

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 489 218 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

22.12.2004 Bulletin 2004/52

(51) Int Cl.7: **D06F 37/10**

(21) Application number: **03101823.7**

(22) Date of filing: **20.06.2003**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**

Designated Extension States:

AL LT LV MK

• **Haerer, Manfred**

21025, Comerio (IT)

• **Wohnhas, Stefan**

21025, Comerio (IT)

(71) Applicant: **WHIRLPOOL CORPORATION**

Benton Harbor Michigan 49022 (US)

(74) Representative: **Guerici, Alessandro**

Whirlpool Europe S.r.l.

Patent Department

Viale G. Borghi 27

21025 Comerio (VA) (IT)

(72) Inventors:

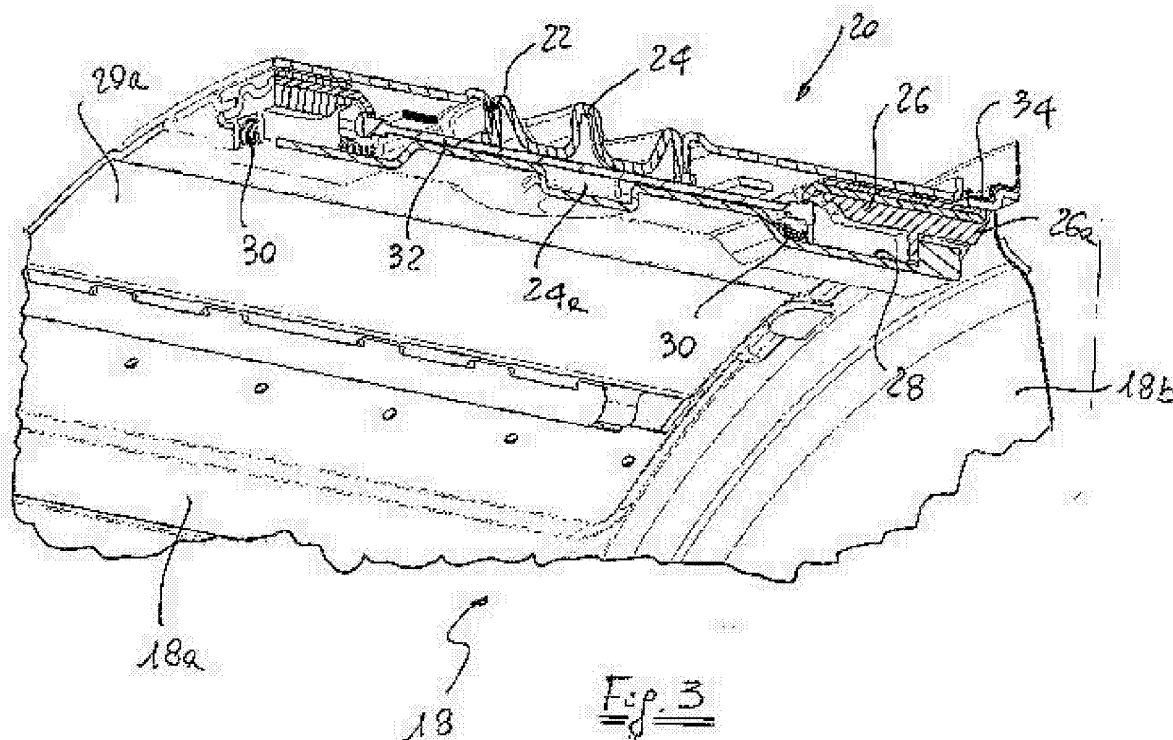
• **Valton, Philippe**

21025, Comerio (IT)

(54) **A top-loading clothes washing machine**

(57) A top-loading clothes washing machine comprises a drum (18) with a substantially horizontal axis, a cylindrical side wall (18a) and two opposing end walls (18b), in the cylindrical side wall (18a) being provided an opening (21) for loading items into the drum. The

opening has a door (20,20a,20b) pivotally mounted to the drum (18), and the door (20) is provided with a locking device for keeping the door closed. The locking device comprises two bolt members (26,26a) adapted to cooperate with the sides of said opening (21) adjacent the end walls (18b) of the drum (18).



EP 1 489 218 A1

Description

[0001] The present invention relates to a top-loading clothes washing machine comprising a drum with an horizontal axis, a cylindrical side wall and two opposing end walls, in the cylindrical side wall being provided an opening for loading items into the drum, such opening having a door pivotally mounted to the drum, the door being provided with a locking device for keeping the door closed during the washing program.

