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(54) **Drum for washing machines**

(57) A drum (1) for a washing machine (3, 4) comprises a metal frame (5) that forms a hooking portion (6) to lock the leaf (3, 4) in a closed position and a hinge portion (7) for the rotary connection of the leaf to the drum (1) and a body made of plastic material (8) injection

moulded onto the metal frame (5), forming a composite leaf with an outer surface (9) made of plastic material, wherein the hooking portion (6) and the hinge portion (7) are separately manufactured pieces and then are connected together before the formation of the plastic body (8) on the frame (5).

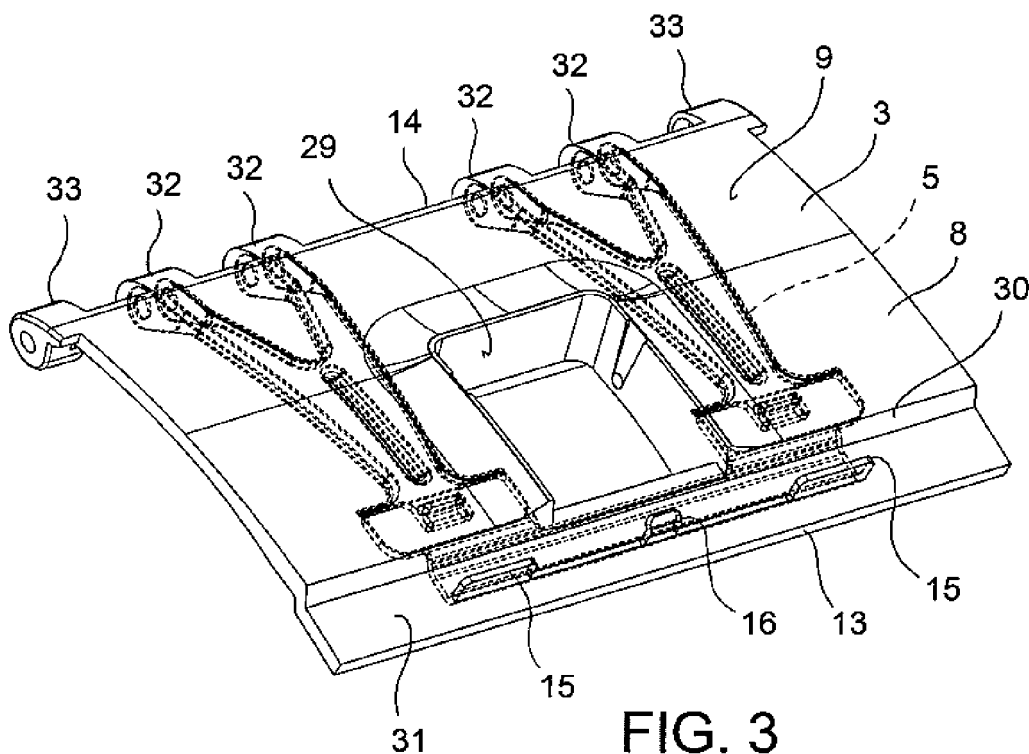


FIG. 3

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 reduce the unwelcome aspects of the snapping open of known metal leaves it has been proposed, for example in IT01311223, to make the leaves themselves through a single-piece metal frame with a hinge portion and a hooking portion and to injection overmould a plastic body onto the single-piece metal frame, so as to make a leaf with a plastic outer surface the manual contact with which is less unpleasant and jagged than manual contact with metal leaves without plastic coating.

[0007] However, both metal leaves, and leaves with a single-piece metal frame and injection overmoulded plastic body are expensive due to the large amount of swarf and the insufficient versatility of manufacture of leaves of different sizes for different models of washing machine drum.

[0008] Indeed, the leaves of washing machine drums of the prior art require special presses and shearing machines to make the single-piece frames for each size of hatch and for each of the two leaves of the same hatch.

[0009] The purpose of the present invention is therefore to provide a drum for top-loading washing machines, dryers or washer-dryers, having characteristics such as to reduce the swarf during the manufacture of the leaves and to facilitate the manufacture of drums with hatches of different sizes.

[0010] 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, wherein the leaf comprises:

- a metal frame that forms a hooking portion to lock the leaf in the closed position and a hinge portion for

the rotary connection of the leaf to the drum,

- a body made of plastic material overmoulded onto the metal frame so as to form a composite body with an outer surface made of plastic material,

in which the hooking portion and the hinge portion are separately manufactured pieces and are then connected together before the overmoulding of the plastic body.

The separate manufacture of the hooking portion and of the hinge portion makes it possible to reduce the amount of swarf with respect to making a single-piece frame with a complex shape and the connection between the hinge portion and the hooking portion before the overmoulding of the plastic body makes it possible to combine different hinge portions with different hooking portions and to choose the connection position as a function of the shape and size of the leaf.

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

[0011] figure 1 is an exploded perspective view of a metal frame of a leaf for a washing machine drum according to an embodiment of the invention;

[0012] figure 2 is a perspective view of the metal frame in figure 1 after its assembly and connection;

[0013] figure 3 is a perspective view of a leaf for a washing machine drum made through the frame in figure 2;

[0014] figure 4 is an exploded perspective view of a metal frame of a further leaf for a washing machine drum according to an embodiment of the invention;

[0015] figure 5 is a perspective view of the metal frame in figure 4 after its assembly and connection;

[0016] figure 6 is a perspective view of a leaf for a washing machine drum made through the frame in figure 5;

[0017] figure 7 is a perspective view of a hinge portion of a metal frame of a leaf for a washing machine drum according to an embodiment of the invention;

[0018] figure 8 is a perspective view of a metal frame made with the hinge portion in figure 7 after its assembly and connection;

[0019] figure 9 is a perspective view of a leaf for a washing machine drum made through the frame in figure 8;

[0020] figure 10 is an exploded perspective view of a hinging area of a washing machine drum according to an embodiment before assembly;

[0021] figure 11 is a perspective view of the hinging area in figure 10 after assembly, but without leaves;

[0022] figure 12 is a perspective view of the hatch area of a washing machine drum completely assembled;

[0023] figures 13 and 14 are perspective views of an area of the hinge of a washing machine drum with a torsion spring in leaves mounting configuration and in an operating configuration according to an embodiment.

