

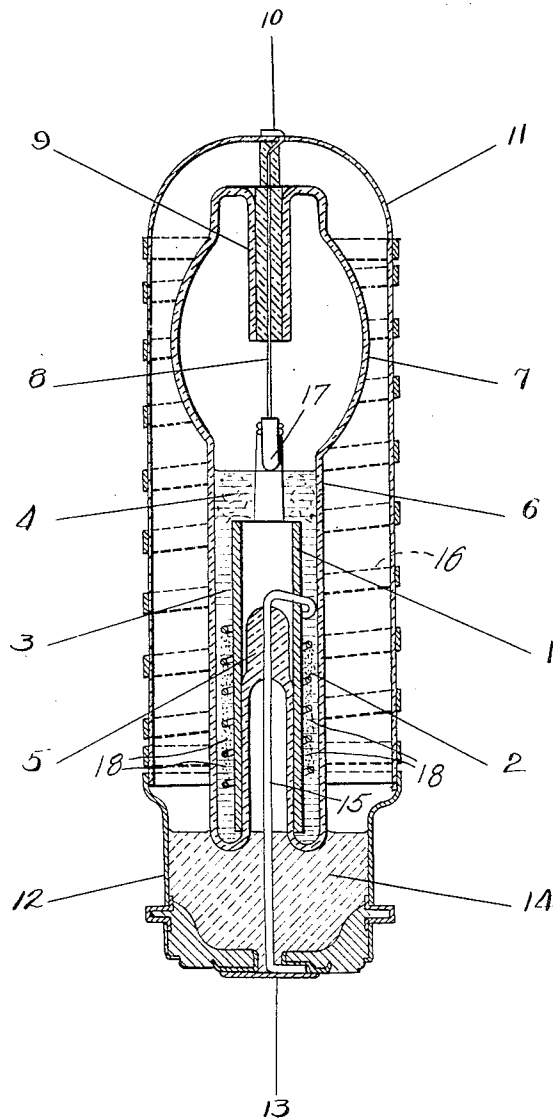
Nov. 18, 1930.

H. G. ANDRÉ

1,782,129

UNILATERAL CONDUCTOR FOR RECTIFYING ALTERNATING CURRENT

Original Filed April 29, 1925



Inventor
Henri G. André
By Robert Cushman & Woodbury
Attys.

UNITED STATES PATENT OFFICE

HENRI GEORGES ANDRÉ, OF PARIS, FRANCE

UNILATERAL CONDUCTOR FOR RECTIFYING ALTERNATING CURRENT

Application filed April 29, 1925, Serial No. 26,748, and in France December 26, 1924. Renewed April 11, 1930.

The present invention relates to electrical apparatus and in particular to alternating current rectifiers in which two metals of different character are employed as electrodes, the metals fulfilling alternately the function of cathode and anode.

In my application Serial No. 749,214, filed November 11, 1924, of which this is a continuation-in-part, I have disclosed a rectifier, one electrode of which comprises a metallic colloid while the other is formed of a material that when subjected to an oxidizing agent yields a compound permeable to current in one direction only.

In the application identified, I have also stated the presence and manner in which derived of an element in colloidal or subdivided form making physical contact with one of the electrodes and in particular with the cathode. Apparatus made according to the foregoing specification has the property of rectifying alternating current of comparatively large amplitude.

Now I have found that the unilateral conducting device disclosed in my prior application supra has the defect of becoming symmetrical after a prolonged period of inactivity.

Careful study and experiment indicates that this defect is due to the exaggerated concentration of colloidal or pulverulent silver, which coagulates and forms metallic masses which short circuit the system.

Gravity also favors this agglomeration, and it is found that short circuits take place at the base of the rectifying tubes described in the above mentioned prior case.

The object of the present invention is to remedy these defects and, the present apparatus permits of fractionating the colloidal anodic mass and preventing a deposit of solid form by the weight of a mass of anodic materials on the cathode.

In the accompanying drawing wherein an approved embodiment of the invention is illustrated:

The figure is a longitudinal section of the improved conductor.

Referring to the drawing in detail there is provided the anode 1 preferably of silver lo-

cated at the center of the cathode. The colloidal part of the anode, in suspension in sulfuric acid 66° Baumé 3 is divided into portions 18 placed between the turns of helical cathode 2. The latter, however, may assume forms other than that shown, for example, a network, perforated sheet or the like having large area in which the interstices are filled with the colloid or particles. Moreover, the apportionment of material offers free access for the gases liberated during the initial electrolysis period.