[0002] In the known top-loading washing machines, as shown for instance in FR-A-2793265, the locking device comprises hooks in one of the two flaps of the doors, which are adapted to cooperate with opening or seats provided in the other flap of the door. The two flaps of the door are urged by spring towards an opening configuration of the door. Even if such system is simple, nevertheless the strains supported by the drum during spinning require a very robust construction of the hooks and related seat. If this robust construction can avoid any accidental aperture of the door during rotation of the drum (which could cause serious damages to the machine), nevertheless this cannot prevent the door from warping especially during spinning. Therefore, in order to avoid any possible mechanical interference between the drum and the tub, it is necessary to design the two flaps of the door as stiff as possible, with the addition of reinforcement pieces which also increase the overall cost of the machine.

[0003] Another disadvantage of the known locking device 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] According to the present invention, the above disadvantages are overcome thanks to the features listed in the appended claims.

[0005] Instead of the hooks used in the known machines, which are used to keep the two flaps of the door together, the door is kept closed by a side locking system, hanging it to the sides of the opening adjacent the end walls of the drum. With the term "adjacent" we mean any distance from the end walls, including the case in which such distance is zero. So, in a preferred embodiment of the invention, the side locking system cooperates directly with the end walls of the drum. In case a door with two flaps is used, the back flap is preferably kept closed by the side locking system, while the front flap is kept closed by the back flap over it ("back" means far from the front side of the machine).

[0006] This new concept of locking system reduces drastically the stress level in the flaps of the door, since the centrifugal forces are transmitted directly to the drum structure, without the today high stresses in hooks and hinge areas. 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.

[0007] According to the invention, the door may have only one flap and it may be hinged to one of the end flat walls of the drum instead to the cylindrical sidewall. In this case it will be sufficient only one side locking element.

[0008] 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 washing machine according to the present invention,
- Figure 2 is a section taken along line II - II of figure 1, in which only the drum is shown for sake of clarity,
- Figure 3 is a perspective view of the locking system of figure 2,
- Figure 4 is a perspective partial view of a drum of a washing machine according to the invention in which the device for opening the door is slightly different from figures 1-3, and
- Figure 5 is a perspective partial view of the drum of figure 5 with one flap of the door in an open configuration.

[0009] With reference to the drawings, particularly figures 1-3, a top-loading clothes washing machine comprises a structural frame 10, an opening 12 closed by a lid 14, a tub 16 suspended in the frame 10 and a drum 18 having an horizontal axis rotatably mounted in the tub 16 and provided with a door 20 for loading and unloading clothes items.

[0010] The drum 18 comprises a cylindrical sidewall 18a and two opposing end walls 18b. In the embodiment shown in the drawings, the door 20 comprises a back flap 20a and a front flap 20b. The door 20 closes an opening 21 provided in the cylindrical wall 18a of the drum 18. The back flap 20a has a central seat 22 in which is rotatably mounted a knob 24 which drives the locking system. This latter comprises two bolt elements 26 guided in corresponding seats 28 of the back flap 20a, and the bolt elements 26 are urged by springs 30 towards the operative locking position shown in figures 2 and 3. As an alternative, one spring only can be used, positioned between the two bolt elements 26. On a lower portion 24a of the knob 24, whose rotating axis is substantially orthogonal to the axis of the drum, it is wound a wire 32 having the function of pulling the two bolt elements 26 towards the knob 24, against the force of the springs 30. Each bolt element has a lock end portion 26a which cooperates with a corresponding L shaped portion of the edge of the drum, indicated with reference 34.

[0011] In order to open the door 20, the user has only to rotate the knob 24 that, through the wire 32, disengages the bolt elements 26 from the edge 34 of the drum. The springs (not shown) associated to the hinges of the two flaps 20a and 20b help the user to open the

