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(54) **Manufacturing method of a door unit, in particular a door unit for a laundry treating machine**

(57) The present invention relates to a manufacturing method of a door unit, in particular a door for a laundry treating machine, and to a door unit so manufactured.

A manufacturing method of a door unit according to the invention is **characterized by** comprising the following steps:

- Providing a latch support (114) and a hinge support (115) in a mould;
- Blow injecting a polymeric mass in said mould and incorporating the latch support (114) and the hinge support (115) in a unitary hollow body (111);
- Associating a latch (106) onto said latch support (114) and a hinge (104) onto said hinge support (115);

A door unit manufactured by said method and a laundry treating machine provided with such door are also disclosed.

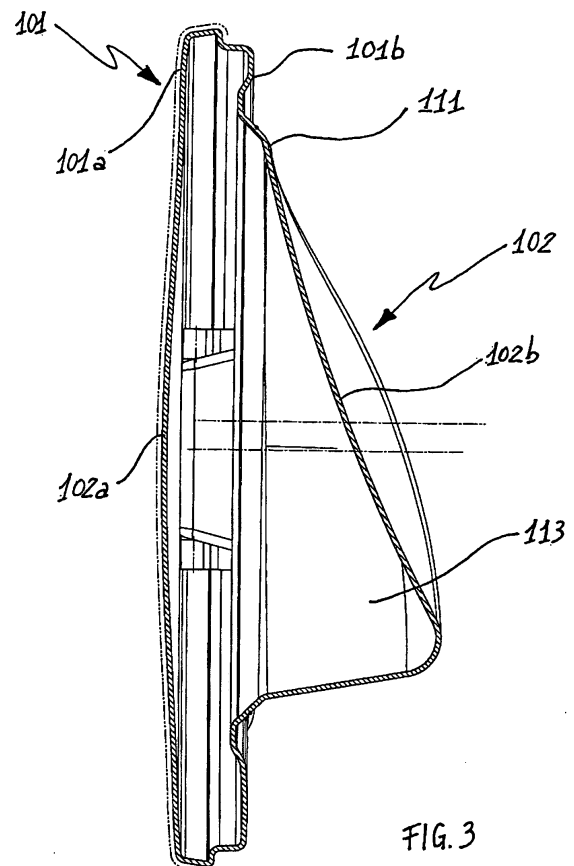


FIG. 3

Description

[0001] The present invention relates to a manufacturing method of a door unit, in particular a door for a laundry treating machine, and to a door unit so manufactured.

[0002] Door units for a laundry treating machine of known type generally comprise a frame structure, hingedly associated to the appliance cabinet, surrounding a window body. In figure 1 it is shown a door unit of known type.

[0003] With reference to Figure 1, a door unit of the known type comprises a frame structure 1 formed by a front member 1a and a rear member 1b, both being made by polymeric material and having a substantially annular shape. A window body 2 is attached to the frame structure 1 by interposing an edge region of the body 2 between the front and rear member 1a, 1b of the frame structure 1 that are fixed one onto the other by a plurality of screws 3. Window body 2 comprises an outer portion 2a and an inner portion 2b, the latter being in the form of a glass bowl. Outer portion 2a is in the form of a cover disc, usually made of transparent polymeric material, which is connected to the inner portion 2b through snap fastening means or sliding connections thereby forming a cavity therebetween. A hinge 4 is pivotally associated to the rear member 1b of the frame through a pivot 5, and a latch 6 is provided opposite to hinge 4 for securely close the door unit. Latch 6 comprises a lever 7 pivotally mounted onto the rear member 1b through a pivot 8 to drive locking means 9 against the force of a biasing element 10. Lever 7 protrudes from the front member 1a so as to be grasped by a user when the door unit has to be opened or closed.

[0004] A drawback of such known door unit consists in that its manufacturing process requires two moulds to form the polymeric front and rear member 1a, 1b of the frame structure 1 and a further mould to form cover disc 2a of the window body 2. This causes the manufacturing plant to be rather complicated other than costly. In addition, the inner portion 2b, being usually made of glass, requires a further plant to be made.

[0005] Another drawback of prior art door unit of Figure 1 consists in that the high number of parts of the door unit complicates the assembling procedure and, at the same time, increases the risk of assembling errors with a consequent number of discarded units.

[0006] A further disadvantage of the prior art door unit is that its manufacturing process is quite long to be carried out. For example at least eight screws 3 must be screwed for fixing the frame members 1a, 1b together, which is particularly tiresome.

[0007] Still another drawback of a door unit of known type is that joined parts necessarily present junctions lines where dirt can undesirably accumulate.

[0008] The aim of the present invention is therefore to solve the noted drawbacks and thus providing a manufacturing method of a door unit, in particular a door unit for a laundry treating machine, that is easier and quick

to be carried out compared to known methods.

[0009] An object of the present invention is therefore to reduce number of parts composing the door unit and simplify their assembling operations.

[0010] A further object of the invention is to provide a manufacturing method of a door unit that allows to produce a higher number of doors per unit of time compared to methods known in the art, avoiding, as far as possible, the need of fastening means like screws or weldings.

