



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US99/24152</p> <p>(22) International Filing Date: 15 October 1999 (15.10.99)</p> <p>(30) Priority Data: 09/174,270 16 October 1998 (16.10.98) US</p> <p>(71) Applicant: LEAR AUTOMOTIVE DEARBORN, INC. [US/US]; 21557 Telegraph Road, Southfield, MI 48034 (US).</p> <p>(72) Inventors: DAVIS, Joseph, J., Jr.; 2935 Auten Road, Ortonville, MI 48462 (US). O'BRIEN, Timothy, F.; 1321 Corey Cove, White Lake, MI 48383 (US).</p> <p>(74) Agent: MOLNAR, John, B.; MacMillan, Sobanski &amp; Todd, LLC, One Maritime Plaza, 4th floor, 720 Water Street, Toledo, OH 43604 (US).</p>		<p>(81) Designated States: CA, JP, MX, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: TWO-TONE MIRROR HOUSING</p>		
<p>(57) Abstract</p> <p>A mirror housing is formed of two colors in a two-stage molding process. An inlay (26) of the first color is inserted into a mold, and plastic (22) of a second color is molded to surround the inlay. In this way, a two-toned mirror housing is formed without the necessity of painting or masking.</p>		

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## TWO-TONE MIRROR HOUSING

### BACKGROUND OF THE INVENTION

5 This invention relates to the use of a two-step molding process to develop a two-toned mirror housing.

All vehicles have outside rear-view mirrors mounted for use by the driver. Known rear-view mirrors have a forward reflective face and a housing which receives the reflective face, and any associated motors, *etc.* The housings are typically colored to blend with the color of the vehicle exterior. However, in some instances, the housing may be of two distinct colors. As an example, in a vehicle with a first predominant body color, but a second trim color, the mirror housings may sometimes desirably include both the predominant body color and the trim color. This type of dual color often requires there be a central location in the outer mirror housing which is of a distinct color. This is known as a "skull cap" in the industry. To date, the skull caps on mirror housings have been created by masking the portions of the mirror housing, and painting unmasked parts to achieve the two distinct colors.

Masking and selective painting are complex operations in large assembly installations. It would be desirable to reduce the complexity of forming a two-toned mirror housing.

It is known to mold parts in successive steps to create distinct colors. However, this technology has not been applied to mirror housings to date.

### SUMMARY OF THE INVENTION

25 In a disclosed embodiment of this invention, a two-stage molding process is

utilized to form a two-toned mirror housing. In a first stage, an inlay is created of a first color. The inlay is placed into a mold, and plastic of a second color surrounds the inlay. The second plastic bonds to the inlay and creates the mirror housing.

The mirror housing now has its "skull cap" and no painting or masking is required. The inlay may be first molded in the same mold that is utilized to form the overall housing, or can be molded at a separate location.

The present invention eliminates many of the steps for forming a two-toned mirror housing, and thus provides benefits over the prior art. These and other features of the present invention can be best understood from the following specification and drawings, the following of which is a brief description.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1A shows a mirror housing incorporated in the present invention.

Figure 1B is a cross-sectional view.

Figure 2A shows a first step in forming the inventive mirror housing.

Figure 2B shows a subsequent step.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

A mirror housing 20 is illustrated in Figure 1A. Mirror housing 20 includes a main outer area 22 associated with a mounting stem 24. A central area 26 is shown separated from the main area 22. It should be understood that Figure 1A is from the rear of the mirror, and does not show its reflective surface. The reflective surface is facing into the plane of Figure 1A.

Figure 1B shows the reflective surface 27 and the areas 22 and 26. Internal structure of the mirror housing is omitted for simplicity.

The plastic areas 22 and 26 are formed of different colored plastic which are molded together to form the housing 20. This reduces the complexity of forming a two-toned mirror housing, as described above.

One possible method for forming the mirror housing is schematically shown in Figures 2A and 2B. It should be understood that many distinct types of two-stage molding techniques are now known, and could also be utilized to form this invention.

As an example, as shown in Figure 2A, a schematic molding assembly 28 includes a first mold bottom 30 and a mold top 32. The molds 30 and 32 define a mold chamber 34 into which plastic is injected to form an inlay 35.

