(No Model.)

N. M. GARLAND.

ELECTRIC ARC LAMP.

No. 458,389. Patented Aug. 25, 1891.

Fig. 1.

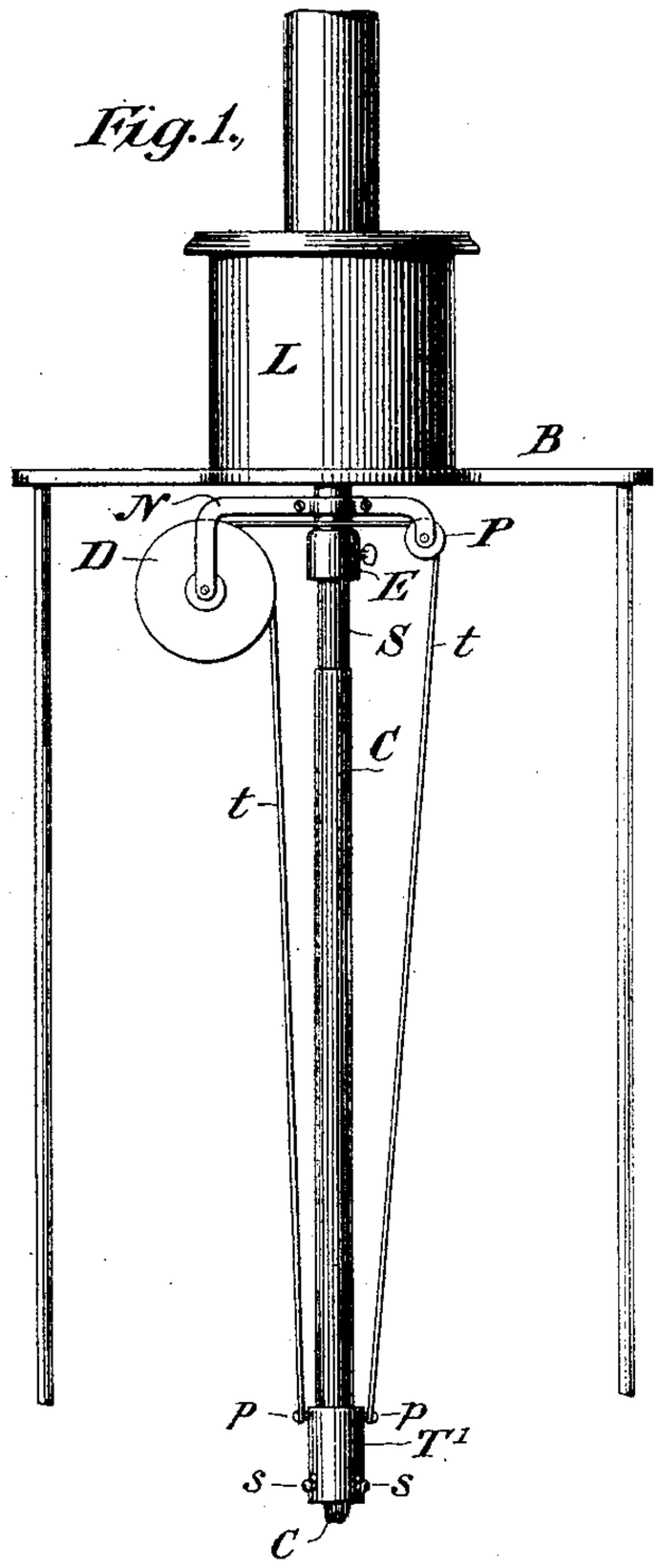

Fig. 2.

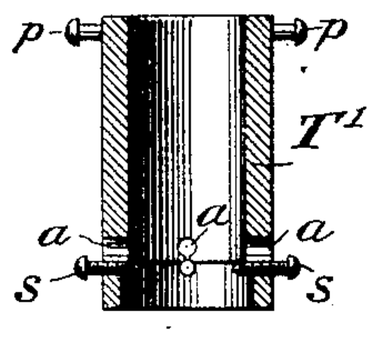

Fig. 4.

