

# Advice on Patents

## DEVICE TO PREVENT EAVESDROPPING ON TELEPHONE PARTY LINES.

(28.) Earl E. Becker, of Tacoma, Wash., writes:

"In your January issue of Modern Electrics, you published my article on "Improved Flashlight Lens," for which I wish to thank you for the desired information which you gave me, as it has proven invaluable.

Enclosed you will find a diagram of connections for a device to prevent eavesdropping on party telephone lines. I am desirous of finding out if the idea for such a device has ever been patented, and if not would you advise me to obtain a patent on same?"

A. In looking over the device we would say that it is rather hard for us to give an expert opinion on any idea pertaining to telephony inasmuch as there are at least over 10,000 patents on matters pertaining to telephony and, without making a search, it would be practically impossible to state if the device in question has been patented already.

As far as we know, nothing like Mr. Becker's description has ever come to our notice, and we would strongly advise him to have a search made in the patent office, as the idea seems to have quite a few original points which probably are of interest to some concern manufacturing telephone apparatus. From the drawing and description, we take it that the apparatus in question could only be worked on a two-party line, which, if correct, would be a drawback to the invention.

## AEROPLANE TAIL.

(29.) Charles Keevil, of Kansas City, Mo., writes:

"I enclose a drawing of an aeroplane tail of my design. I want to know if a tail made according to my drawing large enough to fit an aeroplane would be any improvement over the ordinary tail? Would you advise a patent? Is there any tail like this in successful use?"

A. In looking over the drawing we would say that from same it is very hard to judge whether the aeroplane tail is practical or not and although we think that a patent might be obtained on same, we would think it safer to try it out first before applying for a patent.

## TO RECEIVE TWO WIRELESS MESSAGES AT ONCE FROM ONE AERIAL.

(30.) Daniel Zorger, of Harrisburg, Pa., writes:

"There is a 2 k.w. station and a friend of mine has a one-half K. W.

"I have discovered a way of using an aerial, 2 coherers (my own type), 2 detectors, 2 relays, and 2 recorders or registers, that I can receive a message from each one, each sending a different message at the same time.

"Would this be of any use to wireless telegraphy, and would it be of any benefit to me if I would patent it.

The large station is one mile away and the small station is one-half mile away. The small set is tuned so as the large station does not interfere."

In the absence of drawings and other it is impossible to give any opinion, uld request you to give us more on.

## MOUSE TRAP.

J. V. M., of Chicago, Ill., wants to e on a rat or mouse trap and rawing of same.

rring to our department, "With r," in this issue, it will be found ave discussed rat traps, and by e information printed therein, ondent will see that his device e faults as the patent which is

## AERIAL SPREADER.

ohn Esch, of Milwaukee, Wis.,

"I have here enclosed a sketch on which I would very much like your opinion. Also would it be practical to obtain a patent, or what value would it be? This is an aerial spreader."

A. In looking over the drawing in question, we find that there is nothing new involved in the idea as described. As a matter of fact, such aerials have been in use on board a ship a good deal. There is nothing novel as far as we can see.

## SAFETY STIRRUP.

(33.) R. Michaelis, of Ridgeway, Mo., wishes to have some information on a Safety Stirrup, and encloses drawing and information on the device.

A. Modern Electrics being a strictly electrical magazine, cannot possibly give opinions on any ideas as to patentability on subjects which do not pertain to electricity or aeronautics, and we would ask our correspondent to be good enough to write to some patent attorney, who will gladly give him the information desired.

## DETECTOR STAND.

(34.) R. W. Bliss, of Wollaston, Mass., encloses a sketch for a new detector stand and asks if he can get a patent on same.

A. We would strongly advise inventors to steer clear of the detector stands, inasmuch as we doubt that any concern would ever wish to buy such a stand. It seems that there is hardly anything simpler than to make an efficient detector stand, and for this reason manufacturing concerns will always prefer to work on their own models; besides, no matter how good the patent on a detector stand is, it is always a simple matter to go around such a patent and make something almost exactly like it without really infringing on it.

The "detector stand" is in the class with the "telephone receiver," of which thousands have been patented; and there are hardly three on the market to-day that can

make a claim of radically differing from each other.

### ELECTRIC BELL.

(36.) C. M. Frykman, of Minneapolis, Minn., writes:

"Have invented an electric bell and a telegraph sounder, of which I enclose sketches. Would like to have your opinion in Modern Electrics or by letter regarding their patentability and commercial value.

"The main idea consists in having a movable iron core and a stationary part of iron against which the core is attracted when energized by a current in the coil. The attraction between the core and the other iron part is, of course, equally strong whether the core is movable and the other part stationary, or vice versa."

Our correspondent also enclosed some drawings, illustrating the idea.

A. We would refer our correspondent to our January, 1912, issue, in which he will find Patent No. 1,009,345, which covers the same subject. We do not think that our correspondent's device differs enough from the patent quoted to enable him to get a patent. As a matter of fact, his device directly infringes on the above mentioned patent.

### SCREW HEAD.

(37.) Edgar Edwards, of Lander, Wyo., sends a sketch and description of a special screw, the purpose of same being to prevent a screw driver from slipping.

A. As far as we can tell from the sketch, which we have carefully inspected, we have come to the conclusion that the idea is really a good one and think it is worth patenting. There is only one thing, and that is, that different variations should be shown in the patent application, as it would seem that a similar article could be manufactured by going around the claims.

