Sept. 17, 1968 J. G. WARHOL 3,402,004

PRISMATIC MIRROR

Filed Oct. 12, 1964

Fig. 1

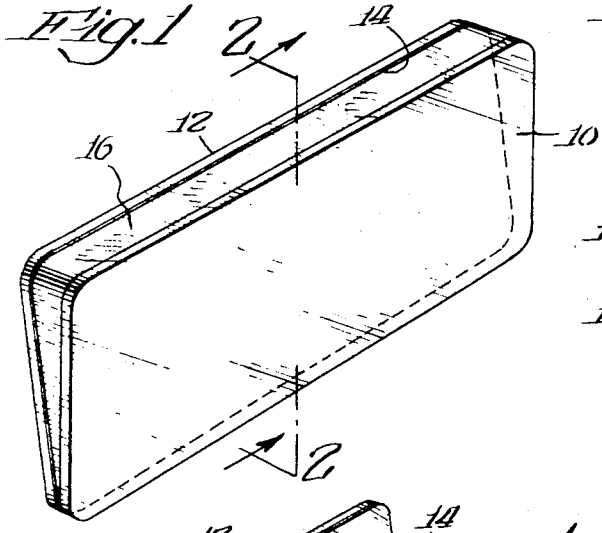


Fig. 2

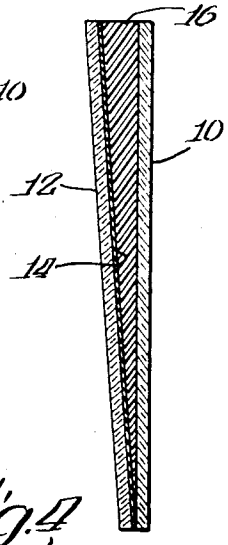


Fig. 8

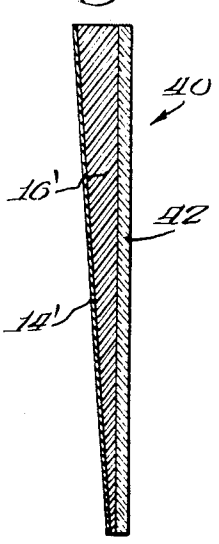


Fig. 3

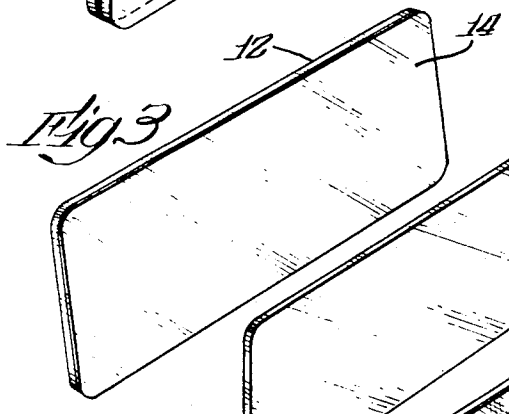


Fig. 4

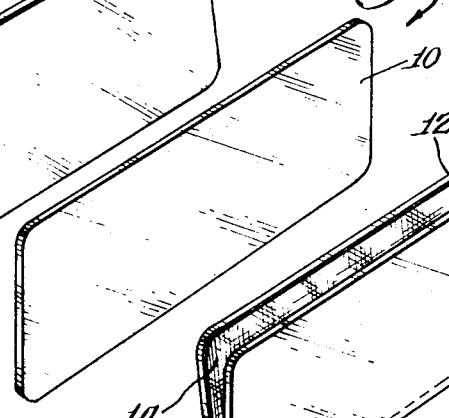


Fig. 5

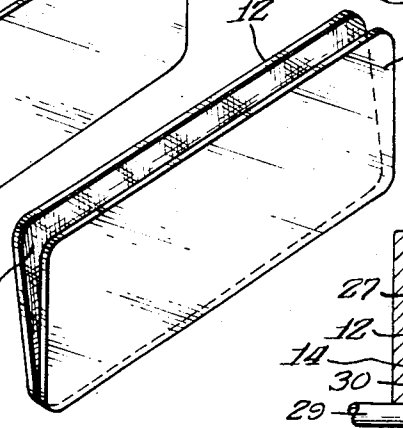


Fig. 6

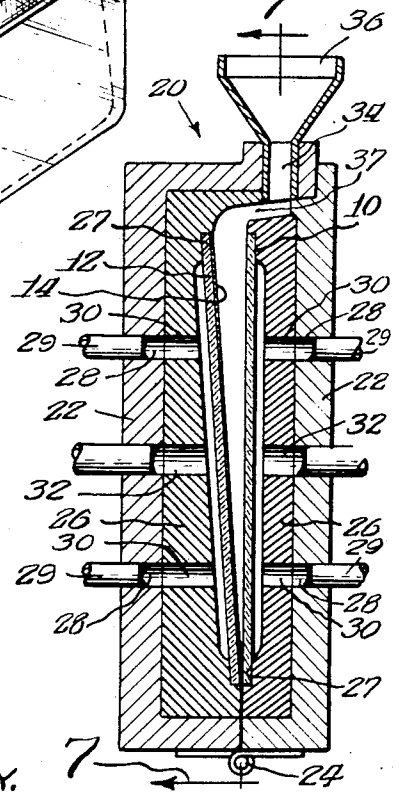
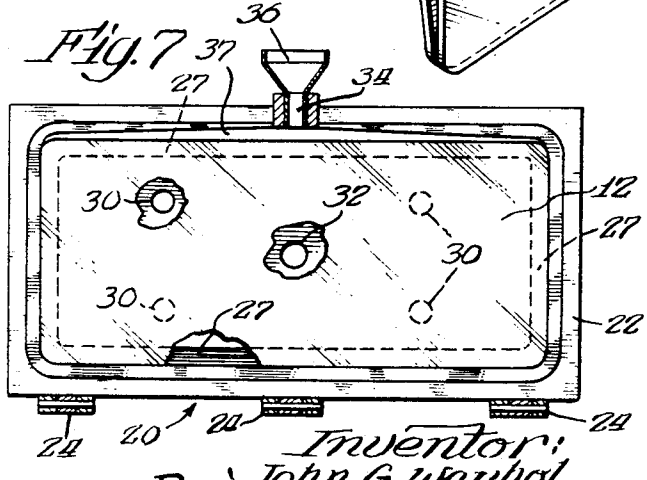


Fig. 7



Inventor:
John G. Warhol
BY MAX R. KRAUS ATTY.

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PRISMATIC MIRROR

John G. Warhol, Oak Park, Mich., assignor, by mesne assignments, to Nelmor Corporation, Harper Woods, Mich., a corporation of Illinois

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1 Claim. (Cl. 350—281)

ABSTRACT OF THE DISCLOSURE

A non-shatterable mechanically strong rear view mirror for automotive use is provided by having flat pieces of glass in non-parallel relationship and maintained in position by having cast therebetween a thermosetting transparent plastic. The plastic is a mixture of polyester and acrylic compounds including a catalyst hardening agent to promote setting.

This invention relates to improvements in prismatic mirrors and to the process and method for forming same.

Under present day practice, prismatic mirrors are produced from a single piece of plate glass, with one of the sides being coated and the uncoated side being ground to provide an angled surface to produce a wedge-shaped plate in vertical section. This grinding process is a very slow and expensive procedure and adds greatly to the cost of the finished product. By virtue of the special grinding machines which are necessary and the slow procedure, a limited number of such mirrors may be produced with a given machine, thus slowing down production and increasing the cost.

The present invention provides a new and improved type of prismatic mirror which may be produced at approximately one-half the cost of producing the present prismatic mirrors, and also includes a process or method which does not require the expensive and costly grinding equipment heretofore necessary, thereby facilitating increased production at reduced costs. In addition, a more efficient and effective prismatic mirror is produced than that now produced in commercial practice.

Other objects will become apparent as this description progresses.

The drawings will illustrate diagrammatically the process or method for forming the prismatic mirror of this invention.

In the drawings:

FIG. 1 is a perspective view of a rear view mirror formed in accordance with this invention.

FIG. 2 is a sectional view taken on lines 2—2 of FIG. 1.

FIG. 3 is a perspective view of the rear panel coated with a reflective material.

FIG. 4 is a perspective view of the front panel.

FIG. 5 is a view of the two panels positioned relative to each other as they would be in the mold when the bonding material is introduced.

FIG. 6 is a sectional view of the panels in a mold cavity, showing the process in the formation of the structure in accordance with this invention.

