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(54) **Top-loading washing machine with a drum equipped with a single door flap**

(57) A top-loading washing machine has a drum (12) with a peripheral wall (12a) formed with an opening (14) for the passage of the laundry, said opening being provided with a door adapted to close such opening. The

door comprises a single flap (16) hingedly mounted on a rectilinear rim (14a) of the opening, on the opposite rim (14b) there being provided hook elements (20) for snap-engagement cooperation with a sliding latch element (22) on the flap for locking the door.

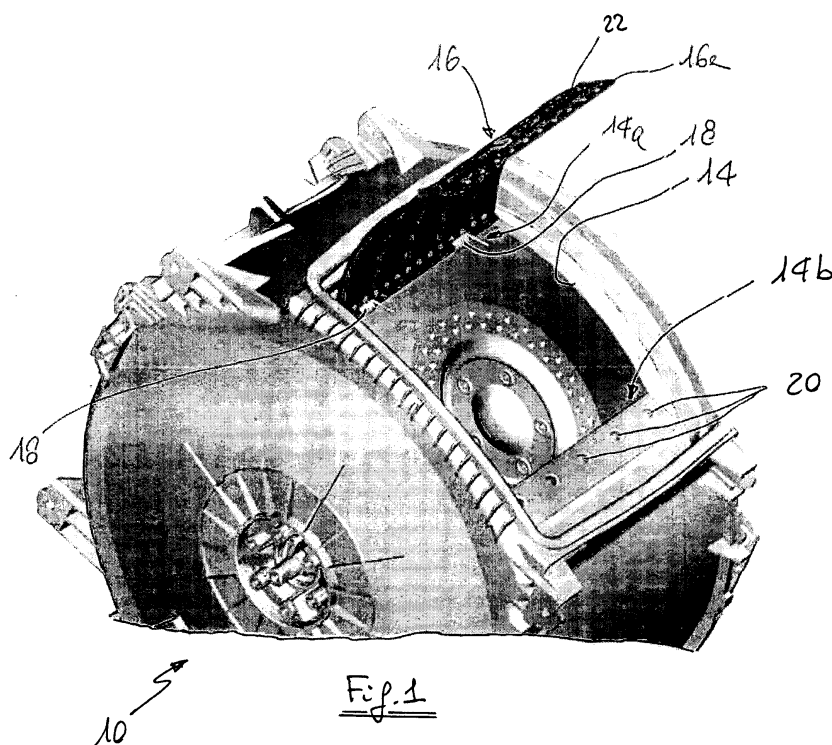


Fig. 1

**EP 1 544 343 A1**

## Description

**[0001]** The present invention relates to a top-loading washing machine having a drum with a peripheral wall formed with an opening for the passage of the laundry, said opening being provided with a door adapted to close such opening.

**[0002]** The drum of the majority of top-loading washing machines has a door made by two flaps adapted to partially overlap one another and hingedly mounted on opposite rims of the drum opening by means of springs adapted to bias them towards their open position. Such door flaps are provided respectively with hooks and engagement openings cooperating with one another for locking the flaps in their closed position.

**[0003]** Such way of construction, for instance shown in EP-A-657573 has the disadvantage that the user has to manipulate two flaps, after having opened the outer lid of the machine that gives access to the drum. Since the user has often one hand already used for carrying a container with the laundry, it is clear that the two flaps door system is not optimal for the user. Another disadvantage of this known door is that it is not very easy to be handled by the user, since the spring-loaded flaps can require damping means for avoiding a too quick and uncontrolled opening of the door, such uncontrolled movement of flaps being noisy. Furthermore, the presence of hooks can also hurt the user.

**[0004]** A top-loading washing machine having a door in a single piece is disclosed in EP-A-869212 in which the door is pivotally mounted to the spin drum so as to pivot about the centre axis of rotation of the drum. Even if this solution does simplify the way in which the door is opened by the user, nevertheless this system is quite complex, expensive and needs a proper balancing of the door. According to the present invention, the above disadvantages are overcome thanks to the features listed in the appended claims.

