Dec. 20, 1927. 1,653,053

E. LYNDON

OPTICAL REFLECTOR

Filed April 7, 1923

Fig.1.

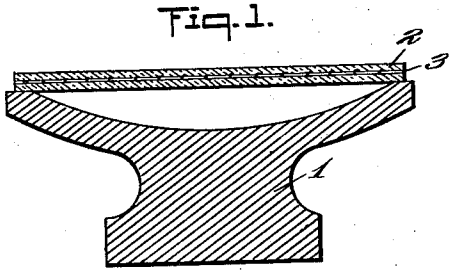
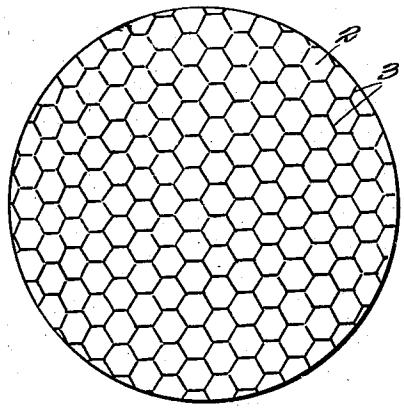


Fig.2.



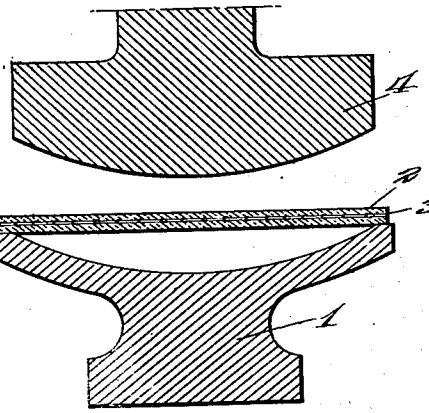


Fig.4.

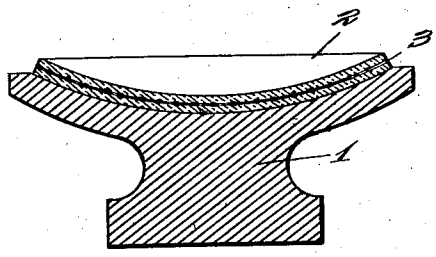


Fig.3.

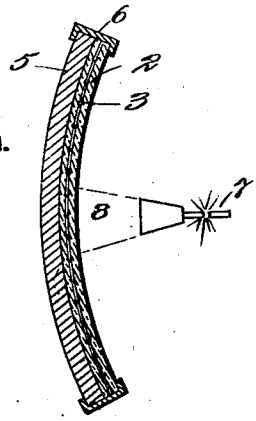


Fig.5.

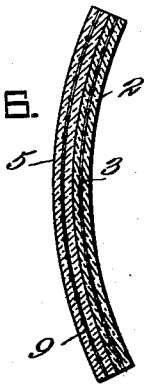


Fig.6.

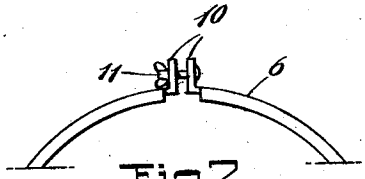


Fig.7.



Fig.8

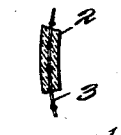


Fig.8.1

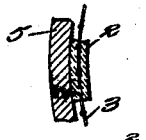


Fig.8.2



Fig.8.3

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UNITED STATES PATENT OFFICE.

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OPTICAL REFLECTOR.

Application filed April 7, 1923. Serial No. 630,536.

My invention relates to optical reflectors which comprise a shell or support of reinforced glass having a reflecting surface, and, more particularly, to reflectors wherein the glass is reinforced by wire mesh imbedded therein.

One object of my invention is to enable the reflector to retain its function when the glass cracks under the action of excessive heat, or from mechanical causes, such as concussion and other violent effects.

Another object is to prevent shattering of the glass, should the reflector be pierced by a bullet or exposed to the effects of gun fire, and to hold the fractured segments together in such an eventuality, preserving their relative positions and original form.

