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THE Annual Official Wireless Blue Book of the WIRELESS ASSOCIATION OF AMERICA goes to press June 30th.

The new Blue Book will be a radical departure from others that have been issued and will positively be the most complete book of the kind published anywhere. The book will be at least twice as large as heretofore and will contain the greatest number of wireless amateur stations in the United States.

Hereafter it will be an honor for the amateur to be licensed in the United States as it gives him a recognized standing not possessed heretofore.

We refer to this month's editorial which should be of utmost interest to every amateur in the United States.

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Modern Electrics

VOL. V. JUNE, 1912 No. 3

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)

79. TANGENTGALVANOMETER, READING 1 AMPERE AT 45° DEVIATION.

TURN a wooden circle 8.8 in. diameter and 0.315 in. thick, the opening may be 5.9 in. On each side of this ring glue a ring 6.3 in. inside measure and 9.2 in. outside measure. These rings may be cut from thin veneer board. Thus one obtains a groove running around the ring of about 0.197 in. depth, Fig. 106. This ring may of course be turned from a single piece of wood, but this of course

Fig. 106

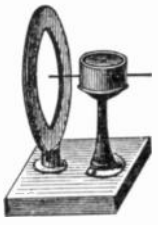


Fig. 107

is somewhat harder to accomplish. In this ring wind five turns No. 15 B. & S. copper wire, double cotton covered, and twist the ends around each other.

Now place the ring on the wooden stand, illustrated in Figs. 106 and 107. Next obtain a box either of wood or cardboard, about 2.36 in. high and 4.72 in. in diameter. On the bottom of the box glue a cardboard scale divided in 360°; such a scale may be bought ready-made.

One-quarter inch from the top of the box, on the inside, glue a strip of cardboard, which will serve as a rest for the glass circle which should fit the box snugly. This glass circle should have a very small hole in its exact center.

Now magnetize a piece of a sewing needle about one-quarter inch long. In its exact center tie a single cocoon thread, which, in order so as not to slip, should be shellacked or glued to the needle. This cocoon thread is now fed through the hole of the glass disc and attached by means of a drop of sealing wax. To the needle itself is glued a fine glass thread or else a fine piece of straw, which serves as the hand playing over the scale.

The box is now glued on a wooden stand, as shown in Fig. 107, in such a manner, that the plane of the needle is perpendicular to the center of the ring. This is shown by the black line passing through the center of the box in Fig. 107. The distance between the center of the open ring and the center of the box must be 2.2 in. Two binding posts

not shown in the illustration may be fastened to the base. A current of 1 ampere will deviate the needle exactly 45°.

80. MAGNET FIELD. EXPERIMENTS.

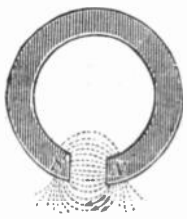


Fig. 108

Place a piece of paper or a thin piece of glass over a permanent horseshoe magnet, shown in Fig. 108, and sift fine iron filings over the paper or glass. These filings will arrange themselves in certain lines running from one pole to the other; these lines are called the magnetic lines of force, and the entire space which is under the influence of the magnet, is called the magnetic field.

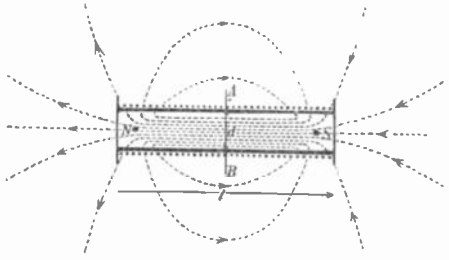


Fig. 109

It is usually agreed that the lines of force go from the north to the south pole. This is shown in Fig. 109, which represents the lines of force in a solenoid or magnet; they form closed curves and seek to traverse the shortest path.

This may be demonstrated quite nicely by means of an arrangement of the author, Fig 110. Over the edges of a glass vessel, the shape of which is of no importance, place a strongly magnetized steel bar. Through a fairly large size cork stick a steel knitting needle, which latter must also be well magnetized and its north pole should come quite close to the bar magnet. If now the north pole of the needle is placed directly under the north pole of the bar magnet, the needle will describe a certain curve and will come to rest directly under the south pole of the steel bar. Therefore:

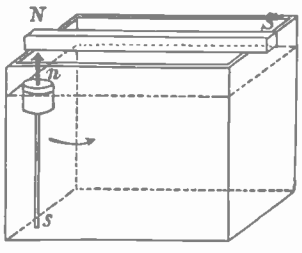


Fig. 110

Like directional lines of force repulse each other, unlike directional lines of force attract each other and seek to permeate each other.

Fig. 111. Take a piece of cardboard or mica or any other good insulating plate, and bore a small hole in the center of same. Through the opening run a copper wire, which passes through the hole at right angles to the plate. If now a powerful current passes through the wire, and if one sifts iron filings on top of the plate, these filings will group themselves in circular lines, as shown in the illustration. The plate is slightly tapped by means of the finger, which assists the forming of the lines. It will be observed that the lines have the wire as a common center. This shows that, from a conductor, traversed by a current, magnetic lines of force are projected, the plane of which is perpendicular to the conductor.

In Fig. 112 is shown a conductor bent into a circle. If a piece of cardboard be introduced into this ring, in a horizontal position, and the current be

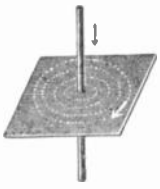


Fig. 111

Fig. 112

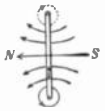


Fig. 113

sent through the conductor, the lines of force will appear again in circular form. All these lines of force run in the same direction and the magnetic field obtained in the ring will be very strong.

The same lines of force could be obtained from a steel magnet, provided that the magnet were in the form of a circular plate, having a thickness equal to that of the wire, and a diameter equal to that of the wire loop.

Referring again to Fig. 109, if we take a wire spiral, i.e. a solenoid, and place same in a glass vessel contain-

ing glycerine, in which fine iron filings are held suspended, and if a strong current is sent through the spiral, the filings will show that the lines of force arrange themselves into a bundle, in which the greatest intensity is inside of the coil opening, and there will be curves outside the solenoid, which are closed upon themselves exactly as shown in Fig. 109.

Fig. 114. Again, if we lay a glass plate on a leg of a horseshoe magnet and place iron filings on same, and, if we place between the poles, a piece of soft iron, it will be seen that the filings group themselves thickly around this iron piece, and, in a greater degree if the iron is soft. The same experiment may be tried with the poles of a bar magnet. The iron becomes magnetic through the absorption of the lines of force, and in such a manner that it becomes oppositely magnetized with re-

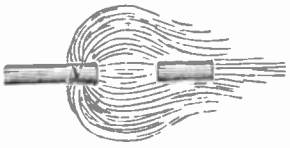


Fig. 114

spect to the neighboring magnetic pole; pole and iron, consequently, attract each other The magnetic lines of force pass through iron a thousand times more readily than through air. For this reason, the iron filings group themselves more readily around the soft iron. This phenomenon is usually termed "permeability."

Conclusions:

1. Magnets and currents send out lines of force.

2. Magnets, and current carrying wires, attract iron.

3. A magnetic needle, and a solenoid, traversed by a current. place themselves in a north to south direction, i.e. in the magnetic meridian.

4. Currents act on each other similarly to magnets.

5. A current field and a magnet field stand perpendicular to each other.

6. As the earth is magnetic there must of necessity be an electric current flux flowing in the direction from east to west.

7. The cause of the electrical magnet field lines is the constant movement of the electrical energy alongside of the path of the current.

If we have a metal sphere on which there is a quantity of electricity rotating with the velocity of light, or 300,000 kilometers per second, we will have the same magnet field as would be produced by the like quantity of electricity flowing, as a current, around this circle, in one second.

To be continued.

NEW METHOD OF MAKING SOLDERED JOINTS IN WIRES.

A unique method of making soldered splices in electrical conductors has been developed by Messrs. Carl Egnér and

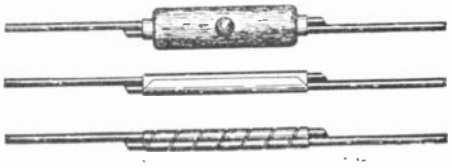


Fig 1

Seth Ljungqvist, of Stockholm, Sweden, whereby, by the use of practically no tools and very little material, satisfactory soldered splices may be made.

The materials used vary slightly with the type of joint to be made, but the method consists in inserting the ends of the two conductors into a specially prepared sleeve and heating with a small torch, or even a match, or, in the "self soldering" type simply firing the combustible compound surrounding the sleeve.

The "self soldering" sleeve is shown in Fig. 1, and consists of: (1) a spirally wrapped sleeve of solder-coated, rosined, copper strip, of oval section, somewhat resembling a McIntyre sleeve; (2) a wrapping of sheet solder over the copper sleeve; (3) a wrapping of sheet alumi-

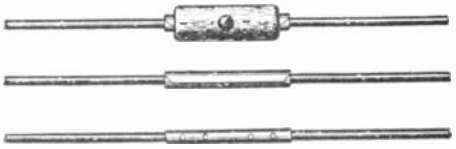


Fig. 2

num over the solder; (4) a combustible body composed of a material similar to that of a "fusee match"; and (5) an igniting tip of material similar to the head of a safety match.

In making a joint the ends of the wires

are cleaned, smeared with a good soldering paste and inserted in the sleeve, the joint held level, and the tip scraped against the side of a safety match box or a strip of similar material. The tip then

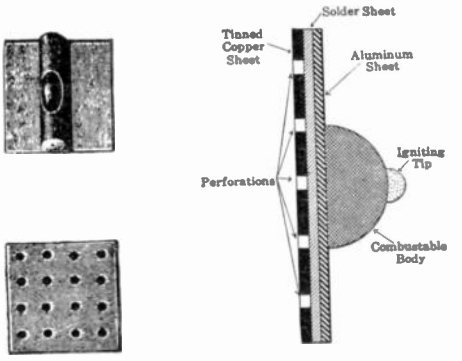


Fig. 3

flares up and ignites the combustible material which develops sufficient heat to cause the solder to flow into all the spaces between the sleeve and the wires, making a very good joint. The sheet aluminum, being a good conductor of heat, evenly distributes the heat from the combustible material, confines the solder to the joint, and protects the joint from the ashes and gases resulting from the combustion. Since solder will not stick to it, it is easily removed after the solder cools, leaving the finished joint ready for insulation. The material composing the combustible portion does not fall off during the firing

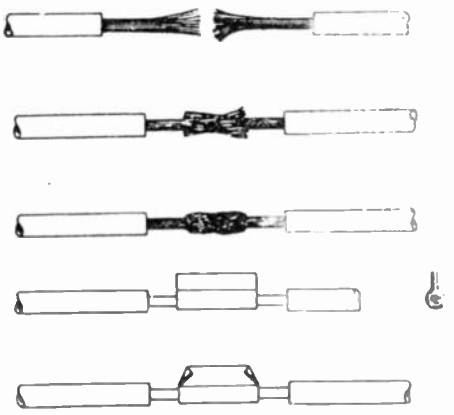


Fig. 4

process but remains firm. It is easily removed by the fingers.

Fig. 1 shows a "lap joint," Fig. 2, a "but joint," Fig. 3, a soldering plate for joining small stranded conductors, and Fig. 4, the method of applying the latter. The soldering plate differs from the sleeve in that it is flat, and has a perforated, tinned copper plate instead of the copper strip. It is simply bent around the splice by means of a pair of pliers, the corners bent over to hold it shut, after which it is fired in the ordinary manner.

A solder composed of 63 per cent. tin and 37 per cent. lead is used. The amount of solder and combustible material is so proportioned for each sized joint that there will be just sufficient to complete the splice without waste. It is said that wind, rain, or snow will not put out the combustible material, once it is fired, but it is advisable to protect the joint while the combustion is going on in order to prevent wasting the heat. About fifteen seconds are required for the combustion to take place. The completed joint is, both electrically and mechanically, fully equal to soldered joints made by any other method.

MARCONI PRESS SERVICE PREVENTS AT LEAST ONE VESSEL FROM GETTING THE TITANIC'S DISTRESS CALL.

The wireless operator on the Steamer Helig Olav is quoted by a New York evening paper as saying that while he was within easy communicating distance of the Titanic and was nearer than the Carpathia at the time she was trying to summon help, he did not hear her calls for the reason that he was copying "press" from the high power station at Cape Cod. Inasmuch as the Cape Cod station operates on a wave of about 1500 metres it is almost certain that he couldn't have heard the Titanic's call even if she had been close by.

This suggests a query: Why, when the Marconi stations at Cape Race or Cape Sable, or Sable Island, first picked up the calls, was the news not telegraphed at once direct to Cape Cod with instructions to stop the "press" and send out the Titanic's distress call? Had this been done, practically every steamer within 1000 miles of Cape Cod would have known of it, and those that were nearest could have gone to her assistance. This could easily have been done as all these offices are connected with land wires.

Transmitting Photographs by Wire

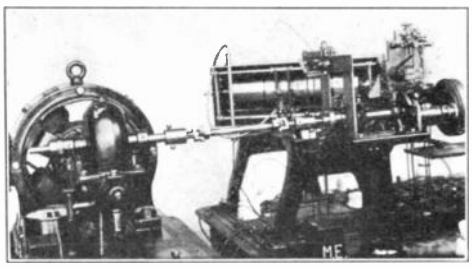
There has been perfected in Paris a method of sending photographs over metallic circuits for long distances, of which the following is a description.

Pictures are sent regularly from Paris to Berlin and also to Monte Carlo and the results are so good that such pictures are published in the French illustrated journals and even Paris daily papers are beginning to use them when anything of special interest takes place. At present the line is being worked between Monte Carlo and Paris for the most part, the distance being about 550 miles.

The first method used by Dr. Korn, which was described in our January, 1910, issue has been abandoned for long distance transmission, as the selenium method involves the use of extremely small line currents and, when it comes to long distance transmission the disturbances on the line interfere too much with the work of the apparatus. The new apparatus uses a simple contact point on a prepared copper plate carrying a picture so that there is nothing essentially new except in the details.

Photograph as received in Paris, by wire, from Monte Carlo.

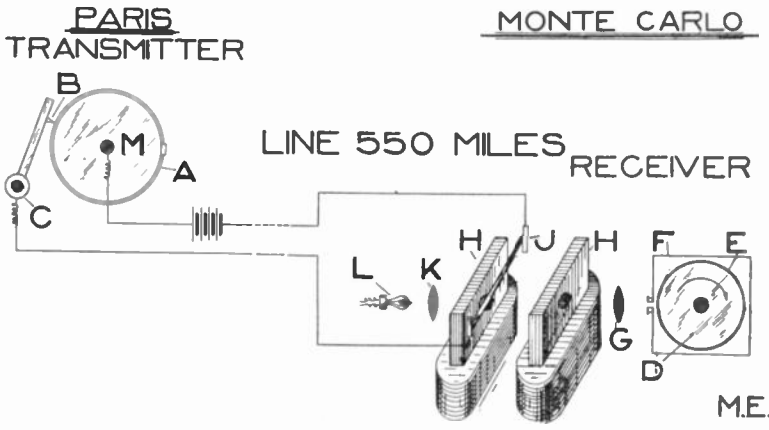
One of the engineers at Paris, M. Chatenet, has a laboratory for preparing the copper plates, one of which is illustrated here, which are a special kind of half tone plate made up of light and heavy parallel lines. The material forming the lines in the finished plate is an insulating substances and the base of the plate is a flexible piece of thin sheet copper. These plates are made entirely by photographic processes. Sometimes line drawings or sketches are used. The lines or sketches being drawn on the copper sheets with an insulating ink. The use of these prepared metallic photographs working by direct contact is preferred to the use of transparent films and a selenium cell, for the reason that the new method allows the use of heavier line currents which are not much affected by disturbances on the line. For the line a double telephone wire is used without a ground. The laboratory with the instruments is in charge of M. Carazzolo, and when he receives the thin copper half-tone plate or drawing he wraps it upon the cylinder, which resembles a large phonograph cylinder, and adjusts the metal contact point so as to press upon it.



Sending Apparatus Open.

As the cylinder is revolved by a synchronous motor, a similar cylinder

at the other end of the line rotates at exactly the same speed, and receives electrical impulses come in over the line wire. When the film has been ex-

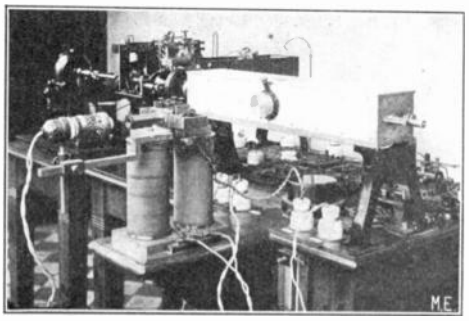


the transmitted picture. The recording is done entirely by the photographic method, utilizing the action of a small beam of light which passes

Photograph Ready to be put on the Sending Drum.

through the hole in a diaphragm, and strikes the surface of the photographic film which has been wrapped around the recording cylinder. In the path of the beam is a galvanometer shutter by which the light is shut off or allowed to strike the photographic film as the posed the light tight box which contains it is taken to the dark room and the film removed from the cylinder and developed and fixed in the ordinary manner, a negative of the picture transmitted being the result. From this negative, bromide prints are made, which are sent to the photo-engraving rooms, where half-tone cuts are made from the photographs and the latter are used for printing.

In the diagram showing the electrical connections, A, is the special copper half-tone plate, wrapped around the cylinder, N, at the sending end. B, is the contact point, which is moved along as the cylinder revolves by means of the screw shaft, C. At the receiving end, the shutter referred to above consists of a wire, J, stretched between poles of the electro-magnet, H. The line current passes through



Receiving Apparatus Ready to Reproduce a Picture.

the wire, J, and moves same aside from the path of the beam of light and allows it to fall on the photographic film.

When no current is flowing through the wire it obstructs the passage of the beam. L, is an incandescent lamp, K, and G, lenses for concentrating the

The Receiving Apparatus Open.

beam of light. D, is the recording cylinder, E, the photographic film, and F, the light tight box containing the film.

THE TELELECTRON.

The telelectron is a new, scientific, electro-therapeutic appliance demonstrating a principle which has been fruitlessly sought after by thousands of previous investigators. By its use, concentration of thought is attained and the cure of disease made certain, purely through electrical means.

The treatment of the human body with electricity is beneficial, but the voltage of the current obtained from medical coils is often too powerful, and the beneficial results are destroyed. It is similar to the fact that a warm-water bag is usually more efficient than a red-hot poker. As it is, the current generated by the telelectron is hardy felt by the patient. Whereas the current from an ordinary medical coil is usually applied to the various parts of the body, the telelectron is placed only on the head by means of a strap.

The apparatus is very simple, consisting of a single dry cell placed in a cylindrical box with a switch of two contacts on top. Connecting cords lead to the head electrode which is equipped with a strap for holding on the head of the patient. A small interrupter is also contained within the battery box, and serves to create the desired current.

The apparatus has claimed the attention of the medical profession, for its uses are broad and the results noteworthy. The manufacturers do not claim that it will cure all sicknesses, as in the case of patent medicines or electric belts, but simply that it will induce sleep in the victims of insomnia, which is in itself a great cure. For run down nerves, the apparatus is of extreme value, and in a

natural way brings forth results which could not be obtained permanently through patent medicines or drugs.

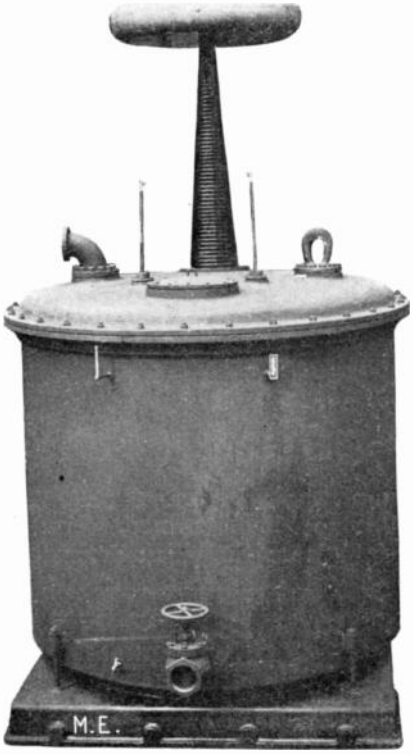
OKLAHOMA STATE WIRELESS ASSOCIATION.

The Oklahoma State Wireless Association has been organized in the city of Muskogee, for the purpose of promoting the art of Wireless Telegraphy among amateurs. This association started with a membership of about five and has already interested seven or eight more in the art.

Meetings are held every Friday night and all amateur operators in the state of Oklahoma are requested to write for membership. The members also answer questions on Wireless from out-of-town amateurs and if any amateur in Oklahoma is having trouble with his apparatus or desires information about wireless he is requested to write the Secretary and his questions will be brought up for discussion at the first meeting. Ralph Jones, Corresponding Secretary, Box 1448, Muskogee, Oklahoma.

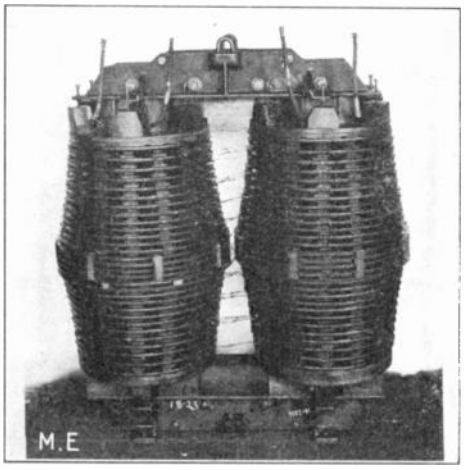
500,000 Volt Testing Transformer

In the accompanying illustrations is shown a testing transformer recently completed by the Westinghouse Electric and Manufacturing Co. at East Pittsburgh, for making insulation tests on high tension power transformers and other high tension apparatus. An ingenious arrangement of the interior parts enables the handling of this extremely high voltage without unduly increasing the amount of insulating material used or the bulk of the apparatus.



The Transformer Complete.

Only one high tension terminal is provided, the other end of the high tension winding being grounded inside the case. This arrangement has many advantages inasmuch as most insulation tests are made from one terminal of the apparatus under test to ground. With one end of the winding grounded it is necessary to insulate the terminal for the full voltage of the transformer. If the middle point of the winding were grounded instead of the end, both ends would have to be brought out, each insulated for half the voltage; but when making insulation tests it would be necessary to insulate the testing



Core and Windings.

transformer, and the apparatus under test, from ground for half the testing voltage.

By the ingenious sub-division of the high tension winding into a large number of small sections and so connecting these sections that the higher the voltage in any section, the further it is away from the core, the amount of insulating material has been kept down to within reasonable limits. The transformer has developed a potential of 600,000 volts without any sign of distress in the windings.

The high tension terminal is of the well known condenser type, made up

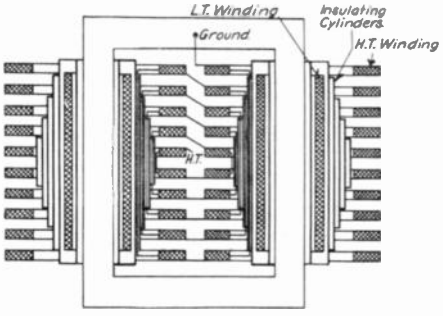


Diagram of Windings.

of alternate layers of paper and tinfoil, so proportioned in length and thickness that the potential gradient along the surface of the terminal from the

(Continued on Page 326.)

The Modern Theory of Electricity

By Karr Parker.

The simple question, "What is Electricity?" has always led to endless wonder and speculation. Many theories have been advanced from time to time which endeavored to account for electrical phenomena by considering electricity as a weightless fluid; an excess of this fluid causing a positive charge and a deficiency, negative, according to the "one fluid" theory of Franklin; or assuming two entirely different fluids, positive and negative, as in the "two fluid" theory. But these theories were at best only speculative and up until 1902 nothing definite was known as to the real nature of electricity.

In recent years, however, experimental work has been done which throws light on the subject and gives definite information as to the true nature of electricity. The modern electrical theory, known as the "electron theory," has been advanced by some of the most prominent men in the scientific world; particularly by Sir J. J. Thompson, of Cambridge University, whose work in this field has excited universal admiration.

This theory holds that a certain amount of positive electricity forms the nucleus of every atom; around this postive charge revolves a number of minute negative particles, the electrons, each of which has a mass approximately 1/1700 of that of a hydrogen atom and bears a negative charge of 3.4×10^{-10} electrostatic units. These electrons, the units of negative electricity, are the ultimate constituents of matter and are universal, i. e., precisely alike in all substances. The fundamental assumption of the electron theory is: "The electrical properties of matter can be attributed to the action of discrete particles each bearing an electric charge." In insulators the electrons are held to fixed centers by elastic forces; in a conductor they are free to move, except for the frictional resistance which varies for different conductors. When a metal cylinder, MN, Fig. I, is charged by induction from the sphere, S, the negative electrons stream away to the opposite end leaving the fixed positive charges, charging the cylinder +, at M, because of a deficiency of electrons, and —, at N because of an excess. Since the electrons are negative, a current passing through a wire from right to left, + to —, is really nothing more or less than a stream of electrons moving in the opposite direction, from left to right. Although the electrons are so minute that they can move with ease through a dense solid, yet their properties, the amount of the charge they bear, their weight, and size are all definitely known.

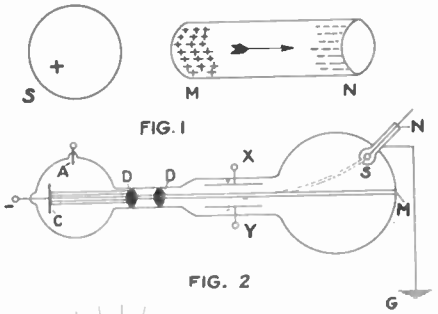


FIG. 1

FIG. 2

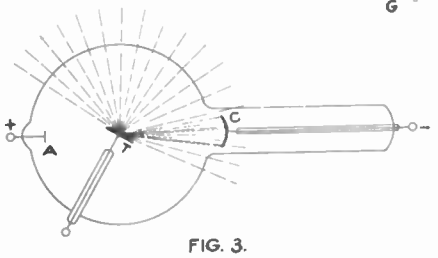


FIG. 3.

In this article it is impossible to go into the experimental evidence that confirms this theory, but that such particles as the electrons really exist and have characteristic properties may be seen from the following experiment.

CATHODE RAYS.—If we take a vacuum tube of the form shown in Fig. II, and excite the tube by passing a high tension current through it from the anode, A, to the cathode, C, a steady stream of particles, the electrons, will be projected, from C, at right angles to its face. These particles passing through the diaphragms, D, are concentrated

into a ray and strike the wall of the tube, at M, producing a brilliant yellowish-green phosphorescence. If we hold a magnet near the stream of particles forming the cathode ray, the ray will be deflected, showing that it is composed of material particles susceptible to magnetism. If a small mica vane be placed in the path of the ray the impact of the particles will cause it to rotate. If an electric charge be given to the plates, X and Y, the ray will be deflected, as shown, proving by the direction of deflection that the charge of the particle is negative. If the ray be deflected so as to pass through the slit, S, and fall upon the conductor, N, it will communicate a negative charge to N, establishing beyond question that the cathode ray is composed of material particles bearing a negative charge and traveling with high velocity. These particles are the same, no matter what gas is contained in the tube and their weight is 1.1×10^{-24} grams.

X RAYS.—The rays given off by radium, and other radio-active substances, are divided into three classes: *alpha rays*, composed of positive corpuscles; *beta rays*, composed of the negative electrons; and *gamma rays*, which are not material particles, but waves or energy pulses in the ether, unaffected by magnetism. *X rays* belong to the third class, the gamma rays, and are produced by the sudden change of motion of an electron, either a sudden increase or decrease in its speed. Since an electron has an electric charge it possesses an electrostatic field and in consequence the ether around every electron is in a state of strain. In an X ray tube, the cathode ray is focused on a platinum target, T, Fig. III, from which the X rays radiate. Now the sudden expulsion of an electron from a radio-active substance, or the sudden stoppage of one, on the target, T, of an X ray tube, produces a short pulse of energy in this electrostatic field in the ether, this pulse is the X ray. The steady succession of impacts of the rapid moving electrons gives rise to these rays, which are ethereal pulses of very short wave length and high penetrative power.

The electron theory is one of the most important additions to scientific knowledge and will undoubtedly throw much light on electrical phenomena in general.

ANENT THE "VALUE" OF THE WIRELESS.

By Felix J. Koch.

A trans-Atlantic traveler tells an interesting anecdote of the wireless and its real positive value which may perhaps open the way to an interesting discussion.