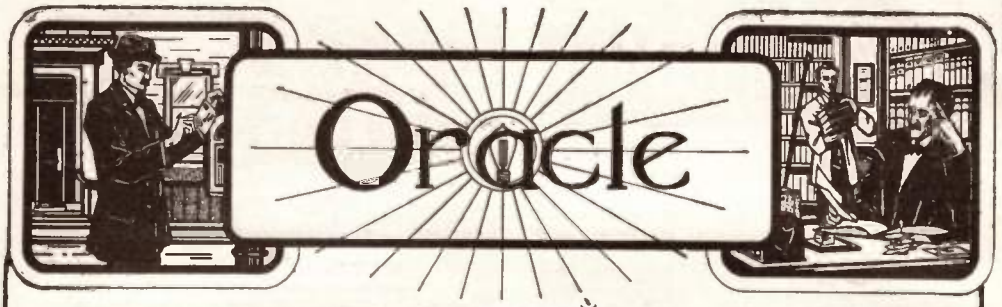
For this reason, as many variations should be shown in the original applications as possible, in order to protect the invention fully.

We might say that a screw of this kind would certainly be of great help in a good many arts.

### ANOTHER DETECTOR STAND.

(38.) Percy De Carteret, of Middleton, Calif., encloses sketch of a mercury detector and wants to have our advice and opinion.

A. We would refer our correspondent to inquiry (34), in which we discussed detector stands fully. We do not think it is worth while patenting such a device.




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.

## COHERER AND RECORDER.

(1983.) R. E. Giltenau, California, writes:

Q. 1.—I have read that the Lodge-Muirhead disc auto-coherer would work a siphon recorder, but the speed had to be kept down to 15 or 20 words a minute. Why will it not receive faster and operate a relay of perhaps say 500 ohms, and why do we not hear more about them in the U. S.? Are they not successful?

A. 1.—We don't know why it won't work faster, perhaps if it could be made to do so the people who developed it would have done this. The reason we don't hear much about coherers is that they have been discarded by almost everyone in favor of some form of detector that operates with a telephone receiver.

Q. 2.—Is there any way that I can change a high frequency spark that pops in the receiver to a buzz of lower frequency? The sounds come in just like on a Morse sounder and I can't tell a dash from a dot and space.

A. 2.—Put some kind of an interrupter in your receiving circuit after the plan of a Poulsen receiving set. This will break the signals up so you can read them.

Q. 3.—In the Alexander Wireless Bill I see they go after receiving stations as well as sending. What harm is it possible for a receiving station to do? In time of war all important messages will be in code, and in time of peace one private corporation, or a dozen, should not control the atmosphere.

A. 3.—You have missed the point, old man. It is the government which would control the atmosphere, not the commercial wireless companies; and the latter are quite as much opposed to the bill in its original form as anyone else.

## TELEPHONE AS A WIRELESS RECEIVING SET.

(1984.) H. M. Allison, New York, writes:

Q.—I had a very funny experience yesterday afternoon, which I have been unable to solve, so I am writing to you to do so if possible. While using an interior telephone in the office, which has no outside or ground connections, I heard a nearby wireless station sending a message. I called a couple of operators from the wire room, and they too heard it. Part of the message was as follows: "———— and will meet you at the pier Friday. Love." sig ————. The signals were fairly strong.

A.—We have heard of one or two cases like this before. The explanation is simple. The interior wiring served for the aerial, the carbon cell in the transmitter acted as a detector, and these, together with the receiver made up a crude though workable receiving set for a short distance work. In this case the distance was only two city blocks, and the sending station had a two k.w. set. It is probable that the telephone wouldn't work as a receiving set every time. The carbon grains in the transmitter just happened to be in the right condition to serve as a detector.

## AERIALS.

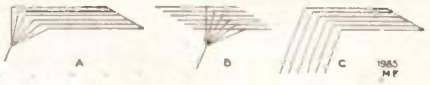
(1985.) Cha Sing, Hawaii, asks:

Q. 1.—Please tell me how many ways to connect a six wire aerial. Give diagram.

A. 1.—Here are several types.

Q. 2.—Which is the best type? Why?

A. 2.—This is largely a matter of choice. The loop type affords slightly better tuning but requires an additional coil




in the receiving set. The editor of this column uses type, C, which gives very good service.

## LIGHTNING, AND OPERATING SPEED.

(1986.) Howard A. Thompson, New York, inquires:

Q. 1.—What is the range of my wireless set consisting of: Receiving, D. S. tuner, silicon and carborundum detectors, mica condenser, 2000 ohm Murdock phones. Transmitting, ½-inch coil, spark gap, key, Leyden jar, sending condenser. Aerial, four strands No. 14 aluminum wire three feet apart and two lead-in wires 9 feet apart, 20 feet high at one end and 35 feet at the other?

A. 1.—This depends entirely on local conditions and may be anywhere from two hundred feet up to two or three miles sending, and anything up to a few hundred miles receiving. See notice in the August, 1911, issue.

Q. 2.—Is there any chance of lightning striking an aerial if it is not grounded.

A. 2.—There is not much likelihood that it will be struck at all; but it is considered safer to ground all aerials during thunder storms.

Q. 3.—How many words a minute do commercial stations generally send.

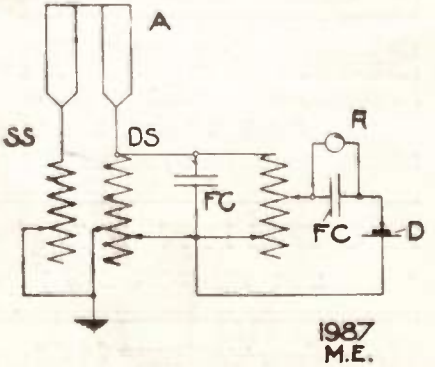
A. 3.—This depends on the ability of the sending and receiving operators, and varies from fifteen to thirty words a minute.

