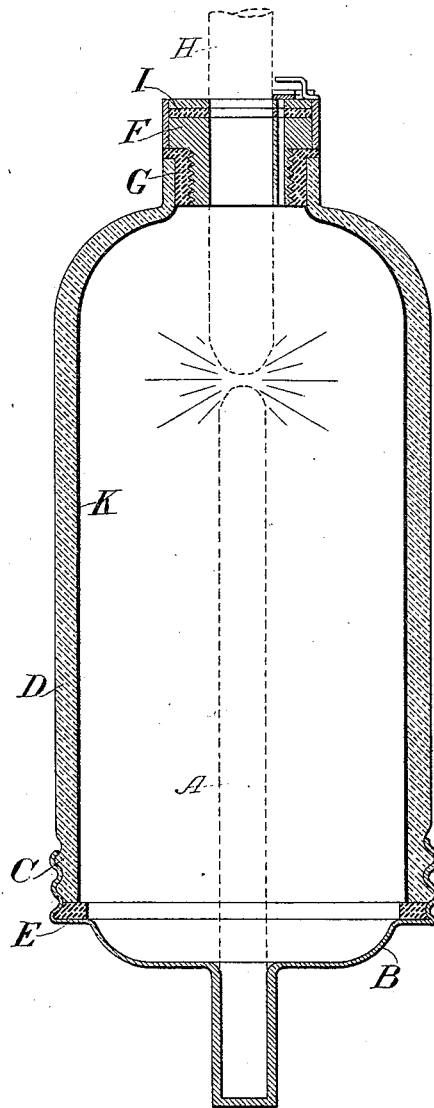


(No Model.)

L. E. HOWARD.
ELECTRIC ARC LAMP.

No. 520,991.

Patented June 5, 1894.



Witnesses
H. W. Lloyd
John P. Nordstrom

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UNITED STATES PATENT OFFICE.

LOUIS E. HOWARD, OF PLAINFIELD, NEW JERSEY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 520,991, dated June 5, 1894.

Application filed August 19, 1893. Serial No. 483,518. (No model.)

To all whom it may concern:

Be it known that I, LOUIS E. HOWARD, a citizen of the United States, residing in Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention relates more particularly to electric arc lamps, its object being to create an agreeable diffusion of the light furnished by the arc by surrounding it with a translucent medium which will obstruct but a small portion of the luminous rays, and to increase the amount of light emitted. Some features of the invention are applicable also to incandescent lamps.

In carrying out my invention I surround the light-giving portion of the lamp with a glass or other transparent inclosing chamber, which in the case of an arc lamp will be preferably made substantially air-tight, and expose the walls of this chamber to certain metallic vapors, by which process it is uniformly coated with a thin film of a metallic oxide or other compound which will on transmission of light therethrough create uniform diffusion, and when the containing envelope is sufficiently small will be rendered phosphorescent or self-luminous.

The several features of novelty of the invention will be more particularly hereinafter described and will be definitely indicated in the claims appended to this specification.

In the accompanying drawing which illustrates one way of carrying out the invention, the figure shows a sectional view of an inclosing chamber embodying my improvement surrounding an arc.

The invention may be applied to an arc lamp of any construction, but is especially adapted to such a lamp as described in Patents Nos. 503,538 and 503,539, granted to me on the 15th day of August, 1893, in which the arc is maintained in a substantially air-tight inclosing envelope. It will be unnecessary to describe in detail all the features involved in such a lamp, it being sufficient to state briefly that the positive carbon is fed through a comparatively close fitting feed opening in the upper portion of the inclosing envelope, the envelope being tightly closed at all other points, thus preventing ingress of air to the

arc. For example, in the accompanying drawing the negative electrode A is mounted in a metallic socket B provided with a flange C screwed upon the lower part of a glass or other transparent envelope D, a washer of asbestos or other suitable material E being interposed to make an air-tight joint. In the top of the envelope is placed a metallic plug F firmly secured by a washer G of asbestos to prevent fracture of the glass and provided with a central opening forming a comparatively close fit for the positive carbon H. In the top of the metallic plug F may be secured an annular washer of soft asbestos I which engages the carbon with sufficient firmness to practically prevent the entrance of air and yet admits of an easy descent of the carbon H as it is consumed by the arc. The regulating mechanism by which the positive electrode is fed to the arc is not shown in the drawing and may be of any approved pattern. The envelope D is preferably made small in size in order to increase the luminosity of the gases surrounding the arc, as described in my prior patents above referred to, as also to render the coating phosphorescent or self-luminous, as hereinafter more fully described.

