No. 682,417. Patented Sept. 10, 1901.

# W. MILLS.

## ELECTRIC BATTERY.

(Application filed Oct. 3, 1900.)

(No Model.)

Fig. 1.

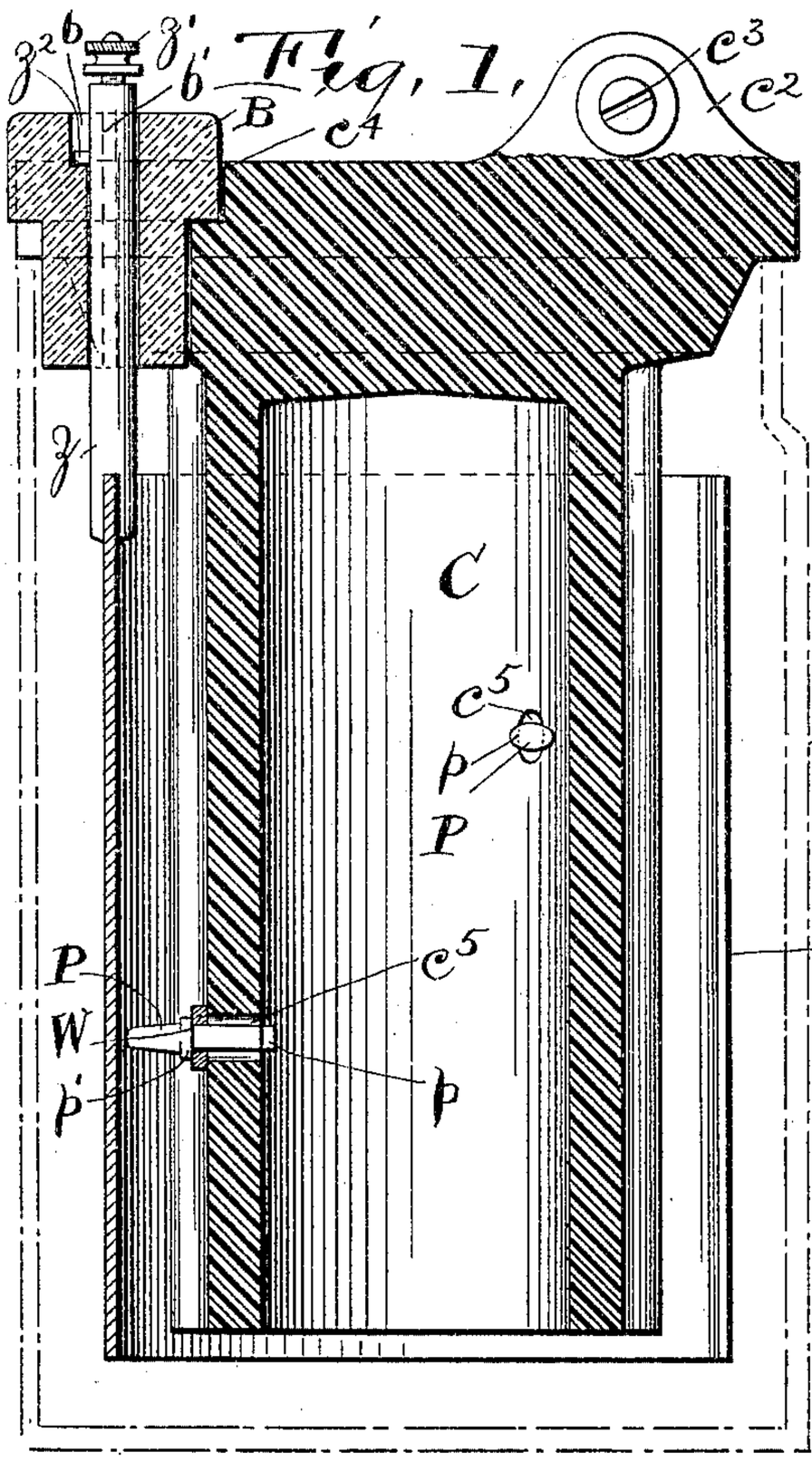



Fig. 2.