"I was bound for the Coronation last summer," he relates, "and had taken a comparatively slow boat, out of Montreal, calculating to get into Liverpool, and so London, just in time for the fete, and, not be subject to the exorbitant over-charge of London shop-keepers, about which we had read, any longer than necessary. I had my arrangements for the Coronation fixed as perfectly as I could from this side the pond. When, however, we began approaching England, I believed it wouldn't do the least bit of harm to dispatch a Marconigram to our Embassy, letting them know, among other things, that I was coming.

"Anyway, I took the message to the Marconi operator, a clever young chap, and he accepted it for transmission 'as soon as possible.' That was shortly after breakfast. Trying the instruments, or however they do discover those things, he informed me that while we were having most delightful weather all about us, and the day was perfect so far as I could see, up in the ether somewhere, an electric storm was raging, and he could not get my message through.

"Off and on, all that day, with the greatest fidelity, the operator made his attempts with my message, while like the returned shade of Peter Grimm, I stood near, waiting for him to get it through.

To cut a long story short, it was close on to supper time when finally I got word from him that he had managed to catch another ship, who would send it on.

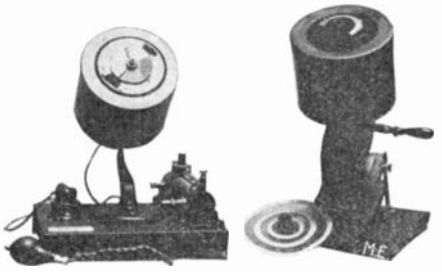
"The crux of the matter is this: We were on comparatively well traveled seas, the route between the mouth of the St. Lawrence and Liverpool is hardly a desolate path of ocean, and yet had our ship been in the utmost distress, had we been caught in this catastrophe, or that, the wireless must obviously have been quite useless.

"That is at least the obvious conclusion a layman must draw. It would be interesting to hear an expert's explanations."

Paris Letter

ELECTRIC COLOR TOP.

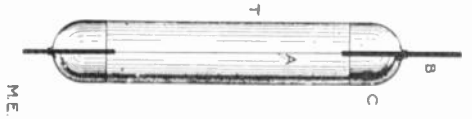
This apparatus, designed by P. Dosne, and made by Poulenc, Paris, consists of a cylindrical box, suitably mounted, and containing a rather elongated electric motor, the shaft of which projects from the box, and is adapted to receive the color discs. The color



discs are adjustable so that any amount of the three primary colors may be combined to match any given color. A graduated circle shows the exact amount of each color used. An apparatus of this sort is very useful in matching or analyzing colors. The motor operates on the lighting current with a resistance in series. At the right is also shown a hand operated machine.

NEW CONDENSER.

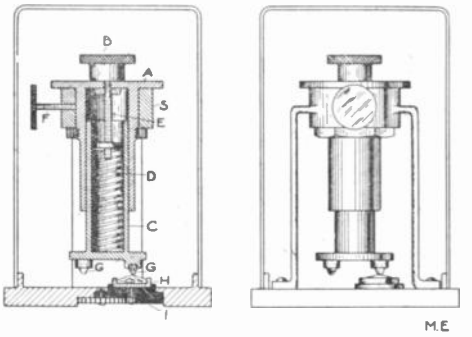
This condenser consists of a glass tube, T, in which is a filament, A, con-



nected to terminals, B, fused into the ends of the tube. The inside of the tube is silvered at C. By flashing the filament by a high voltage the filament is burned out and the particles which composed it are projected against, and deposited upon, the inside surface of the tube. This, together with the silvered ends, forms the inside coating. So far as we can see there is no particular advantage in forming the condenser this way. The entire inside surface might just as easily be silvered.

DETECTOR CRYSTAL TESTER.

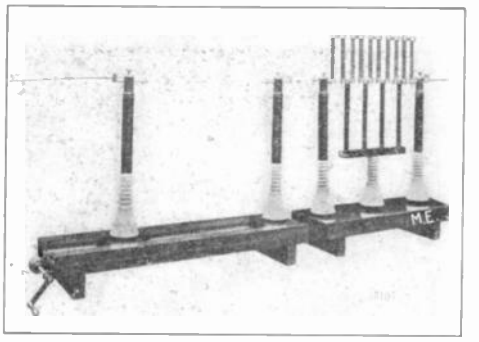
In this apparatus, metal points, G, are brought in contact with the crystal which is held in the insulated support, H. The strap, S, carries a rotating piece, A, which is provided with a screw thread to permit its turning around. It is held in any position by the set screw, F. The piece, C, slides up and down, (it has a pin to prevent rotation). It has a spring inside, with a washer in which is a screw, E, worked by the milled head, B. This screw alters the tension of



the spring, and so varies the pressure of the points, G, on the crystal.

HIGH POTENTIAL SPARK GAP.

In the measurement of the extremely high voltages now used for power transmission, it is impracticable to connect a voltmeter directly to the circuit, so recourse must be had to a volt-



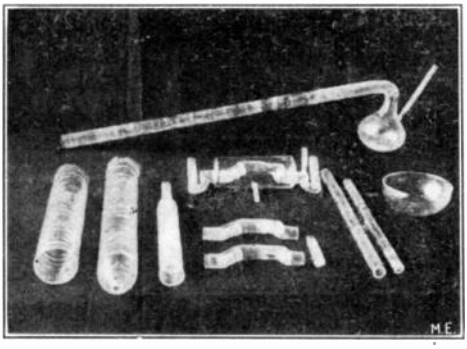
meter connected to a step down transformer of known ratio. If the voltage must be measured directly a needle point spark gap must be used. The illustration shows such a gap for very high potentials, connected in series

with a non-inductive resistance to limit the amount of current flowing across the gap when it sparks over. The left hand terminal is adjustable, to vary the length of the gap, and is moved by means of the small crank at the left hand end of the base. This gap was made by the Swiss Oerlikon company.

QUARTZ TUBES FOR MERCURY ARC LAMPS.

A Frenchman by the name of Daguerre, a nephew of the inventer of the original Daguerreotype photographic process, has invented a meth-

od of making the tubes for mercury vapor arc lamps from quartz. The process is started by placing the quartz, in small lumps, in an electric furnace, and when it softens, the lumps are taken out and worked thereafter by means of the oxy-hydrogen blowpipe. The material is drawn into rods of small diameter, which are then wound on mandrels of suitable size, in much the same manner as a layer

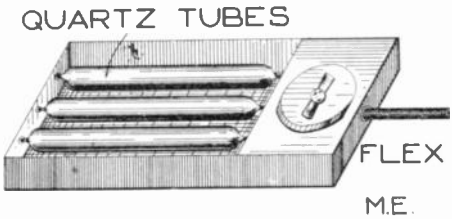


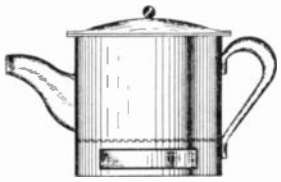
of wire is wound on a magnet core. The resulting coil of quartz rod is then fused together, to form a tube. The process is continuous from the time the pieces are taken out of the electric furnace until the tube is finished. This is necessary on account of the fact that quartz is very brittle and fractures readily if heated suddenly in one spot. By this process odd shaped pieces are readily made that could not be made from a straight quartz tube on account of the difficulty of working it and the liability to fracture when unevenly heated.

One of the illustrations shows a number of odd shaped pieces made by this process while the other shows a water sterilizer, which simply consists of a pipe containing several quartz lamps around which the water to be treated flows. This sterilizer makes use of the excessive amount of ultra violet rays emitted by the quartz arc lamp. It has a capacity of 100,000 litres per hour.

QUARTZ TUBE HEATING UNIT.

The little electric heater shown herewith consists of three quartz tube





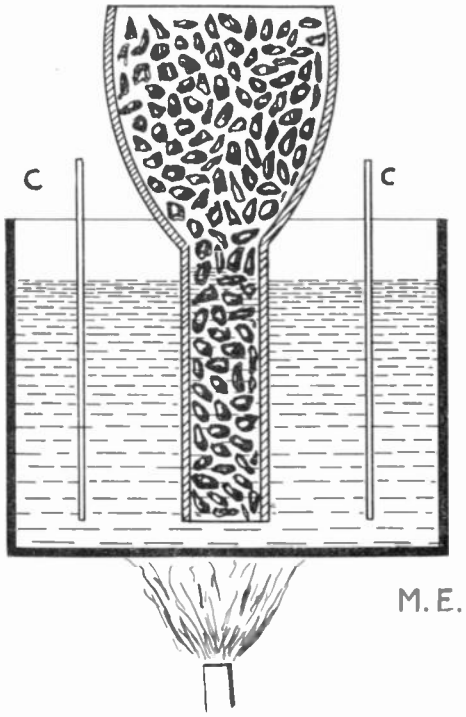
incandescent units having the heating wire sealed into exhausted tubes. This arrangement allows the heat to be freely radiated, with little absorption, and, at the same time protects the wire against oxidation. The heater is adapted to slide into a recess in the bottom of the double bottomed kettle, like a drawer in a cabinet, and is provided with a heat regulating switch.

HEATING INCREASES CURRENT OUTPUT OF PRIMARY BATTERIES.

A French inventor, Jules Hagarde, has found that heating a battery to nearly the boiling point greatly in-

creases the current and lessens the polarization. Weak acid, caustic soda, and bi-chromate solutions are all affected alike.

One form that the cell may take is shown in the figure. The jar is of porcelain to stand the heat, and the solution may be any of those mentioned. In the solution are placed two carbon plates, and a cylinder with a funnel shaped top. The bottom of this cylinder is closed by some form of grating that is not attacked by the solution; and the cylinder is then filled with granulated zinc, which feeds down into the solution as it is consumed. An arrangement may also be applied that removes the spent solution and replaces it with fresh liquid.



ELECTROYL HOUSEHOLD RANGE.

This is not a gas range, although it looks like one. It is an electric range made by Purcell and Nobbs, London. It doesn't possess any particular advantages over those of American manufacture, but is gotten up in a form which suggests a cooking range rather than a counter in an electrical supply store, which most American electrical

ranges resemble more than anything else.

ENGLISH—AS SHE IS WRITTEN.

By Terrell Love Holliday.

A farmer boy who had a cough
Made up his mind his job was tough,
So hied him to a well-stocked slough
Where he could fish the whole day through,
And listen to the soft wind sough
And sigh and kiss each leaf and bough.
"My work's not done," he said, "although
I think that I have done enough.
If dad should kick and cut up rough,
Some other way than at the plough
I'll find to earn my daily dough."

TAKING CHANCES.

An aviator descended in a field, and said to a rather well-dressed individual: "Here, mind my machine a minute, will you?"

"What?" the well-dressed individual snarled. "Me mind your machine? Why, I'm a United States Senator!"

"Well, what of it?" said the aviator. "I'll trust you."—*Argonaut.*

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H. GERNSBACK, Editor

O. J. RIDENOUR, Business Manager

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Vol. V. JUNE No. 3

AS predicted in our last issue the Alexander (and Bourne) bill passed the Senate.

The new bill (S. 6412) passed the Senate on May 7th, and is now fairly well under way to becoming law.

While the present bill must of course first pass Congress, and be signed by the President, there is every reason to believe that neither Congress, nor the President, will prevent the passage of the bill as it stands to-day. In all probability, S. 6412 will be placed upon the Statute books before another year has passed.

Let us now look at the bill, and see how it will affect private stations, that is, the experimenter, and the amateur at large.

We are struck, first, by the seemingly humorous part, that *"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."*

Translated into plain English, this would read somewhat along these lines:

If you live, let us say, in the state of Illinois, and own a wireless outfit, you need not take out a license if you do not wish to do so, *provided* that your transmitting apparatus is not powerful enough to send your messages across the state border line into any of the adjoining states: Wisconsin, Iowa, Missouri, Kentucky, Indiana or Michigan. Therefore if you live in the central part of Illinois, you can use a fairly powerful sending outfit, while, if you live close to the state border line, you must either use a weak transmitter, or take out a license.

You may, however, erect, and operate, anywhere in the United States, a receiving station, without taking out a license, as long as you don't catch messages coming from another state.

However, let us state right here, that it is our own firm conviction that every amateur will only be too anxious to take out a license as soon as the wireless bill becomes law. For, will his station not have the endorsement of Uncle Sam? Of course it will. The amateur who, in former years, trembled every time somebody said "Government," will hereafter push out his chest and proudly proclaim: "I will have you understand, Sir, that I am licensed by the United States Government, and

that my station is registered in Washington!" That surely commands respect, and the amateur's millennium seems close at hand. Furthermore, every citizen of the United States has the right to be licensed, and there will not be any license fee; all that is necessary will be, to make application to the Secretary of Commerce and Labor, and, if your station conforms to the requirements of Paragraph No. 15 of the act, you will receive your license in short order.

Turning to Paragraph No. 15—the one of importance to the amateur,—we find that he must not use a greater wave length than 200 meters, nor use a greater power than a 1 K.W., input in either his transformer or spark coil,—nor more than ½ K.W. if he is within five nautical miles of a government station.

If, however, he wishes to use a greater wave length, or a greater power, upon proper application, permission to do so will be granted by the Secretary of Commerce and Labor, provided, the applicant shows cause why he should require additional wave length and additional power.

Summing up, the amateur is to be congratulated, as he has received all the consideration he could possibly have asked,—and more. He has all the liberty he wants, and, on top of it, he will be recognized by the Government. He will have a standing which was denied him heretofore. He will no longer be looked upon as a public nuisance, but quite the contrary, he will be treated with the respect that is due him. For does he not pursue the study of the most wonderful and elevating art ever known to man? And, will not the science advance, due to his efforts?

Verily, "Wireless," meaning not alone Wireless Telegraphy or Telephony, but also transmission of energy through space,—during the next few years, will see tremendous progress. Inventions will be made, so staggering, to our present imagination, that we cannot even conceive them. Immense, new, industries will spring up, all supported by the magic "Wireless," and the young man who gets in "on the ground floor" to-day, will surely have a great and brilliant future.

This is not the silly optimism of a romantic brain, it is the expression of cold facts, which must be apparent to anyone who has watched, and studied, the phenomenal progress made during the last fifteen years, in the newest addition to electrical science, for let us not forget that: "There are more things in heaven and earth, than are dreamt of in your philosophy."

Wireless Legislation

SENATE BILL S-6412.

On May 7, 1912, the wireless bill known as S-6412 passed the United States Senate, and on May 8th, was sent to the House of Representatives and referred to the Committee on the Merchant Marine and Fisheries.

This bill is the same as the amended Alexander Wireless Bill, which we printed in our May issue with the following exceptions:

After the word "State," in the ninth line of Sec. 2 add the words "of the United States."

Between the words "said" and "stations" in the sixth line of Sec. 4 add words "private and commercial."

At the end of the first paragraph of Regulations add the words "Every coastal station open to general public service shall at all times be ready to receive messages of such wave lengths as are required by the Berlin Convention."

Under Secrecy of Messages, substitute for the word "cancelled" in the last line of this paragraph "revoked by the Secretary of Commerce and Labor."

Under Penalties omit "as provided in Sec. 1," in the last line of the first paragraph, and "as provided in Sec. 3" in the last line of the second paragraph.

Sec. 10 has been changed to read "That this act shall take effect and be in force on and after ninety days from its passage."

D'Arsonval Currents

By James H. Doran.

The history of high frequency Currents extends back to 1842, when the experiments of the American scientist, Professor Henry, showed that the discharge of a Leyden jar is oscillatory in nature. In 1859 his experiments were confirmed by Dr. Feddersen by the use of a rapidly revolving mirror. The mathematical calculations of Sir William Thompson, afterwards Lord Kelvin, and those of Maxwell also tended to show that under certain conditions currents of very high frequency and also electric waves could exist. These conclusions were proven in 1888 by Professor Heinrich Hertz in a series of brilliant experiments at Karlsruhe and later in his new laboratory at Bonn. About two years later the air-core transformer or Tesla coil as it is now called, was developed independently by Prof. Elihu Thomson and Nikola Tesla. The practical uses of the high frequency currents and electric waves has rapidly developed due to the efforts of such men as Marconi, DeForest, Fessenden and many others and it is on these principles that we have wireless telegraphy, telephony and recently the developments of multiplex telephony. It is also on this line that the wireless transmission of power is expected. To Dr. Tesla more than any other man we owe the experimental development of high voltage high frequency currents and he has experimented extensively with currents of extreme voltage and frequency.

The fact that electricity of high frequency is not fatal or dangerous in its results was noticed by many experimenters early in its development and currents of very high amperage have been taken through the body of many who have worked in this line. Since the experiments of Prof. d'Arsonval of Paris these currents have been used extensively by doctors all over the world for treatments and at the present time the application of this form of electricity in medicine marks a well defined branch of electro-therapeutics. The voltage most generally used for these purposes varies from 5,000 to about 50,000 and the frequency one million or above. From their application to electro-therapeutics by d'Arsonval they are generally known as d'Arsonval currents. When the voltage goes above about 50,000 they are generally termed Tesla High Frequency Currents or simply high frequency currents, although no fixed voltage has been set for these terms. The amperage is relatively much higher in the d'Arsonval than the other high frequency currents.

The instruments used for the production of this form of electricity is identical with those used in the spark method of wireless telegraphy. The outfits put on the market by electro-medical houses vary in power, usually from ¼ to 1 K. W. and transformers are being used more and more to replace the induction coil.

The following experiments give best results when performed by ¼ to 3 K. W. instruments and the experiments where the current is taken directly

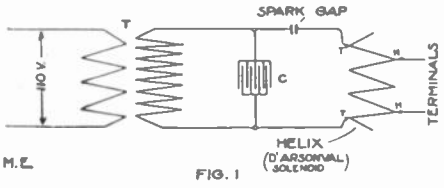


FIG. 1

through the body should be performed only by persons who thoroughly understand the use of their instruments and care should be taken to pass only the high frequency current through the body and *never* the secondary current of the transformer itself which with large transformers would be very painful and probably fatal. Fig. 1 shows the connections for the instruments. The connections, H, H, may be made by ordinary helix clips and may be varied to obtain the best results; but are the only ones that should be used. The tuning may be accomplished the same as is done when the instruments are used for wireless. The helix used may be made of brass, copper or aluminum ribbon or No. 4 or 6 B & S gauge wire. Ten or twelve turns may be used and the helix should be rather small, six to twelve inches in diameter, so as to obtain a high frequency.

Tune the apparatus to give the best results and after shutting off the current grasp the terminals in the hand, ¾ in.

aluminum rods a foot long are excellent for this, and have the current again turned on, which can hardly be felt if the spark gap in the primary circuit is not opened out too far. It is a good plan to clamp one of the clips to the bottom turn of the helix and first taking the current from only one turn, gradually increase the number and in this way an idea can be gained as to the relative amount of current taken.

While the current is passing through the body bring the ends of the handles held in the hands, together. An intensely hot and noisy spark passes between the ends of the rods and if they touch each other will be lightly welded together. This is an experiment which is always puzzling to the electrician who has never worked with high frequency currents as an ordinary current of that voltage would rather pass through the body than jump even a minute spark gap.

Turn off the current and short circuit the handles with a heavy piece of fuse wire 2 or 3 inches long (a 1 K. W. outfit will easily blow a 15 ampere or even heavier). When the current is turned on the fuse will blow out instantly with almost explosive violence. This experiment is an excellent one to perform when a visitor having a slight knowledge of electricity asks what amperage was taken through the experimenter's body.

Hold a piece of magnesium wire in a pair of pliers, and, grasping the handle of one terminal in the free hand, gradually bring the wire to the other terminal. After a few seconds the wire will catch fire and may be taken away from the terminal and it will continue to burn with a dazzling white light. The spark used to light the wire should not be over an inch long.

Connect a 32 c. p. 220 volt carbon filament lamp in series with the body and first using one or two turns gradually increase the number until the lamp lights up to full candle power. If a little more current is used the lamp is easily burned out, and if given during an entertainment always brings applause, although it is rather expensive for ordinary amusement.

Take a foot or so of about No. 24 copper wire and wind into a small coil by wrapping around a pencil. Connect to the terminals of the helix and when the "juice" is turned on for a few seconds the wire can be made red hot and if iron wire is used can often be melted.

Crumple two or three sheets of tinfoil in the hand and place in the center of the helix and turn on the current for a minute or two. The ball is made hot by the eddy currents induced in the rumpled sheets of tinfoil.

Bend a heavy coil of wire into an inverted U shape and short circuit its ends by the lamp used in one of the experiments above. On making connections with the helix and adjusting the number of turns, the lamp can be brought to incandescence although the resistance of the wire is less than one thousandth of an ohm.

Form a coil of five or more turns of heavy, well insulated, wire and about three or four feet in diameter and connect the ends with the clips, T, T, using the coil of wire in place of the helix. Arrange three people in the center of this in the form of a triangle and have small Geissler tubes held between them. The induced current set up in the closed circuit formed by their bodies is sufficient to light up the tubes.

The experiments in impedance, induction and electro-static action performed by these oscillatory currents are innumerable. The higher the frequency the better and more numerous the experiments, and it is a good plan to always use a frequency of over 500,000 as then the danger of a painful shock is much less and currents which would ordinarily be fatal can be taken with little discomfort and only a slight warmth and tingling of the wrists.

SUGGESTS TIME SCHEDULE FOR ALL WIRELESS STATIONS.

The Pacific States Wireless Association has sent to its representatives in Congress a resolution protesting against the licensing private wireless stations under the Alexander bill and suggesting instead an arrangement whereby government, commercial and private stations be allowed 40 minutes each in each two hours,—that is, the government stations will take the first 40 minutes, the commercial stations the second 40 minutes and the third period of 40 minutes to be reserved for all private stations. They recommend that wireless clubs throughout the country formulate and send similar resolutions to their own representatives.

Loud Acoustical Reproduction of Wireless Signals

By Stanley E. Hyde.

The tendency of wireless experimenters, at the present time, in regard to receiving apparatus, has been

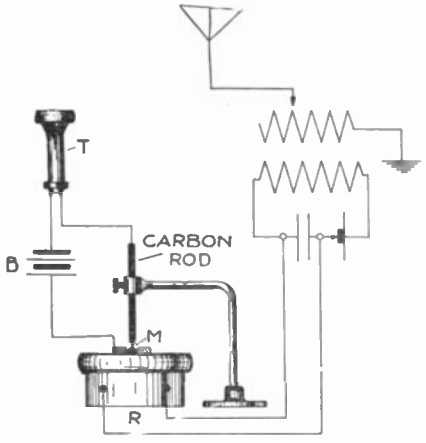


FIG. 1 M.E.

to perfect an appliance whereby the audibility of the incoming signals could be considerably increased. The outcome of these experiments is the production of a telephone relay called the ampliphone.

The most essential parts of this instrument are shown in Fig. 1, where

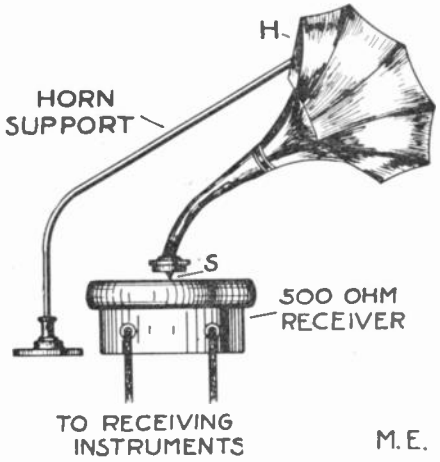


FIG. 2

(R) is an ordinary wireless receiver, (M) a microphonic contact and (T) a loud speaking telephone.

As data on telephone relays is very scarce, the writer constructed the above apparatus to see how the experiment would work. As the vibrations of the telephone diaphragm are very weak, a sensitive contact must be used in conjunction with it. On, and in the middle of the diaphragm is soldered a small brass container, in which is a small quantity of mercury. This forms one of the elements of the microphone. The other element consists of a carbon rod (C) which is mounted so that it can be lowered until it just touches the pool of mercury. This forms a self-restoring microphone which was used some time ago as a detector.

Ordinarily the movement of the telephone diaphragm is still and the current through the reproducing tele-

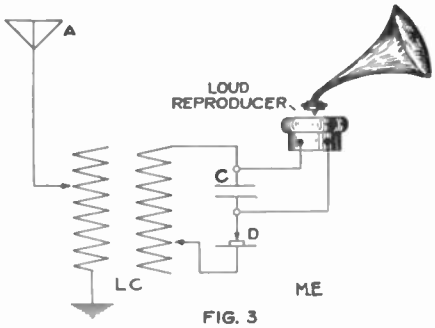


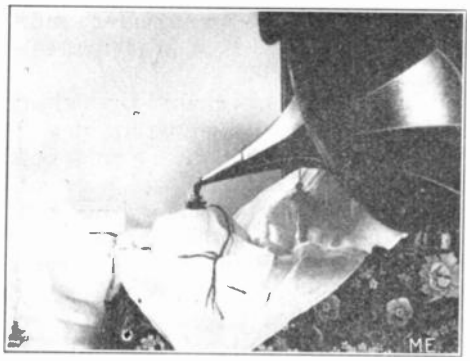
FIG. 3

phone is constant and its diaphragm does not disturb the air with sound waves; but as soon as wireless signals pulsate through the receiver (R) its diaphragm vibrates according to the frequency of the received oscillations and lets the current flow through the microphonic contact accordingly. The battery used consists of three dry cells.

This experiment worked to a certain extent but the adjustment of the carbon rod is a very delicate operation and jarring any of the apparatus threw the contacts out of adjustment immediately.

After working in vain for good results the writer tried the following experiment which made it possible to stand twelve feet from the reproducer and plainly hear signals from a 2 kilowatt station 350 miles distant.

The apparatus is a departure from the telephone relay principle and is shown in Fig. 2 and consists of the following, a telephone receiver, phonographic reproducer and a horn. The horn and reproducer were taken from an Edison phonograph. The needle or stylus (S) is mounted with the horn so that it presses gently on the center of the receiver (R), and the motion of the receiver diaphragm is transmitted to the sounding disk of the reproducer, and thence from the horn out into the surrounding air. The tone of the incoming signals can be varied by adjusting the pressure of the needle on the telephone diaphragm; the highest pitches being obtained when the pressure of the stylus is very light.



To obtain the best results a pyron or iron pyrites detector should be used as this form of detector gives a clear pitch and gives a solid tone to the signals.

The arrangement is shown in the photograph. The receiver is a 500 ohm wireless receiver with the usual connecting cord and tips.

Such a device could be used in any wireless station to great advantage as the use of head telephones is eliminated and the horn can be turned so that the signals are directed to the operator's ear.

PACIFIC COAST WIRELESS NOTES.

Atmospheric conditions for wireless on this coast seem to have been exceptionally good through the whole winter, leading to several wonderful and, heretofore, impossible records.

The United Wireless station at San Francisco (power 10 k.w.) used a rotary spark gap for several months, and on one occasion (October 24, 1:30 a. m., Pacific Coast time) was in communication with the Naval Station at Washington, D. C., (NAL). These stations exchanged weather reports, and worked, altogether, over an hour.

On several other occasions the 'Frisco station has cleared ships over 4,000 miles out at sea.

Amateurs along the coast are making wonderful records this winter, both in sending and receiving. One or two Los Angeles amateurs are working regularly as far north as Cape Blanco, Oregon (NPF), while a regular service between amateurs is maintained between Seattle, Wash., Portland, Oregon; Walla Walla, Washington, and San Francisco, Calif.

The average amateur of this coast with a fair sized aerial does not consider picking up Kahuka Head, Hawaiian Islands (HU) as extraordinary, and at least one amateur in San Francisco has copied a 5 k.w ship station 3,000 miles out. Another leading San Francisco amateur occasionally picks up Key West, Florida, (NAR), but of course, this is possible only with a very large aerial.

The Navy, however, is doing wireless work on this coast which is even far in advance of that already mentioned.

The new 300 foot towers and the latest design of Telefunken 500 cycle transmitting set are bringing marvelous results at Mare Island Navy Yard. Regular work is carried on by this station with Sitka, Alaska; Key West, Florida; and Colon, Panama. Several stations on the Atlantic coast have copied Mare Island, among which are Washington, D. C., and Norfolk, Va.

The Telefunken system is also used at Puget Sound Navy Yard, Bremerton, Wash.; Table Bluff, Calif., and Point Loma, Calif. The latter has just been installed and great results are expected from it.

During the recent visit of the Pacific Coast Division of the Fleet to Honolulu, the two cruisers "South Dakota" (NSX) and "California" (NCZ) were in communication each night with Mare Island. Both of these ships have only 3 k.w. outfits, and such regular and efficient work with them is considered a notable feat.

Contributed by

G. S. CORPE.

Simple Experiments in Chemistry.—Air

By Philip Edelman.

Air is a mixture of gases. It has weight, one cubic foot weighing 1.28 oz. Without calculation it will be readily seen that the total weight of the atmosphere runs into the billions of tons. As a result of this immense weight, every square inch of the earth is subjected to a pressure of about 15 pounds. The pressure of 15 pounds to a square inch is taken as a standard unit called an "atmosphere." This weight of the air is the force which causes water to be lifted in pumps and through siphons.