## WAVE LENGTH.

(1987.) Edward A. Eichstadt, Connecticut, says:

Q. 1.—Please give a hook-up for a four wire loop aerial, 2 double slide tuners, one single slide tuner, two fixed condensers, galena detector, and 1000 ohm phone.

A. 1.—Here it is.




Q. 2.—Without considering the Alexander Bill or your suggestion of limited wave lengths, is it more desirable to have a

wave length of 1000 metres than one of 500 metres?

A. 2.—The longer the wave length, the better it carries.

Q. 3.—Please explain the work that a galena or other mineral detector does, and how it does it?

A. 3.—The theory of the action of crystal detectors is too long to be fully explained here. Briefly it may be said that the detector acts as a rectifier for the extremely high frequency currents set up in a receiving set. This rectified current will pass through the telephone receiver while the high frequency current would not, on account of the choking effect the inductance of the receiver windings have on currents of this nature.

## RANGE, AND HOOK-UP.

(1988.) John Schlichting, New York, asks:

Q. 1.—Can a tuned ½-inch spark coil set send two miles? If not, how far?

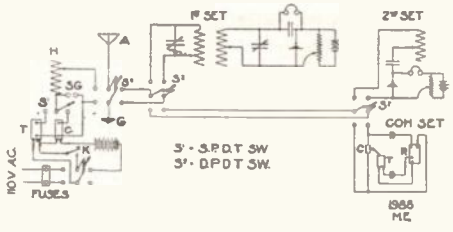
A. 1.—No. A coil of this size could not be expected to send more than a half mile under ordinary conditions.

Q. 2.—Can I use a helix made of No. 6 wire on a ½-inch coil? If so, please state dimensions of helix.

A. 2.—No. We do not advise the use of a helix on such a small coil. If you want to build the helix, use about thirty feet of wire, and mount it on a frame 10 inches diameter, and space the turns ¾-inch apart.

Q. 3.—Please give a diagram for the following: 1st receiving outfit, single slide loose coupler, galena detector, 160 ohm receivers, two variable and one fixed condensers and a potentiometer; 2nd receiving outfit, single slide tuner, silicon detector, receivers, fixed condenser, potentiometer; coherer set. Sending, ½-inch coil, transformer (the kind not using an interrupter), spark gap, key, helix.

A. 3.—We can't understand why anyone should want to hook up a whole room full of apparatus like this; but there is your diagram. Why do you want to use potentiometers with galena and silicon de-




tectors? You will get much better results without potentiometers and batteries with these detectors.

## RECEIVING LONG WAVES.

(1989.) Andrew Haas, New York, writes:

My aerial is 100 feet high, composed of 6 No. 14 wires, spaced 1½ feet apart and is about 75 feet long. The lead-in is 125 feet long. For tuning I use a loading coil wound with 600 feet of No. 24 enameled

wire, Electro loose coupler (new style), Murdock rotary variable condenser.

Q. 1.—With these, the Audion detector, and Electro government phones could I possibly hear Key West?

A. 1.—No. You will need a loose coupler having more wire on the secondary or else a much larger variable condenser.

Q. 2.—What are the respective wave-lengths of Cape Cod (commercial) and Key West?

A. 2.—MCC 1500 metres, NAR 1000 and 2000 metres.

Q. 3.—What is the wave-length of the Electro loose coupler?

A. 3.—The wave length of the primary coil is about 85 metres, but the wave length to which you can tune with it depends upon what you have connected to it.

## AERIAL INSULATION AND HUM IN PHONES.

(1990.) R. W. Bliss, Massachusetts, asks:

Q. 1.—Can you receive messages with an insulated aerial half as well as without the insulation?

A. 1.—If you refer to the use of insulated wire for the aerial be advised that the presence of the insulation makes no difference and you should be able to receive just as well with it on as off.

Q. 2.—Why is it that I can hear a hum in my receiver when the mineral is taken from the detector?

A. 2.—This is usually an inductive effect and is due to the presence of alternating current power wires in the vicinity of the aerial.

## NO MESSAGES IN THE DAYTIME.

(1991.) W. H. Amerine, Georgia, asks:

Q. 1.—Why is it that my receiving set will not pick up any messages in the daytime? I hear Hatteras, Norfolk, Savannah, Charleston, etc., also Key West at night. My aerial is 90 feet high at one end, 84 feet at the low end, 6 wires, each 125 feet long, 3 feet apart, loop system, lead-in from the low end. My receiving set consists of 1 Clapp-Eastham tuning transformer (1800 M), 1 Ferron detector, 1 Murdock fixed condenser, 1 variable condenser (rotary type), 1 silicon detector, 1 pair 3000 ohm phones.

A. 1.—We never heard of a case like this before. There is no reason why you shouldn't be able to hear any station that is working anywhere within 200 to 500 miles of you in the daytime, if your detectors, and the rest of your apparatus are properly adjusted.

Q. 2.—Would another variable condenser in the ground circuit help? The ground is on the water works pipe.

A. 2.—No, we don't think so. The effect of a condenser so used is to enable you to tune to shorter wave-lengths than you could otherwise.

## KICK BACK PREVENTION.

(1992.) The Standard Electric Company, Rhode Island, writes:

Q.—We enclose herewith a rough pencil sketch showing our system of grounding the lighting system of distribution for

Providence. Our amateur trade find considerable difficulty in connecting up transformers to the lighting system. The kick backs from the transformers blow fuses, spoil the incandescent lamps, and put holes in the lighting fixtures. It occurs to us that possibly some of your correspondents may be able to help us out in regard to placing either condensers or non-inductive resistances on our lighting circuits, so as to avoid the above troubles.

