April 1, 1924. 1,488,923

H. K. HITCHCOCK

MIRROR OR REFLECTOR

Filed March 8, 1919

FIG. 1.

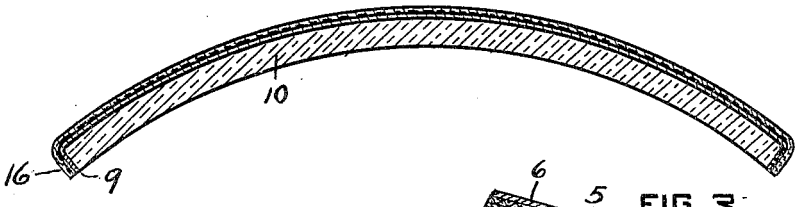


FIG. 2.

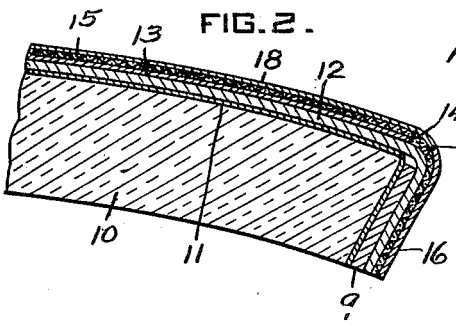


FIG. 3.

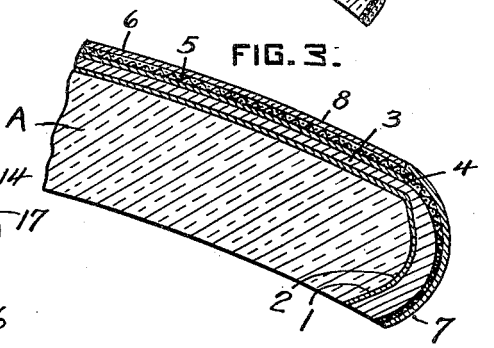


FIG. 4.

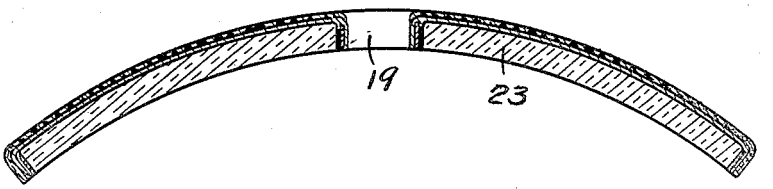
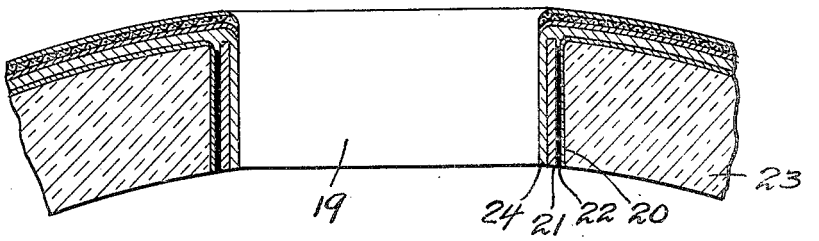


FIG. 5.



INVENTOR

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Patented Apr. 1, 1924. 1,488,923

UNITED STATES PATENT OFFICE.

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MIRROR OR REFLECTOR.

Application filed March 8, 1919. Serial No. 281,558.

To all whom it may concern:

Be it known that I, HALBERT K. HITCHCOCK, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Mirrors or Reflectors, of which the following is a specification.

The invention relates to mirrors or reflectors. The invention is illustrated as applied to convex concave reflectors or lenses such as are used in search-light or light-house work and has its greatest utility in such connection, but the invention is not limited to such reflectors and is applicable to reflectors or mirrors of all types. The invention has to do primarily with the plating for protecting the silvering and its method of application, and its principal objects are, (1) the provision of a construction wherein the edge of the reflector is reinforced, and (2) the provision of a construction wherein a thicker and more perfect plating is possible and wherein such plating is positively maintained against loosening or detachment.

The mirrors or reflectors for use in light-house and search-light use often approximate five feet in diameter and it has been common to protect the silvering by plating a coating of metal, such as copper, over the silvering. This plating protects the silvering and prolongs its life, but heretofore has necessarily been made very thin and even when relatively thin has a tendency to become loosened and peel off with the silvering. This is due to the fact that a high tension is created in an electroplated coating, in some cases approaching the tensile strength of the metal, and this pull of the plating tends to loosen the silvering. The pull of the plating upon the silvering is directly proportional to the thickness of the plating and since the silvering is maintained on the glass only by adhesion, the plating has heretofore been made so thin as to only imperfectly perform its protecting function.