My present invention relates to a treatment of the wall of the inclosing envelope, as, for example, D, by which a soft and thoroughly diffused light may be emitted from the lamp. This treatment consists in producing preferably upon the inner wall of the envelope a deposit of some comparatively opaque material, such as a metallic oxide or other compound, which will be so small in depth as to admit of an easy passage of the light but will thoroughly diffuse the same. This deposit may be made in any suitable way but will preferably be produced by primarily exposing the envelope prior to its use in the lamp to metallic fumes or vapor. I find that excellent results are yielded by exposing it to the vapor of magnesium in the presence of air, by which a thin coating of magnesium oxide is deposited upon the inner wall of the envelope, as indicated at K in the drawing, which firmly adheres to it, and when the envelope so treated surrounds the arc produces a soft and agreeable light. The invention, however, is not restricted to the use of

magnesium, as other metals will yield more or less perfect results. It is an ascertained fact that the oxides of certain metals, among which are magnesium and zinc, grow luminous or phosphorescent under a comparatively low degree of heat, and that the spectra of these oxides contain a much greater proportion of luminous waves than those of other metals. When such oxides are used, therefore, a larger proportion of the energy developed by the arc becomes sensible to the eye as luminous waves than would be the case with other oxides. The proportion of luminous energy thrown off from an arc formed between carbon electrodes to the whole amount of energy developed in the arc is comparatively small, and as this ratio is inherent in carbon no considerable increase in the amount of luminous waves emitted can be expected from this material. As the ratio is much higher with oxide of magnesia the amount of luminous energy thrown off may under certain circumstances be considerably increased by producing a proper working relation between the oxide and the heat developed by the arc. The deposit might in some cases be produced by priming the electrodes when the lamp is started with a small quantity of the metal to be used for forming the deposit; its volatilization by the heat of the arc will be followed by a finely divided deposit on the inside of the inclosing envelope which, in the case of such metals as magnesium, will be in the form of oxide by reaction with the oxygen of the air. I prefer, however, to coat the envelope prior to its assemblage with the lamp, as by such treatment a more uniform product may be obtained.

Although the envelope will be preferably small in size so as to produce a highly heated and opalescent condition of the inclosed gases, as well as the coating, the coating herein described may be applied to larger envelopes or globes with excellent results, rendering them translucent and capable of diffusing and softening the intense luminosity of the

arc. Such a coated inclosing envelope when made small in size, say, three inches or less in diameter, as prescribed in my patents aforesaid, not only acts in the capacity of a translucent screen, softening the light, but the high heat of the inclosed gases renders the coating more or less self-luminous or phosphorescent, and thus increases the quantity of light emitted. This phosphorescence is more marked with some metals than with others. With magnesium oxide it is not so great in degree, for example, as with zinc oxide, which latter becomes self-luminous at a much lower temperature and may in some cases be preferred on this account. The coating hereinbefore described may also be applied to the containing envelope of an incandescent lamp, and especially such coatings as zinc oxide, which become self-luminous at a comparatively low temperature, but in such cases the interior wall of the envelope should be comparatively close to the filament or incandescent portion of the lamp, so that the heat thereof may produce the desired effect.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electric lamp having its burner or source of light surrounded by a transparent envelope coated with a deposit of translucent metallic oxide.
2. An electric lamp having its burner surrounded by a transparent envelope primarily coated with a thin translucent layer of a metallic compound of the character described.
3. An arc lamp having its arc surrounded by a transparent envelope coated with a deposit of magnesium oxide.

In testimony whereof I have hereunto subscribed my name this 17th day of August, A. D. 1893.

LOUIS E. HOWARD.

Witnesses:

LOUIS B. MARKS,
C. RANSOM.