**[0005]** In the washing machine according to the invention the door of the drum comprises a single flap having a first end hingedly mounted on a first rim of the opening. Snap-engagement means for locking and unlocking the door are provided between a second end of the flap, opposite to its first end, and a second rim of the opening. In this way the user has to handle only one flap.

**[0006]** Moreover, such kind of door can be easily opened automatically once the user has manually opened the outer lid of the machine.

**[0007]** Preferably the snap-engagement means comprise a latch element slidable on the second end of the flap and hook elements on the corresponding second rim.

**[0008]** The absence of hooks results also in a less dangerous design for the user, who does not run the risk of being hurt during the opening of the door.

**[0009]** The invention will be explained in the following description on the basis of an example of embodiments shown in the drawings in which:

- Figure 1 shows a perspective view of a partially sectioned tub of a top-loading washing machine according to the present invention,
- Figure 2 is a perspective view of the drum of the washing machine shown in figure 1,
- Figure 3 is a top view of a portion of the door drum in a closed configuration,
- Figure 4 is a view similar to figure 3 in which a cover is removed in order to show the snap-engagement mechanism,
- Figures 5 is a cross sectional view along line V-V of figure 3 (configuration of the door immediately before the activation of the snap-engagement mechanism), and
- Figure 6 is a cross sectional view similar to figure 5 in which the locked configuration of the door is shown.

**[0010]** With reference to the drawings, a top-loading clothes washing machine comprises a tub 10 that is adapted to be suspended in a frame (not shown). In the tub 10 a drum 12 having a horizontal axis is rotatably mounted and it is provided, on its peripheral cylindrical wall 12a, with an opening 14 for loading and unloading clothes items.

**[0011]** The drum 12 comprises also two opposing end walls 12b, and the opening 14 has two opposite rectilinear rims 14a and 14b respectively. In the embodiment shown in the drawings, a door 16 made by a single curved flap is hinged to a first rim 14a of the opening 14, and springs 18 are coaxially mounted on the hinge in order to bias the door 16 towards its open position shown in figure 1.

**[0012]** The second rim 14b of the opening 14 is provided with a plurality of mushroom-shaped pins 20 projecting outside the drum. Each pin 20 has a base portion 20a fixed to the drum, and an enlarged tapered end portion 20b, adapted to cooperate with corresponding holes 22a provided in a sliding latch 22 carried by an edge 16a of the door 16. The latch 22 is slidably mounted in a seat 24 defined by the wall of the door and by a cover 26 fixed in 28 to the door (figure 3). For sake of clarity the cover 26 is not shown in figures 1 and 4. The cover 26 presents a plurality of dome portions 26a in correspondence to the position of the holes 22a, and it has the main function to avoid any entanglement of laundry items with the pins 20 during loading and unloading of the drum 12. Between the wall of the door 16 and the latch 22 there is provided an axial spring 30 which urges the latch toward a side end position, as shown in figure 4. The latch 22 is also provided with a trigger 32 sliding in a corresponding slot of the cover 26 in order to allow the user to slide the latch 22 against the action of the spring 30.

**[0013]** The closure of the door 16 is very easy for the user. He has only to urge the door 16 against the actions of the springs 18 up to a position shown in figures 4 and 5, where the latch 22 is in contact with the tapered end