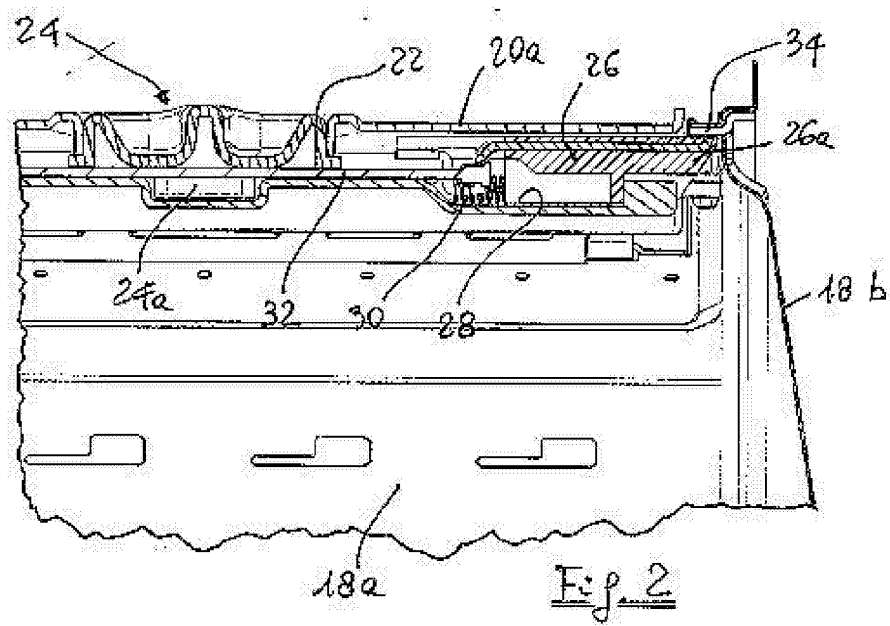
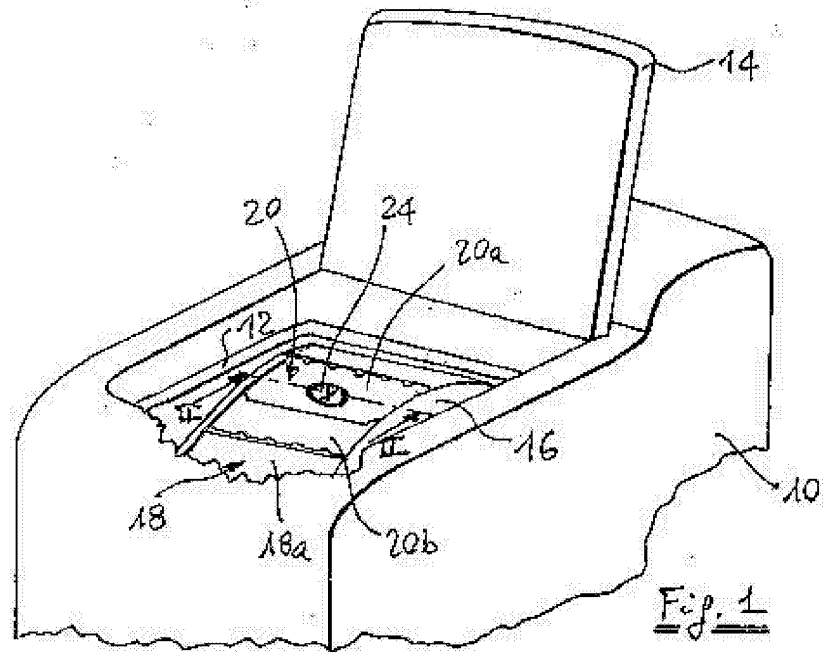
door 20. For closing the door 20, it is not necessary to rotate the knob 24 again since the slanted shape of the end portion 26a of the bolt elements 26 allow their automatic snap engagement with the edge 34 of the drum.

[0012] The rotating knob 24 can be easily replaced by a turning lever 36 (figures 4, 5), by a latch (not shown) whose rotating axis is parallel to the drum axis, or by a sliding button (not shown) whose movement is transformed in linear movement of the bolt elements 26 through the wire 32. Instead of using the wire 32, the movement of the knob or button can be transferred to the bolt elements 26 by means of levers, gears or similar devices.

