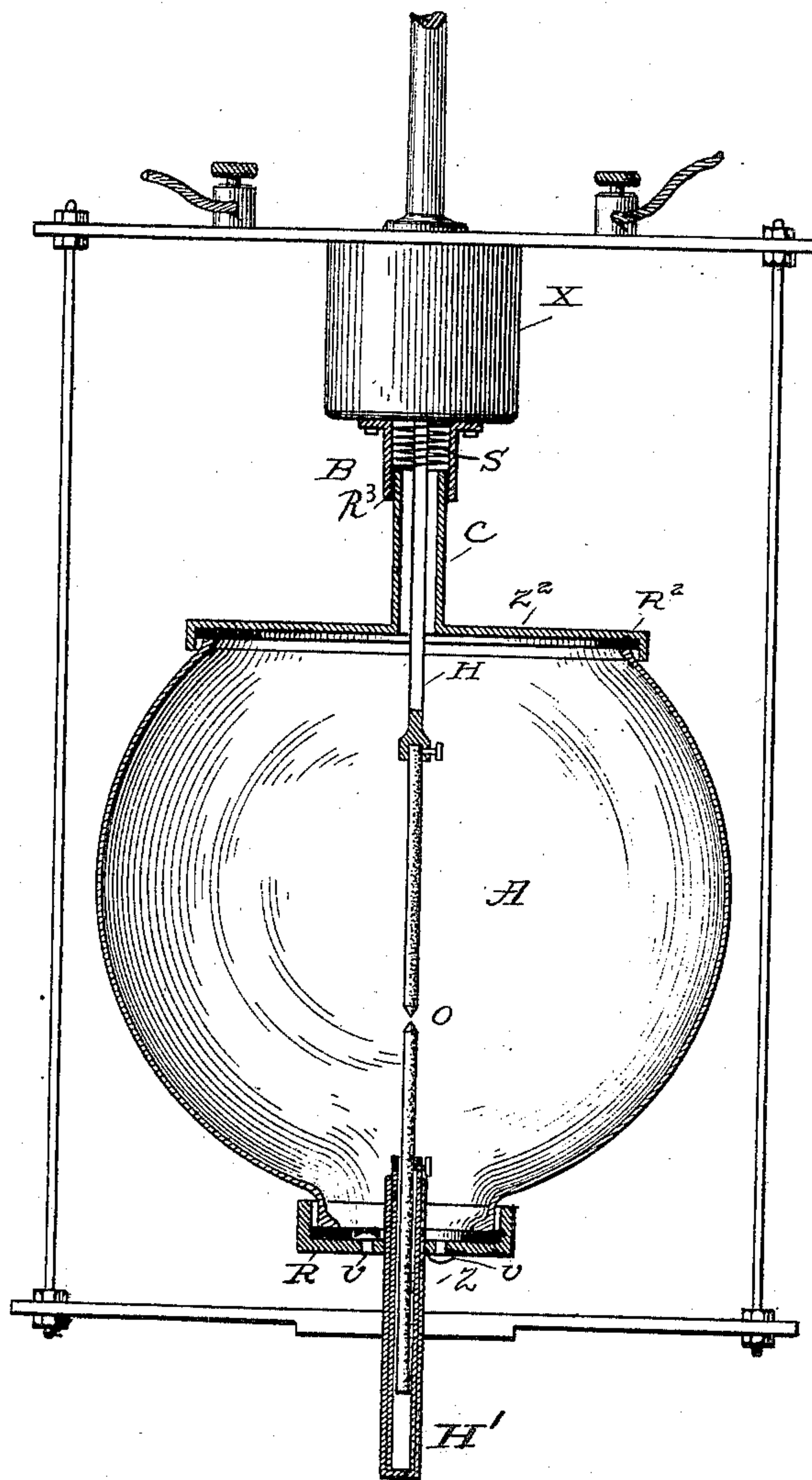


(No Model.)

S. H. SHORT.  
ELECTRIC ARC LAMP.

No. 299,025.

Patented May 20, 1884.



Attest:  
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# UNITED STATES PATENT OFFICE.

SIDNEY HOWE SHORT, OF DENVER, COLORADO.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 299,025, dated May 20, 1884.

Application filed October 26, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY H. SHORT, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful  
5 Improvement in Electric-Arc Lighting; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to electric-arc lamps; and its object is to prevent the rapid consumption of the carbons, and to produce a clear and steady light which will not be affected by the circulation of air either upon the outside or in the interior of the globe in which the electric light is formed.