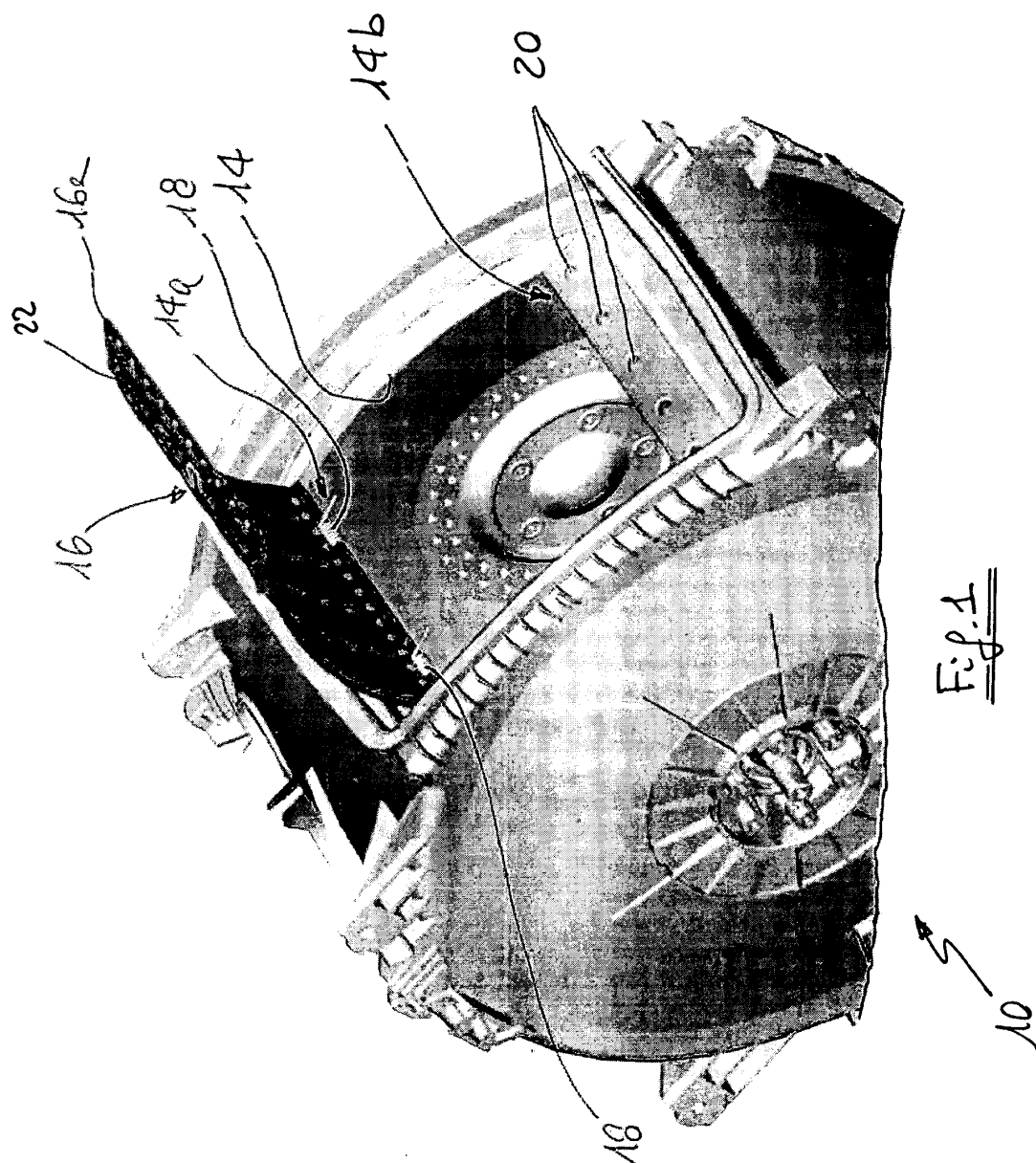
portions 20b of the pins 20. A further small rotation of the door 16 urged by the user causes a snap-engagement of the pin 20 in the corresponding holes 22a of the latch 22 (as shown in figure 6). In this configuration the washing machine can start its washing program. For opening the door 16 the user needs only to act on the trigger 32 so that the latch 22 is disengaged from the pins 20. The springs 18 do the rest.