[0011] A further object of the invention is to provide a manufacturing method of a door unit requiring a relatively small number of steps to be completed.

[0012] Another object of the invention is to provide a door unit having an improved construction that reduces dirty accumulation and that is easy to clean.

[0013] Still another object of the invention is to provide a door unit which is lighter than known doors.

[0014] Advantages, objects, and features of the invention will be set forth in part in the description and drawings which follow and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realised and attained as particularly pointed out in the appended claims.

[0015] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate possible embodiments of the invention and together with the description serve to explain the principles of the invention. In the drawings:

[0016] Figure 1 shows, in an exploded view, a prior art door unit for a laundry treating machine;

[0017] Figure 2 shows a rear view of a door unit according to the invention with an enlarged view D of a bushing seat;

[0018] Figure 3 shows a sectional view taken along line III-III in Figure 2;

[0019] Figure 4 shows the door unit of Figure 2 in a step of its production;

[0020] Figure 5 shows the door unit of Figure 2 in a further step of its production with an enlarged view E of a bushing;

[0021] Figure 6 shows the door unit of Figure 2 in another step of its production;

[0022] Figures 7A and 7B show details of door hinge connections;

[0023] With reference to figures 2 and 3, the present manufacturing method of a door unit, in particular a door unit for a laundry treating machine, comprises a initial step of forming a polymeric, unitary and hollow body 111 by means of blow injection moulding technique.

[0024] Blow injection moulding is well known in the art of plastics forming as a method for producing polymeric hollow bodies like bottles and containers. Such technique, in general, comprises a first phase of melting down a polymeric material mass and forming it into a preform having a rough hollow shape. A pressurized gas, usually

air, is used to expand said preform of hot plastics and press it against a conjugated mould cavity. Gas pressure is held until the plastic cools and hardens and then it is exhausted. At this point a unitary, hollow body is ejected from the mould.

[0025] Figure 2 and 3 shows as the door unit body 111 comprises a unitary hollow structure differing from the prior art door unit shown in Figure 1 in that the frame structure 101 and the window body 102 are made in a single piece, without any joining interfaces. The shape of the body 111 defines a cavity 113 limited by a bulging inner portion 102b, adapted to protrude inside a laundry treating chamber of a laundry machine, an outer portion 102a and an annular region 101. The door unit body 111 may be made of transparent plastics so as to allow a user to see through the door unit. However, if desired, opaque plastics may be used. The annular portion 101 comprises a front part 101a and a rear part 101b forming a unitary, i.e. single piece wall of the hollow body 111.

[0026] On an edge region of the body 111, i.e. on the perimetrical annular portion 101 thereof, a latch support 114 and a hinge support 115 are provided, preferably on opposite sides of the annular portion 101. In order to incorporate, i.e. embedding the latch and hinge supports 114, 115 in the unitary door body 111 to form a single piece, they are made by moulding a polymeric material independently on the door unit manufacturing steps so as to be at disposal when the door unit production is started. The material of the latch and hinge supports 114, 115, which is preferably a polymeric material, may be different from that of the hollow body 111 but it must be suitable to ensure a stable and reliable adhesion to said body 111.

[0027] Therefore, in the initial step of the door unit manufacturing method, latch and hinge supports 114, 115 are placed in appropriate seats provided in the door unit mould. Then, blow injection moulding is started following the above mentioned, and known per se, technique.

[0028] Hinge support 115 comprises a couple of bushing seats 116 each having a cup-like shape and a first opening 117 extending in a wall of the bushing seat 116 along a longitudinal direction Y thereof as better shown in the enlarged view named "Detail D" in Figure 2.

[0029] When a hollow body 111 embedding latch and hinge supports 114, 115 is formed, a latch 106 and a hinge 104 are associated, respectively, to the latch and hinge supports 114, 115, as disclosed in Figures 4-7B. In particular, latch 106, which is known per se and may be the same described with reference to prior art door unit shown in Figure 1, has a lever 107 capable of rotating about a pivot 108 relative to the hollow body 111. Upon a rotation of the lever 107 locking means 109 is actuated to open and closing the door unit mounted on a cabinet of a laundry treating machine. Locking means 109 is rotatably movable against the force of a biasing member (not shown), like a spring, mounted between locking means 109 and lever 107.

[0030] With reference to Figures 4 and 5, according to

the invention, latch 106 is mounted onto its support 114 by placing lever 107 in a front part 101a of the hollow body 111. An aperture 118 is provided in a position adjacent to the latch support 114 for allowing locking means 109 to be passed through the hollow body 111 from the front part 101a to the rear part 101b, as it is shown in Figure 5. To complete the attachment of the latch 106 onto its support 114, a covering plate 119 is removably attached to the latch support 114 by means of screws 120. In this way, latch support 114 remains placed between the lever 107 and the covering plate 119. An aperture 121 is provided on the covering plate 119 to receive locking means 109.

[0031] In Figure 6, and particularly in "Detail E", it is shown how a hinge 104 is arranged onto its support 115. Hinge 104, known per se, may be of the same type of that described with reference to a prior art door unit shown in Figure 1. Hinge 104 is provided with a pivot 105 allowing rotation of the door unit relative to a cabinet on which the door is fixed trough hinge flaps 124 and fastening means not shown in Figure 6.