As shown in Figure 2B, the mold bottom 30 is then indexed to a second mold station with the inlay 35 remaining in the mold 38. A new top mold 36 then defines a second mold chamber 38 surrounding the inlay 35. The plastic 39 injected into chamber 38 bonds to the inlay 35 to form the mirror housing 20.

By utilizing this invention, the present invention reduces the steps necessary to form a two-color mirror housing. No time consuming and expensive masking or painting is required.

A preferred embodiment of this invention has been disclosed, however, a worker of ordinary skill in the art would recognize that certain modifications come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.

CLAIMS

## WHAT IS CLAIMED IS:

1. A mirror housing comprising:
  - (1) a mirror housing body formed from a material having a first color;
  - 5 and
  - (2) an inlay molded into said mirror housing body, said inlay being formed from a material having a second color with said second color being different from said first color.
- 10 2. A mirror housing as recited in Claim 1 wherein a portion of said inlay is visible, such that the mirror housing has a two-tone appearance.
3. A mirror housing as recited in Claim 2 wherein said mirror housing body completely surrounds said inlay.
- 15 4. A mirror housing as recited in Claim 3 wherein said material forming said mirror housing body is a plastic.
5. A mirror housing as recited in Claim 4 wherein said material forming said insert is a plastic.
- 20 6. A mirror housing as recited in Claim 5 wherein said mirror housing body includes a post.
- 25 7. A method of forming a mirror housing comprising the steps of:
  - (a) providing a mold;
  - (b) placing an inlay formed from a material having a first color in the mold; and
  - (c) molding a material having a second color around the inlay with the

material having the second color bonding to the inlay to form a two-toned mirror housing.

