

(No Model.)

H. WALTER & W. E. H. MARSH.

GALVANIC BATTERY.

No. 378,122.

Patented Feb. 21, 1888.

Fig. 1.

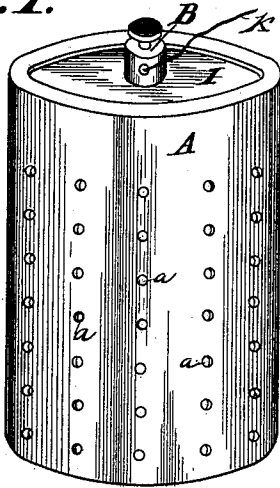


Fig. 2.

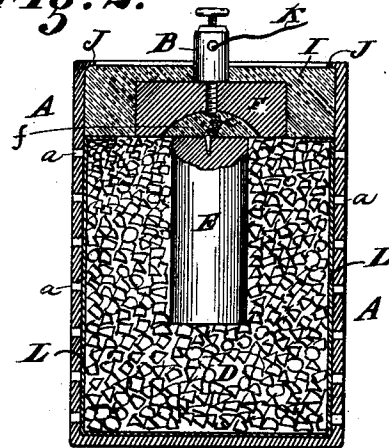


Fig. 3.

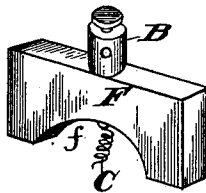


Fig. 4.

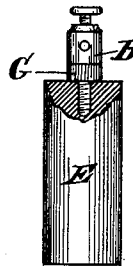
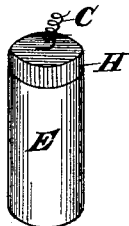


Fig. 5.



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UNITED STATES PATENT OFFICE.

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GALVANIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 378,122, dated February 21, 1888.

Application filed May 12, 1887. Serial No. 238,002. (No model.)

To all whom it may concern:

Be it known that we, HUGO WALTER and WILLIAM E. H. MARSH, of Cincinnati, county of Hamilton, and State of Ohio, have invented
5 new and useful Improvements in Galvanic Batteries, of which the following is a specification.

Heretofore battery-cups have usually been made of unglazed bisque-ware, which is of an
10 extremely porous quality. By endosmose of the solution the pores of the cup speedily become filled with the metal of the battery solution, the deposit not only permeating the entire cup, but in places occurring in streaks or veins,
15 whereby the current is weakened and sometimes wholly destroyed by local action. In this way the porous cup is rendered entirely worthless in a short time. Moreover, these cups are extremely liable to crumble after being saturated for a very short period.

It is one purpose of our invention, therefore, to provide a glazed or non-absorbent cup which shall be entirely free from these objections, and in which the porous or absorbent
25 quality shall be replaced by perforations in the wall of the cup, such perforations being properly of a diameter admitting the free entrance of the solution, but preventing the escape of the particles of crushed carbon, whereby
30 the energy of the electrolyte might be diminished.

The object of our invention is to provide a carbon electrode of the lowest possible internal resistance with an outlet of a non-corroding nature, so as to prevent any interruption
35 of the current by the corroding, eating away, or insulation of the connector which joins the main wire and the carbon electrode. It is a well-known fact that the greatest trouble of all batteries using carbon electrodes is the eating away or insulation of the connection of the carbon leading out the current by the creeping of the salts or the rising of the vapors of the battery solutions as now used. In
40 some cases these creepings entirely destroy the connections, and thereby break the current. In others they encircle the connector with a layer of non-conducting substance, as sulphates, thus destroying the current.

Our invention has for its purpose the making of the carbon element of crushed carbon,

packed closely in a perforated vessel of glass, china or stone ware, hard rubber, or any other non-absorbing substance, the falling out of the particles of crushed carbon through the perforations being prevented by an inside lining
55 of asbestos-cloth or any other cloth texture sufficiently strong to withstand the pressure of the packing of the crushed carbon.

For the leading out of the current from the carbon we employ a piece of solid carbon,
60 around and against which the crushed carbon is closely packed, and with this solid carbon we combine a peculiar connection of platinum, which is only attacked by *aqua regia*, a solution rarely used in batteries. Platinum being
65 impervious to the attacks of any other chemical compound, it makes an imperishable connector. Gold would serve the same purpose; but we prefer platinum for its hardness. By
70 drilling a hole into a piece of carbon and inserting a platinum wire therein and plugging it tightly with a piece of wood or hard rubber we have an indestructible connection with the carbon, which will always outlive the battery, while now the battery outlives the carbon-connection. We find that a carbon electrode thus constructed has only about one-
75 tenth of the resistance of the usually-employed porous cup.

