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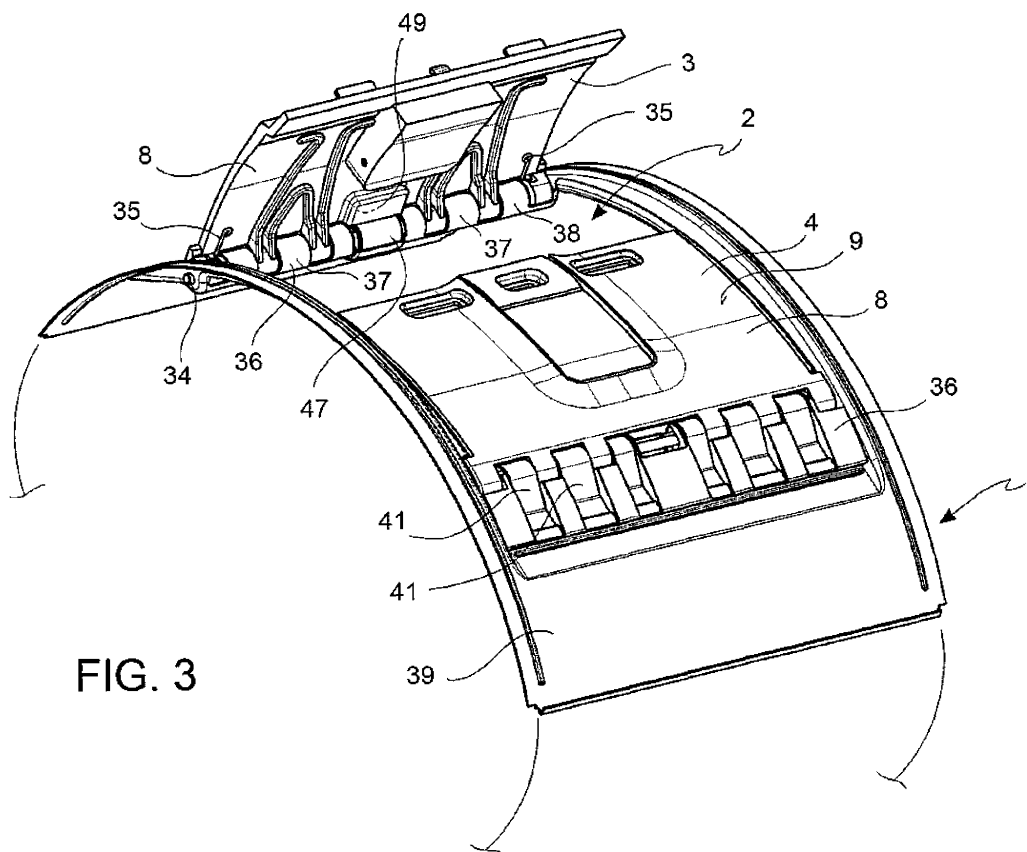
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(54) **Drum for washing machines**

(57) A drum (1) for a washing machine comprises an access hatch (2) with at least one leaf (3, 4) connected to the drum (1) in a rotary manner and pushed by elastic means (35) into an open position, a damper (47) having a stationary portion (46) and a mobile portion (48), a leaf body (8) made of plastic material connected to a metal

frame (5) of the leaf (3, 4), a plastic hinge body (36) connected to the drum (1) made of metal, wherein the plastic hinge body (36) forms a damping seat (45) that receives the stationary portion (46) of the damper (47) and the plastic leaf body (8) forms a damper cavity (49) that receives a thrusting tab (64) of the mobile portion (48) of the damper (46).



**FIG. 3**

## Description

**[0001]** The present invention refers to a drum or container for top-loading washing machines.

**[0002]** In top-loading washing machines, the drum is supported so as to be able to rotate around a substantially horizontal axis and able to be loaded from the top through an access hatch foreseen in the side wall of the drum.

**[0003]** The access hatch usually consists of two leaves, fixed through hinges to two opposite edges of a loading opening in the side wall of the drum.

**[0004]** The leaves of the hatch, at their free edges and opposite the edges hinged to the drum, have hooking means able to be engaged with one another to keep the hatch closed during the operation of the domestic appliance.

**[0005]** The hooking together of the leaves of the closed hatch is ensured by torsion springs that exert a thrust force on the leaves, which pushes them open, which, after the hooking means are released by manually pressing, causes the hatch to snap open. This snap opening of the leaves of the hatch, as well as constituting a risk of injury to the user's fingers, is noisy and cumbersome.

**[0006]** In order to slow down the rotary movement of the leaves of the access hatch, it has been proposed, for example in FR 2 723 382 and in FR 2 793 265, to use friction means or dampers associated with the hinges of the leaves.

**[0007]** The dampers, in order to sufficiently brake the opening movement of the leaves, must offer resistance to their movement, corresponding to the force exerted by the torsion springs.

**[0008]** Consequently, the use of dampers suitably sized to prevent violent opening of the leaves are large in size, which on the one hand means difficulty in fixing and receiving the damper in the drum and to the leaf and, on the other hand, an unpleasant appearance for the user.

**[0009]** The purpose of the present invention is therefore to provide a drum for washing machines, dryers or washer-dryers having characteristics such as to facilitate the fixing and receiving of the damper in the drum and its fixing to the leaf.