The chief ingredients of the air are nitrogen and oxygen, and for ordinary purposes, it may be said to contain 78 parts of nitrogen to 21 parts of oxygen. Other gases present are, carbon dioxide, argon, helium, and water vapor. Hydrogen, hydrogen-peroxide, ammonia and nitrogen compounds, dust, and germs, are also likely to be present. The exact composition of the air varies slightly with the locality. Thus air in Chicago naturally contains more dust, ammonia, sulphur compounds, and acids than the air in the country, while the air over the ocean contains an appreciable quantity of salt.

The chemical activity of the atmosphere is employed in countless manners, not the least of which are the support of life, combination with coal and other materials in combustion, purification, etc. The oxygen which it contains is the active agent and the nitrogen merely serves to dilute the oxygen. In this manner the activity of the oxygen is subdued and made useful.

The atmosphere always contains some water vapor on account of the continual evaporation of water from the lakes, rivers, and other bodies. Warm air contains more water vapor than cold air and the variations in the quantity, from day to day, play an important part in the comfort of human beings. Stuffy air, in poorly ventilated rooms, is caused by the presence of too much water vapor. To prove that water is present in the air experimentally it is only necessary to expose a small quantity of Calcium Chloride to the air. It soon absorbs the water vapor and deliquesces.

The air receives carbon dioxide from the respiration of animals, from the combustion of coal, wood and similar materials, and from the decay of plants and similar matter. The proportion of this gas in the air may vary from 4 to 30 parts in 10,000, according to conditions. Its presence is proved experimentally by exposing a solution of lime water to the air. The gas unites with the lime in the solution and forms calcium carbonate which is insoluble. A crust of the carbonate forms upon standing. If the air is forced through the solution the lime water merely turns milky. This is a delicate test for carbon dioxide.

Lime water is prepared by slaking a little lime and dissolving it in water. The solution should be filtered before using and the solution which is not to be used immediately should be kept in a tightly stoppered bottle.

Air can be be liquefied by subjecting it to extreme cold and pressure, as can most of its components. The great practical uses which were promised when liquid air was first obtained do not appear to have materialized and it is little more than a laboratory and lecture curiosity as yet.

Perhaps the most important component of the air is nitrogen. It constitutes about four-fifths of the air. It is a colorless gas and is an inert element. It is lighter than air, has neither taste nor odor, is practically insoluble in water, and will not sustain life or support combustion. Nitrogen is a very necessary constituent of plant and animal matter. It is one component of ammonia and nitric acid and their related compounds.

Human beings and other animals obtain the required nitrogen from meat, fish, wheat, and similar foods. Human beings do not assimilate the nitrogen in the air which they breathe but only combined nitrogen such as is present in food matter.

Plants receive their nitrogen from the soil. They receive the combined nitrogen only, usually in the form of nitrates.* Since nitrogen in the com-

bined state is continually taken from the soil some means must be adopted for replenishing the supply or it will soon become exhausted. The use of fertilizers, which are nothing more nor less than mixtures containing nitrogen compounds, is often resorted to. Certain nitrogenous matter is often allowed to decay upon the soil to accomplish the desired result.

The problem of supplying the soil with nitrogen is becoming one of great importance and it deserves particular mention because electricity is counted on to do the work in the future, when other means are exhausted. Successful experiments have already been carried on and the results seem to indicate that the methods proposed are entirely feasible.

It has been known for some time that electric sparks will bring about the combination of nitrogen with oxygen and hydrogen to form nitric acid and ammonia. Rain which falls during an electrical storm has been found to contain compounds of these substances. Great processes for making artificial nitrogen fertilizers are already in commercial use in Norway where electrical power is cheap. Currents of air are passed through great arcs and the desired change is thus brought about. Since the only part of the process which actually costs anything is the electrical energy, the process must certainly be profitable. The arcs are many feet in length and are maintained by strong air currents.

By other methods the electrical energy is applied directly to the plants at the spot. A system of wires is brought over the plants and a high voltage discharge of low or high frequency is passed from it to the plants. There are many variations of the system just outlined. The latter method is said to increase the growth from 50 to 100 per cent. A Minnesota man tried the method shown in Fig. 1 recently. The garden treated was very small but he claims that the treated area showed a greater output than the non-treated part. As is readily seen the energy in this case was obtained from the atmosphere and is very cheap. While it is doubtful if the method would be practical over large areas, it would be worth trying as an experiment.

The matter of nitrogen and the soil has been emphasized in this hurried account because it is of great importance. The readers would doubtless find it instructive and profitable to try similar experiments on a small scale.

Amateurs who operate powerful wireless transmission sets have probably noticed the collection of a whitish material on the spark gaps of their

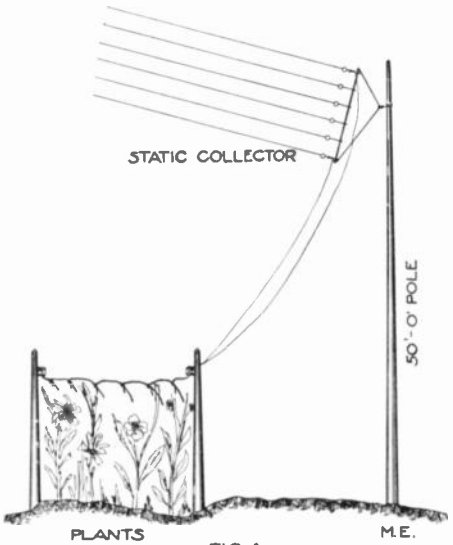


FIG. 1

sets. The material may even short circuit the gap. This merely illustrates the manner in which an electrical discharge may form nitrogen compounds.

WATERBURY WIRELESS ASSOCIATION.

The Waterbury Wireless Association was organized March 18, 1912. Our aim is to help amateurs in this vicinity to build up their sets and to become better operators. We would like to hear from other wireless associations. Address all communications to H. M. Rogers, Jr., 26 Linden Street, Waterbury, Conn.

GREATER BOSTON WIRELESS ASSOCIATION.

All amateurs wishing to join this association are requested to write to C. R. Eldredge, 41 Lawrence Street, Wakefield, Mass. We want to make the association a success. Help us.

*Certain climbing plants receive nitrogen directly from the air.

The Underwriters Rules for Wireless Installations

Now that the country is pretty well covered by wireless stations, either government, commercial or private, it is well to call attention at the present time to the requirements of the National Board of Fire Underwriters for the installation of wireless equipment, including aerial and ground connections.

We reprint below the sections from the National Electric Code which cover wireless installations, and call our readers' attention to the fact that these requirements should be complied with in every instance in order to avoid difficulty with their insurance companies.

It is well to bear in mind that should a fire occur in a building in which a wireless station had been installed, and the installation had not been approved by the underwriters, there would almost certainly be difficulty in adjusting the losses, if indeed the insurance company did not refuse to make any payment whatever.

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86. WIRELESS TELEGRAPH APPARATUS.

In setting up Wireless Telegraph apparatus (so-called) all wiring within the building must conform to the Rules and Requirements of the National Electrical Code for the class of work installed and the following additional specifications:—

a. Aerial conductors to be permanently and effectively grounded at all times when station is not in operation by a conductor not smaller than No. 4 B. & S. gage copper wire, run in a direct line as possible to water pipe at a point on the street side of all connections to said water pipe within the premises, or to some other equally satisfactory earth connection.

b. Aerial conductors when grounded as above specified must be effectually cut off from all apparatus within the building.

c. Or the aerial to be permanently connected at all times to earth in the manner specified above, through a short-gap lightning arrester; said arrester to have a gap of not over .015 inch between brass or copper plates not less than 2½ inches in length parallel to the gap and 1½ inches the other way with a thickness of not less than one-eighth inch mounted upon non-combustible, non-absorptive, insulating material of such dimensions as to give ample strength. Other approved arresters of equally low resistance and equally substantial construction may be used.

d. In cases where the aerial is grounded as specified in paragraph 1, the switch employed to join the aerial to the ground connection shall not be smaller than a standard 100 ampere knife switch.

e. Where supply is obtained direct from the street service the circuit must be installed in approved metal conduits or armored cable. In order to protect the supply system from high potential surges, there must be inserted in circuit either a transformer having a ratio which will have a potential on the secondary leads not to exceed 550 volts, or two condensers in series across the line, the connection between said condensers to be permanently and effectually grounded. These condensers should have capacity of not less than one-half m.f.

In addition to these rules of the National Board, in a good many cities there is a local department of the city government, whose approval it is also necessary to secure. It is advisable to look up their rules also and if they differ from the National Board requirements they should also be complied with.

NEW ELECTRICAL FACTS ABOUT TUNGSTEN AND MOLYBDENUM.

By Dr. Leonard Keene Hirshberg, A. B., M. D. (Johns Hopkins).

It seems but yesterday that many metallic elements were considered brittle. Only a year or two ago, the physical-chemists who would have dared to say that tungsten and molybdenum could be obtained in ductile or in a non-brittle condition, would have been riddled with contempt. Tungsten, as the filament, and molybdenum as the support, in the incandescent lamp, were known to every newsboy.

Scarcely more than a year ago, chemists began to seriously predict that malleable and ductile tungsten would soon be in general use. This prophecy is now fulfilled on a large scale, for in England and the United States, finely drawn tungsten wire, is now being manufactured in commercial quantities.

Diamond wire apertures in very small dies, permit the making of ductile tungsten, fine enough for the highest candlepower lamps.

A tungsten or molybdenum electric furnace, is now having extensive use. It is of course cheaper, and much su-

perior to the platinum-wound electric furnace. Diamonds may be made in the tungsten electric furnace, and higher temperatures may be obtained, than are obtainable in the platinum furnace.

Tungsten and molybdenum are just beginning to play important roles in the manufacture of contact-making instruments. Having a high melting point, which prevents them fusing together, and a heat conductivity twice that of platinum, they are rapidly replacing the latter, which is apt to become overheated.

Tungsten is now replacing silver in the relay contacts of voltage regulators, replacing iridium in similar contact regulators, and governors. It is reducing the use of expensive platinum in railroad signal relays, telephone jacks, in automobile engines, stationary ignition work, spare coil contacts, magneto-circuit breakers, etc.

The troublesome obstacle of obtaining good heat conducting contact between tungsten and molybdenum on one side and iron or brass on the other, has been overcome.

Until recently, Crooke's tubes, and the other X-ray paraphernalia used by scientific and practical physicians, were made with platinum connections. The target or anti-cathode upon which the rays are bombarded, will henceforth be made of tungsten or molybdenum.

Electrons, those electrically charged particles that shoot with high velocity parallel to the vacuum tube's surface, leave the concave cathode and converge upon a platinum disk at the focusing point of the electrons. When they meet this obstruction, their velocity is lowered, and the denser the target, the greater is this slowing. And the more rapid is this lowering of velocity, the more penetrating are the X-rays sent out.

In most X-rays work, as high as six kilowatts are used to excite the Crooke's tube. At the point where the electrons butt the target, the greater quantity of electro-energy is changed into heat. This at the focus, is great enough to melt the platinum disks, so that the latter has always been placed safely beyond the focus. This also spreads the electrons over a larger surface.

Since the X-rays picture is a shadowgraph, and since the Roentgen or X-rays arise at the target of platinum, the less the focus and the wider the rays, the more ill-defined will the resulting picture be. Hence our Roentgen rays have been limited in scope and development because of the platinum. Even cooling devices and platinum alloys have failed to solve the problem of good definition for X-ray pictures.

Platinum melts at 1755 degrees, but tungsten does not melt until 3000 degrees are reached. Consequently the Roentgen rays of the future will be sent out from tungsten disks placed exactly at the focus of the bombarding electrons. More energy will be available, more heat will flow rapidly from the focus point of indestructible tungsten to the surrounding metal, and the most wonderfully defined X-rays photographs will soon be made in every doctor's office.

When all is said and done, it will soon be evident that the tungsten age is about to dawn upon us.

THE NAVY DEPARTMENT'S WIRELESS PLANS.

The Bureau of Steam Engineers of the Navy Department, of which Rear Admiral Hutch I. Cone is chief, and which has charge of all wireless engineering, construction, maintenance and repair for the Navy, plans to erect, as soon as funds permit, six new high-power wireless stations, and a medium-power station on the Island of Porto Rico.

It is probable that these high-power stations will be placed : 1—In the Canal Zone; 2—In California; 3—At the Pearl Harbor Naval Station; 4—At Tutuila, Samoa; 5—At Guam; 6—In the Island of Luzon, Philippines.

It is planned that all these stations shall be within defenses, in view of the fact that their importance to naval operations would invite attack: and it is proposed that they shall be of the type of the high-power station now building outside of Washington, known as the Arlington station.

The Washington correspondent of the Electrical Review and Western Electrician has obtained from the Bureau of Steam Engineering these and other de-

tails of the Navy's plans in wireless matters. It is stated at the bureau that during the coming summer a new medium-power station, for which funds are available, is to be established on Unalga Island, near Unalaska, and near the entrance to Bering Sea, to connect all Alaskan stations for day work, and for the benefit of all vessels crossing the North Pacific or entering the Bering Sea. This station will be expected to communicate with stations in the State of Washington by day in favorable circumstances, regularly at night, and to talk with Honolulu and Japanese stations occasionally at night.

The Department's wireless staff is constantly experimenting and improving at the forty-four naval stations now in operation.

The following is a schedule of improvements now being made at the stations:

Substituting 500-cycle for 60-cycle transmitters.

Increasing heights of masts and towers supporting aerials.

Substituting steel towers for wooden masts in the tropics.

Substituting flat-top aerials for umbrellas.

Duplicating power units to avoid probability of a complete breakdown of any station.

Placing oil engines in fireproof buildings.

Extension of the time signal service and extension of all available land lines to each station.

Furnishing two or three receivers to be used in connection with "listening-in" devices.

The Department's wireless staff is engaged upon numerous unsolved wireless problems, believing as it does that experimenters are still on the threshold of discovery. In order to show the trend of thought in the Department, the following list of Navy wireless needs is set down.

An amplifone, preferably one which is selective in itself.

A light, portable wireless set, of about 500 cycles, quenched-gap, capable of giving two amperes in a suitable aerial, to operate on 110 or 125 volts direct-current, using a commutator interrupter.

Same, to run on 10 to 20 volts, current to be supplied by portable storage battery.

A light aeroplane set.

A 500-cycle hand-generator set.

A small, inexpensive set, power supplied by oil or gasoline engine, to give out a certain signal on a certain pitch at definite intervals, say, once a minute, during fog.

Distant-control, quick-starting arrangement for kerosene and gasoline engines.

Wireless direction finder made in the United States.

Transmitter which will send in one direction only.

Receiver which will receive from one direction only.

Sensitive detector which will retain its sensitiveness indefinitely and which can not be knocked out of adjustment by gun fire and can stand nearby heavy sending and static.

Wireless set which can be made to send either one of a number of pure musical notes at will, with a quick change feature, for experiment in the search for standard calling tunes.

Wireless telephone good for 12 miles over sea between modern battleships.

Secret sending device; i. e., one whose signals can be picked up only by a special type of receiver or are intelligible only to the initiated.

Means of radiating energy for long-range wireless communication without the necessity for high towers.

The Navy Department is also trying to find an American manufacturer or company who can deliver efficient modern wireless sets, 500-cycle, quenched gap, sizes 1, 2, 5 and 10 kilowatts, within six months, and one who can furnish 50 and 100-kilowatt sets within six months.

THE ELECTRIC ST. LOUIS WIRELESS CLUB.

This club was recently organized with about eleven members; and the following officers were elected: Henry Dahm, President, Ralph Voepel, Vice-President; Robert Stevens, Treasurer; Alois G. Neuwirth, 2008 Allen Avenue, Secretary.

Any amateur wishing to apply for membership, must send a list of his instruments together with his application to the Secretary.

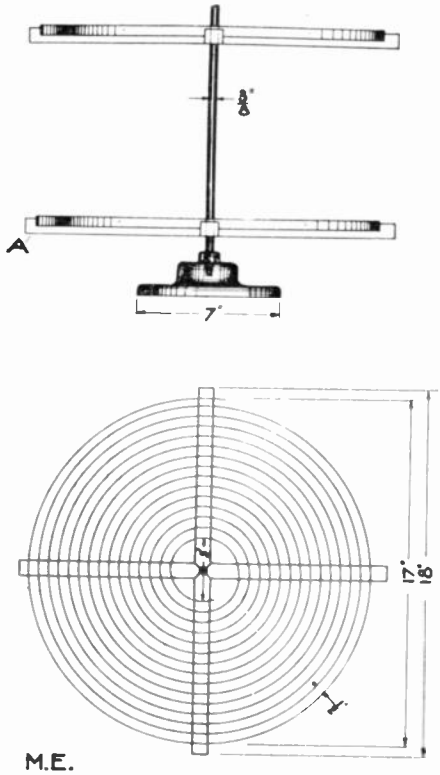
Applicants for membership must live in the vicinity of St. Louis, Mo.

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.

AN IDEAL OSCILLATION TRANSFORMER.

An oscillation transformer made as per sketch certainly has advantages over the "squirrel cage" type. In most cases the mutual inductance of that type is rarely adjustable. Not only that, but it is rather difficult to reach every point on the winding without considerable "fussing." In the flat type of helix, every inch of both windings is easily accessible and the mutual inductance is variable within the widest limits. A and A are 4 pieces of hardwood ¾ x ¾ x 18 inches, finished, sand-papered and heavily varnished, lapped together at the center so as to be flush. A ⅜ inch hole is bored through each cross thus formed directly in the center. The slots for the ribbon may be either cut by a fine band saw before the crosses are assembled or may be cut afterwards by means of a small hack saw. Each slot is 1-16 by ⅜ inch deep. The slots are spaced ½ inch apart. On starting to lay off the slots from the centre lay off each one, around the cross ⅛ inch farther out from the centre than the preceding slot, in this way the ½ inch pitch will be obtained upon completing the circle. It is hardly practical to start the slots any nearer the centre of the circle than about three inches, that is, have the inside diameter of the winding approximately three inches, and the outside approximately 17 inches. After the slots are cut to the required depth the ribbon may be put in position and driven down with a wooden mallet. If the slots have not been cut too wide the ribbon will readily retain its place after once putting it in position. Attention must be paid to see that the ribbon is formed in a true circle between the arms, that is, have each convolution well rounding between the arms.



The base is simply a piece of hardwood turned to a pleasing shape, with a diameter of about 7 inches. A ⅜ inch hole is bored through the center of base and counter bored on the bottom for a ⅜ inch nut. The ⅜ inch brass rod is

inserted into the base and the lower, or primary winding of the helix placed in position and the nut tightened up. The secondary winding may then be slipped into place on the rod above.

The woodwork may be finished in any color but the writer would suggest that all parts be finished in black shellac in imitation of hard rubber. By shellacking all over and rubbing out with fine sand paper, and then again shellacking, a very fine imitation of hard rubber may be obtained. If made according to sketch and finished in black, it certainly makes a piece of apparatus of which you may be proud.

Contributed by

MOORE STUART.

SECOND PRIZE ONE DOLLAR.

A NEW TYPE OF VARIABLE CONDENSER.

Here is an easily made variable condenser.

It consists of a cylinder, A, fixed on a shaft, B, and arranged so that it can be made to rotate. A semi-cylindrical piece of sheet aluminum, C, is screwed to the cylinder, A, in a depression in the latter so that both surfaces lie flush. This is clearly shown in Fig. 2.

Over the cylinder, A, is glued a thin sheet of insulating material, G. In

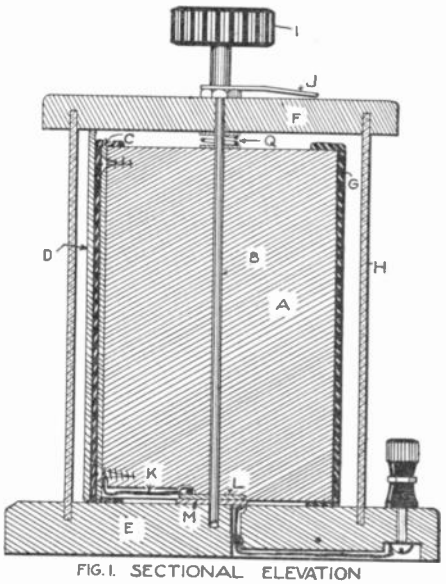


FIG. 1. SECTIONAL ELEVATION

this instance it was paraffined paper, but a coating of shellac, asphaltum, mica, etc., would be just as good. The seam, if it is made of paper or mica, is *not* over the metal plate.

Over this cylinder is made to bear another semi-cylindrical aluminum plate, D. This has four ears (two at the top and two at the bottom),

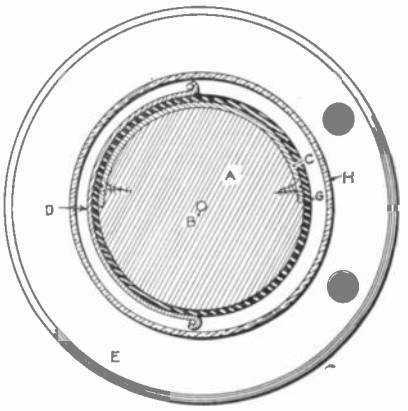


FIG. 2 CROSS SECTION

projecting, and bent over four corresponding pieces of spring-brass wire. These wires are inserted in holes made in the base, E, and the cap, F, and are so bent that the plate, D, is made to bear upon the cylinder, A, with a light pressure.

The base, E, and cap, F, are turned out of hardwood, to the shape shown, with grooves to admit the covering cylinder, H. This is made of aluminum, but it might as well be made of a sheet of black fibre, the seam being a lap joint. The reason a metal case was chosen was because it is more durable than fibre. It should have a tight fit in the grooves, as it is the only thing holding the base and cap together.

A large knob, I, is screwed on the shaft, B, and, beneath it, an aluminum index, J, is clamped with a hexagon nut.

The connections to the binding-posts are made as follows:

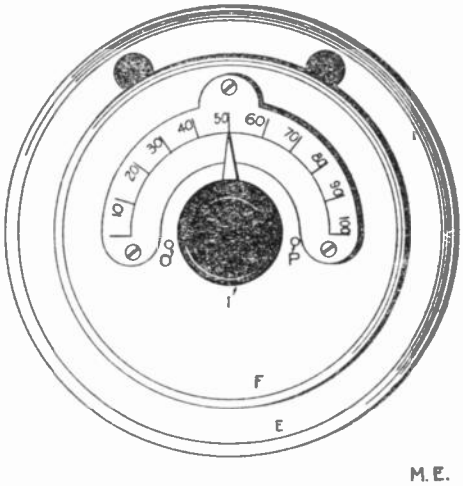
A wire, K, is caught under one of the screws holding the plate, C, to the cylinder, A. This wire is passed through a groove in the cylinder, as shown, to a washer, L, to which it is soldered. This washer makes contact with another washer, M, to which a wire is soldered. This wire is passed through a groove underneath the base to one of the binding posts. The other binding post is connected to one of

the ears of the stationary plate, D, by a wire, running through another groove underneath the base.

Mention was made above of the cylinder, H, being of metal. The reader may have, at first thought, believed that this was not good, inasmuch as a short-circuit could accidentally be made. If the drawings are carefully observed, however, it will be seen that contact *might* be made between it and the plate, D, but a contact with the plate, C, is absolutely impossible.

A scale, H, for the index, J, to indicate the comparative capacity is made from a sheet of German silver and screwed to the cap, F. In my case the numbers and lines were etched upon it as follows:

It was covered with a thin coating of paraffin wax, and the characters scratched on it, so as to leave the surface of the German silver bare at those points. Then it was dipped in a bath of dilute nitric acid and left there for a while. When taken out it was washed in water and then dipped in boiling water to melt off the wax. The engraved surface was then painted over with asphaltum varnish, and when the latter had dried, it was washed off with a rag wet with gasoline. The varnish in the grooves made by the engraving remained, so that a neat and attractive, as well as durable,



M.E.

FIG. 3

scale was the result. It will be noticed that German silver was used, instead of aluminum. This is because aluminum cannot be etched easily, as nitric acid has no effect upon it.

Two pins, O and P, are inserted in the cap, F, at the points shown, to prevent the knob from being turned more than 180 degrees.

As the condenser may be operated at any angle, a small spring, Q, was inserted between two washers at the

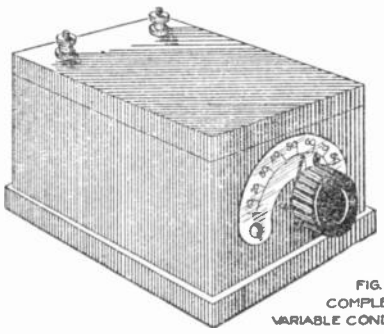


FIG. 4
COMPLETE
VARIABLE CONDENSER

place shown, to keep the washers, L and M, in contact.

From the description above, it would not seem that a condenser of this type could have a high capacity in a small space, as there are only about twenty-four square inches of active surface with a cylinder three and one-quarter inches in diameter and four and three-quarters inches long, the size which I adopted.

However, it must be borne in mind that the two plates, C and D, may be very close to each other, by making G very thin. In my case it is only 0.001 in. thick, resulting in a capacity of about 0.02 mfd.! The total space occupied by the condenser is seven and one-quarter inches by six inches by six inches.

The results were so gratifying that a smaller one was made, having a capacity of 0.005 mfd., and occupying a space of less than three and three-quarter inches by three inches by three inches (Fig. 4)! This also shows a different form of case.

Although not absolutely necessary, I found it to greatly increase the efficiency of the condenser if all the sharp edges of the plates, etc., were rounded with a file.

Contributed by

P. MERTZ.

Note.—The case should not be made of metal for the reason that if a short circuit occurs between the case

not only batteries, but also magnetos, small dynamos, and the like.

Contributed by

P. MERTZ.

A NEW BICHROMATE BATTERY.

The following diagrams illustrate a very efficient as well as economical battery for operating induction coils, miniature lamps, locomotives, motors and other devices requiring an energetic current.

Referring to Fig. 1, we note dimensions there given. The box shaped affair is made entirely of wood, thoroughly soaked in paraffine, and is held tightly together with brass screws. The elements or plates (carbon and zinc) are spaced about ¼-inch apart, and may be two amalgamated sticks of zinc, with rubber rings as separators at the lower end of each, and the carbons taken from old dry batteries. These are assembled, sealed in, and connected as shown in diagram, with binding posts, N and P. The battery is now mounted upon two supports and held firmly in place by two screws, binding the supports against the sides of the battery, in order that it may be

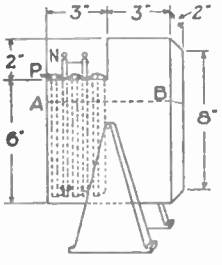


FIG. 1

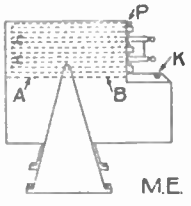


FIG. 2

held at any desired angle. A one-half inch hole is bored at K, into which a tight fitting cork is inserted after battery is charged. For charging pour in three ounces of Bichromate of Potassium, six ounces of Sal-Ammoniac, then fill up with water and allow to dissolve. If a weak solution of Sulphuric Acid be used in place of the Sal-Ammoniac, we get a more energetic current, but the life of both the zinc and the solution will be greatly shortened.

Fig. 1, shows the level of the solution, A-B, and the relative position of the Zinc and Carbon while in use. In Fig. 2, their position is also shown while at rest. (Note that both Zinc and Carbon swing clear of the solution). It is obvious that any degree of current may be had by simply tilting the battery, thereby immersing the whole or any part of the plates. In this way lamps may be dimmed, speed of a motor regulated and other unique results accomplished without the use of a rheostat.

Contributed by

S. K. C.

AN AUTOMATIC TIME SWITCH.