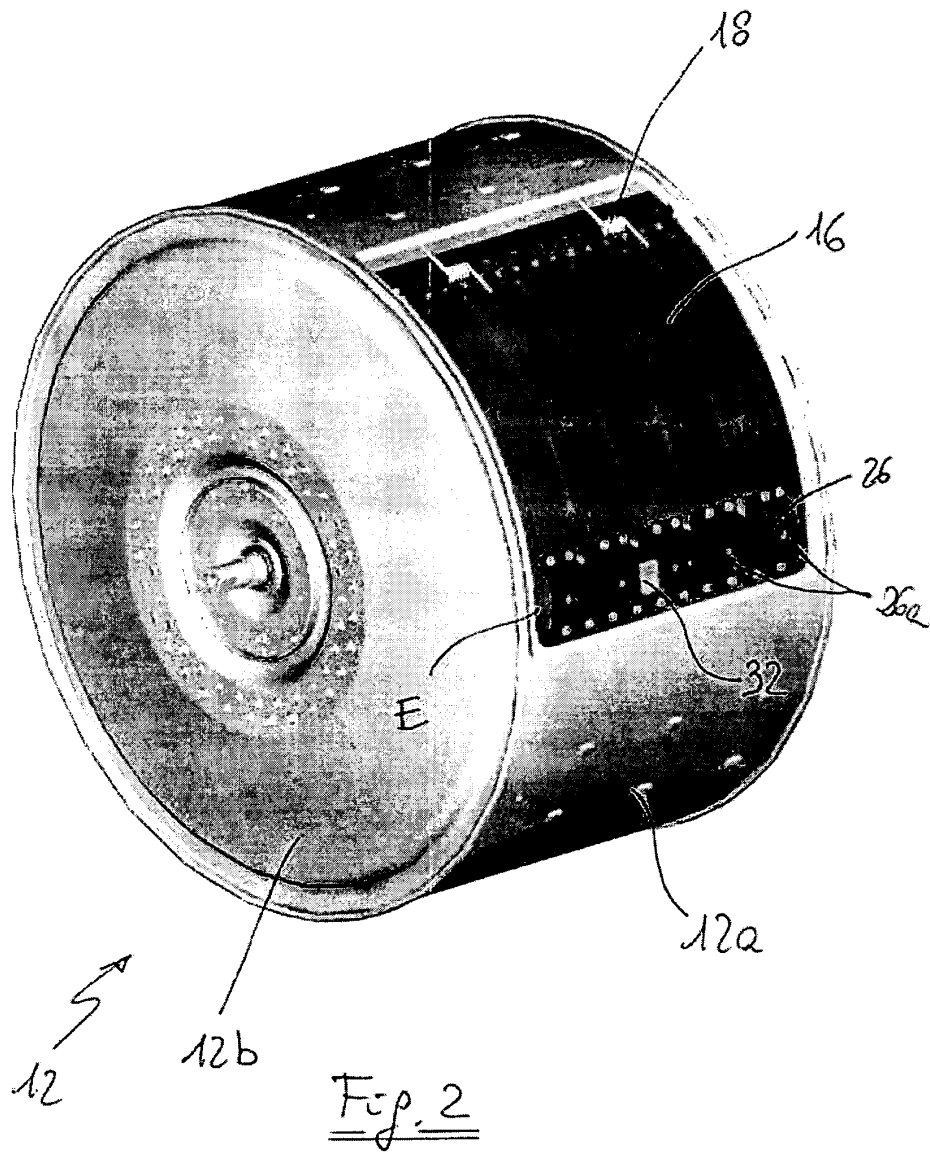
**[0014]** In another embodiment of the invention, the latch 22 is provided with an end E which can be driven automatically by a device (not shown) in order to open automatically the door once the user open the lid of the washing machine. Such device can be mechanical (for instance driven by the opening movement of the lid) or electromechanical (for instance driven by a switch that senses when the lid is opened by the user).

6. A top-loading washing machine according to any of the preceding claims, **characterised in that** it comprises means for automatically driving the snap-engagement means (20, 22) in order to open the door (16).

## Claims

1. A top-loading washing machine, having a drum with a peripheral wall formed with an opening for the passage of the laundry, said opening being provided with a door adapted to close such opening, **characterised in that** said door comprises a single flap (16) hingedly mounted on a rim (14a) of said opening, there being provided snap-engagement means (20, 22) between the flap (16) and the drum (12) for locking the door.
2. A top-loading washing machine, **characterised in that** the snap-engagement means are placed between a second rim (14b) opposite to the first rim (14a) where the single flap (16) is hinged and a second end (16a) of the flap (16) opposite to the first end hinged to the drum (12).
3. A top-loading washing machine according to claim 2, **characterised in that** said snap-engagement means comprise a latch element (22) on the second end (16a) of the flap (16) and hook elements (20) on the corresponding second rim (14b).
4. A top-loading washing machine according to claim 3, **characterised in that** the latch element (22) is slidably mounted on the flap (16) in a direction substantially parallel to the axis of the drum and comprises a plurality of openings (22a) adapted to cooperate with said hook elements (20), spring means (30) being provided between the latch element (22) and the flap (16) in order to allow the snap-engagement with the hook elements (20) when the door (16) is closed.
5. A top-loading washing machine according to claim 4, **characterised in that** the latch element (22) is provided with a trigger portion (32) adapted to be driven by the user in order to allow the door opening.





