(12) UK Patent Application (19) GB (11) 2 353 245 (13) A

(43) Date of A Publication 21.02.2001

(21) Application No 9919654.5

(22) Date of Filing 20.08.1999

(51) INT CL[7]
B29C 45/17 45/14 45/16

(52) UK CL (Edition S)
B5A AD28 A1R214A A1R214F A1R214H A1R314C1A A1R314C1C A1R314C1F A1R314C3 A1R411 A1R422 A2A3 A2E9 A2G A2H5 A2X A20T14 A20T16

(56) Documents Cited
GB 2039215 A EP 0636465 A1 US 4968474 A

(58) Field of Search
UK CL (Edition Q) B5A AB19 AD28 AT14M AT14P
INT CL[6] B29C 39/12 41/22 45/14 45/16 45/17
Online: WPI EPODOC JAPIO

(71) Applicant(s)
Rover Group Limited
(Incorporated in the United Kingdom)
International Headquarters,
Warwick Technology Park, WARWICK, CV34 6RG,
United Kingdom

(72) Inventor(s)
Robert John Coates
Americk Singh Loha

(74) Agent and/or Address for Service
Bromhead & Co
150 Regent Street, LONDON, W1R 5FA,
United Kingdom

(54) Abstract Title
A moulding technique

(57) Presently, if a chrome finished door handle is required there are a number of options that may be considered. A door handle can be produced from a metal and be provided with a chrome finish. However, such an approach is relatively expensive. Another solution is to provide a chrome plating to a plastics door handle. However, the cost of a chrome plated plastics handle can be twice as much as the cost of a plastics handle.

A method is disclosed in which a first liquid polymer 20, a second liquid polymer 22 and a gas 24 are sequentially back injected into a cavity containing an insert 8, the insert having a chrome or chrome effect outer surface 4. The method has a number of advantages. For example, the use of a gas to urge the liquid polymers during forming means that a gas bubble is formed in the component during moulding. As a result, the component is more lightweight than a solid moulding of comparable size.

Upon cooling, the first polymer 20 is relatively soft whilst the second polymer 22 is relatively hard.

FIG. 2

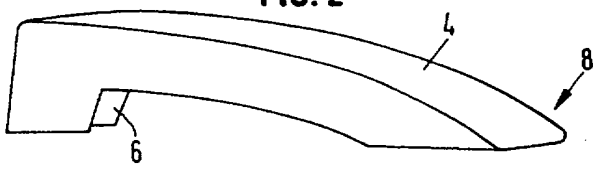
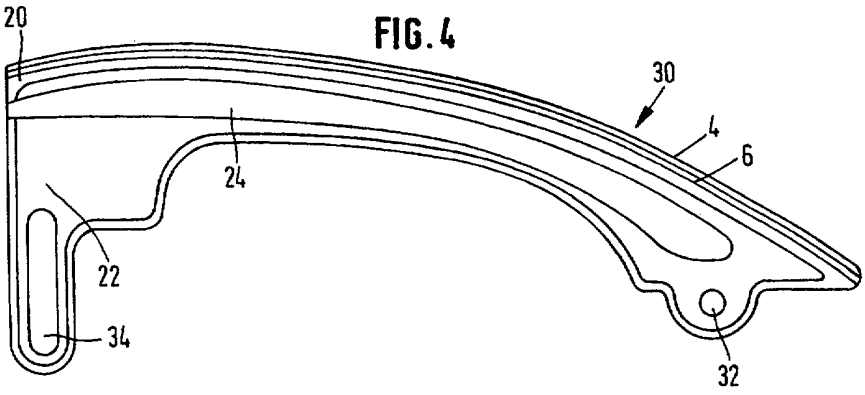


