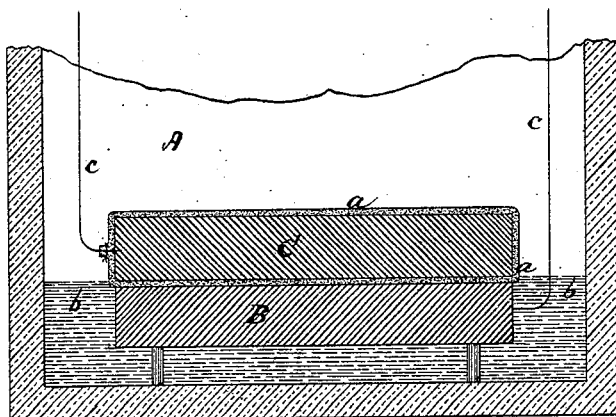


(No Model.)

A. BERNSTEIN.
GALVANIC BATTERY.

No. 267,319.

Patented Nov. 14, 1882.



WITNESSES

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GALVANIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 267,319, dated November 14, 1882.

Application filed September 27, 1882. (No model.)

To all whom it may concern:

Be it known that I, ARON BERNSTEIN, doctor of philosophy, residing in Berlin, Kingdom of Prussia, German Empire, have invented new and useful Improvements in Galvanic Elements, of which the following is a specification.

My invention relates to galvanic elements the positive electrode whereof consists of an amalgam of an alkali metal; and its object is to render such elements more efficient and to protect the said metal against the oxidizing influence of the air.

It is known that by the employment of an amalgamated alkali metal—for instance, potassium or sodium—as electrode a galvanic element of considerable energy may be produced. Nevertheless elements of this kind have hitherto not found any practical use, as, on one hand, the amalgam speedily oxidizes, while on the other hand certain arrangements introduced in order to obviate this inconvenience give rise to an excessive internal resistance. Such elements, may, however, be rendered fit for practical purposes in the following manner: The sodium or potassium amalgam, to which a conducting-wire of copper or other suitable metal is attached, is brought into a small bag or an envelope, consisting of any cloth which is not affected by the exciting-fluid to be employed. As such cloth may be used linen, cotton, or other sufficiently-close fabrics made of vegetable fibers. The bag or envelope is drawn tightly together around the conducting-wire by a string, and it is by preference at this point coated with stearine, paraffine, rosin, or other similar substance, in order to prevent its upper end from being soaked by liquid. Finally, the envelope is impregnated with a solution of caustic soda or potash containing in one hundred parts from thirty to fifty parts, by weight, of the alkali, whereupon it is dried. The fabric thereby becomes so close that it will efficiently protect the amalgam against oxidation by the atmospheric air, (which is specially of importance while the element is not in use,) whereas, on the other hand, it presents but slight resistance to the galvanic current.

The plate of amalgam thus prepared and enveloped, and which forms the positive elec-

trode of the element, is brought in close contact with the negative electrode and immersed with the same in the exciting-liquid. In case copper is used as negative electrode, the liquid to be employed may consist, as in Daniell's battery, of a concentrated solution of sulphate of copper, to which crystals of the same salt are added, in order to keep up its full degree of concentration.

If it be desired to use a carbon plate, the same is first moistened with diluted nitric acid, and thereupon plunged, together with the enveloped plate of amalgam, into a weak solution of caustic soda. Various other materials, may, however, be applied as negative electrode, and other solutions as exciting-liquids, provided that the latter do not affect the envelope of the amalgam plate.

In respect to the form of the element, the horizontal arrangement of the electrodes has proved to be very advantageous. Supposing, for instance, a carbon plate or a plate of copper having small feet be laid, with the enveloped amalgam plate on top thereof, into a flat vessel of glass or gutta-percha, &c., and the latter then be so far filled with liquid that only the lower surface of the amalgam becomes wet, an element is obtained which is of but small bulk in comparison with its efficiency, and, besides, the close contact between the electrodes and the envelope or diaphragm which is required for the purpose of reducing as much as possible the internal resistance of the element is thus attained in the simplest manner. In order to facilitate the access of the liquid to the surfaces in contact with each other, it is advantageous to drill several holes into the copper plate. Such an arrangement is shown in section in the accompanying drawings, in which A represents the jar or vessel; B, the negative plate; C, the positive plate; *a*, the bag, inclosing plate C; *b*, the exciting-liquid, and *c c* the conductors. The combination of two or more such elements to a battery does not require any explanation, as the same is carried out in the usual manner.

I claim as my invention—

1. In a galvanic element, a positive electrode consisting of the amalgam of an alkali metal, in combination with an envelope serv-

ing as diaphragm and made of a fabric not
affected by the exciting-liquid—such as a fab-
ric of vegetable fibers—and which is impreg-
nated with a caustic alkaline solution, sub-
stantially as and for the purpose described.

5 2. A galvanic element composed of a flat
negative electrode, and a positive electrode
consisting of a plate of amalgamated alkali
metal and inclosed in an envelope having the
10 nature and prepared as described, both elec-

trodes being placed horizontally and so as to
be both in contact with the said envelope,
substantially as specified.

In testimony whereof I have signed my name
to this specification in the presence of two sub- 15
scribing witnesses.

ARON BERNSTEIN.

Witnesses:

HENRY SPRINGMANN,
B. ROY.