**[0010]** A further purpose of the present invention is to provide a drum for washing machines, dryers or washer-dryers with better separation of the connection areas of the damper from the clothes and from the user's hands.

**[0011]** Yet another purpose of the present invention is to provide a drum for washing machines, dryers or washer-dryers that is more pleasing to the eye of the user.

**[0012]** This and other purposes are accomplished through a drum for a washing machine, washer-dryer or tumble-dryer, comprising:

- an access hatch with at least one leaf connected to the drum so as to be able to rotate between a closed position and an open position and biased by elastic means into the open position,

- a damper having a stationary portion and a mobile portion the relative movement of which is damped, the stationary portion being connected to the drum and the mobile portion being connected to the leaf,
- a hinge body made of plastic material connected to the metal drum,
- a leaf body made of plastic material overmoulded onto a metal frame of the leaf,

wherein the hinge body forms a damping seat that receives the stationary portion of the damper with shape coupling and the leaf body forms a damper cavity that receives a thrusting tab of the mobile portion of the damper with shape coupling or vice-versa.

Thanks to the formation of the damping seat and of the damper cavity in a plastic hinge body and in a plastic leaf body, respectively, it is possible to make such seats, for example through injection moulding, at low cost and with the most suitable shape and position for easy connection and receiving of the damper.

In order to better understand the invention and appreciate its advantages, some non-limiting embodiments thereof will be described hereafter, with reference to the drawings, in which:

figure 1 is an exploded perspective view of a hatch area of a washing machine drum before assembly according to an embodiment of the invention;

figure 2 is a perspective view of the hatch area in figure 1 after assembly, but without leaves;

figure 3 is a perspective view of the hatch area in figure 1 after assembly is complete;

figure 4 is a perspective view of a first leaf of a washing machine drum according to an embodiment of the invention;

figure 5 is a perspective view of a second leaf for a washing machine drum according to an embodiment of the invention;

figures 6 and 7 are perspective views of an area of the hinge of a washing machine drum with a torsion spring in an assembly configuration of the leaves and in an operating configuration according to an embodiment;

figure 8 is a perspective view of a damper for the hatch of the washing machine drum in figures 1, 2 and 3;

figure 9 is a view of the damper in figure 8 in longitudinal section according to the plane IX-IX in figure 11;

figure 10 is a view of the damper in figure 8 in longitudinal section according to the plane X-X in figure 11;

figure 11 is a view of the damper in figure 8 in cross section;

figure 12 is a side view of the damper in figure 8.

With reference to the figures, a drum for a washing machine, washer-dryer or tumble-dryer is wholly indicated with reference numeral 1.

The drum 1 comprises an access hatch 2 with at least one leaf 3, 4 connected to the drum 1 so as to

be able to rotate between a closed position and an open position and biased by elastic means 35 into the open position, as well as a damper 47 having a stationary portion 46 and a mobile portion 48 the relative movement of which is damped, the stationary portion 46 being connected to the drum 1 and the mobile portion 48 being connected to the leaf 3, 4.

**[0028]** The drum 1 also comprises a hinge body 36 made of plastic material connected to the metal drum 1 and a leaf body 8 made of plastic material overmoulded onto a metal frame 5 of the leaf 3, 4.

**[0029]** According to an aspect of the invention, the plastic hinge body 36 forms a damping seat 45 that receives the stationary portion 46 of the damper 47 with shape coupling and the plastic leaf body 8 forms a damper cavity 49 that receives a thrusting tab 64 of the mobile portion 48 of the damper 46 with shape coupling or vice-versa.

**[0030]** Thanks to the formation of the damping seat and of the damper cavity in a plastic hinge body and in a plastic leaf body, respectively, it is possible to make such seats, for example through injection moulding, at low cost and with the most suitable shape and position for easy connection and receiving of the damper.

**[0031]** The metal frame 5 of the leaf 3, 4 can form a hooking portion 6 to lock the leaf 3, 4 in the closed position and a hinge portion 7 for the rotary connection of the leaf 3, 4 to the drum 1.

**[0032]** The leaf body 8 made of plastic material is advantageously injection overmoulded onto the metal frame 5 so as to form a composite leaf with an outer surface 9 made of plastic material.

**[0033]** The leaf body 8 injection overmoulded onto the metal frame 5 can also define a button seat 29 suitable for receiving a button for locking and releasing the connection between the hooking portions 6 of the leaves 3, 4.

**[0034]** Moreover, near to a hooking edge 13 of each leaf 3, 4 a step 30 can be formed that defines a hooking area 31 from which some hooks 15, 16 (fig. 4) project or in which some counter-hooking seats 18 (fig. 5) open, so that the hooking areas 31 of the first 3 and second leaf 4 can overlap with the respective outer surfaces 9 arranged substantially flush.

**[0035]** In accordance with a further embodiment, the plastic leaf body 8 forms a plurality of first hinge bushings 32 around the hinge portions 7 of the metal frame 5 and, preferably a second plurality of hinge bushings 33 without metallic reinforcement and sized so as to be able to at least partially receive one or more torsion springs 35 (figures 3, 6 and 7) that push the leaf 3, 4 into the open position.

**[0036]** This allows the user and the clothes to be protected from the springs 35 and allows the springs themselves to be received in a manner substantially invisible from outside of the drum 1.

