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Directions

for the instalation and care of

Automatic Electric Clocks

Manufactured by

The American Clock Company

381 - 385 WABASH AVENUE,

Chicago, Ill., U. S. A.

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INTRODUCTION.

Although our Clock is very simple and easy to understand, yet we trust that a description, setting forth the principles underlying its design, the plan of its operation, and covering all of the important details of its construction, will be highly advantageous to our patrons who handle and care for them.

We have sought to avoid all unnecessary detail, passing by with brief notice, that which is common to clocks in general, and have devoted the following pages principally to the special features pertaining to our Clock. We trust, however, that the instructions given are sufficiently comprehensive to enable any one of ordinary intelligence, by giving special attention to the descriptive matter herein contained, to handle the Clocks as easily as we do in our factory.

GENERAL DESCRIPTION.

Mechanically considered, aside from the actuating mechanism, our Clock is essentially the same as other high grade clocks; having a pendulum, a dead-beat anchor escapement, and a driving train of three wheels.

The motive power is supplied by the gravity of two weighted levers, mounted upon the center staff. These levers, together with the accompanying mechanism for operating them, constitute the special mechanical features of most importance in our Clock.

The electrical elements consist of a horse shoe magnet, a pivoted armature, an electric circuit, a device for making and breaking the said circuit, and a battery, usually of two cells.

Recognizing the fact that for accurate time keeping purposes, a clock should be uniformly supplied with very little more power than what is absolutely necessary to maintain vibration of the pendulum; we have mounted upon the outer end of each of the above named levers, a weight of small size. These weighted levers stand at an angle with each other. Both move slowly downward as the center staff of the clock rotates. When the upper lever reaches a horizon-

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tal position, the electric circuit is closed, and the lower lever is thrown upward, past the other one to the same angle above that it previously occupied below it. The relative position of the levers is reversed, but the angular difference between them is the same as before, and the circular arc through which the said lever passes downward, after a rise, is the same during each successive period of descent, both in position and extent of travel; and the amount of power delivered to the clock train by the gravity of the weighted levers is exactly the same for each of the above named periods during the entire life of the battery. So far as the motive power is concerned, the plan is, therefore, such as to produce a perfect rate of time keeping.

The mechanism for closing the electric circuit, operates to supply sufficient current to properly energize the magnets, so that the work of raising the lever is performed, and the said ascending lever, before it reaches the limit of its upward movement, opens the circuit and prevents any further expenditure of battery power. This automatic feature is of immense value, as it prevents waste, thus prolonging the life of the battery.

The construction of the clock is such as regards workmanship and material used, that the power applied by the weighted levers is transmitted through the train to the pendulum, with the least possible loss from friction, the escapement having jeweled pallets, and the train pivots being of hardened steel, highly polished.

The pendulum stick and the supporting springs are designed with special reference to convenience in attaching and removing the pendulum, as well as special adaptation for preventing lost motion between the parts so joined, the pendulum being free to assume a vertical position under all conditions. The pendulum is also provided with a graduated adjusting nut to facilitate regulation.

All parts are made interchangeable, so that in case of breakage, or injury to any of them, the same may be replaced by a new one.

DETAIL INFORMATION.

Pivots, Freedom Of.

Like most time keeping devices, it is absolutely necessary to have sufficient freedom in the train pivots, both of side and end shake, and no tightness in any of the moving parts.

The Cannon Pinion.

The tongue of the Cannon Pinion should have enough pressure against the center staff of the clock so that the friction between them is sufficient to enable the said pinion to safely operate the dial wheels, and carry the hands without any danger of slipping.

The Levers.

The two weighted levers should be perfectly free upon the center staff, and the supporting clicks, or pawls, should be perfectly free on the shoulder screws on which they are pivoted. The click springs should have tension enough to act quickly. These features are very important.

The Ratchets.

The seven equi-distant notches in each of the ratchets mounted on the center staff outside the levers, are placed opposite those of the other ratchet, so that the steel plate which is attached to the upper contact mechanism, and which extends over both ratchets, may drop down and permit the electric circuit to be closed.

The Armature.