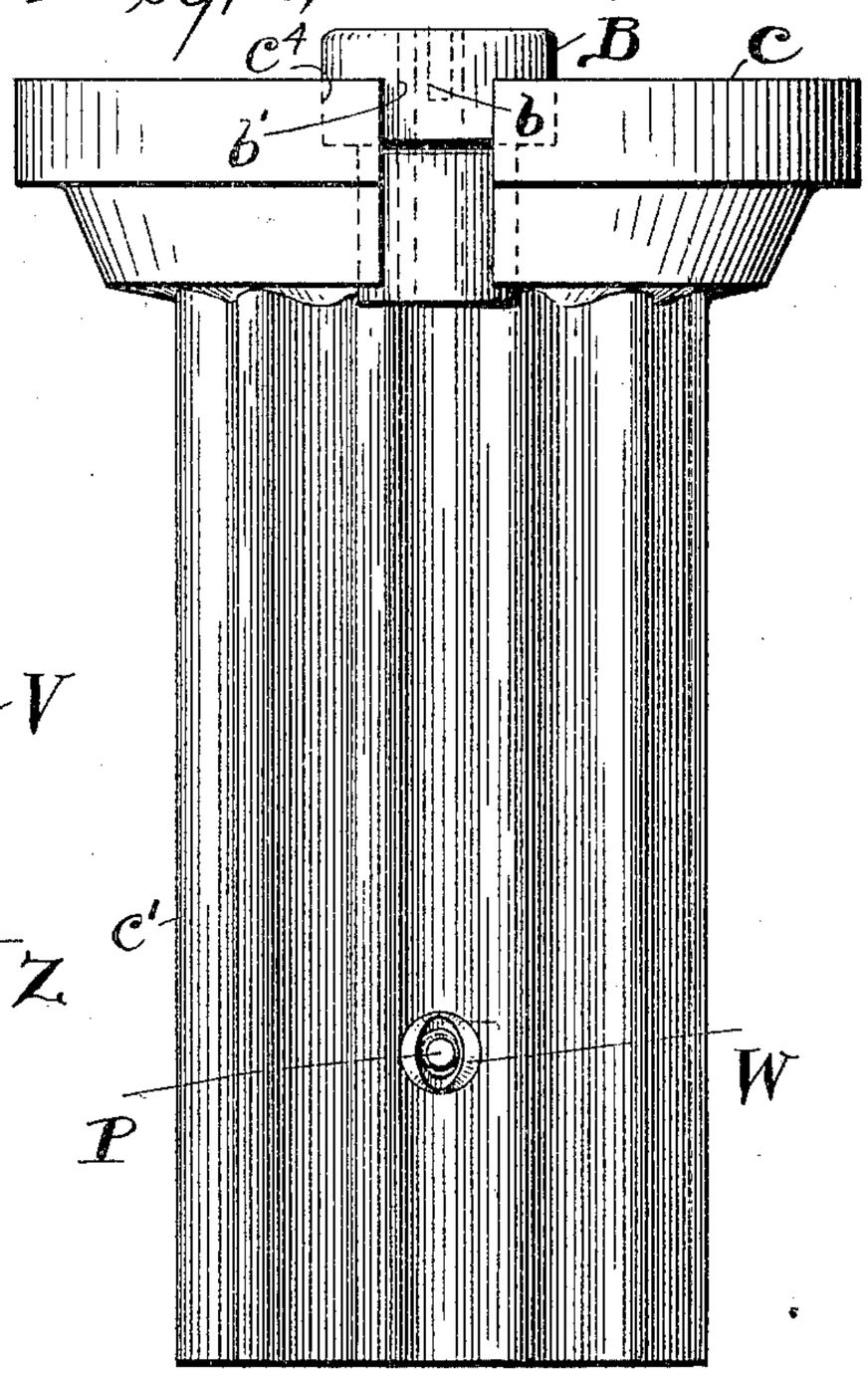
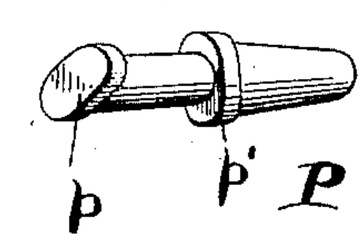



Fig. 5.