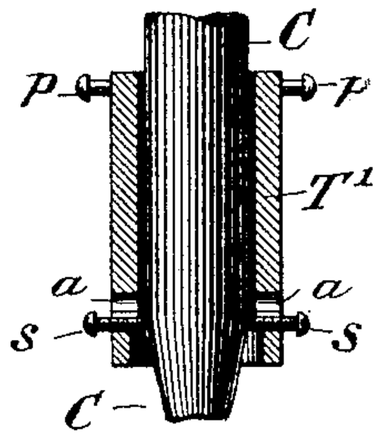

Fig. 3.

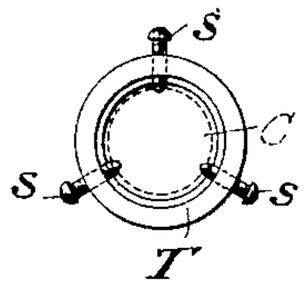

Fig. 5.

Fig. 6

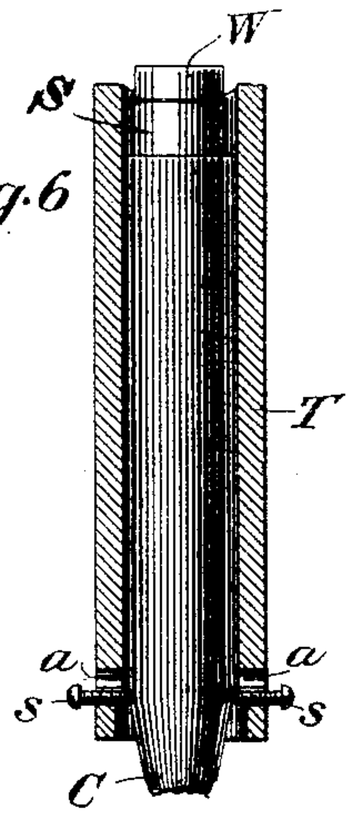

Fig. 7.

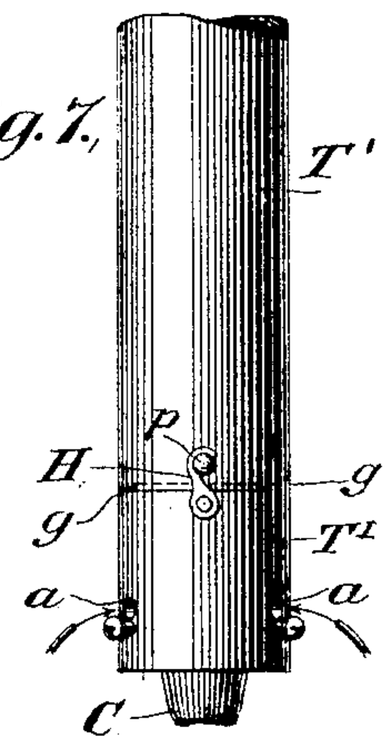

Fig. 9.

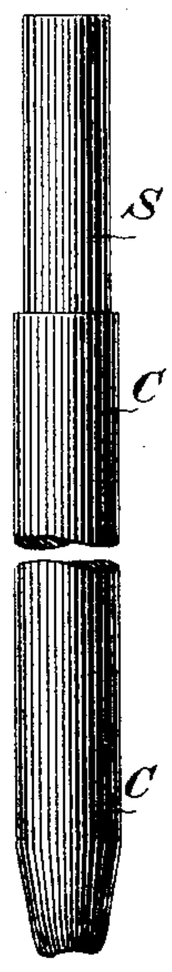

Fig. 8.

Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 458,389, dated August 25, 1891.

Application filed May 18, 1891. Serial No. 393,162. (No model.)

To all whom it may concern:

Be it known that I, NATHAN M. GARLAND, a citizen of the United States, residing at Boston, county of Suffolk, and State of Massachusetts, have made a new and useful Improvement in Arc Lights, of which the following is a specification.

My invention is directed particularly to novel apparatus for giving increased life and efficiency to arc-light carbons; and it will be fully understood by referring to the accompanying drawings, taken in connection with the specification and claims which follow.