A further object of my invention is to minimize the chance of cracking of the glass from the effect of excessive heat, by facilitating the distribution of heat throughout the shell, or support, through heat conductors; and by reducing the temperature of the reflector thereby at any point of heat concentration; and by further reducing this temperature in providing readily radiating means for the heat thus conducted out of the shell or support.

A still further object of my invention is to combine a form of strengthening of the glass shell itself with a form of reinforcing applied to the back of said shell, so that each transversal section of the glass shell is supported at two points, instead of having a single support on the back, as now practised. This greatly increases the efficiency of the reinforcing means, my method of reinforcing being somewhat analogous to supporting a beam at two points in lieu of supporting it at one end.

Other objects of my invention will appear from the detailed description thereof which follows.

Referring to the drawings, Figures 1 and 2 are a front and a top view, respectively, of the glass support and the mould before the glass is shaped into the required form; Figure 3 is a front view of the same mould and glass support after the glass is shaped into the required form; Figure 4 is a front view of the glass support and the mould before shaping the glass, according to another method used in my invention; Figure 5 is a sectional view of the optical reflector in position; Figure 6 is a sectional view of one form of my reflector; Figure 7 is a detail of the ring encircling one form of my reflector; Figures 8, 8^1, 8^2, 8^3 are fragmentary sectional views of several forms of reflectors.

Referring more particularly to Figures 1, 2 and 3, 1 is a mould or dish made of suitable material having a top surface shaped to conform with the desired form of the glass shell of the reflector; 2 is a glass support which, in Figure 1, is a flat plate, and, in Figure 3, curved to the shape of the mould; 3 is a wire mesh imbedded in the glass.

In Figure 4, the elements 1, 2 and 3 are identical with the corresponding elements in Figure 1, while 4 is a supplementary portion of the mould having a bottom surface shaped to conform with the external surface of the reflector, the top surface of the portion 1 being shaped to conform with the back of the glass shell of the reflector.

In Figure 5, 2 is the glass shell, and 5 any form of backing provided for this shell; 3 is the wire mesh imbedded in the glass; 6 the ring encircling the shell; all in cross section. The reflector is in position before the source of light which is schematically indicated by 7; 8 is the region of the reflector within which the light from 7 does not penetrate.

In Figure 6, the backing of the glass shell, 5, is reinforced by a wire mesh 9, while the glass is reinforced with the wire mesh 3.

Figure 7 is a fragmentary view of the ring 6 with its flanges 10 and screw 11 to hold the ring in position and make the necessary adjustments therefor.

Referring to Figures 8, 8^1, 8^2 and 8^3, 5 is the backing for the glass shell, this backing being provided with a reinforcing wire netting 9 in the type 8^3; 2 is a section of the glass shell, which is reinforced with a wire mesh in the types 8^1, 8^2 and 8^3.

In the practice of my invention, I lay a slab of wire glass on the dish or mold, as shown in Figure 1, after which the mould with the slab of glass is placed in a heating oven, where the glass is heated until it softens and sinks into the depressed top of the mould. Then the temperature of the oven is gradually decreased until it reaches the normal room temperature. The glass shell is then removed, ground and polished on both of its surfaces, and ground along its periphery, the latter process including the grinding of the strands of wire imbedded in the glass, to form a smooth edge. The succeeding steps in preparing the finished

article do not differ from the well known practice and need not be mentioned, except to say that the glass, after being silvered on the convex surface, may be supplied with any of the known forms of backing, among such forms being the reinforced types, both with, and without, metal or similar strengthening layers.

Another method which I may use in the practice of my invention involves the two-part mould shown in Figure 4. In this case, both parts of the mould are heated before the glass is placed in the mould, and the slab of wire glass is also heated prior to placing it, sufficiently so to render it plastic. Then the two heated parts of the mould are brought together under pressure, forcing the glass to assume the desired shape, the two parts of the mould being kept at the requisite distance to insure the proper thickness for the glass shell. This shell is then removed from the mould and placed in an annealing oven. The succeeding steps are the same as in the first described process.

In one form of my invention, I may add an encircling ring 6, to the finished reflector. This ring is made of metal, either split at one point, or made in two halves, the split ends in either case having flanges, 10, which may be brought together by means of screws 11, so as to make a close fit of the ring along the periphery of the reflector and, at the same time, bring the ends of the wire strands along the edge of the glass shell into contact with the metal ring, for purposes explained further below.