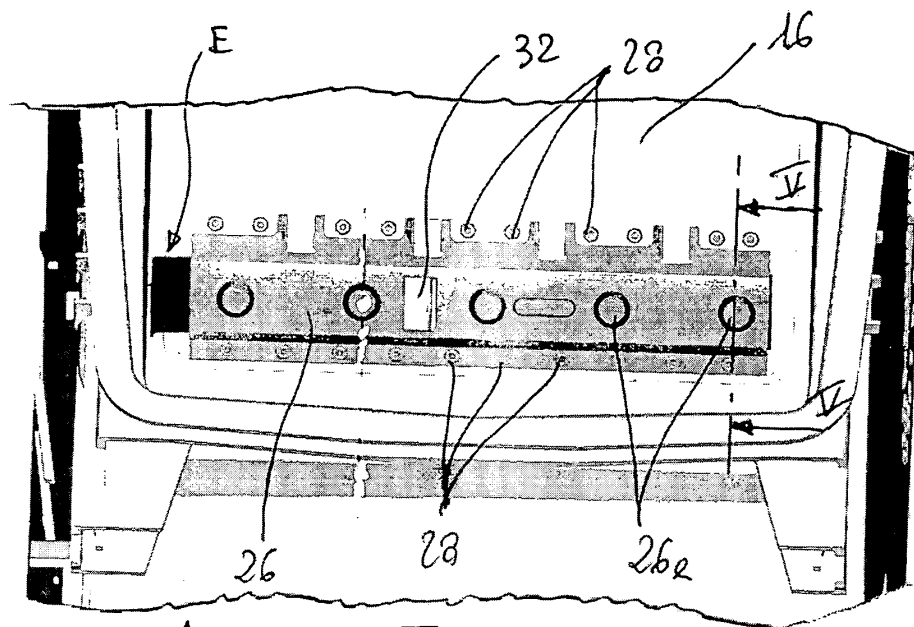


Fig. 3

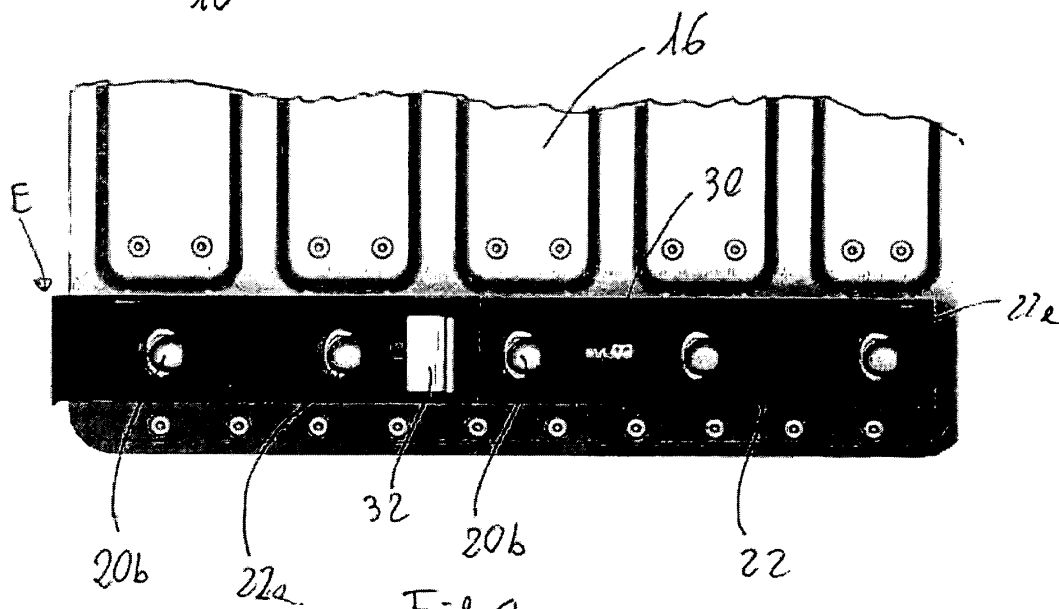