The invention consists in the several novel features of construction and new combinations of parts, hereinafter fully described, and specifically pointed out and defined in the claims following this specification.

Referring to the drawings accompanying and forming part of this application, Figure 1 is a perspective view of the perforated cup ready for use. Fig. 2 is a central vertical section of Fig. 1. Fig. 3 is a detail view of the binding-
80 post and its support. Fig. 4 is an elevation, partly in section, of the platinized connection with the solid carbon. Fig. 5 is a detail perspective showing a modified construction.

In the said drawings, the reference-letter A
85 denotes the cup, made of glass, china, or glazed earthenware, in contradistinction to the unglazed porous cups heretofore used. The vertical walls of the cup are provided with perforations *a*, of suitable size and at proper intervals.

Within the cup is placed a cloth lining, L,

which covers the perforations, but does not obstruct the entrance or exit of the solution. Within the cloth L we closely pack crushed carbon D, and when about half filled a piece of solid carbon, E, is inserted, and the cup is then filled with the crushed carbon, which is tightly packed around and against the solid carbon.

Upon the top of the carbon E a hole is drilled, and a piece of platinum wire, C, or wire of a base metal plated or covered with platinum, is inserted and tightly plugged therein. Upon the top of the carbon E is placed a strip of wood, F, carrying a binding-post, B, to which the wire C is connected, the wood being cut away at *f* to form an opening between the strip F and the top of the carbon. After filling the cup to the top of carbon E, we pour thereon pitch, wax, or other material, which forms a cover or seal, I. The wood F having been previously placed in cup, resting upon the crushed carbon, the melted wax or other material surrounds and covers it, besides flowing into the space *f* surrounding the wire C, and holding all the parts firmly in place. A lip, J, on the cup holds the cover or seal in place.

Any of the baser metals will do the same service as platinum, if plated with a film of platinum entirely covering the baser metal within, and a common brass binding-post plated with platinum and screwed or fastened into the carbon will serve the same purpose, as in all the above-named cases the non-destructible metal platinum faces the attacks of the creeping salts or rising acids or vapors.

For better connections' and conductivity's sake, we insert into the crushed carbon in our perforated cup a piece of solid carbon with platinum in some shape plugged tightly into it, pressing said piece of carbon well into the crushed carbon with the plugged part at the top, taking the current either off the platinum direct in the shape of wire or from a binding post or clamp attached to said platinum. Another way is to platinize the piece of carbon at a point to remain above the solution of the battery and to hard-solder thereto a piece of platinum wire.

The entire process of construction is clearly shown in Fig. 2. Instead of using a mounted binding-post, B, as shown in Fig. 3, we also use a platinized post, B, as shown in Fig. 4, where the plated part G only comes in contact with carbon E; or we use a platinized carbon, E, as shown in Fig. 5, where H represents the platinized part of carbon E, and C the platinum or platinized wire soldered thereto for

connection with binding-post B; but we do not bind ourselves to any of the forms of connection shown, as in any other mechanical way a connection made between carbon and platinum would be perfect in galvanic batteries. In any of the cases where we have mentioned platinum we wish it understood that either that metal pure or any other base metal covered with a film or coating of platinum would serve the same purpose.

It is evident that the bridge piece or support F might be made of brass or other metal, instead of wood, since, being wholly inclosed in the seal I, it is not subject to deterioration from atmospheric causes.

In case the apertures or perforations *a* are fine enough to prevent the escape of the smaller particles of carbon, no cloth lining will be needed, and we have shown and described the same only because it has not, in the present state of the art, been found easy to form these perforations of the small diameter required.

We make no claim, broadly, to a non-porous cup having perforations, as such a device has been used heretofore.

What we claim is—

1. An electrode composed of a perforated cup constructed of non-absorbent material, a filling of crushed carbon, a piece of solid carbon packed therein, and a fabric interposed between the crushed carbon and the wall of the cup to prevent the loss of the particles of carbon through the perforations, substantially as specified.

2. An electrode composed of a perforated cup of non-absorbent material, a filling of crushed carbon packed closely around a central piece of solid carbon, a fabric interposed between the crushed carbon and the perforated wall of the cup, a wooden bridge-strip overlying the solid carbon and having a binding-post, and a platinum wire soldered to the binding-post and having its end plugged into the solid carbon, substantially as specified.

3. The combination, with the perforated non-absorbent cup containing crushed carbon packed around a piece of solid carbon, of a support resting upon said carbon filling, a binding-post on said support, a platinum wire having one end buried in the solid carbon and the other end connected to the binding-post, and a seal inclosing and covering said parts, substantially as specified.

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W. E. H. MARSH.

Witnesses:

W. E. MARSH, Jr.,

F. O. HESS.