

[54] **LATERALLY CURVED DECORATIVE TRIM STRIP ASSEMBLY AND METHOD OF MAKING SAME**

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**Related U.S. Application Data**

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[51] Int. Cl.<sup>3</sup> ..... B60R 13/02; B60R 13/04

[52] U.S. Cl. .... 428/31; 428/136; 428/192; 156/211; 52/716; 293/128; 296/41

[58] Field of Search ..... 428/31, 136, 192; 156/256, 267, 211; 52/716; 293/128; 296/41

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

3,745,056 7/1973 Jackson ..... 428/31 X

**FOREIGN PATENT DOCUMENTS**

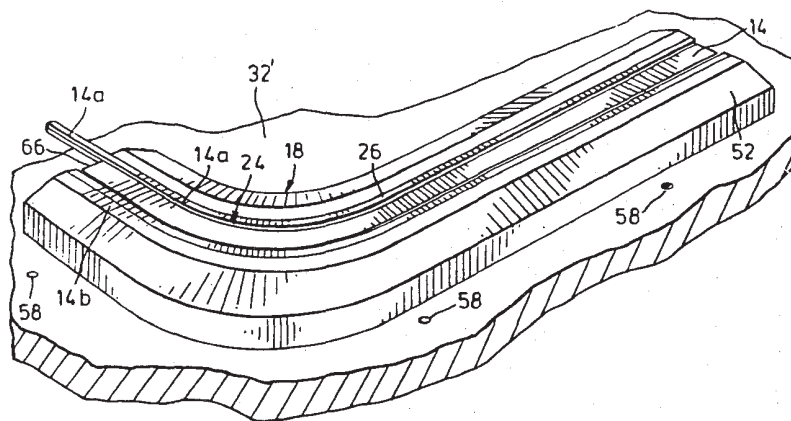
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*Primary Examiner*—Alexander S. Thomas  
*Attorney, Agent, or Firm*—D. E. Hewson

[57] **ABSTRACT**

A decorative trim strip assembly for vehicles is provided, having a laterally curved portion formed therein. The assembly comprises a metallic backing plate and a polymeric resinous strip element (usually polyvinyl chloride) bonded to it. At least one longitudinal slit is formed in the polymeric resinous material so as to form longitudinal strip portions therein, in the area of the curved portion, and each of the longitudinal strip portions is stressed to an extent less than that which would cause undesirable deformation. In forming the decorative strip, the slit polymeric material is placed into a jig, with the ends of the slit portions thereof extending to varying amounts beyond the curve, the jigged element is then bonded to the backing plate (usually by heat bonding), and any excess amount of polymeric material extending beyond the curved portion which is not required is then trimmed off.