[0024] 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, wherein the leaf 3, 4 comprises a metal frame 5 that forms 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 to the drum 1, as well as a body made of plastic material 8 injection overmoulded onto the metal frame 5 so as to form a composite leaf with an outer surface 9 made of plastic material.

[0025] In accordance with an aspect of the present invention, the hooking portion 6 and the hinge portion 7 are separately manufactured pieces and are then connected together before the overmoulding of the plastic body 8.

[0026] The separate manufacture of the hooking portion and of the hinge portion makes it possible to substantially reduce the amount of swarf with respect to making a single-piece frame with a complex shape and the connection between the hinge portion 7 and the hooking portion 6 before the overmoulding of the plastic body 8 makes it possible to combine different hinge portions with different hooking portions and to select the connection position as a function of the desired shape and size of the leaf 3, 4.

[0027] In accordance with an embodiment, the connection points 11 between the hooking portion 6 and the hinge portion 7 of the metal frame 5 are covered by the plastic body 8 at least on an outer side 10 of the leaf 3 that is visible and can be manually touched by the user.

[0028] In this way, it is not necessary to eliminate possible sharp edges or ugly parts in the connection points 10, since the plastic coating present there protects the user's hands and improve the appearance of the leaf.

[0029] Figures 1 to 3 illustrate the structure and the manufacture of a first leaf 3, the hooking portion 6 of which comprises a hooking cross-member 12 that extends substantially along a hooking edge 13 of the leaf 3 opposite to a hinging edge 14 thereof and forms two plate-like side hooks 15, projecting towards the outside of the leaf 3 and extending parallel to the hooking edge 13, as well as a central hook 16 projecting towards the outside of the leaf 3 and arranged about half-way between the side hooks 15, wherein the central hook has a free end 17 bent towards the hinging edge 14 of the leaf 3.

[0030] The hooking cross-member 12 stabilises the hooking edge 13 of the leaf and the bent central hook 16 more effectively prevents disengagement of the counter-hooking seats 18 of the opposite leaf 4 in the closed configuration.

[0031] The hooking portion 6, in particular the hooking cross-member 12, can comprise one or more positioning portions 19, for example tongues, configured to insert into corresponding positioning seats 20, for example slots, formed in the hinge portion 7 or in an intermediate portion between the hinge portion 7 and the hooking portion 6, so as to form one or more reference for a correct mutual positioning of the individual elements of the metal frame 5.

[0032] Advantageously, the connection points 11, for example welding points, are arranged adjacent to the positioning portions 19.

[0033] In accordance with an embodiment, the hooking portion is formed from a single piece of metal plate.

[0034] The frame 5 advantageously comprises two distinct hinge portions 7, each of which has a main wall 21 substantially parallel to the outer surface 9 of the leaf 3 and a plurality of hinge seats 22 formed from holes in plate laps 23 bent towards the inside of the drum 1 and transversal, preferably perpendicular to the main wall 21.

[0035] In this way, the bent laps 23 make reinforcement ribs of the hinge portion 7.

[0036] Between the hinge seats 22 and a connection end 24 (which forms the aforementioned positioning seat 20, for example a groove extending parallel to the hooking edge 13 of the leaf 3) a reinforcing beam 25 extends that is formed from the main wall 21 substantially parallel to the outer surface 9 of the leaf 3 and from side edges 26 bent towards the inside of the drum 1 and transversal, preferably perpendicular to the main wall 21.

[0037] The reinforcing beam 25 can also comprise an elongated reinforcing groove 27, so as to give the reinforcing beams 25 a V-shaped cross section.

[0038] In accordance with an alternative embodiment (fig. 7, 8 and 9) the hinge seats 22 are formed from an end lap 28 of the main wall 21 bent into a loop and connected, for example welded or riveted, to the main wall 21 itself so as to define a passage for a pin 34 of the hinge.

[0039] Figures 4 to 6 illustrate the structure and manufacture of a second leaf 4 generally configured as described with reference to the first leaf 3 with the difference that the hooking cross-member 12 of the second leaf 4 forms the aforementioned counter-hooking seats 18, for example slots, instead of the hooks 15, 16.

[0040] Thanks to the initial separate manufacture of the hooking portion and of the hinge portions it is possible to use the same hinge portions 7 both for the first leaf 3 (leaf with hooks) and for the second leaf 4 (leaf with slots).

[0041] The plastic body 8 injection overmoulded onto the metal frame 5 defines a button seat 29 suitable for receiving a button for locking and releasing the connection between the hooking and counter-hooking portions 6 of the leaves 3, 4.

[0042] Moreover, near to the hooking edge 13 of each leaf 3, 4 a step 30 can be formed that defines a hooking area 31 from which the hooks 15, 16 project (in the case of the first leaf 3) or in which the counter-hooking seats 18 open (in the case of the second leaf 4), 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.

[0043] In accordance with a further embodiment, the plastic body 8 forms a plurality of first hinge bushings 32 around the hinge seats 22 of the metal frame 5 and, preferably, a second plurality of hinge bushings 33 without metal reinforcement and sized so as to be able to at least partially receive one or more torsion springs 35 (figure

12 and 14) that bias the leaf 3, 4 into an open position.

[0044] This allows the user and the clothes to be protected from the spring itself in a manner substantially invisible from outside of the drum 1.

[0045] In accordance with a further aspect of the invention, the drum 1 comprises at least one hinge body 36 made of plastic material that forms a plurality of third hinge bushings 37 having a hole to receive the 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 12, 13, 14).