A.—The best scheme we know of is to use an electrolytic condenser consisting of three aluminum plates immersed in a saturated solution of sodium phosphate or sodium-ammonium tartrate. The plates should be close together. Connect the outside plates to the two power wires close to the wireless transformer, and the middle plate to ground. In this connection it is well to bear in mind the requirements of the National Board of Fire Underwriters who call for two condensers of not less than ½-mfd., capacity connected in series, the two outside ends being connected to the power wires as above, and the connection between the condensers grounded.

## HIGH POTENTIAL AND HIGH FREQUENCY.

(1993.) William McPherson, Missouri, asks:

Q. 1.—What is meant by a high potential transformer?

A. 1.—A transformer that operates on a circuit, the voltage of which exceeds 550.

Q. 2.—What is meant by a high frequency current? Please state how this is produced.

A. 2.—Currents having a frequency of from two or three hundred cycles per second up are usually designated as high frequency. The oscillatory currents used in wireless telegraphy run up to a frequency of a million or more per second. They are usually produced by the discharge of a suitable condenser, through a suitable inductance coil, such as a helix, and a spark gap, as in a wireless sending set.

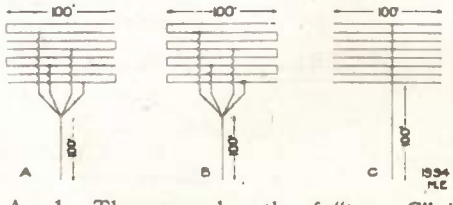
Q. 3.—Electricity travels in a circuit. From which pole does it start?

A. 3.—The positive pole.

## CHOICE OF AERIALS.

(1994.) M. R. Snapp, Missouri, writes:

Q. 1.—I am sending you some sketches and would like to know the wave length of each, and which is the best to put up.




A. 1.—The wave length of "type C" is about 250 metres. The wave length of the others is practically impossible to compute. Type C is the best to put up. It would be better, however, to bring down a wire from each of the aerial wires to

your station. Then if the aerial wires are connected together at both ends, the aerial may be changed from the straightaway to the loop type at will without taking it down.

Q. 2.—Would the wave-length be the same in a four wire aerial constructed in the same way as the others?

A. 2.—No, it would be somewhat less.

### BREAK IN SYSTEM.

(1995.) Ernest Hechler, New Jersey, asks:

Q. 1.—Is there any way of connecting up a wireless set so that the aerial switch can be dispensed with and you can listen while you are sending?

A. 1.—Yes, connect the receiving set across a very short gap in the ground lead. You will have to use a carborundum or some other detector that is not easily knocked out of adjustment by the sending current; or use a relay to close the gap just before the sending key is closed, and open it just after the key opens.

Q. 2.—Do all electric currents have to be high tension as well as high frequency, to become wireless and travel through space?

A. 2.—It is not the current which travels through space in wireless telegraphy, but waves of electric and magnetic energy set up by the high frequency currents in the transmitting aerial.

Q. 3.—Will a transmitter, oscillation transformer, and batteries connected in series, transmit the voice ¾ of a mile, if ground and a good sized aerial are connected to the secondary of the oscillation transformer?

A. 3.—Hardly. The oscillations set up in the aerial would not be powerful enough.

### 1 K.W. OPEN CORE TRANSFORMER.

(1996.) Sewall P. Smith, Maryland, asks:

Q. 1.—What size wire, amount of wire (in pounds), number of turns in each layer and each section, number of sections, number of pounds core wire, and kind of insulation for both the primary and secondary of a one kilowatt open core transformer to be operated on 110 volts, 60 cycles alternating current without an interrupter or resistance of any kind?

A. 1.—Open core transformers do not operate satisfactorily without some form of controlling resistance or reactance in the primary circuit. Core 14 inches long, 1½ inches diameter, primary 2 layers No. 12 DCCC, secondary 30 pies ¼-inch thick, containing in all 12 pounds No. 32 SSCC. Insulating tube between primary and secondary ⅜-inch thick. Core weighs 5¼ pounds, and the primary winding 2½ pounds.

Q. 2.—How many glass plates ten by twelve are required to make a condenser for the above transformer?

A. 2.—Sixty-four plates with tinfoil eight by ten on each side. This is for two equal condensers connected in series.

Q. 3.—How much of No. 20 enameled wire will it take for the primary and sec-

ondary of a loose coupler? The primary tube is four inches in diameter and six inches long, the secondary tube three and three-quarter inches in diameter and five inches long.

A. 3.—Primary 185 feet, secondary 145 feet. Together, a trifle over one pound.

### POSITION OF SLIDERS.

(1997.) Ray Green, New York, wants to know:

Q. 1.—If it makes any difference if the sliders of a tuning coil are close together or far apart?

A. 1.—If you mean along the coil, Ray, and have your detector circuit connected to the two sliders, it certainly does, for the distance between them is dependent on the tuning of your detector circuit. If the detector circuit is connected to one slider and one end of the coil, and your aerial and ground leads are similarly connected, it makes no difference. Neither does it make any difference how far apart they are, crosswise of the coil.

### STRENGTH OF SIGNALS AND VARIABLE CONDENSER.

(1998.) Jack Shaler, California, inquires:

Q. 1.—Will a Type S, Knapp Dynamo charge storage batteries?

A. 1.—Yes.

Q. 2.—Why is it that when I am listening to San Francisco (PH) that the signals gradually die out?

A. 2.—There are a number of reasons. Your detector may lose its sensitiveness, the signals may actually become weaker, due to spark gap trouble at the sending station, or on account of atmospheric conditions. Your trouble is probably in the detector burning out on account of the short distance you are away from PH.