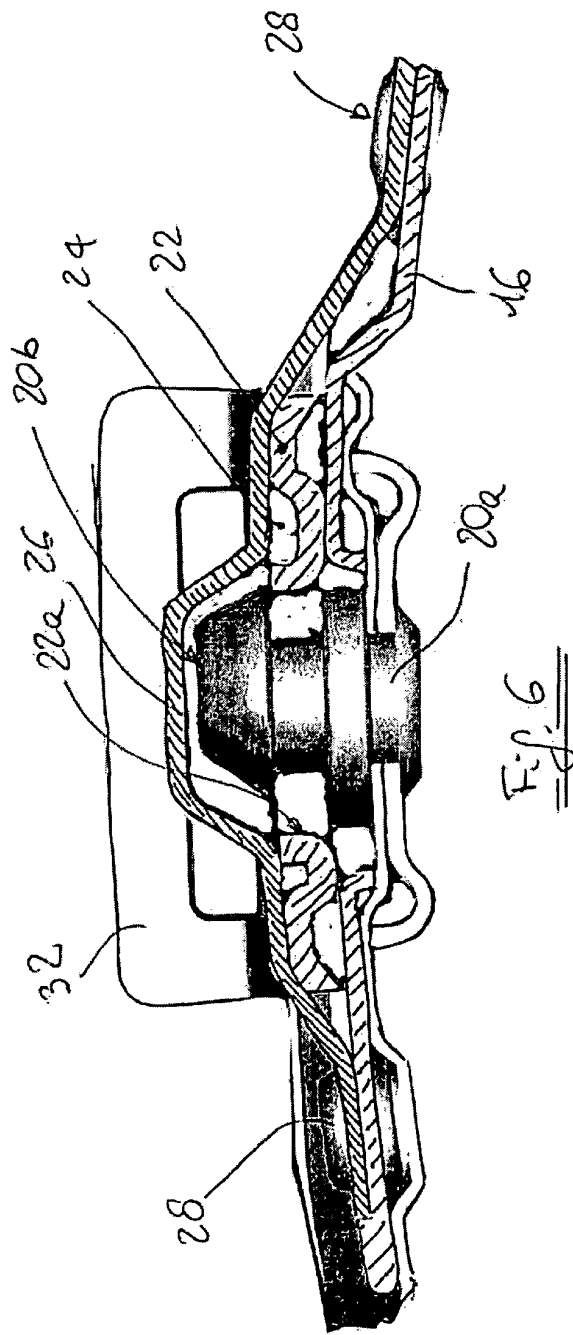
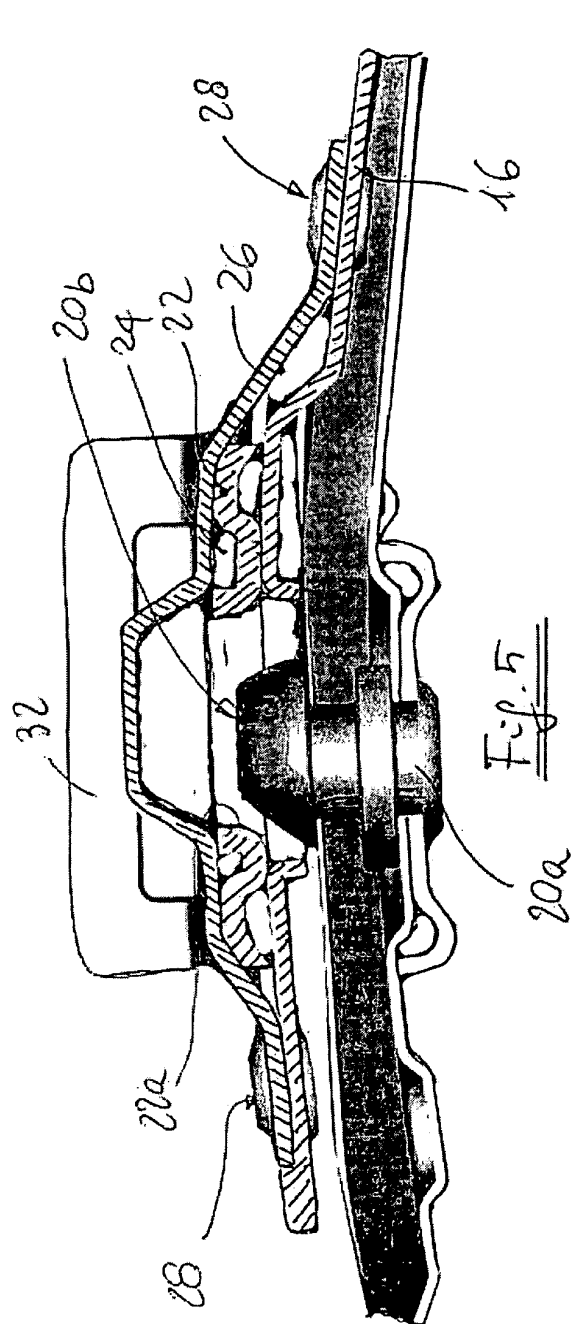


