(No Model.)

T. D. BOTTOME.

ASYMMETRICAL ELECTRICAL RESISTANCE.

No. 445,687. Patented Feb. 3, 1891.

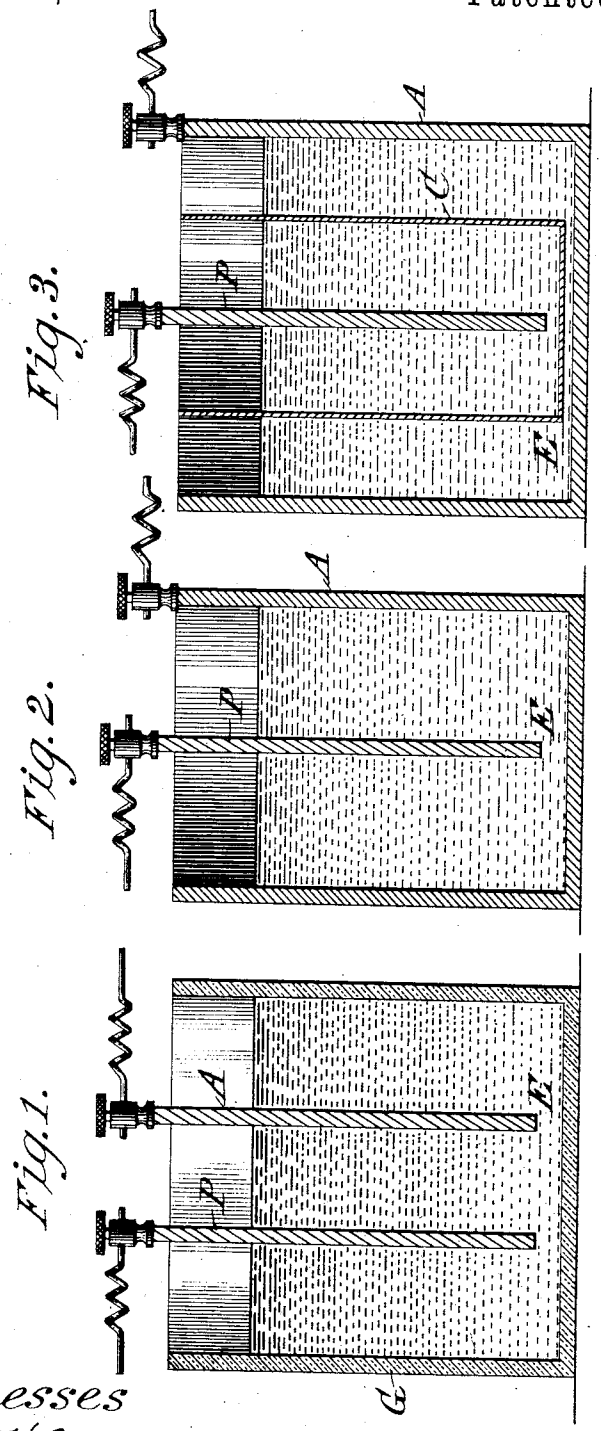

Fig. 3.

Fig. 2.

Fig. 1.

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ASYMMETRICAL ELECTRICAL RESISTANCE.

SPECIFICATION forming part of Letters Patent No. 445,687, dated February 3, 1891.

Application filed January 28, 1890. Serial No. 338,433. (No model.)

To all whom it may concern:

Be it known that I, TURNER D. BOTTOME, a citizen of the United States, and a resident of Hoosick, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Asymmetrical Electrical Resistances, of which the following is a specification.

This invention relates to electrical conductors; but it differs from the ordinary conducting substances, elements, or devices in that a direct continuous electric current may be passed through the ordinary conductors in either direction with equal facility and results; but when passed through the device known as an "asymmetrical conductor" the current will flow freely when passed through it in one direction, but will be resisted or nearly stopped when attempting to pass the same current in a reverse direction.

The object of this invention is to produce an asymmetrical conductor that can be used for practical purposes, especially such as directing alternating currents into currents of a continuous nature of but one direction and suitable for energizing the field-magnets of alternating-current dynamos, electrolytic operations, &c.