15 In arc lamps as now commonly used the carbon electrodes are rapidly consumed by oxidation, due to the free access of air to the globe in which they are contained. As the light produced is not due to any appreciable extent  
20 to the combustion of the carbon, the oxygen of the atmosphere may be excluded, provided the free movement of the carbon be not interfered with, and means be found to prevent breaking of the globe by reason of the expansion of the inclosed air or other gases.

The main feature of my invention consists, therefore, in inclosing the electrodes in a globe or chamber air-tight at the bottom, and opening at the top into a chamber or box which contains the regulating mechanism by which the moving electrode is properly advanced; but  
30 this I do not broadly herein claim, as this is the subject of a separate application. I have found by practical trial that if the globe or chamber inclosing the electrodes be air-tight at the bottom and on all sides it may be open at the top to admit the passage of the electrode and its holder from the regulator box or chamber without any diaphragm or stuffing-box, or any  
40 close contact of the carbon or its holder with the walls of the tube or passage between the globe or chamber of the arc and that of the regulating apparatus; nor is it essential that the regulator-box itself should be air-tight, but it  
45 may be of ordinary construction. The arc chamber at the commencement of the work will be filled with atmospheric air. So long as any free oxygen remains in this air the carbon will be consumed, resulting in the production of carbonous-oxide gas, and this action soon terminating the oxygen of the air is replaced by a heavy carbonous-oxide gas,

which, mixed with the nitrogen, is still heavier than the air, and remains by its gravity in the arc globe or chamber. As no further oxygen  
55 is supplied, combustion of carbon ceases; but any expansion due to the heat, or to the formation of a carbonic oxide on relighting, will find relief through the passage to the regulator-box, or through valves specially provided,  
60 as hereinafter explained. Besides, the movement of the upper electrodes is perfectly free.

My present invention is limited to the means for securing free movement of the electrodes, and for avoiding fracture of the globe by reaction of expansion of the inclosed gases.

In the accompanying drawing I have shown my improved apparatus with the globe and its connections in central vertical section, the other parts being in side elevation.

In the drawing, X represents an ordinary regulator-box, containing any ordinary regulating apparatus for advancing the carbon-holder H. To the bottom of this box is attached a tubular box, B, by means of suitable  
75 flanges and packing, to form an air-tight joint. Into this tube fits a tube, C, connected to the upper cap, Z<sup>2</sup>, being connected thereto so as to be air-tight. The box B is long enough to form a guide of the tube C, which is adapted  
80 to slip therein, and is provided with a packing-ring, R<sup>3</sup>. Between the upper end of the tube and the end of the regulator-box is a spring, S, which tends to force the tube C downward, but which permits the tube to be  
85 raised for removal. The upper part of the globe A is formed with an opening, the edges of which are ground, and with a packing-ring, R<sup>2</sup>, make an air-tight joint with the cap Z<sup>2</sup>. The lower surface of this cap may be polished,  
90 if desired, and act as a reflector. The lower opening of the globe has similar ground edges, and is fitted to the lower cap by an air-tight joint, formed by the packing-ring R. The lower cap has a tubular extension, Z, which  
95 forms a lower-carbon holder, the lower end of the extension being air-tight, so that the globe is hermetically closed in the lower part. The cap, however, is provided with valves *v v*, one opening outwardly and the other inwardly.  
100 The upper-carbon holder H moves loosely in the tube C, without any such close contact as will interfere with its movement, and above this is the ordinary open box, so that the regu-



lating apparatus may cause the carbon to move as freely as in ordinary open globes.

As heretofore explained, the gases formed by combustion in the atmospheric air contained in the globe A at the beginning of the formation of the arc are heavier than the air itself, and will not, therefore, rise or escape through the thin annular passage in the tube C, and through the regulator-box, and, remaining in the globe A, prevent any access of air to support combustion of the carbon. In case of any expansion or contraction of the air or gases within the globe so sudden and great as not to find sufficient outlet through the tube C, one of the valves *v* will open, according to the direction of the pressure, and establish equilibrium without danger of breaking the globe. In practice, however, this would seldom be required, as there is sufficient vent through the tube C under ordinary circumstances.

I claim as my invention—

In an arc lamp, a globe or chamber for the arc, closed air-tight at the bottom and on all sides, a regulator above the globe or chamber, a tight tube forming a passage between the regulator and the globe or chamber, and a carbon-holder extending loosely through the said tube, whereby the gases are retained in the globe, undue pressure avoided, and free movement of the carbon secured, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIDNEY HOWE SHORT.

Witnesses:

WM. G. EVANS,  
EVAN E. EVANS.