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(54) **System for fixing a front panel to a washing machine**

(57) A system for fixing a ring-shaped panel (16a) around a circular window of a front loading washing machine comprises curved support elements (16b) having seats (28) and first fastening means (20), second fastening means (22, 22a) integral with the panel (16a) and adapted to cooperate with said first fastening means (20) for fixing the support element (16b) to a back face of the panel (16a), and clip members (16c) adapted to be located in the seats (28) of the support element (16b) and to cooperate with corresponding apertures (18) of said front face (10) of the appliance in order to fix the panel (16a).

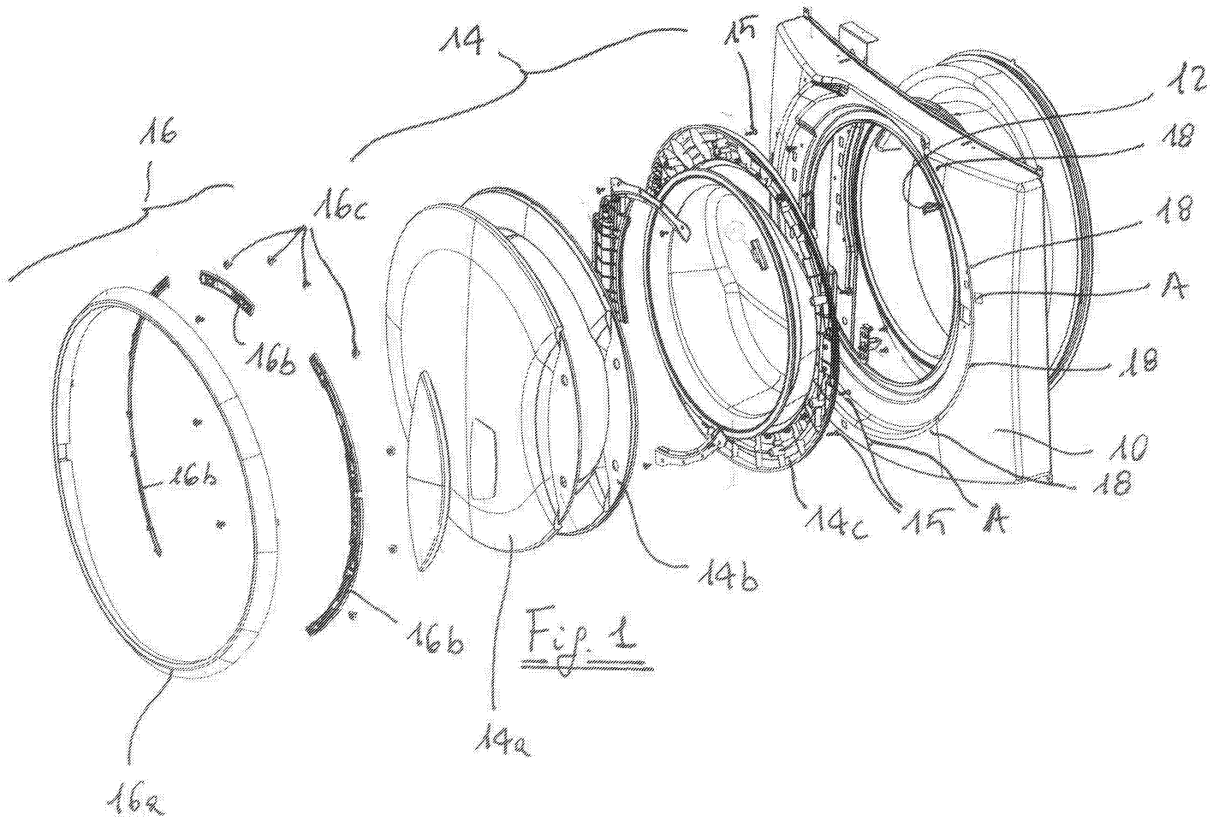


Fig. 1

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Description

[0001] The present invention relates to a system for fixing a panel or the like to a front face of a domestic appliance, particularly a washing machine.

[0002] It is well known in the art of domestic appliances the need of installing large panels to the appliance, particularly to a front face thereof. Such large panels have either decorative purposes (for instance for hiding functional parts of the appliance, as a door hinge of a washer) or functional ones (for instance in the case of a control panel including the user interface of the appliance).