The Armature, which is located above the magnets, should not be pivoted so low in the frame of the clock as to strike on the back edges (edges nearest the point of pivoting) of the magnet cores, when drawn down by the magnetism induced by the electric current; and must not be pivoted so high that the distance between the armature and magnet will materially lessen its attractive power when it first begins to act. The pivoting to the right, should bring the bottom face of the armature parallel with the top end faces of the magnet cores, when said armature is at its lowest limit.

The Connecting Link.

The projecting tongue of the armature has pivoted to it, a link, which projects upward and supports at its upper end, a cross pin. The link should not be tight in the slot of the armature tongue, but should fit closely on the sides, in order to keep the cross pin at the top of the link parallel with the center staff of the clock. This cross pin projects through the said link an equal distance on either side, each end respectively passing through the slot of the corresponding lever,

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the total length of this pin being nearly equal to the distance between the ratchets. When the electric circuit is closed, and the magnets energized, the armature and link are drawn downward; the weighted end of one of the levers which runs the clock, being at this time, at the limit of its downward movement, the opposite, or slotted end, of said lever, is then at its highest point, and the downward pull in the slot by one end of the above described cross pin which enters it, will throw the weighted end of the said lever upward. The direct action of the magnets raises the lever nearly to the horizontal position, and the momentum acquired by the said lever carries it the remainder of the distance. See Diagram of Levers, Fig. 1.

In Fig. 1 the lever A is at the horizontal position at the time of closing the electric circuit. The lever B is at its lowest limit, and is thrown upward in the manner described above, to the position represented by the dotted lines B 1; the said momentum carrying it to the position represented by the dotted line B 2. By this arrangement of stopping the downward pull of the link pin when the ascending lever reaches the point B 1, all danger of disturbing the other lever A is avoided. The position B 1 is such that the top of the ascending lever weight is about even with the center of the other weight A. When the rotation of the center staff of the clock brings the notches of the ratchets, which are mounted upon it, to the proper position, the above described steel plate attached to the brass of the upper contact will drop down into them, and the above described piece of platinum attached to the long arm, will also drop down into the V of the lower contact, and close the electric circuit. The magnets will then be energized and the lower lever thrown upward. After it has risen about two-thirds of the distance, the cam-shaped hub of the said lever will lift the above described steel plate out of the lever notches, the upper and lower contact points being separated and the electric circuit broken at the same time.

The Magnets.

The magnets of the clock are provided with a shunt or short circuit connection of high resistance, between an outer coil of one spool and a similar coil on the opposite spool of the magnet. This reduces the sparking at the contact points when the circuit is broken. One of the terminal wires from the magnet is soldered into the binding post F, and the other one into the post G, as shown in Fig. 6.