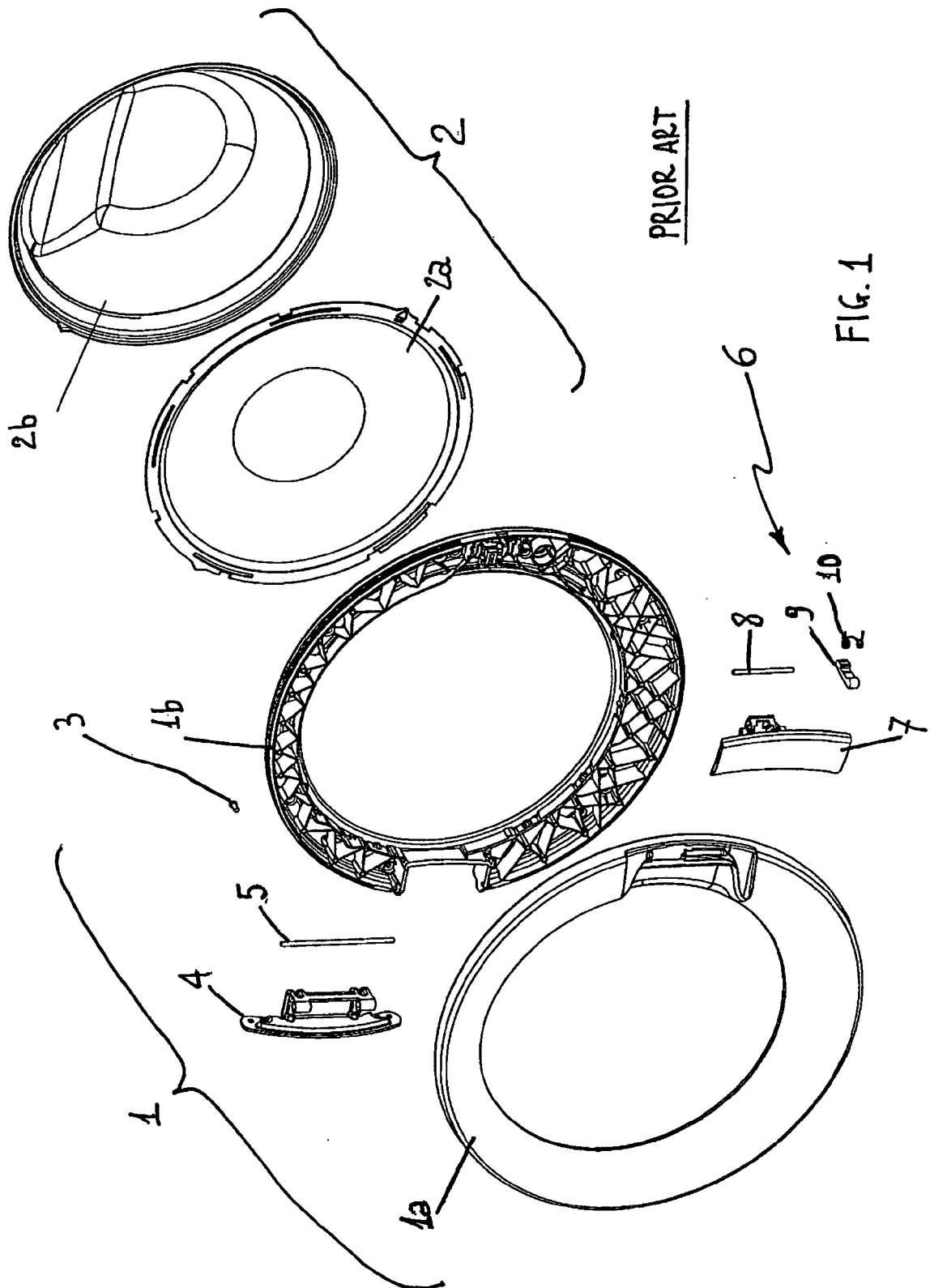
[0032] A couple of bushing 122 having a conjugated shape relative to the bushing seats 116 are inserted into the latter thereby forming a rotatable coupling. Each bushing 122 has a second longitudinal opening 123 extending along the longitudinal axis of the bushing 122 which coincides with axis Y (Figure 2) of the bushing seat 116 when bushing 122 is inserted into its seat 116. In the latter condition, opening 123 may be made superimposed onto the first opening 117 of the seat 116 by rotating manually the bushing 122 relative to the bushing seat 116. In such position pivot 105 can be received into each bushing 122.

[0033] An enlarged view of this condition is shown in "Detail E" and in Figure 7A. In order to removably attach the hinge 104 to the door unit each bushing 122 is rotated relative to its seat 116 such that the first opening 117 faces a wall portion of the bushing 122. In this second position (Figure 7B), pivot 105 is prevented from leaving its housing provided in each bushing 122. In this way door unit results to be rotatably coupled to the hinge 104.

