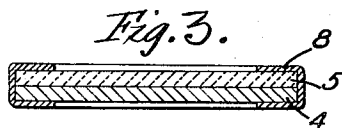
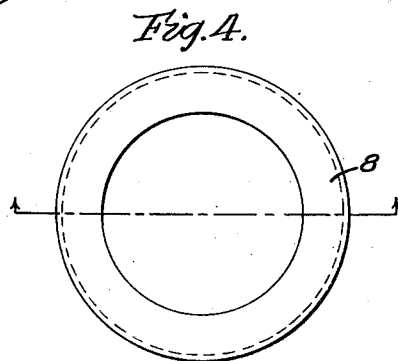
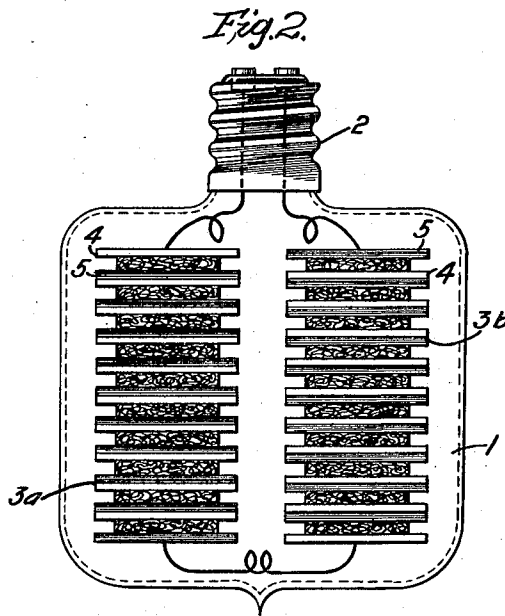
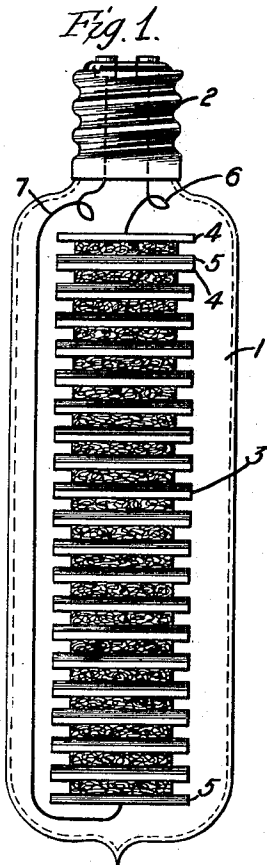


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EMERGENCY SOURCE OF VOLTAGE.  
APPLICATION FILED DEC. 14, 1918.

1,401,671.

Patented Dec. 27, 1921.



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# UNITED STATES PATENT OFFICE.

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## EMERGENCY SOURCE OF VOLTAGE.

1,401,671.

Specification of Letters Patent. Patented Dec. 27, 1921.

Application filed December 14, 1918. Serial No. 266,745.

*To all whom it may concern:*

Be it known that I, LEWIS WARRINGTON CHUBB, a citizen of the United States, and a resident of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Emergency Source of Voltage, of which the following is a specification.

My invention relates to voltage-generating means and it has particular relation to apparatus of the character designated which shall be inactive until desired and which may then be made active in a simple and expeditious manner.

One object of my invention is to provide voltage-generating means which may be maintained inactive and stored for an indefinite length of time, and then brought to a state of activity, whereby a predetermined voltage will be generated by the simple exposure of the voltage-generating means to the atmosphere. To this end, I provide a structure analogous to a galvanopile and associate deliquescent substances with the elements thereof in such manner that the galvanopile will be inactive while the deliquescent substances remain unaffected by moisture. I maintain a dry state for the materials in question by inclosing the galvanopile structure in a vacuum.

It is obvious that, if the containing structure is of a frangible nature, the vacuum may be broken by a slight blow, and the voltage-generating means will thereafter become active.

If the containing structure is of such nature that the whole voltage-producing means may be secured to the apparatus which is to utilize the generated electromotive force, it is obvious that many desirable advantages will attach to such voltage-producing means. In some circumstances, it may be desirable to have at hand a source of high voltage although of comparatively low power, and, moreover, it may be further desirable that a source of voltage of the character described shall be always available for use at any and at all times.

Again, in order that such a source of voltage may be always available and adapted to function at its original value, it is imperative that no depreciation of the voltage-generating means shall occur during its period of inactivity or the time during which

it is stored before it is put into use. For all of the above reasons, I find that a voltage-producing means constructed in accordance with my invention is of great utility at the present time.

For a better understanding of my invention, reference may be had to the accompanying drawing in which Figure 1 is an elevational view of a galvanopile constructed in accordance with my invention, in which the containing structure is composed of glass; Fig. 2 is a modification of the structure shown in Fig. 1; while Figs. 3 and 4 are, respectively, an elevational sectional view and plan view of a pair of elements, as employed in my galvanopile.

Referring more particularly to Fig. 1, a containing structure 1, composed of frangible material, such, for example, as glass, is provided with an attaching member 2, that is like, or similar to, that of a common incandescent lamp bulb. Positioned within the containing structure 1 is a galvanopile 3 composed of a plurality of groups of elements. Two of the elements of each group occupy different positions in the electrochemical series and are designated as 4 and 5 and the other element is a mass of any suitable deliquescent material, which is here shown as positioned between the element 4 and the element 5. For purposes of illustration, I will describe my galvanopile as comprising copper elements 4 and zinc elements 5 but it will be obvious that other elements made of materials which occupy different positions in the electro-chemical series and between which a potential difference may be maintained, may be substituted for copper and zinc elements. A wire 6 is shown attached to the copper element 4 at one end and a wire 7 to the zinc element 5 at the other end of the pile. The two wires constitute leading in wires and, by proper attachment to contact members at the base of the threaded portion 2, are adapted to supply any apparatus which is to consume the electromotive force generated by the galvanopile.