[0003] At present, such large panels are sliptted in pieces that can be fixed to the front face of the appliance with usual fastening means. From an aestethical point of view, this solution is not always satisfactory since split lines are always visible. Moreover dust and soil can deposit in these split lines giving a dirty appearance of the front face of the appliance. From a technical point of view, with the known solutions the number of pieces forming a domestic appliance is increased, with related problems either for the more complex assembly process or for the management of spare parts.

[0004] There is also the problem of avoiding unwanted traces and recesses appearing on the front side of the panel that could therefore damage the aesthetic appearance of the front face as a smooth surface. This leads to polymeric components with almost constant cross sections, since any substantial change in such section (for instance for complex fastening means integral with the component) can give to the above visible traces and recesses.

[0005] It is an object of the present invention to provide a fixing system of the type mentioned at the beginning of the description which does not present the above problems and which assures also a quick assembly of the panel to the front face of the appliance.

[0006] This object is obtained tanks to the features listed in the appended claims.

[0007] The gist of the invention is to have a single moulded part (i.e. the panel) with a regular cross-section and with added internal fixation parts that can be easily fixed to such single moulded part. The assembly of the panel and the fixation parts is then fixed to the front face of the appliance by means of known fastening devices like clips, retainers or the like. The use of exchangeable separate clips or retainers allows bridging the large tolerances between the front components of the appliance. Such clips are removable and can be easily replaced in case of breakage. If for service purpose the panel has to be removed from the appliance, this can be done very easily without the need of any tool.

[0008] The fixing system according to the present invention is particularly useful for polymeric panels with chromed surfaces. It is well known that during the chrome deposition process there is a substantial shrinkage of the base material; the fixing system according to the invention permits to cope with big tolerances needed by chromed surfaces of the panel.

[0009] Further characteristics and advantages of the fixing system according to the invention will appear in the description that follows with reference to the attached drawings in which:

- figure 1 is a perspective exploded view of a washing machine using the fixing system according to the present invention;
- figure 2 is a perspective exploded back view of some components of figure 1;
- figure 3 is a detailed view showing an enlarged part of the components shown in figure 2;
- figures 4a and 4b are cross sectional views showing how the components of figure 3 are fastened together;
- figure 5 is a perspective view showing how a fixing clip is mounted in one of the component of figure 3;
- figure 6 is a cross sectional view showing the fixing clip in its installed configuration in one of the component of figure 3 and inserted in an opening of the front face of the washing machine; and
- figure 7 is a view similar to figure 2 and showing a second embodiment of the invention.

[0010] With reference to the drawings, a front face 10 of a front loading washing machine comprises a circular window 12 that can be closed by a door 14. Such door comprises a transparent door screen 14a (for instance of PET) glued to an annular frame 14b (for instance by means of adhesive Loctite).

[0011] The combination of the transparent door screen 14a glued to the annular frame 14b assures a stiff construction, with an easy assembly and low cost. The combination of door screen 14a and annular frame 14b is then fixed around a glass central part to an auxiliary annular frame 14c by means of screws 15.

[0012] On the front face 10 a ring shaped assembly 16 is mounted which surrounds the window 12. The ring shape assembly 16, whose purpose is mainly an aestethical one and which also hides openings A in the front face 10, comprises a ring shaped panel 16a, three curved support elements 16b and a plurality of clips 16c adapted to cooperate both with the support elements 16b and with corresponding holes 18 of the front face 10 for fixing the assembly 16 to the washer.

[0013] With reference to figure 3, each support element 16b comprises resilient hook portions 20 adapted to cooperate with corresponding pegs 22 raising from the back face of the panel 16a and having tooth portions 22a. As it is clearly shown in figures 4a and 4b, the shape of the resilient hook portions 20 and of the pegs 22 is so that the support elements 16b can be easily snap engaged with the panel 16a.

[0014] Referring to figures 5 and 6, each clip 16c is mushroom-shaped and presents a head portion 24 and a resilient stem portion 26. The head portion 24 has a circular circumferential groove 24a in order to cooperate

with edges of an elongated hole 28 of the support element 16b. Each elongated hole 28 of each support element 16b has an enlarged end 28a for inserting the head portion 24 of the clip 16c without mechanical interference. By sliding transversally the clip 16c towards a narrow end 28b of the elongated hole 28, the groove 24a of the head portion 24 slides on the edges so that the clip 16c is fixed to support element 16b. In order to assure that the clip 16c is fixed firmly, the portion of the support element 16 near the middle area of the elongated hole 28 is provided with stopper domes 30 which cooperate with the edge of the head portion 24 of the clip 16c. The resilient stem portion 26 of the clip 16c is designed to cooperate with a corresponding hole 18 of the front face 10 of the washing machine (figure 6) when the ring shaped assembly 16 is installed on the washer.