Q. 3.—Would the following idea work as a variable condenser i.e., have a rheostat switchboard, but instead of resistance coils have small fixed condensers?

A. 3.—Yes it will work, but probably not the way you think it would. The maximum capacity would be that of the first condenser connected in circuit by the sliding contact arm. The capacity would then diminish as the other condensers were connected in series with the first one.

### WIRELESS SET IN GARAGE.

(1999.) Justin D. Hartford, New Hampshire, writes:

Q. 1.—If my aerial is strung from a pole to the house and my instruments are in a garage about fifty feet from the house and aerial, will the set work if I run the ground wire along the ground back to the house to a water pipe? Will there be any danger from the spark in transmitting if there is gasoline in the garage?

A. 1.—Yes, the set will work all right; but there will be danger of the spark igniting gasoline vapor in the garage.

### ARC TRANSMITTER FOR WIRELESS.

(2000.) David V. Hudson, North Carolina, writes:

Q. 1.—The electric light current in our house is 220 volts. Would it be advisable to put one or two 220 volt lamps in an

arc lamp sending set instead of resistance coils?

A. 1.—The use of lamps is all right but you should use one 32 c.p. lamp in each leg of the power circuit. If 32 c.p. lamps are not available, use two 16 c.p. or four 8 c.p. connected in parallel in place of each 32 c.p. Use 110 volt lamps.

Q. 2.—How far could I send, etc.?

A. 2.—Can't answer that, Dave, see notice in the August, 1911, issue.

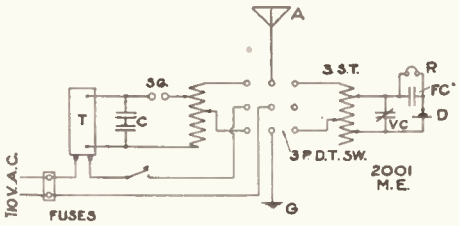
## STATION EQUIPMENT.

(2001.) Clarence Martin, Oklahoma, says:

Q. 1.—Please tell me what instruments I will need in order to send and receive 85 miles. There is one high mountain, but no high steel towers to interfere.

A. 1.—For sending you will need a one kilowatt transformer, with a suitable plate condenser, and helix or oscillation transformer, key, and aerial switch. For receiving, a good three slide tuner, fixed condenser, variable condenser, silicon detector, and a pair of good wireless receivers of 2000 to 3000 ohms resistance. The aerial should be composed of four or six wires spaced three feet apart, 100 feet long, and 50 to 100 feet high, the higher, the better.

Q. 2.—Please give diagram for connecting up.




A. 2.—Here it is.

## FRICTIONAL ELECTRICITY.

(2002.) Lawrence McCammon, Illinois, writes:

Q. 1.—During the recent cold weather, upon picking up a stove poker from under the stove, and holding its point half an inch from the knob of the stove door, a fat spark passed between the point and the knob. What caused this freak? It occurred every evening without fail.

A. 1.—This is probably due to the accumulation of a static charge on the body of the person trying it, caused by walking over the carpet on the floor of the room where the stove was located. The editor of this column has noticed a similar effect but the spark was never longer than one eighth of an inch.

## WEHNELT INTERRUPTER, AND KEY CONTACTS.

(2003.) G. A. Gamble, Nebraska, asks:

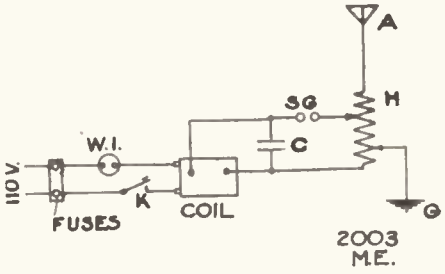
Q. 1.—Is a Wehnelt interrupter as good as an electrolytic interrupter, when used on 110 volts, 60 cycles, with an Electro ½-k.w. transformer coil?

A. 1.—The Wehnelt interrupter is an electrolytic interrupter and should work satisfactorily.

Q. 2.—Please give diagram for the fol-

lowing instruments: Wehnelt interrupter, helix, condenser as described on page 798 in the February issue, coil as described above, key and spark gap.

A. 2.—Here is your diagram.




Q. 3.—If I use dimes for contacts on an ordinary key will it be all right for use on 110 volts?

A. 3.—Yes.

### TRANSFORMER SECONDARY.

(2004.) Claude R. Ellis, California, writes:

Q. 1.—I have on hand about 50 pounds of No. 22 and 23 enameled copper wire. Can I use this for the secondary of a two k.w. open core wireless transformer? If so, what should be the dimensions of the core, size and amount of primary wire, etc.

A. 1.—It might be used, but the transformer would be unnecessarily bulky, and not efficient. A standard 2 k.w. transformer is as follows: Core 18 inches by 2¼ inches; primary 2 layers No. 10 DCCC; secondary, 60 pies ¼-inch thick, containing in all 22 pounds No. 28 SSCC. Insulating tube between primary and secondary ⅝-inch thick.

### SPARK COIL.

(2005.) L. Falconi, Virginia, writes:

Q. 1.—I enclose sample of wire. Can I wind the secondary of a spark coil with that size?

A. 1.—Yes you can but the coil wouldn't be good for much after you had finished it. This wire (No. 26) is big enough for a 3 or 4 k.w. transformer.