**7 Claims, 4 Drawing Figures**





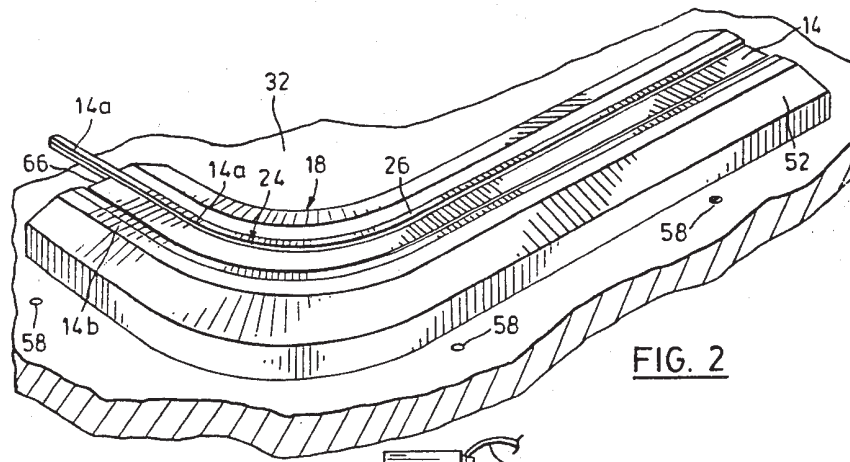


FIG. 2

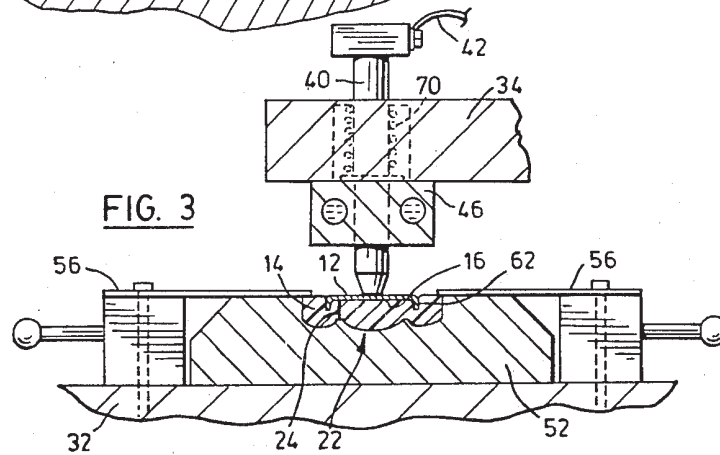


FIG. 3

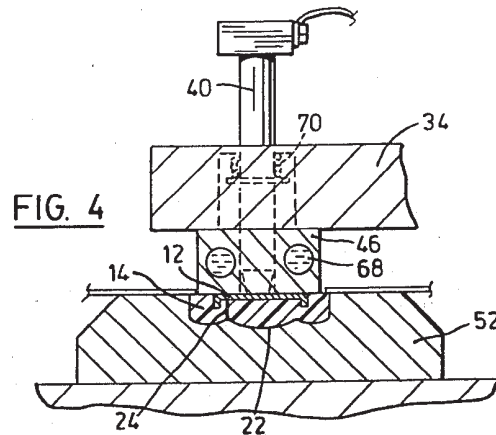


FIG. 4

# **LATERALLY CURVED DECORATIVE TRIM STRIP ASSEMBLY AND METHOD OF MAKING SAME**

## **CROSS-REFERENCE**

This is a divisional of Ser. No. 233,047, filed Feb. 10, 1981, now U.S. Pat. No. 4,364,789.

## **FIELD OF THE INVENTION**

This invention relates to decorative trim strip assemblies, particularly composite trim strip assemblies, for vehicles such as automobiles, vans, trucks, watercraft and the like. The invention relates particularly to such composite decorative trim strips that have substantially greater width than thickness, and which are curved laterally in a plane generally parallel to the plane which defines the width of the trim strip.

## **BACKGROUND OF THE INVENTION**

Decorative trim strip assemblies have been applied to vehicles, particularly automobiles, vans and the like, for a great many years. Such trim strips have been in the form of side moldings or edgings, for both decorative and protective purposes. Usually such trim strips as body moldings and the like are formed of an extruded polyvinyl chloride or other polymeric resinous material; and they may have their outer surface covered or embossed, or a combination thereof, so as to give a particular desired decorative appearance and surface contour. For example, they may be covered with a pre-printed plastic film having such as a wood grain effect, or a metallized film such as polyethylene terephthalate which gives the outer surface of the trim strip a metallic—usually a bright metallic—appearance. Such trim strips have generally been bonded to the surface to which they are mounted by way of an adhesive backing, and are sufficiently pliable as to adapt to the contour of the surface to which they are applied.

However, it has been the trend in vehicle design to use relatively broad or wide protective and/or decorative trim strips to define certain areas on the vehicle surface, both inside and outside the vehicle such as on doors, interior door panels, dashboards, and the like. Particularly, it has been the trend to make designs embodying wide trim strips having laterally curved portions in them, where the curve is substantially in the plane which defines the width of the trim strip.

Moreover, due to the nature of the design of such laterally curved trim strips, and their placement on or in a vehicle, it is possible that they may be secured to a rigid backing plate of sheet steel or the like, so as to secure them in place and to assure that they maintain their curved appearance and do not tend to straighten themselves by bending laterally away from the direction of the curve.