[0046] The hinge body 36 is connected to a metal side wall 39 of the laundry drum 1 and is configured to make, together with the hinge portions 7 of the leaves 3, 4, their rotary connection to such a side wall 39.

[0047] In accordance with an embodiment, 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 11).

[0048] For this purpose the appendages 41 can be bent towards the outside of the drum and connected on its outer surface or, alternatively, they can be bent towards the inside of the drum and fixed to its inner surface.

[0049] 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 13) in which it does not form an obstacle to the mounting of the leaf 3, 4 to the hinge body 36.

[0050] Moreover, the plastic body 8 of the leaf 3, 4 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 is mounted.

[0051] The hinge body 36 can also form a damping seat 45 (figure 10) that through shape coupling receives a stationary portion 46 of a damper 47, whereas a thrusting tab 64 of a mobile portion 48 thereof can be received in a damper cavity 49 (figure 12) formed directly in the plastic body 8 of the leaf 3, 4.

[0052] As known, the damper 45 is placed between the leaf and the side wall of the drum so as to slow down the opening movement of the leaf.

[0053] 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.

[0054] In this way it is possible to conceal the springs and the damper from the user's view and to protect the clothes from the risk of getting caught in these mobile elements.

[0055] 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 de-

finied 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, wherein the leaf (3, 4) comprises:

- a metal frame (5) that forms 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 to the drum (1),
- a body made of plastic material (8) injection moulded onto the metal frame (5), forming a composite leaf with an outer surface (9) made of plastic material,

characterised in that the hooking portion (6) and the hinge portion (7) are separately manufactured which are connected together before the formation of the plastic body (8) on the frame (5).

2. Drum (1) according to claim 1, wherein the connection areas (11) between the hooking portion (6) and the hinge portion (7) of the metal frame (5) are covered by the plastic body (8) at least on an outer side (10) of the leaf (3).

3. Drum (1) according to claim 1 or 2, wherein said hooking portion (6) comprises a hooking cross-member (12) extending parallel to a hooking edge (13) of the leaf (3) opposite its hinging edge (14) and forms two plate-like side hooks (15), projecting towards the outside of the leaf (3) and extending parallel to the hooking edge (13), and a central hook (16) projecting towards the outside of the leaf (3) and arranged halfway between the side hooks (15), said central hook (16) having a free end (17) bent towards the hinging edge (14) of the leaf (3).

4. Drum (1) according to any one of the previous claims, wherein the hooking portion (6) comprises at least one positioning tongue (19) configured to insert into a corresponding positioning seat (20) formed in the hinge portion (7) or vice-versa so as to form a mutual positioning reference of the components of the metal frame (5).

5. Drum (1) according to claim 2 and 4, wherein the connection points (11) are welding points formed adjacent to the positioning portions (19).

6. Drum (1) according to any one of the previous claims, wherein the frame (5) advantageously comprises two hinge portions (7) that are initially separate and

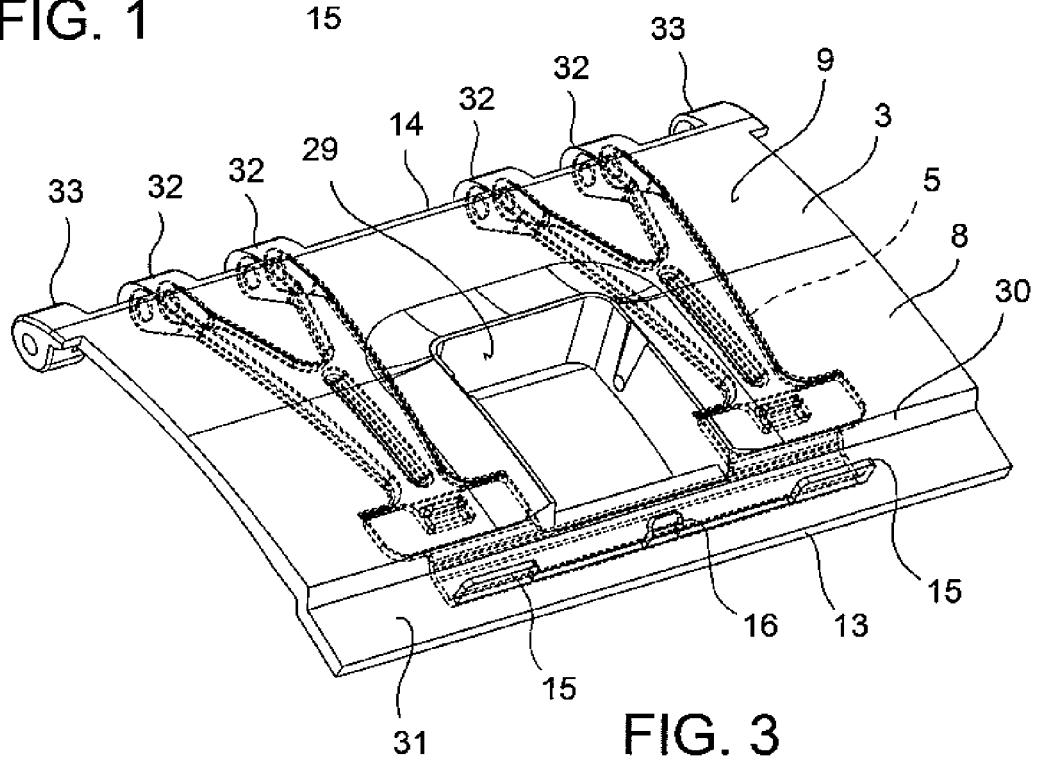
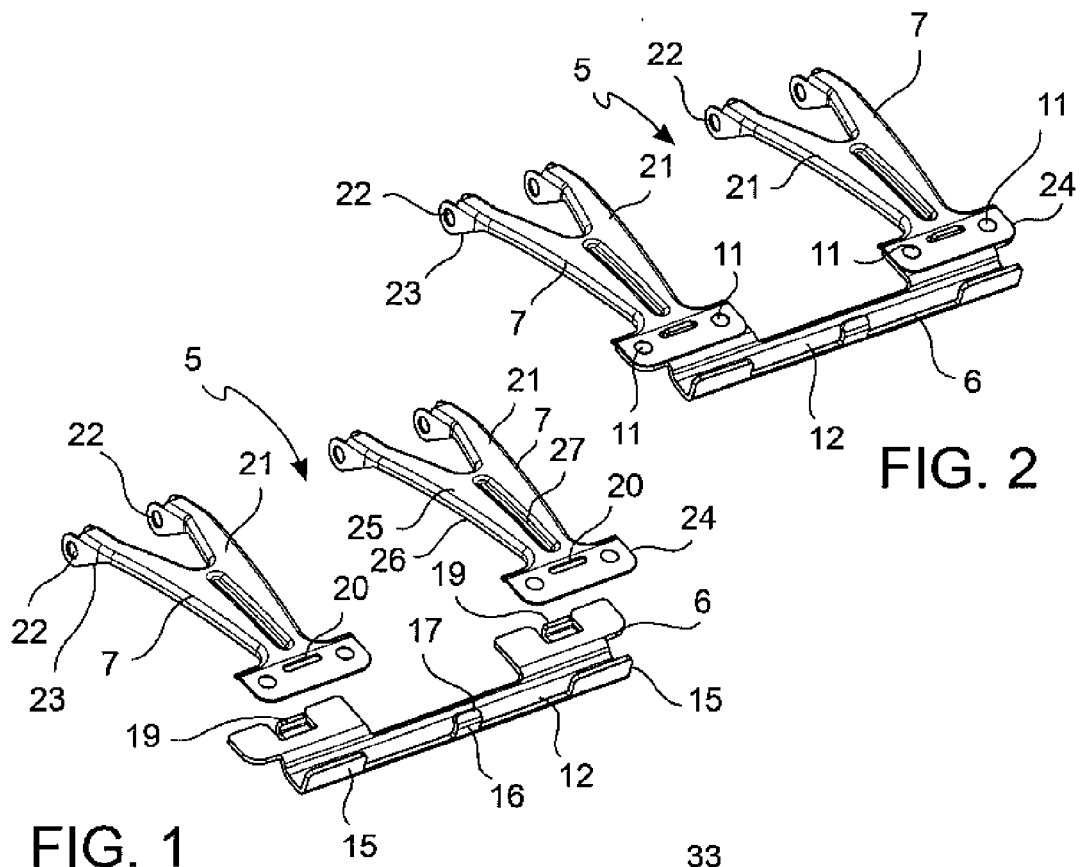
then connected to the hooking portion (6) and each hinge portion (7) has a main wall (21) substantially parallel to the outer surface (9) of the leaf (3) and a plurality of hinge seats (22) formed by holes in plate laps (23) bent towards the inside of the drum (1) and transversal to the main wall (21).