Here is a scheme which I have used successfully in turning off lights at night, automatically, at any desired time. The materials necessary are: alarm clock, a single throw knife switch, a throw rat

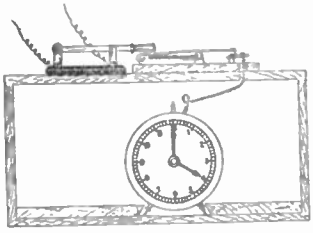


FIG. 1 M.E.

trap, a piece of jack chain six or seven inches long, and a box, (I found one 14 inches long, 10 inches high, and 5 inches deep to be a very good size). The diagram, (Fig. 1), shows the princple upon which it works, and if carefully constructed, will give good results. Place the box on its side, facing yourself, and, on the upper left hand corner, near the edge of the top screw the switch on the box, with the handle of same facing to the right. Next place the trap in position so that when the lever of the trap flies up it will open the switch, as in Fig. 2. When the right position is found screw the trap

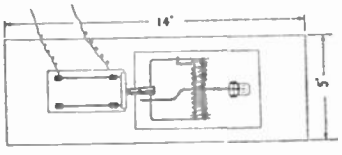


FIG. 2

FIG. 3

down firmly. Bore a hole, about one-half inch in diameter, directly under the trigger of the trap, Fig. 2. The bell is next taken off the clock and the clock is placed in the center of the box below the switch and trap. Two blocks are sawed, as in Fig. 1, and are placed

as in Fig. 1 so that the clock will be held firmly in position, by the legs of same sliding into the slot. The jack chain is next fastened to the trigger of the rat trap and drawn through the hole bored in trap and box and when the right length is found, open one of the links of the chain and place it around the tapper. It would be well to solder this near the top of the tapper as shown in Fig. 3. The switch is now ready for use. It should be screwed to the walls to give best results.

Contributed by

CLIFFORD W. VICK.

BREAK-IN SYSTEM WITHOUT KEY ATTACHMENTS.

In most of the so-called "break-in systems" that are in use at the present time an extra attachment is fixed to the sending key to short circuit the detector so that it will not be thrown out of adjustment.

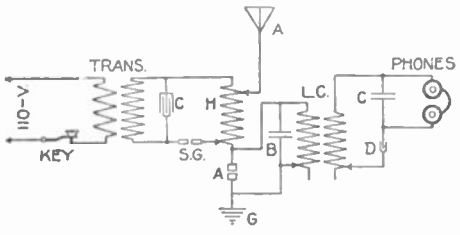


FIG. 1 M.E.

The connections shown below are provided to overcome the necessity of having this key contact and they work very satisfactorily on a half kilowatt outfit and will probably work the same with larger outfits. In the diagram, at A, is inserted a knife edge spark gap which can be made of sheet copper as shown in Fig. 2. This gap is merely an anchor gap inserted between the helix and the ground and it is set very close so that the current will pass into the ground direct. The inductance from the tuner will make enough resistance so that practically no energy will flow through the receiving instruments and destroy the detector adjustment. The length of the gap can be regulated by inserting a piece of paper and closing the electrodes till they are separated by the thickness of the paper.

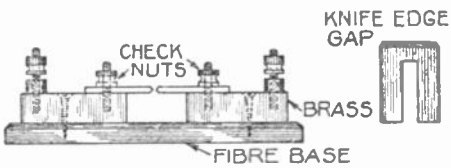


FIG. 2 M.E.

If the leads from the gap, A, to the receiving instruments are very long a second gap should be put across the leads as shown at B, Fig. 3, so that the accumulated energy that is taken from the aerial leads will spark across the auxiliary gap. This one can be much smaller than the first one as the current that will flow through it will be very small. It can be made by screwing two binding posts into a piece of wood and using the heads of small nails for the gap.

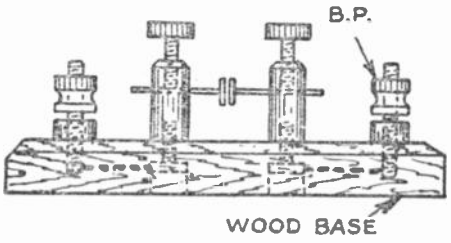


FIG. 3 M.E.

When the gaps are adjusted all you have to do is send and receive without stopping to throw an aerial switch.

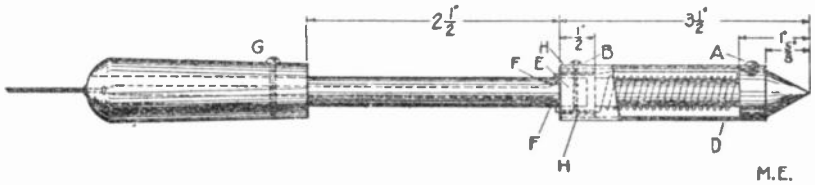
This serves to protect the station from lightning during storms.

Contributed by

STANLEY E. HYDE.

AN ELECTRIC SOLDERING IRON

If the directions given below are carried out properly you will find this tool to be the most useful in your shop. File one end of a 5/8-inch round copper rod 3½ inches long to a point like that of an ordinary soldering iron back to 5/8 of an inch. Next file, or turn out in a lathe, to a depth of 3-16 of an inch, a groove, D, for the heating element. Tap each end for an 8-32 screw at A and B, the one at B to a depth of 9-16 of an inch. Drill a hole 3/8x3/8 at E for the handle. Now obtain a brass tube 3/8-inch outside diameter, and 4 inches long. This is held, in the hole, E, by the screw, B. Get a hard wood handle and drill a 3/8-inch hole from end to end fitting this on the tube and fastening it with an 8-32 machine screw at G. Now get some flat heating wire and wind in the groove, D, first insulating the copper with mica, and using mica between the



layers of wire. Enough wire should be wound on so that when the current is turned on the wire gets a cherry red. The right amount of wire can easily be found by testing. Grooves should be filed, at H H, for the terminals, and holes bored in the tube directly under the grooves, at F F; then the terminals can be brought through the grooves and tubes in beads. After the wire is wound on, fit a brass tube 5/8 of an inch inside diameter and 2¾ inches long over the copper, drilling holes for the screws, A and B. Care must be taken not to get the wire too hot, otherwise it would burn out easily. The iron is ready to use in 20 or 30 seconds after the current is turned on.

Contributed by

G. A. HIGBEE.

AN INEXPENSIVE MAST.

The construction of this pole is very simple and the expense is small.

The holes for the foundation and the guy posts are one foot in diameter and

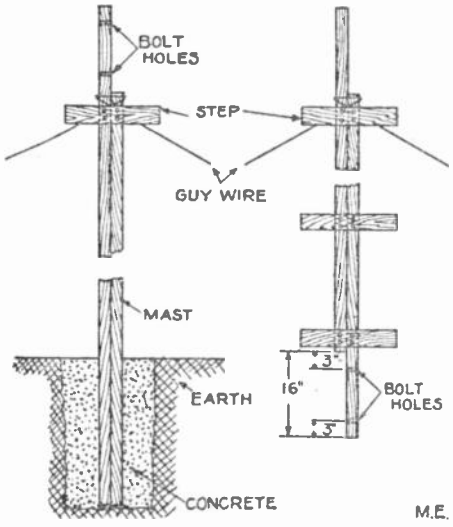


FIG. 1 FIG. 2

four feet deep. The guy posts are four inches square and eight feet long. They, and the mast are set in concrete as in Fig. 1.

The first section of the tower is made up of two pieces of two by four, one, sixteen feet long and the other fourteen feet, eight inches long. These pieces are nailed together with the bottom ends even, thus forming a four by four timber. In the end overlapping, are then bored two holes, one half inch diameter in the places shown in Fig. 2. After this has been done, the guy wires, which are long enough to reach to the posts, are put on as in Fig. 1, and 2. This wire is No. 12 or 14 galvanized iron wire.

Then beginning six feet from the bottom nail on steps every twenty inches. These steps are two and one half inches wide and sixteen inches long.

This section is then set in the concrete and the guy wires tightened. This makes this section ready to be climbed up to put on the next section, as soon as the concrete has hardened.

All the rest of the sections are like Fig. 2. This is the way it is made: Take two, two by fours, ten feet long and nail them together with their ends slipped past each other sixteen inches. Fig. 2 shows this in detail. The holes for the bolts are bored as in the other section, care being taken to have them accurately placed, or the holes won't match. Then fix the guy wires as in Fig. 2 and on the other section. After this is done the steps are put on. The section is carried up and bolted on, then guyed, and it is ready for the next section. In this way the pole may be built as high as desired.

Contributed by

WALKER M. JAGOE.

CAT WHISKER DETECTOR.

I enclose diagram of a wireless detector which I wish to enter in your prize contest. It is easily made and will give good service. Almost any kind of mineral may be used. Following are dimensions and directions for making:

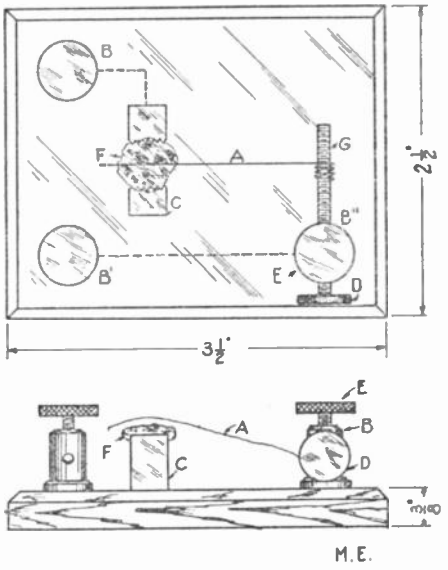
Base is of hard wood, three and one-half inches by two and one-half inches by three-eighths inch.

First procure three large binding

posts. In one of these tap a hole for the screw, G.

In a piece of brass, three-eighths inch wide and about two inches long, drill a hole in center for fastening to base, bend to shape shown, and file the edges like a saw, to hold crystal. Fasten binding posts and brass clip in positions as shown.

Thread a brass rod about one inch long, so as to fit the hole previously tapped. To one end of this, fasten a small rubber knob. Screw the rod into the binding post. To the other end of the rod solder a fine silver, or silver-plated, wire, so as to be in line with center of crystal holder Connect one post to the clip and the other to the wire holder.



A, is the silver wire; B, B′, B″ are binding posts; C, is crystal holder; F, is crystal; E, is a lock screw on wire holder; D, is rubber knob; and G, the threaded rod.

Pressure of contact is adjusted by means of rubber knob and screw.

Contributed by

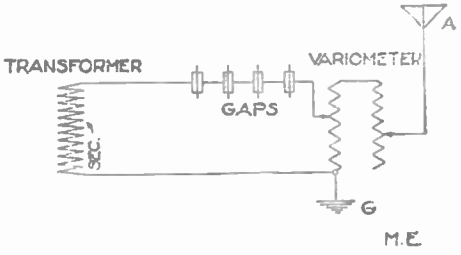
EARL ZANDER.

METHOD OF GROOVING PLATES FOR QUENCHED SPARK GAPS.

I have read with interest your article on the "Quenched Spark System," by C. A. Le Quesne, Jr.

In constructing this gap, I used circular plates of copper, three-sixteenths inch in thickness, with a groove on one side of each, one-quarter inch wide and one-eighth inch deep.

This groove was so placed that, in assembling the gap, the inner edge of



the mica ring coincided with the middle of the groove, thus protecting the edge of the mica from being burned by the spark.

As I had no lathe, with which to groove the plates, I gave each plate a thin layer of paraffine on the side to be grooved. Then with a pair of dividers I marked the "ring" where the groove was to be, and removed the paraffine from this ring. I then put strong nitric acid on this bare ring, and in a short time each plate was grooved as neatly as could be desired. The paraffine, which was put on the plate to confine the action of the acid to the ring, or space to be grooved, should be thoroughly removed.

I used mica rings 0.135 inch in thickness. Also retained all principal dimensions of the gap described in the February issue of *Modern Electrics.*

When carefully adjusted, this gap gives twenty per cent. higher radiation than when the ordinary spark gap is used.

I use a small variable sending condenser and a variometer in connection with this gap, as shown in the hook-up herewith.

Contributed by

G. S. CORPE.

Note.—When using grooved flat plates instead of the built-up plates, specified in the article mentioned, mica rings 0.01 inch thick should be used. It is important that the distance the spark has to jump in each gap does not exceed 0.01 inch.

C. A. L., Jr.

A HOME-MADE, MOTOR-DRIVEN LATHE.

I have recently made a very inexpensive and serviceable lathe, details

of which are shown on the enclosed sketches.

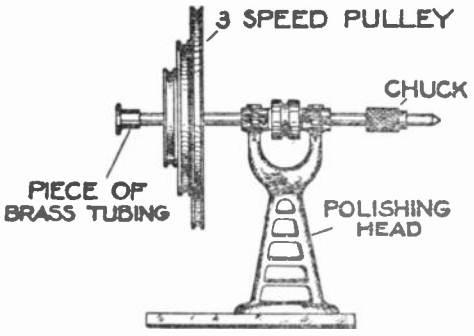


FIG. 1 M.E.

A polishing head, such as used by jewelers, may be obtained for about $1.50, having on one end of the shaft a chuck. If it does not have a chuck, a drill chuck should be fitted.

On the other end of the shaft, mount a three-speed pulley—the largest being

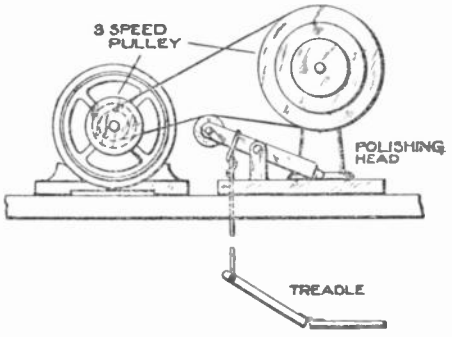


FIG. 2

9 inches, the intermediate one 7 inches and the smallest 5 inches in diameter. These pulleys may be easily made by sawing out of pine, roughly to shape, and then truing up by being held against a rapidly revolving emery wheel. The sharp edge of the emery wheel will soon cut a "V" groove around the periphery for the belt. Details are shown in Fig. 1.

For driving the lathe, I have used a one-eighth H.P. induction motor. Aside from its inherent simplicity, the induction motor runs at practically constant speed, whether loaded or not. If overloaded, it simply stops. With a series wound motor, the speed is entirely dependent upon the load and voltage. If the load is suddenly thrown off, the motor will speed up. My induction motor runs at 1,750 RPM.

In Fig. 2 is shown the polishing head, mounted on a piece of board, together with the motor, and a foot-operated belt tightener, or idler. It will be noted that when the treadle is fully depressed, the belt is slackened and the end of the lever comes up against the largest pulley, acting as a brake. By releasing the treadle, the gum band pulls the idler pulley

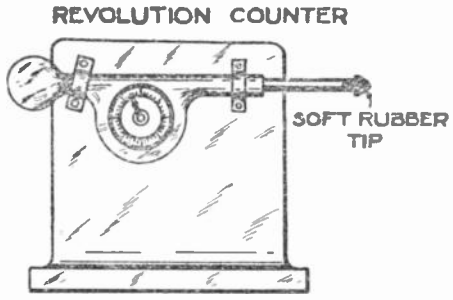


FIG. 3 M.E.

against the belt, tightening it, and starting the lathe. This arrangement will be found especially valuable for coil winding. The lathe can be stopped instantly, and started without any jerk.

Fig. 3 shows a very useful kink I have used in winding transformer coils. Counting the turns is impossible, with a motor-driven lathe—at least, it is exceedingly difficult, and the likelihood of error is great. I have used one of the regular "Starret"

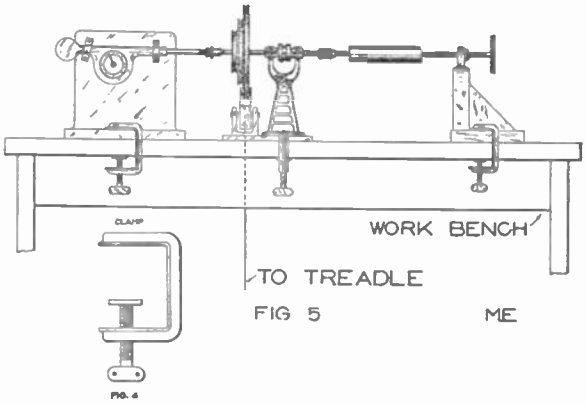


FIG 5 ME

speed or revolution counters, mounted as shown.

In Fig. 1 it will be noted that there is a small brass ferrule, or piece of tubing on the end of the shaft, into which the soft rubber tip of the speed indicator is placed. Of course, if the end of the shaft has a cup center, the ferrule is unnecessary. The number of revolutions may be read at any time, direct from the dial. I have found this a great help.

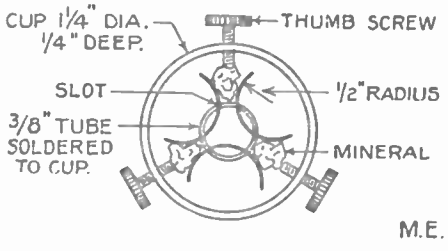
Instead of making a lathe bed, I mounted the polishing head, revolution counter, and lathe center on small pieces of board, which were then clamped in position along the edge of my work bench, as shown. These cast iron clamps may be purchased for five cents apiece, and will be found very convenient for other purposes as well.

For a belt I used a piece of very heavy cord, which receives a dressing of beeswax, occasionally.

Contributed by
WESLEY G. PAULSON.

MINERAL HOLDER.

Enclosed please find sketch of a mineral holder for a perikon detector. Although the space for the mineral seems small, it is enlarged by the spreading of



the curved brass pieces, and, as a matter of fact, the "Zincite" usually comes in small pieces.

Contributed by
H. W. THOMPSON.

HOW TO MAKE AN 8 A. H. STORAGE CELL.

The materials required are: 1 sq. foot of 1/16-inch sheet lead; some ⅜-inch wood; some red lead; some yellow lead or litharge (both procurable at a paint store); some chemically pure sulphuric acid; and some tar.

From the wood make a box 1x6x6 inches, coat the inside and outside thoroughly with the tar, which should be put into a can and melted and applied with a brush.

Now take the lead and cut it as shown in Fig. 1. Make three pieces. When these have been made, get a piece of soft wood a little larger than one plate. Lay a plate on this wood, then, with a nail set and a hammer, punch it full of holes as shown (Fig. 1).

When all of the plates have been punched, take an old crockery cup,

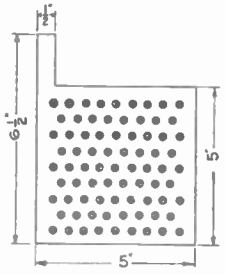


FIG. 1

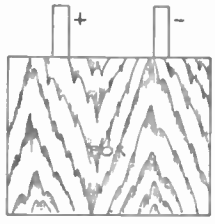


FIG. 2

put in some red lead, and mix with it a twenty per cent. solution of sulphuric acid. Mix well with a glass rod, being careful not to get it too thin. When it is about the consistency of sticky mud, plaster one of the plates with it. Be liberal, but do not put it on too thick. Do the same with the yellow lead and the other two plates. Before the plates are put into the box, two pieces of wood should be put in the bottom to keep the plates from being short circuited by pieces of filling dropping off the plates.

The plates are separated by pieces of wood taken from an old peach basket. The plates are now ready to be put together. Lay a separator on the table, then lay a negative or yellow plate, then a separator, then the red or positive plate with its lug at the opposite side, then a separator, and last a yellow plate and a separator. Bind all together by heavy rubber bands. Put plates in box, and just cover with 20 per cent. solution of sulphuric acid. Make a cover of cardboard or thin wood with holes in the top for lugs and a vent to come through. Solder the two negative lugs together. Drill a hole in each lug for a binding post. This cell gives two volts and one ampere for about eight hours. Finished cell looks like (Fig. 2).

Contributed by
E. H. BRADLEY.

A WIRELESS OUTFIT FOR A DOLLAR.

Recently I finished constructing a wireless outfit, with which, while it cost me only one dollar to make, I am able to send and receive to the extent of over a quarter of a mile. My idea in building it was to see just how cheaply an outfit could be built.

The materials I bought are as follows, together with the prices:

1 Phone	$0.35
1 Buzzer	0.35
¼ Lb. No. 24 bare copper wire..	0.10
1/3 Lb. No. 14 bare aluminum wire	0.20
Total	$1.00

The rest of the material I found lying around the house and was merely scrap.

The sending battery consists of (12)

FIG. 1

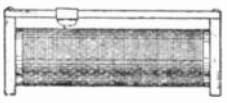


FIG. 2

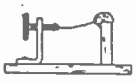


FIG. 3

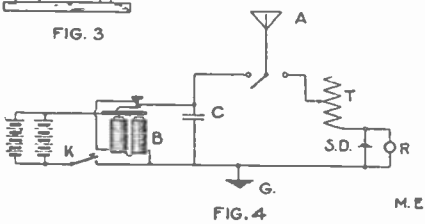


FIG. 4 M.E

twelve dry cells connected in multiple-series (two rows of six cells in series). These batteries I got for nothing at different garages in the city, being considered no longer fit for use; but I found I could get quite a respectable current from them when a large number was used.

The key is made of strips of brass, (or other metals may be used) 1-32 inch by ½ inch. Figure 1 shows the key. The condenser is made of a 4 x 5 inch photograph plate with a sheet of tin foil 3 x 4 inches on each side and having a lug ½ inch wide extending out from the glass. Wrap the condenser with some thick brown paper and glue or bind it. The lugs should be wrapped around two (2) pieces of copper wire about six (6) inches long, and soldered or bound tightly with thread.

For the receiving set you will need a small tuner made as shown in Figure 2. The No. 24 bare copper wire is wound on with a thread between the turns. The design for the detector is shown in Figure 3. The contact on the silicon is made by a fine silver, gold or copper wire, but I find silver is the best.

The set is wired up on a baseboard as shown in Figure 4.

The aluminum wire was used in making the aerial.

Contributed by

LANCE BOYD.

A SEMIVARIABLE CONDENSER.

The following described variable condenser, which is built in sections, is very useful when one of the rotary, or plate type, cannot be obtained; or it may be used as an auxiliary. The condenser is of paraffined paper and tin foil, built in sections of whatever capacity is desired, and the method of construction is shown in sketch.

Procure a piece of one-quarter inch rod, seven inches long. Also a piece of five-sixteenths inch (outside) tubing, three inches long, to fit the rod. Tap the rod at both ends for an eight-thirty-two screw. Also procure two brass pillars, one-half inch high, five-eighths inch thick, with holes for an eight-thirty-two screw, an electrose knob, and some thin sheet brass.

Cut up the sheet brass into pieces and bore holes in them, as shown in Fig. 2. Cut as many as there are sections of the condenser. Then, assemble on the condenser case, or receiving cabinet, as shown in Fig. 1. Bend the brass contacts into the shape shown

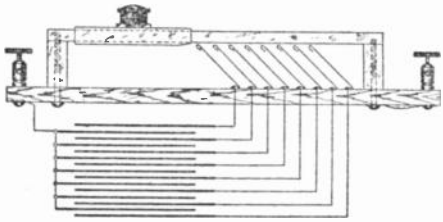


FIG.1

FIG. 2 M.E.

and fasten to the wood with small screws, connecting a section of the condenser to each one. Bend them up until each one nearly touches the one-quarter inch rod. Now, when the five-sixteenths inch tube slides over the rod it

should touch all contacts. By pushing back and forth the number of sections, and hence the capacity, may be varied. The one-quarter inch rod is fastened to the board by eight-thirty-two screws from below, through the pillar, or by wood screws passing down from the top. A flat-headed eight-thirty-two screw is soldered to the tube and the electrose knob placed on it.

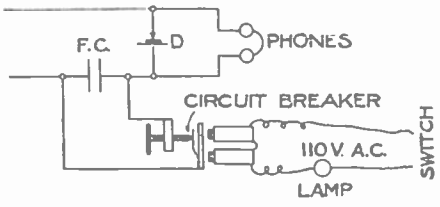
If one side of each section be one sheet of tinfoil, having ten square inches of surface, and using paraffined linen paper, the capacity of each will be approximately .0001 mfd. If desired a pointer or hand from a clock may be fastened under the electrose knob, and a scale made, showing the capacity in circuit.

This condenser may be used wherever a variable condenser, or a fixed condenser of several capacities, is needed. It may be shunted across one of the rotary or slide plate type. Rough adjustment for capacity is made on this while finer adjustment is obtained by the plate type condenser. Sharp tuning is thus made possible.

Contributed by
HENRY L. DAHM.

SIMPLE POULSEN TICKER.

The present is a diagram of a Poulsen Ticker, which, I think, will be of interest to some amateurs. It is not necessary to have a telegraph relay, as shown in the February issue, in the Experimental Department. The fact that a relay was required



M.E.

would prevent some from attempting to construct the ticker.

Instead of a relay I used a buzzer. Disconnect the magnets from the contact points and connect them as in the relay. Now connect to the contact points just as you would connect the relay contacts. You now have a ticker that is just as good as the one constructed from the relay, and it costs very much less.

Contributed by
JAS. LEROY HODGES.

BALANCED DETECTOR STAND.

A is the base 5x2 inches; B is a double binding post, with top set screw removed; C is hole where lead wire goes in; D is hole in binding post for the balance rod, and the rod should fit easily in the hole, or the hole may be drilled to fit one-eighth inch rod; E

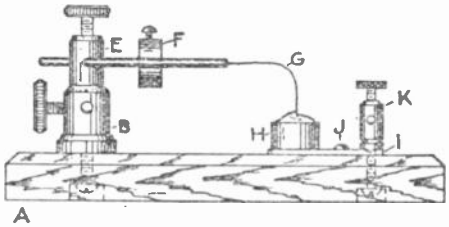


FIG. 1

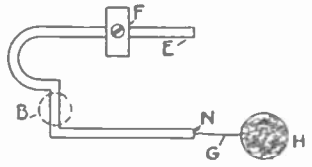


FIG. 2 M.E.

is balance rod (one-eighth inch copper). The part, N, in Fig. 2 should be made first and put through the hole in B and then bent as shown. F is a counter weight and should be one-half inch in diameter and one-quarter inch thick with one-eighth inch hole in center to slip over balance rod E, and should have a small set screw, M. A small hole should be drilled in rod, E, at N, to receive the No. 30 steel or phosphor bronze wire, G, which should be bent as shown in Fig. 1, and be three-quarters inch from the end of balance rod to the point where it bends down to the mineral. Cup, H, should be not less than one-half inch in diameter, and should be soldered to plate, I, and drilled to receive small screw, J, and binding post, K, as in Fig. 1.

Contributed by
M. E. ARMSTRONG.

Simple Experiments in Alternating Currents

(Continued.)

By P. Mertz.

9. While the induction motor as explained in §8* is very simple and therefore adapted to many uses, it cannot start well under load. If the

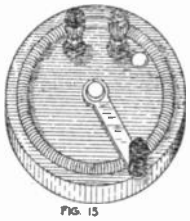


FIG. 15

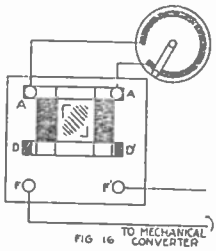


FIG 16

amount of current flowing in the field winding be lowered for starting, the torque (twisting power) is greatly reduced. On account of this, the *wound* induction motor is often used.

To experiment with this you will need the use of a *starter*. This is nothing more nor less than an ordinary rheostat; in Fig. 15 is shown a type that can be bought more cheaply than could be conveniently made, and is perfectly adapted for this experiment. You should connect it with the rotary converter (§1)† and mechanical converter as shown in Fig. 16. You will notice that when the motor is wired in this way the resistance of the starter controls the amount of current flowing through the armature coils, and therefore the speed of the motor.

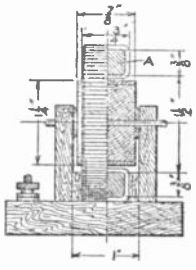
However, it does not decrease the torque. From this you will see that simply by turning the starter lever the speed can be adjusted, the torque remaining constant, so that the motor can be started under load. Some motor designers go even farther than this, by placing the whole starting arrangement on the shaft, next to the armature, and controlled by centrifugal force, so that the motor will be self-starting. This feature, however, complicates the construction very much, so that it is used only on large motors.

10. Another type of induction motor used to some extent is known as the *creeping field* motor. This motor cannot, like the preceding ones, be made by using the rotary converter (§1)†, but must be specially constructed. It is shown in Fig. 17.

It consists of a circular core, A, which can be made of a number of thin sheet iron laminations of the required size. It can also be made by winding a ribbon of thin, soft iron or a length of soft iron wire around a wooden mandrel. The field winding consists of two layers of No. 24 S.C.C. wire wound as shown in Fig. 18. The first layer is represented by the inner circle, and the winding should be reversed at every 90 degrees. The second layer is wound in the same way as the first, but the starting point should be 45 degrees away from that of the latter.

The armature simply consists of a wooden cylinder over which are wound a few layers of thin, soft iron ribbon or soft iron wire. A tin box may be used instead, if it is of the same dimensions. A piece of steel wire passes through it, serving as shaft. The standards, base, and other minor things should be constructed and the connections made to the binding-posts. For running this motor you will also need a *choke-coil*. This is similar to the field of the motor, except that only one layer of wire is wound and it is not reversed at every 90 degrees. You

FIG 17



should then connect all the apparatus together as in Fig. 18.

To understand the working of this motor we will have to first study the operation of the field. You will notice that the choke-coil is connected in series with the inner winding. The re-

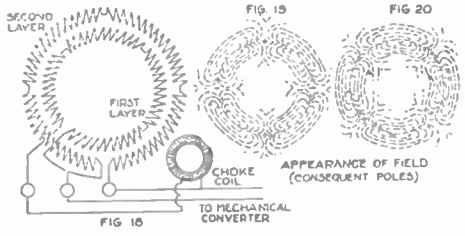
* See p. 156 May Issue.