Fig. 4





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# EUROPEAN SEARCH REPORT

Application Number  
EP 03 02 9430

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 959 169 A (CIAPEM) 24 November 1999 (1999-11-24) * the whole document *	1,2	D06F37/10
X	DE 18 15 020 U (JOSEF BROCKE MASCHINEN-UND METALLWARENFABRIK) 21 July 1960 (1960-07-21) * the whole document *	1,2	
A	---	3-5	
X	GB 134 659 A (TAYLOR, G. F.) 13 November 1919 (1919-11-13) * page 3, line 20-45; figures *	1,2	
A	EP 0 681 050 A (WHIRLPOOL CO) 8 November 1995 (1995-11-08) * abstract * * column 5, line 12-25 * * column 6, line 14 - column 7, line 39 * * column 12, line 13-21 * * column 14, line 13-39; figures *	1-6	
A	US 3 226 961 A (IRVING JACOBS) 4 January 1966 (1966-01-04) * the whole document *	1-3	
A	US 1 596 887 A (MOREY JUNE B) 24 August 1926 (1926-08-24) * the whole document *	1	D06F
A	GB 351 418 A (FREDERICK MARRYAT LORD; R G WHITAKER LTD) 24 June 1931 (1931-06-24) * the whole document *	1	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 19 May 2004	Examiner Falkentoft, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)



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

EP 03 02 9430

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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19-05-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0959169	A	24-11-1999	FR 2778677 A1	19-11-1999
			AT 250156 T	15-10-2003
			DE 69911301 D1	23-10-2003
			EP 0959169 A1	24-11-1999
-----				
DE 1815020	U		NONE	
-----				
GB 134659	A		NONE	
-----				
EP 0681050	A	08-11-1995	US 5469593 A	28-11-1995
			AU 682258 B2	25-09-1997
			AU 1778595 A	09-11-1995
			CA 2148151 A1	03-11-1995
			CN 1124799 A	19-06-1996
			DE 69522991 D1	08-11-2001
			DE 69522991 T2	11-04-2002
			EP 0681050 A2	08-11-1995
			ES 2161268 T3	01-12-2001
			NZ 272036 A	28-10-1996
			US 5546772 A	20-08-1996
			US 5678430 A	21-10-1997
-----				
US 3226961	A	04-01-1966	GB 1006958 A	06-10-1965
			CH 407023 A	15-02-1966
			DE 1610270 A1	04-12-1969
			FR 1370863 A	28-08-1964
			LU 44119 A1	09-10-1963
			NL 299264 A	
			NO 117974 B	20-10-1969
			SE 311008 B	27-05-1969
-----				
US 1596887	A	24-08-1926	NONE	
-----				
GB 351418	A	24-06-1931	NONE	
-----				