E. E. F. CREIGHTON.

ELECTROLYTIC CONDENSER.

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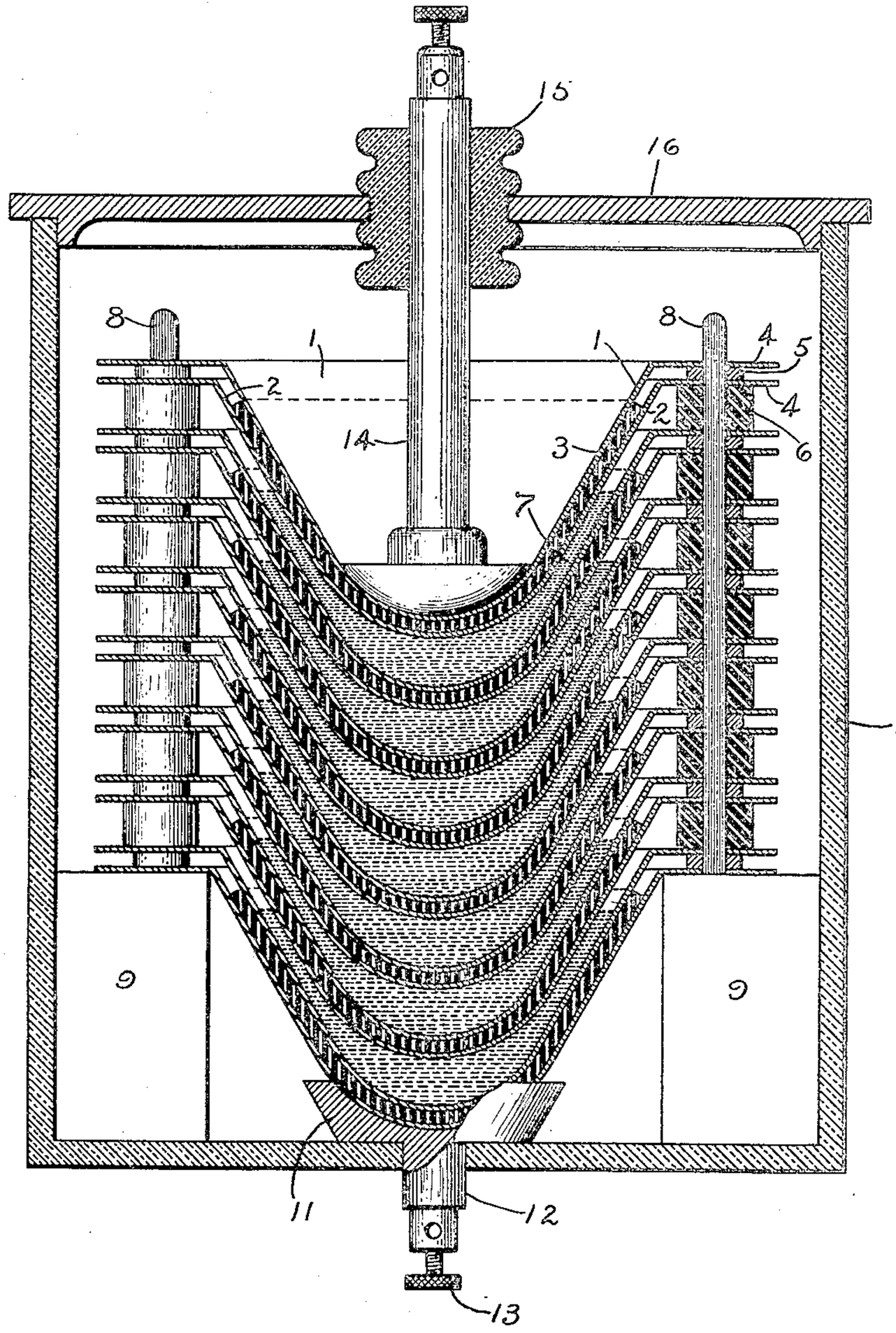
974,029.

Patented Oct. 25, 1910.




WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## ELECTROLYTIC CONDENSER.

974,029. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed October 26, 1907. Serial No. 399,272.

*To all whom it may concern:*

Be it known that I, ELMER E. F. CREIGHTON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electrolytic Condensers, of which the following is a specification.

This invention relates to devices for protecting transmission lines from the destructive effect of abnormally high potential or frequency, due to lightning strokes, induction, surges, and the like.

In a pending application Serial No. 325,195, I have disclosed a protective device consisting of a plurality of nested aluminum dishes, with a suitable electrolyte between them, the top and bottom dishes being connected to line terminals. These dishes are preferably conical in shape, and are inclosed in a tank of oil to keep them cool. The effect of a current of electricity passing through this cell is to form a thin film of oxid or hydroxid on the surface of the aluminum cones exposed to the electrolyte, said film offering a high resistance to the further flow of current, up to a certain "critical" voltage at which the film yields, like the opening of a spring-closed check valve, and permits the current to flow uninterruptedly. When the excess voltage drops below the critical voltage, the film valve closes and again interposes its resistance to the current.