[0015] The assembly sequence of the ring shaped assembly 16 is a very quick three steps sequence. Step one is the fixation of the support elements 16b to the panel 16a on the back surface thereof. This step is very quick in view of snap engagement between hook portions 20 and pegs 22. It is also reliable since it can fit big tolerances that are typical of big polymeric components, either or not treated in a metallization process.

[0016] Second step of the assembly sequence is the fixing of the clips 16c to the support elements 16b. As already mentioned in the above description, the second step comprises actually two sub steps: the first sub step is inserting the head portions 24 of the clips 16c in the enlarged ends 28a of the elongated holes 28, and the second sub step is sliding the clips 16c towards the narrow ends 28 to have a press fit with the stopper domes 30.

[0017] The last and third step is snapping the ring shaped assembly 16 with the front face 10.

[0018] Figure 7 shows a second embodiment of the invention in which the panel 16a comprises an enlarged top portion 32 with a plurality of holes 32a whose shape matches the shape of knobs and buttons of the washer user interface (not shown). This solution gives a very stiff guidance for the buttons or knobs, minimising wobbling and improving perceived quality of the appliance.

[0019] The panel 16a can be made of a different colour compared to the front face 10 of the washer (such face being usually made of stamped and formed aluminium). The colour of the panel 16a usually matches the colour of the front frame 14a of the door 14, and the user, willing to change such colour, can easily change both the panel 16a and the frames 14a, 14b and 14c of the door 14 by means either of the quick assembly system according to the invention or of the quick assembly system of the door (with only few screws 15), without any risk of having the door 14 falling down in single parts. In other words, by unscrewing only few screws, the door will be easily removed in one piece.

[0020] Even if the user interface of the washer is not shown in the drawings, it can be easily mounted in an upper zone of the front face 10 with reference to the panel 16a. This latter may have, on the back surface thereof, hooks (not shown) integral with the panel and adapted to enter corresponding openings in the user interface.

Claims

1. System for fixing a panel (16a) or the like to a front face (10) of a domestic appliance, particularly a washing machine, **characterised in that** it comprises at least a support element (16b) having seats (28) and first fastening means (20), second fastening means (22, 22a) integral with said panel (16a) and adapted to cooperate with said first fastening means (20) for fixing the support element (16b) to a back face of the panel (16a), and clip members (16c) adapted to be located in the seats (28) of the support element (16b) and to cooperate with corresponding apertures (18) of said front face (10) of the appliance in order to fix the panel (16a).

2. System according to claim 1, **characterised in that** the support element comprises curved elements (16b) adapted to be fixed to a ring-shaped panel (16s) that is adapted to be fixed around a circular window (12) of a front loading washing machine.

3. System according to claim 1 or 2, **characterised in that** the seats of the support element (16b) are shaped elongated holes (28) in which head portions (24) of the clip members (16c) can be inserted and fixed.

4. System according to claim 3, **characterised in that** the head portion (24) of the clip members (16c) has a circular slot (24a) adapted to cooperate with corresponding edges of the shaped elongated hole (28, 28b) of the support element (16b) in order to retain firmly the clip member (16c) to the support element (16b).

5. System according to claim 4, **characterised in that** each shaped elongated hole (28) has an enlarged end (28a) in which the head portion (24) of the corresponding clip member (16c) can be inserted, and a narrow end (28b) whose edges are adapted to be inserted in the circular slot (24a) of the clip member (16c) by a transversal sliding movement of said clip member, retention portions (30) being provided on the support element (16b) in order to retain firmly the clip member (16c) in the narrow end (28b) of the shaped elongated hole (28).

6. System according to any of the preceding claims, **characterised in that** the first fastening means of each support element (16b) comprises a plurality of hook-shaped resilient portions (20) and **in that** the second fastening means of the panel (16a) comprise a plurality of integral peg portions (22, 22a) adapted

to snap engage the hook-shaped resilient portions (20) of the support element (16b).

7. System according to any of claims 2-7, **characterised in that** the ring-shaped panel (16a) includes at least one hole (32a) whose shape correspond to buttons and/or knobs of a control panel of the washing machine.

8. System according to any of claims 2-7, **characterised in that** the window (14) comprises annular frames (14a, 14b, 14c) assembled by means of fastening means (15).

