Jan. 15, 1952 S. G. MALBY 2,582,786

MIRROR

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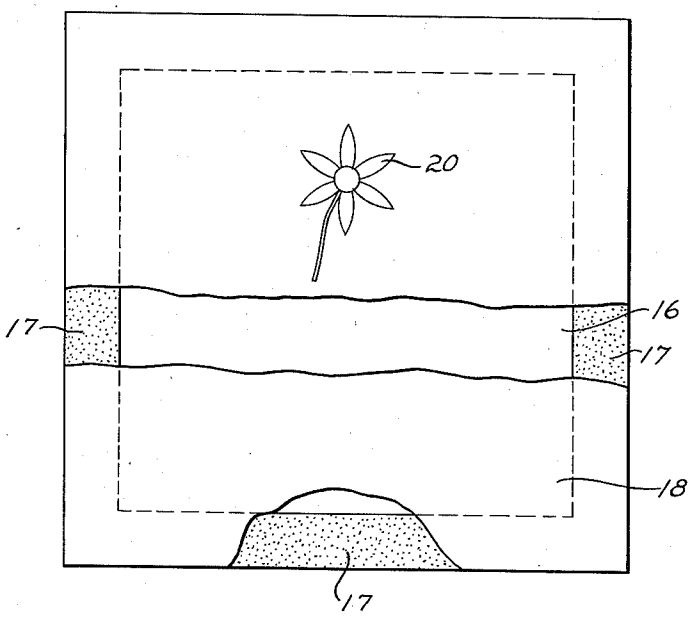
Fig. 1



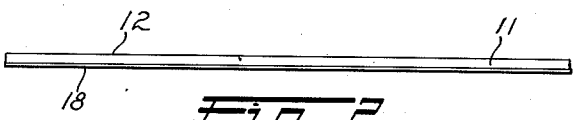


Fig. 2

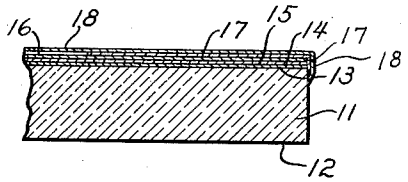


Fig. 3

INVENTOR
SETH G. MALBY

BY Strauch, Nolan & Diggins
ATTORNEYS

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MIRROR

Seth G. Malby, Edgewater, N. J.

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3 Claims. (Cl. 88—105)

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This invention relates to mirror assemblies and is particularly directed to the improvement which comprises providing a protective covering of aluminum foil for the back of a mirror.

The ordinary mirror, such as that seen on a dressing table or in a vanity compact, is a plate of clear glass having an opaque metal reflecting backing. Most of these metal backings are silver because this metal may be readily deposited in a smooth, continuous and very highly reflective film upon the glass plate, and a considerable industry has grown up relating to the silvering of glass plates for mirrors.

With the development of the mirror silvering industry, it was recognized that unless protective measures were taken the silver film would tarnish, become blackened, and eventually peel off due to deterioration by moisture, hydrolytic action due to combination with water vapor in the air, and chemical action with gases in the air, as for example the formation of silver oxides and sulfides through contamination by oxygen and sulphur gases in the air. The film also had to be protected against wear and abrasion.

Various methods have been proposed throughout the years for protecting the silver coating against tarnishing and abrasion. The method most widely used today for making these mirrors is as follows. First a thin but opaque layer or film of silver is precipitated onto the glass plate from an ammoniacal solution of silver nitrate. The procedures for doing this are well-known and do not comprise part of the present invention. Then a coating of shellac is applied to completely cover the deposited silver layer. The shellac dries relatively quickly to provide a clear overlayer, and its intended purpose is to provide a hard protective coating for keeping moisture and atmosphere gases away from the underlying silver film. After the shellac has become hard, a coating of paint, usually a dark grey asphalt base paint which does not chemically act on the shellac, is applied overlying the layer of shellac. The shellac is chemically inert with respect to the silver, and the major purpose of the paint is to provide an abrasive resistant and so-called "weatherproof" coating over the shellac and to darken the mirror background, that is to say to insure that the backing is entirely opaque with respect to light from the front surface of the mirror.

While these conventional mirrors may be satisfactory for a short period of time and in fact for many years, they are subject to deterioration for the same reason that the original silver coating became deteriorated, the difference being only a matter of time before the atmospheric moisture and gases penetrated through the paint and shellac to the underlying silver film. Also the pain and shellac layers are readily scratched and as the pain ages it tends to crack and peel, all permitting entry of moisture to attack the silver layer.

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As a result there has been constant research and many different proposals have been made for the protective backing of the silver film. Among these is another conventional method by which, instead of coating with paint and shellac, a coat of copper is immediately electro-deposited directly upon the silver to serve as an opaque abrasive resistant cover. This deposited layer has proved more or less porous, and eventually the silver film becomes discolored, darkened, and the entire mirror therefore unsatisfactory.

The present invention comprises the backing of a mirror of this type with aluminum foil sheeting applied in such a manner as to provide a tough abrasion-resistant gas and moisture tight coating for the entire mirror back.