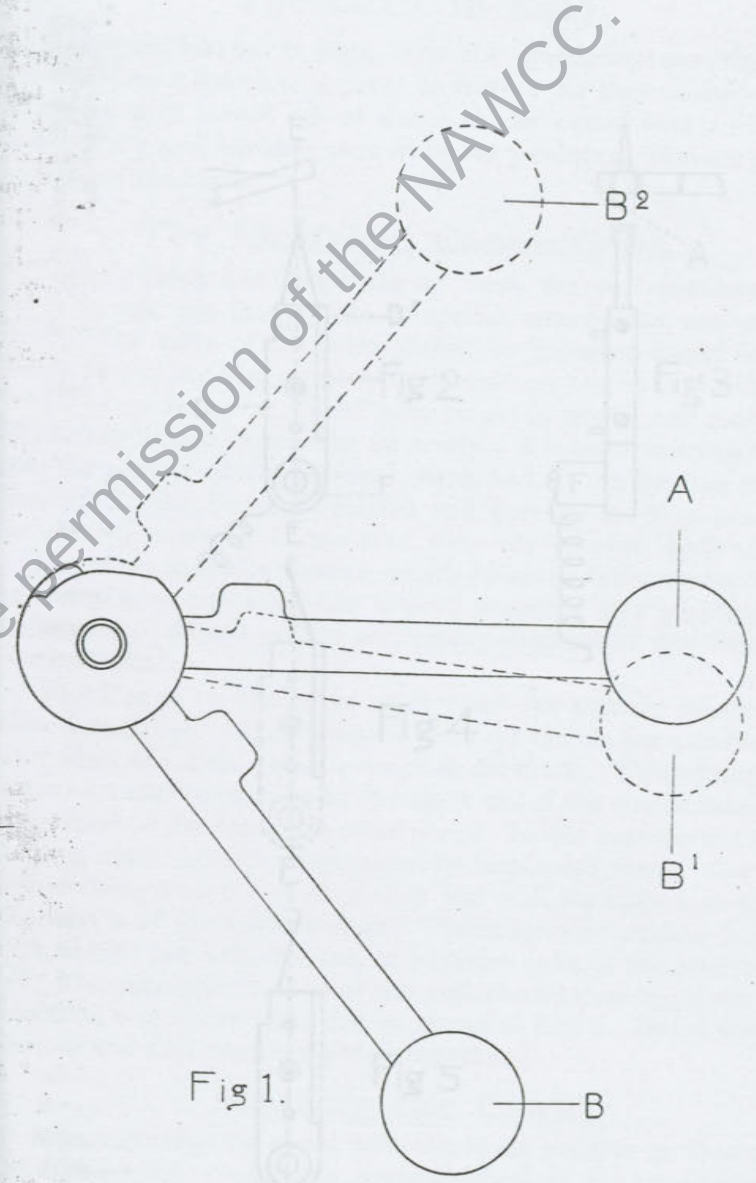

Fig 1.

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The Contact.

The mechanism for making and breaking the electric circuit will in this description, be termed the contact, and consists of an upper and lower element. The upper contact has an electrical connection with the front frame of the clock, while the lower element is insulated therefrom, being mounted upon a strip of vulcanized fiber. Upon a long steel pin driven into the frame of the clock, the brass part of the upper contact is rotatably mounted. It has attached to it a hard steel plate, which extends over and rests upon the two ratchets. It has also a spring which presses it against the said ratchet; and has near the end of a projecting arm, a thin piece of platinum extending downward.

The lower contact element is fixed to its fiber support by a screw and two pins. The brass part of this consists of two pieces held together by screws. From each piece extending upward, are two steel springs tipped with platinum, shaped so that when they are together they form a V, which stands directly under and close to the platinum of the upper contact. Figures 2 and 3 are respectively a front and side view, on an enlarged scale, of a portion of the upper and lower contact.

Figures 4 and 5 are detailed views showing contact springs.

As will be seen by Fig. 2, the brass portion of the lower contact, is in two pieces, D and D 1. One of the platinum tipped springs is attached to the larger piece D, the other being attached to the smaller piece D 1, the said pieces being fastened together by screws. When the parts are together, as shown in Fig. 2, the platinum tips upon the springs press against each other, the tension on each spring being such that the V formed by the said tips is in line with the platinum of the upper contact; Fig. 2, showing their position when in the clock ready for operation, the circuit being open, the upper contact point and the lower V being on the dotted line EEEE. If one of the springs was broken off, the remaining spring would be relieved of its tension and extend over the line EEEE as shown in Fig. 4. If the other was broken off, then the remaining one would assume the position shown in Fig. 5.

The springs are set in separate pieces of brass so they may be taken apart for purposes of alignment and cleaning. It may be necessary, after a long period of time, to bend the springs toward each other so as to give them more tension. It requires very little,

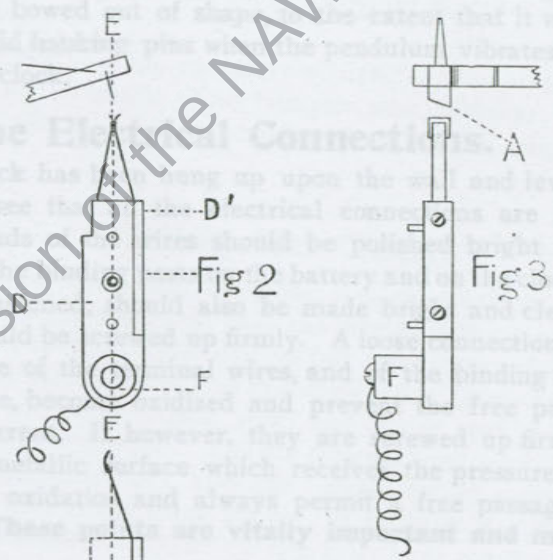

Fig 2

Fig 3

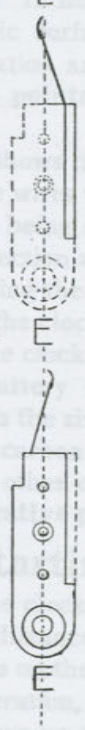

Fig 4

Fig 5

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however, as a slight friction between the upper and lower platinum points, when the circuit is closed and opened, will suffice to keep the surfaces bright and clean.

