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(54) Top-loading washing machine

(57) A top-loading washing machine comprises a tub in which a drum (10) is rotatably mounted and having a peripheral wall with an opening for loading and unloading the laundry, said opening being provided with at least one door flap (12, 14) hingedly mounted on an edge of said opening. Between the flap and the edge of the opening or between edges of two flaps it is comprised a latching device having on one side a plurality of rotating hook-shaped portions (20b) and on the other side a plurality of engageable portions (16, 16a).

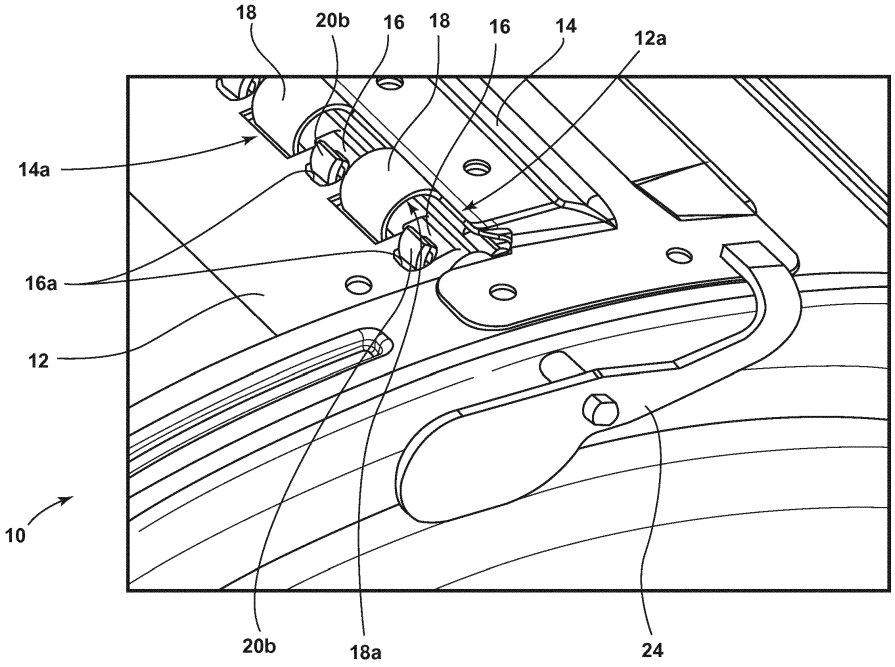

FIG. 1

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Description

[0001] The present invention relates to a horizontal axis top-loading washing machine, comprising a tub in which a drum is rotatably mounted, the drum comprising a peripheral wall with an opening for loading/unloading the laundry, said opening being provided with at least one door flap hingedly mounted on an edge of said opening.

[0002] Top-loading washing machines (known also as "top-loaders") are well known in the art of the washing machines. One of the major technical problems found in this category of washers is the way in which the door flaps or wings are secured one to the other in a closed configuration of the drum opening. This applies either to washing machines having two door flaps or a single flap. Usually the traditional system for assuring a safe closure of the door flaps is to use hook-shaped catches provided on one door flap and configured to cooperate, in the closed configuration of the opening, with matching slots provided on the other door flap. Such solution, disclosed for instance in EP 402252, requires the use of a safety latch for preventing the unintentional release of the closing catches. Moreover for washing machine having very high spinning speed, of the order of 1200 - 1400 rpm, this solution is not considered entirely reliable from a mechanical point of view. Other solutions have been proposed for overcoming the above technical problem. EP 120388 discloses a washing drum of an horizontal axis top-loading washing machine in which one of the door flaps is provided with a cylindrical element resiliently rotatable abut a fixed transverse shaft and adapted to accomplish closure of the door flaps by a latching action and to ensure locking of the door flaps in the closed position. The reliability of this solution is limited either by the limited strength assured by brackets supporting the traverse shaft, or by the precise shape of the cylindrical element with its elongate projections. Moreover the use of a spring for assuring the locking action of the device reduces further the reliability of the system.

