(No Model.)

E. G. HAMMER.

ELECTRIC BATTERY.

No. 326,033. Patented Sept. 8, 1885.

Fig. 1.

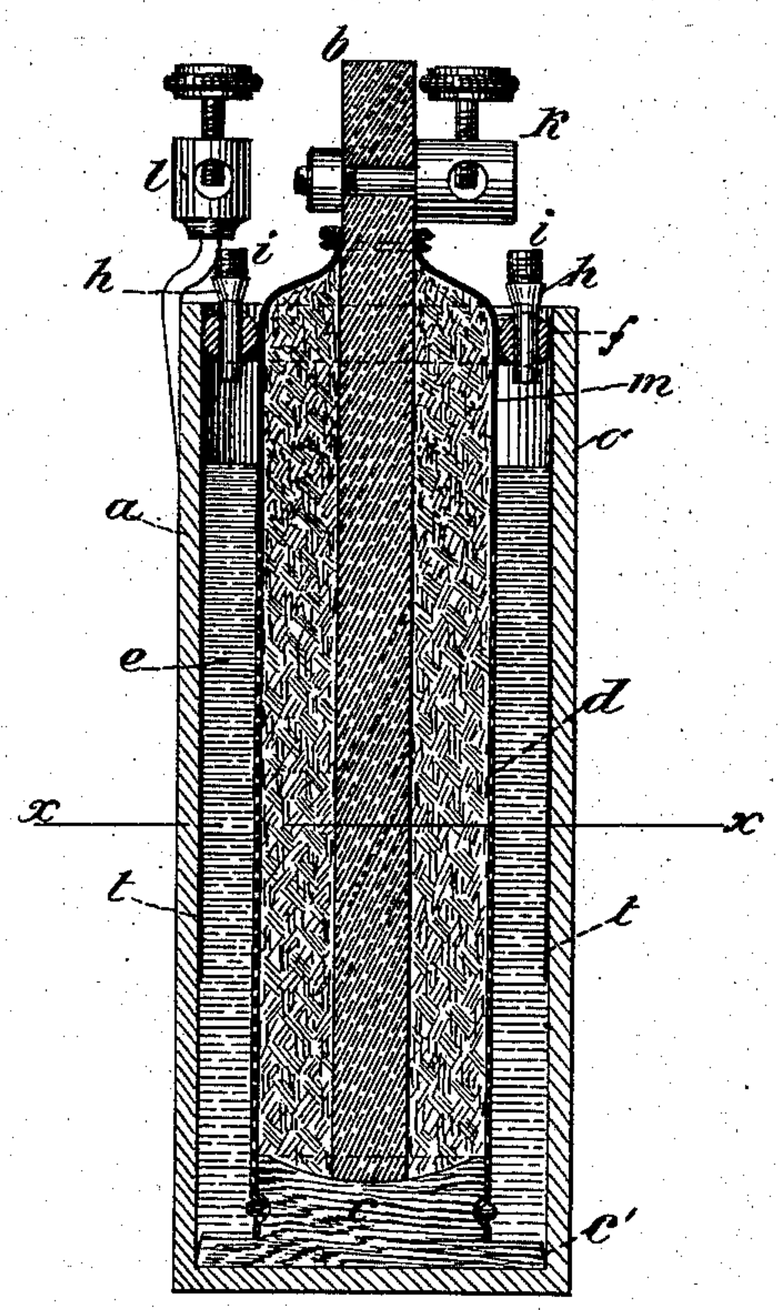


Fig. 2.