Fig. 3. is a side view of the contact mechanism. The platinum of the upper contact is beveled, as shown, so that the point A is lowest and comes into engagement with the V of the lower contact first, when the electric circuit is closed; and is also last to separate from the lower V, when the circuit is broken. The purpose of this bevelled form is to facilitate the entry of the upper contact point into the lower V when the circuit closes; and to locate all the black oxide upon the extreme lower point of the upper contact, and upon the corresponding corner of the lower V, instead of having it distributed over the entire surface.

This oxide is caused by the spark which appears when the circuit is broken, and tends to hinder the free passage of the electric current. With our Clock, however, there is very little oxide formed and that is being continually rubbed off.

The long spring which presses the upper contact downward, should be polished bright where it bears against the pin. The pin should also be bright. The upper contact should be perfectly free upon its post, so that there can be no failure to drop promptly at the proper time. **Never permit any oil to get on the contact points,** as this will certainly make trouble. The platinum surfaces should be dry, clean and bright.

The Pendulum and Suspension Springs.

The pendulum is supported by two springs which are fastened to brass plates. The upper plate is clamped in the slot of the iron hanger which supports it. This plate should be in the bottom of the slot and screwed up firmly, as the clock can never be regulated to accurate time keeping if the spring plate is loose. In case the suspension springs, from accident or other cause, are bent—particularly when they receive a short kink—it is not advisable to try to straighten them; better replace them with new ones. The pendulum can be attached by passing the screw head on the upper end of the stick, through the V shaped opening in the lower brass plate of the suspension spring, using care that the parts are clean. See that the end of the crutch wire stands out straight and perpendicular from the clock frame, and that it is free in the pendulum slot.

The Clock in Beat.

If the clock is not in beat, bend the crutch wire over one of the banking pins a sufficient amount to correct the error; using care not to get the wire bowed out of shape, to the extent that it will strike either of the said banking pins when the pendulum vibrates with the running of the clock.

The Electrical Connections.

After a clock has been hung up upon the wall and levelled up ready to run, see that all the electrical connections are properly made. The ends of the wires should be polished bright with fine emery paper; the binding posts on the battery and on the clock where the wires are fastened, should also be made bright and clean, after which they should be screwed up firmly. A loose connection will expose the surface of the terminal wires, and of the binding posts, so they will in time, become oxidized and prevent the free passage of the electric current. If however, they are screwed up firmly, that portion of the metallic surface which receives the pressure will be protected from oxidation and always permit a free passage of the said current. **These points are vitally important and must not be overlooked.**

Fig. 6, page 10, shows the battery and the electric circuit. The ends G and H of the wires which form the circuit, are soldered into brass discs, the discs being screwed to the clock. This arrangement insures a better connection at the clock end of the circuit than would be attained by clamping the plain wires. In this case the flat face of the disc, which joins the clock, must be bright and clean. One of the wires leading from the clock should join with the carbon, or positive pole, of one of the battery cells. The other wire leading from the clock, should join with the zinc, or negative pole, of the other battery cell. The remaining carbon of one cell, should then be joined to the remaining zinc of the other cell, as shown in Fig. 6. **Never join two positive nor two negative poles together.**

Starting the Clock.

