

No. 636,318.

C. E. BURROUGHS.
BATTERY.

Patented Nov. 7, 1899.

(Application filed Nov. 21, 1898.)

(No Model.)

Fig. 1.

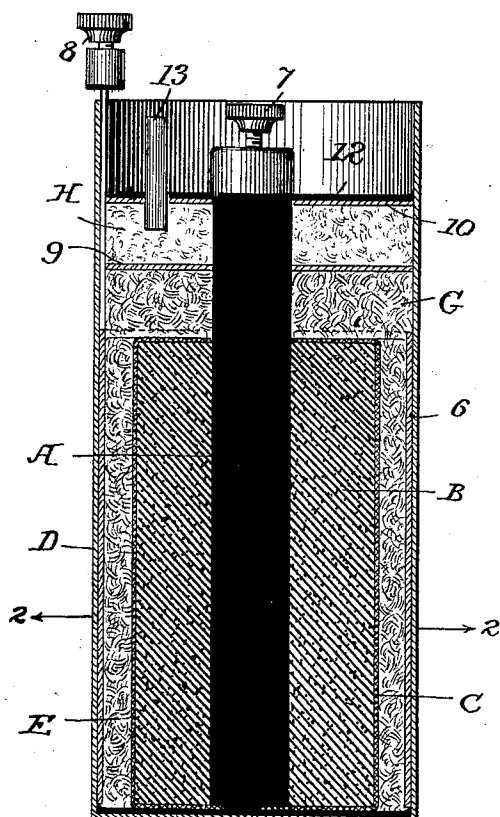


Fig. 3.

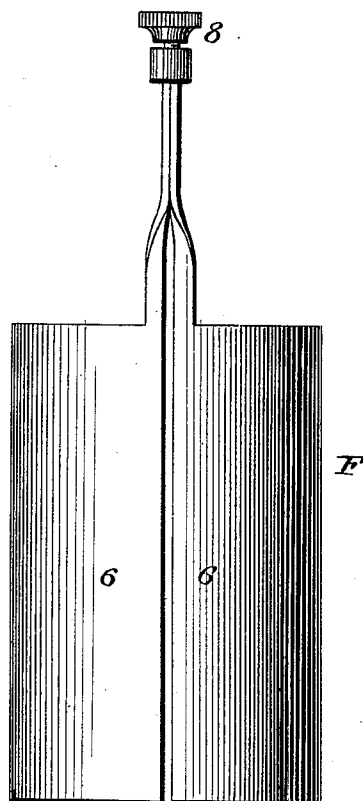
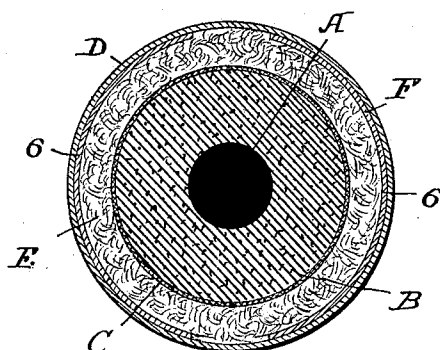


Fig. 2.



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UNITED STATES PATENT OFFICE.

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BATTERY.

SPECIFICATION forming part of Letters Patent No. 636,318, dated November 7, 1899.

Application filed November 21, 1898. Serial No. 697,037. (No model.)

To all whom it may concern:

Be it known that I, CHARLES EDWD. BURROUGHS, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Batteries, of which the following is a specification.

This invention relates to galvanic batteries or what are usually termed "dry cells," and has for its objects to make use in such cells of as large a body of excitant fluid as possible while maintaining the dry character of the cells, to maintain the energy and increase the recuperative power of the battery, and otherwise to increase and maintain its efficiency and cheapen its construction; and to this end the same is constructed as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of a dry battery-cell embodying my improvement. Fig. 2 is a section on the line 1 1, Fig. 1. Fig. 3 is a detached view showing a sectional electrode.

The hard carbon cylinder or rod A is inclosed, as usual, for a part of its length in a composition or mixture of pulverized plumbago and lampblack or other or equivalent mixture B, which is suitably held in form and position—as, for instance, by a fabric bag or wrapper C—the element A B thus formed constituting one electrode or element of the battery. The other element or electrode F consists of a metal electronegative to the carbon, as zinc, and although it may be a slitted shell consisting of a plate bent to a cylindrical or other form and capable of expansion it preferably consists of two or more bent or semi-circular zinc plates 6 6 of an external form corresponding to that of the interior of a case D, which may be of galvanized iron or other suitable material.

The electrode A B, of the character shown or of any other suitable character, is inclosed in a body of absorbent material E, of cellulose, felt, or fibrous material, so applied as to be substantially uniform in density and with a comparatively smooth, regular, and level outer face—that is, an outer face free from lumps or protuberances—whereby to secure a practically uniform and continuous contact

with the inner face of the zinc shell F. One means of securing this result consists in applying one edge of a sheet of absorbent cotton to the exterior of the part B and then rolling the latter to wrap it in the cotton or other absorbent one, two, or more times, thereby securing a wrapping of practically uniform thickness and density, so that when the shell F is applied to the exterior face of the body of absorbent material and pressed thereon there will be a regular and intimate contact between the outer face of the body E and inner face of the electrode F.

