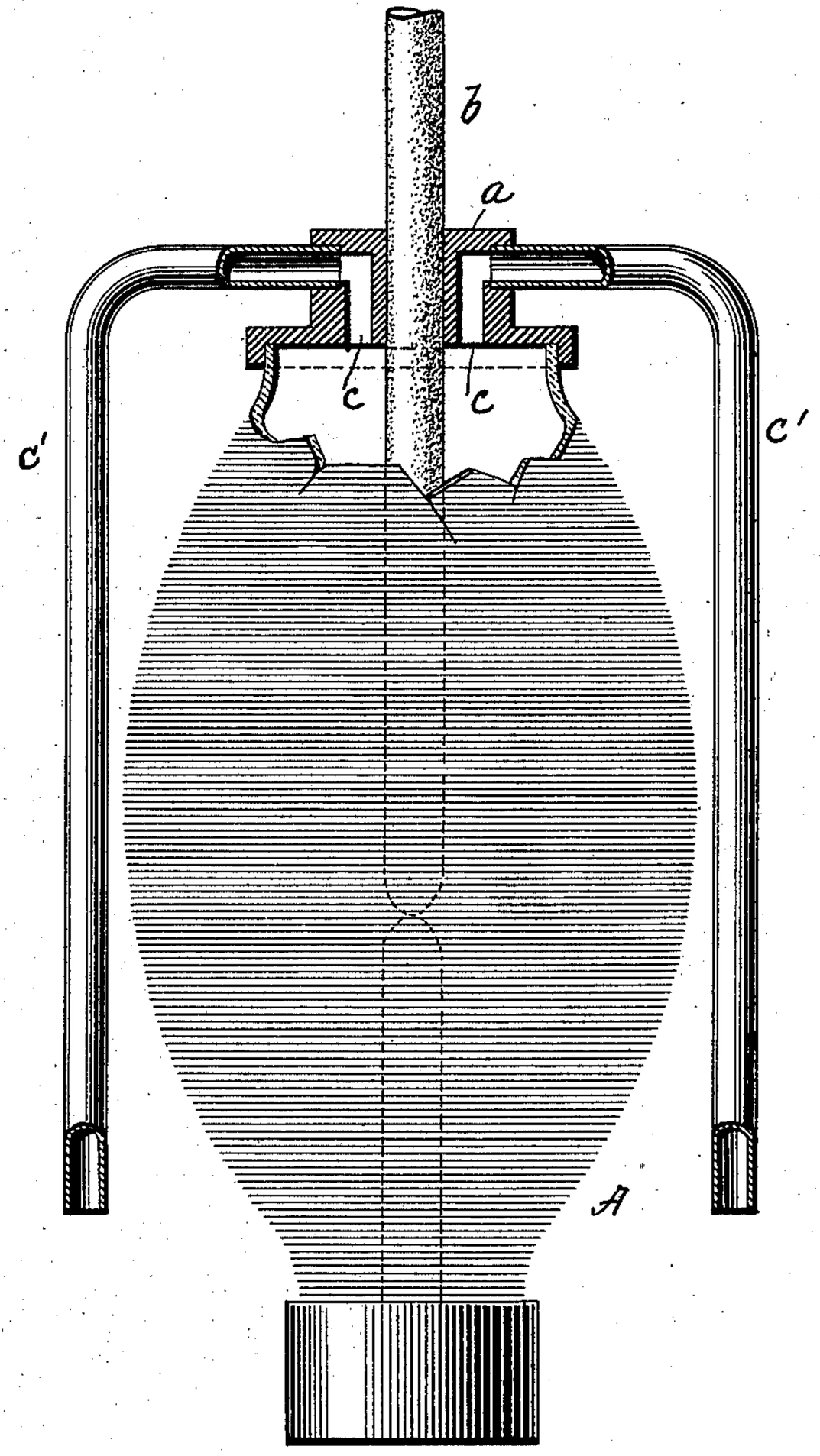
No. 698,388. Patented Apr. 22, 1902.

J. AUERBACH & F. GUBING.

ELECTRIC ARC LAMP.

(Application filed May 17, 1901.)

(No Model.)



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JULIUS AUERBACH AND FRANK GUBING, OF NEW YORK, N. Y., ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO STANLEY ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 698,388, dated April 22, 1902.

Application filed May 17, 1901. Serial No. 60,673. (No model.)

To all whom it may concern:

Be it known that we, JULIUS AUERBACH, residing in the borough of Manhattan, and FRANK GUBING, residing in the borough of Brooklyn, in the city of New York and State of New York, citizens of the United States, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a full, clear, and exact description.