Before starting the clock, raise the lever weights so that one is above the other, a distance corresponding to the spacing of the notches in the ratchets on the center staff, as shown in Fig. 6. After the clock is in operation, observe the action of the electrical mechanism in throwing up the weighted levers. See that they rise

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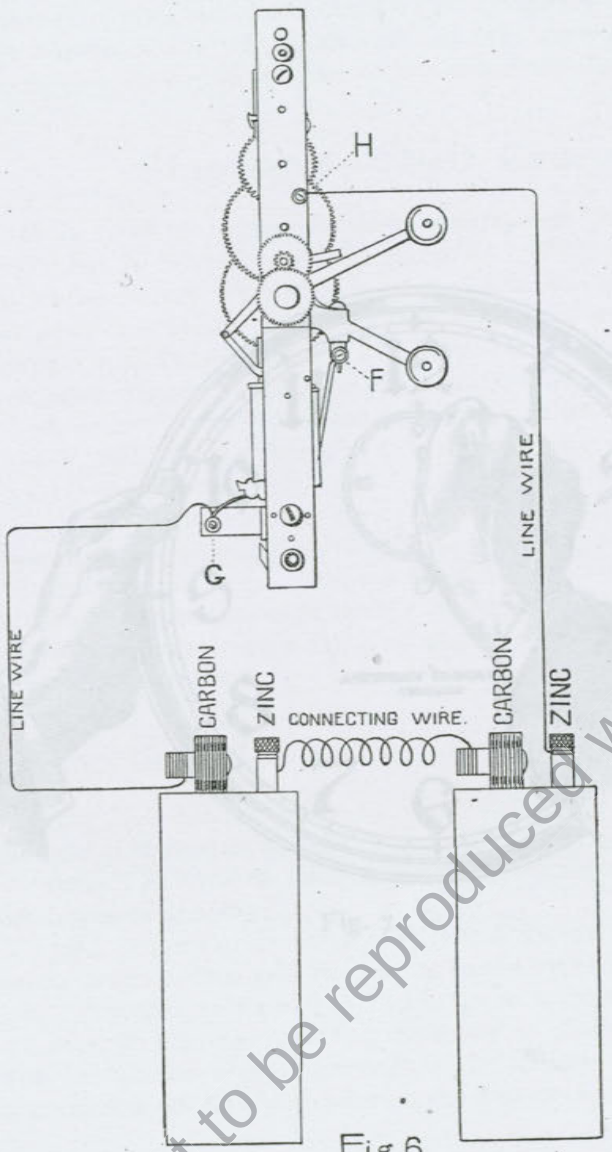

Fig 6.

promptly and with sufficient force. After one of them has risen stop the pendulum and see that the bumper strap is high enough, so that there is no danger of the lever wedging in under the strap and sticking there.

See also that it is not excessively high, as that would make the lever rebound too much. This bumper post, however, is set right when the clock leaves our factory, and seldom, if ever, needs re-adjusting.

Dialing the Clock.

For convenience in putting on the dial, especially to avoid dropping the screws, we suggest that the screws first be placed in the screw holes in the dial, hold dial in left hand, screw-driver in right hand with the blade pressed into the screw slot. Then raise dial until you can see the second hand staff, and center staff through their respective holes in the dial. You are thus enabled to get the position of dial approximately right, and can readily feel a screw point into the threaded hole in the clock frame. It may be well to put in one screw at a time, preferably the top one first, then hold the lower portion of the dial slightly away from the frame, and enter another screw sufficiently to catch the threads. Finally put in the last one, and screw them in to the limit. A clear idea of the above operation can be obtained from Fig. 7, page 12.

Mounting the Hands.

After the dial is on firmly, the hands can be mounted by placing second hand on the escape staff with the point at Fig. 12. Then put minute hand on the cannon pinion and turn the said pinion until the hand points to Fig. 12, then remove said minute hand temporarily and put on hour hand, pointing it also to Fig. 12, and press it tightly on the hour wheel socket. The minute hand may then be replaced as before and the nut screwed on finally. See that the second hand is sufficiently tight upon the staff. The socket may be closed with pair of pliers, if necessary. See also that the hour wheel socket has plenty of freedom in the hole and a little end shake. See that all three of the hands have sufficient room to pass each other without danger or interference, and that second hand clears the dial by a safe distance.

