

lation means tending as far as possible to protect the iris shutter apparatus, and particularly the adjustable segments thereof, from damage by heat and by dissipating to a maximum extent the heat transmitted to it in any way. For this purpose there is shown a fan or blower apparatus 37 having an outlet duct 38 directed generally toward the front side of the iris apparatus as particularly shown in Fig. 1. It will be understood that the casing 5 will be provided with suitable ventilation ports, permitting the escape of the heated air.

It is contemplated, however, in accordance with the present invention that the blower 38 or any blower means which can reasonably be provided will be inadequate completely to protect the iris shutter apparatus and particularly the adjustable segments thereof from heat damage, especially when the iris shutter is completely closed and while the source of light remains in full operation. This is due to the fact that much of the heat is transmitted from the light source to the iris shutter apparatus, and particularly to the adjustable segments thereof, in the form of radiant heat energy, the rays of which are focused upon these segments by the ellipsoidal reflector 9. It will further be understood that any ventilation provided cannot in any way interfere with the transmission of radiant heat to the iris shutter apparatus, even though such ventilation may be effective in tending to cool the iris shutter apparatus once it has been heated, or to dissipate heat which has first been received by such apparatus by radiation or otherwise.

In order adequately to protect the iris shutter apparatus, particularly when the iris is completely closed, there is provided in accordance with the present invention a heat absorbing shutter indicated generally at 39. This heat absorbing shutter is preferably movable to and from a position to intercept radiant heat flow from the light source to the sensitive portions at least of the iris shutter apparatus, i. e. the adjustable segments thereof. As such, the shutter 39 may be substantially circular in shape, conforming in its diameter to the maximum dimensions of the segments of the iris shutter apparatus when the latter are closed, or being slightly larger, so as to protect some of the outwardly disposed portions of the iris shutter apparatus.

This shutter 39 may be formed as a metallic disc 40, coated or covered with a suitable heat absorbing medium or composition 41, which may be an asbestos sheet or some equivalent heat resistant material. As particularly shown herein, tab portions 42 extend integrally from the metallic plate 40 and may be bent over portions of the periphery of the composition 41 to hold it in place.

While it is conceivable that the heat absorbing shutter generally indicated at 39 may be mounted for movement into and out of an iris protecting position in any suitable way, there is provided as particularly disclosed herein a mounting in which this heat absorbing shutter is carried rigidly by an arm 43 pivoted at 44 on a fixed axis parallel to the light axis of the apparatus, i. e. parallel to the rods 13 and 35. As such the shutter is movable between the three positions 39a, 39b and 39c shown in Fig. 2.

It is important in an apparatus of this kind that the shutter 39 be prevented from interfering with the flow or path of light through the iris when the latter is open at any one of its open adjusted positions. For this reason it is pref-

erable to provide some interlocking means, preferably mechanical in nature, between the iris adjustment means hereinabove described and the means for operating the shutter 39. A preferred arrangement is that shown in the drawings, wherein the shutter 39 is mechanically and manually operated by the same means by which the iris is adjusted, so that the operation of the iris and of the shutter 39 are necessarily coordinated at all times. As shown a link 45 is provided connecting a point 46 on the arm 43 with a point 47 on the link 24 as shown.

The arrangement and geometry of the linkage is best shown in Fig. 2, wherein the link 45 is shown in three positions at 45a, 45b and 45c respectively, these positions corresponding to the positions of other parts having the letters a, b and c respectively associated therewith. Thus when the iris is completely closed with the parts in the "a" position shown in Fig. 2, the shutter 39 will occupy a position substantially concentric with the iris and will protect it completely from damage by radiant heat from the light source. As the handle 27 is rotated clockwise as seen from the right in Fig. 1, so as to rotate the rod 26 clockwise as seen in Fig. 2, the shutter 39 is first moved rapidly to the right as seen in Fig. 2, so as to displace it from alignment with a path of light through the iris even when the latter is open to a minimum operative extent. As a practical matter at the time the iris is opened to an inside diameter of approximately 1/4" or somewhat less, the shutter 39 is completely out of alignment with the path of light through the iris opening and is moving toward the position 39c, i. e. intermediate the positions 39a and 39c shown in the drawings, Fig. 2. As the iris is further opened, and at the time it is opened at the "b" position shown in the drawings, the shutter 39 has been moved to its extreme right-hand position shown at 39b. As the iris is further opened, to its extreme open position shown for example in Fig. 3, the shutter 39 is moved to the left (as seen in Figs. 2 and 3) from its extreme right hand position and to the position 39c shown in full lines in Fig. 3 and in dotted lines in Fig. 2. Even at this intermediate position in the extreme amplitude of movement of the shutter 39, it is completely out of alignment with all light passing through the fully opened iris shutter. The reverse operation occurs upon the closing of the iris, so that upon the initial closing movement of the crank arm 25, for example from the position 25c to the position 25b, the shutter 39 moves from position 39c to the right as seen in Fig. 2 to position 39b. Further movement of the crank arm 25 from position 25b to position 25a results in movement of the shutter 39 from position 39b, to the left as seen in Fig. 2, to position 39a, thus protecting the iris, or at least the sensitive parts thereof, to a maximum extent consistent with the use of the device with various diameters of the iris openings.

While there is herein shown and described but one preferred embodiment of the present invention, the principles have been pointed out in a manner from which it will be apparent to those skilled in the art how many equivalent constructions could be made embodying the present invention and attaining the objects thereof. I do not wish to be limited, therefore, except by the scope of the appended claims, which are to be construed validly as broadly as the state of the prior art permits.