

(No Model.)

D. M. LAMB.  
ELECTRIC BATTERY.

No. 461,025.

Patented Oct. 13, 1891.

Fig. 1.

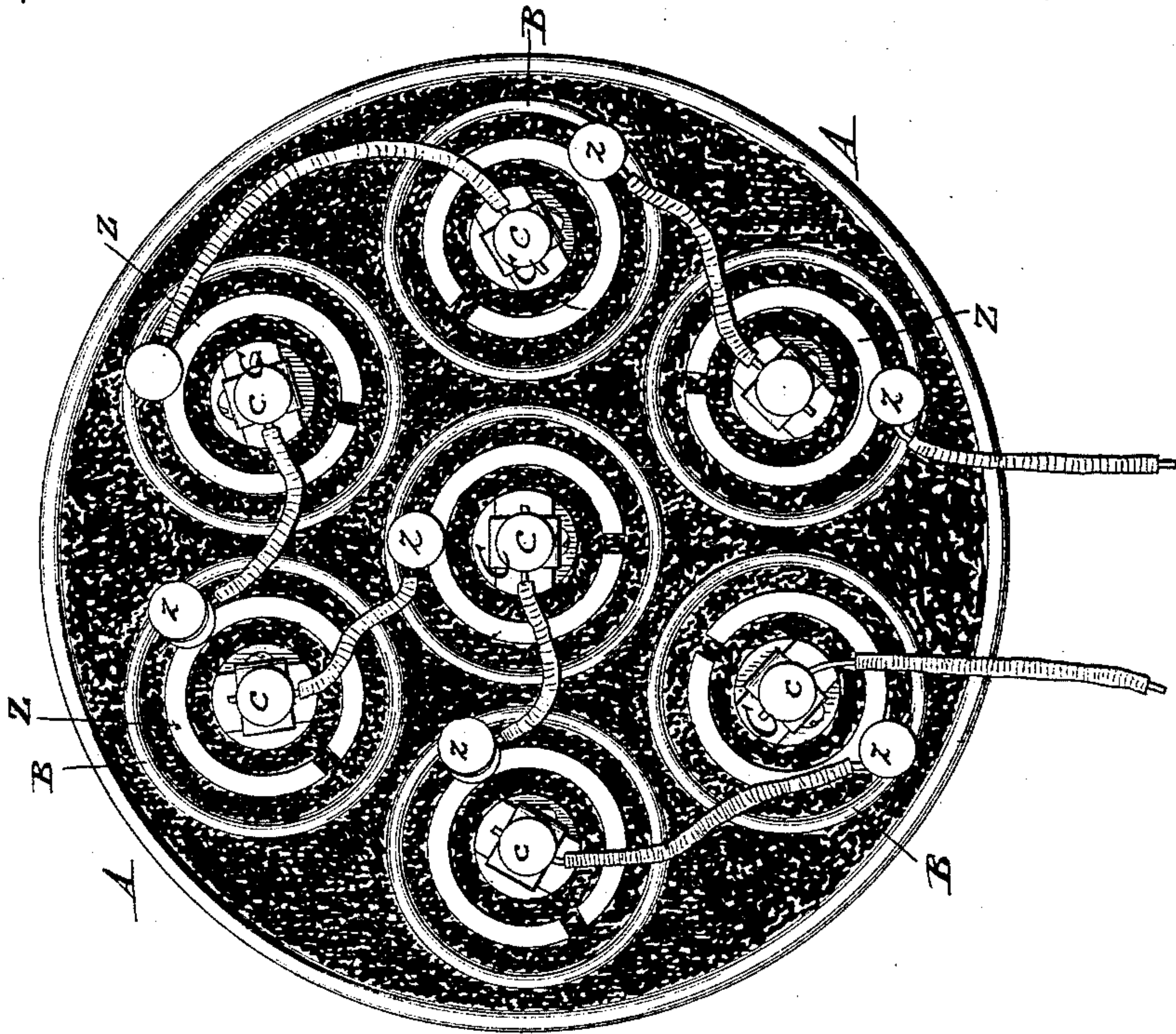
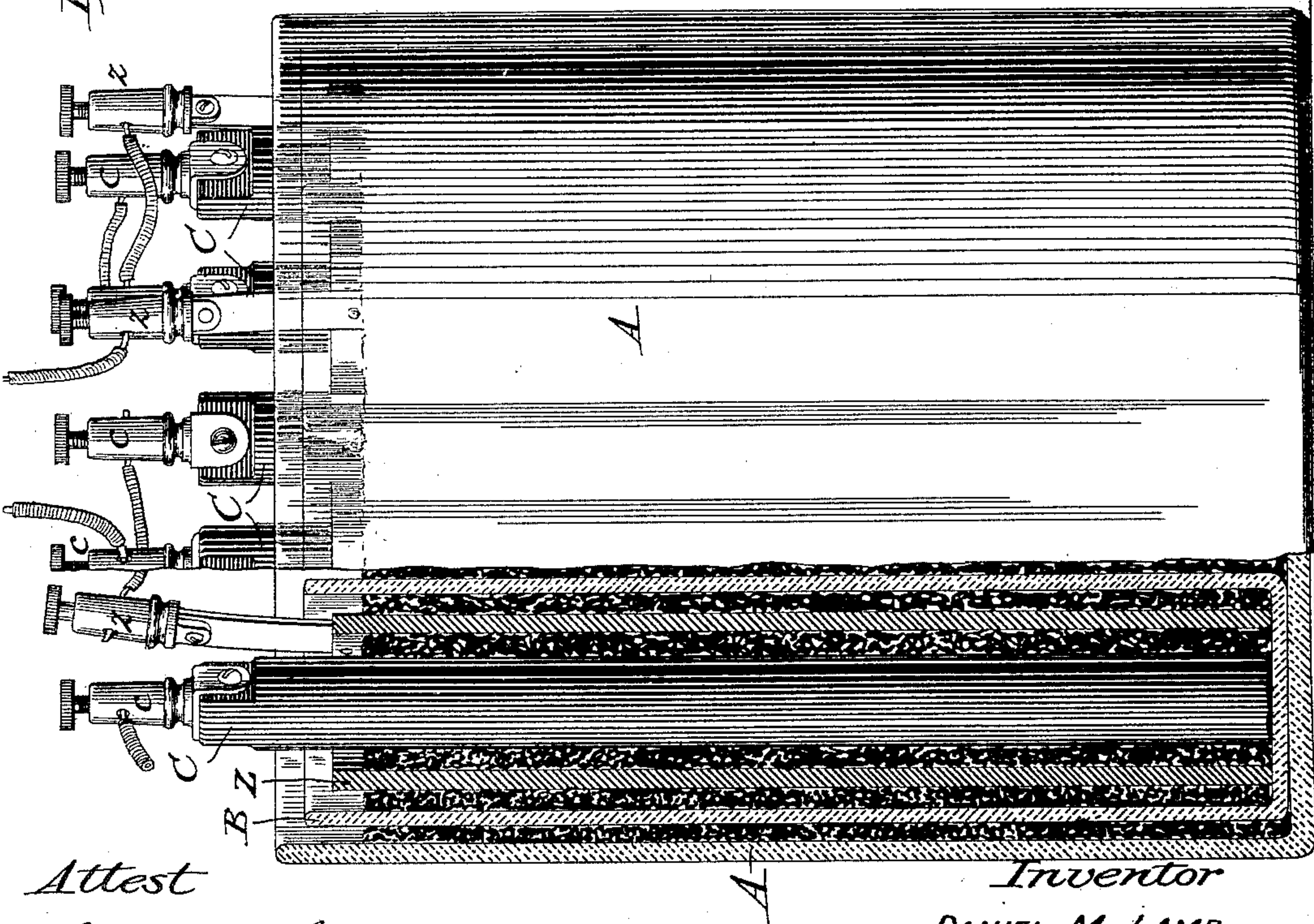