FIG. 7 is an elevational view taken on lines 7—7 of FIG. 6, and

FIG. 8 is a sectional view taken on lines similar to FIG. 2 of a modified construction.

In the embodiment shown in FIGS. 1 to 7, which will be first described, two panels of glass are used, the front panel being identified by the numeral **10** and the rear panel identified by the numeral **12**. Both of these panels are ordinary picture frame glass, which is a clear colorless glass, each having a thickness of approximately .060. If it is intended that the mirror be used for a rear view mirror for automobiles then the panels or strips are precut to the generally oblong shape shown.

The front panel **10** is not treated in any particular manner. The rear panel **12**, which is of the same size and dimension as the front panel **10**, is coated and luminized to provide a film of a reflective surface, indicated by the numeral **14**. It may be coated or luminized or treated in an equivalent manner similar to a vacuum deposition metallic coating or first surface chrome, which is a well-known process in the industry. The rear panel **12** is positioned with the luminized surface **14** on the inside facing the front panel **10**. There are other reflective surfaces which may be used, such as chrome or the like, all of which are well-known.

The two panels **10** and **12** are positioned with respect to each other, as shown in FIG. 5, in which they are disposed at an angle relative to each other to form a prism structure. The two glass panels touch each other at the bottom and are spaced apart adjacent their upper ends. The angular separation at the top is approximately 3.5 degrees, this measurement being taken from the inside of the film coating **14** to the front wall of the front panel **10**. The 3.5 degree angular separation, as aforesaid, is the preferred position, although it will be understood that it can be more or less than 3.5 degrees.

With the two panels **10** and **12** held in the angular position shown, by the means hereinafter described and best shown in FIGS. 6 and 7, the space between the panels is filled with a bonding material **16** which is a plastic composition, more particularly hereinafter described. To position the two panes or panels **10** and **12** in the aforementioned manner they are placed in a fixture, which is best shown in FIGS. 6 and 7, and identified generally by the numeral **20**.

The fixture **20** comprises a pair of mold sections **22** hinged together at the bottom thereof as at **24**. A split silicone rubber mold or lining **26** is mounted in the mold sections. Each of the panel molds or linings **26** is recessed as at **27** to accommodate its respective panel **10** or **12**. Each mold section **22** has openings **28** which are connected to conduits **29**, which in turn are connected to vacuum producing means (not shown). Openings **28** register with openings **30** in the silicone rubber mold or equivalent lining **26**. Other openings **32** are provided for introducing air into the mold cavity. The mold sections are provided with a central inlet opening **34** at the top thereof which communicates with the mold cavity. A funnel **36** and a baffle **37** are connected to said central opening **34** and it is through the funnel and baffle that the plastic composition **16** is fed into the mold cavity.

The two glass panels **10** and **12** are positioned in the mold cavities and when the mold cavities are closed the vacuum introduced into the mold through the conduits **29**, openings **28** and **30** hold the two panels **10** and **12** in their angular position, shown in FIG. 6. Contact adhesive spots may be used in place of vacuum, with the adhesive spots located in the same positions as the openings **30** in the silicone rubber, as shown in FIG. 6, and openings **32** could be used for the air pressure to release the finished product from the mold. The adhesive spots would protrude far enough to contact the glass. When the mold sections are in closed position the edges of the mold are sealed and the plastic bonding material that is introduced between the panels **10** and **12** will not escape from between the two panels.

The bonding material **16** which is to fill the void between the two panels **10** and **12** is a plastic composition. One extremely well suited for such use is a product known as Castolite, sold by the Castolite Company of Woodstock, Ill. The plastic composition used belongs to the thermosetting class of plastics and is composed of poly-

ester and acrylic compounds. These compounds are liquefied and the use of a catalyst hardener speeds the setting. If necessary, a polyester alone can be used. The plastic composition is of such character that heat will not melt it; in fact, it will not soften appreciably at temperatures below 250° F. The higher temperatures will tend to harden the composition rather than soften it.

Before introducing the Castolite material into the mold, as aforementioned, it is mixed with a hardener which may be a conventional chemical composition. It is important that in the mixing of the hardener with the Castolite material that all the bubbles are eliminated from the two materials. One manner of eliminating the bubbles in the mixing and handling is to place the Castolite material in a container and then add the hardening material thereto and then roll the container with the materials therein so that the hardener mixes with the Castolite material. This procedure eliminates bubbles in the mixed composition. After the composition material has been mixed it is then ready to be introduced into the mold, as aforementioned.