This invention relates to electric-arc lamps of that class in which the arc is burned in a comparatively small transparent or translucent globe constructed to be substantially air-tight to avoid the free access of atmospheric air to the arc for the purpose of securing slow consumption of the electrodes and consequent long life of the carbons. The object of our invention is to promote the desired conditions of such lamps—that is to say, to provide a construction which will afford slower consumption of the electrodes than heretofore experienced, and consequently produce a lamp which will burn for a greater length of time without renewal of the electrodes. In the operation of these lamps gas is generated inside of the globe by the combustion or disintegration of the electrodes, and the problem is to provide a construction which will permit of the free escape of these gases and at the same time prevent the entrance of the atmosphere to the globe. To accomplish this, it has been the practice heretofore to either utilize the opening through which the movable electrode penetrates the globe or an entirely separate opening which is controlled by a mechanical valve. In either of these constructions the internal pressure of gases is relied upon to prevent the entrance of air, it being assumed that as long as the pressure inside is in excess of the pressure outside the air will to a great extent be excluded. In addition to this, however, in the second instance, that of the passage controlled by the mechanical valve, the passage is supposed to be held closed to the atmosphere until the internal pressure exceeds that of the atmosphere, whereupon the internal pressure lifts or opens the valve and allows the internal pressure to escape without admitting air, and as soon as the pressures are again substantially balanced the valve closes. Now in both of these constructions there are defects. In the first, that wherein the electrode-opening is used, the reciprocating movements of the electrode in the passage cause an irregularity in the flow of gas, there being friction between the solid electrode and the fluid gas. An inward movement of the electrode retards the outward movement of the gas and at the same time tends to carry air with it. An outward movement of the electrode promotes the escape of gas and retards entrance of air. These movements of the carbon also vary the displacement of gases within the globe, which likewise affects the pressure. The result of these actions, therefore, is that the pressure inside of the globe fluctuates and more air is admitted to the globe than would be the case if the passage was not restricted by a movable body within it. In the second instance, where the mechanical valve is used in the opening not otherwise restricted or obstructed, it is evident at once that the internal pressure of the globe will fluctuate very materially, because the weight and inertia of the valve permit the pressure to build up before it will allow it to escape, and when it finally opens the release of pressure will be correspondingly excessive. It being understood that variations of the gas-pressure affect the light and life of the carbons, it is evident that the mechanical valve arrangement is not desirable.

Now it will be seen that the defects in the operation of the two constructions described are due to the fact that the passage for the escape of the gases is, in one way or the other, restricted or obstructed and that the outer and inner pressures cannot freely and naturally adjust themselves automatically, as the burning of the arc demands. Our invention overcomes this defect; and it consists in general in providing an unrestricted escape-passage for the gases developed inside of the globe, which passage is at the same time so constructed as to provide an effectual barrier to the entrance of the atmosphere.

The details of this construction will now be fully described with reference to the accom-

panying drawing, in which the figure represents a side elevation of an arc-inclosing globe fitted with our invention.

A indicates the globe in which the arc burns. *a* is a cover-plate resting upon or attached to the top of the globe and which is provided with an orifice through which the upper or movable electrode *b* passes. The cover-plate is also provided with one or more other orifices *c c*, with which are connected tubes *c' c'*, which lead downward to a point below the cover-plate, where they are open freely to the atmosphere. The orifices *c* and the tubes *c'* furnish an unrestricted passage for the flow of gas or air, there being no moving body or valve device in or upon them to interfere with the natural flow of gaseous material between the interior of the globe and the atmosphere.

It will be seen that since in the normal operation of the lamp the pressure of the gases inside of the globe tends to be greater than that of the atmosphere there will always be a flow of the gases outward through the tubes, and since the tubes are unrestricted this flow will be natural and easy and the internal pressure will remain practically constant. It will also be seen that since the tendency of heated gases is to rise this fact together with the pressure of the gas will insure the constant presence of gas in the upper or bent portion of the passage or passages *c'*, which will just as constantly act as a bar to the inward flow of air, and air will only be admitted to the globe when the arc is not burning.

The essential feature of our invention is, in the first place, an unrestricted passage for the gases, and, in the second place, means for preventing the ingress of air through such a passage. This can be accomplished by constructions other than that described. The bent tube or tubes may enter the globe at other locations and may have other shapes; but for the purpose of preventing the ingress of the atmosphere the passage through which the gas flows should have a bend at some point or points above its outlet to the atmosphere, in which the heated gas is sure to be present during the operation of the lamp. We wish to point out further that the escape-passages need not be constructed as tubes, but may be passages formed in any part of a frame or body so long as they are unrestricted and are provided with means to bar the ingress of the atmosphere when the lamp is in operation. The passage might even be straight and have an enlargement for the collection of gases which would bar the entrance of the atmosphere. This would operate very well provided the passage was not restricted.

The best results are obtained when the passage is of sufficiently large diameter to permit of a normal outflow of the gases from the globe while at the same time of sufficiently small diameter to prevent such diffusion or mixture of air and gas as would allow air to enter the globe. When thus proportioned, the dividing-line between the gas and air in the tube or passage will shift as the relation between the inner and outer pressures varies, and the tube should therefore be long enough to prevent the dividing-line from shifting inward to a point where the atmosphere can enter the globe.

The term "unrestricted" used in this specification is intended to convey the meaning that the gaseous material flowing through said passage or passages is not interrupted or interfered with, but can flow freely and naturally in accordance with the balance of pressures.

Having described our invention, we claim—

1. An arc-lamp having the arc surrounded by a transparent or translucent substantially air-tight inclosure provided with an elongated exit-passage free from obstructions to a natural flow of the gases, whereby a normal outflow of gases and minimized diffusion or mixture with air is afforded.

2. An arc-lamp having the arc surrounded by a transparent or translucent substantially air-tight inclosure, provided with an unrestricted passage leading to the atmosphere, said passage being of such diameter and length as will permit the normal outflow of gases without diffusion and prevent the ingress of the atmosphere.

3. An arc-lamp having the arc surrounded by a transparent or translucent substantially air-tight inclosure provided with an elongated passage leading from the interior of the inclosure to the atmosphere and free from obstructions to the natural flow of the gases and leading upward from the point of its connection with the inclosure and thence downward for the purpose set forth.

4. An arc-lamp having the arc surrounded by a transparent or translucent inclosure, a cover-plate for said inclosure, said cover-plate having an orifice for an electrode and another orifice for the escape of gases developed by the arc, and a bent tube connected to the second orifice and affording an unrestricted passage for the said gases.

5. An arc-lamp having the arc surrounded by a transparent or translucent substantially air-tight inclosure, a tube connecting directly with said inclosure affording free communication with the atmosphere and leading downward from its point of connection with the inclosure.

In witness whereof we subscribe our signatures in presence of two witnesses.

JULIUS AUERBACH.
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Witnesses:
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