[0034] Conclusively it can be stated that a manufacturing process according to the invention is quite cheap and allows a door unit, in particular a door unit for a laundry treating machine, to be produced with few easy steps. The same door unit may be produced with different surface finishing, in order to be adapted to different machines. For example, the door unit may comprise a transparent window, i.e. a window through which a user can see an object placed behind the door. In addition, front and rear part of the door unit may comprise polymeric materials having different mechanical properties, so as, for example. To improve door appearance in its front part or heat resistance in its rear part.

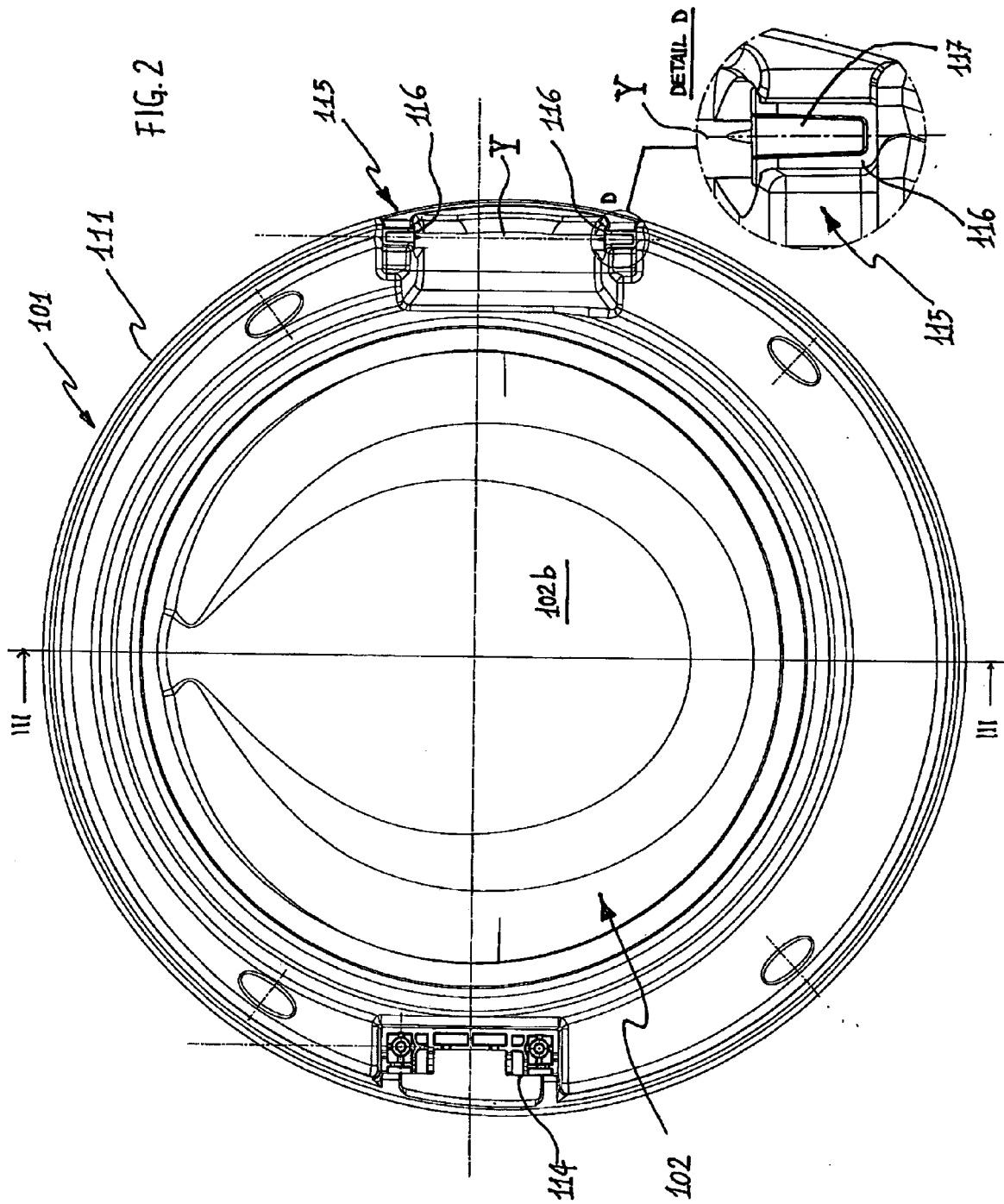
Claims

1. A manufacturing method of a door unit, in particular a door unit for a laundry treating machine, **characterized by** comprising the following steps:
 - a. Providing a latch support (114) and a hinge support (115) in a mould;
 - b. Blow injecting a polymeric mass in said mould and incorporating the latch support (114) and the hinge support (115) in a unitary hollow body (111);
 - c. Associating a latch (106) onto said latch support (114) and a hinge (104) onto said hinge support (115);
2. A manufacturing method of a door unit according to claim 1 wherein the association of the latch (106) onto said latch support (114) is carried out by arranging a lever (107) on said latch support (114) in a front part (101a) of the hollow body (111) and by arranging a covering plate (119) on said latch support (114) in a rear part (101b) of the hollow body (111) so as to clamp the latch support (114) therebetween.
3. A manufacturing method of a door unit according to claim 2 wherein said covering plate (119) is removably attached to the latch support (114) by screws (120).
4. A manufacturing method of a door unit according to any preceding claim wherein said hinge support (115) comprises bushing seats (116), each of them having a first longitudinal opening (117).
5. A manufacturing method of a door unit according to claim 4 wherein said step C) is carried out by inserting a bushing (122) having a second longitudinal opening (123) within each of said bushing seat (116) and by introducing a pivot (105) within the first and second openings (117, 123).
6. A manufacturing method of a door unit according to claim 5 wherein said bushing (122) is rotatably mounted in said bushing seat (116).
7. A manufacturing method of a door unit according to claim 5 or 6 wherein said bushing (122) is movable between a first position in which the first and the second openings (117, 123) are superimposed one onto the other and a second position in which said first opening (117) faces a wall portion of said bushing (122).
8. A door unit, in particular for a laundry treating machine, made by a manufacturing method according to any preceding claim **characterized in that** it comprises a single piece, hollow body (111) having a latch support (114) and a hinge support (115) embedded therein to form a single, unitary, piece.
9. A door unit according to claim 8 wherein said latch support (114) and a hinge support (115) are made of a first polymeric material and said hollow body (111) is made of a second polymeric material.
10. A door unit according to claim 8 or 9 comprising a window body (102) made of a transparent polymeric material.
11. A laundry treating machine comprising a door unit according to any claim 8 to 10.