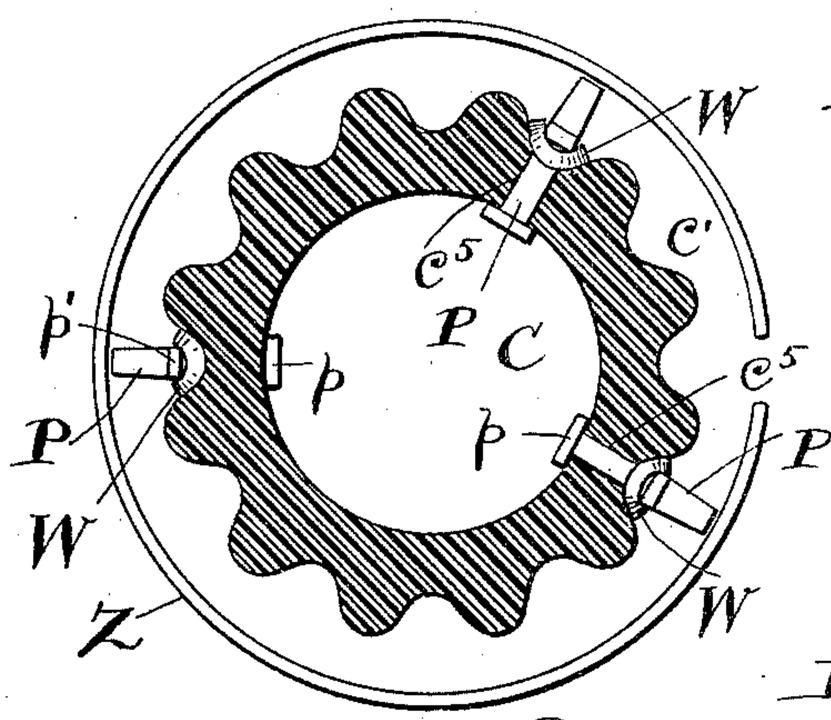
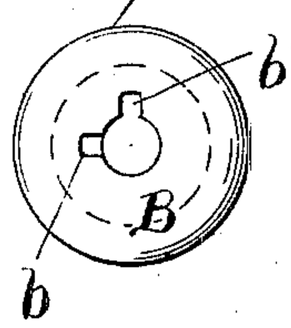




Fig. 3.

Fig. 4.




Witnesses
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# UNITED STATES PATENT OFFICE.

WILLIAM MILLS, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE EASTERN CARBON WORKS, OF RAHWAY, NEW JERSEY.

## ELECTRIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 682,417, dated September 10, 1901.

Application filed October 3, 1900. Serial No. 31,812. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM MILLS, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented a certain new and useful Improvement in Electric Batteries, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide very simple and efficient means for preventing accidental contact between the elements of an electric battery.

The invention is particularly designed for voltaic cells which have a central carbon element more or less completely surrounded by a zinc sleeve. In such a cell it has been heretofore attempted to prevent this accidental contact by surrounding the carbon with a heavy elastic band of rubber. This had many disadvantages. The rubber covered a material amount of the carbon surface, it formed a shelf on which salts deposited, which covered a considerably additional area of the carbon and, moreover, in time accumulated to make a short circuit between the carbon and zinc, and the action of the exciting fluid caused the rubber to lose its tensile force quickly, whereby it dropped off of the carbon. In order to subject a large surface of the carbon element to the exciting solution, it is desirable to flute the exterior surface of the carbon electrode; but this fluting still further reduces the hold which this rubber band can have on the carbon.

My invention obviates all the above-mentioned difficulties by providing insulating-pins between the two electrodes adapted to prevent their contact, and the invention consists, broadly, of pins so employed. In carrying out the invention I have found it very advantageous to removably secure the pins to the carbon electrode. The invention comprehends also this feature and includes, further, the more specific adaptation thereof, as hereinafter fully explained, and set out in the claims.

In the drawings which fully illustrate my invention, Figure 1 represents a vertical cross-section of a voltaic cell to which my invention has been applied. Fig. 2 is a side elevation of the carbon element of this cell. Fig. 3 is a horizontal cross-section of the two opposed elements of a cell in the relative position they will assume when set up in operation. Fig. 4 is a plan of the insulating-bushing for the zinc electrode, and Fig. 5 is an enlarged perspective view of the pin which I use to separate the elements.

Referring to the parts by letters, C represents the carbon element, Z the zinc element, and V the vessel containing them with the exciting solution. The carbon element C has an integral laterally-projecting head *c*, adapted to be supported upon the rim of the vessel V. The body *c'* of this element is annular, being preferably in the form of a hollow cylinder with a fluted or corrugated outer surface, as shown, whereby greater surface is presented to the exciting solution. The head is provided with a lug $c^2$, which carries a binding-post $c^3$ and has also a recess $c^4$, in which sits the insulating-bushing B. The zinc element Z consists of a sheet bent to a nearly complete cylindrical form and has a shank *z* extending vertically from its upper edge, the shank carrying at its upper end a binding-screw *z'*. The zinc is supported in any suitable manner, the means shown being by a small pin $z^2$, projecting laterally from the shank *z* and occupying a recess *b* in the bushing B. A groove *b'* passes through the bushing alongside of the bore thereof, and in assembling the parts the bushing is turned so that the pin $z^2$ may pass through this groove onto the upper side of the bushing, whereupon a small turn of the bushing allows the pin to descend into the recess *b*.