7. Drum (1) according to any one of the previous claims, wherein the hinge seats (22) are formed from an end lap (28) of the main wall (21) bent into a ring and connected to the main wall (21) so as to define a passage for a hinge pin (34). 10
8. Drum (1) according to claim 6, comprising two leaves (3, 4), wherein the hooking cross-member (12) of a second leaf (4) forms counter-hooking seats (18) suitable for receiving the hooks (15, 16) of the first leaf (3). 15
9. Drum (1) according to any one of the previous claims, wherein said plastic body (8) defines 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). 20
10. Drum (1) according to any one of the previous claims, wherein a first leaf (3) and a second leaf (4) of said leaves (3, 4) each have 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 with the adjacent outer surfaces (9) aligned substantially flush. 25 30 35
11. Drum (1) according to any one of the previous claims, wherein said plastic body (8) forms a plurality of first hinge bushings (32) around the hinge seats (22) 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. 40 45
12. Drum (1) according to any one of the previous claims, comprising at least one hinge body (36) made of plastic material that forms a plurality of third hinge bushings (37) having a hole for receiving the 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. 50
13. 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). 55

14. 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 in a loop around the hinge body (36) and fixed to the side wall (39).

15. Drum (1) according to claim 11, wherein the hinge plastic 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 plastic body (8) of the leaf (3, 4) 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.

16. Drum (1) according to claim 11, wherein the hinge body (36) forms a damping seat (45) that receives, through shape coupling, a stationary portion (46) of a damper (47), whereas a thrusting tab (64) of a mobile portion (48) of the damper (45) can be received in a damper cavity (49) formed directly in the plastic body (8) of the leaf (3, 4).



