Jan. 9, 1934. G. F. COLBERT ET AL 1,942,686

MIRROR AND PROCESS OF MAKING IT

Filed Jan. 19, 1932

Fig. 1.

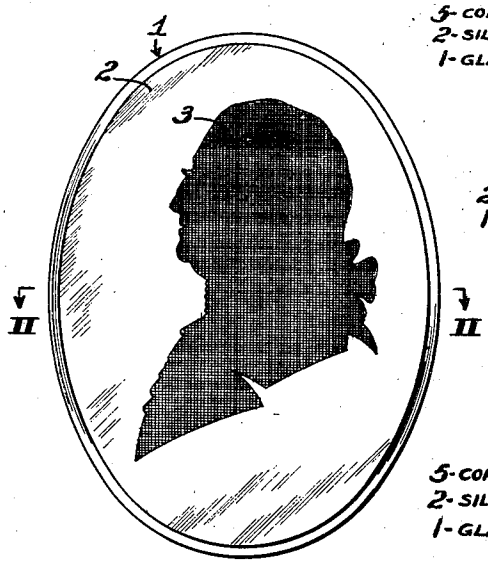


Fig. 2.

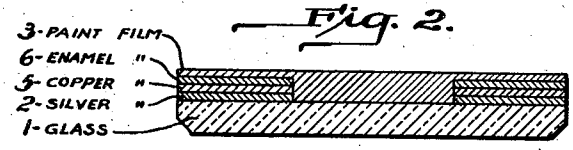


Fig. 3.

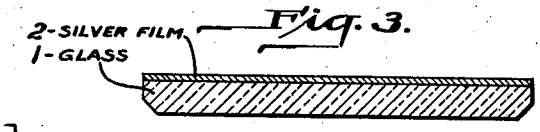


Fig. 4.

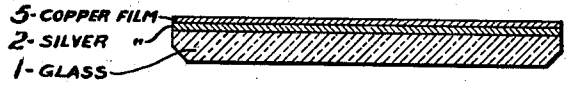


Fig. 5.

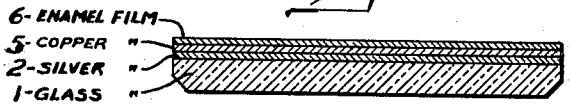


Fig. 8.

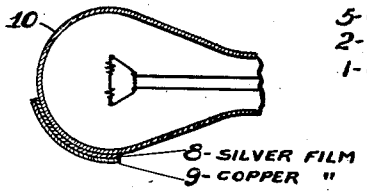


Fig. 6.

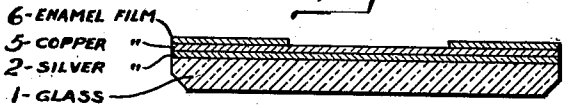
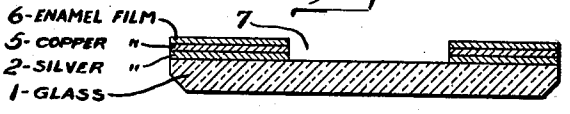


Fig. 7.



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MIRROR AND PROCESS OF MAKING IT

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Application January 19, 1932. Serial No. 587,538

3 Claims. (Cl. 41—43)

The invention relates to an improved mirror of the multitone type shown in our Patents Nos. 1,788,562 and 1,802,168, and to an improved method of making such mirror. The term "mirror" is used here in its broad sense to include ornamental plates whose surfaces are of a reflecting character whether such surfaces are designed to be utilized as ordinary household mirrors or for purely ornamental purpose, such as placques, table tops, coasters, and the like. While the ornamental phase of the invention is stressed as the more important one, the invention has industrial applications, one of which is found in the plating of reflector bulbs to reduce the glare from automobile headlights as hereinafter more fully set forth.

In making multitone mirrors, in which the first deposited film is of silver, part of which is removed to form a pattern which is subsequently filled in with a metal coat or paint of a contrasting color, difficulty arises in handling and storing the silvered plates, so that they will not be damaged by such handling or in storing them preliminary to the next coating. Further the plates can not be held for any length of time without deterioration due to the oxidation of the silver, and it is inconvenient, if not impossible, to always proceed with the final steps of the operation as soon as the silvering is completed.

The present invention is designed to obviate the foregoing difficulties, and further to give a finished multitone plate which will not develop defects in the silvering in a relatively short time, such as often occurs with mirrors made by the processes heretofore known and used in the art. Briefly stated this result is accomplished by plating or coating the silver with a metal protection as soon as possible after the silvering step. The protecting coat or film is copper, and such copper is preferably electroplated onto the silver, but the protecting coat or film may be of some other metal, such as nickel. After the application of the protecting film of metal, the plates may be handled without danger of injury to the silvering and may be kept indefinitely without deterioration due to oxidation. When plates of this character are used in multitone work, the finished product is free from any deterioration of the silver portion of the pattern work, such as is very apt to occur with multitone plates made by the ordinary methods, including the well-known silk screen method of patterning. Certain embodiments of the invention are shown in the accompanying drawing, wherein:

Figure 1 is a face view of an ornamental multitone plate. Fig. 2 is a section on the line II—II of Fig. 1, the films of material shown in this figure and Figs. 3 to 8 being much exaggerated in thickness for the purpose of clear illustration. Figs. 3 to 7 are sections illustrating the steps of the operation. And Fig. 8 is a sectional view of a lamp bulb to whose construction the process has been applied.