PRIOR ART

FIG. 1



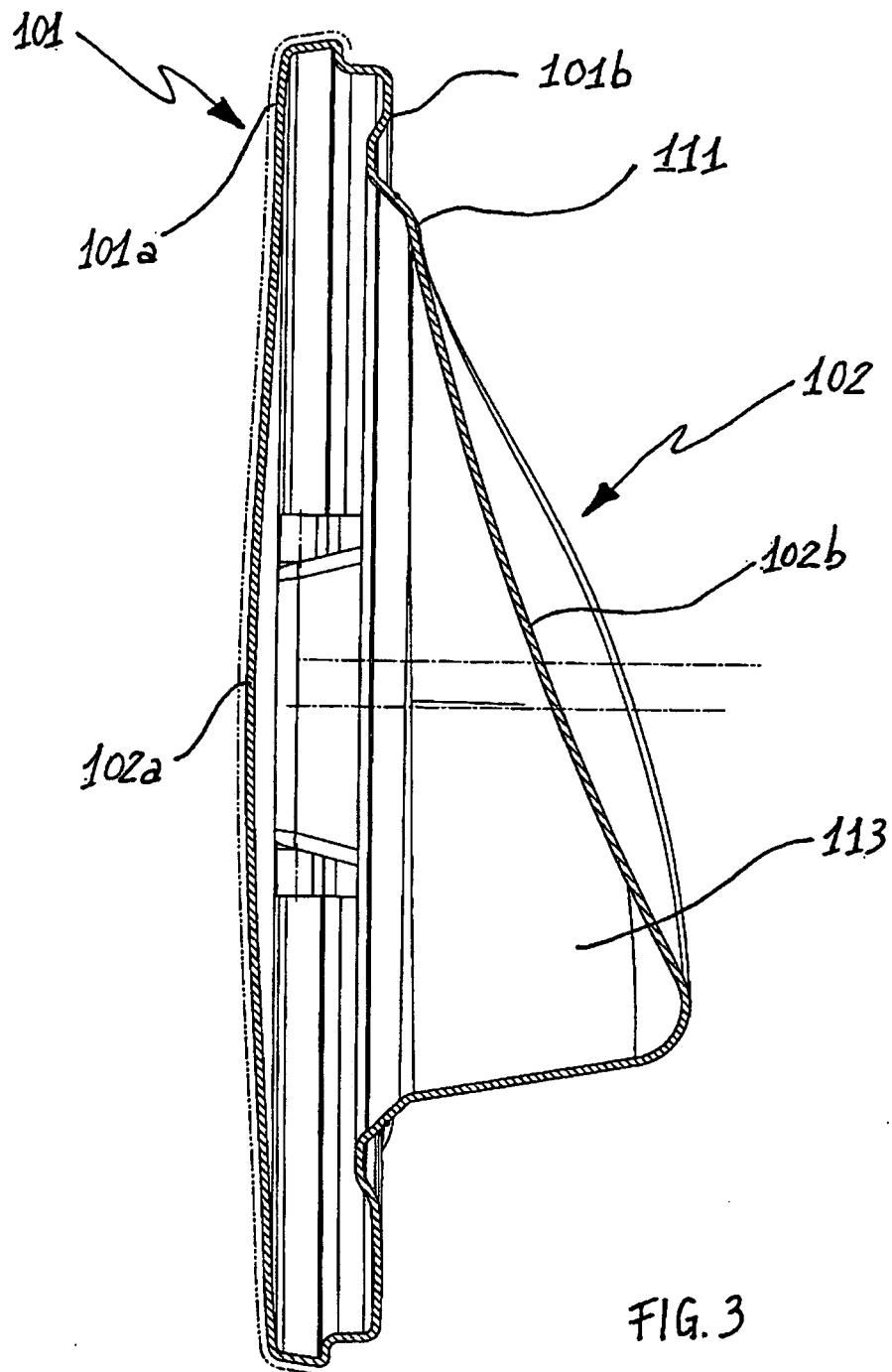


FIG. 4