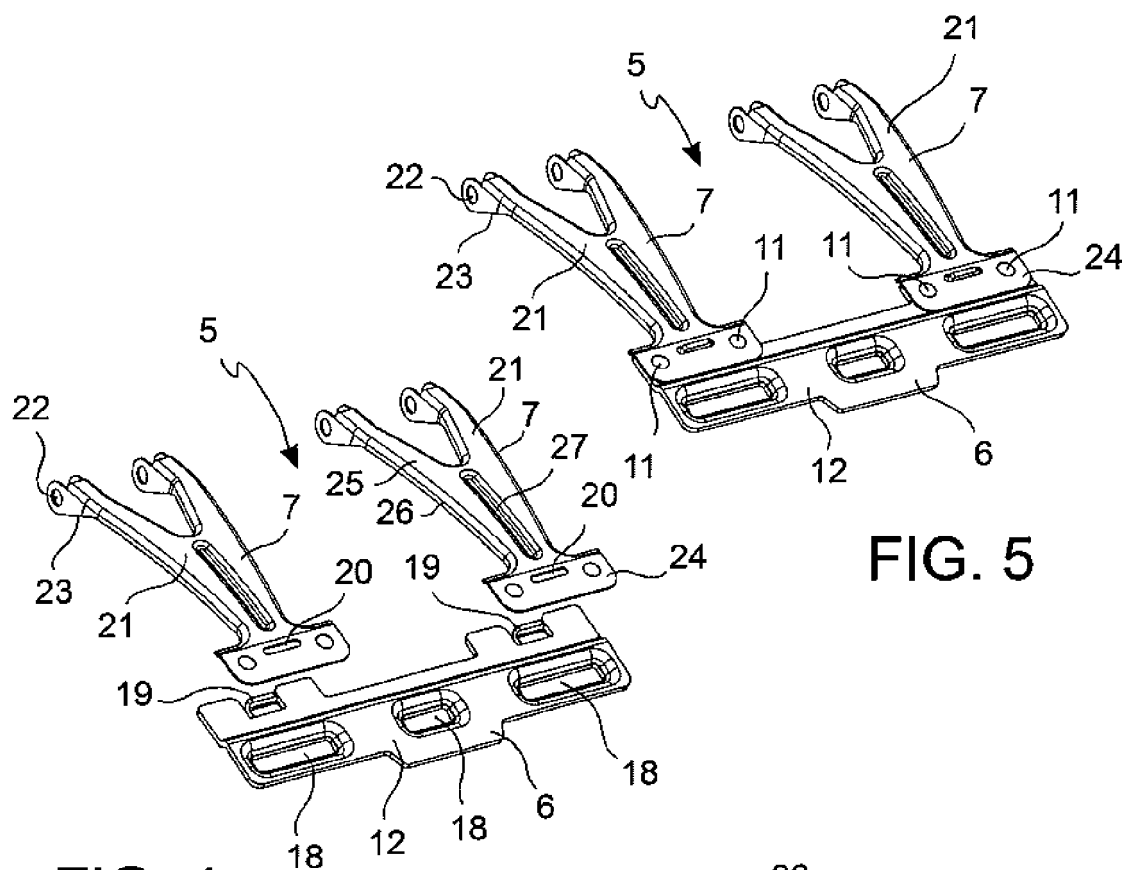


FIG. 4

FIG. 5

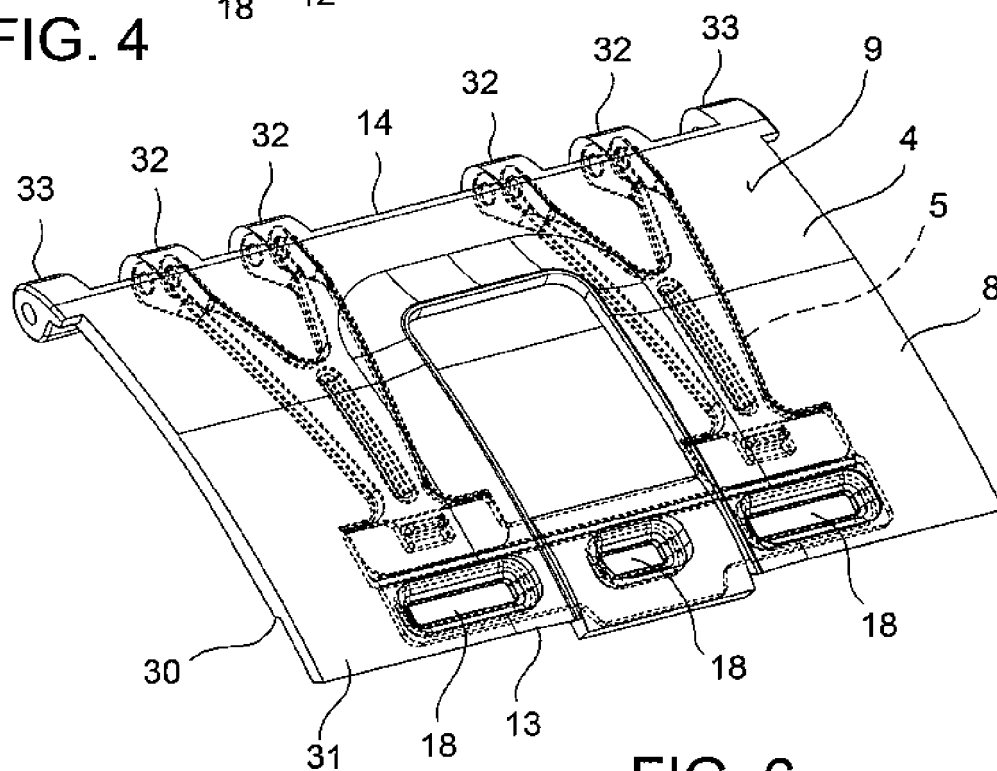