**[0037]** In accordance with a further embodiment, the hinge body 36 made of plastic material forms a plurality of third hinge bushings 37 having a hole to receive the

hinge pin 34, as well as one or more fourth hinge bushings 38 sized so as to be able to at least partially receive the aforementioned torsion springs 35 (figures 3, 6, 7).

**[0038]** The hinge body 36 is connected to a metal side wall 39 of the washing machine drum 1 and is configured to form, together with the hinge portions 7 and hinge bushings 32, 33 of the leaves 3, 4, a rotary connection of the leaves to the side wall 39.

**[0039]** The side wall 39 of the drum 1 forms a hinge seat 40 that partially receives the hinge body 36, as well as a plurality of band-shaped appendages 41 bent in a loop around the third 37 and fourth hinge bushings 38 and fixed to the side wall 39 (for example through riveting, welding or crimping) so as to lock the hinge body 36 to the side wall 39 (figure 2).

**[0040]** For this purpose the appendages 41 can be bent towards the outside of the drum and connected onto its outer surface or, alternatively, they can be bent towards the inside of the drum and fixed to its inner surface.

**[0041]** In accordance with an advantageous embodiment, the hinge body 36, in particular a fourth hinge bushing 38 thereof, forms a stop seat 42 that engages a thrusting end 43 of the torsion spring 35 so as to hold it in a stop position (figure 6) in which it does not form an obstacle to the mounting of the leaf 3, 4 to the hinge body 36.

**[0042]** Moreover, the plastic leaf body 8 can form a separating projection 43 suitable for separating the thrusting end 43 of the torsion spring 35 from the stop seat 42 when the leaf 3, 4 is mounted.

**[0043]** In accordance with an embodiment, the damper cavity 49 is shaped so as to wrap around and completely cover the free end of the thrusting tab 64 of the damper 47.

**[0044]** In this way it is possible to conceal the spring and the damper from the user's view and protect the laundry from the risk of them getting caught in these mobile elements.

**[0045]** Figures 8 - 12 illustrate an embodiment of the damper 47, specifically developed for the laundry drum 1 of the invention.

**[0046]** The stationary portion 46 of the damper 47 comprises a shaft 50 with a through hole 51 to receive the hinge pin 34, as well as two opposite annular shoulders 52 and two longitudinal radial walls 54 that extend between the two shoulders 52 and together with them form two seats for receiving two rubber blocks 53 dipped in a lubricant and to lock them so that they rotate as a unit with the shaft 50.

**[0047]** The rubber blocks are preferably made from a closed-cell rubber.

**[0048]** The mobile portion 48 has a housing 55 that defines a sealed damping chamber 60 with a circumferential wall 56, an opening 57 for the insertion of the stationary portion 46 together with the rubber blocks 53, as well as a bottom wall 58 and a lid 59 to close the opening 57, both equipped with a hole for the shaft 50 to pass through.

**[0049]** The rubber blocks 53 press against an inner

surface of the circumferential wall 56, so that their relative movement generates a resistant friction torque.

**[0050]** The bottom wall 58 and the lid 59 form respective gasket seats 61, 62 in the passage holes that receive gaskets, for example o-rings, pressing against the shoulders 52.

**[0051]** The free ends of the shaft 50 have a coupling surface 63 suitable for a shape coupling rotating as a unit with the damping seat 45 of the hinge body 36 and the aforementioned thrusting tab 64 projects from the circumferential wall 56 of the mobile portion 48, said tab being received in the damper cavity 49 of the plastic leaf body 8.

**[0052]** From the description of the invention provided up to now, the man skilled in the art will appreciate how the drum 1 for top-loading washing machines, washer-dryers and dryers achieves the purposes defined in the introduction, in particular cost-effective and easy assembly, housing of the damper such as to protect the user's hands and conceal the damper from the user's view and protect the clothes both from dirt and sharp edges of the damper and from the projections and sharp edges of the torsion spring.

**[0053]** Of course, a man skilled in the art can add further modifications and variants to the drum according to the present invention, in order to satisfy contingent and specific requirements, all of which are in any case covered by the scope of protection of the invention, as defined by the following claims.

## Claims

1. Drum (1) for a washing machine, washer-dryer or tumble-dryer, comprising:

- an access hatch (2) with at least one leaf (3, 4) connected to the drum (1) so as to be able to rotate between a closed position and an open position and biased by elastic means (35) into the open position,
- a damper (47) having a stationary portion (46) and a mobile portion (48) the relative movement of which is damped, the stationary portion (46) being connected to the drum (1) and the mobile portion (48) being connected to the leaf (3, 4),
- a leaf body (8) made of plastic material connected to a metal frame (5) of the leaf (3, 4),
- a hinge body (36) made of plastic connected to the drum (1) made of metal,

wherein the plastic hinge body (36) forms a damping seat (45) that receives the stationary portion (46) of the damper (47) and the plastic leaf body (8) forms a damper cavity (49) that receives a thrusting tab (64) of the mobile portion (48) of the damper (46) or vice-versa.

2. Drum (1) according to claim 1, wherein said plastic leaf body (8) defines a button seat (29) suitable for receiving a button for locking and releasing the connection between hooking portions (6) of the leaves (3, 4).

3. Drum (1) according to any one of the previous claims, wherein the leaf body (8) made of plastic material is injection overmoulded onto the metal frame (5) so as to form a composite leaf with an outer surface (9) made of plastic material.

