May 21, 1929. L. DEL RICCIO 1,714,242

REFLECTOR ARC

Filed April 19, 1927

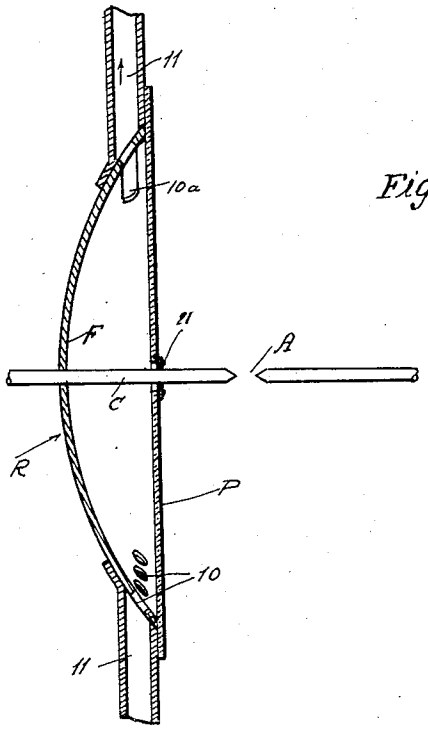
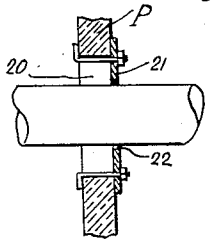


Fig. 1.

Fig. 3.



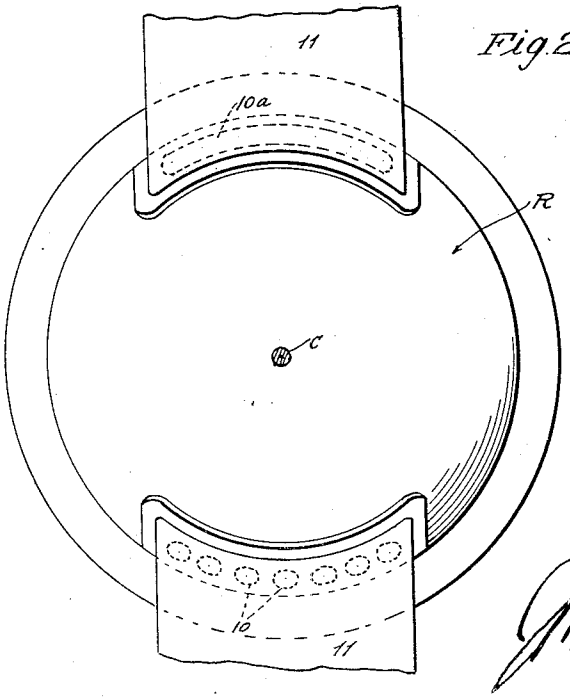


Fig. 2.

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UNITED STATES PATENT OFFICE.

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REFLECTOR ARC.

Application filed April 19, 1927. Serial No. 184,854.

This invention has to do with illuminating sources such as are used in motion picture and other projectors and in other situations where high intensity of illumination is necessary. Although the invention is not necessarily limited to use in motion picture projectors, its utility and its inventive objects and corresponding accomplishments may perhaps be best understood from a consideration of the invention as applied to motion picture projection.

Various factors have caused desirability of high illumination intensity, and at the same time it is economically desirable to keep down current consumption. The most economical form of electric light for the purpose is the arc light; but the intense heat generated in such a light has occasioned difficulties. Although arcs equipped with reflectors are now in use, the large majority of projectors employ a condensing lens placed in front of the light. The condensing lens can be somewhat protected against great heat, but it has the disadvantage of receiving only a small portion of the light generated by the arc. The reflector behind the light can be made to receive a much larger proportion of the generated light, but the reflectors as now commonly in use are exposed to the intense heat and are also exposed to the arc "sputter", which, within a short time, necessitates renewal or refinishing of the reflector.