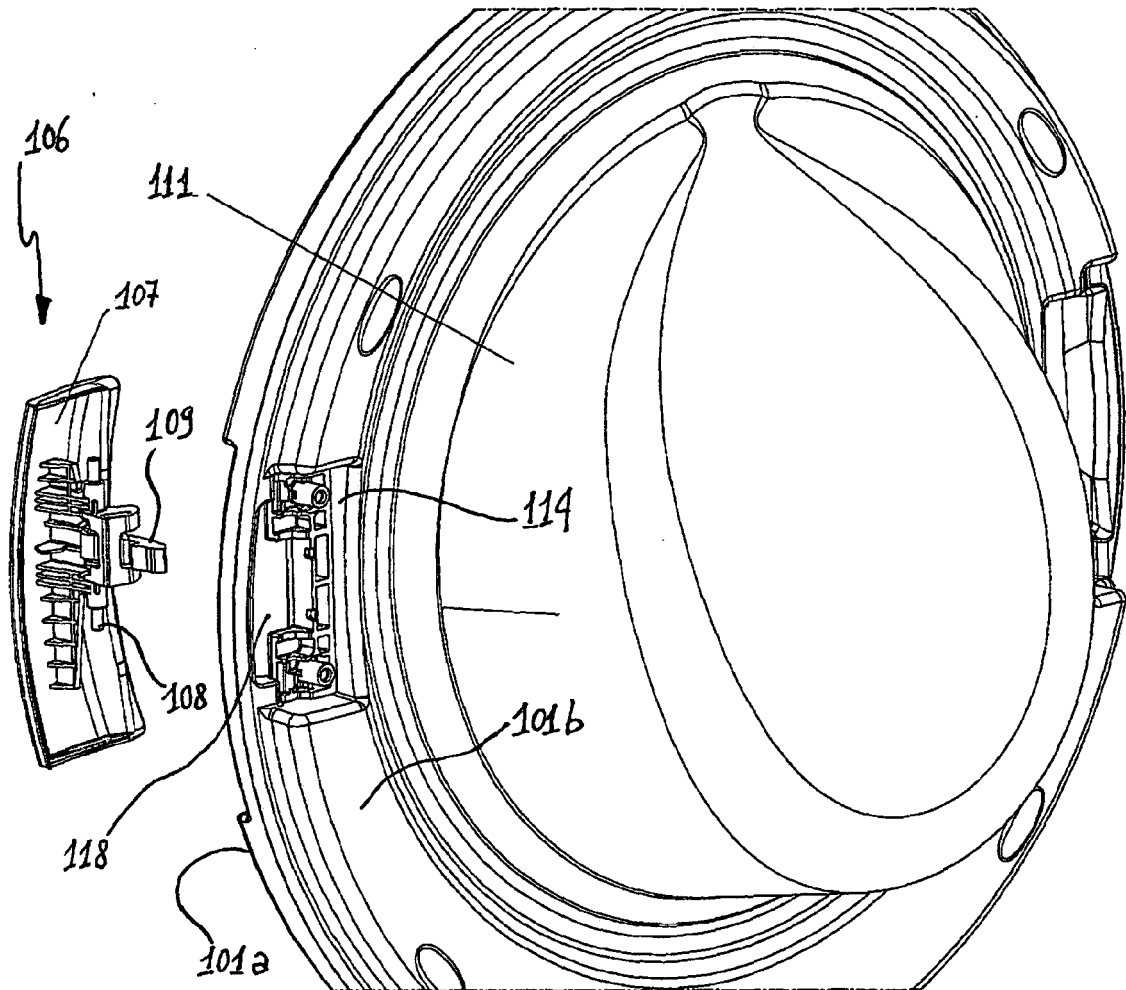
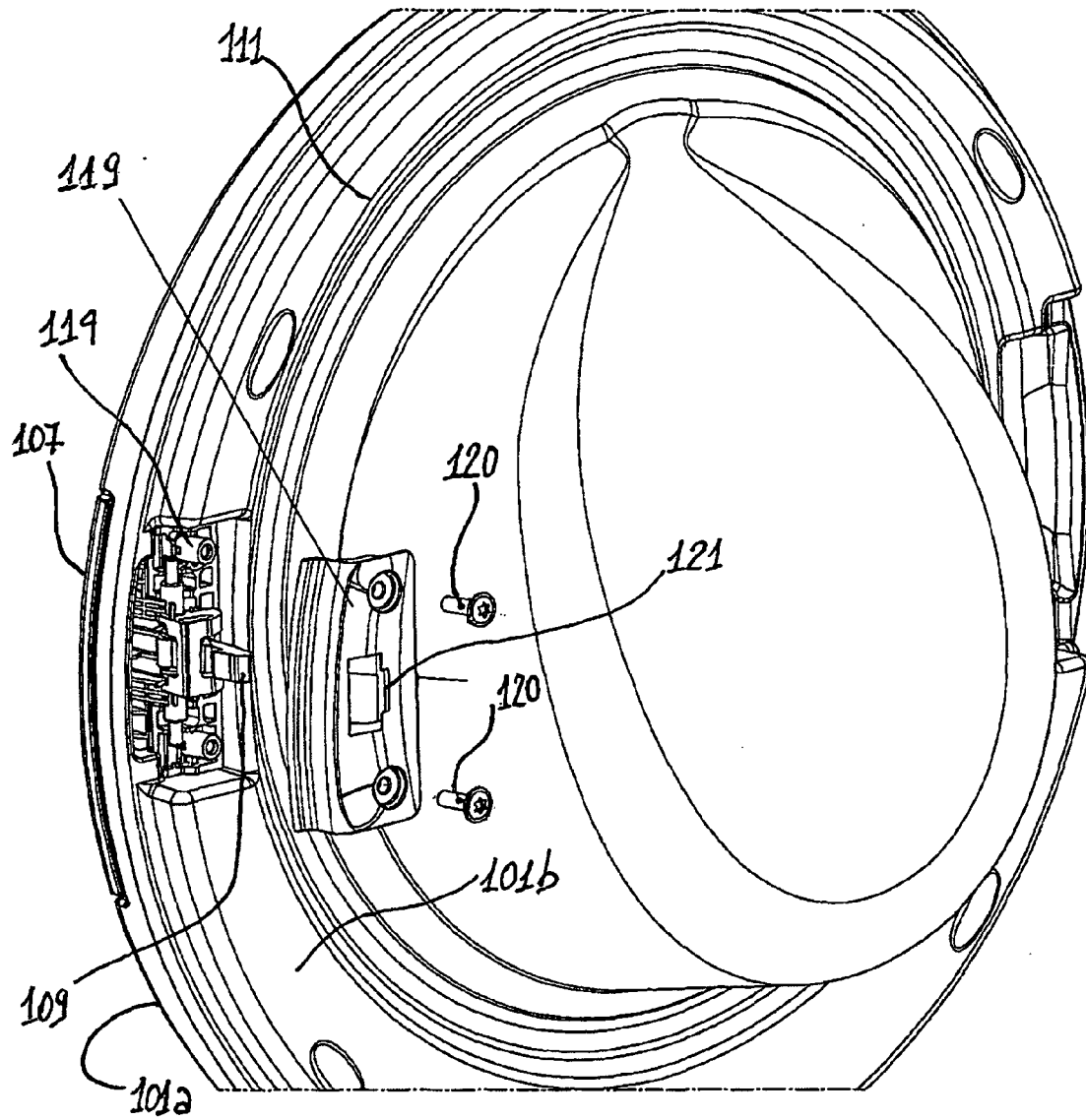


