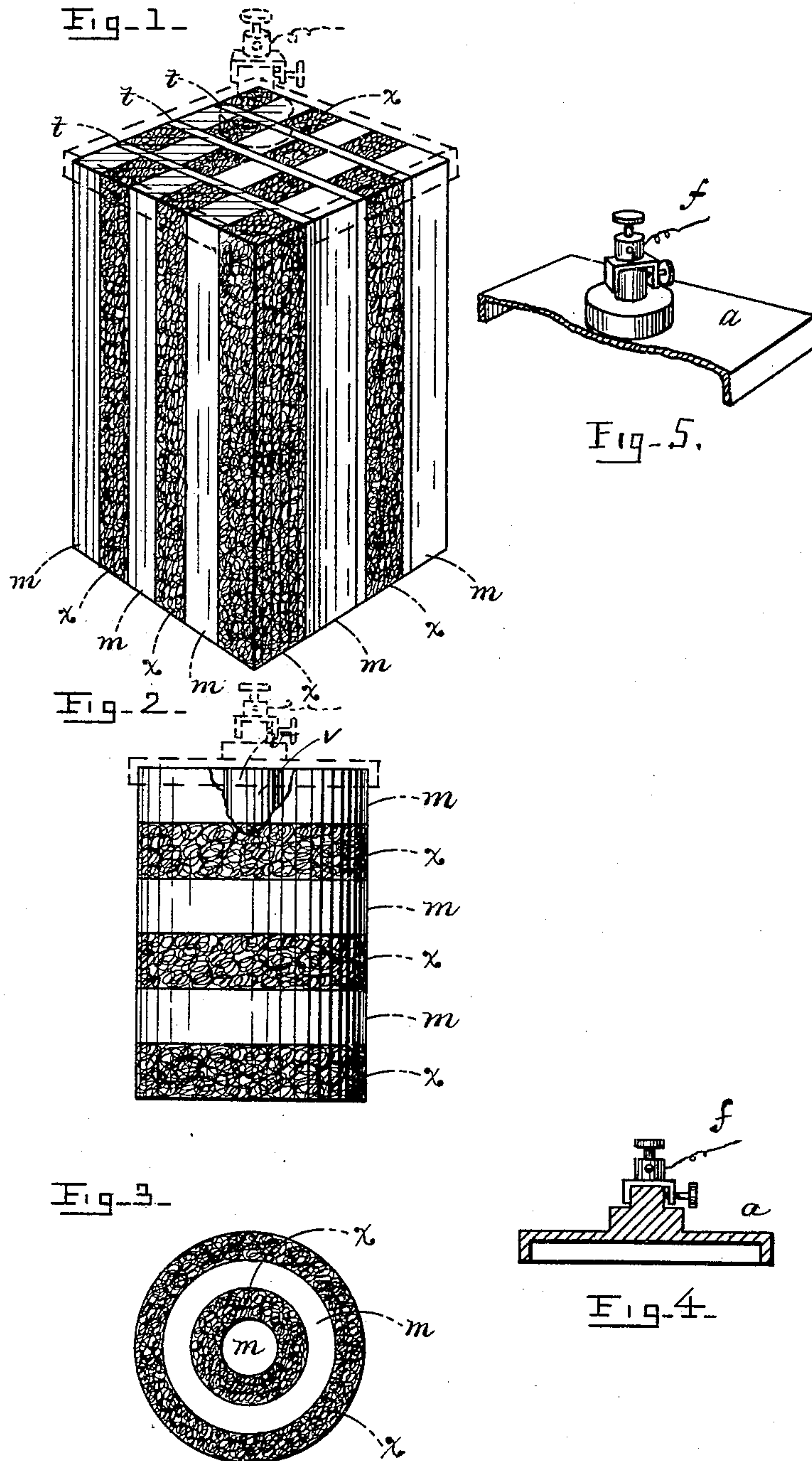


(No Model.)

B. SCARLES.  
BATTERY ZINC.

No. 388,312.

Patented Aug. 21, 1888.



WITNESSES:  
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*Thomas A. Tallon*

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ATTYS-



# UNITED STATES PATENT OFFICE.

BENJAMIN SCARLES, OF CLINTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO CHARLES SWINSCOE, OF SAME PLACE.

## BATTERY-ZINC.

SPECIFICATION forming part of Letters Patent No. 388,312, dated August 21, 1888.

Application filed February 17, 1888. Serial No. 264,323. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN SCARLES, of Clinton, in the county of Worcester, State of Massachusetts, have invented a certain new and useful Improvement in Battery-Plates, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an isometrical perspective view of my improved battery-plate, and Figs. 2 and 3 views showing different forms of construction. Fig. 4 is a vertical section of a cap adapted to cover the cylindrical element shown in Fig. 2. Fig. 5 is a segment of the cap adapted to cover the square element shown in Fig. 1.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates more especially to the zinc electrodes for that class of galvanic batteries known as "dry" batteries; and it consists in certain novel features, as hereinafter fully set forth and claimed, the object being to produce a more effective and otherwise desirable plate for batteries of this character than is now in ordinary use.

In the construction of battery-zincs for electrical purposes it has been usual to form the zinc of proper shape in accordance with the size or style of the battery, and then amalgamate it with mercury to protect it from the corrosive action of the acidulated solution in which it is immersed when the battery is in use; but in the process of amalgamation generally employed the mercury forms merely a coating for the zinc or unites with it on the surface only, and hence the degree of protection afforded is comparatively limited, the amalgamated portion being soon destroyed and the zinc thereafter left entirely unprotected against local action. My invention is designed to obviate this objection or difficulty, and also to produce a battery-plate of this character superior in other respects to those now in ordinary use, and to that end I make use

of means that will be readily understood by all conversant with such matters from the following explanation.