However, bending trim strips as aforementioned can create severe compressive and tensile stresses in the material of the trim strip, particularly the plastic material, on the inside and outside respectively of the neutral axis of the trim strip with respect to the direction of lateral curvature. If these stresses are excessive, the appearance of the laterally curved trim strips is affected, and they may be crazed, stretch marked, wrinkled or corrugated, or the covering film or material may be torn.

One attempt to overcome the above problems has been to cast the portion of the decorative trim strip

which is laterally curved, and then to assemble it with conventional extruded trim strip having the same general appearance in an appropriate manner according to the vehicle assembly procedures. However, it may very often happen that the cast portion has a different appearance, colour or contour than the remaining extruded portions; and in any event, it is comparatively very expensive since it requires the preparation of injection molding dies and the use of additional molding equipment.

One particular attempt to solve the above problems has been proposed by Loew in Canadian Pat. No. 1,020,199, issued Nov. 1, 1977. What Loew has done is to provide a plurality of strips of polymeric resinous material which are fitted side by side in the curved portion of a composite decorative trim strip. The various longitudinal strips may have differing widths, and each individual strip is stressed to an extent that does not exceed the stress resistance of the material of the respective strip. [The term "stress resistance" is defined hereafter.] All of the strips are bonded in a side-by-side fashion to a supporting substrate.

However, the cost of handling, and extruding separate longitudinal polymeric strips, and assembling them one at a time, can become excessive; and may require some compromise in the design and appearance of the outer surface of the strip, so that the abutting edges of the various individual strips are not highly visible. Moreover, Loew generally calls for overlapped relationship of adjacent strips in the composite decorative trim strip, which requires assembly in the correct order, so that the handling and general labour costs in producing each formed composite decorative trim strip having a lateral curvature may become quite high. "Stress resistance" of a longitudinal trim strip or a longitudinal portion of a trim strip is defined as being the limit or ability to which the plastic trim strip may be laterally bent in a curvature such that the compressive and tensile forces set up on the inside and outside, respectively, of the neutral axis in that strip do not cause an apparent visible surface aberration or failure. Such surface failure may, as noted above, include crazing, tearing, stretch marking, wrinkling or corrugating, any of which is undesirable and is usually unacceptable when present in a laterally curved decorative trim strip of the sort contemplated herein.

## **OBJECTS OF THE INVENTION**

The present invention overcomes a number of these difficulties by providing that a conventional extruded polymeric resinous material trim strip having the desired width and surface contour may be easily and inexpensively handled in such a manner that an unstressed laterally curved trim strip assembly is achieved. This means, then, that it is not necessary to separately extrude various longitudinal portions which, together, provide a composite strip having the requisite width and surface contour, so that additional handling and extruding costs can be eliminated. Moreover, the present invention provides an effective method for assembling a decorative trim strip having a laterally curved portion therein, such that the assembled trim strip and backing plate are securely bonded one to the other, with the requisite curved and surface appearance on the outer side thereof, away from the backing plate.

Putting the above in other words, the width of each longitudinal portion of the polymeric resinous material



strip element in the region of the at least one longitudinal slit which is formed in said strip element—and which is therefore positioned in a place so as to extend completely around the curved portion and onwards to one end of the decorative trim strip—is such that stress resistance of each respective longitudinal portion of the single, extruded polymeric resinous material strip element, is not exceeded for the curvature thereof in the curved portion of the decorative trim strip assembly.

The method by which a decorative trim strip assembly may be made, according to this invention, therefore comprises the steps of providing an elongated polymeric resinous material strip element having the desired width and surface configuration, and providing the backing plate which has the laterally curved portion formed therein to the desired configuration thereof, making at least one longitudinal slit in the polymeric resinous material strip element and placing it in a jig which also has the desired configuration, so that the slit extends in the strip element past and around the curved portion to one end of the element, and then bonding the plastic strip element to the metallic backing plate. Thereafter, any ends of the slit portions of the single slitted strip element which extend beyond a predetermined distance relative to the end of the backing plate, are cut off.

Accordingly the present invention provides a decorative trim strip assembly and a method of making the same, economically and easily, and particularly as compared to prior assemblies and methods.