I will now point out the particular way in which I have applied my invention to a cell such as described. At a plurality of points, preferably three in number, I provide the exterior surface of the wall of the carbon element with pins P, of some good non-conducting material, such as porcelain, which pins effectually prevent contact between the carbon and zinc elements. These pins are removably secured in place, which not only allows convenient construction, but assists in in the easy cleaning of the cell. I form openings $c^5$, oblong or elliptical in section, in the wall *c'* of the carbon element. The pins P

are provided with shanks having shoulders at each end, which shoulders consist of the head $p$ and the intermediate offset $p'$, one at least of which is oblong or elliptical in form and may thus pass through the opening if properly applied thereto, but may be locked against return by simply turning the pin therein, the ends of the oblong part projecting over the edges of the opening.

To provide a desirable elasticity, a washer W, preferably of rubber, surrounds the shank of each pin and is clamped between one of the shoulders and the wall $c'$. The pins shown in the drawings have both their heads and offsets of the elliptical form, wherefore they may be passed through the wall either from the outside or from the inside. In the former case the washer is on the outside of the wall and in the latter case on the inside, and this allows an adjustability in the amount of the projection of the pin equal to the thickness of the washer.

My invention is well adapted for carbons having fluted exteriors, as shown. In this case if the washer is on the outside it simply assumes the crowded position shown in Fig. 3, and the oblong shoulder $p'$, standing, preferably, in the direction of the flutings, allows the washer to easily assume this shape. In any event, however, the washer does not have any tensile duty to perform, and hence its efficiency is not materially reduced by the action of the exciting solution.

The advantages of my invention are many. The pins are cheap in construction. They are small enough and smooth enough so that they form no appreciable support for salts which might form, and there is no chance for a short circuit. They are easily inserted, as explained, and may be easily removed for cleaning the electrode, if desired. They will last as long as the rest of the cell, thus obviating renewals.

Having described my invention, I claim—

1. A carbon element having openings in the wall thereof, combined with insulating-pins removably mounted in said openings, and means for locking said pins therein, substantially as described.

2. The combination of an electrode for an electric battery, and an insulating-pin removably carried thereby for preventing contact with the electrode, said pin being passed through an opening in the electrode and having means whereby it is locked thereto by being turned on its axis after such passage, substantially as described.

3. An electrode for an electric battery having an elongated opening through it, combined with an insulating-pin occupying said opening and having means whereby it is locked to the electrode by being turned on its axis in the opening, and an elastic padding surrounding the pin and clamped between it and the electrode, substantially as described.

4. In an electric battery, in combination, a positive electrode, a negative electrode, one of said electrodes having an elongated opening through it, and a non-conducting pin carried by the electrode which has the opening, said pin having a shank terminating by an elongated shoulder, which shoulder is adapted to be passed through said opening and the pin then locked to the electrode by being turned on its axis in the opening, substantially as described.

5. In an electric battery, in combination, a carbon element having an annular wall with an elongated opening through it, a zinc element exterior to said wall, an insulating-pin adapted to be passed through said opening and locked by being turned on its axis after such passage, and an elastic padding for holding said pin to said carbon element, substantially as described.

6. In an electric battery, in combination, a carbon element with an annular wall having an elongated opening through it, a zinc element surrounding said wall, a pin having a shank with a shoulder at each end thereof, one of said shoulders being adapted to pass through said opening and lock against said wall, and an elastic washer surrounding said pin between the other side of said wall and the other shoulder, substantially as described.

7. In an electric battery, in combination, a carbon element having an annular wall with a fluted exterior, openings between the flutes thereof, pins of insulating material adapted to pass through said wall, said pins each having an elongated head and an elongated shoulder adapted to be on opposite sides of said wall, and an elastic washer surrounding said pin between the head and the shoulder and bearing against the carbon element, substantially as described.

8. A carbon element for an electric battery having an annular wall, a pin made of hard material removably occupying an opening in said wall, and a soft elastic padding compressed between a shoulder on the pin and said wall, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

WILLIAM MILLS.

Witnesses:
E. J. WILSON,
GEO. B. ARFKEN.