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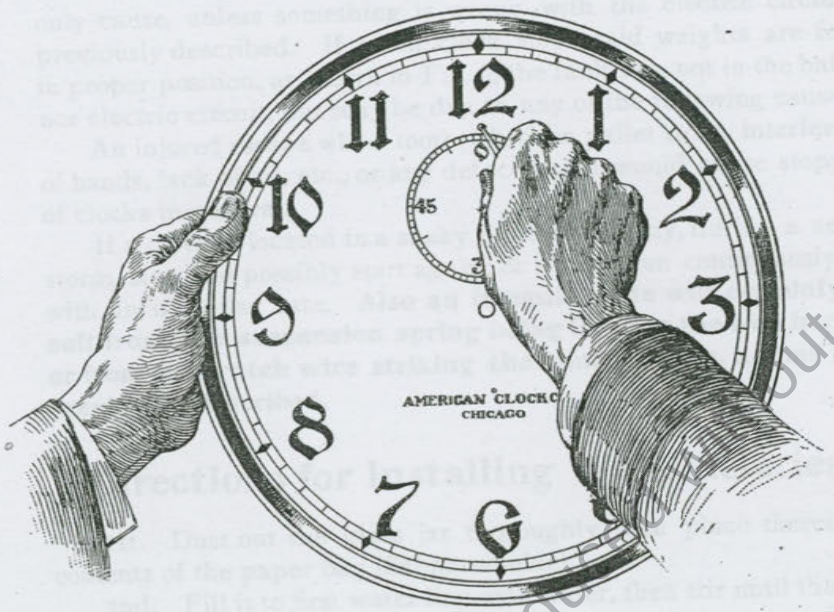

Fig. 7.

Location of the Clock.

In case the clock is to be installed in an upper story of a long narrow building, we suggest that whenever possible it be hung so as to face the broad side, instead of the narrow end, of the said building, as the vibration occasioned by storms will have much less effect upon it when so placed.

Cleaning and Oiling.

The clock should be taken apart, cleaned and oiled periodically; as often, under ordinary circumstances, as once in two years, although this must depend entirely, as with other clocks, upon the surrounding conditions. Some clocks would remain comparatively clean for a much longer period, while others would become dirty in a shorter time.

The lever bushings should be well oiled to avoid friction on the center staff when the magnets pull down the armature and link and throw up the lever.

In order to clean the levers, the front ratchet must be removed, after first driving out the taper pin, when the levers will slip off from the staff. Care must be used to replace the ratchets in the same position when putting the movement together again. The edges of the ratchets should receive a little oil, as well as the train pivots and the armature pivots. The pallets should be oiled very sparingly.

SPECIAL NOTICE.

Do not under any circumstances oil the contact points, nor permit any oil to reach them. Keep the oil off of the upper contact spring and the pin against which it bears. Do not oil the long pin or post on which the upper contact rocks. This bearing is intended to be clean and dry.

Broken Parts—How to Remedy.

In case any of the clock parts are broken, or seriously injured, we recommend that our patrons send to the factory for duplicates. When a pallet stone is broken, the pallet complete should, if pos-

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sible, be sent to the factory. It will be more satisfactory if we get the pallet together with the staff and crutch wire, so that all of the parts can be matched by our standards. In case a part is ordered, state whether for a 60, 80, 100 or 140 beat movement. It is well also to give the serial number of the movement for which it is intended.

Stoppages—Their Causes.

If the clock stops and the lever weights are found together, the usual cause is exhaustion of the batteries. This is practically the only cause, unless something is wrong with the electric circuit, as previously described. If, when clock stops, said weights are found in proper position, as shown in Fig. 6, the fault lies, not in the battery nor electric circuit, but may be due to any of the following causes:

An injured escape wheel tooth, a broken pallet stone, interference of hands, lack of oil, etc., or any defect which would cause stoppage of clocks in general.

If a clock is located in a shaky building it may, during a severe storm, stop and possibly start again; or it may run continuously, but with an irregular rate. **Also an irregular rate will certainly result from the suspension spring being loose in the iron hanger, or from the crutch wire striking the banking pins, as has been previously described.**

Directions for Installing Wet Batteries.

1st. Dust out the glass jar thoroughly, then place therein the contents of the paper bag (Sal ammoniac).

2nd. Fill it to first water line with water, then stir until the solution is nearly dissolved.

3rd. Insert the carbon through slit in the cover, then attach the gonda to the carbon with the rubber bands around the top and bottom. Place the gonda and carbon in the solution, then insert the zinc.

4th. In filling and putting batteries in place be careful not to slop the solution upon the outside of the jar; also see that the cover is pressed down tightly to prevent the evaporation of the solution.

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