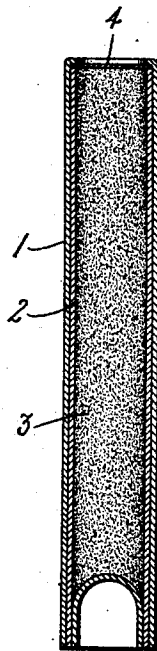


C. A. B. HALVORSON, JR.
ARC LAMP ELECTRODE.
APPLICATION FILED MAR. 4, 1911.

1,057,054.

Patented Mar. 25, 1913



Witnesses:

George H. Tilden
J. Ellis Elm.

Inventor:

Cromwell A.B. Halvorson Jr.,

by *Wm. H. Davis*
His Attorney.

UNITED STATES PATENT OFFICE.

CROMWELL A. B. HALVORSON, JR., OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ARC-LAMP ELECTRODE.

1,057,054.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed March 4, 1911. Serial No. 612,379.

To all whom it may concern:

Be it known that I, CROMWELL A. B. HALVORSON, Jr., a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Arc-Lamp Electrodes, of which the following is a specification.

My invention pertains to an electrode, and particularly to an electrode producing a luminous arc in which a liquid pool is formed upon the arcing end of the electrode. It has hitherto been proposed to use an electrode of this character composed of a mixture of magnetite, rutile and chromite, this mixture being inclosed in an iron shell to be used as the negative electrode, and to use as the positive electrode a very slowly consuming electrode and which is known in the art as a non-consuming electrode. Such an arc is much longer than the arc formed between carbon electrodes, and in practice commonly has a length of about an inch. When the arc is burning between electrodes of this character, a pool is formed on the negative electrode which moves irregularly about the arcing face. Under certain conditions, however, and particularly when it is required that the negative electrode should have a smaller diameter than usual with an abnormally high titanium content, and should at the same time be run at a higher current than ordinarily employed, the tip of the electrode, particularly during the first portion of its life, becomes very hot, the liquid pool becomes very much enlarged and extends in fact over the entire arcing end of the electrode, and, as the iron shell, as ordinarily used, is consumed rather rapidly, the molten material exhibits a tendency to flow over the edge of the electrode and present a rounded surface to the arc. The cathode blast issues from the negative electrode in a direction normal to the surface of the electrode at that point, and, when the arc is burning near the edge of the electrode, the arc is bowed outwardly to an excessive extent and is liable to be frequently ruptured. In the type of lamp in which electrodes of this character are ordinarily used, the electrodes may or may not be in engagement when the lamp is not in operation, and, when they are separated or brought together and separated to strike the arc, the arc is liable to be bowed out-

wardly to such an extent as to be ruptured altogether. The electrodes are then again brought together and the process repeated, producing what is known in the art as "jumping." A further difficulty is encountered in the use of a negative electrode having a rounded end, in that the arc is not struck with as great certainty between such an electrode and the non-consuming electrode as between an electrode presenting a flat surface and a corresponding non-consuming electrode. I have overcome this tendency of the negative electrode to burn with a rounded end by providing the electrode with a second metallic shell, preferably of iron.

In the figure, 1 indicates the outer shell within which the inner shell 2 is sprung and frictionally held. The inner shell 2 is filled with the usual electrode composition 3, such as magnetite mixture. The tip of the electrode is closed by a seal 4.

My understanding of the reason for the second shell curing the defect hitherto noted is that the outer shell is kept much cooler than the inner shell, or than the ordinary single shell. The contact between the two shells in my electrode is imperfect at best, with the consequence that the heat of the inner shell is but imperfectly transmitted to the outer shell. The outer shell being cooler than the inner one is more slowly consumed than the inner one, or than the ordinary single shell, with the consequence that the molten material is caused to assume a flattened condition and burn with a flat surface. Whatever may be the correct theory, however, for the second shell curing the defect hitherto noted, I have found in practice that it does overcome this defect and have found by experiment that a single shell having the same thickness as that of the combined thickness of the two shells does not accomplish the same result. I am not limited to the use of two concentric shells, since, in some cases, three or more such shells may be used.

While I have described my invention as particularly applicable to an electrode in which the arc producing material is a mixture of magnetite, rutile and chromite, it is obvious that it is applicable to any electrode producing a luminous arc and in which the electrode material is fusible and the end becomes rounded in operation. Furthermore,

while I have described a shell as made of iron, it is obvious that other metals could be used. It is also obvious that, while I have mentioned a non-consuming electrode as the anode, my invention does not depend on the use of such anode, as it would be equally applicable in conjunction with other anodes.

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

1. An arc light electrode composed of a material giving a luminous arc and a plurality of concentric metallic shells in frictional contact with each other.

2. An arc light electrode having a core giving a luminous arc and two concentric iron shells in frictional contact.

3. An arc light electrode having a core composed of a luminous arc material inclosed in a metallic shell which is surrounded by a second metallic shell in frictional contact with the first.

4. An arc light electrode having a core containing fusible luminous arc material surrounded by a plurality of metallic shells in frictional contact with each other.

5. An arc light electrode composed of material producing a luminous arc and which forms a liquid pool during operation, provided with a plurality of metallic shells in frictional contact with each other, whereby said fusible material burns with a flat surface.

6. An arc light electrode composed of a material yielding a luminous arc springing from a molten pool, provided with two metallic shells and a thermal insulating layer between the two shells.

7. An arc light electrode composed of a material yielding a luminous arc springing from a molten pool, inclosed within a metallic shell, said shell being surrounded by a second shell concentric therewith, and means for thermally insulating said second shell from said first shell.

In witness whereof, I have hereunto set my hand this second day of March, 1911.

CROMWELL A. B. HALVORSON, JR.

Witnesses:

JOHN A. McMANUS, Jr.,
CHARLES A. BARNARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."