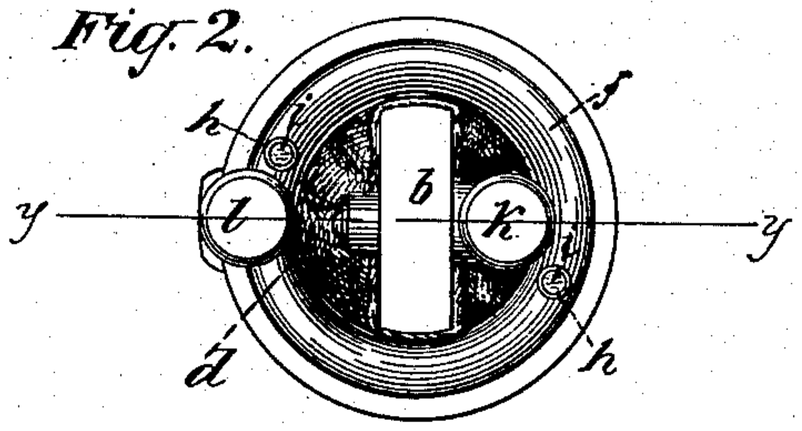
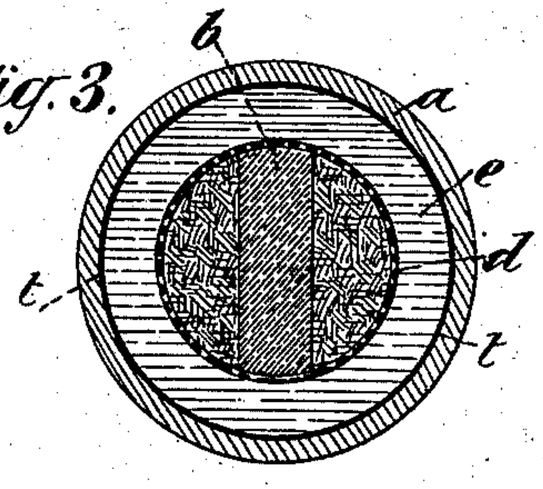


Fig. 3.



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ELECTRIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 326,033, dated September 8, 1885.

Application filed September 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, EMIL G. HAMMER, of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Electric Batteries, of which the following is a specification.

My invention applies to porous-cell batteries and relates more particularly to the Leclanché type of battery, and it aims to simplify and cheapen the construction thereof, and particularly to render the battery portable and tight and yet maintain the known excellences of this form of battery. To these ends I construct my improved battery of an external cup or cylinder of zinc, in which is placed the carbon electrode inclosed in a porous sack or bag, preferably made of a woven or fibrous fabric and packed with the granulated carbon, the peroxide of manganese, and with the sal-ammoniac crystals. Water is placed in the annular space between the sack and the zinc cylinder. A non-conducting collar at the bottom of the porous sack separates it from the zinc cylinder, and a rubber ring surrounding the neck of the sack closes the mouth of the zinc cylinder liquid-tight and prevents electric contact between the two elements. The top of the sack above the liquid-line is made impervious by asphaltum or its equivalent.

My invention, therefore, consists in the novel features here outlined, particularly in the porous sack inclosing one element of the battery and packed with the exciting material, in the stoppering rubber ring surrounding the sack, in the special preparation of the sack, and in other special details above indicated and hereinafter fully set forth.

In the drawings annexed, Figure 1 gives a vertical section of my improved battery; Fig. 2, a plan view thereof, and Fig. 3 a cross-section on line *x x*.

In the drawings, *a* indicates a cup or cylinder of zinc cast or otherwise formed, and constituting the soluble element or positive electrode of the battery, as well as the containing and sustaining jar or vessel thereof.

b indicates the carbon or conducting element of the battery, which is inclosed in a sack or tube-like bag, *d*, of linen, muslin, or its equivalent.

The bag *d* when fully distended is preferably circular and of less size than the interior of the zinc cylinder *a*, so that when placed therein, as shown, an annular space, *e*, is left between the two for the exciting-liquid. The top or neck of the sack is closed around the top of the carbon *b*, which protrudes therefrom, as shown in Figs. 1 and 2, the bag being securely wrapped around the carbon by a binding of cord, wire, or by any other suitable fastening, and also sealed with wax or its equivalent at the wrapping, as will be understood. The bottom of the bag is wrapped around a wooden or other plug, *c*, which closes that end of the bag, and is also formed with a rim, *c'*, which fits the interior of the zinc cylinder, and, resting on the bottom thereof, thus supports the bag centrally thereon, keeping the bag isolated from the sides of the cylinder, and, being a non-conductor, insulates the bottom of the bag and its contents from the zinc, as will be readily appreciated.

The bag *d* is packed with crystals of the exciting salt or substance, preferably sal-ammoniac, around the carbon *b*, and with this is preferably mixed granulated carbon and the peroxide of manganese, as used in the Leclanché battery, the whole forming a compact mass around the carbon electrode, filling the bag *d*, as fully shown in Fig. 1.