The invention consists, essentially, in an electro-chemical device having conducting-plates of chemically inoxidizable elements or metals immersed in a fluid conducting medium consisting largely or entirely of sulphuric acid or a solution of a sulphate. One of the conducting plates or electrodes is composed particularly of metallic aluminum, while the other plate may be composed of almost any inoxidizable electric conducting metal or element, such as platinum, gold, or carbon.

In more fully describing my invention in its practical form reference may be had to the accompanying drawings, which form a part of this specification, wherein—

Figure 1 represents the device contained in an insulating-vessel. Fig. 2 shows the device self-contained. Fig. 3 illustrates a modification of the foregoing, the difference being that in this case a porous partition is used to separate the two conducting elements.

In Fig. 1, G represents a glass jar or other insulating-vessel. A represents a conducting-plate composed of metallic aluminum. P is a conducting-electrode composed of platinum, carbon, or other inoxidizable element, while E shows the fluid conducting medium.

Fig. 2 shows the device without an insulating-vessel. In lieu thereof A represents a containing-vessel composed of metallic aluminum, in which is placed the fluid conductor E and the conducting-electrode P.

It is obvious that the containing-vessel may be constructed of the inoxidizable element P and contain a fluid conducting medium E, with a plate of aluminum A suspended therein.

In Fig. 3, C shows a porous partition or vessel, in which either the aluminum conducting-plate A or the other conducting-plate P may be placed, while one or the other of the plates is placed outside of the vessel C.

The fluid conducting medium E may vary considerably in its composition and yet serve the purpose. It is not intended to perform the office of a depolarizer or excitant, as is the case with fluid conducting mediums in primary batteries. It is simply construed to be a compound conducting device composed of two conductors separated by a fluid medium. The said medium may be either a liquid, jelly, or semi-solid mass and serve the purpose.

When the electrode A is electrically connected to the positive pole of an electric generator supplying a continuous electric current and the electrode P attached to the negative pole, upon passing a current for a very short period of time no unusual resistance will be offered by the device to the passage of the current; but upon reversing the direction of the current and passing it as before for a very short period of time it is found that only a small portion of the original current passes, owing to the high resistance the device offers to the current in that direction.

The exact reactions taking place during the operations of the device are not perfectly understood; but it is supposed that the main action is due largely to the peculiar nature of metallic aluminum under electrolytic action and to the possible formation of a basic aluminum oxide of insulating properties upon the aluminum plates when the current passes in one direction and the decomposition of

the said oxide into a soluble sulphate when the current is passed in the other direction.

I do not limit myself to any special shape or size of the conducting elements used nor to the form, as they may be in the form of grids, plates, wires, &c., without departing from the invention.

I do not limit myself to the strength or particular kind of the chemical conducting medium used, as there are several mixtures that may be successfully used.

What I claim as my invention is as follows:

1. An asymmetrical conductor consisting of a fluid medium composed of chemical substances, through which an alternating electric current is passed by means of two electrical conducting-electrodes, both being immersed therein, one electrode consisting of an inoxidizable metal or element, the other of a metal that becomes superficially oxidized and deoxidized alternately, substantially as and for the purpose shown and described.

2. An asymmetrical electrical conductor consisting of two dissimilar electrical conducting metals, both inoxidizable while immersed in a chemical conducting medium, one of the metals being subject to changes in its electrical conductance under the influence of electro-chemical action, the other metal being inert, substantially as herein described.

3. An asymmetrical conductor consisting of a chemical conducting medium placed between inoxidizable conducting elements, one of the said elements being inert, the other having the property of having its electrical conductance changed from a low to a high resistance alternately while subjected to the action of an alternating electric current, substantially as described.

4. An asymmetrical conductor consisting of a device for directing alternating electric currents, composed of a fluid chemical conducting medium interposed between a plate of some inert conducting metal or element and a plate of aluminum, as described.

Signed at Hoosick, in the county of Rensselaer and State of New York, this 25th day of January, A. D. 1890.

TURNER D. BOTTOME.

Witnesses:
D. V. JONES,
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