FIG. 4



GB 2 353 245 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

FIG. 1

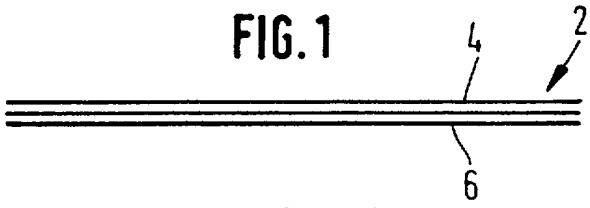


FIG. 2

FIG. 3

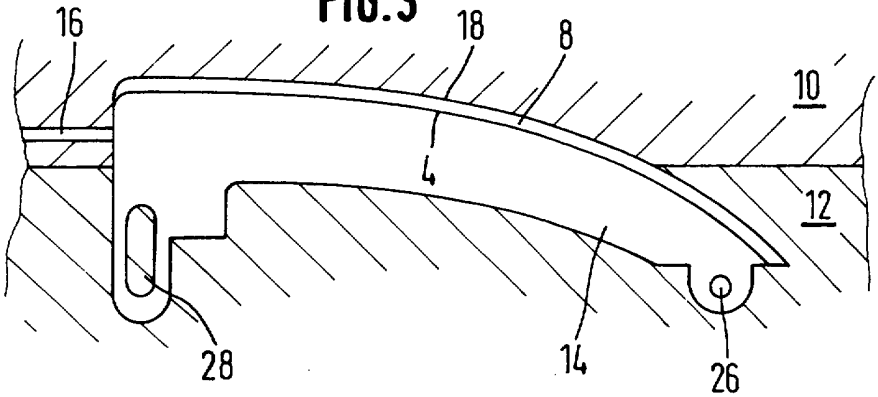


FIG. 4

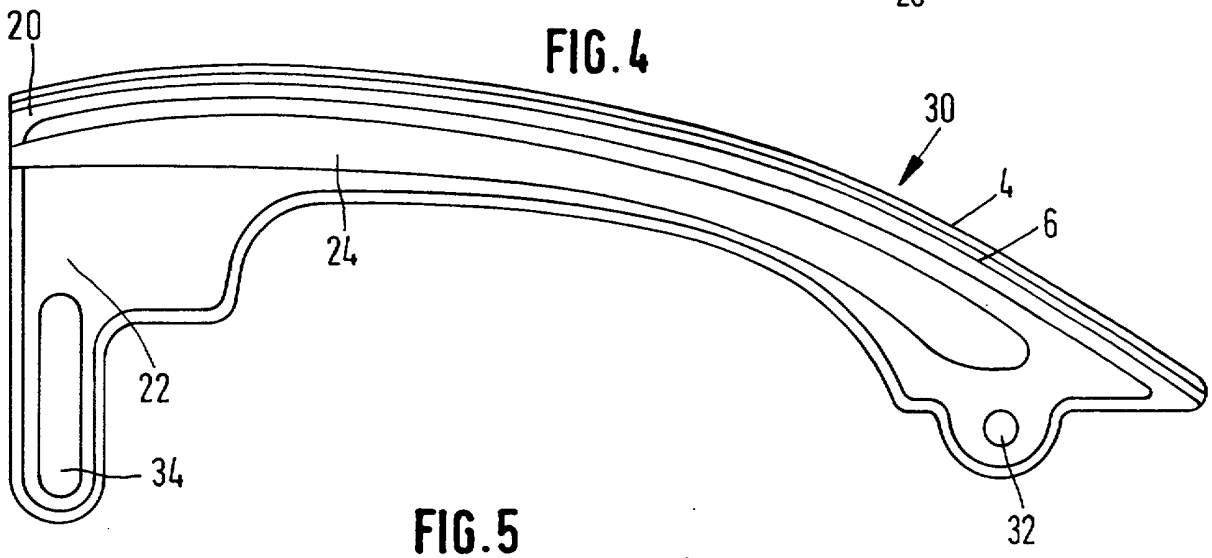
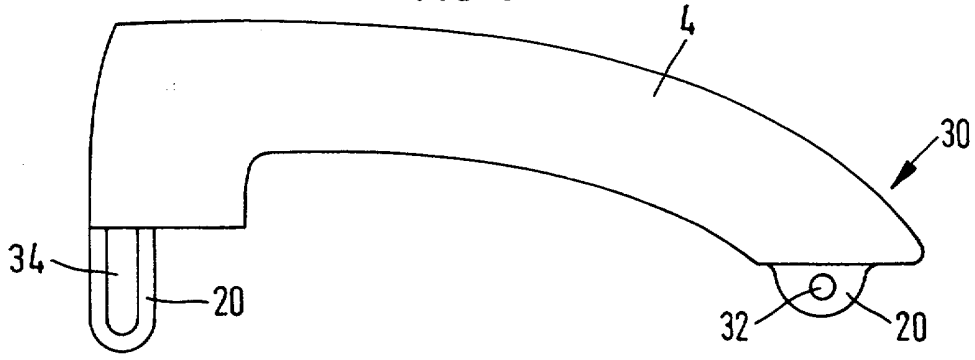


FIG. 5



Manufacturing Method

The present invention relates to a manufacturing method for the production of a motor vehicle component and to a motor vehicle component produced thereby.