Figure 1 of the drawings represents a side elevational view of the upper portion of any well-known form of arc lamp in which the upper carbon is fed forward as it is consumed through the agency of feeding mechanism located in a housing at the top of the lamp, one form of my improved apparatus being disclosed in connection therewith. Fig. 2 is a sectional elevational view of an arc-light-carbon protector constructed in accordance with my improvement. Fig. 3 is a plan view of the same, and Fig. 4 is a side elevational view thereof, showing a carbon in position. Fig. 5 is a sectional view of the carbon as taken on a plane through Fig. 4, in such position as to show the grooves or channels cut by the screws near the tip of the protector as the carbon is fed forward. Fig. 6 is a sectional elevational view showing the application of the invention to a positive feed-arc lamp, where the carbon is fed forward under pressure. Fig. 7 is a side elevational view of a modified form of the same. Fig. 8 is a sectional view of my improved protector provided with a modified form of feeding or regulating apparatus which supplants the screws shown in the remaining figures of the drawings. Fig. 9 is a side elevational view of my improved carbon adapted for use in connection with the apparatus illustrated in the other figures of the drawings.

Referring now to the drawings in detail, L represents a housing, such as incloses any well-known feeding apparatus for arc lights, E the carbon-carrier therefor, and C the carbon provided with a diminished shouldered end S, adapted to be held in the carbon-holder E.

T′ represents my improved apparatus for protecting the tip of the carbon and giving to the latter increased life and efficiency. Said apparatus consists of a short hollow tube having substantially the same internal diameter as that of the carbon C, which it is to protect. It is made of any highly-refractory material, preferably of some refractory metal, and is provided at its upper end with a pair of pins *p*, to which are attached cords or chains *t t*, one running over a pulley P, and both to a spring-actuated drum D, said pulley and drum being carried by a two-arm support N, attached to and moving with the carbon-carrier E. The lower end of the tube T′ is perforated in two or more places, as shown at *a a*, and pointed adjustable screws *s s* are secured in said perforations at the lower sides thereof, and adapted, when in place, to prevent the upward movement of the sleeve or tube T′, as said screws bear against the coned end of the carbon, as clearly shown in Figs. 1, 2, and 3. The interior diameter of the protecting sleeve or tube T′ should be as nearly that of the exterior diameter of the carbon C at all points above the screw-pins *s s* as possible, and is preferably larger below those pins, as shown in Figs. 2, 4, and 6, in order to admit of the free egress of the disintegrated carbon powder as the arc advances and the carbon is consumed, and also to protect the exposed end of the carbon so far as possible from the air and at the same time prevent any injurious effects upon said sleeve or tube due to the intense heat at this point. The vent-holes *a* should be directly above the screws *s s* in order to convey the air directly to the points of said pins or screws, as shown by the arrows in Fig. 7. The carbon C having been secured in place, as shown in Fig. 1, and the protecting sleeve or tube T′ located in position at the point thereof, so that the pointed screws *s s* rest against the coned end thereof with sufficient bearing to prevent the sleeve or tube T′ from being drawn upward by the cords or chains *t t* under the stress of the coiled spring in drum D, the apparatus is then in condition for operation. After the arc is established as the point of the carbon burns away the lower portion of the sleeve or tube T′ acts as a protector therefor, and at

the same time air is admitted, as shown by the arrows in Fig. 7, through the perforations *a*, above or near the points of the screws *s s*, the air impinging upon the carbon at these points and acting in conjunction with the intense heat at the carbon points to disintegrate the carbon in grooves or channels, as shown in Fig. 5, so that the sleeve is drawn forward under the influence of the spring-actuated cords or chains *t t*, as these channels or grooves are formed. Under this action the point of the carbon C assumes a regular rounded end and is protected by the sleeve or tube T′, the latter being fed forward, as already described, as the carbon is consumed.

In the modified form shown in Figs. 6 and 7 I have shown my improved apparatus in the one instance as integral with a carbon-guiding tube T, which is fixed at its upper end to some support, (not shown,) while the carbon is fed forward under the influence of a weight W, resting on its upper end. It will be understood, of course, that a spring might supplant the weight; or the carbon might be fed by its own weight, and the arc established in this form of lamp by any well-known arc-establishing device acting upon either carbon, said device not being shown.

In Fig. 7 the protecting sleeve or tube T′ is attached to the lower end of a fixed carbon-guiding tube T through the agency of a pair of hooks H, carried by the sleeve, and a pair of pins *p*, carried by the tube, the sleeve or tube T′ being shouldered at *g*, as shown, so as to insure secure alignment of the two.