The primary object of this invention is to provide a reflector which although it may be used with any kind of light source, is peculiarly adapted to use with an arc, the reflector being protected from the heat of the arc and also protected from its sputter. The result of the invention is the production of an illumination source with which a high intensity of illumination can be attained and which is also very economical of current consumption.

All of this will be best understood from the following detailed specification of a preferred form and arrangement embodying the invention, reference for this purpose being had to the accompanying drawings, in which:

Fig. 1 is a vertical central section of my improved reflector arc;

Fig. 2 is a rear elevation of the same; and

Fig. 3 is an enlarged detail of parts of the section of Fig. 1.

In the drawings let A designate the arc or other source of light. Typically this source of light will be an electric arc and typically one carbon C may project through the parabolic or other shaped reflector R so that the carbons will present a light obstruction as small as possible. Assuming that the light source is located at or near the focus of the reflector surface, the reflector may then be constructed to obtain as wide a light receiving angle as is practicable and yet keep the source of illumination and heat a little distance in front of the reflector cover-plate P. In practice I find it perfectly feasible to make the reflector occupy an angle of about 120° around a source of illumination, thus giving a light receiving and transmitting surface of several times the effective area of an average condensing lens.

A reflector for projection purposes should form a parallel or nearly parallel beam of light; and in order to concentrate that beam of light either upon a motion picture film or upon an optical system of lenses of reasonable size, the reflector itself should not be very large. That fact and the desirability of making the reflector include a large angle around the source of light puts the reflector close enough to the source of light that, as usually used, the reflector soon becomes deteriorated by the heat and the reflective surface also becomes pitted with the carbon emanations and sputter of an arc.

To overcome these difficulties I provide reflector R with a cover plate P of some suitable material. I prefer a plate of quartz for this purpose, as it can be placed very close to the arc without danger of softening or melting and it is also immune to deterioration by the arc sputter or by the carbon deposit coming from the arc. However, a suitable plate of glass may be used, especially if the glass be of rather high softening or melting point; and a physically hard glass is to be preferred. Such a glass plate may in time become clouded with a deposit of fine carbon particles, but they can be cleaned off or a new glass plate substituted very easily.

The glass plate closes the front of the reflector; and in the space thus enclosed within the reflector I pass a ventilating current of some suitable fluid, either gas or liquid, to keep the reflective face F cool enough to prevent deterioration. I find it fully effec-

tive to use air as the ventilating and cooling fluid. Near its upper and lower edges the reflector may have a series of ventilation openings 10 and ventilation ducts 11 are arranged to communicate with those openings. The ventilating air may be put in at the bottom and taken out at the top by any suitable ventilating machine, as for instance by a small blower, the air being moved through at sufficient velocity and therefore in sufficient quantity to keep down the temperature of the reflector and also incidentally to keep down the temperature of cover plate P.

In some cases it may not be necessary to provide a forced draft through the reflector space. If the heat intensity of the light source is not very great natural air currents set up by convection upwardly through the reflector may be sufficient to carry off the heat. However, when using a high intensity arc I find it desirable to provide artificial draft. In any case the upper ventilation openings 10 should be larger than the lower ones, to insure that no large pressure will develop behind plate P and to take care of that expansion of the cooling fluid. I show the upper opening as a slot 10^a.

To provide that the carbon C does not come in contact with plate P, that plate may have a comparatively large opening 20 which may be closed by a washer 21 of mica or other suitable substance. This washer may have a central opening 22 around the carbon, the size of the opening, if desired, being gauged to pass a current of air out around the carbon to blow the arc flame away from the plate.

A reflector protected as I describe is wholly immune to any of the usual deteriorative influences; and it is therefore unnecessary that the initial construction of the reflector itself be limited in the least by considerations of heat resistivity, the reflector can therefore be constructed solely with a view to obtaining the highest light efficiency.