FIG. 6

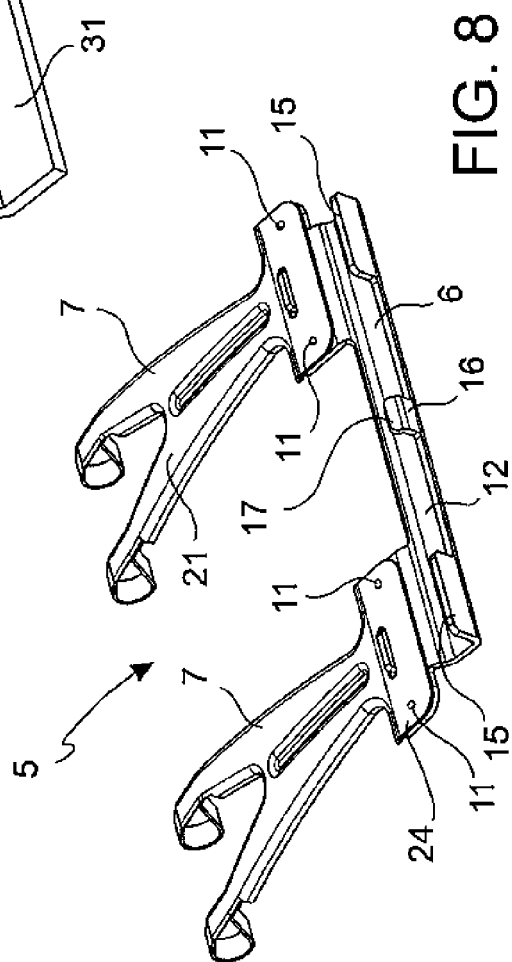
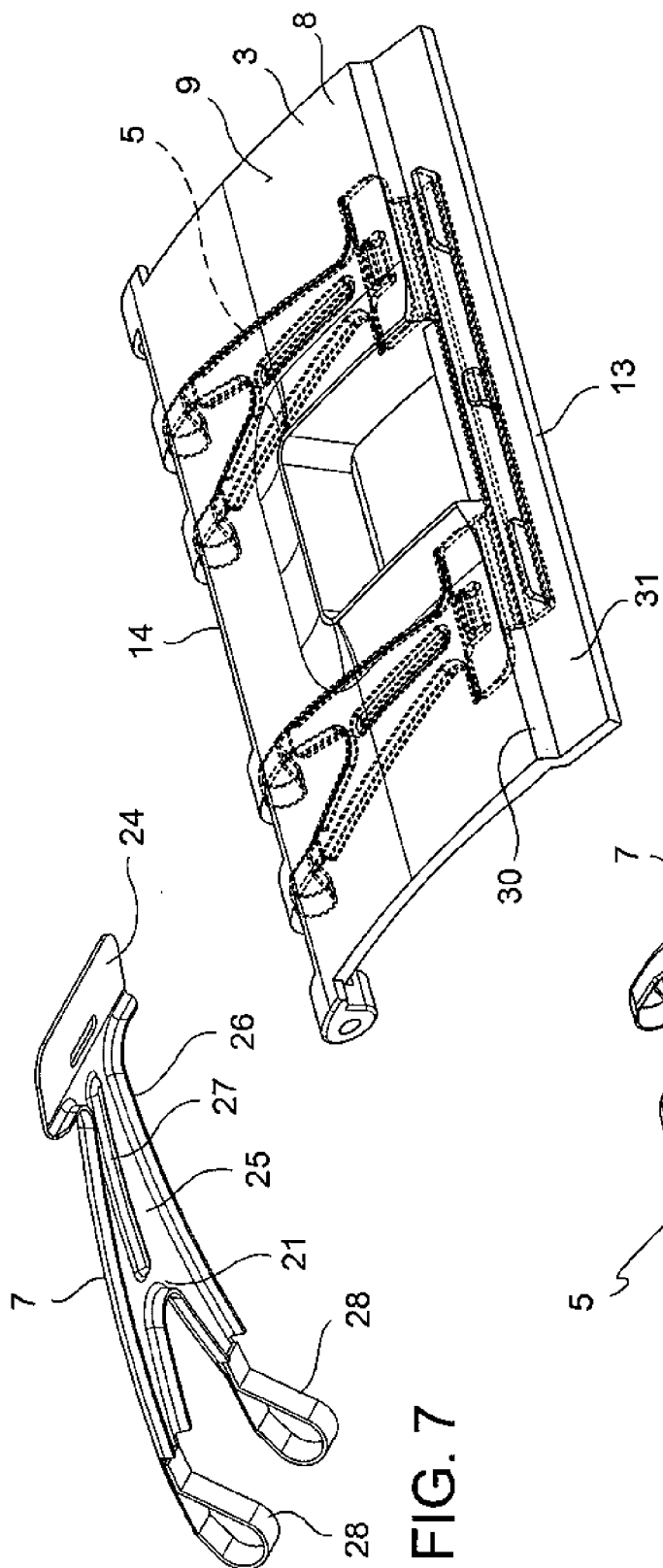