The present invention may be used to manufacture improved vehicle trim components such as door handles.

Presently, if, for example a chrome finished door handle is required there are a number of options that may be considered.

A door handle can be produced from a metal, for example by casting, and be provided with a chrome finish. However, not only is such an approach relatively expensive, it will also add weight to a vehicle in comparison to the plastics handles commonly currently favoured by motor vehicle manufacturers. It will be understood that for reasons of fuel economy that motor vehicle manufacturers are unwilling to add extra weight to a motor vehicle without good justification.

One solution to this problem is to provide a chrome plating to a plastics door handle. However, the cost of plating each door handle is generally as much again as the cost of producing the plastics door handle itself. In other words, the cost of a chrome plated plastics handle is generally twice as much as the cost of a plastics handle.

Also, conventionally moulded plastics handles can include unwanted sink marks or other surface defects. Such defects can be emphasised once the handles have been plated. It would be undesirable to use such a plated handle of such quality on a production motor vehicle.

It is an advantage of the present invention that it eliminates, or at least substantially reduces, the problems identified above.

According to a first aspect of the present invention, a method of manufacture of a motor vehicle component comprises the steps of:

providing an insert, the insert having a front surface layer and a rear surface layer;

providing a split mould defining a mould cavity;

locating the insert in the mould cavity, the front surface layer of the insert being adjacent a surface of the mould cavity;

injecting sequentially a first liquid polymer which on cooling is relatively soft, a second liquid polymer which on cooling is relatively hard and finally a gas through a common sprue, such that the second liquid polymer is urged to force the first liquid polymer to spread and cover an exposed portion of the mould cavity surface and the rear surface layer of the insert, the gas creating a cavity within the second liquid polymer;

allowing the liquid polymers to cool to form the component; and then

removing the component from the mould.

This method has a number of advantages. For example, the use of a gas to urge the liquid polymers during forming means that a gas bubble is formed in the component during moulding. As a result, the component is more lightweight than a solid moulding of comparable size. Other advantages of the present invention are made clear below.

Preferably, the insert is obtained by forming a skin material, the skin material comprising the front surface layer and the rear surface layer, and subsequently trimming the formed skin material to form an insert of a desired shape.

Preferably, the front surface layer of the skin material comprises a chrome or a chrome effect material. In this way a chrome finish can be produced as an integral step of the manufacturing process reducing the time to produce the chrome covered component and the cost of producing a component having a chrome finish.

Alternatively, the front surface layer of the skin material comprises a paint material. This enables a painted finish to be produced by the method of the present invention.

Preferably, the second liquid polymer includes a reinforcement. This reinforcement may comprises fibres, for example glass fibres.

According to a second aspect, the present invention comprises a motor vehicle component produced in accordance with the first aspect of the present invention.

The invention will now be described, by way of example only, with reference to the accompanying Figures, in which:

Figure 1 shows a side section of a skin material for use in the present innovation;

Figure 2 shows a side view of a formed skin material insert;

Figure 3 shows a side section of a suitable mould apparatus for use in the present invention;

Figure 4 shows a side section of a component produced in accordance with the present invention; and

Figure 5 shows a side view of the component of Figure 4.

Referring to Figure 1, there is shown a sheet of a skin material 2 for use in the present invention. The skin material 2 comprises an upper layer 4 and a lower layer 6. The upper layer 4 of the skin material preferably comprises a chrome or a chrome effect material. Alternatively, the upper layer 4 may comprise a paint material. The lower layer 6 of the skin material is of a material compatible with a first polymer to be described below. Where the first polymer is a polypropylene, the lower layer is preferably a thermopolyolefin (TPO). Where the first polymer is an ABS polymer, the lower layer is preferably also an ABS polymer.

The sheet of skin material 2 is then thermoformed to a desired shape. This achieved by placing a heated sheet of the skin material 2 on a mould and then vacuum forming the skin material to form an insert 8 of a desired shape (Figure 2). Any spare material of the sheet not forming part of the insert is removed by trimming prior to the next step of the method.

A moulding apparatus is provided. Conveniently, the moulding apparatus comprises a first mould part 10 and a second mould part 12 (Figure 3). A mould cavity 14 having an interior surface 18 is defined between the first and second mould parts. A sprue 16 opens into the mould cavity to allow liquid polymer or the like to be injected under pressure in to the mould cavity.