Broadly speaking, liquids instead of gases may be used for circulation in the reflector space. Where air or other gas is used as a cooling medium, the refraction is small enough that it need not be taken into account in the figuring of the reflector, and the cover plate may be plane. But if it should be desirable to use a liquid as a cooling medium, as it may be if the reflector were made especially small and placed very close to a very high powered arc, then the refraction due to the liquid itself can be offset by a proper compensatory figuring of the reflective surface, or by using a lens shaped transparent plate instead of the plane plate P.

I claim:

1. A light reflector comprising a reflective member having a concave reflecting surface, a plate of transparent heat resisting material covering the front of the reflector, and means for conducting a cooling fluid through the space enclosed by the reflector and said plate.

2. A light reflector comprising a reflective member having a concave reflecting surface, a plate of transparent heat resisting material covering the front of the reflector, and means for conducting cooling fluid through the space enclosed by the reflector and said plate, said means comprising ventilation openings near the upper and lower edges of the reflector and ventilation ducts communicating with said openings.

3. A light reflector comprising a reflective member having a concave reflecting surface, a plate of transparent heat resisting material covering the front of the reflector, the plate being plane and of uniform thickness, and means for conducting a cooling fluid through the space enclosed by the reflector and said plate.

4. A light reflector comprising a reflective member having a concave reflecting surface, a plate of transparent heat resisting material covering the front of the reflector, the plate being plane and of uniform thickness, and means for conducting a cooling fluid through the space enclosed by the reflector and said plate, said means comprising ventilation openings near the upper and lower edges of the reflector and ventilation ducts communicating with said openings.

5. In combination with an arc, a concave surfaced reflector located behind the arc, a transparent plate of heat resistant material covering the front of the reflector and also located behind the arc, and means for passing a cooling fluid through the space enclosed between the reflector and the plate.

6. In combination with an arc, a concave surfaced reflector located behind the arc, a transparent plate of heat resistant material covering the front of the reflector and also located behind the arc, and means for passing the cooling fluid through the space enclosed between the reflector and the plate, said means comprising ventilation openings near the upper and lower edges of the reflector.

7. In combination with an arc, a concave surfaced reflector located behind the arc, a transparent plate of heat resistant material covering the front of the reflector and also located behind the arc, and means for passing the cooling fluid through the space enclosed between the reflector and the plate, said means comprising ventilation openings near the upper and lower edges of the reflector, and ventilation ducts leading to and from said ventilation openings and adapted to direct a forced draft through said reflector enclosed space.

8. In combination with an arc, a concave surfaced reflector located behind the arc, a

transparent plate of heat resistant material covering the front of the reflector and also located behind the arc, and means for passing a cooling fluid through the space enclosed between the reflector and the plate, a carbon of the arc extending through the plate, and the plate being provided with an opening around the carbon to pass a fluid stream for blowing the arc flame away from the plate.

9. In combination with an arc, a concave surfaced reflector located behind the arc, a transparent plate of heat resistant material covering the front of the reflector and also located behind the arc, and means for passing a cooling fluid through the space enclosed between the reflector and the plate, the plate having an opening directing a fluid stream at the arc to blow its flame away from the plate.

10. In combination, a reflector, electrodes adapted to produce an arc, and a transparent plate of heat-resistant material interposed between said reflector and said arc.

11. In combination, a reflector, electrodes adapted to produce an arc, a transparent plate of heat-resistant material interposed between said reflector and said arc, and means for conducting a cooling fluid through the space between said reflector and said plate.

12. In combination, a reflector, electrodes adapted to produce an arc at a point spaced from the reflector, a transparent plate of heat-resistant material interposed between the arc and the reflector, the space between the plate and the reflector being in communication with the space exterior for passage of a cooling fluid through said space between the plate and the reflector.

In witness that I claim the foregoing I have hereunto subscribed my name this 25th day of March, 1927.

LORENZO DEL RICCIO.