† See p. 153 May Issue.

sult is that at every alternation the outer winding will be first energized, the choke coil holding back the magnetization of the inner winding till about the middle of the alternation. Let us now study the aspect of the field when the outer winding is being energized. It will be something like that shown in Fig. 19; when like poles are arranged together they are known as *consequent poles.* Now at the next instant the whole field will move 45 degrees, as shown in Fig. 20. At the next alternation of current it will move another 45 degrees, and will again be like Fig. 19, except that the poles will be of opposite polarity. In this manner the whole field will keep *creeping* steadily around the core.

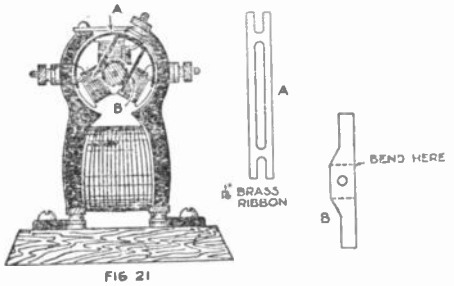
Now iron, you will remember, has magnetic inertia (hysteresis), that is, it will resist to some extent any change of magnetic polarity, so that the armature, always being attracted to the same pole, will keep following the field.

This motor runs much more smoothly than the ordinary induction motor, and will be spoken of again under two-phase currents.



11. Still another type of induction motor in use at the present time is known as the *repulsion* motor. To experiment with this you will need to restore the three-pole armature to the toy motor from which the rotary converter (§1) was made. The brushes should be removed, and in their place, a piece of brass ribbon cut as at A, Fig. 21, and bent into a semi-circle, should be fastened at its ends. Another piece of brass ribbon, B, should be cut, and bent as shown by the dotted lines, the space between these lines being nearly equal to the diameter of the commutator. This piece, B, should then be fastened to the piece, A, by a battery binding-post, as depicted in the illustration. It will be seen by this that the piece, B, can be clamped at any angle with respect to the field poles. The field coils should then be connected to the mechanical converter.

The principle of operation of this type of motor is quite simple. Instead of the current having to flow through all the coils as in the ordinary induction motor (§8), it flows only through those so situated as to have the maximum number of magnetic lines of force passing through them, together with the highest pulling power. That is, the coils whose axes are parallel to the lines of force can cut a large number of lines of force, but they have little pulling power, being on the dead cen-



ter. On the other hand, those whose axes are perpendicular to the lines of force, have the maximum pulling power, but few lines of force can thread them. Therefore only those whose axes make approximately 45 degrees with the lines of force should be included in the circuit. The two pole armature cannot be used with this motor because it will be seen that the same two poles will always be in the circuit, and no advantage will be gained. The above system utilizes a great amount of current that would otherwise be wasted in passing through coils in useless and inefficient positions.

The result of this is that the efficiency of this type of motor is very high, although its construction is somewhat more complicated than that of the ordinary induction motor.

(To be continued.)

THE LEXINGTON WIRELESS CLUB.

This is a club for boys and we take members between the ages of 10 and 15, and they must be interested in the art.

Please communicate with the president, John F. Schlichting, 254 Sumner Avenue, Brooklyn, N. Y.; Secretary, Edward Goetz; Chief Operators, Frank Wilson and John H. Schlichting.

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Idiotorial

Our Editor.

The Editor is Pickled to Death over the outcome of our voting contest. The replies came in by the barrelful and the Post - office could hardly handle the immense traffic. 596594 readers like Fips, 596594½ others would like to catch him on an open lot. (The "½" happens to be a ½-brother to one of our readers.) Nothing succeeds like popularity.

The Editor urges our readers to read every word of the "Wireless Screech Association of America"; every reader should belong to this illustrious league, as it fathers and mothers only the highest standards of human endurance.

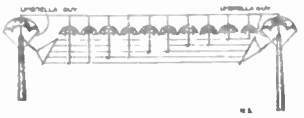
The Editor cannot but feel proud of his great achievement of bringing about this condition on our little planet and unless someoue gets his goat, he will surely keep up the fine work.

Expearimental Department

FIRST PRIZE: TWO (2) YEARS IN SING-SING.

A SIMPLE UMBRELLA AERIAL.

Having tried a great many aeriuls, such as the loop aerial, flat top aerial, and others, but finding that all of them do not work well in the rain, on account of the inevitable leakage caused thereby, I set about to construct an umbrella aerial, of which I had read so much. Altho I have never seen such an aerial I constructed one after my own plans



Umbrella Aerial

and specifications and I can only say that it beats positively anything I have ever seen or heard.

My father being in the umbrella business, I had no trouble in securing twelve large umbrellas. Between two masts I stretched a regular 5-wire aerial and on top of each mast I mounted a big umbrella. Between the top of the two umbrellas I stretched a light aluminum wire and on this I attached the ten umbrellas as shown. The handles of all the umbrellas were attached to the aerial proper as shown in illustration. This is for the purpose of keeping the umbrellas from flying away and also to steady the aerial.

No matter how much it rains, my umbrella aerial keeps nice and dry and thus my sending as well as receiving radius is enhanced at least 51 per cent.

Contributed by

K. NOWSITALL.

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 any fool, 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.

RECEIVING DISTANCE.

(B1269%.) Jonathan Slickguy, Tomahawk, L. I., shrieks:

My aerial is composed of 14 strands of 14-stranded, stranding cable. The aerial stands on the strand. I have eighteen loose couplers, close coupled together, except two of the loose couplers, which being close loose couplers, are of course loose coupled by means of a loose coupled loose coupler. Each loose coupler is close coupled to a detector of my own design, except the two close loose couplers, which are close coupled to the two detectors, also of my own individual design.

I have an eighteen pole, triple throw switch, which close couples the loose couplers or else loose couples the close couplers, except the two loose close couplers, which are loose coupled ordinarily but close coupled extra ordinarily. I use a 75-Ohm receiver. What is my receiving range?

A. While we do not generally make it a practice of indulging in higher mathematics, it would appear that in order to thoroughly circumscribe the ordinary methods of the procedure from the standpoint of modern ethics, contrary to the necessary disturbing secondary effects which perforce underlie such problems as these, it cannot be denied that, bearing the aforementioned facts in mind it should be possible to analyze with mathematical exactitude the resulting polarization plane with respect to the rising node of the vernal equinox, also of course bearing in mind, that in order to come to a satisfactory as well as bi-

ological conclusion, it should be remembered, contrary to adopted adaptations, that the negatively charged ions from the positively (+) charged meridian would in noway be directly affected by the equatorial parallax in the horizontal plane of the prevailing atom, but that it must be clear even to the casual layman that the distance will be inversely proportional to the cube of the longitudinal aberration of the angular retrogression superimposed directly upon the nebular hypothesis, ad ipso factum.

A QUESTION.

(C9059¼%.) Reggy Vanderpuysterboom, Lala, La., lisps:

Q. What is the foolishest question you have ever been asked?

A. Yours.

200 METERS WAVELENGTH.

(D40019½%.) S. W. Itch, Point, Tex., howls:

I am an amateur and want to know my rights. I have a 13 K.W. Transformer, a 15 K.W. spark gap and a 16 K.W. aerial. How can I prevent this outfit from sending out over 200 meters wave length, which, so I am told, is all we amateurs will be allowed to use shortly?

A. Why my dear Mr. Itch! You amaze us. You might as well ask us if your grandmother had any children!! However, since you don't know, here goes:

Strike a circle of 200 meters radius with your aerial in the exact center. On this circle erect 200 poles, 200 meters high. Then stretch 200 wires from one pole to the other, all around the circle. When all the wires are stretched attach between every two poles two hundred wire sieves.

Now when you send messages, the wire sieves, 200 meters away from the aerial, will pass only waves 200 meters long; the longer waves will simply drop down on the ground, where they can be collected and used over again or else they may be used as fertilizer.

The Wireless Screech Association of America

DIRECTORS:

Prof. Spif Marseroni, P.S.; N.B.; T.O.; R.S.V.P., of the Etherial University of Canaljo, Planet Mars.

The Right Hon. Sipf Cocodyplosaurus, B.C.; C.O.D.; H.M.S., I.e., of the Parthenon of Athens.

Prof. Ipfs Francisco del Cervantes Beaucoupdeschmierkaeshelmer, R.R.; N.Y.C.&H.R.; B.&O.; S.P.; U.P.; K.T.C., of the Wireless Observatory of the Bastille, Paris.

H. R. H. Mohammed Ulysses Socrates Fips, M.S.S.; e.g.; A.M.; P.M.; N.N.W.; S.S.E.; A.T.&S.F.; S. W.; P.R.R.; A.D.+. Editor of the Wireless Screech, U. S. A.

The Wireless Screech Association of America has been founded with the sole object in view of spreading the wireless disease in these United States.

The illustrious directors who organized the new association have observed with the greatest regret that the wireless amateurs of America do not screech loud enough—they do not make enough propaganda—they do not advertise themselves sufficiently. Butting in in other people's messages or "jamming" the ether is not the best way to advertise Wireless in America. There are other methods of informing the public at large that there is a great federation of Wireless Screechers on this continent, and it is mainly for this reason that the great association has been founded.

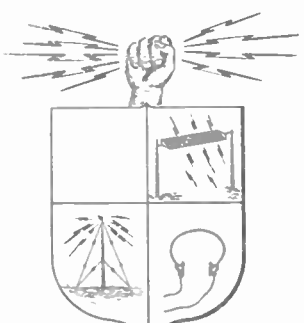
One method of exciting interest, is, of course, through the daily press. While quite a few wireless screechers have had their pictures and their stations in the local papers, there is no reason in the world why every paper from Portland, Me., to Portland, Ore., should not have some news of an amateur station each and every day. The amateurs should cultivate the friendship of the reporters. These poor fellows are only too glad to get some "dope" for their paper, especially in the summertime. They usually "swallow" everything eagerly and the less they understand about wireless the better their story will be. Just drop a few casual words about your having received last night at 11.55 P. M. a strange lot of unreadable signals in a strange, never-heard-of pitch, and you will read next morning at breakfast in the "Bungville Hurrah" something like this:

GETS MESSAGES FROM MARS. AMATEUR HAS CAUGHT THEM.

"Down at 69 Clinton street, "Ted Tinkersome, the young "Edison of our city and wireless "amateur, when visited last night "in answer to an urgent call, "gave an uncanny demonstration. "The young 'ethershinger' clapped a pair of odd-looking re"ceivers on the reporter's ears "and after manipulating a few "strange levers, switches and "knobs, the most extraordinary "signals were heard, extending "over a period of 12¼ minutes. "After a few minutes our repor"ter became so unnerved listen"ing to the uncanny message, "that he sank down on his knees "overawed; he became so befud"dled in his brain that he started "to pray: 'Now I lay me down "to sleep ——' ".

And so on for columns and columns. Your picture and that of your station is of course in the paper and you are the hero of the day.

Another good method of drawing the public's attention is to hang out a wireless shingle, and if displayed conspicuously everybody who passes will know that a wireless amateur lives there. We give an illustration of such a shingle or sign. We might even call it a wireless crest. Of course the owner may make it to suit himself, but the crest shown covers the subject fairly



well. The blank field represents the ether. If curious people ask why it is blank, tell them ether is invisible, that's why the field seems only blank. Just the same it's full of ether!

The Wireless Screech Association will give monthly prizes for the best ideas for advertising Wireless in the U. S. and all suggestions should be sent to the Editor of the "Screech."

This Month's Supplement

This month we present as a supplement, instead of a photogravure, a working drawing for an oscillation transformer of the flat spiral type. It is capable of handling any transmitting set up to 1 kw.

A word concerning inductances of the flat spiral type. This type of sending inductance has not found favor generally with amateurs in the past, principally, because they did not realize its advantages over the cumbersome helix. It is of the type used today by the Telefunken Company in connection with their singing spark sets, the carrying power of which is well known, and it will be used, more and more, as people come to realize its advantages over inductances of other types.

This oscillation transformer has been designed for use on a wave length of 200 meters or less. As mentioned elsewhere in this issue, a bill has passed the United States Senate, which is practically the same as the Alexander Bill, which we printed in full in our last issue. This bill, which will probably pass the House of Representatives before the close of the present session, limits the wave length of private stations to 200 meters; and as this oscillation transformer is intended to be used mainly by amateurs and experimenters, it has been designed to conform to this wave length and has been purposely made small on that account, though longer wave lengths than this may be obtained under certain conditions.

Either coil contains sufficient inductance to permit the use of either a rotary or a quenched spark gap and obtain a pleasing musical tone to the spark. The limits for the spark frequencies when using a rotary or a quenched spark gap using all of one coil in the condenser circuit are as follows: ¼ kw, 650 sparks per second; ½ kw, 1290 sparks per second; 1 kw, 2670 sparks per second.

The new wireless regulations specify the use of a pure wave, also that it be sharply tuned. This is the apparatus that will give it to you, so get busy boys, and build one.

A NEW POULSEN WIRELESS STATION.

Much active work is being done by the Federal Telegraph Company, who operate the Poulsen System of Wireless Telegraphy. They are making notable progress in the building of many new stations in various parts of the United States, in accordance with their plan of establishing wireless telegraphic communication on a commercial basis from one end of the continent to the other.

They have just purchased an eleven-acre tract of land in Oregon. It is situated in Jackson County, in the southwestern part of the State, about one-half mile east of the town of Centralpoint, on the Southern Pacific Railroad.

It is their intention to erect a large wireless telegraph station on this property, and equip it with apparatus of such a nature as to make this one of the most powerful and complete stations on the Pacific Coast. To support the aerial wires, two lofty towers will be constructed, each 300 feet in height. These will be 100 feet higher than the standard wireless towers of the Navy Shore Stations, which are 200 feet high.

This company already has twelve stations in full operation, some of which are located on the Pacific Coast, while others are situated east of the Rocky Mountains. They are handling regular messages, day and night, charging the same rate for fifteen words that the other companies charge for ten words. All these stations have a power rating of 12 K. W. each; their equipment has all been manufactured at the company's own plant at Palo Alto, California.

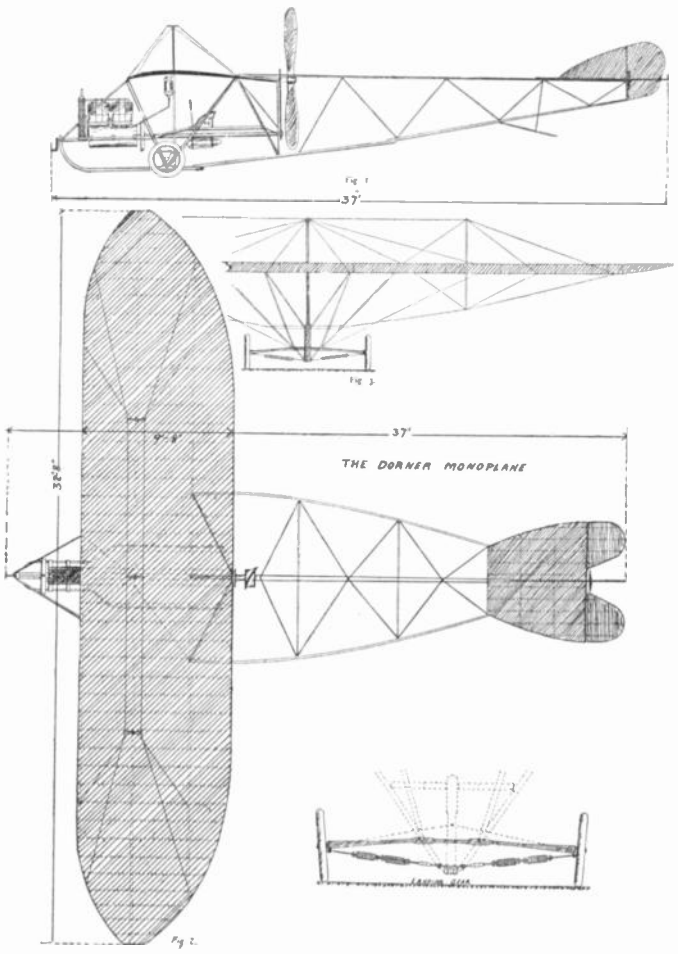
The successful accomplishment by the Federal Telegraph Company of the task which they have undertaken will unquestionably be a great achievement in wireless work.

TURBO-GENERATORS FOR LOCOMOTIVE HEADLIGHTS.

The Westinghouse Machine Company, of Pittsburg, has developed a new type of turbine and generator for supplying the power for the electric headlight of a steam locomotive. The generating unit is very compact, and as it operates on exhaust steam from the locomotive, it costs almost nothing to run it.

The Dorner Monoplane

One of the few really original and distinctive types of successful monoplanes is the Dorner machine, a product of H. Dorner, of Berlin, one of Germany's most consistent aeronautical designers and pilots. Although the Dorner monoplane differs radically from most accepted designs, it nevertheless has proved itself a capable flier and record breaker.



It is of the low centre of gravity underslung type, having the weight of both the engine and the pilot situated below the main plane. The motor, which is situated in front, is hand cranked and drives the large two-bladed propeller through a clutch, shaft and chain transmission as shown in Fig. 1. This system of transmission has the advantage of allowing the operator to start his motor when on the ground without the propeller turning and also permits him to accomplish glides with his motor running and the propeller stationary.

The principal dimensions of the machine are as follows: Span, 31 feet; length, 37 feet; chord of wing, 9 feet 8 inches; engine, 36 H. P., 4-cylinder Korting, which drives a large "Eta" propeller at reduced speed through sprocket and chain transmission.

The Fuselage.

The fuselage, which is built of wood and steel tubing, is of the open triangular type tapering front and rear with the single main spar running along the bottom and acting as a skid. The two upper spars are spread out in the vicinity of the propeller to

allow plenty of clearance, but taper to a point both front and rear. The fuselage uprights are put in slanting fashion, thereby acting as cross braces and eliminating the necessity of wire bracing. Owing to the depth of the fuselage in front the pilot is provided with roomy seating accommodation and also has an unobstructed view in all directions.

The Main Plane.

The construction and warping arrangement of the main plane is the chief peculiarity of the Dorner machine. It is built up, contrary to general practise, with three main spars, one in the centre and the other two near the edges of the planes. The centre main spar is rigid and has three vertical posts mounted on it, one in the centre and one near each end of the wing. A system of wiring runs through pulleys mounted on these posts and is so connected to the two outer main spars of the wings that these can be moved equally, one up, the other down in such a manner as to warp the plane the same amount at each end, thereby overcoming the usual drag on the low side. A careful study of the accompanying drawing will show clearly how the Dorner warping system works.

The Tail.

The tail of the machine is of the flat non-lifting type and is longer than it is wide and is intended to act as a stabilizer. Two elevator flaps attach to its rear while the rudder is placed directly between them.

The Chassis.

The landing chassis is of the single skid and two wheel variety and in principle is somewhat similar to the Nieuport, although its construction is somewhat different. The two wheels are mounted on a springy arched wooden axle which is strengthened without losing its flexibility, by a system of springs stretched across between the wheel centres under the arch of the wooden axle.

JEWISH BOYS' MODEL AERO CLUB.

This club has recently been organized for the purpose of furnishing instruction in the art of aviation and the stimulation of the interest of its members in the construction and flying of model aeroplanes by means of contests which are held Sunday afternoons at Hamilton Fish Park, New York.

Anyone interested should communicate with Mr. Samuel Wein, 51 East 98th street, New York City.

WIRELESS TELEGRAPHY FROM AN AEROPLANE.

The accompanying photographs were taken recently, at Hendon, England, in connection with some successful experiments in transmitting and receiving messages from an aeroplane in flight. The first picture shows Mr.

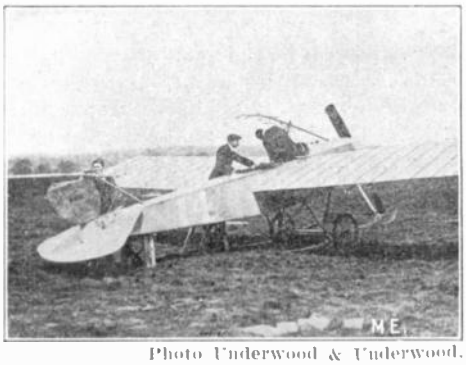


Photo Underwood & Underwood.

Fitting up the Aeroplane.

Valentine's Bristol monoplane being fitted with the necessary aerial and apparatus, which required but eight minutes time and but forty feet of wire. The second shows Mr. Valentine operating the transmitter. It is said that the experiments were entirely successful, up to distances of five miles; and that the greater the altitude, the clearer the messages were received.

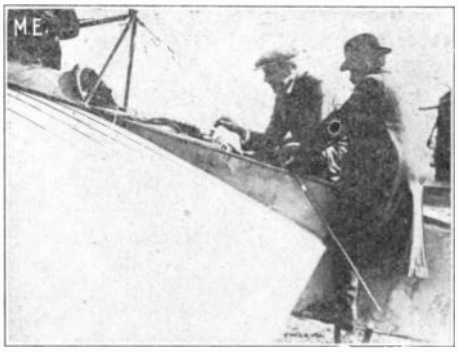


Photo Underwood & Underwood.

Operating the Transmitter.

CALIFORNIA WIRELESS CLUB.

The amateur Wireless Telegraphy Club of California. Evan S. Marlin, Irving Sawyer, Managers; Evan Marlin, Secretary. Box 55, Capitola, Cal.

"One on the Editor"

Editor *Modern Electrics*.
Dear Sir:

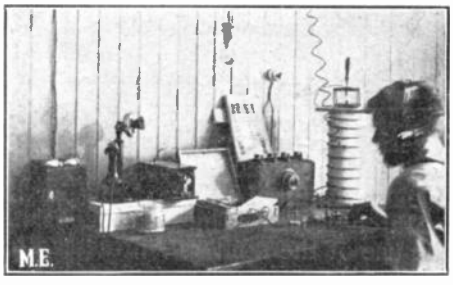
In glancing over the ads. (which I always do), I noticed in your last, page 828, a notice to Rudolph Harris to send in his correct address. Ha! ha! Excuse my hilarity, but I am writing to tell you I perpetrated that little joke myself. Sh-h! Don't tell anyone. But honest, now, I was way up there in Yuba City last Summer, and nothing to do, so I cleared off part of my desk, went outside and took the set of four coils off the auto dash (see 'em on the table?), stuck the telephone and an M.E. in evidence, took a show card, pinned it in a cylinder and wrapped some 12 R. C. C. on it (helix?), and had my friend sit for the picture. Now, you will admit it was a good one! Ha! ha! It won first prize anyway! O, I forgot one—see the little portable box in front? That's my little portable I carry in my grip wherever I go. It helped some.

On the level, you're not peeved, are you? I'm not looking for the prize, but, say, if you can see where it's your treat, why I'll be glad to have you send me a year's subscription to M. E. How about it, old scout? Sure the treat's on you, *hi! hi!* How did you like that article (description)? That took imagination, old man. What, to build a transformer with galvanized iron core, 37 turns primary, 40,000 secondary (figure voltage), and hearing that awful distance, 125 miles with 200 aerial? *He, he!* and *ho, ho!* The rest is juicy, too.

To change. Say, I've been an amateur on the coast here for some years. If there's anyone who don't know W. O. I haven't heard him yet. I've read M. E. since the first little red one (got 'em stacked up near the arc), every issue, and I like it. Of course, I don't like everything, but you can't please everybody. However, I enclose a filled-out voting blank, which is the average opinion among the fellows in my radius (1200 mi.).

The amateurs in your magazine, and their stations, are a source of endless enjoyment to us fellows out here, and we'd just as soon see 'em continue as not.

We enjoy those wonderful records of 25 to 30 mi. on a one-inch. Pretty fair, but on this coast, nix! (I have done 125 overland in the daytime, amateur receiving, with a motorcycle coil on 110 with lamp in series and Caldwell interrupter. E. W., of San Jose, has signed evidence from Tatoosh Island of having heard his one-inch "National" up there. That's only about a thousand miles, but what do you expect on 30 watts? Freakish, no doubt, but E. W. worked regularly 150 and 200 overland day and night). Also in regard to receiving, I have copied (verified) NAR at Key West here myself and have only 102 foot pole, 20 foot spreaders, 6 wires, 250 feet long, other end within 15 feet of the ground. I can copy Sitka, Alaska, any time (night), and have heard 2 K. W. boats out 1700. There's a mountain range between me and the coast too. Mr. Lotz, of San Jose, call AZ, has a letter (I have read it), from Colon, Panama, saying they heard him down there. Oh, pretty fair,



The Photo That Fooled the Editor.

about 4,000 miles with a 5 K. W. amateur joint! I am doubtless the first one of the amateurs on this coast to write you people, as we keep the dope to ourselves, but, some of those records (?!) grate on my nerves. Well, this is drawing out a letter pretty long, but might as well do a good job. Why do we hear about Marconi doing 4,000 miles a couple of times with 500 K. W., when NPH at Mare Island handles messages every night with Key West on 2 K. W.? I have heard the N SX work NPH in Honolulu harbor at daylight in the morning with those Telefunken sets. Enough of that. I would like very much to see more technical articles in M. E. and keep up the good work on the Paris Letter and like articles. I'm especially interested in wireless telephony (have worked spark system four miles), and would appreciate a few new points very much. We have a number of companies with telephones

on the coast here and get them great. Our difficulty is, we cannot get D. C.

Well, don't forget the subscription if you see the joke the right way. I ask your pardon for any offense, but I assure you none was intended. Thank you for your time in reading this.

Yours very sincerely,

WM. R. ORGAN.

Palo Alto, Calif.

PACIFIC STATES WIRELESS ASSOCIATION.

There has recently been organized in Los Angeles a new wireless association, which, through the progressive spirit which has been exhibited in its foundation and membership, gives promise of becoming an institution of the greatest influence and value among the wireless operators of Southern California. This association has, since its inception a few months ago, maintained a heavy attendance, and unlike similar organizations of the past, is steadily growing in membership. Programs of value are being provided, and measures have been adopted toward the welfare and advancement of the interests of both the experimenter and the commercial operator. The association contemplates the installation of a comprehensive library of works upon the subject, which shall be open at all times to its members.

The discussion of various topics appertaining to the art is to be taken up by members best informed upon each subject, and many points of value should be brought forth. All who are interested in the art of wireless communication, and reside in Southern California, are urged to lend their support to the rapid development of an organization which is destined to prove of the greatest value to every wireless enthusiast upon the coast. The organization has its headquarters and meeting place at 400 Germain Building, and applications for membership should be forwarded to this address.

LIMITED WAVE LENGTHS. A CORRECTION.

A serious error has been brought to our attention in connection with the article on Limited Wave Lengths in the March issue. The error consists in the use of the numeral, 4, instead of the quantity 2π, in formula (1) on page 871. The formula, as given, shows the natural frequency of transmission line; but, unfortunately, does not apply to a closed circuit including lumped capacity and inductance as used in a wireless transmitting set.

On account of this error, the following changes should be made in the various numerical expressions throughout the article, including the table, as follows:

In the second line above formula (1) the quantity 0.0000000000000278 should be 0.00000000000001125. Formula (1) should read:

Frequency$=(2\pi)^{-1}\ (LC)^{-0.5}$.

and the quantity 2π should replace the word, four, in the second line following. Formula (3) should read:

Wave length$=3\times10^{8}\times2\ \ (LC)^{0.5}$.

$=18.85\times10^{8}(LC)^{0.5}$.

and in the line following, the quantity 1,200,000,000 should be replaced by 1,885,000,000.

In the first line in the left hand column on page 872, the quantity 0.00029 should be 0.00014; and in the fifth line 21.5 should be 14.

The table on page 873 should read as follows:

	No. of Plates.	Condenser Capacity, Microfarads.	Inductance, Microhenrys.	No. of turns. Helix.	O. T.*
		SPARK COILS.			
½″	3	0.002	5.62	3.	3.
1″	6	0.004	2.81	2.1	1.8
2″	12	0.008	1.41	1.5	1.3
		TRANSFORMERS 60 CYCLES.			
¼ KW	16	0.0046	2.45	2.	1.7
½ KW	32	0.0092	1.22	1.4	1.2
1 KW	40	0.019	0.59	1.	0.8
		TRANSFORMERS 125 CYCLES.			
¼ KW	8	0.0022	5.11	2.9	2.3
½ KW	16	0.0044	2.56	2.	1.7
1 KW	20	0.0091	1.24	1.4	1.2

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.