My improved plate comprises a "zinc" or series of zincs proper, and also an absorbent body or series of absorbent bodies or "felts;" and in constructing the zinc I take a sufficient quantity of pure or approximately pure commercial zinc and granulate it by any convenient method known to the arts, after which the grains may be passed through a sieve or sieves to separate or remove the coarser pieces, if desired. I then select such a quantity of the grains and of such a grade as may be necessary for use in forming the zinc to be made and submit them to the action of diluted acid to brighten them or remove the oxide from their surfaces, after which they are mixed in any suitable vessel with mercury, a sufficient quantity of mercury being used to cover the surfaces of all the grains of zinc and form an amalgam mass consisting of mercury and zinc, the mass being thoroughly stirred or agitated until the grains are combined with the mercury and perfectly amalgamated. I then take a mold made of any suitable material and corresponding in shape interiorly with the zinc to be formed and fill it with the amalgam or compound of grains of zinc and mercury and submit the mass when in the mold to pressure by any suitable means. The mold is provided with perforations or openings, through which the surplus mercury may pass off as the pressure is applied; and it should not be filled to such an extent with amalgam as to prevent the appliances for exerting a pressure on the mass within the mold from being readily operated. Having compressed the mass of amalgam within the mold and expressed the surplus mercury to such an extent as may be deemed desirable, I remove the zinc from the mold and wash it in water to remove any remaining traces of acid, after which it is placed in any convenient place to dry and harden, which soon occurs under ordinary circumstances.

In place of the granulated zinc, wire-cloth or zinc in any other form adapted to produce a homogeneous mass of amalgam when com-



bined with the mercury may be employed, if preferred.

The use of granulated zinc and mercury in the manner described enables a zinc to be 5 formed possessing nearly any desired degree of porosity, depending mainly upon the size of the grains and the degree of pressure exerted upon the mass in the mold, and as the mass is homogeneous, or nearly so, it will be 10 obvious that it is substantially indestructible, and hence that a zinc constructed in the manner described will to a great extent obviate the inconveniences and other leading objections resulting from local action or from the 15 destructive action of the acidulated solutions of the battery on the zinc when it is not in use, as in the case of zincs of the ordinary construction. The porous nature of the zinc permits it to absorb a sufficient quantity of the acidu- 20 lated solution such as is ordinarily used in batteries to "charge" it and enable it to act for a long period after being removed from the solution, and hence it is specially adapted for use in dry batteries. Having cast or molded 25 the required number of zincs, as described, I take felt, asbestos, or any suitable absorbent material and cut or form from it a number of pieces corresponding, or approximately so, in size with the zinc or zincs to be used in mak- 30 ing the plate. The zincs and pieces of felt are then assembled and arranged substantially as shown in the drawings, in which *m* represents the zincs and *x* the felts. The pieces of felt and the zincs are preferably arranged alternately, and to facilitate the absorption and 35 circulation of the acidulated solution the zincs may be perforated, if desired.

In Fig. 1 a plate composed of long "pencils" of zinc and felt is shown, the files or tiers 40 being separated by partitions *t*, composed of the mercury and zinc amalgam described. These partitions serve to connect the zincs, and thereby increase the force of the battery, and also to keep the files of zinc and felt pen- 45 cils in proper position.

In the plate shown in Fig. 2 the zincs and felts are formed in the shape of disks, which are arranged alternately one above the other, the zincs being connected and all of the disks 50 kept in position by a pencil, *v*, composed of the mercury and zinc amalgam, and which is inserted in a hole through the centers of the disks.

Fig. 3 is a top plan view of a plate having 55 a vertically-arranged pencil of the zinc and mercury amalgam surrounded by tubes of felt and said amalgam arranged alternately, any

number of the tubes being employed in accordance with the size of the battery. The tubes of amalgam are connected by the round metallic cap *a*, (shown in section in Fig. 4,) a 60 square cap of the same kind being used to connect the pencils in Fig. 1; but the zincs of the plate may be connected by any suitable and convenient metallic connections. When 65 the zincs and felts are arranged in position substantially as described, the "plate" thus formed is placed in any suitable vessel adapted to contain and keep them in position, and the acidulated solution (sulphuric acid and water 70 or any other proper solution) is poured into the vessel, where it is permitted to remain until the plate is thoroughly saturated, after which the surplus liquid is poured out and the plate used in the battery in connection with 75 a carbon electrode in a manner that will be readily understood by all conversant with such matters without a more explicit description.

In place of the composite zincs *m*, constructed 80 as described, zincs made and amalgamated in the ordinary manner may be employed, if desired.

The partitions *t* are provided with perforation (not shown) to permit the circulation of 85 the fluid. The disks and tubes shown in Figs. 2 and 3 are also provided with perforations (not shown) for a like purpose.

It will be obvious that the conducting-wires of the battery may be connected with the plate 90 in any convenient and suitable manner.

As I have made a battery-zinc constructed of granulated zinc and mercury the subject-matter of another application (Serial No. 242,494, filed June 25, 1888) for Letters Patent, 95 I do not herein claim the same, broadly.

Having thus explained my invention, what I claim is—

1. An electrode for a galvanic battery, comprising zincs, interposed felts, and metallic 100 connections between the zincs.

2. An electrode for a galvanic battery, comprising a number of zincs and a number of felts disposed in alternation, the zincs being 105 connected by metallic connections.

3. An electrode for a galvanic battery, comprising a number of zincs and a number of felts disposed in alternation in juxtaposition and saturated with an acid solution, said zincs being connected by metallic connections.

BENJAMIN SCARLES.

Witnesses:

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E. M. SPINNEY.