Q. 2.—Can a chemical rectifier be made by using carbon and lead for the plates?

A. 2.—No, one of the plates must be aluminum. The other may be either carbon or lead.

### BALL BEARING SLIDERS.

(2006.) Walter S. Ross, Maine, writes:

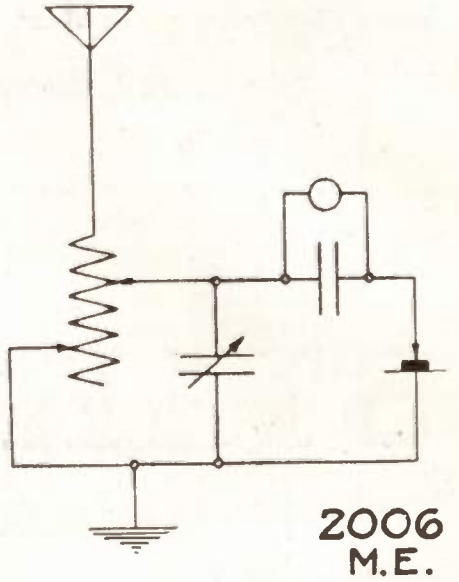
Q. 1.—I bought some ball bearing sliders for my tuner but they do not roll on the wire, but scrape it instead. Is there any way to make them roll as they wear the wire down rapidly now.

A. 1.—See that the ball fits loosely in the hole in the bottom of the slider. Bend one end of the spring inward so this end projects straight across the middle of the spring but does not stick out beyond the body of the spring. When you look through the spring from end to end it should appear as a circle with a line drawn straight

across it through the center. When you put the slider in place see that this end of the spring is in contact with the ball. Also see that the spring does not press the ball down too hard. If it does, cut off one or two turns from the end which is in contact with the slider rod.

Q. 2.—I have my instruments connected as per enclosed diagram, but can hear no noise in the receiver when using the buzzer test. I have looked over the connections thoroughly and can find no trouble unless it is the solder in the detector (silicon). I used the following: Lead 1 part, tin 1 part, bismuth 2 parts.

A. 2.—You have your instruments hooked up wrong. Connect them as per the




sketch herewith. You do not need a potentiometer and batteries with a silicon detector.

SENDING CONDENSER. TRANSFORMERS IN SERIES.

(200 ) Norman E. Soules, Connecticut, writes:

Q. 1.—I have a Clapp-Eastham Co., ½-k.w. closed core "Blitzen" transformer having a secondary voltage of 13,000. I have two racks each holding 10 plates 7 inches by 9 inches, with tinfoil on each side, for a condenser. Is this the right number, if not how many should I have?

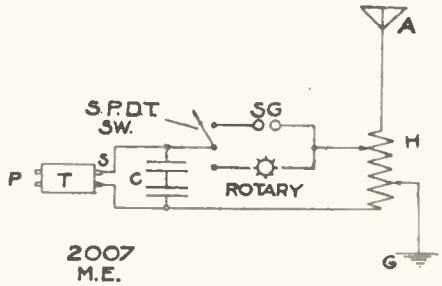
A. 1.—Your condenser should contain 2,700 square inches of glass 0.05 inch thick, covered both sides with tinfoil. This is for two equal condensers connected in series. If only one condenser is used it should contain 675 square inches.

Q. 2.—Please give diagram showing how to connect this transformer with two or more racks of condensers, one adjustable E. I. Co., spark gap and one rotary gap, with a helix.

A. 2.—See diagram herewith.

Q. 3.—Could a closed core transformer rated at ½-k.w. be connected with a ¼-k.w. open core transformer, and be used to any advantage?

A. 3.—It might be done, but on account of the different characteristics of the two types of transformer, the results probably would not be satisfactory.




2007
M.E.

### TYPE OF AERIAL.

(2008.) Charles Garde, Ontario, asks:

Q. 1.—Is the loop aerial better for receiving than this type (straightaway)?

A. 1.—The editor of this column has found it so for all ordinary wave-lengths. For long waves the straightaway has been found more efficient. This is probably due to the shortness of his aerial. Probably if it were longer the loop type would be found more efficient for the long waves also.

Q. 2.—Is the loop aerial connected as per this diagram? If not please give correct connections.

A. 2.—Your sketch is O. K.

## ALEXANDER WIRELESS BILL, AMENDED.

(Continued from Page 169)

tion shall prescribe that the operator thereof shall not willfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanor, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

Sec. 6. That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

Sec. 7. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call, or false or fraudulent signal, call, or radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars, or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or radiogram shall be a fine of not more than one thousand dollars, or imprisonment for not more than two years,

(Continued on Page 212)

## ALEXANDER WIRELESS BILL AMENDED.

(Continued from Page 210)

or both, in the discretion of the court, for each and every such offense.

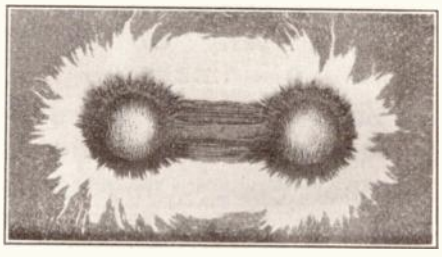
Sec. 8. That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections four and seven of this Act, and so much of section five as imposes a penalty for interference. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

Sec. 9. That the trial of any offense under this Act shall be in the district in which it is committed, or in any district in which the offender may be found, or if the offense is committed upon the high seas or out of the jurisdiction of any particular State or district, the trial shall be in the district where the offender may be found or into which he shall be first brought.