A further object of this invention is to provide a method which is easily carried out by relatively unskilled labour.

Yet a further object of this invention is to provide a decorative trim strip assembly having a laterally curved portion formed therein, which may be formed in virtually any extruded trim strip, thereby permitting greater design freedom for a vehicle designer.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other features and objects of the invention are more clearly described and discussed hereafter, in association with the accompanying drawings, in which:

FIG. 1 is a partially schematic, partially idealized perspective view of an assembly apparatus for making decorative trim strip assemblies having laterally curved portions formed therein, and showing the relative unassembled relationship of the two major components of such assembly, namely an elongated polymeric resinous material strip element and a substantially rigid metallic backing plate;

FIG. 2 is a partial perspective view showing the elongated polymeric resinous material strip element assembled into a jig fixture shown in FIG. 1;

FIG. 3 is a cross-sectional area showing operative components of the apparatus of FIG. 1 as they are situated during the heating cycle of the assembly method according to this invention; and,

FIG. 4 is similar to FIG. 3 showing the operative components as they are situated during the cooling cycle of the assembly method according to this invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

As stated, this invention provides a decorative trim strip assembly having a laterally curved portion formed therein, where the decorative trim strip assembly com-

prises a substantially rigid metallic backing plate 12 and an elongated polymeric resinous material strip element 14. The metallic backing plate 12 has a substantially planar face 16 (the underside of the backing plate 12 as shown in FIG. 1), and has a laterally curved portion 18 formed therein where the curve is to the desired configuration. As seen from FIG. 1, the backing plate 12 is laterally curved in the portion 18 in a plane which is parallel to the substantially planar face 16.

The elongated polymeric resinous material strip element 14 has substantially greater width than thickness, as indicated by the designations "W" and "T" in FIG. 1. The strip element 14 has a substantially planar first surface 20 and the opposite surface 22 to the first surface 20. The desired decorative appearance and surface contour. Obviously, the decorative appearance and surface contour of the surface 22 of the plastic strip element 14 may be such as is desired by the vehicle designer.

At least one longitudinal slit 24 is formed in the plastic strip element 14; and as will be seen hereafter, the longitudinal slit 24 is formed so as to be from a place 26 which is situated beyond a first end of the curved portion 18 which will be formed in the plastic strip when it is assembled to the backing plate 12. The longitudinal slit 24 extends around the curve to the end of the strip element 14 which is remote from the first end of the curve 18 where the slit has started.

Referring now specifically to FIG. 1, an apparatus is shown in which the decorative trim assembly of the present invention is made, and within which the assembly method of the present invention is carried out. That apparatus, designated generally at 30, has a fixed base plate 32 and a movable upper plate 34, which moves upwards and downwards along guide rods 36, two of which are shown. The driving force for the upper plate 34 is transferred to it by such as a rod 38 secured to the drive cylinder (not shown).

Extending through the upper plate 38 and electrically insulated from it are electrodes 40, three of which are shown in the apparatus of FIG. 1, which number is generally sufficient for purposes of the present invention. The electrodes 40 may conveniently be attached to a source of low voltage, high current electricity, such as a pair of series transformers or a centre-tape transformer, by wires 42 from the two outer electrodes and wire 44 from the inner electrode which goes to the centre tap or the common connection between the series transformers. Of course, any suitable source of electric power may be used, in keeping the ordinary skill

Beneath the undersurface of the upper plate 34, there are located a number of cooling blocks 46. The exact number and spacing of the cooling blocks 46 is determined by the size and configuration of the trim strip to be assembled; and in the embodiment shown, there are a number of gaps 48 between the cooling blocks 46 which accommodate the connector stems or tongs 50 formed in the backing plate 12.

On the bottom plate 32, there is a jig fixture 52, which has formed in its upper face 54 the configuration of the lateral curve 18 which is desired for the decorative trim strip assembly being made, and the upper face of the jig fixture 52 is conveniently contoured in such a manner as to accommodate the surface contour 22 of the polymeric resinous material strip element 14.

A number of hold-down elements 56 are rotatably mounted above the bottom plate 32, on either side of the

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