After the application of the absorbent material E to the electrode A B the electrolytic fluid is applied by pouring it upon the cylinder of absorbent material E, held horizontally below the stream of liquid, or preferably by placing the latter in a pan and rolling the absorbent cylinder therein.

The electrolytic fluid may be any suitable mixture or emulsion—as, for instance, a mixture of water, chlorid of zinc, oxid of manganese, and sal-ammoniac, the water partially dissolving and also holding particles of the materials in suspension.

When, as heretofore, the absorbent material is packed around the electrode A B while the latter is held centrally in the cell or wrapped around and put in dry and the electrolytic-fluid mixture is then poured onto the top of the absorbent cylinder, the result is to collect the undissolved particles at the top of the absorbent cylinder, and therefore the galvanic or chemical action is most energetic at the point where the said particles are collected, and the electrode F is eaten away at a point about level with the top of the absorbent material and the life of the cell is proportionately limited.

By applying the electrolytic mixture over the outer face of the absorbent cylinder the undissolved particles are uniformly distributed over the entire face and also over the entire inner face of the shell or electrode F, so that there is a much larger area of galvanic action. The latter is uniform over the whole face of the electrode F, and not only is the life of the cell prolonged, but the energy of the battery and its recuperative powers greatly increased.

I have found that the regular uniform and intimate contact over the entire proximate faces of the absorbent cylinder and shell F is most important. This I secure, first, by applying the absorbent material uniformly to the electrode A B, and, second, by securing a uniform pressure of the shell upon the cylinder. This results by using an outer electrode which is independent of the cylinder E—that is, by applying the shell or its sections 6 6 to the outside of the cylinder E after the coating of the latter is saturated and then pressing the shell or its sections firmly against the cylinder, reducing its dimensions by compression until the shell F will slip readily into the case D, when all parts will be held in place by the expansion of the compressed absorbent material and the desired intimate contact of the surfaces secured.

The electrode A B and shell F have suitable connecting posts or terminals 7 8. When the shell is in sections, the latter are electrically connected in any suitable way—for instance, as shown in Fig. 3.

I find that by applying the exciting fluid to the mass of absorbent material before compressing the latter I can absorb and retain a greater volume of liquid, thereby increasing the life and energy of the cell. Above the saturated absorbent material E, I prefer in most cases to place another body of saturated material G, which adds to the efficiency of the cell. Whether this supplementary body of material is used or not, it is desirable to avoid the possibility of leakage from the cell. Therefore I pack around the central electrode, between the latter and the case D and above a fluid-proof partition 9, a body H of dry absorbent material, covering it with a disk 10 of like character to the disk 9, and then close the cell by a body 12 of tar, wax, &c., poured onto the disk 10. The disks may be of thin metal or paper coated with shellac or varnish. A vent-pipe 13, extending through the disk 12, permits the escape of any gases generated within the cell. While the cell is shown as round, it may be rectangular or other shape in cross-section. It may be protected externally in any suitable manner. The exterior surface of the absorbent cylinder may be wound with tape or fabric before saturating to condense the same and secure a smooth regular face and perfect contact with the outer electrode, which in such case may be the shell D; but I prefer to use the shell consisting of two or more bent plates.

Without limiting myself to the precise con-

struction shown or to the use of all the specified elements in combination, I claim—

1. The combination in a battery-cell, of inner and outer electrodes, the latter being expandible, a body of saturated absorbent material between the electrodes normally tending to expand the outer electrode, and means engaging the outer electrode to limit its expansion and thus hold the absorbent material under pressure in contact with both electrodes, substantially as set forth.

2. The combination in a battery-cell, of inner and outer electrodes, the latter being expandible, a body of absorbent material between the electrodes normally tending to expand the outer electrode, a case fitted over the outer electrode to limit its expansion and thus hold the absorbent material under pressure in contact with both electrodes, substantially as described.

3. A battery-cell provided with an inner and an outer electrode, the latter being formed of longitudinally-separated sections, a body of absorbent material between the inner and outer electrodes normally tending to expand the outer electrode, and means engaging the outer electrode to limit its expansion and thus hold the absorbent material under pressure in contact with both electrodes, substantially as set forth.

4. A battery-cell having an inner electrode, a body of absorbent material confined to said electrode, an outer electrode, consisting of separate bent plates, means for clamping the latter upon the absorbent material, and means to electrically connect the said plates, substantially as described.

5. A battery-cell having an inner electrode, a body of absorbent material confined to said electrode, an outer electrode consisting of separate bent plates, and means for clamping the latter upon the absorbent material, substantially as set forth.

6. The combination with the inner and outer electrodes and intervening absorbent material of a battery-cell, of a fluid-proof disk extending between the electrodes at the top of the cell and a body of absorbent material above said disk, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES EDWD. BURROUGHS.

Witnesses:

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SOL SOLOMON.