4. Drum (1) according to any one of the previous claims, wherein said plastic leaf body 8 of a first leaf (3) and of a second leaf (4) of said leaves (3, 4) has a step (30) near to a hooking edge (13) that defines a hooking area (31), wherein from the hooking area (31) of the first leaf (3) hooks (15, 16) project and in the hooking area (31) of the second leaf (4) counter-hooking seats (18) open to receive the hooks (15, 16) and the hooking areas (31) of the first (3) and second leaf (4) can be coupled so as to align the adjacent outer surfaces (9) substantially flush.

5. Drum (1) according to any one of the previous claims, wherein said plastic leaf body (8) forms a plurality of first hinge bushings (32) around the hinge portions (7) of the metal frame (5) and one or more second hinge bushings (33) that at least partially receive a torsion spring (35) that biases the leaf (3, 4) into the open position.

6. Drum (1) according to any one of the previous claims, wherein the hinge body (36) made of plastic material forms a plurality of third hinge bushings (37) having a hole for receiving a hinge pin (34), as well as one or more fourth hinge bushings (38) that at least partially receive a torsion spring (35) that biases the leaf (3, 4) into the open position.

7. Drum (1) according to the previous claim, wherein the hinge body (36) is connected to a metal side wall (39) of the drum (1) and forms, together with the hinge portions (7) of the leaves (3, 4), their rotary connection to said side wall (39).

8. Drum (1) according to the previous claim, wherein the side wall (39) of the drum (1) forms a hinge seat (40) that partially receives the hinge body (36), as well as a plurality of band-shaped appendages (41) bent into a loop around the hinge body (36) and fixed to the side wall (39).

9. Drum (1) according to claim 6, wherein the plastic hinge body (36) forms a stop seat (42) to hold a thrusting end (43) of the torsion spring (35) in a stop position that does not form an obstacle to the mounting of the leaf (3, 4) to the hinge body (36) and the

leaf body (8) forms a separating projection (43) suitable for separating the thrusting end (43) of the torsion spring (35) from the stop seat 42 when the leaf (3, 4) is mounted.

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10. Drum (1) according to any one of the previous claims, wherein said damper cavity (49) is shaped so as to wrap around and completely cover the free end of the thrusting tab (64) of the damper (47).

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11. Drum (1) according to any one of the previous claims, wherein:

- said stationary portion (46) of the damper (47) comprises a shaft (50) with a through hole (51) that receives a hinge pin (34), two opposite annular shoulders (52) and two longitudinal radial walls (54) that extend between the two shoulders (52), forming two seats that lock two lubricated rubber blocks (53) to the shaft (50) so that they rotate as a unit, 15 20
- said mobile portion (48) comprises a housing (55) that defines a sealed damping chamber (60) with a circumferential wall (56), an opening (57) for the insertion of the stationary portion (46) together with the rubber blocks (53), as well as a bottom wall (58) and a lid (59) that closes the opening (57), wherein the bottom wall (58) and the lid (59) define the holes for the shaft (50) to pass through and the rubber blocks (53) press against the circumferential wall (56). 25 30