The major object of my invention is to provide a novel mirror assembly wherein the deposited silver reflecting layer is protected by a continucus aluminum foil covering.

It is a further object of my invention to provide a novel mirror assembly having an adhesively secured water and air tight alumium foil backing.

A further object of the invention is to provide a mirror assembly wherein the mirror back is covered with aluminum foil sheeting secured thereto by a normally tacky pressure sensitive water insoluble adhesive.

Further objects of the invention will appear as the description proceeds in connection with the appended claims and the annexed drawings wherein:

Figure 1 is a rear elevation of a mirror assembly according to a preferred embodiment of the invention, partly broken away to show its construction;

Figure 2 is an end elevation of the mirror assembly;

Figure 3 is a fragmentary enlarged section illustrating the structure at an edge of the mirror assembly.

In carrying out the invention I prefer to start with a mirror which has been silvered, shellacked, and painted according to the above prior method. In other words, I may start with a mirror which is produced and sold to the consumer today as a finished article having an alleged mois-

ture and gas-proof backing. Upon the back of this mirror I apply a layer of aluminum foil, preferably in a single sheet, but it may be made of one or more sheets overlapped at adjacent edges if the mirror is a large one. The first step in applying the foil to the back of the mirror according to my preferred procedure is to apply a border strip of adhesive material all around the periphery of the mirror back in overlying relation to the coating of paint and preferably extending slightly outwardly beyond the edges of the mirror so as to extend over and cover the edges of the paint, shellac, and silver layers along the edges of the glass. For this purpose I must use an adhesive material which is comparatively free of the relatively acidic and chemically reactive materials that characterize many adhesives, and for the purpose I have found that it is extremely satisfactory to employ one of the known pressure sensitive adhesives which are variously known as crude rubber base adhesives.

The pressure sensitive adhesive may be any of those disclosed in United States Letters Patent Nos. 2,156,380; 2,206,899; 2,236,527; 2,410,079 and 2,444,830. These pressure sensitive adhesives are normally tacky at room temperatures and do not appreciably harden with age. Their composition is relatively dense so that they provide a water-tight seal, and they are insoluble in water. They are chemically neutral and inert with respect to aluminum, silver and the paint on the mirror back.

These pressure sensitive adhesives are mainly crude rubber bases treated specially or admixed with ester gum or some rosin or resin to provide a normally tacky state wherein they are adhesive without the need for solvents or heat. This absence of solvents and other elements from the adhesive materially reduces the chance of chemical attack upon the paint layer.

A prime advantage of using pressure sensitive adhesives is that no heat, chemical or mechanical action beyond merely smoothly pressing the aluminum foil onto the mirror back is required to complete the assembly wherein it is tight between the sealed portions.

These particular rubber base adhesives, besides being free of elements which might react with either the aluminum foil or the underlying paint or silver layers on the glass, are very strongly adhesive and provide a water and gas tight bond between the foil and the back of the mirror. The foil sheet, after the adhesive has been placed around the periphery of the back of the mirror, is placed directly upon the mirror back. Preferably an oversized sheet is used, and it is drawn taut and pressed tightly into smooth engagement with the adhesive, and then the edges are trimmed off and smoothed over the corners leaving a neat, smooth, clean appearance at the back of the mirror.

For purposes of the invention, I have found that aluminum foil having a thickness at least in the order of about .0015'' should be used since with present day methods of manufacture, this is the minimum thickness that is surely uniformly free of pin holes or weak spots that might admit air and gas. However, a foil thickness of about .0025'' or more is preferable for the invention, because of the desirable resistance to abrasion and facility of handling offered by the thicker foil. Foil of about .0015'' thickness, laminated with a sheet of cellulose acetate or the like, as will later be described, may be employed because the thickness of the laminated

product will make it as easy to handle and as abrasive resistant as the thicker foil.

Referring to the drawings, the mirror assembly comprises a clear transparent glass plate 11 having a smooth flat front surface 12 and a smooth flat rear surface 13 parallel to surface 12. Overlying rear surface 13 is a deposited film of silver 14 which provides the reflecting surface of the mirror. Overlying silver film 14 are a layer 15 of shellac and a layer 16 of the usual grey paint in succession. This is the usual commercial mirror.

In the invention I apply a border strip 17 of adhesive entirely around the perimeter of the mirror overlying the paint layer. This adhesive is of the rubber base pressure sensitive type above described and may be sprayed or otherwise applied to the mirror. In practicing the invention I have found it very satisfactory to make strip 17 of lengths of flexible tape coated on both sides with the pressure sensitive adhesive. Such a double coated tape is available on the market under the designation of No. 400 Scotch tape, and a double coated tape of this nature is disclosed in Patents 2,206,899 and 2,444,830. Preferably I simply lay lengths of this tape along the mirror back with overlapped or abutted ends at the corners, so as to provide a complete and continuous strip of adhesive 17 all around the periphery.