It sometimes happens that by reason of local action a small hole is developed in one of the cones. This causes a short-circuiting of the films on this cone which throws an extra load on the other cones. It is evidently desirable to provide some safeguard against this contingency. I have therefore devised the cell which forms the subject-matter of the present application in which the cones are arranged in pairs, with their adjacent faces protected from the action of the electrolyte so that no film can form thereon. The preferred mode of accomplishing this is by placing between the submerged or central portions of the cones a layer of hydrocarbon or other compound not affected by the electrolyte and adhering to the surfaces of the cones. I may, if desired, substitute some other insulating material, such as glass, porcelain, celluloid, and the like. The effect of this construction is to make a compound or double aluminum cone composed of two plates separated throughout their submerged or central portion by an impervious layer or backing of insulating material, but electrically connected at their edges. Each compound cone so built up is used in place of the single cones shown in my aforesaid application. A plurality of compound cones is arranged with spaces between them into which the electrolyte is poured. The film forms only on the surfaces exposed to the electrolyte. If a plate is punctured by local action, the electrolyte cannot penetrate the insulating backing and thus the plate is not put out of service but may continue in use until entirely destroyed by the electrolysis.

Instead of supporting the cones by interposed spacing blocks at their apexes, I form flanges on their edges, and place the spacing blocks between said flanges, the flange of the bottom cone being supported on suitable piers or brackets in the inclosing oil tank.

The accompanying drawing is a vertical section of a lightning arrester cell embodying my improvements.

Each compound cone is composed of two conical aluminum plates 1, 2 with an interposed layer or backing 3 of insulating material, such as hydrocarbon or other compound, glass, porcelain, celluloid, or the like. The backing extends over the central portions only of the plates. In the drawing the thickness of this backing is exaggerated for the sake of clearness. The plates have peripheral flanges 4, extending beyond the edges of the insulating backing 3. The flanges in each compound cone are electrically connected by one or more washers 5 of metal. The central portions of the cones are convex so that no bubbles of gas can accumulate and displace the electrolyte by their sudden escape.

When the compound cones are nested together, they are spaced apart by supporting blocks 6 of insulation, placed between their flanges, so as to leave room for the electrolyte 7 to be introduced between them. The several cones and blocks are kept in position by upright posts 8 of insulating material which pass through the flanges 4, the washers 5 and the blocks 6. The lower cone is supported on suitable piers or brackets 9 attached to the inside of the oil tank 10 in which the cones are inclosed. The

bottom of the lower cone is in electrical contact with a terminal plate 11 which has a stem 12 projecting through the bottom of the tank and provided with a binding screw 13. The upper terminal 14 rests on the upper cone and extends through an insulating bushing 15 in the lid 16 of the tank.

Inasmuch as the two plates in each double or compound cone are electrically connected by the washers 5, current can flow freely through the cell when the critical film voltage is exceeded. But all open-circuiting due to the puncturing of a plate by local electrochemical action is absolutely prevented by the insulating layer between the plates.

It is evident that the mode of supporting the plates by peripheral flanges and interposed blocks is not confined to the compound plates but may be used equally well with the single cones shown in my aforesaid application.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A compound plate for an electrolytic lightning arrester, consisting of two aluminum plates, and insulation interposed between their central portions only, having their edges free to be electrically connected.

2. A compound plate for an electrolytic lightning arrester, consisting of two aluminum plates, insulation interposed between their central portions only, and metallic washers between their edge portions.

3. An electrolytic cell comprising an electrolyte, aluminum plates mounted in contact with the electrolyte to form electrodes, and insulating supports for engaging the edges of said plates to hold them in definite relation to one another and out of metallic contact.

4. An electrolytic lightning arrester, consisting of a plurality of compound plates each composed of two aluminum cones with an interposed backing of insulation, flanges on said plates, aluminum washers between the flanges of each compound plate, and insulating supporting and spacing blocks between the flanges of adjacent compound plates.

5. In an electrolytic lightning arrester, the combination of a plurality of fluid-containing trays each having a smooth convex center and a flanged edge.

6. An electrolytic cell comprising an electrolyte, a plurality of aluminum plates mounted in contact with the electrolyte, and insulating supporting means for engaging the edges of said plates to support them out of metallic contact with one another, said supporting means being maintained out of contact with the electrolyte.

7. In an electrolytic condenser cell, a plurality of fluid-containing dished plates, each having a flanged edge, insulating supports passing through perforations in said edge, and spacing blocks placed between said flanges.

8. An electrolytic cell comprising a plurality of plates shaped to contain fluid and filled with electrolyte to a point below their edges, and insulating supporting means engaging the edges of said plates at points above the surface of the electrolyte.

9. An electrolytic cell comprising a plurality of dished plates nested within one another and having flanged edges, each plate being partially filled with electrolyte, and supporting means for engaging the flanges of said plates to hold said plates in fixed relation to one another.

10. An electrolytic cell comprising a plurality of dished plates nested within one another and having perforated flanges, each plate being partially filled with electrolyte, and insulated supporting means extending through the perforations in the flanges of said plates to position said plates with reference to one another.

11. An electrolytic cell comprising an electrolyte, a plurality of aluminum plates perforated near their edges and in contact with the electrolyte, insulating standards extending through the perforations in the edges of said plates, and insulating washers between said plates.

12. An electrolytic cell comprising a plurality of concave plates nested within one another and partially filled with electrolyte, said plates having perforated flanged edges, insulating supports extending through perforations in the flanges of said plates, and insulating washers on said standards between the plates.

In witness whereof, I have hereunto set my hand this 25th day of October, 1907.

ELMER E. F. CREIGHTON.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.