9. Method for fixing a panel (16a) or the like to a front face (10) of a domestic appliance, particularly a washing machine, **characterised in that** it comprises the steps of fixing at least a support element (16b) to a back face of said panel (16a) and fixing the support element (16b) supporting the panel (16a) to said front face (10) of the appliance.

10. Method according to claim 9, **characterised in that** the support element (16b) is fixed to the panel (16a) by means of removable resilient clip members (16c).

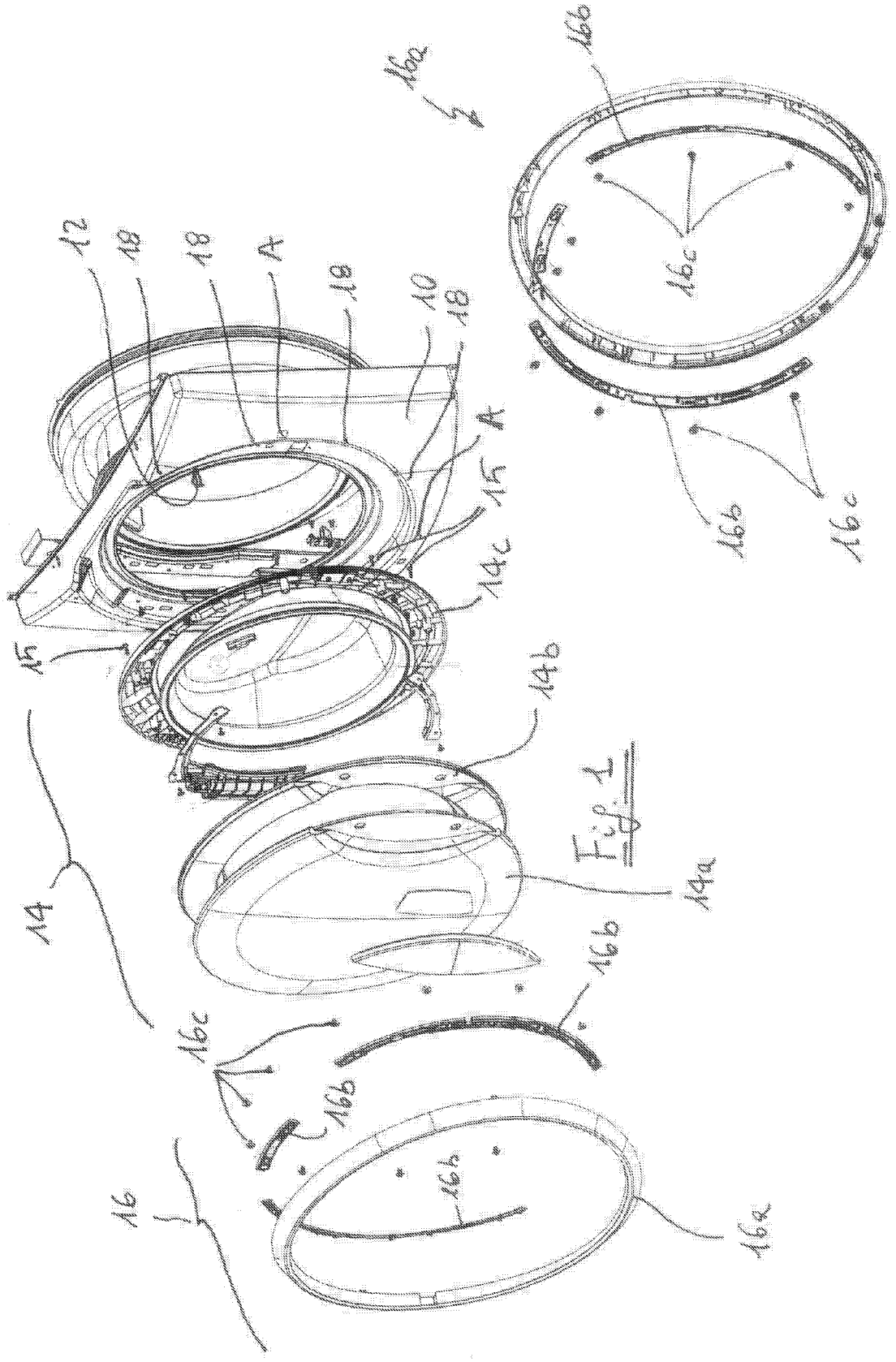

12
18
18
A
18
10
18
A
15
14c
15
14b
14
14a
16
16c
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Fig. 1