FIG. 9

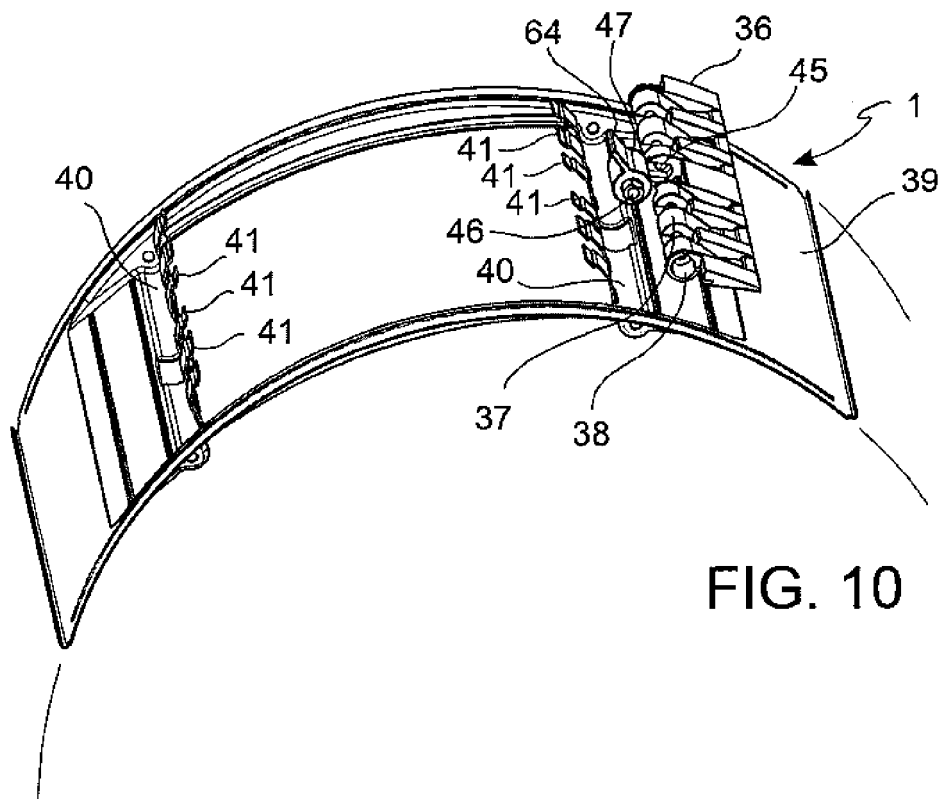


FIG. 10

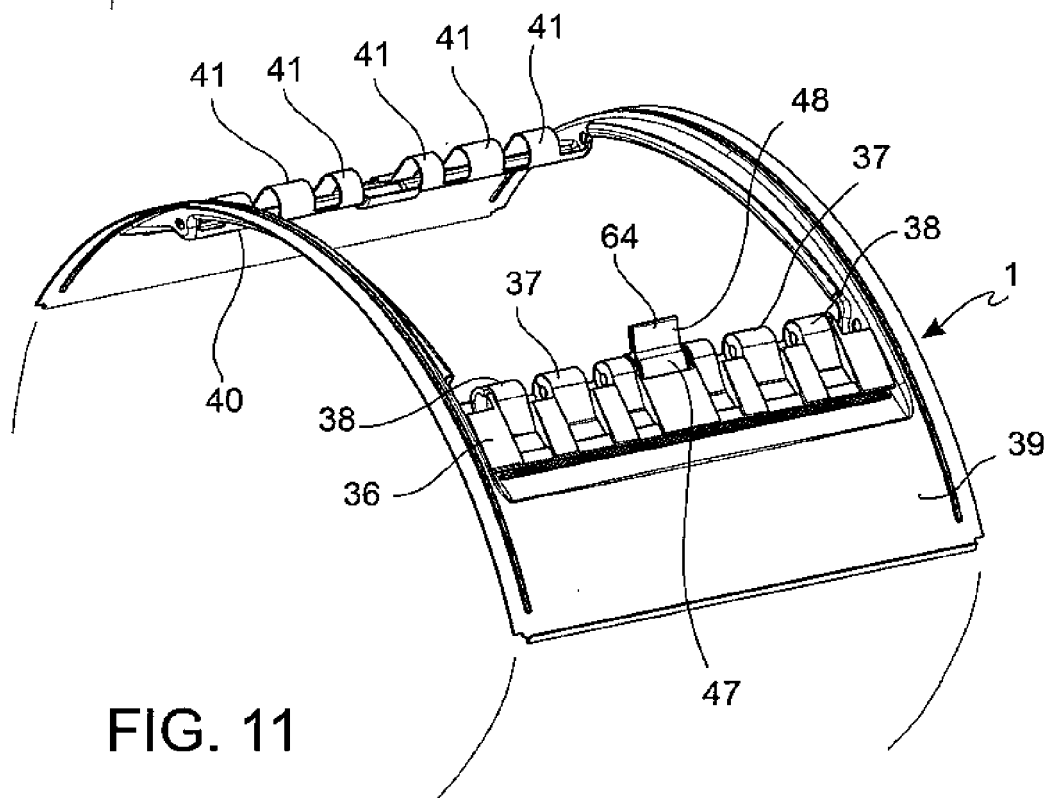


FIG. 11

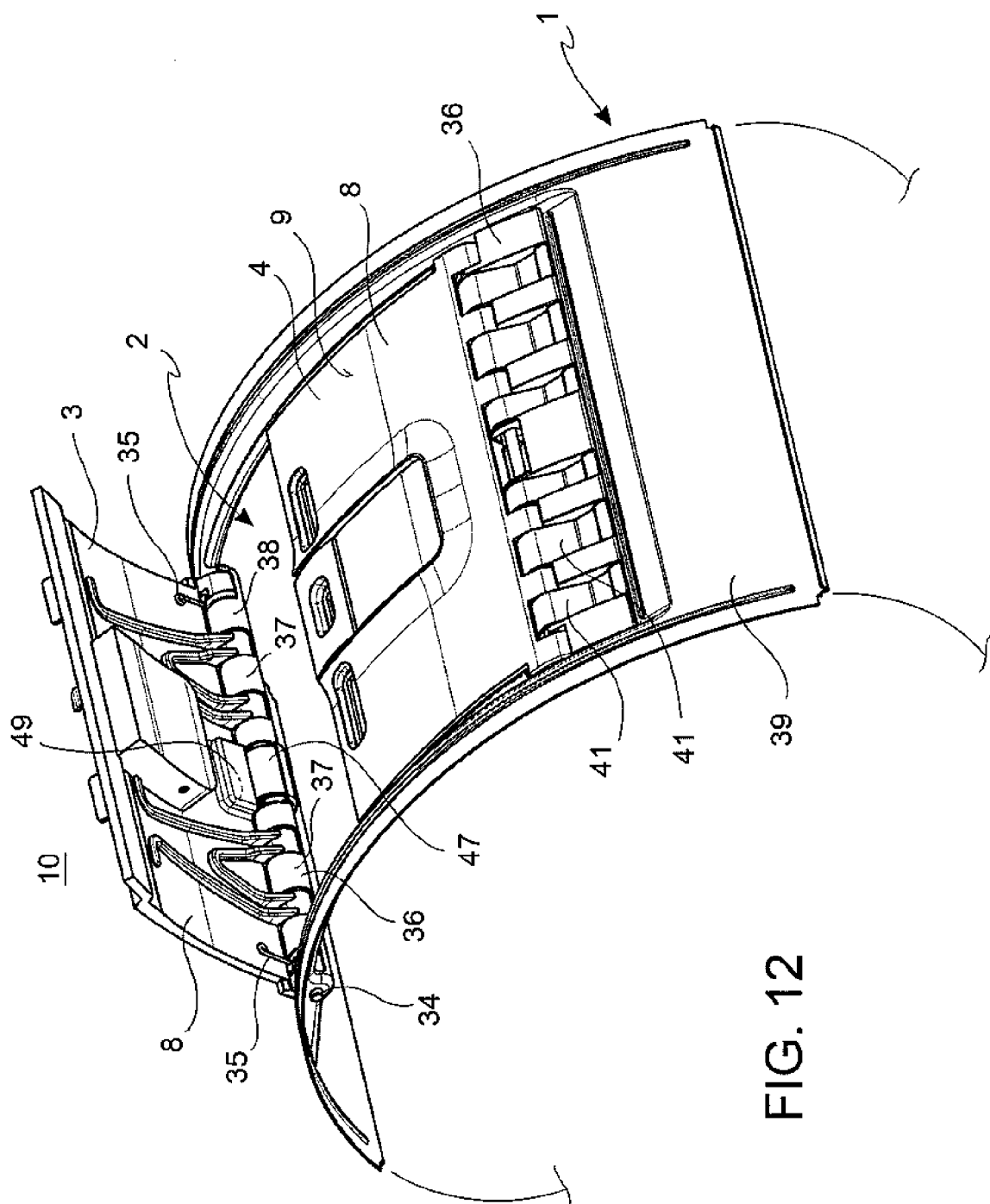


FIG. 12

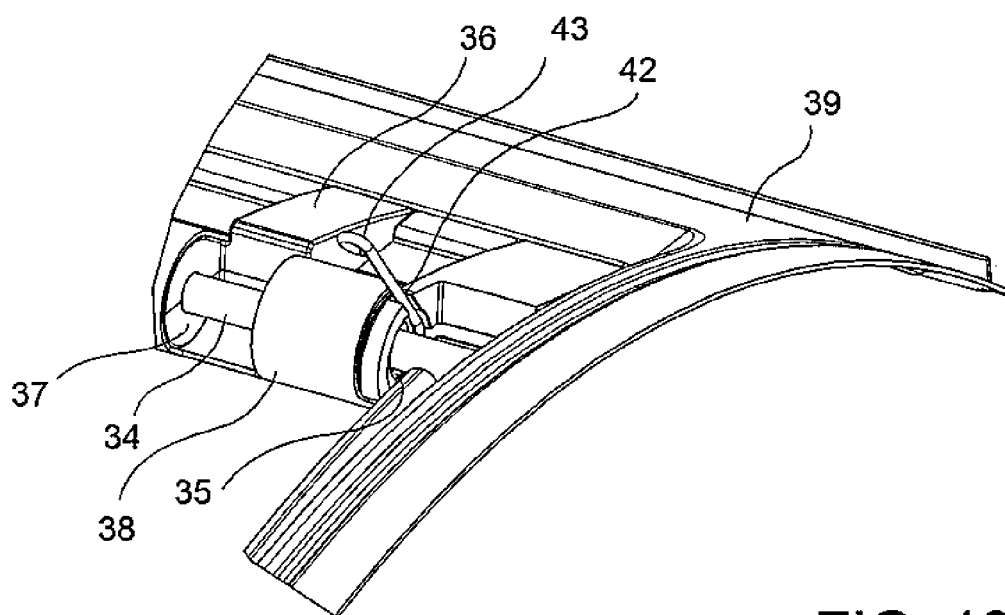


FIG. 13

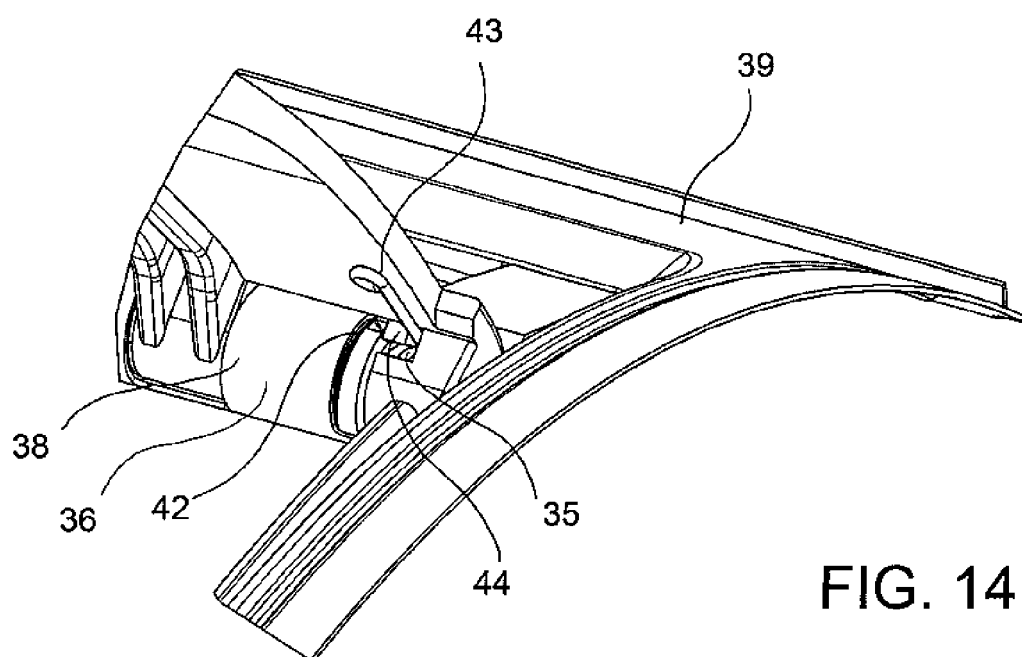


FIG. 14



EUROPEAN SEARCH REPORT

Application Number
EP 10 42 5128

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	DE 200 09 053 U1 (ELECTROLUX ZANUSSI ELETTRODOME [IT]) 10 August 2000 (2000-08-10) * page 4, line 4 - page 5, line 2; figures 1-4 *	1	INV. D06F37/10
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A	FR 2 892 128 A1 (BRANDT IND SAS [FR]) 20 April 2007 (2007-04-20) * page 1, line 21 - page 2, line 26; figures 1,2 *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
Munich		30 September 2010	Fachin, Fabiano
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 42 5128

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30-09-2010

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REFERENCES CITED IN THE DESCRIPTION

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