Bosses or similar relief protrusions are provided in the mould cavity to form openings in the finished product. In the illustrated embodiment, a first relief 26 is provided to form an opening 32 about which the finished component may pivot at a first end of the finished component 30 and a second relief member 28 is provided to form a guide opening 34 at a second end of the finished component 30 to limit the degree to which the finished component may pivot.

The insert 8 is placed in the mould cavity such that the upper layer 4 of the insert is placed adjacent a portion of the interior surface 18 of the mould cavity 14. The insert 8 is so located that it does not obscure or otherwise block the sprue 16.

The mould cavity 14 is closed. A first liquid polymer 20 is injected through the sprue into the mould. A second liquid polymer 22 is subsequently injected behind the first liquid polymer 20. Then, a gas 24 is injected through the sprue 16 behind the second liquid polymer 22. This has the effect of spreading the first liquid polymer 20 over the lower layer 6 of the insert and that portion of the surface 18 of the mould cavity 14 not covered by the insert 8. The gas 24 spreads the second liquid polymer 22 such that it forms a lining over an inner surface of the first liquid polymer 20 (Figure 4).

The gas 24 may conveniently comprise compressed air.

By packing out the middle of the moulding with the gas 24 it is possible to avoid the formation of sink marks and other unwanted defects at an outer surface of the finished component. In addition, the use of gas injection in the moulding process reduces the final weight of the finished component. Also, because of the reduction in the amount of raw materials used, the cost of producing the finished component is reduced in comparison with a solid moulding of similar size.

On cooling, the first polymer provides a relatively soft layer to the finished component, and the second polymer provides a relatively hard layer to the finished component. This enables the provision of a structural substrate, the second polymer, covered by a skin suitable for cosmetic finishing, the first polymer. In this way the problem of providing a single material having both the required mechanical performance and cosmetic finish acceptable to a user of the motor vehicle is avoided. The skin and substrate ratio can be varied to produce an optimum skin thickness or optimum core thickness as required, for example at any sealing edges of the finished component.

In a preferred embodiment, the first liquid polymer 20 comprises a polypropylene which is compatible with a TPO backed skin material. In a preferred embodiment, the second liquid polymer 22 comprises a glass filled nylon. This will provide an inner layer of suitable strength and stiffness for the finished component.

The first and second liquid polymers are allowed to cool. Once the finished component 30 has sufficient integrity, the mould assembly is opened to allow removal of the finished component (Figure 5).

CLAIMS

1. A method of manufacture of a motor vehicle component comprising the steps of:
providing an insert, the insert having a front surface layer and a rear surface layer;
providing a split mould defining a mould cavity;
locating the insert in the mould cavity, the front surface layer of the insert being adjacent a surface of the mould cavity;
injecting sequentially a first liquid polymer which on cooling is relatively soft, a second liquid polymer which on cooling is relatively hard and finally a gas through a common sprue, such that the second liquid polymer is urged to force the first liquid polymer to spread and cover an exposed portion of the mould cavity surface and the rear surface layer of the insert, the gas creating a cavity within the second liquid polymer;
allowing the liquid polymers to cool to form a component; and
then removing the component from the mould.

2. A method according to claim 1, characterised in that the insert is obtained by forming a skin material, the skin material comprising the front surface layer and the rear surface layer, and subsequently trimming the formed skin material to form the insert.

3. A method according to claim 1 or claim 2, characterised in that the front surface layer of the skin material comprises a chrome or a chrome effect material.

4. A method according to claim 1 or claim 2, characterised in that the front surface layer of the skin material comprises a paint material.

5. A method according to any previous claim, characterised in that the second liquid polymer includes a reinforcement.

6. A method according to claim 5, characterised in that the reinforcement comprises fibres.

7. A method according to claim 5, characterised in that the fibres are glass fibres.

8. A method substantially as described herein with reference to and illustrated in the accompanying drawings..

9. A motor vehicle component produced according to the method of any previous claim.

10. A motor vehicle component substantially as described herein with reference to and as illustrated in Figures 4 and 5.

Application No: GB 9919654.5 **Examiner:** Monty Siddique
Claims searched: 1-9 **Date of search:** 23 December 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B5A (AB19, AD28, AT14M, AT14P)

Int Cl (Ed.6): B29C 39/12 41/22 45/14 45/16 45/17

Other: Online: WPI EPODOC JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB 2039215 A	(SOCIETE DELSAY) page 2 lines 91-114	1 at least
A	EP 0636465 A1	(REYDEL)	
Y	US 4968474	(TOYODA) column 5 lines 1-40 etc.	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.