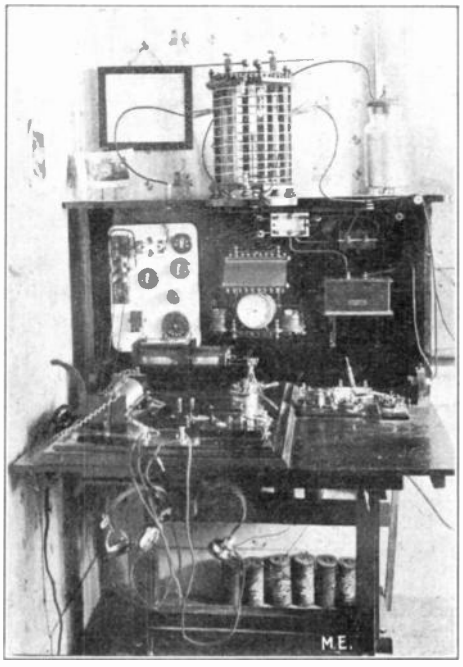
It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

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 is a photo of my wireless telegraph outfit.

The sending set consists of a 1-inch induction coil run on six dry cells, brass ball testing spark gap as seen



Bogardus Station.

on top of helix, zinc spark gap, which I use for transmitting, a helix, of long wave length, which I constructed to be used on either ¼ K. W. transformer or the 1-inch coil, one Leyden jar condenser, wireless key with heavy contacts, all operated by necessary switches.

My receiving outfit consists of two tuning coils, loose coupler and double slide, operated by a D. P. D. T. switch, two condensers, fixed and variable (rotary type), and a combination, silicon and galena, mineral detector.

My aerial is 85 feet long, 60 feet high at both ends, and is composed of 4 copper wires on 12-foot spreaders.

With this outfit I have obtained excellent results. I can send in both Morse and Continental codes, but receive in the Morse better than Continental. I communicate evenings with another amateur who is about a mile or so away. My call letter is (R. S.).

I am an International Correspondence School student, preparing to become a telegraph engineer, and have been an experimenter in wireless for over two years; and can recommend *Modern Electrics*, from which I have received so many helpful hints, to any amateur who is an experimenter in the wireless field.

KING JAMES BOGARDUS,
Connecticut.

HONORABLE MENTION.

Enclosed find a photograph of my wireless station. I made most all my instruments.

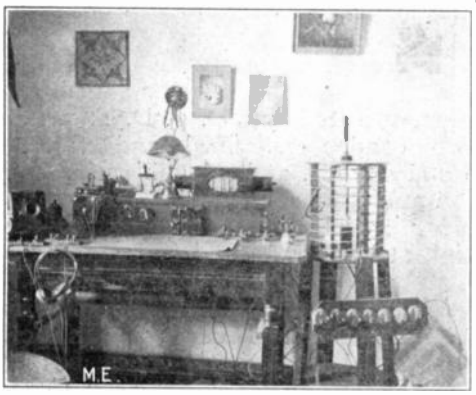
The receiving instruments are placed on the left side, and my transmitting instruments are on the right.

The receiving instruments are: Double slide tuning coil, two fixed condensers, two variable condensers, two detectors (one silicon and one galena), and a pair of E. I. Co. 2,000-ohm phones; also a test buzzer for the receiving set.

The transmitting instruments are: A six-inch spark coil, spark gap, helix, adjustable glass plate, sending condenser, a T. P. D. T. switch to throw from receiving to sending, or vice versa, an automatic plunger for 110-V. A. C. which I use, an electrolytic interrupter, and a wireless key.

The aerial (loop type), is 55 feet high at one end and 45 feet at the other. It is 60 feet long, 12 wires No. 12 B. & S., aluminum, 22 inches apart. I also have a short telegraph and telephone line.

I use a lead water pipe for a ground; and have a lightning arrester on the house.



Edwards Station.

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

This station is the result of 2 years' study and experimenting.

My call is P. N.

PAUL EDWARDS, Colorado.

HONORABLE MENTION.

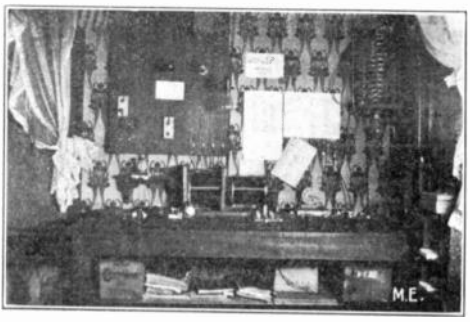
Here is a flashlight of my wireless telegraph outfit.

The receiving set consists of a large loose-coupler, fixed condenser, galena detector, Brandes 2,000-ohm phones and all necessary switches.

Sending: ½ K. W. closed core transformer, No. 6 aluminum wire helix; wireless key with ¾-inch contacts; large zinc spark gap; lamps in aerial circuit; glass plate condenser.

Since picture was taken, the transmitting set has been mounted in a cabinet and a rotary spark gap added.

The aerial is 200 feet long, 45 feet high at one end, 50 feet at the other



Bien Station.

and consists of four No. 14 aluminum wires.

With this set I hear "PD", Tampa, Fla., "MSW", Wellsfleet, Mass., "NY", New York, "HA", Cape Hatteras, "NEP", U. S. Dixie, down in the Gulf of Mexico.

I would be glad to hear from any station from 8:00 to 9:00 any night.

Call letters "DI."

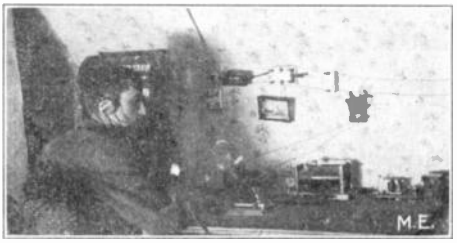
GILBERT G. BIEN, Ohio.

HONORABLE MENTION.

Enclosed find a flashlight picture of my wireless station. My set consists of:

For sending, Bunnell key, E. I. Co., 1½ inch coil, a closed core Carpenter coil 10 by 12 inches, helix, plate condenser, of 13 glass plates 8 by 12 inches, E. I. Co.'s zinc spark gap, an anchor gap, and a D.P.D.T. switch to change from sending to receiving.

For receiving, Loose coupler, E. I. Co.'s Junior tuner, also one of their



Elliott Station.

electrolytic detector stands made into a silicon detector, a Massie cup and point detector, E. I. Co.'s potentiometer, 1,000 ohm receiver, and Junior fixed condenser.

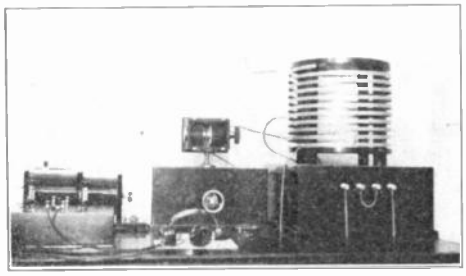
I am making a coherer to use with a 75-ohm Gernsback relay.

I am a constant reader of Modern Electrics, and think it one of the best wireless magazines I ever saw or read.

MORTON ELLIOTT,
Montana.

HONORABLE MENTION.

Find herewith a flashlight photograph of my wireless telegraph station. I have avoided all complicity in the design of these instruments; resulting in a simple and effective installation. The woodwork is of birch and



Denny Station.

mahogany, and the metal parts all finished correspondingly.

The receiving set comprises a loose-coupled tuner, combination electrolytic and silicon receiving set with variable and fixed condensers, rotary potentiometer and 2,000-ohm, Western Electric head phones.

The transmitting set consists of 1½ K. W. closed core transformer, glass plate condenser, variable choke coil, muffled air cooled spark gap and helix.

My aerial wires are 75 feet high and my wave length about 200 meters.

ROBERT C. DENNY,
Missouri.

HONORABLE MENTION.

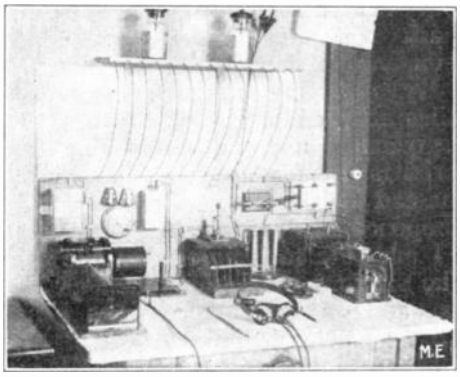
I enclose a photo of my wireless station.

For sending I use an E. I. Co.'s 1-inch spark coil, a helix, an E. I. Co.'s zinc spark gap, a condenser, and a transformer to reduce the electric light current.

For receiving I use an E. I. Co.'s loose coupler, which gives perfect results, an E. I. Co.'s detector stand, in which I use perikon, a loading coil of my own construction, and five condensers.

With this set I have picked up Cape Cod, Fire Island, and Portsmouth, N. H., and many other stations.

I can send about 8 to 10 miles.



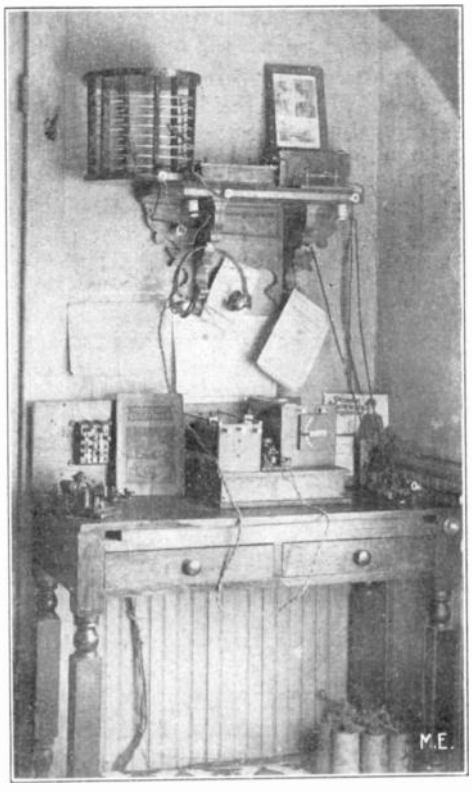
Benson Station.

My call is P. B.

PHILIP BENSON,
New York.

HONORABLE MENTION.

Enclosed is a picture of my wireless station. My receiving set consists of one double slide tuning coil, provided



Rowland Station.

with pure platinum sliding contacts, also a transformer tuner, two fixed con-

densers and one variable (not shown in picture), silicon detector and 2,000-ohm head set. To the right is the push button operating buzzer test set.

My sending set consists of one 2-inch spark coil, key, sending condenser, helix and spark gap.

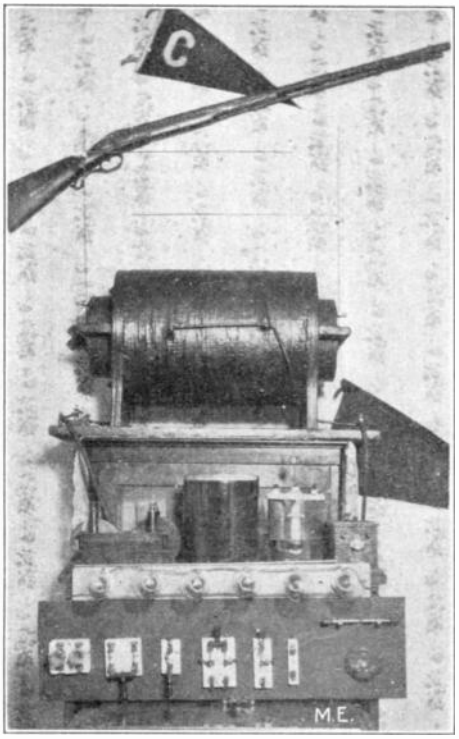
My receiving range is about 800 miles and sending about 8 miles. For a ground I use the water pipe. My aerial is 100 feet long, 50 feet high at one end and 35 feet at the other, and is composed of 6 wires, 18 inches apart.

I am able to hear any of the great lake stations and as far east as Erie, Pa., and on several occasions I have heard Cleveland, Ohio.

J. C. ROWLAND,
Missouri.

HONORABLE MENTION.

Enclosed herewith please find photo of my high frequency apparatus. It consists of a 1-inch coil, electrolytic interrupter, condenser and Tesla Trans-



Lucas High Frequency Apparatus.

former. In using the Electro 1-inch coil I obtain a 6-inch spark, which I consider remarkable; using E. I. Co.'s, half K. W. coil, a 10-inch spark is obtained; and with the E. I. Co.'s quarter K. W. closed core transformer, a 20-inch spark, which is almost the length of the transformer, is obtained. I also have a small wireless station, which is composed of instruments built according to instructions published in *Modern Electrics,* and several of E. I. Co.'s make.

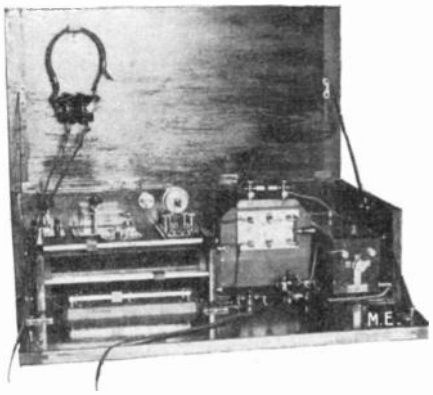
HOWARD LUCAS, Pennsylvania.

HONORABLE MENTION.

Here is my wireless station.

My sending apparatus consists of the following instruments: 2-inch coil, glass plate condenser, zinc spark gap, and key.

For receiving, I use a pair of 2,000-



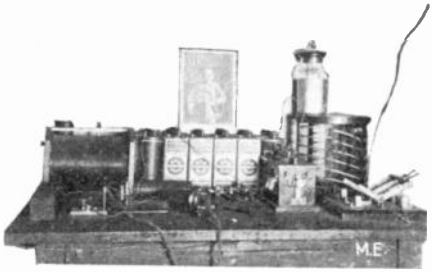
Petit Station.

ohm phones, a large double slide tuning coil, fixed condenser, peroxide of lead, and mineral detectors, potentiometer, and a 2-point switch, for changing from one detector to the other.

L. E. PETIT, Illinois.

HONORABLE MENTION.

Please find enclosed a flashlight photograph of my wireless outfit, consisting of: Helix, two-inch spark coil, one-quart Leyden jar, tuning coil, vari-



Instone Station.

able condenser, 2,000-ohm phones and two detectors, silicon and perikon.

JOSEPH INSTONE,
New York.

Flying Sparks

THE BUSY AMERICAN

—at leisure

—and the busy American, when "Time is Money," as seen through French eyes.—Pêle Mêle.

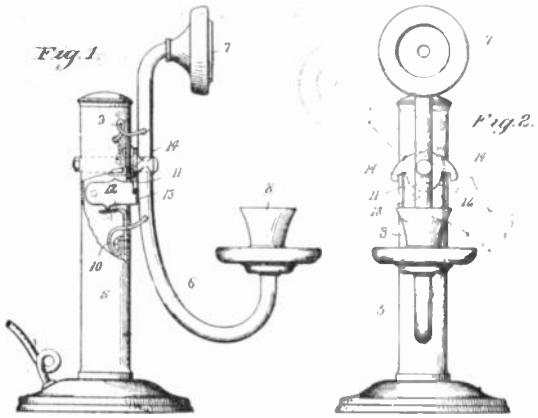
THE LATEST AERONAUTICAL INVENTION.

"What's the idea of wearing that lightning arrester?"

"To save my scull, as you may perceive!"

CHARLES C. BLACKHAM, OF BRIDGEPORT, CONN., HAS BEEN GRANTED PATENT NO. 1,022,350 FOR A TELEPHONE.

The object of this invention is to provide an instrument in which the receiver and transmitter are combined upon a single bracket and pivotally connected to the portable stand, so that when the receiver is in proper position at the ear the transmitter is also in position for use in front of the mouth; to so arrange and construct the pivotal connection of the bracket and stand, that the electrical connections for receiver and transmitter will be automatically regulated with the adjustment of the bracket.



At the first thought this invention is quite unique and one could think that it would surely replace the present style of telephone desk apparatus. But on looking over the specification it becomes apparent that there is a great defect incorporated in the device, inasmuch as it is necessary for the person using the telephone apparatus, to reset the arm into a vertical position when through talking. In the present telephone apparatus this objection is of course, also present, but the most convenient place to put the receiver, after you are through using it, is on the hook, and placing it on the hook disconnects the circuit. Of course, with Mr. Blackham's instrument, one could get into the habit of pushing the arm back; but unfortunately, it seems to us that, being that the arm must be in a strictly vertical position, many people, although they would shove the arm back, especially if in a hurry, would really not disconnect the instrument. However, we believe that this defect could be overcome as in other respects, the invention seems to have merit.

PATENT NO. 1,024,577, FOR A PRIMARY BATTERY, HAS BEEN GRANTED TO CHARLES E. HITE, OF BURLINGTON, N. J.

The purpose of this battery is to make a two-fluid battery having different compartments. The carbon plates, 17, which act, at the same time, as a porous vessel, are sunk in a compound, 16, which compound, in turn, is supported by the walls of the box, 15. The zinc plate is shown at 25. Such a battery is partitioned off by the well, 18, which may be of glass, hard rubber or the like, and this wall thus forms a complete battery by means of the elements, 17 and 25.

Our illustration shows four such batteries, all in one case. The elements are connected together by means of a novel aluminum connector, 20, which really presents the only novel point about the invention.

We really do not see how the United States Patent office could issue the patent, inasmuch as identically the same idea has been described in the Muirhead battery used by the British Post Office.

Fig. 1

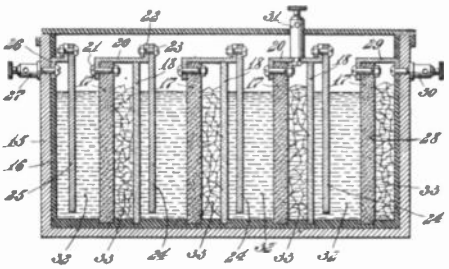
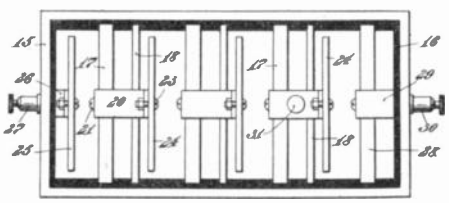


Fig. 2.

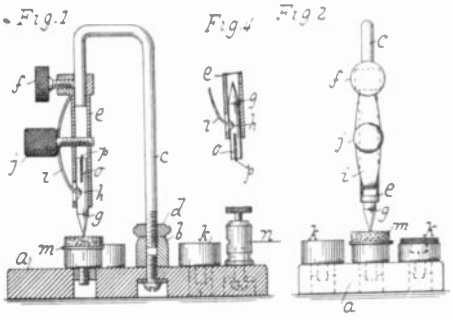


This battery, as do all others of this class, suffers from the common defect that it is ex-

tremely hard to make the cells waterproof and current-proof. There will also be some leakage from one cell to the other as the current goes through a crack where water or acid would not penetrate. Such batteries cannot be used at all when transported, as the shaking will surely provide the means to make the current leak worse than ever.

EDWIN R. CARLSON, OF BROOKLYN, N. Y., HAS BEEN GRANTED PATENT NO. 1,027,238, FOR RECEIVER FOR ELECTROMAGNETIC WAVES.

The invention relates to a detector stand and presents some novel features. The means of moving the pin, g, up and down is quite novel, and the regulation is made by the screw, j, which bears upon the spring, i, fitting in the indentation in the pin, h. When j is screwed down, pin, g, moves down, thus a good regulation is had. The same pin, g, when taken out, and turned upside-down, is



used for an electrolytic detector, and the Wollaston wire, p, is clamped by the spring, o, also a novel arrangement.

This idea is quite novel, as well as clever, and will be of particular interest to our readers.

The detector shows a few other features which have been described lots of times in *Modern Electrics*, namely, the stanchion may be revolved so that the point, g, may be used on other minerals or substances, and the inventor provides five cups for this purpose. Aside from the movement and general execution of the pin, the patent does not present anything novel.

OTTO FRICKE, OF NEW YORK, HAS BEEN GRANTED PATENT NO. 1,026,388, FOR A MAST FOR WIRELESS TELEGRAPHY.

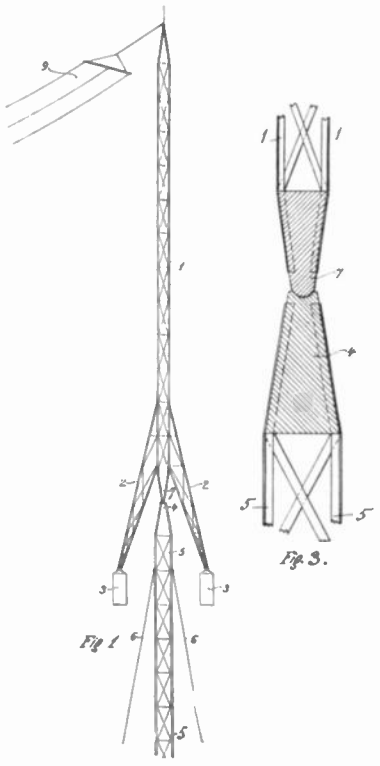
The present invention relates to an improved mast for wireless telegraphy.

Here is something real novel, although we do not know how great the usefulness of the device will be. From the illustration it will be seen that the part, 1, which is a regular latticed tower, has a cone-shaped part, 7, which engages with the stationary mast, 5, by means of the support, 4. As will be seen the mast, 1, is not secured, except at the point, 7, and is held in position by means of the counterweights, 3. Consequently the mast, 1, can swing back and forth on the point, 7.

For some mysterious reason the inventor advises the use of an unfreezable liquid, such

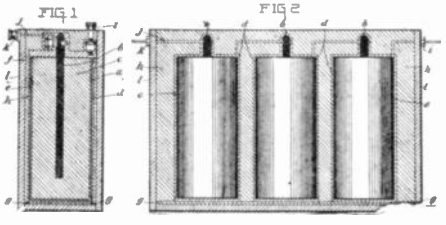
as glycerine, in the counterweights, 3. It would seem to us from a casual observation that the weights, 3, had better be a carload of lead, or mercury, as it is inconceivable to us how the aerial, 9, would be held in position unless the weights, 3, are of enormous weight. The mast, 1, as pictured, affords an extraordinarily good lever; and the slightest pull at the aerial, 9, would, of necessity, pull the mast over, 1, on account of the great leverage.

It would seem to us that while the idea is good, the weights, 3, would have to be enormous, in order to put even a small strain upon the aerial, 9. The inventor also states that four counterweights, instead of two, could be used.



PATENT NO. 1,027,088, FOR A WATERPROOF BATTERY, AND METHOD OF MAKING SAME, HAS BEEN GRANTED TO RALPH V. VILLIERS, OF EAST FREETOWN, MASS.

The illustration shows the idea as well as words can describe it, and there is really



nothing novel about the invention, as far as we can see.

The inventor simply places the battery in a container, and pours insulating compound

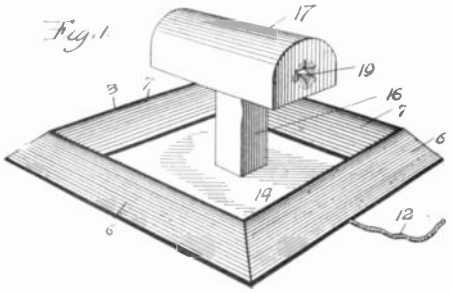
around the various parts, thereby waterproofing the cell, or cells.

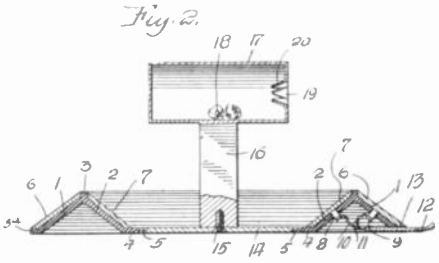
The writer has been in the habit of doing this for years, and the idea is so obvious to everybody, that it is strange that anyone should have even applied for a patent on the arrangement. Most of the motorboat owners, having dry cells, connect them together with flexible cord, place the batteries in a box and pour hot pitch around and over the top connections of the battery, leaving only the two cords to take off the current.

This method is practically the same in all respects as the present patent.

JOHN BALINT, OF CINCINNATI, OHIO, HAS BEEN GRANTED PATENT NO. 1,024,967, FOR AN ELECTRIC RAT-TRAP.

This is another patent on rat-traps and suffers from the same evils as its predecessors. We have pointed out, in connection with former patents, that no electric rat-trap is a success, that does not entirely do away with the carcass of the rodent, after it has been electrocuted. It is obvious that in the present invention the carcass will be set on fire, nine times out of ten, when falling across the corner pieces, 6 and 7, which are only insulated by the insulating piece, 3. It is almost impossible to prevent the carcass from smouldering, after it has been killed, and no other rodent will come near the trap as long as the dead one lies in the trap.





It seems that these things should be uppermost in the mind of would-be electric rat-trap inventors, but they are usually lost sight of.

PATENT NO. 1,027,376, FOR A TELEGRAPH TRANSMITTING MACHINE, HAS BEEN GRANTED TO FRANCESCO DE A. DEL VALLE ATILES, OF SAN JUAN, PORTO RICO.

The present invention refers to a mechanical keyboard, which can be used by anyone

who does not know the Morse code, and the signals are transmitted simply by pressing down the keys, as on a typewriter.

The general arrangement of the outfit is shown in Fig. 1, which shows the keyboard with the keys. Fig. 3 shows how the keys are worked. By pressing down the key, B, which is attached to the pivot, 2, the lever, 14, operates the ratchet, 17 and 13.

The Morse characters are cut in the edge of the wheel, the white spaces representing the

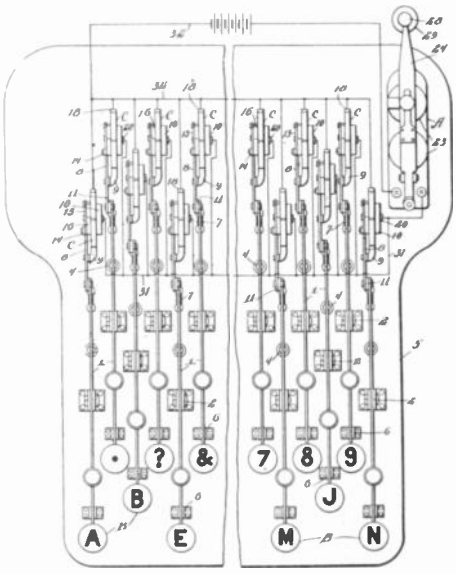


Fig. 1

metal, while the black spaces represent insulation, such as hard rubber. Thus the wheel, C, when revolving, will transmit the dots and dashes, through the arm, 18, contact, and the line being connected to the post, 19, will

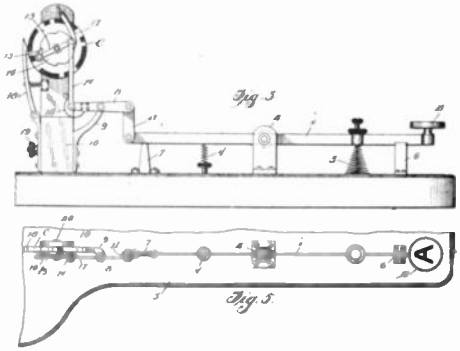


Fig. 3

Fig. 5.

transmit these signals faithfully. Thus it will be seen that when pressing any of the keys on the keyboard, the actual dots and dashes represented by the letters will be sent out over the line.

How fast the apparatus may be worked, is not known to us.

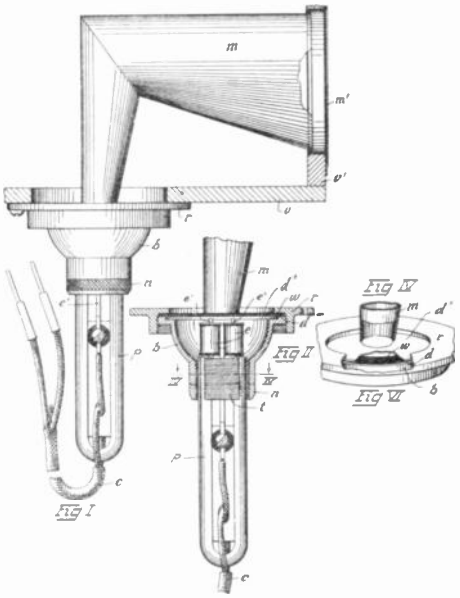
PATENT NO. 1,027,351, FOR ELECTRIC SIGNAL-RECEIVING APPLIANCE, HAS BEEN GRANTED TO JAY G. MITCHELL, OF CLEVELAND, OHIO.

This invention relates to a loud, audible

signal, giving a trumpet-like sound, the sound being produced by means of an ordinary telephone receiver.

It is well known that if a telephone diaphragm be made to vibrate rapidly by means of an alternating current, or a pulsating current, a loud tone will be emitted.