The purpose of the present invention is to provide a plating construction and means for applying it, whereby the plating may be made of any desired thickness and attached positively and securely so that it cannot become loosened. Briefly stated, this result is secured by providing a reinforcing and attaching band of metal upon the edge of the reflector or mirror to which the plating on the back of the silvering is secured. With this construction, any strain imposed by the shrinkage of the plating is taken by the reinforcing band, so that there is no tendency to loosen the silvering. By this means a coating may be applied of such thickness as to form a perfect protection against injury to the silvering. The band upon the edge of the mirror is preferably secured by electroplating a relatively thick coating of metal over such edge before applying the plating to the back, but such band may, if desired, be provided by shrinking or otherwise securing by mechanical process, a ring of metal around the edge. In carrying out the process a glass sheet which is to be coated is preferably supported from its upper surface by a vacuum frame, which in turn is supported for movement from a position over the silvering bath, or series of baths, to a position over an electroplating bath. The sheet of glass supported in this manner is carried from one bath to the other and successively lowered in such baths, a silvering coating being first deposited, and subsequently an electrolytic coating or plating. In case the supporting or reinforcing band is to be electrically deposited, such coating is deposited in the electroplating bath before depositing the plating upon the back of the plate. After a relatively thick band of metal has been deposited upon the edge of the plate, the current is so directed through the bath that a plate is deposited both upon the back and upon the edge, thus securing the plating upon the back to that upon the edge. Certain embodiments of the invention are illustrated in the accompanying drawings, wherein,—

Figures 1 and 2 are sections through a complete reflector made in accordance with the invention, Fig. 2 being an enlargement at the edge of the construction of Fig. 1. Fig. 3 is an enlarged section through a modified reflector construction, and Figs. 4 and 5 are sections through still another type of reflector having an opening through its central portion, Fig. 5 being an enlarged section at the center of the reflector of Fig. 4.

Fig. 3 of the drawing illustrates the deposit of plating upon the edge of a reflector A as a result of the procedure heretofore described, the edge of the reflector in this

case being rounded, although this is not necessarily the case, as such edge might be either straight or concave. Fig. 3 also illustrates additional protecting means which are applied to the reflector before the plating operation. The coatings in this figure are, of course, exaggerated, in order to make them clear. As here shown, 1 is the silvering coating, 2 is the plating of copper upon the edge of the reflector, and 3 is the lighter coating of copper upon the back of the reflector. Over the back of the reflector and terminating at the point 4 is a coating of varnish 5, and above this coating of varnish is a woven metal fabric 6 which extends over the back of the reflector and over the edge thereof as illustrated. After this fabric is applied, the reflector is returned to the plating bath, and an edge plating 7 is applied, such edge plating extending around to the point 4 and serving to securely anchor the metallic fabric in position. A further coating 8 is then applied, extending over the back to the point 4.

Figures 1 and 2 illustrate a reflector construction in which the band 9 at the edge of the glass plate 10 is formed separately and placed upon the reflector glass instead of being plated thereon as heretofore described. As shown in Fig. 2, 11 is the silvering and after this coating and the band 9 have been applied, a plating coating 12 of copper is applied, as heretofore described. This coating extends over the back of the reflector and also over the metal band 9 so that the plating at the back is securely attached to the edge band. After the plating has been applied, the varnish coat 13 is applied, extending to the point 14. Over this coating the metal fabric 15 is placed, such fabric extending around the edge of the reflector and being secured in place by the plating 16, which extends up to the point 17. A final coating of varnish 18 is then applied over the metal fabric on the back of the reflector.

Figures 4 and 5 illustrate the invention as applied to a reflector having the opening 19 through the center. The construction at the outer edge of the reflector is the same as heretofore described in connection with Figures 1 and 2, but the reinforcing around the opening 19 is somewhat different, as illustrated in Fig. 5. As here shown, 20 is the silvering coating, and between this coating and the metal ring 21 a layer 22 of wax is introduced. This cushions the ring and takes care of the difference in expansion and contraction between the ring 21 and the glass plate 23. The plating 24 of copper or other metal is applied over the silvering at the back of the reflector, and over the ring 21, as in the construction heretofore described. The protecting coatings of metal fabric and varnish are applied as in the other types of construction.

What I claim is:

1. In combination in a mirror, a glass plate, a silvering coating on the back of the plate, a metal band on the edge of the plate, and an electrically deposited protecting coating on the silvering coating connected at its edges to the metal band.

2. In combination in a mirror, a glass plate, a silvering coating on the back and edge of the plate, an electrically deposited metal band on the edge of the plate, and an electrically deposited protecting coating extending over the said silvering on the back of the plate and connected at its edges to said band.

3. In combination in a mirror, a glass plate, a silvering coating on the back and edge of the plate, and an electrically deposited protecting coating extending over the silvering coating on the back and edge of the plate.

4. In combination in a mirror, a glass plate, a silvering coating on the back and edge of the plate, and an electrically deposited protecting coating extending over the silvering coating on the back and edge of the plate, said coating being thicker on the edge of the plate than on the back.

5. In combination in a mirror, a glass plate, a silvering coating on the back of the plate, a metal band on the edge of the plate, an electrically deposited protecting coating on the silvering coating extending at its edges to the metal band and connected thereto, a foraminous metal fabric extending over the protecting coating on the back and edge of the plate, and an electrically deposited coating securing the fabric to the protecting coating at the edge thereof.

6. In combination in a mirror, a glass plate, a silvering coating on the back of the plate, a continuous metal strip anchored securely to the edge of the plate, an electrically deposited protecting coating on the silvering coating, and a foraminous metal fabric extending over said protecting coating and anchored at its edges to said continuous metal strip.

7. In combination in a mirror, a glass plate, a silvering coating on the back of the plate, a continuous metal strip anchored securely to the edge of the plate, an electrically deposited protecting coating on the silvering coating, a foraminous metallic fabric extending over said protecting coating, and anchoring means for said fabric comprising an electrically deposited plating extending over the edge of the fabric and said metal strip.

In testimony whereof, I have hereunto subscribed my name this 4th day of March, 1919.

HALBERT K. HITCHCOCK.