FIG. 5



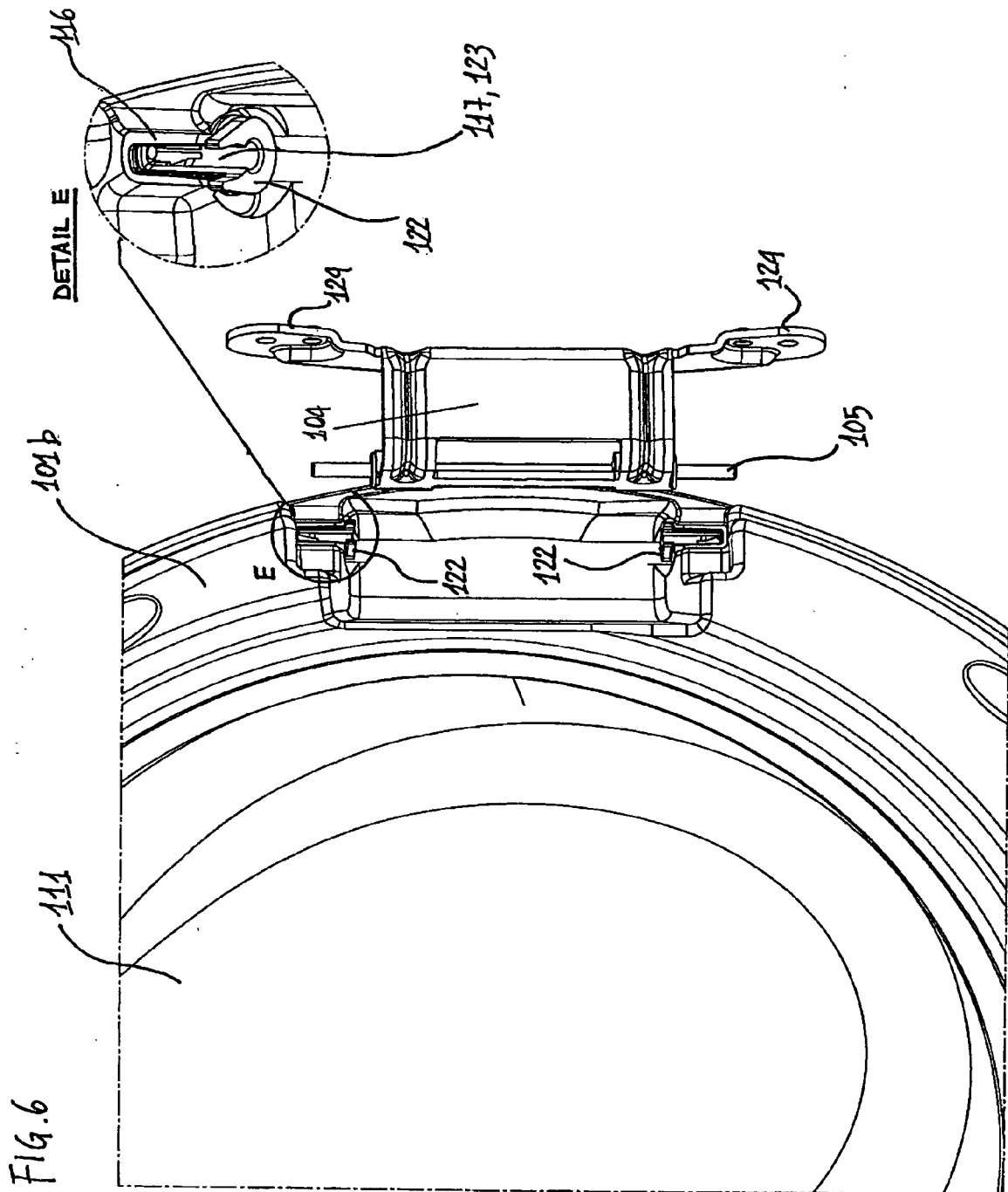


FIG. 7A

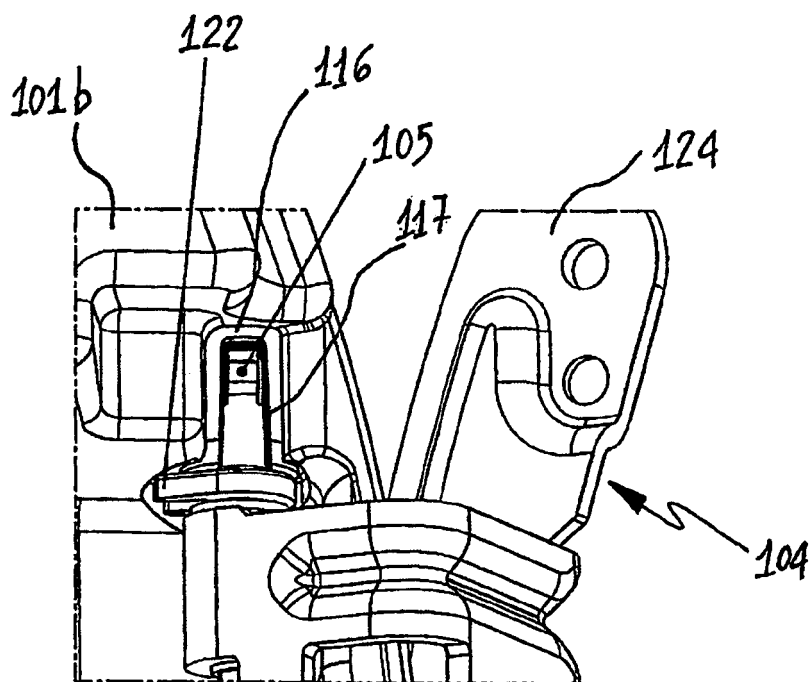
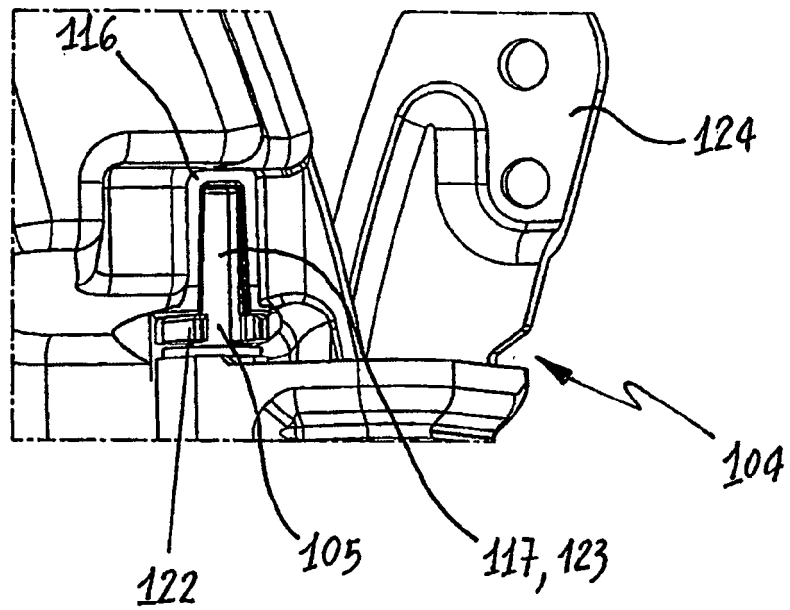


FIG. 7B



EUROPEAN SEARCH REPORT

Application Number
EP 09 00 6901

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 941 134 A (ASS ELECT IND) 6 November 1963 (1963-11-06) * page 2, lines 6-43; figures * -----	1-11	INV. D06F39/14
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			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 September 2009	Examiner Stroppa, Giovanni
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EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 00 6901

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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15-09-2009

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