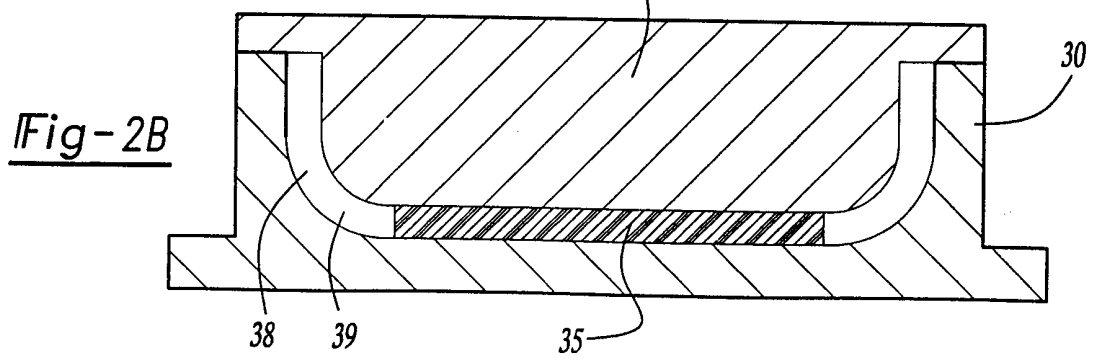
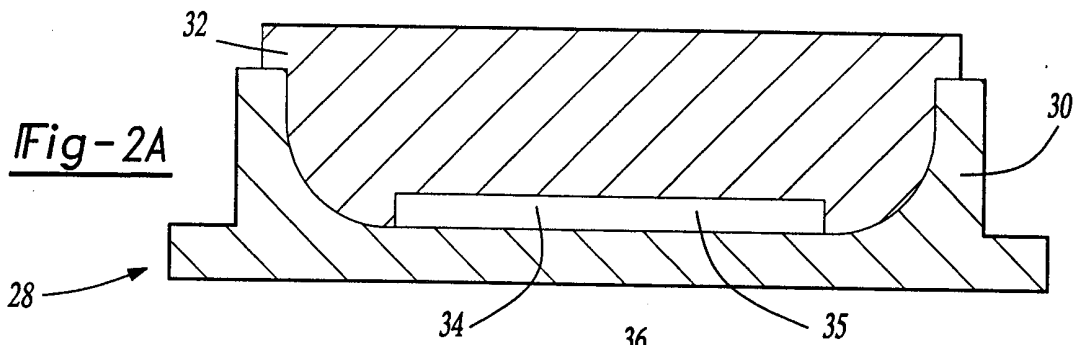
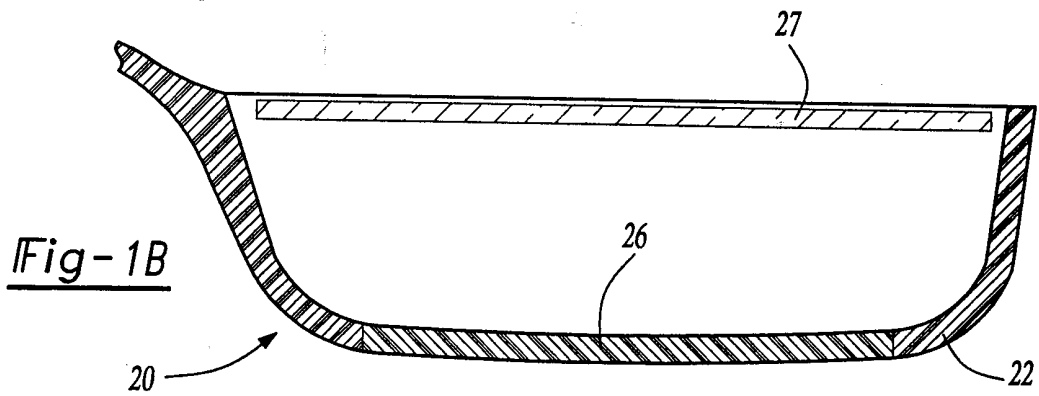
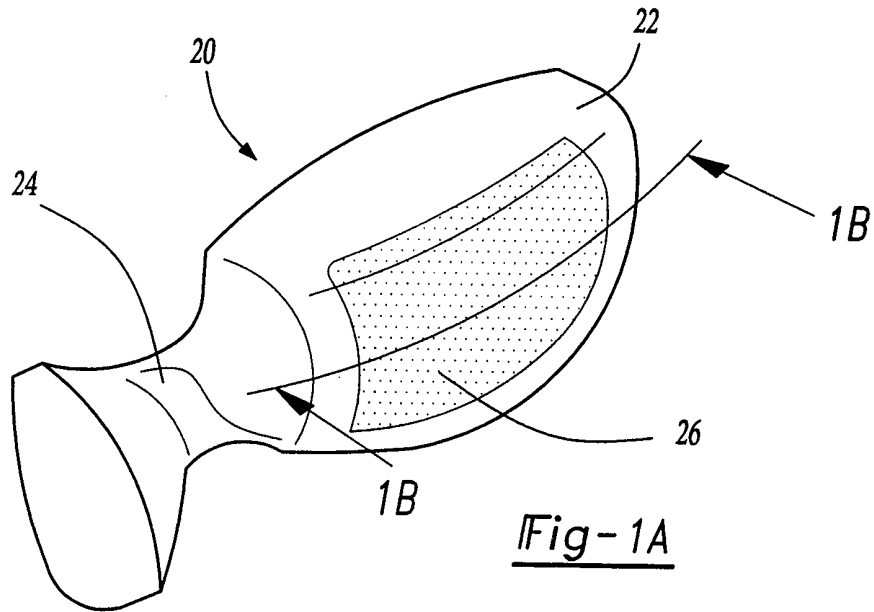
8. A method as recited in claim 7 wherein the material having the  
5 second color is a plastic.

9. A method as recited in claim 8 wherein the material having the first  
color is a plastic.

10. A method as recited in claim 7 wherein a reflective surface is  
10 attached to the mirror housing.

11. A method as recited in claim 7 wherein the inlay is molded in a  
two-stage process.

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# INTERNATIONAL SEARCH REPORT

national Application No <b>PCT/US 99/24152</b>
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**A. CLASSIFICATION OF SUBJECT MATTER**  
**IPC 7 B60R1/06**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
**IPC 7 B60R**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	GB 1 129 088 A (JOHN ANTHONY DAY) * The whole document * ---	1,4,7,10
A	DE 197 28 704 A (DONNELLY CORP) 22 January 1998 (1998-01-22) * Abstract * claim 1 ---	1,4,7,10
A	US 4 436 371 A (DONNELLY MIRRORS INC.) 13 March 1984 (1984-03-13) * Abstract * claim 23; figures 5,6 ---	1,4,7,10
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Further documents are listed in the continuation of box C.       Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search  <b>20 March 2000</b>	Date of mailing of the international search report  <b>28/03/2000</b>
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# INTERNATIONAL SEARCH REPORT

1. national Application No

PCT/US 99/24152

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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