Referring to the drawing, 1 is a sheet of glass, 2 is a precipitated film, ordinarily silver (and the term "silver" is used here in the sense ordinarily used in mirror work to cover either actual silver or quicksilver) which covers the main portion of one of the surfaces of the glass, and 3 is a coating of a contrasting color such as black paint. The two films are disposed so as to give an ornamental design which may present a wide variety both as to design and colors.

In carrying out the process to make the particular mirror shown, the glass is placed in a horizontal position and the silver film 2 is deposited over the entire back of the sheet, as indicated in Fig. 3, by the usual procedure of the art. The next step is the application of the protecting film or coating 5, preferably of copper, which is electroplated onto the silver. This is ordinarily done by placing the plate, silver side down, in a plating bath and proceeding in a manner well known in the art, the production of copper backed mirrors being a process well known in the art.

The plate is now ready for the etching of the desired pattern, a number of processes for accomplishing which are fully explained in our Patent No. 1,802,168 heretofore referred to. One of these is the cold top enamel process, which consists in coating the copper film with an emulsion film 6 (Fig. 5) sensitive to light. The desired design is then impressed on the sensitized surface by the projection of an illuminated image thereon, or by covering with a stencil sheet which is exposed to light. After the exposure, the latent image is developed in such manner that the light treated portions of the emulsion are rendered insoluble and the plate is washed to remove the other portions of the emulsion. In this case the figure 3 at the center of the plate is the portion of the enamel film which is not exposed to light, so that such portion is solvent and therefore removed by the washing as indicated in Fig. 6.

The plate as thus prepared for etching is now placed in a tray containing a dilute solution (e. g. about 10%) of nitric acid. This treatment removes the portions of the copper and silver films not protected by the enamel, namely the

central portion, in the particular design illustrated, thus bringing the plate to the condition shown in Fig. 7, so that viewed from the front the plate shows a silver background surrounding the central clear portion which constitutes the head.

The final step consisting in applying the paint film over the back of the plate, thus covering the enamel film 6 and the open space 7, is shown in Fig. 7. Black paint is ordinarily used, thus giving a black silhouette against a silver background, as viewed from the front of the plate, but other colors may be used, and if desired a precipitated metallic film may be substituted for the paint as in our patents heretofore referred to.

Fig. 8 illustrates another application of the process in silvering non-glare automobile lamps 10. As here shown, 8 is a circular spot of silver and 9 is a protecting film of copper. In carrying out the process, an area somewhat larger than the area 8 is covered with a precipitated silver film and over this is electroplated a copper film 9. A silk screen is then placed over the area covered by the two metal films, such screen having an untreated central portion corresponding to the desired area 8, and a portion surrounding such central portion treated with a material which renders it impervious to the inking resist later used. The screen is now inked with a resist which penetrates the central portion thereof, but not the outer portion. The screen is now removed and the bulb treated with a dilute etching acid which removes all of the metal films except the central portions 8, 9 which were protected by the resist. The silk screen method of applying a patterned resist preliminary to the etching may be used in a wide variety of work, including that required to produce the design of Figs. 1 and 2. Such method lends itself most readily to the simpler designs.

In addition to the advantages of the process as heretofore explained, a further utility is present when silver and lead sulphide coatings are to be used in combination to produce a multitone effect. With these combinations it has been impracticable heretofore to use the silver as the first or foundation coat, as the lead sulphide, when applied as the second coat will discolor the silver. The use of the copper plating obviates this difficulty as it protects the silver from discoloration.

The term "solvent" is used throughout in its broad sense to designate any compound which is effective to remove or dissolve certain unprotected portions of the films by chemical reaction therewith or otherwise.

What we claim is:

1. A process of partially silvering a glass surface, which consists in precipitating over the area a coat of silver, electroplating a film of copper over said coat, placing a pattern resistant to the action of a solvent of said metals on said film so that a part thereof is covered and a part is left uncovered, and then exposing the film thus partially protected to the action of said solvent.

2. A process of partially coating a glass surface with metal which consists in precipitating over the area a coat of silver, electroplating a film of metal over said coat, placing a pattern resistant to the action of a solvent of said metals on said film so that a part thereof is covered and a part is left uncovered, and then exposing the film thus partially protected to the action of said solvent.

3. A process of partially coating a glass surface with metal which consists in precipitating over the area a coat of silver, electroplating a film of metal over said coat, placing a pattern resistant to the action of a solvent of said metals on said film so that a part thereof is covered and a part left uncovered, exposing the film thus partially protected to the action of said solvent, and applying a coat of material of a color contrasting to the silver to those portions of the glass not covered by the silver.

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