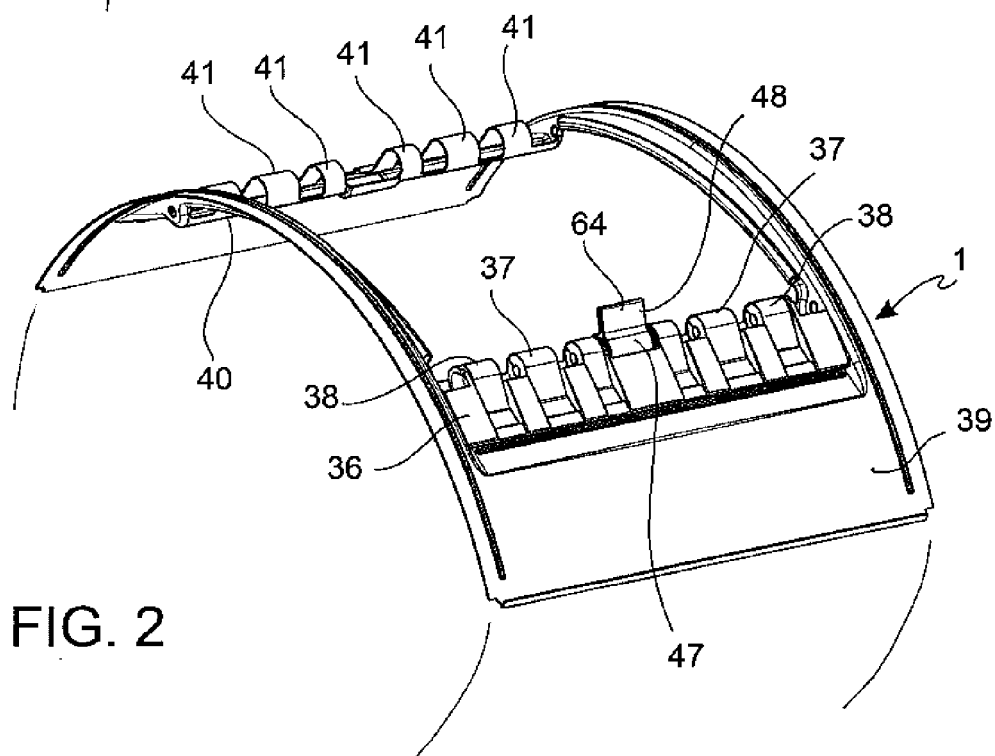
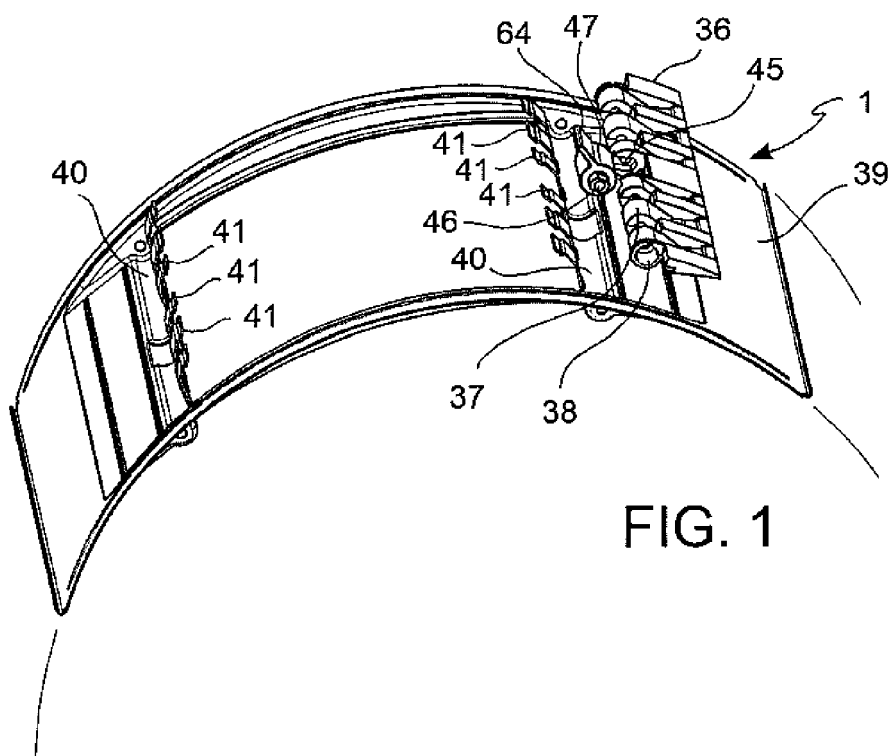
12. Drum (1) according to the previous claim, comprising two gaskets received in gasket seats (61, 62) in the passage holes of the bottom wall (58) and of the lid (59) and pressing against the shoulders (52). 35