In the modified form shown in Fig. 8 I show a pair of V-shaped rollers *s′ s′*, journaled in position in the perforations *a a* and adapted to perform the same function as the screws *s s*. These screws *s s* or rollers *s′ s′* are made, preferably, of platinum, iridium, or some highly-refractory metal, and are made adjustable, as shown, in order to regulate the delicacy of the feed to be transmitted to the protecting sleeve or tube.

In Fig. 9 I have shown my preferred form of carbon, which is of the usual type, save that it is made smaller in diameter at its upper end, as shown at S. I make the carbon thus of diminished diameter at its upper end, so that when the protecting sleeve or tube T′ reaches its uppermost position under the tension of the cords or chains *t t* there will be no danger of evil effects of the arc upon said sleeve or tube as the carbon is nearly consumed, by reason of the fact that the former will be drawn against the carbon-carrier E, leaving only the short end of the carbon to be consumed.

In the forms shown in Figs. 6 and 7 it will be readily understood that when the carbon is nearly consumed the diminished diameter will permit the weight W to force it forward after the screws pass the shouldered end thereof, and thus force the carbons into contact with each other, thereby acting as a short-circuiting or cut-out device.

Although I have shown the above apparatus as applicable to the upper carbon of an arc lamp, it is obvious that it might be applied to the lower carbon as well, or to both, if preferred. When used in connection with the lower carbon, the sleeve or tube T′ would of course rest by its own weight upon the upward-projecting coned end of the carbon as it consumes away, thereby permitting the sleeve or tube T′ to descend.

I do not limit myself to the specific construction of apparatus herein shown for accomplishing the results attained, as I believe it is broadly new with me to cause a portion of the heat generated at the arc to pass through one or more perforations in a carbon-retaining sleeve or tube, so as to impinge upon the carbon in advance of one or more carbon-retaining devices in such manner as to cause them to create grooves or channels in the carbon as it descends or as the sleeve ascends.

By the term "groove-forming retaining device" used in the claims I do not mean to cover a complete ring used as a retaining device which would scrape off a portion of the entire surface of the carbon; but I do mean to cover, broadly, one or more separate retaining devices, which may be either a point or points, or, at all events, one or more segments of circles which form one or more separate longitudinal grooves in the carbon as it is fed forward.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The described apparatus for increasing the efficiency and life of an arc-light carbon, consisting of a protecting-tube having substantially the same inner diameter as that of the carbon, in combination with one or more perforations or air-vents and groove-forming retaining devices extending into the path of the carbon near the lower end of the tube, substantially as described.

2. The described apparatus for increasing the efficiency and life of an arc-light carbon, consisting of a protecting-tube of substantially the same inner diameter as that of the carbon, provided at one end with adjustable groove-forming retaining devices and air-vents, one for each retaining device, substantially as described.

3. The described apparatus for increasing the efficiency and life of an arc-light carbon, consisting of a removable or detachable protecting-tube adapted to surround the tip of the carbon and provided with one or more groove-forming retaining devices and air-vents, one for each retaining device, for admitting air at the junction of the carbon and retaining device or devices, substantially as described.

4. A protector for the tip of an arc-light carbon, consisting of a hollow sleeve or tube of substantially the same internal diameter as the carbon, slightly enlarged at its lower end, and provided with perforations or air-

vents and retaining devices, the latter extending inwardly into the path of the carbon, substantially as described.

5. A protector for the tip of an arc-light carbon, consisting of a movable hollow sleeve or tube of substantially the same internal diameter as the carbon, provided with one or more adjustable groove-forming retaining devices, in combination with mechanism for giving to the protector a forward motion as the carbon is consumed, substantially as described.

6. A protector for an arc-light carbon, consisting of a movable hollow sleeve or tube of substantially the same internal diameter as the carbon and provided with two or more radial perforations and adjustable groove-forming retaining devices, substantially as described.

7. An arc-light carbon having a shouldered upper end, in combination with a carbon-protector provided with retaining devices at its lower end, substantially as described.

8. The described apparatus for automatically cutting out an arc lamp, consisting of a carbon-retaining tube having means at one end for sustaining the carbon against movement, a carbon located in said retaining-tube having a diminished upper end, and a lower carbon in alignment therewith, whereby when the retaining means reach the diminished portion of the carbon it will drop through and short-circuit the lamp, substantially as described.

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Witnesses:

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