Fig. 2

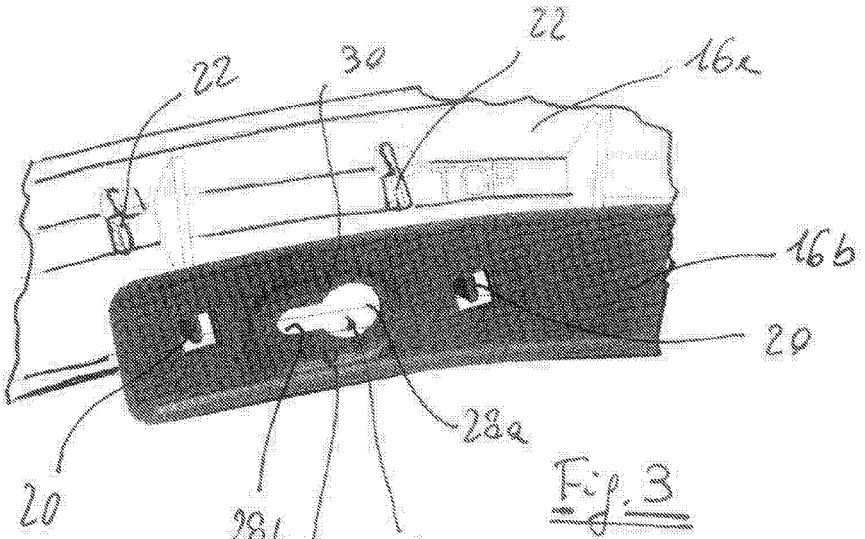


Fig. 3

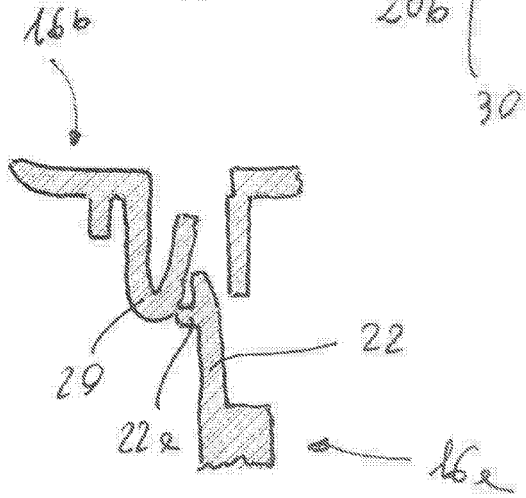


Fig. 4a

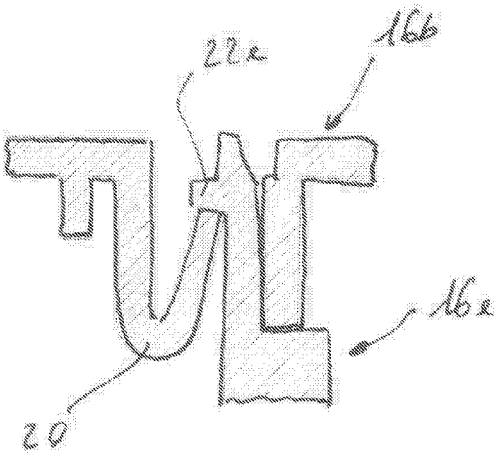


Fig. 4b

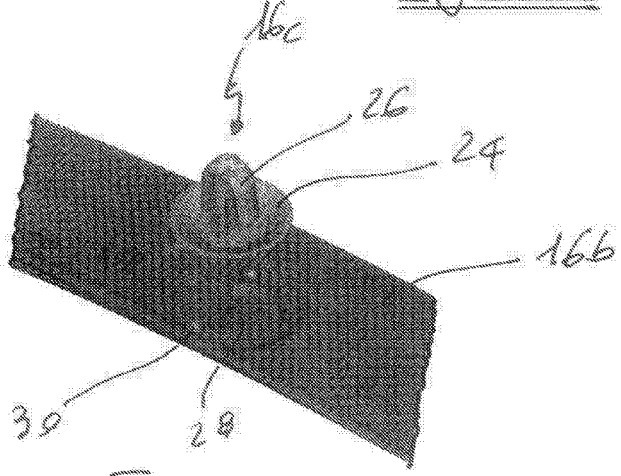


Fig. 5

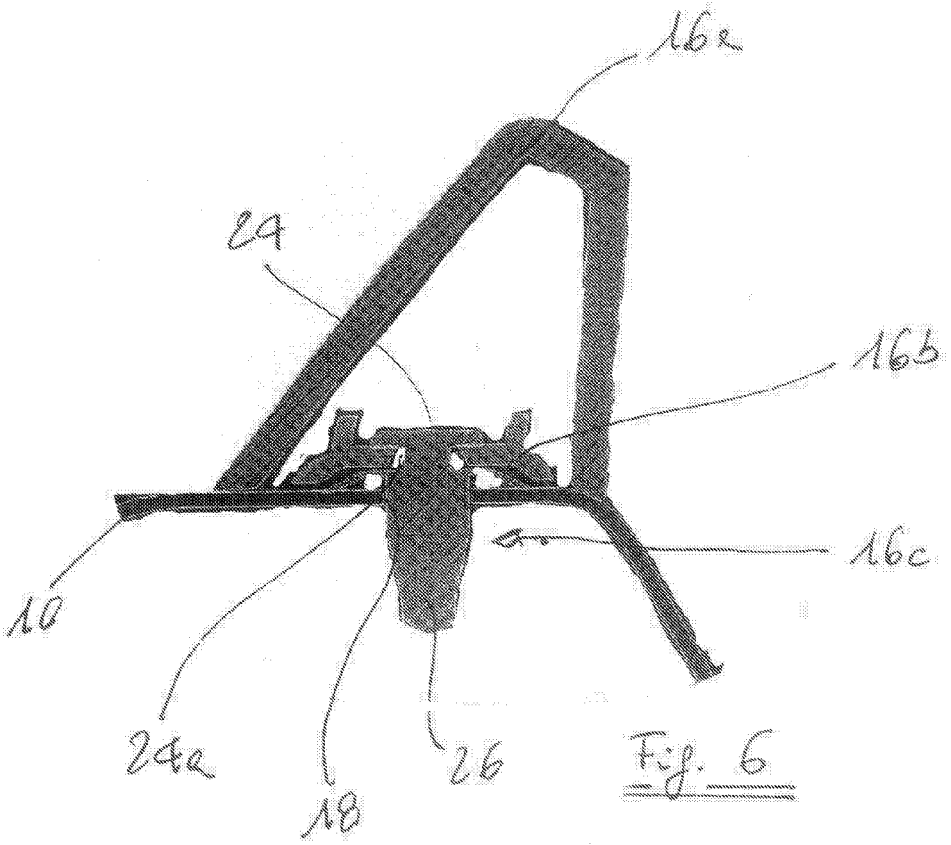