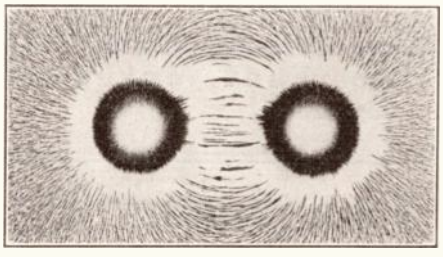
Sec. 10. That this Act shall take effect and be in force on and after the first day of January, 1913; provided, however, that the fourth, fifth, seventh, and ninth sections of this Act shall take effect and be in force on and after four months after its passage.

## MAGNETIC LINES OF FORCE.

Here are two good photographs illustrating the magnetic field of force between the poles of an electromagnet.



These were made in the regular way, a sheet of white paper being laid over the magnet poles and iron filings sprinkled over the paper. The paper



was then tapped gently until the filings arranged themselves along the lines of

(Continued on Page 218.)

## THE HOPE-JONES UNIT ORCHESTRA.

(Continued from Page 131)

work composed for thirty or forty instruments.

The Hope-Jones Unit Orchestra (even of medium size), represents not only thirty or forty instruments but fully twice as many. Instead of one clarinet able to produce but a single note at a time, we find clarinets capable of playing in full chords, at all parts of the compass. A similar advantage is found in the case of the "brass," the "string," the flutes, oboes, etc.

It will readily be seen that a musician having control of such great resources, can produce effects that are in many points not obtainable from an orchestra, even though it be composed of one hundred musicians.

In the Unit Orchestra everything is brought under the control of a single musician. On one keyboard the "Wood Wind" stops are grouped, on another keyboard all members of the string family are available on another, the "Brass," on another the "Basses," and so on. Each one of these families of tone is under separate control. A touch of the performer's foot or of one of his fingers will bring out the string group and will cause the other families to retire to just such a stage, as his musical taste may direct. Another touch, and the strings are subdued while the plaintive oboe, clarinet or other member of the "Wood Wind" family makes its voice heard.

The range of expression of the Unit Orchestra is very much greater than that of any instruments found in the present day orchestra. Though "the Unit Orchestra" can be swelled up until it rivals a large pipe organ in dignity and power it can be reduced to the merest whisper and will furnish tone more delicate and refined than that emanating from the ordinary orchestra.

"The Unit Orchestra" can be stowed in a basement or an office, and yet the tones can be reflected with resonance into the audience room in which it is desired to hear the music.

One of these instruments now in operation, has been located in two bed rooms, and yet the tone is projected at will into the large banqueting hall or into the dome of the restaurant more than fifty feet distant. Glass has been removed from a portion of the dome

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Dimo-Grit the new artificial diamond abrasive, is a twin product of carborundum, but Dimo-Grit is especially suitable for steel, leaving the smoothest, keenest edge—cuts hardest steel as emery does soft copper. It peels steel away in tiny shavings instead of wearing it away like grindstones or emery wheels—never glazes, no heat developed—no need of water cooling—no danger of drawing temper. Genuine South African diamonds could cut steel no quicker—outwears any number of emery and grindstones. Carborundum wheels furnished if wanted.

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Foot or engine power—runs by foot power easy as sewing machine—built all of steel—shaft drive like automobile—dust-proof ball bearings—gravity lubrication—costs no more than cheap chain drive grinders—half a million Luther Grinders now in use—5 years guarantee—shop outfit provides for every sharpening, grinding, buffing and polishing need for mechanics, carpenters, and all other tool users. Extra attachments convert it into turning lathes, jig and circle saws, force feed drill, etc.—16 extra attachments—completely equips your work shop at low cost.

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and parchment panels have been substituted. Through these latter the tone finds its way into the audience room without the spectators being able to see where it comes from. Two movable consoles or key desks are provided, one in the banquet hall, and another in the restaurant. The whole instrument can be controlled from either of these consoles by a single musician. All the connections are made through a flexible electric cable about the size of one's wrist. The electric contacts are made between rubbing surfaces of pure silver. By using this metal absolute reliability is secured and an electric contact so made has never been known to fail.

Each of the keyboards is fitted with "double touch" by means of which the performer can, by a firmer pressure upon any or all of the keys, produce accents or "sforzando," or can emphasize any note or melody.

The tones in the "Unit Orchestra" are produced from bells, tubes, reeds, gongs, plates, drums, and unusually formed organ pipes. All of the tone families are enclosed in separate boxes or chambers having adjustable openings. These latter are under the control of the feet, and fingers of the performer.

The response of the notes to the striking of the keys is of lightning-like rapidity; this response is so perfect that even if a key were struck many times a second the tones would still be clear and crisp.

## ELECTRICITY IN BOTTLES.

According to "B. L. T.," of the Chicago Daily Tribune, an electrical concern has received the following letter: "Lily, Fla., February the 1912. Sir: I rite to find out if you air still in business yet. I am and old agent and want to revive it by saying please send me 2 bottles electricity in a bottle and as soon as I get it I will send the money for it. If I had none you was still there I wood have sent it right along for my wife has got the Asthama and other parties want it so please send the 2 bottles right along. don't be afaraid to trust me." The writer probably had a vague recollection of an advertisement widely published some years ago offering, for curative purposes, negative electricity in green bottles and positive electricity in red bottles.

When writing, please mention "Modern Electrics."

## MAGNETIC LINES OF FORCE.

(Continued from Page 212)

magnetic flux from the north pole to the south pole, in each case. The paper, with the filings on it, was then photographed, the camera being held above the paper with the lens pointing downward.