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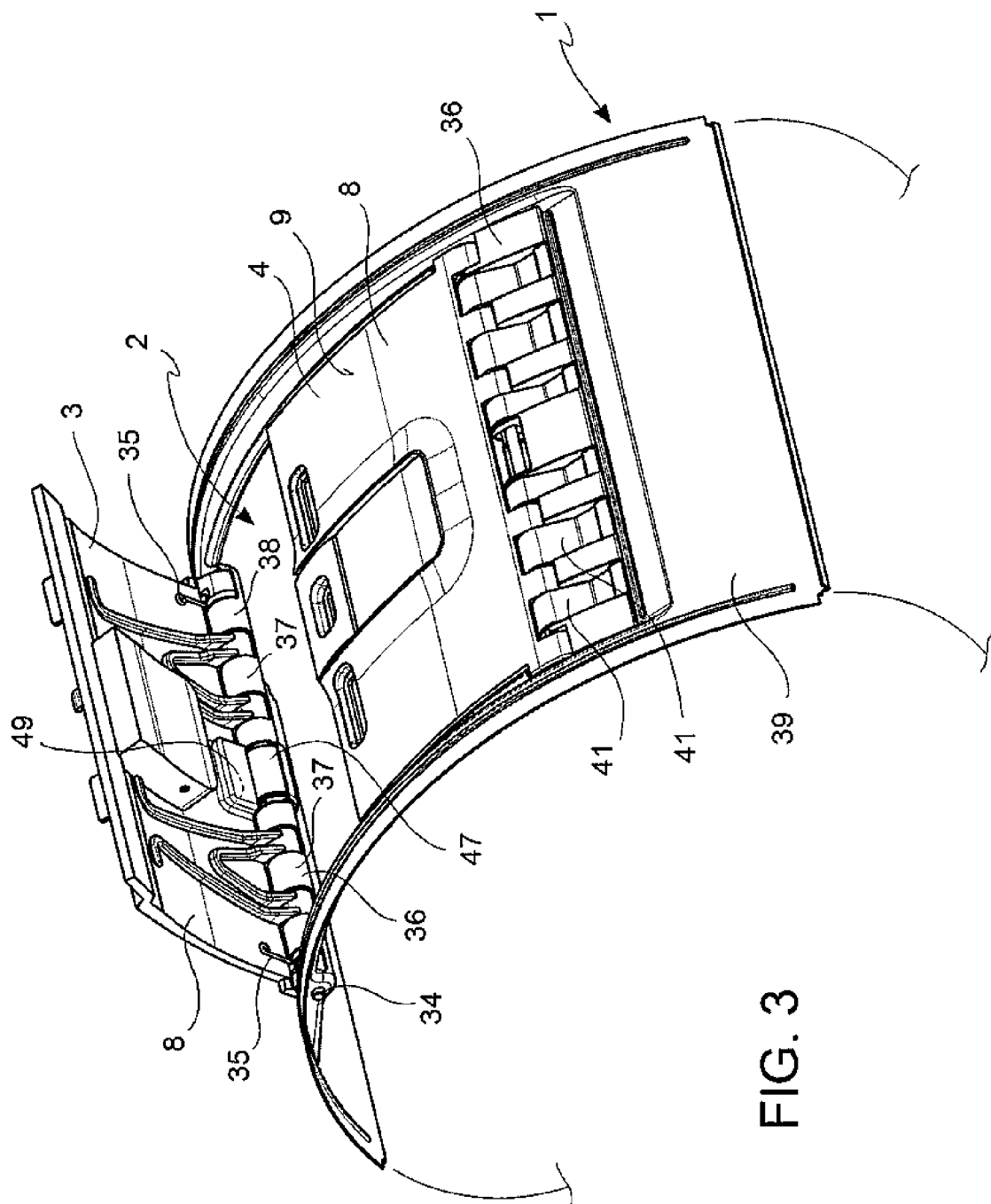
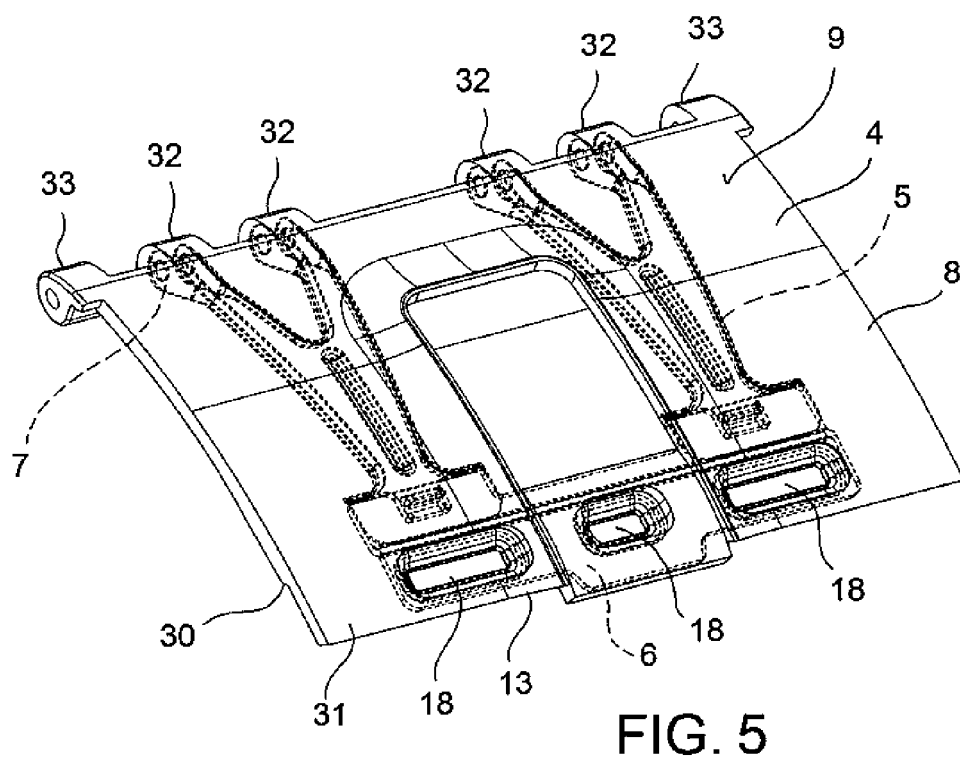
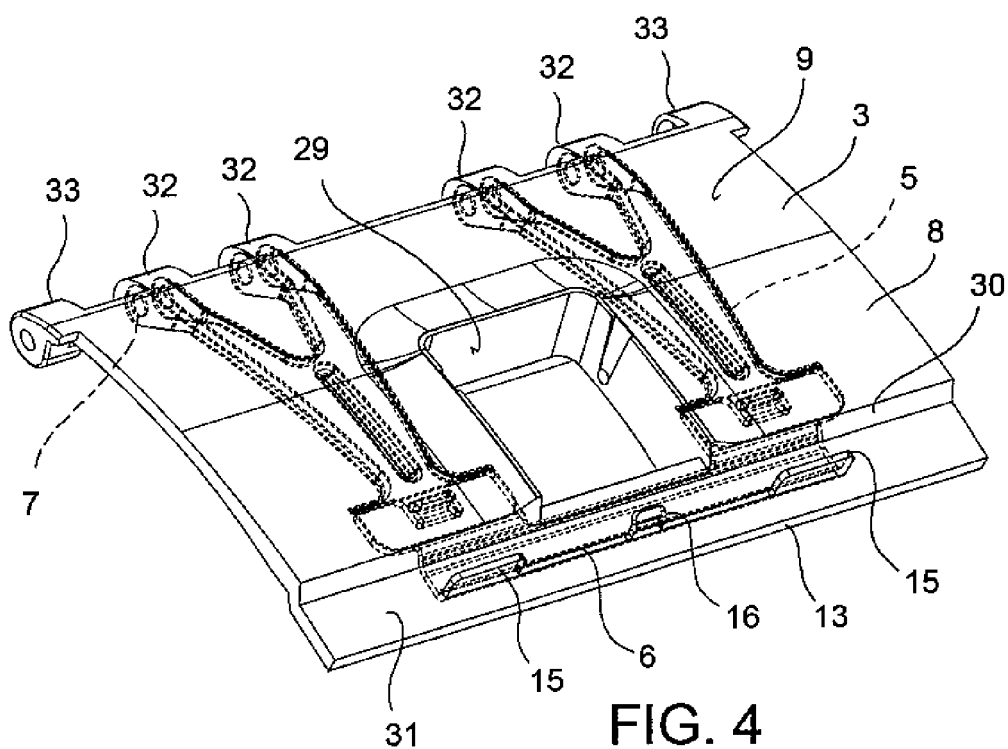