Then, in the case of a mirror of fairly small size, I take a single sheet 18 of aluminum foil (preferably of the .0025'' thickness above pointed out) and draw it tightly and smoothly across the mirror back and press it onto adhesive strip 17 which retains it in the assembly. Where the mirror is large, I use several sheets of foil, with their adjacent edges overlapped and bonded by the pressure sensitive adhesive.

As illustrated in Figure 3, the side edges of strip 17 may extend slightly outwardly beyond the plane of the edge of glass 11, and the aluminum foil sheeting is slightly oversize, so that it may be bent over to cover and seal the hitherto exposed side edges of the layers of silver, shellac and paint in the assembly.

The aluminum foil backing presents a smooth, clean and pleasing appearance. It is tough and abrasion resistant and is itself free of holes so as to be gas and moisture tight. The flexible, resilient sealing strip 17 around the perimeter of the mirror back is impervious to moisture and provides a cushioned seal which increases its sealing action when it is mounted in a holder or frame that may clamp the mirror edges. The adhesive material of strip 17 remains tacky for a long period thereby retaining its high adhesive quality indefinitely.

While I have above described providing adhesive only in a strip which may be about an inch wide along the mirror periphery, the strip 17 need be wide enough only to maintain the seal, and on the other hand the entire back of the mirror may be adhesive covered if desired, without departing from the spirit of the invention. Wherever I refer to a sheet of aluminum foil in the claims, this is intended to cover both single sheets and overlapped bonded multiple sheets of foil.

The aluminum foil and the adhesive strip 17 may be combined together before attachment to the mirror back. For example the double coated tape may be secured along the perimeter of a pre-cut sheet of the aluminum foil, and then the adhesive bearing foil sheet applied and smoothed over the back of the mirror.

Also for many applications of the invention it is possible to secure a good mirror by eliminating the shellac and paint layers and adhesively securing the aluminum foil directly upon the deposited silver backing, but this should be done immediately after the silver has been deposited and the deposited silver layer dried.

The aluminum foil may be plain or decorative. This decoration may be provided either by direct printing upon the back of the foil sheeting, or by laminating the foil sheeting, prior to assembly with the mirror, with a printed or otherwise decorated sheet of a transparent plastic like cellulose acetate of rubber hydrochloride. The cellulose acetate, printed and colored as at **20** on the side to be secured to the foil, is secured to the foil by a suitable adhesive which may be transparent or colored for added ornamentation. Where sheet rubber hydrochloride, such as Pliofilm, is used, the laminated bond may be heat sealed. Where the printing or decorating is done on the foil itself, the printed surface may be overlaid with a transparent sheet of the above mentioned plastic fully bonded to it. The laminated foil and plastic sheet coverings may use the thinner foil as above explained.

The aluminum foil backed mirror assembly of the invention is more resistant to attack by moisture and atmospheric gas than any prior constructions. I have determined by actual test that it stands up under severe conditions such as may be encountered in hot humid seasons and countries, where the usual paint and shellac backed mirrors have failed. For example, in tests at temperatures of 100° F. and upward, in a relative humidity range of twenty-five to one hundred percent, mirrors made according to the invention were unchanged and standard commercial mirrors with painted backs all showed signs of deterioration within a short time. Scratch tests clearly show my foil back mirrors to be of superior abrasion resistance. I have also found that in case the mirror is shattered the foil sheet is strong enough to hold pieces together and reduce splinters and glass fragments.

In the mirror assembly of the invention the metallic layers of silver and aluminum are entirely separated and electrically insulated by a barrier layer that comprises the shellac and paint coats, and it is an inherent property of this barrier layer that it prevents any electrolytic action between the two metallic layers.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by the United States Letters Patent is:

1. In a mirror, a transparent glass plate having a rear surface coating presenting a highly reflective metal surface when viewed from the front face of the mirror, a continuous narrow band of adhesive extending around the entire periphery of the back surface of said coating and over all of the side edges of said coating to the edges of the glass plate peripherally of the mirror, and an imperforate metal foil sheet mounted in overlying relation to said coating and extending over all of the side edges of said coating to the edges of the glass plate at least as far as the adhesive band for bonding the foil to the mirror and sealing said coating edges against entry of moisture and gases, the major part of the area of the foil peripherally within said adhesive band being substantially free of bonding with the coating, and said adhesive being chemically and electrolytically neutral with respect to both the coating and foil.

2. In the mirror defined in claim 1, said foil being a sheet of aluminum foil having a thickness of at least about 0.0025 inch.

3. In a mirror, a transparent glass plate having a rear surface coating presenting a highly reflective metal surface when viewed from the front face of the mirror, a continuous narrow band of normally tacky pressure sensitive adhesive extending around the entire periphery of back surfaces of the coating and over all of the side edges of said coating to the edges of the glass plate peripherally of the mirror, and an imperforate metal foil sheet mounted in overlying relation to said coating and extending over all of the side edges of said coating to the edges of the glass plate at least as far as the adhesive band for bonding the foil to the mirror and sealing said coating edges against entry of moisture and gases, the major part of the area of the foil peripherally within said adhesive band being substantially free of bonding with the coating, and said adhesive being chemically and electrolytically neutral with respect to both the coating and foil.

SETH G. MALBY.

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