[0003] EP 1544343 discloses a top-loading washing machine with a drum equipped with a single door flap and in which such door flap is provided with a latch element slidably mounted on the flap and comprising a plurality of openings adapted to cooperate in a snap-engagement way with a plurality of matching hook elements placed adjacent one edge of the drum opening. Even if such solution may increase the strength of the coupling between the door flap and the drum, nevertheless this solution is quite complex and increases the overall weight of the latching system. Moreover the use of a spring for maintaining the sliding latch element in a locking position requires a certain effort by the user to safely close the door flap.

[0004] It is an object of the present invention to provide a technical solution for closing the opening of the drum in a top-loading washing machine which does not present the above drawbacks and which is simple, light and reliable.

[0005] Such object is reached thanks to the features listed in the appended claims. According to the invention, between the door flap and the edge of the drum opening, or between edges of two door flaps configured to partially overlap one another in a closed configuration of the opening it is interposed a locking device comprising, on one side, a plurality of movable hook-shaped portions and on the other side a plurality of matching engageable portions. According to a preferred embodiment of the invention, the hook-shaped portions are defined by notched portions of a hollow cylindrical bar which is rotatably mounted in a hollow seat of one of the door flaps. The hook-shaped portions are therefore curved portions which may engage, after rotation of the bar, with corresponding slots provided on the other door flap.

[0006] This construction assures that the locking device can withstand high forces typical of drums rotating at high speeds. Moreover the absence of springs increases the reliability of the locking system, while at the same time does not require any extra effort by the user to close the opening. Other advantages and features of a washing machine according to the present invention will be clear from the following detailed description, provided only as a non limitative example, in which:

- Figure 1 is a perspective view of a detail of a washing machine according to the invention;
- Figure 2 is a perspective partially cross-sectioned view of the same detail of figure 1 viewed from another direction;
- Figure 3 is an enlarged cross-section view of detail of figure 2;
- Figure 4 is a perspective view similar to figure 1 in a second configuration of the locking system; and
- Figure 5 is a perspective view of a second embodiment of the invention in which the locking system is automatically actuated.

[0007] With reference to the drawings, a drum 10 of a top-loading washing machine comprises an opening provided with a first door flap 12 and a second door flap 14 which are hingedly mounted, in a known manner, to parallel edges of the opening (not shown). The first flap 12 presents a toothed edge 12a in which a plurality of protruding rectangular portions 16 are defined, each portion being provided with a rectangular slot 16a. As shown in figure 3, and in order to increase the mechanical strength of the locking system, the toothed edge 12a of the first flap 12 is preferably defined by a folded and flattened portion of the metal sheet of the door flap, and it is provided with a stiffening plate 15.

[0008] In a quite similar way, the second door flap 14 present an edge 14a which is formed by a bent and shaped end of the metal sheet forming the door flap, such bending being realized in order to define a cylindrical seat 18 with a plurality of notches 18a corresponding to protruding rectangular portions 16 of the first door flap 12.

In the close configuration of the drum opening as shown in the drawings, each of the protruding portions 16 is therefore inserted in a corresponding notch 18a of the cylindrical seat 18 of the second door flap.

[0009] Inside the cylindrical seat 18 is rotatably mounted a latch metal bar 20 which may be formed starting from a hollow tube which is longitudinally cut in order to obtain a sort of elongated bent tile having a plurality of notches 20a which define a plurality of curved hooks 20b located in the notches 18a of the cylindrical seat 18. Of course the latch bar 20 may be obtained also by metal casting or other shaping techniques.

[0010] At one end the latch bar 20 is fixed to a shaft 22 which is driven manually by a lever 24 with a handle portion 24a. In figure 1 such lever is shown in a closed configuration in which the handle portion 24a is substantially flush with the peripheral wall of the drum 10 and in which the curved hooks 20b of the latch bar 20 mounted in the second door flap 14 are fully inserted in the slots 16a of the first door flap 12. In this configuration both the door flaps are maintained in a closed configuration.