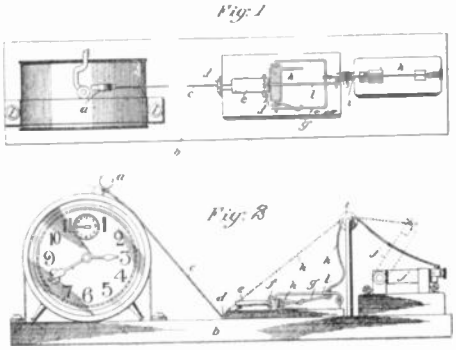
While Mr. Mitchell's patent does not show anything revolutionary, he has added several new features to make the whole apparatus more handy and easier to adjust. He accomplishes this by two means:



First—The part, p, is a screw portion fitting the part, n. Thus the electromagnets, c', are made to approach or recede from the diaphragm, to obtain the best results.

Another novel part is that Mr. Mitchell uses two diaphragms, d and d', which are only 1-32 inch apart, thus only very little air is compressed, which helps to make the sound more powerful. The diaphragm, d', is perforated to take the horn, m.

PATENT NO. 1,026,905, FOR A CLOCK-OPERATED ELECTRIC SWITCH, HAS BEEN GRANTED TO FRANKLIN PIERCE CAUBLE, OF HIGH POINT, N. C.



This invention relates to a clock-operated

electric switch, and while the patent does not state it, it is really nothing but a combination of a rat-trap, an alarm clock and a switch. It will be seen that the cord, c, as it is pulled by the hammer, a, of the alarm, operates the trigger, e, pivoted at its forward end to the base board, and provided, at the same end, with a projection, f.

After the trap springs open the lever, J, of the switch, is jerked open also, by means of a second cord, h, which opens the circuit.

JAMES BURKE, OF ERIE, PA., HAS BEEN GRANTED PATENT NO. 1,026,904, FOR AN ELECTRIC MOTOR.

This invention relates to an improvement in electric motors and more particularly to a motor for blowing air, for cleaning out dust and the like.

The armature of the motor revolves the blades, 21, which, in turn, move the air in the

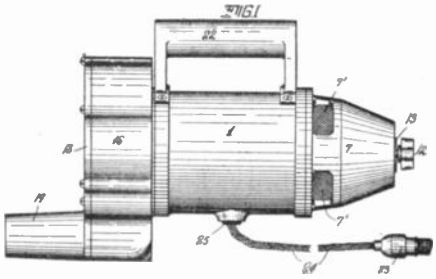


FIG. 1

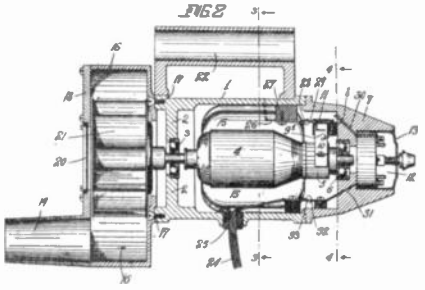


FIG. 2

chamber, 16, and the air is thus forced out from the funnel like arrangement, 19. A handle, 22, is provided, to carry the motor; and the motor may be switched on and off by means of switch, 12. An ordinary plug and cord, 23 and 24, are used to make connection.

In action the air is sucked through the opening, in 18, covered by the screen, 20.

While there is nothing absolutely novel about this invention, it has the one redeemable feature, that the outfit is very compact, and will probably find a good use where a strong air current, produced by a small, compact, instrument, is needed.

Sawdust mixed with wheat and baked into bread is now recommended in Austria as a cure for chronic constipation. And so here is our warrant for the use of our breakfast foods.—*Critic and Guide.*

Advice on Patents

MERCURY CONDENSER.

(38a.) Richard Clark, of Newton, Mass., sends a blue print and specification of a mercury condenser, and would like us to express our opinion as to its practical worth.

A. This department cannot tell its correspondents as to the commercial value of any invention, as, at the most, it would only be a guess.

The invention in question, however, seems to be a particularly good one, and has some features which certainly would make it worth while for any manufacturer to take up the article. As far as we know, the idea is absolutely original, and would think that no trouble would be experienced in patenting the article.

CONVERSATION RECORDER.

(38b.) Charles J. Brooks, of Lititz, Pa., writes as follows:

"Can you inform me whether there is any machine on the market at present which will do the following:

"I have made a machine which I can hear and reproduce any conversation which was held in a room, of which I below give a drawing.

"This machine will take down any conversation in any room. The transmitter is a common telephone transmitter, which sends the conversation into the box which contains a phonograph which is geared to run so that it will run any time desired.

The turning of a switch will swing on the other mechanism and reproduce the conversation. I have it also equipped with a switch, instead of the alarm, which will operate the machine while anybody is in the room. The use of the machine is to reproduce any conversation to the boss which the clerks may have had in his absence."

A. The drawing in question shows a transmitter connected with batteries through an induction coil with a recorder. This recorder has a stylus which, as far as we can judge, is supposed to take down the record on an ordinary phonograph cylinder. We mention the device fully for the reason that the idea has been patented quite a few years ago, and a much better instrument is had in the telegraphone. The device which our correspondent describes is not a very satisfactory one.

There is also a patent on a similar device which is practically the reverse of the one shown by our correspondent, namely, where a transmitter, having a stylus, is made to send phonograph messages over a line to a distance.

AIRSHIP BALANCER.

(39) Joseph Gregorich, of Chicago, Ill., sends in a specification of an Airship Balancer and side motion controller which he has designed and wishes us to give an opinion.

A. A careful study of the subject reveals the fact that the apparatus, as described by our correspondent, is quite feasible and will surely help to control the airship as far as side motion is concerned. This, however, does not take care of a forward or backward motion, and we presume another apparatus would have to be used at right angles with the first one. Aside from this, we think the idea practical and believe that a patent may be obtained on same.

WIRELESS GENERATOR.

(40) Percival D. Lowell, of Washington, D. C., sends a specification of an apparatus to convert 110 volts direct current to 110 volts alternating current of 500 cycles for use in wireless telegraphy.

A. The apparatus shown comes pretty close to an ordinary alternator, such as are on the market already. There is nothing new about this and no patent could be obtained on such a device.

A SENSITIVE RELAY.

(41) Wm. Rethorn, of Chicago, Ill., sends in a lengthy description of a new relay which he thinks might be used in connection with a detector to operate a Morse register.

A. The idea is very similar to the high-grade galvanometers in use now, and while there is no question that the apparatus will work, it could never find application in wireless telegraphy, for the reason that apparatus as the one described where fine wire moves back and forth has too much inertia, and in each case dots and dashes could only be received very slowly with such an arrangement. In fact, we venture to say that the speed would be much less than with an ordinary coherer and decoherer. Another bad feature of the device is that the wire, making imperfect contact with the carbon blocks, will cause the register to work irregularly.

NEW LOOSE COUPLER.

(42) Albert W. Duy, Jr., of Bloomsburg, Pa., sends in a drawing of a selective loose coupler which presents some original features.

A. Although the connections are somewhat complicated we believe that the apparatus has some merits, and while we are not sure that a patent could be obtained on the device, we think it would pay to have a patent attorney make a search for patentability. While there is nothing radically new about the apparatus, the idea of using separate sections of the coil presents some good points which seem to have merit.

AUTOMOBILE REAR LIGHT.

(43) Elmer H. Briggs, of Frankford, Pa., has devised an automobile rear lamp electrically lighted, and on looking this over we find that a number of such devices are already on the market and in actual use on many automobiles. In fact, there are a great many that are much better than

the one shown in the applicant's drawing; and if he will visit any automobile supply store he can easily convince himself that the idea is not new, nor could it be patented.

BUGGY SPRING.

(44) Arthur G. Carlson, of N. Easton, Mass., sends in a drawing showing a spring for rear wheel of a bicycle or motorcycle and wants our opinion on same.

A. Inasmuch as this department can only give advice on electrical devices, or devices using electricity in connection with them, we cannot give an opinion upon the idea, and advise our correspondent to get in touch with some patent attorney.

COST OF PATENT.

(45) D. H. Ingwasen, of Ballard, Wash., advises he has been working on a patent for three years and wants to know how much it would cost to have the device patented.

A. An ordinary patent, with one sheet of drawings, costs from $55.00 up, all depending on the patent attorney and his ability to draw up the patent. If there are one or more sheets to the patent the cost will usually be more, and we would advise our correspondent to get in direct touch with some of the patent attorneys that advertise through our columns. Our correspondent will, no doubt, find the right party through this means.

SECRETS OF SUCCESS—THE ELECTRICIAN.

By Thomas W. Hotchkiss, Vocational Counsellor.

The term electrician covers a wide range of occupations in the study and use of electricity. It includes telegraph and telephone engineering, electric lighting, electric railways, electric-car running, dynamo running, wiring, and power-house work. A boy may begin as a helper in a concern that does interior wiring, may study at home much of the technical science of electricity, and in due time qualify as a practical electrician; but beyond this, there is the field of the professional Electrical Engineer who has had the advantage of a University training for his degree. The one may be the skilled repairer, operator, and installer of electric machinery and appliances; the other designs electric machinery.

The young man can best determine the fitness of his natural qualifications for success as an electrician as the term is ordinarily understood, by looking over the courses of study that must be pursued to enable students to qualify in the various branches of this

science. It takes four years of study in a correspondence school, at the rate of two hours a day for six days in the week, to complete the full electrical engineering course. Such a course, though not a complete substitute, corresponds as nearly as possible to a resident college course in electrical engineering. Special courses can be completed in telephone engineering, telegraph engineering, electric lighting, electric railways, interior wiring, or dynamo running, in nine months, a year and a half, or two years.

The difficulties he has to meet in trying to get ahead are the limitations of the human mind in its struggle to grasp the mathematics, mechanics, power and usefulness of the most wonderful element in all Nature—electricity. It is easy enough to carry the tools of the wireman, to have them ready when called for on the job of wiring a house or in laying cables in an electric conduit; but he must have the real talent of the technical student and workman, beyond a mere "taste for mechanics," if he is to reach a paying proficiency.

As a practical electrician, he can earn from $25 to $40 a week; but before he qualifies as such his earnings will be less than in many other occupations. There are practical electricians who earn large salaries as managers, superintendents, contractors, draftsmen, and machine builders and operators in the electrical field; and there are electrical engineers whose training, ability, and capacity for work have been completely proved by study and practice who are employed by corporations glad to pay for their valuable services as high as from $5,000 to $25,000 a year.—New York American.

WHAT WORRIED HIM.

"You look worried, Biffkins."

"I am."

"Somebody ill at home?"

"No."

"Business isn't what it should be, eh?"

"That ain't it."

"Well, then, what worries you?"

"I was just wondering how it's going to be possible to heat them aeroplanes in the winter."—*Cleveland Plain Dealer.*

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.

ANCHOR GAP. ELECTROLYTIC INTERRUPTER.

(2009.) C. A. Bilms, New Jersey, says:

Q. 1.—Please explain the advantage of using an anchor gap. What systems use it?

A. 1.—About the only advantage we know of is that a loop aerial may be used with a two pole antenna switch. It is connected as shown in the answer to 1945, page 918, in the March issue. It is marked AG in the diagram. It was used by the DeForest system and is now used by the United Wireless Telegraph Co.

Q. 2.—Would an electrolytic interrupter work on six volts, using a 1 inch coil?

A. 2.—No, the electrolytic interrupter requires at least 30 volts before it begins to operate.

INSULATED GROUND WIRE.

(2010.) C. R. Eldrege, Massachusetts, asks:

Q. 1.—Do I need to insulate my ground wire, using a quarter k.w. transformer?

A. 1.—It is not absolutely necessary, but it is better to do so.

Q. 2.—Is an antenna 100 feet long and 30 feet high, seven strands connected in the middle, with a good receiving set capable of doing 1000 miles?

A. 2.—You might do 1000 miles under freak conditions, but your aerial is hardly high enough.

Q. 3.—What is the best kind of wire, and what could I make to reach a wave of 2000 or 3000 metres in sending?

A. 3.—For a helix aluminum wire is about as good as anything. For an oscillation transformer copper ribbon is the best. The amount to be used depends on the size of your transformer and the capacity of your aerial.

WIRELESS SCHOOLS. TYPE E TUNER.

2011.) Clyde Price, Indiana, inquires:

Q. 1.—Does Mr. Marconi have a school teaching wireless telegraphy, and if so where is it located?

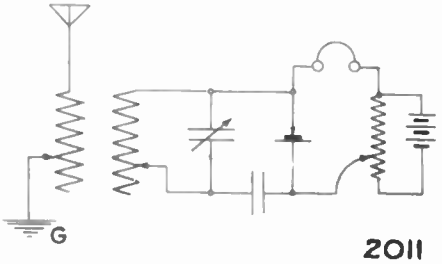
A. 1.—The Marconi Company maintains a school somewhere in England for training operators for its service.

Q. 2.—What is the address of the Philadelphia Wireless School mentioned in Modern Electrics?

A. 2.—Skerritt Building, Ridge and Greene Streets, Philadelphia.

Q. 3.—I would like to have a diagram of what is known as the "Type E" tuner.

A. 3.—The type E tuner is the loose coupled set used by the United Wireless Co., and is connected up as shown below.



2011 M.E.

WIRELESS CONTROLLED BOAT.

(2012.) Albert W. Anderson, Texas, writes:

I am constructing a model boat which I intend to drive by wireless. The boat is four feet long, twelve inches wide and ten inches deep.

Q. 1.—What instruments should I mount on the boat, and what size?

A. 1.—A sensitive coherer, together with the necessary tapper and a sensitive relay, together with the necessary battery for operating the relay and tapper. You will also probably need a small tuning coil. Possibly the relay and tapper may be operated by the same battery which furnishes power for the motor, if not, ordinary flashlight batteries may be used. It will be necessary, of course, to mount a small aerial on the boat and this should be as long and as high as can be conveniently made.

Q. 2.—What apparatus should I install at landing? What size?

A. 2.—At the landing you will need a one-inch spark coil with the necessary battery, a small high tension sending condenser, spark gap, and an aerial which need not be of very large capacity.

Q. 3.—Should the field of the motor be a permanent or electro-magnet?

A. 3.—It makes no great difference whether the field of the motor is a permanent magnet or an electromagnet. The motors, having permanent magnet fields, as a rule are more bulky, and do not develop as much power as those with electromagnet fields.

SPARK COIL.

(2013.) Samuel W. Murphy, Jr., New York, writes:

Q. 1.—I am thinking of constructing a spark coil with a core 10 inches by 1 inch. The primary to be wound with 3 layers of No. 18 DCC wire. The secondary to be wound with a pound and a half of No. 30 enameled wire. Is such a coil practical, and what spark will it give?

A. 1.—Your coil should work all right and give a spark about ½ inch long.

Q. 2.—Do you know a good, reliable firm where I can purchase said wire?

A. 2.—The wire may be purchased from the Electro Importing Company or any other good supply house.

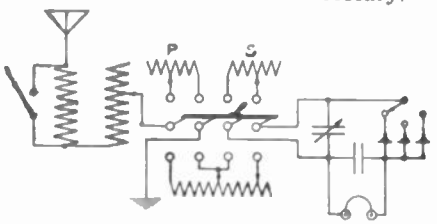
WANTS A HOOK-UP.

(2014.) Nellie B. MacQuarrie, Massachusetts, writes:

Q. 1.—Please give me the best hook-up for the following instruments, and can you suggest anything that I can add, or do to improve the set? The instruments are: loose coupler, primary 13 inches long, 8 inches diameter, wound with No. 22 bare copper wire, secondary 11 inches long, 7 inches diameter, wound with No. 28 SCC magnet wire, with taps taken out every ⅝ inch; a double slide tuner 14 inches long, 3 inches diameter, wound with No. 22 bare copper wire; 2 loading coils, one a 7 step, each wound with No. 24 enameled wire; three detectors, galena, iron pyrites and silicon; fixed and slide plate variable condenser, and phones 2000 ohms. Have buzzer test also.

A. 1.—Here is your hook-up. It is not necessary to add anything to your set. Rather we would suggest that you get rid of the double slide tuner and one of the loading coils, unless you want to receive from stations operating on extremely long wave lengths. For all ordinary wave lengths a loose coupler, one fixed con-

denser and one variable condenser detector and phones are all that are necessary.



2014 M.E.

Q. 2.—Will you also tell me how to reckon my receiving distance?

A. 2.—See article "Determining Range of Radio Telegraph Stations Mathematically," in the March issue.

HELIX. COIL TROUBLE.

(2015.) Charles E. Huber, Delaware, writes:

Q. 1.—Kindly give me data for making a helix for a one inch coil.

A. 1.—Ten turns of No. 6 aluminum or copper wire spaced ½ inch apart on a frame 6 inches in diameter.

Q. 2.—I have a coil that has three binding posts on the primary, and when connected with 110 volt A. C., and an interrupter, and I throw the aerial switch on, the vibrator vibrates (this is when there is no primary circuit), but as soon as I press the key, the action of the vibrator stops and a funny buzzing sound is heard in the coil box, and no spark occurs at the secondary terminals. Kindly tell me why, and how to remedy this strange action.

A. 2.—You have probably got the primary circuit connected up wrong. We would suggest that you write to the maker of the coil, to find out how it should be connected with batteries, after which you can probably figure out how to connect it to the 110 volt alternating circuit with the electrolytic interrupter. We never heard of a spark coil, except an automobile coil, that had three binding posts on the primary side.

Q. 3.—Kindly give me data for a 3 inch coil.

A. 3.—Core 11½ inches long, 1¼ inch diameter; primary winding, 2 layers No. 14 DCCC; insulating tube between primary and secondary, inside diameter 1¾ inch, wall 3-16 inch; diameter of secondary pies, 4 inches; number of pies, 30; length of secondary winding 9½ inches; weight of secondary wire 3 pounds; number of secondary wire 36 SSCC; area of tinfoil in primary condenser 2,400 square inches; primary volts 14.

LOOSE COUPLER.

(2016.) George W. Hobart, Massachusetts, writes:

Q. 1.—Please tell me if a loose coupler can be used without a variable condenser.

A. 1.—Yes, it can be used, but gives better results with a variable condenser across the secondary.

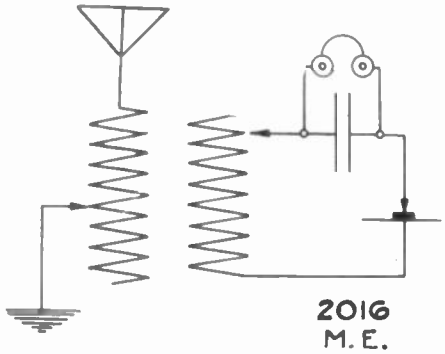
Q. 2.—Please give dimensions for helix for one inch spark coil.

A. 2.—See answer to 2015.

Q. 3.—Please give hook-up for silicon

detector, fixed condenser, loose coupler and 1,000 ohm head set.

A. 3.—Here it is.



WEEDING OUT TUNER.

(2017.) B. L. Miller, Illinois, writes:

Q. 1.—Will you kindly tell me how much wire No. 27 DSC and No. 30 DSC to buy for winding the primary, secondary and weeding out circuits on the "Selective Tuner with Weeding Out Circuit," by H. H. Holden, described on pages 46 to 50, inclusive, of your book, "How to Make Wireless Instruments"?

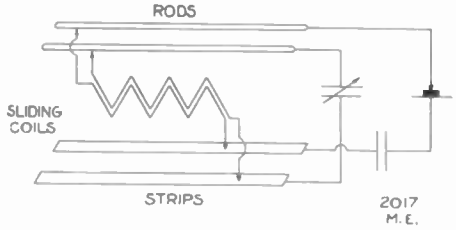
A. 1.—You need about ¼ lb. of the No. 27 and about 2 oz. of the No. 30.

Q. 2.—Would enameled wire of same sizes mentioned be as efficient as the DSC?

A. 2.—Enameled wire would not be as efficient, but the difference would be slight.

Q. 3.—Will you please give me diagram of connections from secondary and weeding out circuits to brass strips on bottom of tube and brass rods running through to binding posts?

A. 3.—Here is your diagram.



SENDING AND RECEIVING SETS.

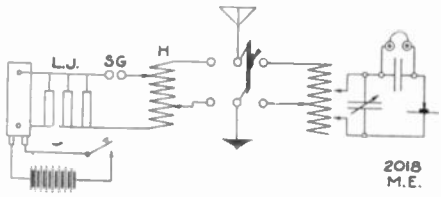
(2018.) L. O. Buckner, New York, writes:

Q. 1.—What instruments would I need for a wireless, receiving 250 miles, using 1,500 ohm phones, sending 25 miles, with an aerial 60 feet high at one end and 50 feet at the other, and 60 to 100 feet long? Also, how many dry cells needed?

A. 1.—Sending spark coil, 2 or 3 one-quart Leyden jars, oscillation transformer, spark gap, 12 volt battery. Receiving 2 or 3 slide tuner, a good crystal detector, one fixed condenser, one variable condenser, and your phones.

Q. 2.—Please give hook-up for same.

A. 2.—Here it is.



CLOSED CORE AUTOMOBILE COIL.

(2019.) Clarence C. Hess, Illinois, writes:

Q. 1.—Could it be possible to ignite an automobile with a closed core transformer and could the transformer be operated with the magneto? The purpose of using the transformer is to do away with the troublesome vibrator.

A. 1.—It might possibly be done, although we never heard of its being tried. The Splitdorf and Remy people make ignition systems similar to this, except that they use open core transformers, and have a mechanical interrupter in the primary circuit, the interrupter being mounted on the end of the magneto armature shaft.

SPARK COIL VOLTAGE.

(2020.) Roy F. Pittman, California, writes:

Q. 1.—Should a wireless receiver buzz?

A. 1.—Yes.

Q. 2.—How many volts will a one inch spark coil give?

A. 1.—20,000.

Q. 3.—Is iron or steel wire as good as aluminum wire, and why (for aerial)?

A. 3.—No. Iron or steel wire is not as good as aluminum, for the reason that they have a choking effect on the high frequency current used in wireless telegraphy.

ELECTRICAL DICTIONARY.

(2021.) J. Edgar Finn, New York, writes:

Q. 1.—Please tell me the author of a good electrical dictionary now on the market.

A. 1.—Webber's Pocket Electrical Dictionary, 25 cents; Sloane's, $3.50.

Q. 2.—Where can I purchase an aerial grounding switch (100 amp.)?

A. 2.—Any good electrical supply house can furnish one of these switches.

Q. 3.—Where can I get a copy of the Marconi Time Chart?

A. 3.—Marconi Wireless Telegraph Company, 27 William street, New York City.

CONDENSER TROUBLE.

(2022.) Lawrence McGrath, Massachusetts, writes:

Q. 1.—I have had considerable trouble the last two weeks. The trouble is, I send messages to a friend by wireless as he gets it O. K. and answers me. The first time I send, it works all right, but I don't like the tone. It is a sort of harsh tone. I want to get a low tone, but can't seem to get it. As I said before, when I first send, it works fine, but after I have sent, say about five minutes, the condenser has a buzz or arc to it, and it will not spark in gap until after that noise is over in the condenser. The condenser is in linseed oil. I am using a ¼ k.w. transformer. It

is really a ½ k.w., but am using a ¼ k.w. Am using a water resistance to reduce power, but it seems to me that I am not reducing it enough. I am using about 18 glass plates for condenser, but I get such a spark that it fills the gap up on the outside edges. What is the cause of this trouble?

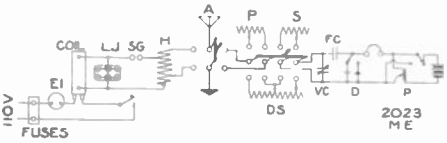
A. 1.—It is probable that one of the condenser plates is punctured or that the margin at the edges of the plates is too small; also, it would be better to use transformer oil instead of linseed oil.

HOOK-UP. GROUND WIRE.

(2023.) Fred Gray, Illinois, writes:

Q. 1.—Please give me a hook-up for the following instruments: Loose coupler, two slide tuning coil, fixed and variable condensers, galena, and electrolytic detectors, with a potentiometer, batteries and a two point switch, to be used for either galena or electrolytic detectors. For sending: E. I. Co. interrupter, used on 110 volt A. C. spark coil, key, helix, six jar condenser and a spark gap.

A. 1.—Here it is.



Q. 2.—Would No. 6 bare aluminum wire do for lightning ground, if not, tell me what size, etc., I have to have?

A. 2.—Your ground wire should be at least equivalent to No. 4 copper. This would require about No. 2 aluminum.

LOOSE COUPLER DATA.

(2024.) E. A. Holmberg, New York, writes:

Q. 1.—What gauge of wire would be suitable for the primary of a loose coupler, size of primary 6 inches diameter by 6 inches long, and what size secondary should I use in connection with the above primary, wound with what gauge wire?

A. 1.—Use No. 22 B. & S. for the primary and No. 24 or No. 26 for the secondary. Make secondary core 6 inches long by 5½ inches in diameter.

Q. 2.—Would enameled wire be the best for both primary and secondary, and, if not, what would?

A. 2.—Bare wire wound as close as possible without touching is better than anything else, although enameled will do very well.

Q. 3.—How many layers should be wound on the secondary?

A. 3.—There should be only one layer on both primary and secondary.

BUZZER TEST.

(2025.) Ralph Jones, Oklahoma, writes:

Q. 1.—I am using a buzzer test and have the vibrator contact screw grounded. The detector tests O. K., but I find that this is not a good test, as I have to readjust while I am receiving. Can you give me a better way of testing other than the electric light method?

A. 1.—Instead of grounding your vibrator contact, connect it to one side of a

small fixed condenser, the other side of the condenser being ungrounded. You will find that while this does not give so loud a sound on the receivers, it gives a better test than using the grounded buzzer arrangement.

Q. 2.—If you have an aerial with a wave length of 200 meters and you wish to receive from some station using a wave length of 65 meters, how would you do it?

A. 2.—Connect a variable condenser in your ground lead.

Q. 3.—Please give me a hook-up that will cut out static using the following instruments: Loose coupler, loading coil, .013 mfd. variable condenser for primary circuit, .0001 mfd. variable condenser for secondary circuit silicon detector, 2000 ohm phones and fixed condenser.

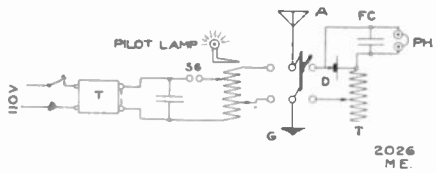
A. 3.—In order to cut out static, it is necessary to use a balanced receiving circuit similar to that described on page 870 of the March issue. Crystal detectors requiring batteries may be used in place of the Fleming valves.

WAVE LENGTH. INTERFERENCE.

(2026.) Harry C. Otten, New York, writes:

Q. 1.—Please give me a diagram for the following instruments: Sending—¼ KW Blitzen transformer with glass plate condenser, key, spark gap helix and pilot lamp. Receiving—Single slide tuning coil, universal detector, three point switch, fixed condenser, 2000 ohm receivers and small fixed condenser. Also double pole, double throw knife switch.

A. 1.—Here is your hook-up.



Q. 2.—What would be the approximate wave length of a four-wire aerial, 115 feet long and 30 feet above the street at both ends, but only 10 feet above the instruments? If I used this aerial with the above instruments would I disturb any commercial or naval stations.

A. 2.—About 175 meters. With all of your helix connected in, and your set close coupled, you probably would disturb commercial or naval stations if you use an ordinary spark gap. If, however, you use an oscillation transformer, and a rotary or quenched spark gap, and have your set loosely coupled, you should not disturb them to any extent.

Q. 3.—Is the following condenser suitable for receiving with the above instruments: 18 sheets of tinfoil separated by twenty glass plates of medium thickness constructed according to diagram on another sheet? The sheets of tinfoil measure 4½x5¾ inches.

A. 3.—Yes. This condenser should be suitable, although it will be rather bulky.

ELECTROLYTIC RECTIFIER.

(2027.) Russell H. Lindsay, Pennsylvania, writes:

MAGAZINES AT CUT PRICES

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

The prices given below are for American subscribers only. Periodicals sent to Canada and foreign countries are subject to the additional postage charges, which may be quoted on application. The individual publications incorporated in one offer may be sent to separate addresses if so desired.

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MODERN ELECTRICS

231 Fulton Street, New York, N. Y.

Q. 1.—What are the electric laws and principles involved in the electrolytic rectifier, or, how does the electrolytic rectifier work?

A. 1.—On the surface of the negative plate a film forms, which permits the current to flow from the electrolyte into the aluminum plate and thence to the outside circuit; but will not allow the current to enter the solution from the aluminum plate.

Q. 2.—Is the direct current (as it comes from the rectifier) pulsating or throbbing, instead of even and steady, on account of this characteristic of alternating current?

A. 2.—The current delivered from the direct current side of the rectifier is pulsating.

CROWFOOT BATTERIES.