Inasmuch as cathode 2 is not attached to the bottom of tube 6, as in my prior application supra, the deposit exerts no pressure thereon and tendency of the particles to pack or agglomerate by action of gravity is thus eliminated.

At 15 I have indicated a lead wire extending through glass stem 5 and rigidly supporting the cathode as in an ordinary incandescent lamp in a position intermediate the stem and tube 6. This lead may be either an extension of the cathode member as shown or an element of different diameter integrally joined thereto.

The part 7 of the exterior tube 6 is enlarged so as to form, in case of reversal, an expansion chamber of a capacity sufficient in order that the level of the liquid will not exceed the height of the tubular member 9.

A double layer of vaseline 4 is provided to prevent undue movement of the materials in suspension.

The assemblage is mounted on a base similar to an incandescent lamp base and including an outer contact member 12 and a center contact member 13 imbedded in an insulating cement 14.

The member 13 is connected to lead wire 15 by solder or the like and the anode 1 is connected to the contact member 12 by lug 17 and a silver connecting wire 8 soldered at 10 to the metallic protective container 11, which latter is soldered to the brass contact member 12. This mounting rigidly secures the unidirectional conductor unit.

To procure additional strength of container, I wrap tightly about the latter, in spiral, a metal strip 16 of flexible material, the strip

being conductively connected to junction 10 and contact member 12. For the purpose of preventing any damage to the glass of the tube 6 by charge effect or emanation of heat by the cathode, use may be made of a material impervious to the acid such as certain kinds of rosin, tar, pitch and the like, a layer of which may be coated on said tube.

As to the acid used in order to be assured of sufficient dehydration, it is possible to provide a mixture of ordinary sulfuric acid 66° Baumé and sulfuric acid with anhydrid ($\text{SO}_3\text{H}_2 + \text{SO}_3$).

In the construction of the cathodic conductor, better results are obtained, from the viewpoint of stability, with alloys of iron-nickel which, moreover, resists superficial short circuiting better than their constituent elements. Iron-silicon alloys have the same advantages and in addition possess a tension disruptive value two or three times greater.

The calculated tension applied to the rectifier should be such that its maximum no load electro-motive force plus the maximum counter-electro-motive force of the load shall not exceed the maximum disruptive tension of the device.

The operation of the foregoing device is similar to that described at length in the application referred to, i. e., a compound of oxidation formed on the nickelous cathode by the acid has the property of unilateral conduction of current producing rectification of alternating potential. The oxide layer on the silver anode, however, is a bi-lateral conductor and offers substantially no resistance to the passage of current.

What I claim is:—

1. In electrical apparatus, the combination of a sealed tube containing a centrally disposed anode in colloidal form, a cathode mounted so that substantially all of its surface is presented to said anode and means including a mixture of sulfuric acid and anhydride for maintaining the colloids in suitable proportions.

2. As an article of manufacture, a helical element of nickel alloy, the convolutions of which contain particles of silver.

3. Electrical apparatus comprising an electrode, a helical cathode surrounding said electrode, the convolutions of said cathode containing anode forming material.

4. In an electrical device the combination of an anode in subdivided form, a cathode associated therewith and having interstices containing divisions of said anode.

5. In an electrical device, the combination of an anode in subdivided form and subject to agglomeration, a cathode associated therewith and means including the latter for fractionating the anodic agglomeration.

6. In an electrical device, the combination of a colloidal anode subject to agglomeration, a helical cathode associated therewith,

the convolutions of which contain said colloid whereby agglomeration is effectively prevented.

7. Electrical apparatus comprising an intersticed cathode, an anode containing silver associated therewith and means cooperating with the anode for maintaining a colloid of silver in said interstices.

8. In a rectifier, the combination of an intersticed cathode, an anode containing silver associated therewith and a single means interposed between said cathode and anode for unilaterally passing current and for maintaining a colloid of silver in said interstices.

9. In electrical apparatus, the combination of a subdivided anode subject to agglomeration, an electrolyte associated therewith and means comprising an intersticed cathode, for permitting flow through the agglomeration of the gas formed by electrolysis.

10. An electrical device comprising a container, an amorphous anodic mass therein having a tendency to agglomerate at the bottom of said container, and a cathode disposed within said anodic mass in such a manner that said cathode does not contact with any agglomerated mass.

In testimony whereof I hereunto affix my signature.

HENRI GEORGES ANDRÉ.