[0011] When the user has to open the door flaps, he/she grasp the handle portion 24a of the lever 24 in order to rotate the latch bar 20 in the cylindrical seat 18. This configuration is shown in figure 4, where the curved hooks 20b are close to the position in which they are released from the slots 16a. By a further rotation of the latch bar 20 the spring acting on the door flaps cause the opening thereof.

[0012] Instead of opening manually the drum, the embodiment shown in figure 5 does drive automatically such opening by exploiting the rotation of the drum. In this case the shaft 22 of the latch bar 20 is provided with a fork shaped laver 26 which can cooperate with a moving pin 28 mounted on an electro-mechancial actuator placed on a wall of the tub. By driving the pin 28 in an axial movement, it can engage the lever 22 when the opening of the drum is close to reach its upper position (i.e. the position designed for loading/unloading the laundry), therefore unlocking the curved hooks 20b of the latch bar 20 from their slots 16a. In a similar way the rotation of the drum can drive an automatic closure of the door flaps.

[0013] Even if the example shown in the drawings the drum is provided with two flap doors or wings, nevertheless the solution according to the invention can be implemented also in drum having a single door flap. In this case either an edge of the opening or an edge of the drum can be provided with the latch bar or with the slots respectively.

Claims

1. Top-loading washing machine, comprising a tub in which a drum (10) is rotatably mounted, the drum (10) comprising a peripheral wall with an opening for loading and unloading the laundry, said opening being provided with at least one door flap (12, 14) hingedly mounted on an edge of said opening, **characterized in that** between the flap (12,14) and the edge of the opening or between edges (12a, 14a) of two flaps (12, 14) it is comprised a latching device (16a, 18, 20, 20b) having on one side (14) a plurality of movable hook-shaped portions (20b) and on the other side (12) a plurality of engageable portions (16, 16a).

2. Top-loading washing machine according to claim 1, wherein the plurality of engageable portion comprises slots (16a) adjacent an edge (12a) of the door flap (12) or an edge of the opening and the plurality of movable hook-shaped portions (20b) comprises a shaped rotating bar (20) mounted in a seat (18) provided on a second door flap (14) or on a single door flap respectively and having a plurality of curved hooks (20b) configured, due to rotation of said bar (20), to enter said slots (16a) for locking the door.

3. Top-loading washing machine according to claim 2, wherein said seat (18) of the rotating rod (20) is defined by a bent and round edge (14a) of the flap door (14) with a plurality of notches (18a) in which protruding portions (16) of the edge (12a) of the door flap (12) or of the opening where said slots (16a) are located.

4. Top-loading washing machine according to claim 2 or 3, wherein the shaped rotating bar (20) presents, at one of its ends, a lever (24, 24a) for its manual driving.

5. Top-loading washing machine according to claim 2 or 3, wherein the shaped bar (20) presents an end with a lever (26) which can be automatically driven by a movable pin (28) configured to selectively engage said lever (26) at a predetermined angle of rotation of the drum (10).

