Nov. 23, 1926. 1,607,759

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ELECTRODE FOR BATTERIES

Filed March 17, 1925

Fig. 1.

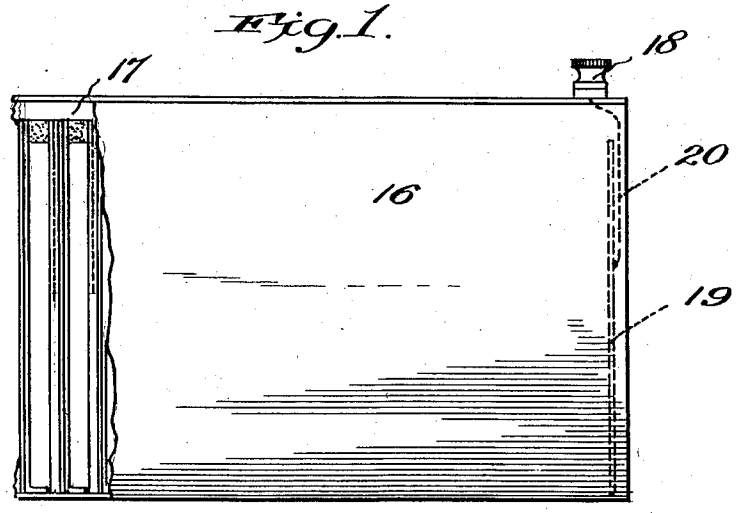


Fig. 2.

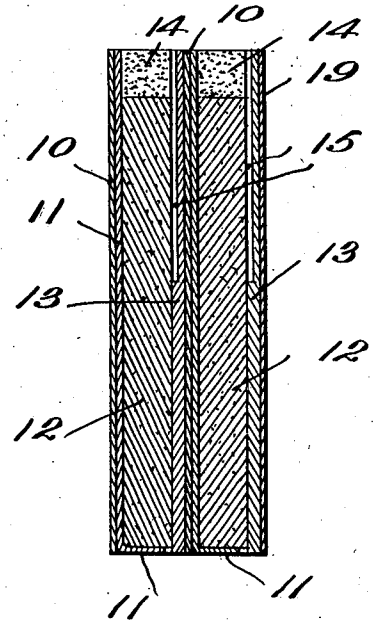
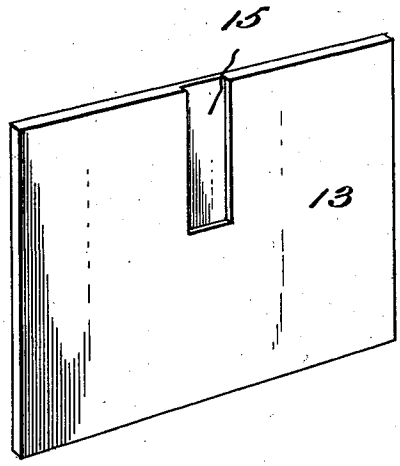


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ELECTRODE FOR BATTERIES.

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The present invention relates to an improved form of cathode or positive electrode for use in dry or semi-dry battery cells particularly. In its preferred form, the improved electrode is especially useful in cells of the flat type, and the same has been illustrated and described herein as so employed, although it is to be understood that I do not confine myself to electrodes of the form in question.

Indeed it is one of the advantages of this improvement that it lends itself to easy and inexpensive molding, cutting and pressing in a great variety of shapes.

Another advantage of this invention is its cheapness. The cathodes at present in use in dry cells generally consist of a cylinder or short rod of gas-carbon, which cannot be had cheaply in a form sufficiently pure for this purpose. It is, moreover, quite hard and rather brittle and does not lend itself to easy working.

Electrodes made in accordance with the present invention can be made thinner than if graphite or carbon alone be used. They are also flexible and non-breakable, and are therefore more easily handled.

The present invention makes it possible to make available the properties of pure graphite, which has a higher conductivity than gas carbon and can be procured from a wider field of supply. The invention is not, however, confined to the use of this material.

In the manufacture of cardboard, pulp board and the like it is customary to use a so-called "filler" usually of some earthy substance. In the practice of the present invention, graphite or other suitable carbonaceous material is substituted as a filler in the manufacture of a pulp board, which latter term I shall employ herein to designate any of the various forms of card or board made from paper pulp or its equivalent.

The carbonaceous material is ground up and thoroughly mixed with the pulp and water in the process of manufacture of the pulp board, and the board so produced may be made in the form of sheets or may be molded in any convenient form.

I have shown a preferred mode of use of my improvement as embodied in a flat electrode in the accompanying drawings, wherein Figure 1 shows one end of a complete battery with a portion of one side of the casing broken away, Figure 2 is a sectional view of two cells at the positive end of the battery showing the conducting plate there used for facilitating external connection, and Figure 3 is a perspective view of the preferred form of electrode as provided with a gas vent.

In Figure 2, the left hand cell comprises a flat negative plate 10 (usually of zinc) against which lies a bibulous layer 11 impregnated with the excitant or electrolyte. Placed flat against this is a depolarizing layer 12, and against the opposite side of this layer rests the improved positive electrode 13 composed of a mixture of pulp and carbonaceous material, preferably graphite.

The depolarizing layer 12 does not extend up as far as the other elements described, and the space above this layer is occupied by sand or the like assemblage of small neutral particles 14. The spaces between the particles at 14 afford accomodation for the gases generated during operation of the battery.

In order to facilitate the passage of these gases I prefer to provide a vent passage in the positive electrode. This preferably takes the form of a channel or groove 15 cut or molded in the face of the electrode next to the depolarizing layer 12.

The positive electrode as described may be treated or coated in the usual manner with paraffine or the like waterproofing material.

In making up a battery, cells of the kind described are placed together within a suitable casing 16, with the negative electrode 10 of one cell in direct contact with the positive electrode 13 of the next cell. The space at the top of the casing above the cells is occupied by a layer 17 of sealing material of any well known character, as usual in this art.

At the positive end of the battery the terminal cell (shown as the right hand cell in Figure 2) is connected in any suitable manner with the positive binding post 18. One means for this purpose is that herein shown, and consists of a flat plate 19 of any suitable metal, intended to act as a conductor and laid in contact with the exterior face of the terminal positive electrode 13. A wire 20 which may be soldered to the plate 19, leads to the binding post 18.

The form of electrode shown as well as the specific cell described are so shown and

described by way of example only, and the invention may be embodied in many other forms and structures without departing from its scope.

What I claim is—

1. Process of manufacturing electrodes consisting in mixing in water fine particles of a carbonaceous material and fine particles of paper pulp and then molding, pressing and cutting the resulting mixture into suitable shapes.

2. Process of manufacturing electrodes consisting in grinding a carbonaceous material and mixing it in water with paper pulp and shaping the mixture into flat sheets for the purpose described.

3. Process of manufacturing electrodes consisting in grinding a carbonaceous material and mixing it in water with paper pulp and molding the mixture into convenient blocks for the purpose described.

4. Process of manufacturing electrodes consisting in grinding a carbonaceous material and mixing it in water with paper pulp and molding the mixture into convenient blocks for the purpose described, at the same time providing suitable vent grooves in the surface of the blocks.

In testimony whereof I have hereto affixed my signature.

FREDERICK A. KELLER.