(2028.) Edwin T. Facey, Massachusetts, writes:

Q. 1.—Could crowfoot cells be used to run a spark coil if the batteries were short circuited, when not in use? Would a piece of wire or an old telegraph sounder be the best to short circuit them with?

A. 1.—Crowfoot cells may be used under these conditions, but the number required would be large, inasmuch as the cells have a voltage of 1.1 and their current output is only about 0.1 of an ampere.

Q. 2.—Is it better to use a smaller aerial for sending than is used for receiving?

A. 2.—Yes. Under the conditions of the Alexander Wireless Bill which we printed in the May issue, it will be necessary to make the sending aerial small in order to keep within the wave length limit specified therein.

CONDENSER CHARGING CURRENT.

(2029.) Clare Dolan & Marion Thompson, Iowa, write:

Q. 1.—Why is it that we can hear a faint click in the receiver when we connect it in series with battery and E. I. Co. junior fixed condenser (new) and good glass plate sending condenser?

A. 1.—The click in receivers is due to the current which flows into the condenser and charges it up when the battery circuit is closed. You will probably find that if, after opening the battery circuit, you short circuit the condenser through the receivers, you will get another click, which is the current discharging by the charged condenser through the phones.

Q. 2.—Is the enclosed piece of carborundum the kind to be used in making a sensitive wireless detector?

A. 2.—The sample you sent us looks all right, but we have not had time to test it out, and we cannot tell good carborundum, for detector use, by its appearance.

Q. 3.—Is there any danger, if I use 12 volts A. C., on a one inch coil, of burning out coil or condenser? The current is supplied from a step down transformer. I use vibrator.

A. 3.—We would advise you to consult the maker of the coil on this point. There are a number of coils on the market which

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would stand this, while, on the other hand, there are a number which would be ruined thereby.

THREE SLIDE TUNER.

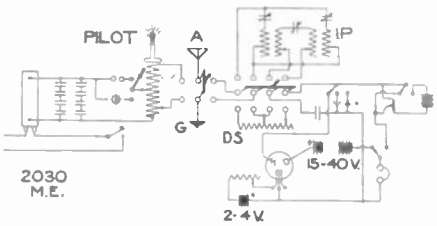
(2030.) L. Baecker, New York, writes:

Q. 1.—Please tell me how a three slide tuner is made, and if there is more advantage obtained from a three slide tuner than from an interference preventer?

A. 1.—The three slide tuner is built in the same manner as the double slide tuner, but is provided with three sliders instead of two. Much better tuning can be done with the three slide tuner than with the double slide, and in fact, it is almost as good as a loose coupler. Most amateur interference preventers do not *prevent.*

Q. 2.—Please publish a hook-up for the following instruments: Sending—14-inch spark coil, eight 2 qt. Leyden jars, helix, key, rotary and fixed spark gap, pilot lamp. Receiving—Loose-coupler and interference preventer, double slide tuner; two variable condensers and one E. I. Co. junior fixed condenser, Perikon, electrolytic and audion detectors and phones.

A. 2.—Here is your hook-up.



Q. 3.—Inclosed is a diagram of my aerial. Could you see any way it could be improved upon?

A. 3.—Your aerial looks all right. The only improvement we may suggest would be that you get it up higher into the air.

RECEIVING TROUBLE.

(2031.) Jerome Labor, New York, writes:

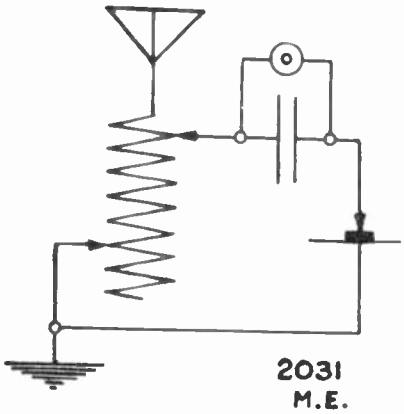
Q. 1.—Please tell me why I don't receive. I live on the ground floor of a five-story house. Another boy and I are receiving on the same aerial, which is 65 feet long and consists of five strands. My set consists of a tuning coil, one 1000 ohm receiver, a silicon detector, and a home-made condenser. I run the wire from my aerial down between two houses and in my window.

A. 1.—If you and the other boy are working with two complete receiving sets connected to the same aerial, it is probable that when the other fellow tries to tune his set it throws yours out of adjustment, and when you tune yours it throws his out. With a single set of instruments such as you describe, and provided your detector is sensitive and your apparatus and aerial properly connected and insulated, there is no reason why you should not receive messages.

Q. 2.—Please tell me how to connect my instruments.

A. 2.—Here is a diagram for connecting up your instruments.

When writing, please mention "Modern Electrics.



Q. 3.—How far can I receive with the above set?

A. 3.—We do not answer questions of this sort. See notice in the August (1910) issue.

HUMMING AERIAL.

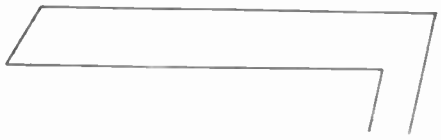
(2032.) Sinclair Smith, New York, writes:

Q. 1.—I have a two wire aerial 60 feet long and 60 feet high, and when I have it connected, as shown in the diagram, I get a humming noise in my receiver. I cannot account for it.

A. 1.—The noise is probably due to induction from a high potential lighting or power circuit near your aerial. The only way to get rid of it is to swing your aerial around so it will be at right angles to the lighting or power circuit.

Q. 2.—Will you please give me a diagram for connecting a two wire aerial, taking the leads from the end?

A. 2.—Here it is.



WIRELESS RECORDERS.

(2033.) L. W. Owens, New York, asks:

Q. 1.—What apparatus will be necessary for a 3 to 5-mile recording wireless set, both transmitting and receiving?

A. 1.—For short distances like this some such outfit as the "Telimco" sets sold by the Electro Importing Co. should operate satisfactorily.

Q. 2.—Can a recorder be used on an apparatus of 200 miles capacity successfully?

A. 2.—Yes, but the apparatus is expensive.

ONE INCH COIL ON LIGHTING CIRCUIT.

(2034.) Alvin McCullough, Pennsylvania, asks:

Q. 1.—Could an incandescent lamp be connected in series with a one inch spark coil, to be connected to a 110 volt lighting circuit?

A. 1.—Yes, but the vibrator contacts will be rapidly burned away.

Q. 2.—If so, what voltage and wattage should the light be?

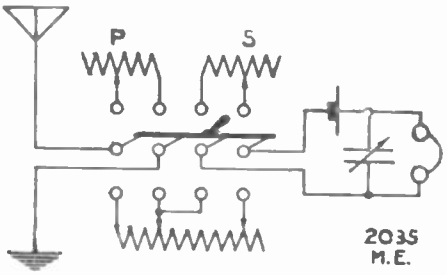
A. 2.—Use ten 110 volt, fifty watt lamps connected in parallel.

ROTARY GAP. THREE SLIDE TUNER.

(2035.) A. S. Francis, Massachusetts, writes:

Q. 1.—Kindly publish the best hook-up for a double slide tuner, a loose coupler, silicon detector, telephones, and a variable condenser.

A. 1.—Here you are.



Q. 2.—Can a rotary singing spark gap be used with a one inch coil to great advantage?

A. 2.—It may be used to advantage, and will increase the sharpness of tuning and the carrying power of your spark, but it won't make it sing.

Q. 3.—Please explain the connections for a three slide tuning coil.

A. 3.—Connect the aerial to one end of the winding, ground to one of the sliders, and the detector circuit to the remaining two sliders.

FIXED CONDENSER.

(2036.) Leroy P. McBrayer, Ohio, writes:

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

A. 1.—The condenser should contain about 36 square inches of tinfoil, in small sheets, separated by paraffined paper about 0.001 inch thick.

Q. 2.—How many ohms resistance should the receivers be for receiving 500 miles with a tuning coil 18 inches long and five inches in diameter?

A. 2.—Get a high grade double head set of 2000 to 3000 ohms resistance.

Q. 3.—How must I connect a three slide tuning coil?

A. 3.—See answer to 2035.

FLICKERING LIGHTS.

(2037.) J. A. R., Illinois, writes:

Q. 1.—The art of wireless telegraphy is not very well advanced in our home town for the following reason: Two stations were set up, the current from the city lighting mains being used for working the transformers; but so many complaints were made about the flickering of the lights in other buildings that the company has refused to supply current to wireless outfits. In one instance, the operator was drawing from a 7½ KW transformer which was connected to only two other subscribers. He drew not more than ten amperes, but when drawing not more than five the lights in the other houses flickered (inductances

and resistances were used to cut down current). The wires leading to this station were joined to the wires of a subscriber about half way from the transformer to the house. A grounded condenser was used on the A. C. mains with no apparent result. In another case the company claimed that a meter had been ruined by the wireless. In another instance where a station is located in the downtown district, no effect is noted except in the building in which the station is located. Here one KW is used. In all cases standard wiring diagrams were used. The current is at a voltage of 110, and 60 cycles.

Is there any way of remedying these faults, or do you think that the trouble lies in the fact that the company is using antiquated machines? Would peculiarities in the current have anything to do with it?

A. 1.—The trouble is due to two causes; first, the regulation of the lighting transformers, and, second, the drop in the service wires from the transformers to the subscribers. The only cure would be the installation of a separate transformer connected to the high tension mains for each wireless outfit. As to the meter being ruined, this was probably caused by a kick back from the wireless transformer. These kick backs may be prevented by the installation of a non-inductive high resistance, the middle point of which is grounded, or of two ½ mfd. condensers in series, with the middle connection grounded. The resistance or condensers should be connected across the power leads close to the wireless transformer. See also answer to 1992 in the May issue.

LOCATION OF AERIAL.

(2038.) Vernon Deal, Illinois, writes:

Q. 1.—About four feet from the end of my aerial are two electric light wires, running into my station, and about seven feet right under my aerial is my ground. Will this be correct for receiving a long distance, and if not how can I fix it so it will?

A. 2.—If the ground connection is made to the piping in your house, it brings the ground up to within seven feet of your aerial, so to speak, and reduces the effective height of the aerial to that figure. The editor of this column has found, that where the instruments are placed in the upper story of a house, that it makes little difference whether the ground be connected to the piping in the same room, or a heavy ground wire be run down to the water pipe in the basement. This is for receiving. Perhaps for sending there would be some difference noticeable. With regard to the electric light wires, if they do not cause a humming noise in your receiving set, you need not bother with them.

Q. 2.—How far apart should the wires be for a four wire aerial 75 feet above the ground?

A. 2.—The wires should not be closer together than one-fiftieth of their length.

Q. 3.—What is the best way to connect the aerial at each end?

A. 3.—If the aerial is of the "T" type, connect the horizontal wires together at each end by means of a cross wire. If the

aerial is of the inverted "L" type connect the wires together at the end opposite that at which the lead-in is connected, and connect a wire to each of the horizontal wires, and, keeping the same spacing as used in the horizontal part, run them all down to the station. The aerial may then be used either loop or straightaway without taking it down to change it.

TUNER AND COIL DATA.

(2039.) Walter A. Smith, Illinois, asks:

Q. 1.—How many ounces of No. 22 B&S enameled wire for primary, and number of ounces of No. 28 B&S enameled wire for secondary ,of the loose coupled tuner described in "How to Make Wireless Instruments"?

A. 1.—5.5 ounces No. 22, 2.4 ounces No. 28.

Q. 2.—Please give data for a spark coil using three-fourths of a pound of No. 33 B&S DCCC wire for the secondary.

A. 2.—Core, 4¾x½ inch; primary, 2 layers No. 22 B&S; secondary, ¾ lb. No. 33 B&S, in two pies; primary condenser, 55 sheets, 2x4 inches; wall of insulating tube between primary and secondary, 1-16 inch; primary volts, 4; spark length about ¼ inch.

Q. 3.—Can No. 14 aluminum wire be used for a helix for this coil, the lead-in and aerial being also No. 14? If so give dimensions.

A. 3.—A helix should not be used with such a small coil, except, perhaps, as a loading coil in the aerial lead, as the energy delivered to the aerial would be very little. Use No. 6 or No. 8 wire, if you make it.

OPERATORS' PAY.

(2040.) J. Arthur Evans, Virginia, asks:

Q. 1.—What is the average pay of a wireless operator?

A. 1.—About thirty dollars a month.

STORAGE BATTERY AND TUNER DATA.

(2041.) Frank Nankivell, New York, writes:

Q. 1.—Please tell me regarding a lead-sulphuric acid storage battery, the proportions, by bulk, of lead and paste that will give the best results in constructing the plates. Also how thick should each plate be, and how far apart should they be placed.

A. 2.—We haven't sufficient data on this subject to advise you properly. You had better consult some good book on storage battery engineering, such as Lyndon's.

Q. 2.—I have covered 16¼ inches of a cardboard tube 2⅞ inches in diameter with No. 20 B&S SCCC wire. I wish to use this as the primary of a selective tuner with weeding out circuit. How many inches of a 2⅞-inch tube must I cover with No. 28 B&S SCCC wire.

A. 2.—Seven inches.

Q. 3.—On page 18 of the April, 1912, issue of *Modern Electrics* there is a cut of the "Blitzen Tuner." Will you please tell me the gauge, number of layers,

The Little Wonder

¶ This is the Tungsten Flashlight Battery which has brought the pocket flashlight out of the class of mere novelties and placed it among the practical articles for daily service.

¶ With ordinary use a small pocket flashlight—when equipped with an Eveready Tungsten battery — will furnish service for months. No flashlight user can afford to carry other than the Eveready Tungsten Battery. It lasts four times as long as the average battery and gives four times the light. It saves not only the cost of these extra batteries, but also the time and trouble required in purchasing renewals.

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and number of turns per layer of wire on the primary and secondary rings? Also what is the diameter and width of the rings?

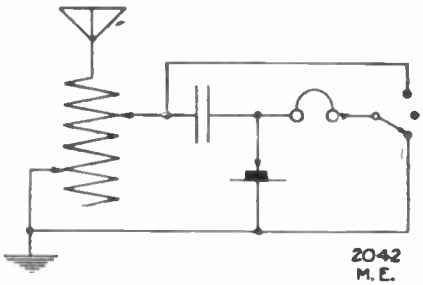
A. 3.—You can search us, Frank; we haven't bought one to pull apart. There is no other way to find out. Maybe the manufacturer will tell you, but we don't think so.

SENDING CONDENSER.

(2042.) William Barr, Alabama, writes:

Q. 1.—Please give me a hook-up for a double slide tuner, 2½ inches in diameter and 11 inches long, 2000 ohm receivers, silicon detector, fixed condenser, 3 point switch.

A. 1.—Here it is, William.



Q. 2.—How far would the above set receive with an aerial about 40 feet high at one end, 25 feet at the other, and 60 feet long?

A. 2.—This is too much for us. See notice in the August, 1911, issue.

Q. 3.—How many plates would a one inch spark coil require for a condenser?

A. 3.—Six plates 8x10 inches, with tinfoil 6x8 inches on both sides.

TRANSFORMER COIL.

(2043.) George B. Davis, Missouri, writes:

Q. 1.—Please give data for condenser suitable for use with E. I. Co.'s ½ KW transformer coil and interrupter. I have about twenty plates 8x10 inches and tinfoil for same.

A. 1.—See answer to 2042.

Q. 2.—What is the secondary voltage of the above coil with interrupter? I use a zinc spark gap with 3-16 inch electrodes about one inch apart.

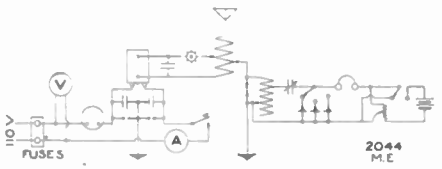
A. 2.—About 20,000 volts.

LARGEST WIRELESS STATION.

(2044.) Joe Mahan, Kansas, writes:

Q. 1.—Please give me a hook-up for the following wireless instruments: Spark coil, rotary spark gap, glass plate condenser, helix, electrolytic interrupter; double slide tuner, detector switch, silicon, carborundum, molybdenite detectors, Murdock variable condenser, potentiometer, W. E. Co., 2000 ohm phones, 2 mfd. and ½ mfd. condensers, volt and ammeters; together with the necessary switches, kick-back protector, and some simple break-in key.

A. 1.—Here is your diagram.



Q. 2.—What is the largest station in operation to-day, and what is the capacity of its sending apparatus in kilowatts?

A. 2.—We cannot say which one is the largest, but it is probably one of the following: The Marconi transatlantic stations at Clifden, Ireland, and Glace Bay, Nova Scotia; the Telefunken station at Nauen, Germany; or the Marconi station at Coltano, Italy. Details of the amount of power used at these stations are not available.

Q. 3.—Will you please explain the construction of the silicon-carbide detector in detail?

A. 3.—This is nothing more nor less than the carborundum detector, consisting of a crystal of carborundum in contact with a metal point.

PLATING ALUMINUM.

(2045.) H. L. Breckinridge, Kansas, writes:

Q. 1.—Please let me know, through the Oracle, if the enclosed sample of aluminum wire has been nickel-plated; and if there has ever been any way discovered by which aluminum can be plated.

A. 1.—As to the nickel plating, we are unable to say, but the wire, when received, showed a trace of copper, to which we got a drop of solder to stick. However, when the solder was pulled away, the copper came with it, so it may be safely said that you have not succeeded in putting on a coating that will stick. We never heard of anyone who has succeeded in plating aluminum satisfactorily.

D. C. MOTOR ON A. C. CIRCUIT.

(2046.) Frank F. N. Watson, New York, wants to know:

Q. 1.—If a type S Knapp dynamo will run on 6 to 8 volts alternating current?

A. 1.—Yes, but on account of the transformer action that takes place between the field and armature, it will probably spark pretty badly.

Q. 2.—If so, why?

A. 2.—The armature and fields are connected in parallel. When the current reverses, the reversal takes place simultaneously in both armature and fields, so the relation between the magnetic flux of the armature and that of the fields is always such as to produce rotation in the same direction.

RECHARGING DANIELL CELLS.

(2047.) Ervin W. Epley, Ohio, asks:

Q. 1.—Can a Daniell cell which is somewhat run down be recharged by pass-

ing a current through it in the opposite direction? Would this not change the copper which has formed on the copper plate to copper sulphate solution, and the zinc sulphate solution which has formed by the dissolving of the zinc back into zinc on the zinc plate?

A. 1.—This can probably be done, but it would probably be as easy, and less expensive, to recharge them in the regular way.

Q. 2.—What primary battery is best for an experimenter to make?

A. 2.—For moderate currents, the Daniell cell; for heavy currents, the bichromate of potassium and sulphuric acid cell with zinc and carbon electrodes.

Q. 3.—What is the cost per ten watt hours to run this cell and the Daniell cell?

A. 3.—We have no data on this, and do not know that any has been published.

RESONANCE. BATTERY RHEOSTAT.

(2048.) P. Mertz, New York, inquires:

Q. 1.—What is meant when it is said that the primary and secondary circuits of any transformer (oscillating, Tesla, or others) are in resonance?

A. 2.—This means that the natural period of alternation, or oscillation, is the same in both circuits.

Q. 2.—Is there any advantage in having them so, and, if so, why?

A. 2.—When this condition is realized, the amount of energy in the secondary circuit is much greater than it would otherwise be. In some forms of transformer, for instance, Tesla, and oscillation transformers, this is a decided advantage; while, on the other hand, in the case of power transformers, where the period of oscillation is comparatively low, on account of the large values of inductance and capacity involved, sometimes enormous voltages, and at other times enormous currents are set up, which break down the insulation or burn out the conductors. While in wireless and high frequency work resonance is sought, in the design of power apparatus and circuits it is avoided at all costs.

Q. 3.—How is it that although the electro rheostat, manufactured by the E. I. Co., is rated at only two amperes, a current from an ordinary dry battery, rated at 25 to 30 amperes, can be passed through it without any effects of heating or anything else? I do not think it is because the rheostat is under rated nor because the battery is over rated.

A. 3.—This is very simply explained by the application of Ohm's Law: I equals E divided by R. Current equals voltage divided by resistance. The resistance of the rheostat is about ten ohms. The voltage of the dry cell is about 1.5. Applying Ohm's Law, we have: Current equals 1.5 divided by 10, or 0.15 ampere, which is not sufficient to heat up the resistance wire to any appreciable extent. In order to force thirty amperes through it, it would be necessary to connect it to a circuit, the voltage of which is about 300. If this were done the rheostat would be destroyed, almost instantly.

500,000 VOLT TESTING TRANSFORMER.

(Continued from Page 238.)

upper end to ground is nearly uniform. The cap at the top which is placed there to reduce the corona effect is made of wood and covered with tinfoil. Its object is to make the static field from the live terminal to ground uniform and to prevent concentration of this static field. Without the cap corona was noticed at about 350,000 volts; while with the cap in place there was no corona up to 570,000 volts.

The transformer case is nine feet ten inches in diameter, by 9 feet eleven inches high, while the top of the high tension terminal is seventeen feet two inches above the floor level. The transformer is rated at 200 kilo-voltamperes, or 200 kilowatts at a power factor of 100 per cent.

TANTALUMS IN "LIGHTER" VEIN.

For some time past there has been a tendency among some of the leading manufacturing firms on the other side of the "Pond" to vary the slightly monotonous tendency of trade public-

ity by introducing humorous sketches into their schemes. These are, in many cases, by artists of distinction in this particular field, and there is no doubt that though they may be looked at askance by some of the more old-fash-

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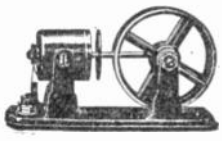
Junior Fixed Condenser. Used in all modern receiving sets. Special dielectric giving extra high capacity. Sealed in hard rubber base with binding posts, as shown. Sells for $0.50. (Add 6 cents for postage).

Given free for 1 subscription.

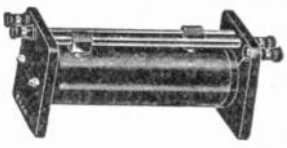


Wireless Engine. The Slickest little engine ever placed on the market. You cannot see a piece of wire. Has two fly-wheels and beautiful balancer. Cast iron base; works on one dry cell. The engine sells for 15 cents. (Add 11c. for postage)

Given free for 1 subscription.

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

Given free for 2 subscriptions.



"Electro" Junior Tuning Coil. Slickest tuning coil on the market. Has solid hard rubber ends, bare copper winding, hard rubber sliders. Size, 8 x 3¼ x 3¼ in. Weight, 1½ lbs. The most beautiful and most practical coil made. "Electro" Tuner sells for $2.00. Sent by express only.

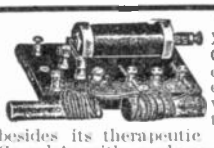
Given free for 5 subscriptions.

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

Given free for 1 subscription.

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

Given free for 1 subscription.

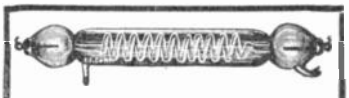


"Electro" Medical Coil. A1 quality. No end of fun with one of these coils, besides its therapeutic properties. Complete with cords and handles. Medical Coil sells for 70 cents. (Add 12 cents for postage.)

Given free for 3 subscriptions.

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

Given free for 10 subscriptions.



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

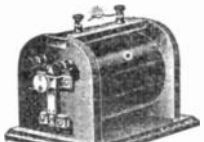
Given free for 1 subscription.

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

Given free for 3 subscriptions.

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

Given free for 3 subscriptions.



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

Given free for 12 subscriptions.

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

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

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MODERN PUBLISHING COMPANY, 231 Fulton St., New York

ioned and conservative houses, yet they "advertise the goods," and that is the main object, while, in addition, they lighten the general trend and rush of business and help to liven things up generally. The publicity department of Messrs. Siemens' well-known Tantalum lamp works at Dalston, England, have gained considerable notoriety (and, *inter alia*, business) in this particular direction, their "Satisfied Consumer" and "Little Bill" showcards being cases in point, and they are now issuing a new cartoon by Mr. MacBean on the subject of "Selling Tantalum Lamps," of which we give a reduced illustration herewith. In it our readers will observe there is a humorous drawing showing the greatly overworked "Tantalum" Sales Department, and an illustration of shipping "Tantalum" Lamps, showing barrels being tumbled over a parapet on to the steamer below, whilst there are three distinct instances of travellers' difficulties, perhaps more imaginary than otherwise, but distinctly humorous. One is entitled "Convincing the West," another "Delighting the East," and the third demonstrating the strength of "Tantalum" Lamps. We do not quite know what the charming damsel in the centre is supposed to be doing, but presume she is acting as "saleswoman" in the sense that she has explained to her fiancé that it is hopeless for him to ask her to name the day until he has promised to have "Tantalums" installed in every room in the "Dovecot." On such terms a "sale" may be counted on, and if the future in the "Dovecot" is a "sell" that is not the fault of the lamps. They will give light to Algernon to stumble upstairs after the last S. S. Smoker.

INTER-COMMUNICATION BETWEEN AMATEURS.

By G. S. Corpe.

Many experimenters, after investing a good deal of money and spending much time with their wireless equipment at first, become indifferent and seem to lose interest. I have noticed this is principally because they do not have any "system" of working with each other—often not even learning how to send and receive. Consequently I believe a few suggestions in

regard to amateur inter-communication will not be amiss.

The beginner should learn to send and receive reasonably well before setting up any sending equipment. If one is interested in wireless, and really wishes to make a success of his station—when he does get one—I believe the best way is to buy a key and buzzer, interest some friend in wireless, and practice together sending and receiving at all possible times. At the same time he should read all Electrical and Wireless magazines and books which he can get his hands on.

In this way, at the end of a very few weeks he will have a good general idea of the electrical and mechanical side of the work, and will be sending and receiving perhaps fifteen words a minute in good shape. Also, as a result of this preliminary work he will know how to intelligently handle his outfit and his interest in the work will be such that "dropping it" will be an absolute impossibility.

After one knows how to send and receive he should learn about communicating with other stations—calling, signing off, message forms, etc.

When a station whose call is, for example, "RZ" wishes to call another station—"KY"—"RZ" should make "KY" about four times, then give his own signal—"RZ"—then give the call "KY" four times again; next signing his call "RZ" and closing with the "finish" signal. For this latter some operators use the figure 3, others 30; while some prefer merely a short dash.

When "KY" answers "RZ" he should say "RZ RZ ge ga KY," meaning "RZ RZ good evening go ahead KY." Of course, if it is before noon he will say "good morning" instead of "good evening."

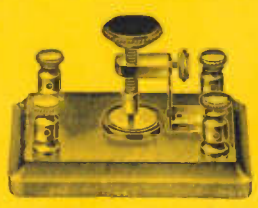
Now suppose "RZ" has a message for "KY." When "KY" answers him, he will say "KY RZ ge hr msg no 1 ck 12 fm RZ 14 to Operator KY, Los Angeles, Cal." This form, when "translated," means: "KY good evening hear message number 1, check 12 (meaning the number of words in the body of the message), from RZ 14 (these figures show the date on which the message is sent) to operator KY, Los Angeles, Cal." He will then give the "body" of the message; after this the signature. It is customary to separate the introduction of a message from the body, and the body from the signature, by a period.

When one is wording a message to be sent by wireless, no unnecessary words should be included. Then after the message is sent the amateur should not "chew the fat."

Regular operators and advanced amateurs respect the beginner who uses his transmitting set very little, and who says something important and to the point when he does use it.

If the beginner in wireless practices faithfully with a key and buzzer and applies himself to a thorough study of the theoretical side of wireless, he will soon become known as a leading amateur and somewhat of an authority on the subject.

But if he sticks up an aerial, has a two kilo-watt transformer installed, and begins to fill the "ether" with a series of unreadable crashes before learning to send and receive or attend to the electrical details of his set, he will be generally disliked and known as a "ham."



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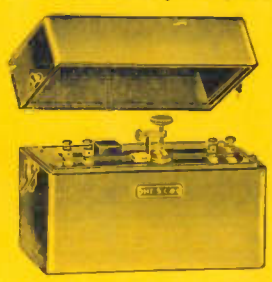
No. 452. Wireless Key.....$1.95



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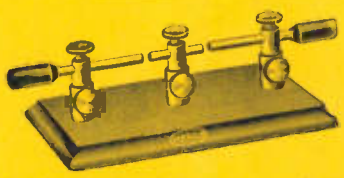

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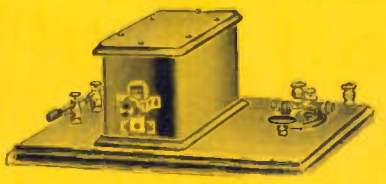

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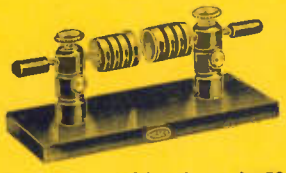
No. 462. Wireless Spark Coil, 1 in.....$5.40



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