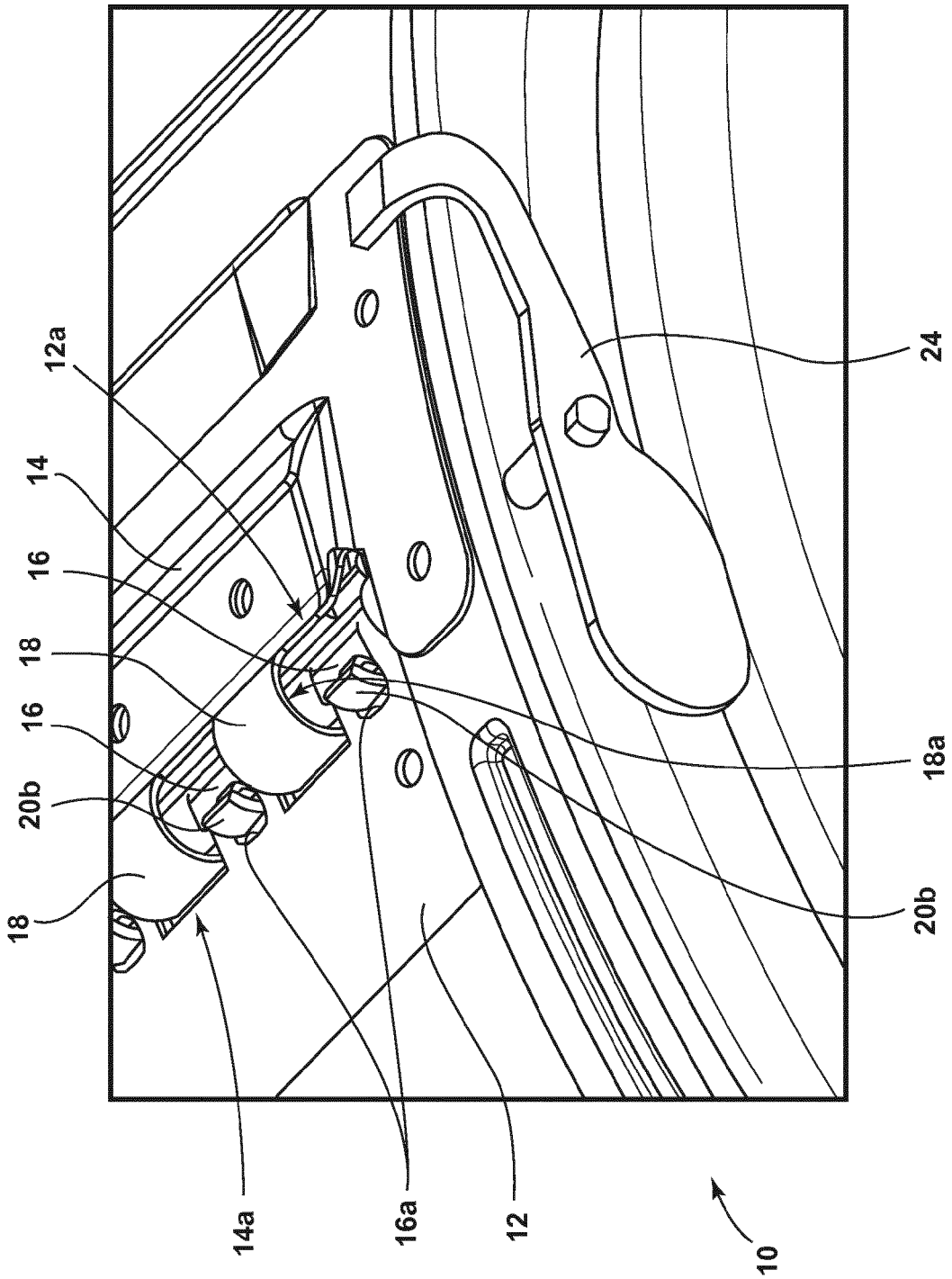

FIG. 1

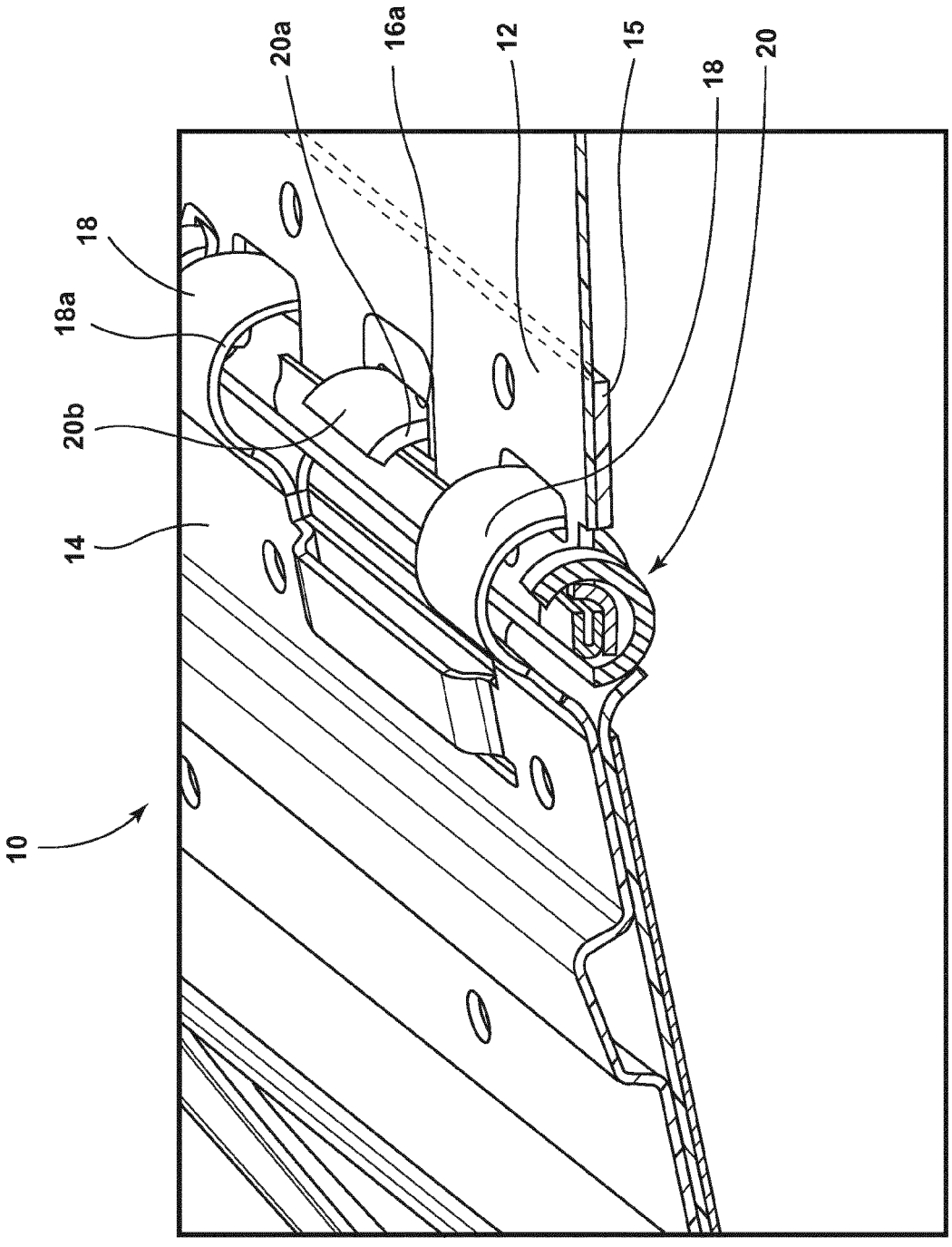

FIG. 2

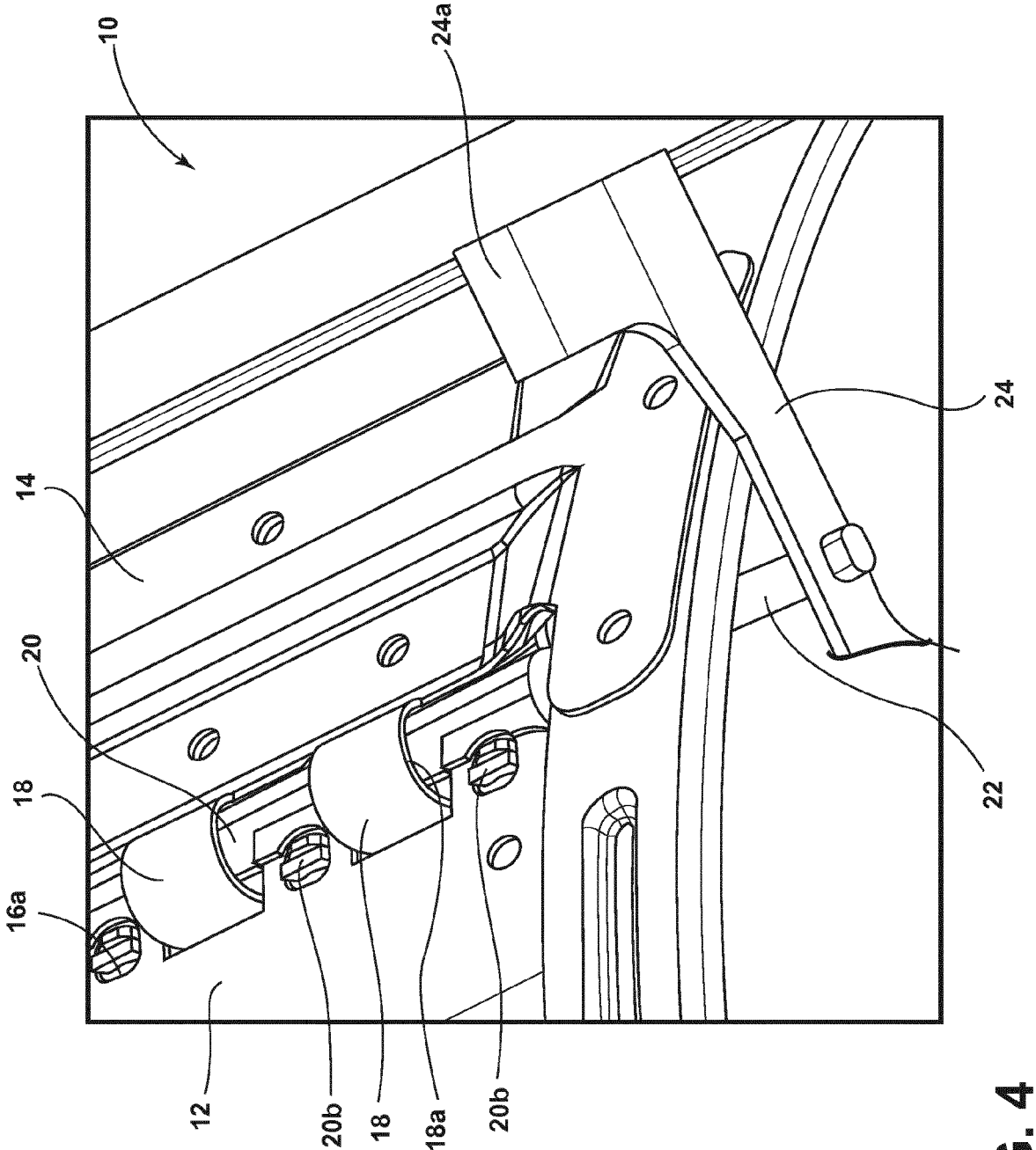

FIG. 4

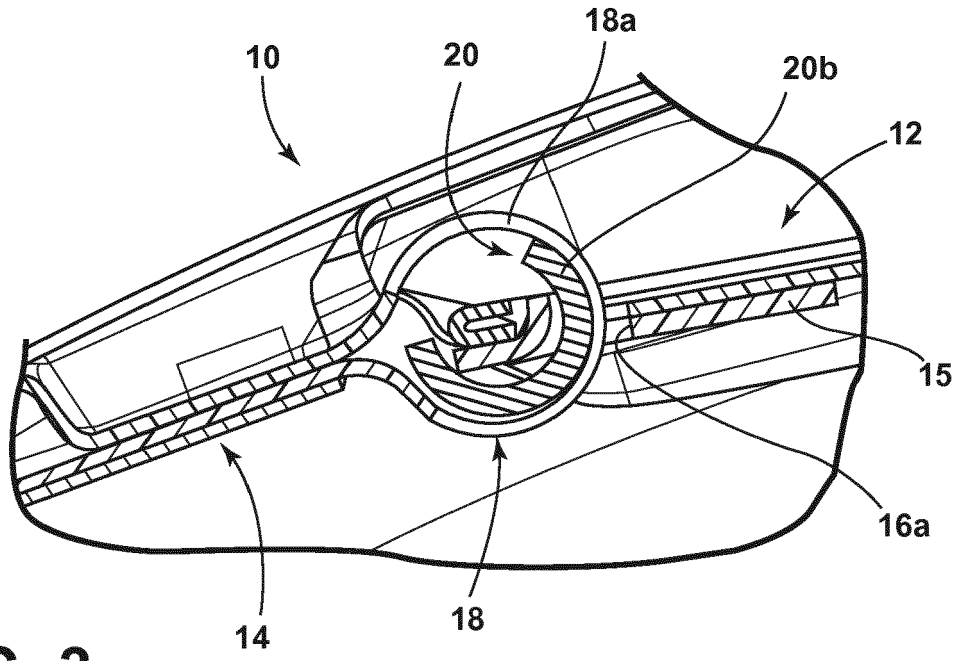

FIG. 3

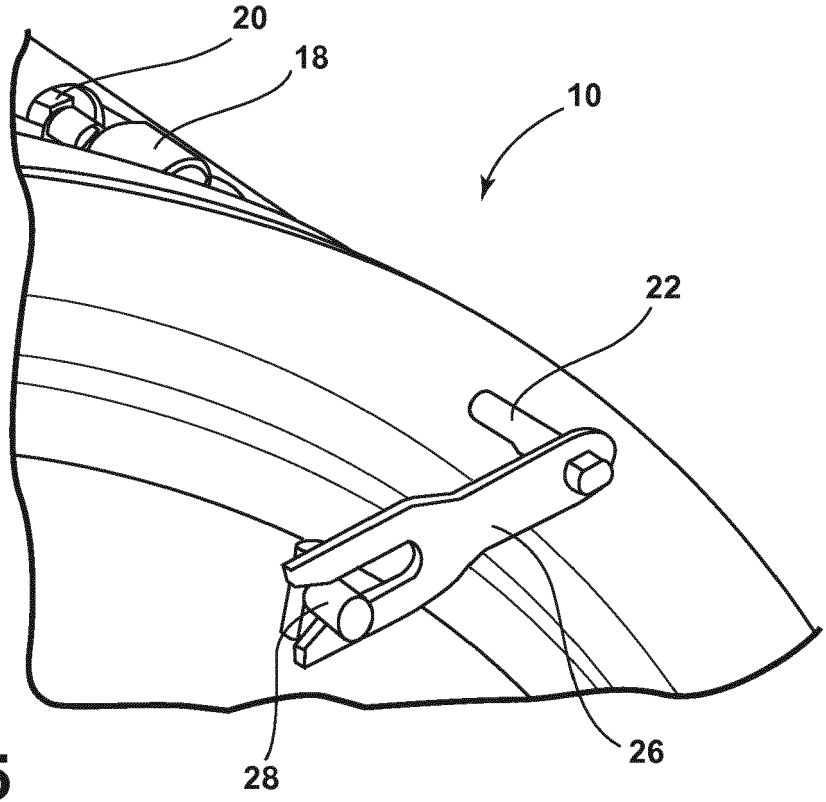

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 14 17 1044

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 478 689 A1 (MAYC SA [ES]) 25 September 1981 (1981-09-25)	1-4	INV. D06F37/10
A	* page 2 - page 3; figures *	5	
X	EP 0 402 252 A1 (ARDAM SNC [FR]) 12 December 1990 (1990-12-12)	1	
A	* column 3 - column 4; figures *	2-5	
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A	* page 3, line 33 - page 5, line 3; figures *	3-5	
A	EP 1 544 343 A1 (WHIRLPOOL CO [US]) 22 June 2005 (2005-06-22) * the whole document *	1-4	

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	8 October 2014	Stroppa, Giovanni

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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