A rubber ring, *f*, is slipped over the neck of the bag and fits the interior of the zinc cylinder *a*, and thus closes the annular space at the mouth of the cylinder and stoppers the battery-jar tightly, at the same time keeping the bag centrally in the jar and preventing electric contact between the elements. One or two tubes, *h h*, pass through the rubber ring *f*, and are provided with stoppers *i i*, through which tubes the interior space may be vented or through which water or other liquid may be introduced to render the battery active.

A binding-post, *k*, is clamped to the carbon *b*, and a second binding-post, *l*, is soldered to the zinc cylinder *a*, from which posts the circuit-wires are led, as usual.

It will now be seen that the battery, as described, is quite compact and entirely portable, and, as the exciting substance is packed within the bag *d* around the electrode *b*, it is only necessary in setting up the battery to pour ordinary water into the annular space *e*,

which, immediately soaking through the bag, dissolves the sal-ammoniac within it, and thus produces the exciting-liquid, which, acting on the elements as soon as the circuit is closed, will produce the electric current in substantially the same way as in the Leclanché battery, and with all the well known advantages of this type of battery. It will be further seen that the stopper-ring *f* prevents all leakage in case the battery is tipped or upset, and also stops all evaporation, which are most important advantages. In order to stop evaporation or leakage from the bag *d*, the upper portion, down to a slight distance below the water-level, is thoroughly impregnated with asphaltum, varnish, paraffine, wax, or other suitable impervious substance, as indicated at *m* in Fig. 1, which renders the fabric impenetrable to the exciting-fluid above the liquid-level, while the lower portion is left freely penetrable, as will be readily comprehended from Fig. 1.

The advantages of this battery are therefore seen to be many and important, for, while all the well-known electrical advantages of the Leclanché type of battery are preserved, the following advantages are gained: first, the construction is very simple and inexpensive; second, the battery is very compact; third, as the walls of the bag *d* are very thin and penetrable, action commences almost as soon as the cell is charged with the liquid; fourth, as the zinc or soluble element surrounds the conducting element on all sides and close to the porous cell, the resistance of the battery is greatly reduced; fifth, as the exciting material in a dry state is packed within the bag inclosing the carbon, and so furnished when the battery is sold, it is rendered perfectly portable or transportable, and needs only the addition of water in the outer cell when the battery is to be set in action; sixth, spilling and evaporating are prevented by the simple stopper at the top.

It will be obvious that while I have described my improvement as applied to the Leclanché style of battery, in which zinc and carbon are the elements, with ground carbon and peroxide of manganese as the conducting and depolarizing agents, and sal-ammoniac as the exciting substance, yet my invention is not necessarily confined to any of these particular materials, but may be applied to batteries employing different materials, as will be readily comprehended.

It is not absolutely essential that the permeable sack *d* actually inclose or surround the battery-element *b*, as it will suffice if the sack with its contents is secured to the element on one or both sides; but it is of course preferable to have the sack surround and inclose the element, as illustrated.

I prefer to construct the sack of common muslin or linen; but any other woven or felted fabric will answer.

I prefer to coat the interior of the zinc cup *a* for about two-thirds of the distance from the mouth with a coating of some insoluble varnish or impervious substance—such as asphaltum, dammar, paraffine, &c.—as indicated at *t* in Fig. 1, so as to leave only the lower part of the zinc exposed to the action of the exciting-liquid, thereby reducing the waste of the zinc and enabling the battery to endure longer usage without reducing the electro-motive force of the current. This coating at the top of the jar will also prevent the "creeping" of the salts up the side of the jar, and forms an advantageous feature of my invention.

What I claim is—

1. The combination, with a battery element, of a permeable sack secured to the same and charged with the attacking-salt.

2. The combination, with a battery element, of a permeable sack surrounding and inclosing the same and secured thereto, and charged with the attacking-salt.

3. The combination, with a battery element, of a permeable sack or bag inclosing the element and charged with the chemicals of the battery, the upper portion of said sack above the liquid-level of the battery being rendered impervious by varnish or its equivalent.

4. An improved battery, consisting of an external containing-cup, *a*, formed of a corrodible metal constituting the soluble element of the battery, with a conducting element, *b*, and a permeable sack, *d*, inclosing and secured to the element *d*, and a charge of the active battery-chemical in a dry state within said sack, whereby the battery is rendered portable and is ready for action when a dissolving-liquid is poured into the space between the sack and cup, substantially as herein set forth.

EMIL G. HAMMER.

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