## CURRENT TELLS ANIMALS FROM PLANTS.

Among the lower forms of life which cannot be seen except with a microscope, it is often next to impossible to distinguish between animal and vegetable matter. As far as their general appearance is concerned there is often little difference between them, while their bodily functions seem to be entirely similar. A recent discovery is said to provide the necessary test. When an electric current is passed through a drop of water containing typical vegetable and animal cells such as blood corpuscles, algae, bacteria, yeast, and other forms of unicellular life, the animal cells are driven to the positive pole, while the vegetable cells seek the negative pole.

Contributed by

R. D. MOCK.



When writing, please mention "Modern Electrics."

### MAN'S SPHERE.

"Where," asked the female suffrage orator, "would man be today were it not for woman?"

She paused a moment, and looked around the hall.

"I repeat," she said, "where would man be today if not for woman?"

"He'd be in the Garden of Eden, eating strawberries," answered a voice from the gallery.—Tit-Bits.

### DISCORD.

The Musician: "Hang it, Blink, don't you realize that one of your shoes squeaks in B flat and the other in G major?"—Life.

### GOING DOWN.

"Bill's goin' to sue the company fer damages."

"Why? Wot did they do to 'im?"

"They blew the quittin' whistle when 'e was carryin' a 'eavy piece of iron, an 'e dropped it on 'is foot, b'dad."

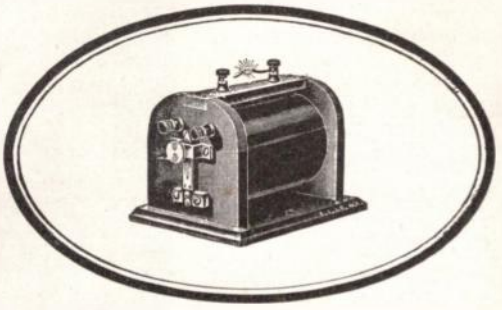
### MISTAKEN IDENTITY.

"Sir, I am looking for a little succor."

"Well, do I look like one?"—Louisville Courier-Journal.

# NEWS

## Our Spark Coils are in the Ring!!



## Unprecedented and Greatest Price Reduction on Spark Coils ever held in the U. S.

☞ The high efficiency of our Bull Dog Spark coils has aroused the envy of our competitors who are unable to duplicate our coils on account of certain patent rights and can only resort to the imprudent practice of price cutting. Any intelligent person knows that price cutting spells disaster for the manufacturer in the long run. Either that or he must double his price on some other product to make it up. Whether our competitors do this or not we know not, neither do we care.

**WE LIKE COMPETITION**

**It stimulates our ambition to produce better goods and we are going to give "MR. PRICE CUTTER" a dose of his own medicine—that's where "MR. EXPERIMENTER" gets the benefit. On every spark coil we sell during the next 30 days we will LOSE MONEY.**

**We are going to charge it TO ADVERTISING.**

We will beat our competitors at their own game and place in the hands of every interested experimenter an **Electro Bull Dog Spark Coil (NOT** an automobile **Box Coil)** guaranteed for one year whose high efficiency and lasting quality will be a constant reminder of the "Superexcellence" of E. I. Co. products.

**These remarkable reductions will be in effect for ONE MONTH only. This is YOUR opportunity.**

**¼-inch Spark, $1.90 ½-inch Spark, $2.75 1-inch Spark, $3.70 1½-inch Spark, $5.25 2-inch Spark, $7.50**

**SPARK LENGTH GUARANTEED.**

## HUGONIUM ALLOY (SOFT METAL)

This wonderful alloy is in a class by itself and has properties not shared by any other metal or alloy. It must not be confounded with the so-called Woods metal, which, melting at about 158° Fahrenheit, cannot be moulded by hand, being too hot at such temperature, and solidifying too rapidly.

For mounting crystals or minerals, etc., **Hugonium Alloy** is unsurpassed, and the crystals retain their full sensitiveness, it not being necessary to use excessive heat to make the alloy pliable as in the cases of Woods metal and other alloys. Heat in most cases kills the mineral for all practical purposes.

**Carbon brushes and battery carbons** are provided with a solid contact of highest conductivity by pouring **Hugonium Alloy** around the head.

**ORDINARY ACID DOES NOT ATTACK HUGONIUM ALLOY.**

**CASTINGS.**—The finest castings can be made with **Hugonium Alloy.** Experimenters often require brass uprights, bases, stands, blocks, etc. All can be made with **Hugonium Alloy.** It can be turned, tapped, drilled, bored, polished easily. **Hugonium Alloy** can be used over and over again. It can be remelted as often as desired. It never loses its characteristics, but becomes harder with age. It can, however always be re-melted with hot water. **SOLDER.**—**Hugonium Alloy** makes a splendid solder, as it can be worked with a low heat. Ordinary flux can be used. **IMPRESSIONS.**—While in an oft state, the most delicate impressions can be taken of coins, electrotypes, specimen, lace, type, etc. The metal always retains its beautiful silver-white luster. **BEARINGS.**—For small motors and machinery **Hugonium Alloy** will make excellent bearings, although they cannot be used with excessive heats as the metal would melt. For cold bearings **Hugonium Alloy** is unsurpassed. **HOLES** in castings or other metal parts can be stopped up with the greatest ease with **Hugonium Alloy.**

**DIRECTIONS FOR USING THE HUGONIUM ALLOY.**

Place bottle containing the alloy in hot water (not necessarily boiling) for about one or two minutes. This liquefies the metal entirely. It can now be poured in the open hand and kneaded like wax. It is to be recommended to have everything in readiness, as the metal solidifies in 30 to 40 seconds becoming as hard as copper.

**No. 9988—Hugonium Alloy, per oz. ..... 30c**
**By mail extra..... 3c In lb. lots.....$4.00**

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