Fig. 2.



Attest

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Inventor

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# UNITED STATES PATENT OFFICE.

DANIEL M. LAMB, OF BOSTON, MASSACHUSETTS.

## ELECTRIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 461,025, dated October 13, 1891.

Application filed July 23, 1890. Renewed May 26, 1891. Serial No. 394,132. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL MARTIN LAMB, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electric Batteries, of which the following is a specification

My invention more especially relates to a composition employed in working the battery, which constitutes an improvement upon the battery described in my pending applications, Serial No. 332,992, filed December 7, 1889, and Serial No. 347,386, filed April 10, 1890. Both of these applications describe a composition consisting of ingredients in the form of powder enveloped with a water-repellent substance.

My invention further consists of an improved organization of the cells of a battery.

While the proportions of my improved compound may be varied within certain limits without departing from the spirit of my invention and well-known chemical equivalents may be substituted, I prefer as the result of my experiments the following ingredients, treated in the way hereinafter described, to wit: Sixteen ounces of blue clay and eight ounces of calcined gypsum, powdered and mixed together as a base, all the other ingredients being likewise pulverized or granulated. Over this base I sift sixteen ounces of granulated or pulverized sal-ammoniac. I then mix sixteen ounces of bichromate of potash with six ounces of blue-stone or sulphate of copper and sift them over the other ingredients. These ingredients are then thoroughly mixed, after which I sift over the mixture forty-eight ounces of black oxide of manganese and mix it thoroughly with the other ingredients. I then mix in about twenty-seven and one-half ounces of powdered rosin, being about twenty-five per cent., by weight, of all the other ingredients. The mixture is then heated in a proper vessel and thoroughly stirred while being heated, say, to a temperature of about  $212^{\circ}$ , which is sufficient to melt the rosin. This heating and stirring causes the mixture to boil up, swell, or work in such manner that its granules roll over each other, the result being that each granule is separately and thoroughly coated with the rosin,

thus constituting a water-repellent envelope therefor.

I prefer to use clay having the largest attainable percentage of aluminum. This constitutes what I term one of the "positive" elements or ingredients, while the negative calcined gypsum is used to separate the particles, but not for any adhesive or setting quality.

In order to carry out my invention in the best manner I have devised a new form of battery-cell, shown in the accompanying drawings, in which—

Figure 1 represents a plan view of a compound cell consisting of a large jar inclosing a number of cells, each containing its proper elements; and Fig. 2 a side elevation thereof with one side of the casing broken away to show the internal organization.

Except as otherwise indicated the parts are of usual construction and material. The relative size of the cells and jar is of course varied according to circumstances or the power of voltage required to be developed. The drawings show the containing vessel and cells as cylindrical, which is the form preferred, as it leaves sufficient space between them for the composition employed.

The containing vessel or jar A is of a size sufficient to contain the desired number of cups or cells B, seven being shown, six of which are arranged around the perimeter of the jar, while the other one occupies its center. Each cell contains a tubular open-ended zinc electrode Z, preferably of a height slightly less than that of the cell; being of somewhat less diameter than the cell, so as to leave a space between them. A usual binding-screw *z* is attached to each zinc. A carbon rod C, provided with a binding-screw *c*, of a smaller diameter than the zinc electrode, is inserted within it. This carbon is preferably made in the manner described in my application, Serial No. 347,385, filed April 10, 1890, and is made longer than the jar, the cell, and the zinc, so as to project above them. The space between each cell and its electrodes is filled with the composition described, and the space between the cells and containing-vessel may be packed with the same or a similar composition, such as that described in my applica-



tions first above mentioned. The cells and containing-vessel are then filled with water, preferably up to the top of the zinc, and the battery is ready for action. The top should  
5 be left open, so as to admit of free contact with the atmosphere. The cells are connected in series in the usual way from zinc to carbon. By this organization I obtain a  
10 is obvious that by increasing the number of cells the voltage developed may be increased to a practically unlimited extent.

I claim as of my own invention—

1. The combination, substantially as and  
15 in about the proportions specified, of clay, calcined gypsum, sal-ammoniac, bichromate of potash, sulphate of copper, black oxide of manganese, and rosin, all pulverized and mixed together, each granule of the composi-

tion being enveloped with water-repellent 20 material.

2. The compound battery-cell hereinbefore described, consisting of the combination of a containing-vessel, a series of independent cells therein, each inclosing a zinc electrode 25 and a carbon rod, all the electrodes being connected in series and the spaces between them and the cells and the cells and containing-vessel being filled with granulated active material having its individual particles each 30 enveloped with water-repellent material.

In testimony whereof I have hereunto subscribed my name.

DANIEL M. LAMB.

Witnesses:

BALTUS DE LONG,  
SIDNEY P. HOLLINGSWORTH.