This admixed bonding composition **16** is introduced into the mold by a gravity flow through the funnel **36** and baffle, and as the composition enters between the panes or panels **10** and **12** it will fill from the bottom up and displace the air trapped between the two panes, thus, all air, bubbles, or other things of that character will not be present in the material between the panes or panels. As the material flows by gravity it will first strike the baffle, which allows the composition material to enter the cavity at a faster rate of speed than would be possible without the use of a baffle.

To accelerate the hardening of the admixed material in the void between the panels, one of the panels can be heated and this will accelerate the hardening process. As previously stated, one of the characteristics of this Castolite material is that higher temperatures tend to harden rather than soften the material, thus, heat will accelerate the hardening process. Under normal conditions, without the application of heat, it is estimated that it would take approximately ten hours to harden, however, with the use of heat the hardening and setting will take place at a much more rapid rate. At no time is pressure applied against the two panes or panels to squeeze the bonded material therebetween. It is allowed to harden, as aforementioned, without any pressure between the panes or panels. After the hardening has taken place, the laminated prismatic mirror is removed from the mold and the outer edges of same is sanded and cleaned by any means, such as a grinding wheel, sand grinder, buffer, or the like, and the unit is then ready for use.

Aside from the increased production possible by this process, and the reduced cost, the resultant product has the advantage of an increased safety factor, in that since this is a laminated product in which the glass panes are bonded to a plastic material the glass will not splinter when in a crash, as would happen with the conventional prismatic mirror. Instead it will crack, with the cracked pieces adhering to the plastic composition and thereby reduce the danger element to the occupant of the car.

Another important advantage derived from this process is the increase in light reflectivity by virtue of the plastic material reflecting the light rays faster than the conventional glass. Conventional prismatic mirrors produce between two-thirds and three-quarters returned light reflection. The present invention increases the light reflectivity, which means the returned light is closer to the maximum of 100%.

A modified prismatic mirror is shown in FIG. 8. In the modified construction, designated generally by the numeral **40**, there is eliminated the second pane of glass and the reflective surface is affixed to the rear side of the plastic composition. In said construction there is a pane of glass **42**, identical to pane **10** described in connection with FIGS. 1 to 7. The plastic composition Castolite, which is the same as that previously described and heretofore identified as **16**, and which is here designated as **16'**, is affixed to the rear of the glass, and the shape of the plastic composition is angular or wedge-shaped, as shown. The rear face of said plastic composition is coated or has a chrome deposition on plastic, as indicated at **14'**, to provide a reflective surface, similar to the reflective surface **14** previously described. The manner of applying the plastic composition **16'** to the pane of glass **42** is similar to that previously described in connection with the process of the elements shown in the previous figures and hence will not be redescribed.

It will be understood that various changes and modifications may be made from the foregoing without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A prismatic mirror for use as a rear view mirror for automotive vehicles, said mirror comprising a transparent front glass plate of uniform thickness, a rear glass plate of uniform thickness having a reflecting coating on one face thereof, said glass plates being disposed in non-parallel laterally offset relationship to provide a prism structure, and a cast thermosetting transparent plastic material disposed between the opposing non-parallel faces of said glass plates with the reflecting surface of the rear plate being disposed to receive light falling on the front plate passing through said plastic, said plastic material consisting of a mixture of polyester and acrylic compounds having a catalyst hardener therein for accelerating setting, said mirror structure being substantially free of air bubbles and forming a laminated non-shatterable but strong construction and resistant to temperatures up to about 250° F. wherein the front and rear glass plates have an angle therebetween of substantially 3.5°.

References Cited

UNITED STATES PATENTS

1,949,138	2/1934	Bell	350—281
2,558,848	7/1931	Harrison	350—278 X
2,887,424	5/1959	Lanberg	350—320 X
3,111,570	11/1963	Strang et al.	350—178 X

FOREIGN PATENTS

557,515	11/1943	Great Britain.
582,248	11/1946	Great Britain.
505,836	5/1939	Great Britain.

DAVID H. RUBIN, *Primary Examiner.*

P. R. GILLIAM, *Assistant Examiner.*