Fig. 6

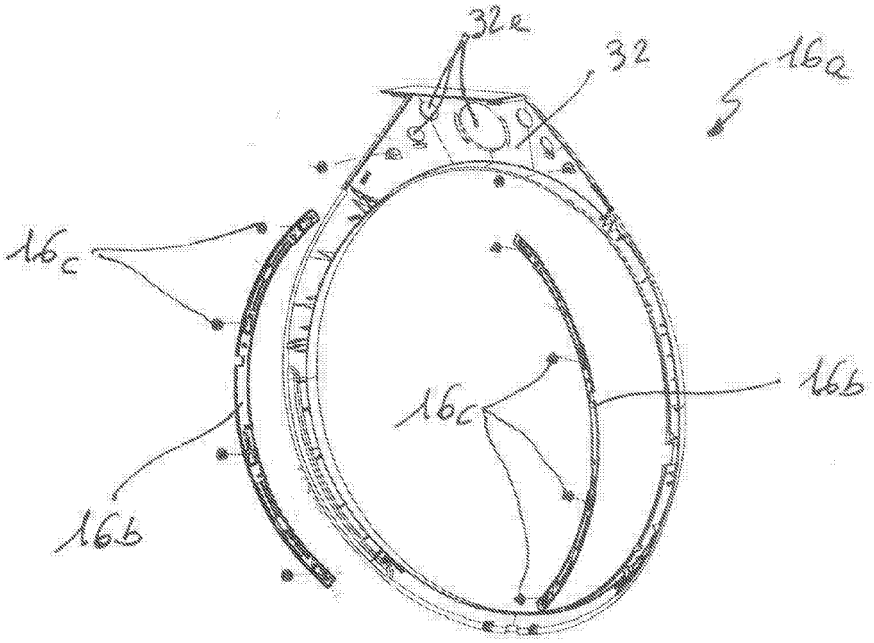


Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 4523

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 October 2006	DIAZ, M

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