FIG. 3



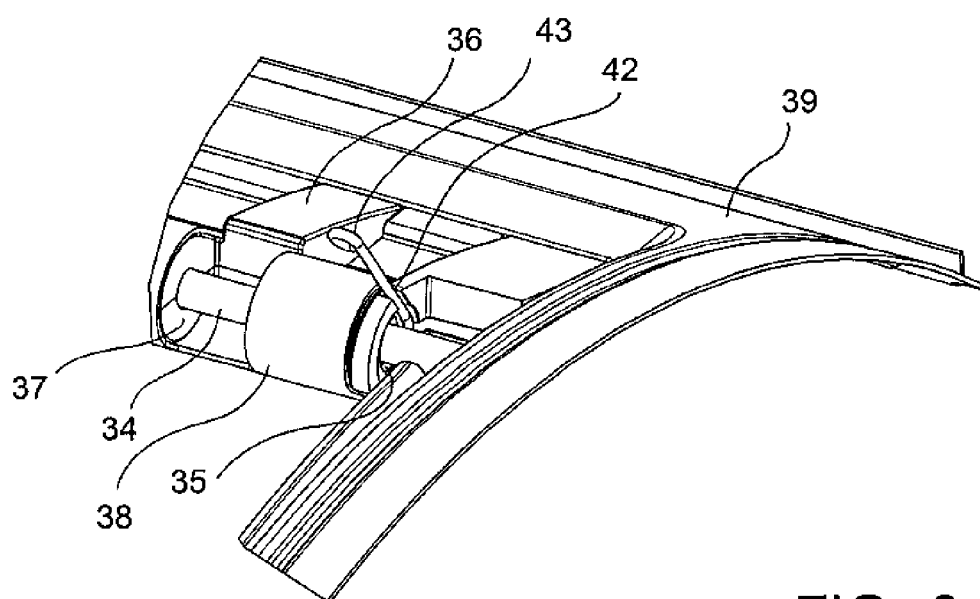


FIG. 6

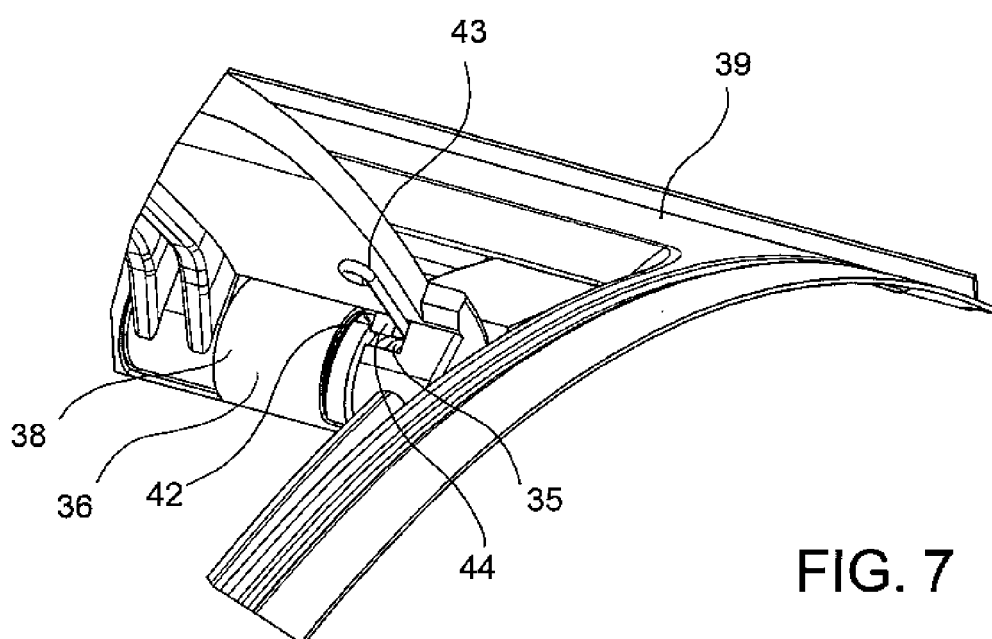
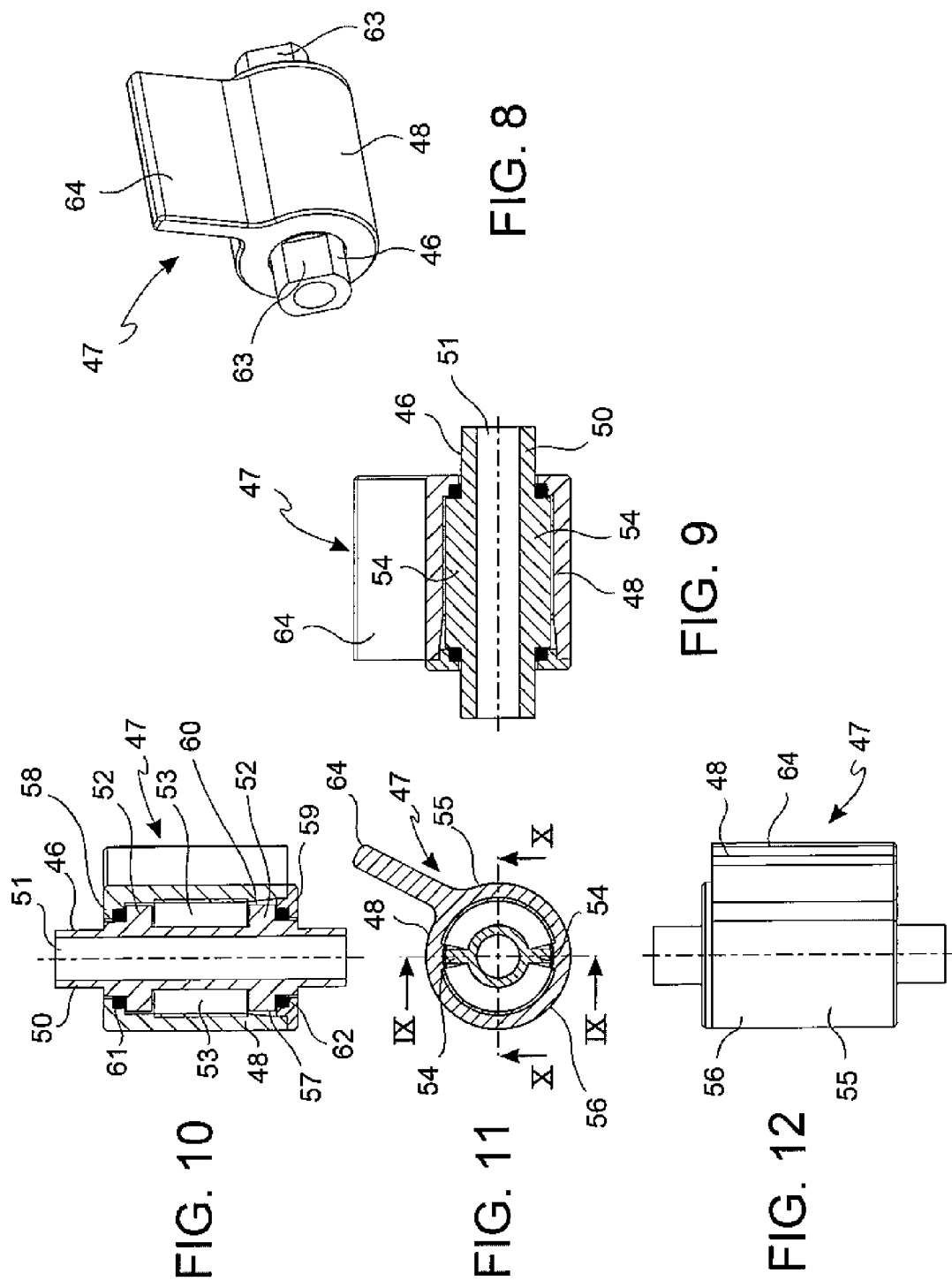


FIG. 7





## EUROPEAN SEARCH REPORT

Application Number  
EP 10 42 5127

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                           |                                                     |                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Citation of document with indication, where appropriate, of relevant passages                                                                             | Relevant to claim                                   | CLASSIFICATION OF THE APPLICATION (IPC) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EP 1 467 013 A1 (CANDY SPA [IT])<br>13 October 2004 (2004-10-13)<br>* paragraph [0019] - paragraph [0021] *<br>* paragraph [0029]; figures 1-3 *<br>----- | 1,5-7,9,10                                          | INV.<br>D06F37/10                       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | EP 1 582 618 A1 (CANDY SPA [IT])<br>5 October 2005 (2005-10-05)<br>* paragraph [0012] - paragraph [0016];<br>figures 1-4 *<br>-----                       | 1-12                                                |                                         |
| A,D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | DE 200 07 903 U1 (ELECTROLUX ZANUSSI<br>ELETTRODOME [IT])<br>20 July 2000 (2000-07-20)<br>* page 5, line 1 - line 9; figures 1-3 *<br>-----               | 1-12                                                |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                           |                                                     | TECHNICAL FIELDS<br>SEARCHED (IPC)      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                           |                                                     | D06F                                    |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                           |                                                     |                                         |
| Place of search<br>Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                           | Date of completion of the search<br>15 October 2010 | Examiner<br>Westermayer, Wilhelm        |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>.....<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                           |                                                     |                                         |

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

EP 10 42 5127

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15-10-2010

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) |               | Publication<br>date |
|-------------------------------------------|----|---------------------|----------------------------|---------------|---------------------|
| EP 1467013                                | A1 | 13-10-2004          | ES                         | 2346419 T3    | 15-10-2010          |
| EP 1582618                                | A1 | 05-10-2005          | IT                         | MI20040139 U1 | 02-07-2004          |
| DE 20007903                               | U1 | 20-07-2000          | ES                         | 1046477 U     | 01-01-2001          |
|                                           |    |                     | FR                         | 2793265 A1    | 10-11-2000          |
|                                           |    |                     | IT                         | PN990040 A1   | 06-11-2000          |
| -----                                     |    |                     |                            |               |                     |

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- FR 2723382 [0006]
- FR 2793265 [0006]