The function of the wire mesh imbedded in the glass is twofold. First, it serves to prevent disintegration of the reflector in the event that the glass is shattered, either because of the effect of excessive heat emanating from the source of light, or from concussion, vibration, and the like, or, during military operations, from a shot piercing the reflector, the wire mesh holding the shattered segments together. Equally important is the second function of the wire mesh, namely, its action in conducting the heat from point to point, and, particularly, from points of concentrated heat to other points not so much affected by heat. For instance, the region 8 of Figure 5, within which the light of the source 7 does not penetrate directly, is also less affected by the heat emanating from this source of light, as compared with the region outside the cone 8. This inequality of heat effects is so well known that in some cases it is advisable to supply this region with a heating surface to equalize the strains in the glass. The wire mesh conducts the heat from the overheated region outside of the cone 8 to the region inside the cone, thus effecting a more even distribution of heat and, therefore, of strains in the glass.

The heat conducting function of the wire mesh embedded in the glass is further enhanced in one form of my invention, viz, the type of reflector comprising the encircling metal ring. This ring, being in contact with the wire mesh, as explained above, serves to conduct the heat out of the reflector through radiation.

The efficiency of the reinforcement embedded in the glass, as compared with a reinforcement on its back, will now be explained. Consider an elementary segment of the glass shell, such as, for instance, illustrated in the four Figures 8, in its relation to the adherent backing and to the reinforcing metal strands. Assuming that the backing is a tenacious, adhesive material, the elementary segment is held in place (with more or less effect according to the nature of the backing) at one end only, like a beam supported at one end. On the other hand, in my invention, the elementary segment is held in place at, or near, its center, as illustrated in Figure 8′. It needs no argument to see that the latter method is by far more effective in holding the segment in place. The two methods may be combined, as is illustrated in Figures 8^2, 8^3, in which case the segment is supported at two points, corresponding to a beam supported at two points, against the end supported beam of Figure 8, to apply the simile further. Thus, the wire mesh embedded in the glass may act as an independent reinforcing means, or, when combined with a reinforced back, co-operate with the latter in a well known and understood mechanical way.

Having described my invention, I claim:

1. In an optical reflector, the combination with a transparent vitreous body having a reflecting surface, of reinforcing means embedded in said body and adapted to conduct heat therethrough, and a heat radiating member in contact with said means.

2. In an optical reflector, the combination with a transparent vitreous shell having a reflecting surface, of a wire mesh embedded in said shell and substantially parallel to said reflecting surface and a heat radiating member in contact with said wire mesh.

3. An optical reflector comprising a transparent vitreous body having a reflecting surface, a backing therefor, and heat conductive reinforcing means embedded in said vitreous body and operatively connected with said backing.

4. In an optical reflector, the combination with a transparent vitreous body having a reflecting surface, of a reinforcing back therefor, and reinforcing means embedded in said body and connected with said back along the periphery of said reflector.

5. In an optical reflector, the combination with a transparent vitreous shell having a

reflecting surface, of heat conducting means embedded in said shell, and a heat radiating member in contact with said heat conducting means.

6. In an optical reflector, the combination with a transparent vitreous body having a reflecting surface, of heat conducting means embedded in said body, and a heat radiating member encircling said body and making contact with said heat conducting means.

7. An optical reflector comprising a transparent vitreous support having a reflecting surface, a wire mesh embedded in said support, a metal ring encircling said support and making contact with said wire mesh, and means for adjusting said ring on said support.

8. An optical reflector, comprising a transparent vitreous body having a reflecting surface, a reinforcing back therefor, a member encircling said body, and reinforcing means embedded in said body and cooperating with said reinforcing back through the intermediary of said encircling ring.

9. An optical reflector comprising a transparent vitreous shell having a reflecting surface, a protective and reinforcing back therefor, a reinforcing ring along the periphery of said reflector, and a wire mesh embedded in said shell and co-operating with said back through the intermediary of said reinforcing ring.

10. An optical reflector comprising a transparent vitreous body having a reflecting surface, a metallic reinforcing back therefor, and a wire mesh embedded in said vitreous body in contact with the metal of said back along the periphery of said reflector.

EDWARD LYNDON.