In the modification shown in Fig. 2, the galvanopile is divided into two sections, 3<sup>a</sup> and 3<sup>b</sup>, the elements being connected in the proper sequence. It is obvious that as many groups of elements and bodies of associated deliquescent material may be provided as are

desired, and, moreover, that, instead of being connected in series relationship they may be connected in parallel relation, whereby an increased current may be obtained. One form which I have found to be particularly advantageous is that in which four stacks of element groups are employed and are arranged in a spider-like container which forms a very compact square structure. It might appear, at first, that such structure would be impracticable in shape for a containing bulb. As will hereinafter appear, however, the outer bulb is dispensed with when the galvanopile is placed in service and, therefore, the structure of the bulb does not import any limitation into the use of a galvanopile structure of such form and dimensions.

Figs. 3 and 4 may be considered together as illustrating one way in which I prevent any local discharge from occurring over the edges of the elements comprising the galvanopile. I find that, by applying a coating of greasy paint or a resinous varnish to the edges of the twin elements, I am able to prevent the normal discharge which might otherwise occur thereover.

Having described one embodiment of my invention the operation thereof is as follows:

The galvanopile is built up, as shown in Fig. 1, of groups of elements, two of the elements of each group occupying different positions in the electro-chemical series and, therefore, being adapted for the maintenance of a potential difference between them. Between the elements of each pair is placed a mass of deliquescent material and it is to be understood that this material will not allow the passage of a current through the galvanopile or between the two elements of any group until it has taken up moisture. In other words, while the two-plate elements of a battery are present, no electrolytic element exists until the deliquescent substance has become moist.

The number of groups of elements required is determined by the voltage which it is desired to obtain from the structure in question, since the potential difference which exists between any two diversely-positioned elements of the electro-chemical series is known. If the galvanopile is surrounded with a containing envelop and the interior of this structure is air evacuated, the galvanopile may be stored for an indefinite time without deterioration, since no moisture will be absorbed by the deliquescent material, and the elements forming the opposing portions of the cell will be inactive. Extended experiments lead to the conclusion that, within the space of four inches square, by the employment of the structure described in connection with Fig. 2, it will be possible to store emergency sources of voltages which

will generate, at will, as much as two thousand volts.

When the time arises for the employment of the voltage-generating means, the frangible containing envelop is fractured by a blow and if, before this fracture, the entire structure is screwed into the apparatus which is to utilize the electromotive force, it is obvious that a very simple and quickly-available source of voltage is at hand, since the deliquescent material, if of sufficient absorptive power, will immediately begin to function. Of course, under a great many conditions, it may be feasible to dip the galvanopile into a liquid, either an electrolyte or water, when the container is fractured, but in case no liquid is at hand, an emergency source of voltage is provided which is available at will and which may be stored for an indefinite period of time without deterioration.

Since I believe that the above described structure is wholly novel, both in function and in arrangement, I desire that the invention be construed as broadly as possible in view of the prior art and that the structure set forth in the foregoing description be limited only thereby and by the scope of the appended claims.

I claim as my invention:

1. A voltage-generating means, containing deliquescent material, that is active only upon exposure to a moisture-containing fluid.
2. Means adapted to maintain an electrical difference of potential, and normally dry deliquescent means associated therewith whereby said potential-generating means is active only upon exposure to a moisture-containing fluid.
3. Means adapted to generate an electrical difference of potential upon the application of moisture thereto, and sealing means therefor whereby moisture may be excluded therefrom.
4. Means adapted to generate an electrical difference of potential when exposed to a normal atmosphere, and frangible sealing means for confining said potential-generating means in an atmosphere devoid of moisture until required for generating service.
5. The combination with elements occupying different positions in the electro-chemical series, of air-tight means for maintaining said elements in an inactive condition until exposed to moisture.
6. The combination with two elements occupying different positions in the electro-chemical series, of separating means for said elements, and vacuum means associated therewith to maintain said elements in an inactive condition until they are exposed to moisture.
7. The combination with electrodes occupying different positions in the electro-chemical series, of deliquescent separating

means for said elements, and means associated therewith to maintain said elements in an inactive condition until they are exposed to moisture.

5 8. The combination with electrodes occupying different positions in the electro-chemical series, of deliquescent separating means for said elements, and an air-evacuated envelop for said elements and separating means.

10 9. The combination with elements occupying different positions in the electro-chemical series, of deliquescent separating means for said elements, and an air-evacuated glass container for said elements and said separating means.

15 10. The combination with elements occupying different positions in the electro-chemical series, of deliquescent separating means for said elements, an air-evacuated frangible containing envelop, and means for attaching said structure to the consumption apparatus for the voltage generated by said elements.

25 11. The combination with elements occupying different positions in the electro-

chemical series, of deliquescent separating means for said elements, means for precluding local discharges over the edges of said elements, and an air-evacuated envelop for said elements and said separating means. 30

12. The combination with electrodes occupying different positions in the electro-chemical series, of deliquescent separating means for said electrodes, an air-evacuated frangible container therefor, having a screw-threaded means for securing said container to a consumption circuit. 35

13. Voltage-generating means dependent upon the rupture of a surrounding vacuum for becoming active. 40

14. Voltage-generating means containing normally dry deliquescent material.

15. Voltage-generating means comprising a plurality of different chemical elements, normally dry deliquescent material located between said elements, and means for normally maintaining said means in a vacuum. 45

In testimony whereof, I have hereunto subscribed my name this 2nd day of Dec., 50 1918.

LEWIS WARRINGTON CHUBB.