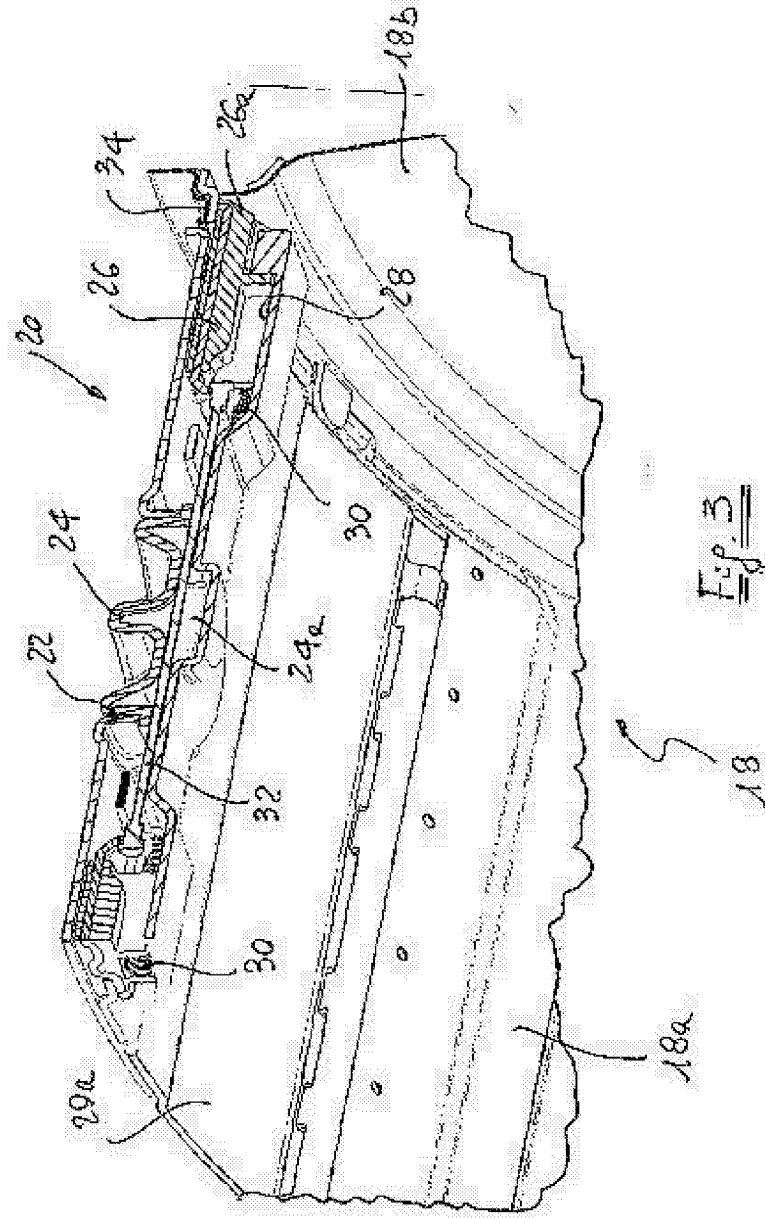
[0013] Even if the above example shows the bolt elements 26 cooperating directly with the end walls 18b (or at least through the corresponding L-shaped edge of the drum), it is intended that also technical solutions in which such cooperation is somehow "indirect" (for instance through portions of the cylindrical wall 18a adjacent the end walls 18b) are within the scope of the present invention. For instance, the bolt elements 26 could abut an edge of an opening in the cylindrical wall of the drum instead of abutting the L-shaped edge of the drum, or it can cooperate with both.

Claims

1. A top-loading clothes washing machine comprising a drum (18) with a substantially horizontal axis, a cylindrical side wall (18a) and two opposing end walls (18b), in the cylindrical side wall (18a) being provided an opening (21) for loading items into the drum, such opening (21) having a door (20, 20a, 20b) pivotally mounted to the drum (18), the door being provided with a locking device for keeping the door (20) closed, **characterised in that** such locking device comprises at least a bolt member (26, 26a) adapted to cooperate with at least one side of said opening (21) adjacent one of said end walls (18b) of the drum (18).
2. A washing machine according to claim 1, **characterised in that** the bolt member (26, 26a) cooperates with at least one of said end walls (18b) of the drum (18).
3. A washing machine according to claim 2, in which the door (20a) is hinged to the cylindrical wall (18a) of the drum (18), **characterised in that** said locking device comprises two bolt members (26) adapted to cooperate with opposing end walls (18b) of the drum (18).
4. A washing machine according to claim 3, **characterised in that** the two opposing end walls (18b) comprise seats (34) adapted to cooperate with the bolt member (26).
5. A washing machine according to claim 3, **characterised in that** the door (20) comprises two flaps (20a, 20b), a first flap (20a) being provided with the bolt member (26) and the second flap (20b) having an edge on which abut the first flap (20a) in order to keep it closed.
6. A washing machine according to any of the preceding claims, **characterised in that** the door (20a) comprises a seat (22) for a control device (24), such device being adapted to be driven by the user for unlocking the bolt members (26).
7. A washing machine according to claim 6, **characterised in that** the control device comprises a rotating knob (24).
8. A washing machine according to claim 6, **characterised in that** the control device comprises a turning lever (36) or a latch.
9. A washing machine according to claim 7 or 8, **characterised in that** the rotating knob (24) or the lever (36) is adapted to cooperate with a wire (32), this latter being connected to the bolt members (26) in order to drive them when the knob (24) or lever (36) is rotated, at least a spring element (30) being provided between the bolt members (26) and the door (20, 20a) in order to urge the bolt members (26) towards the locking position.
10. A washing machine according to claim 1, **characterised in that** the door (20) is hinged to one of the drum end walls (18b).



IT 20030051



1720030051

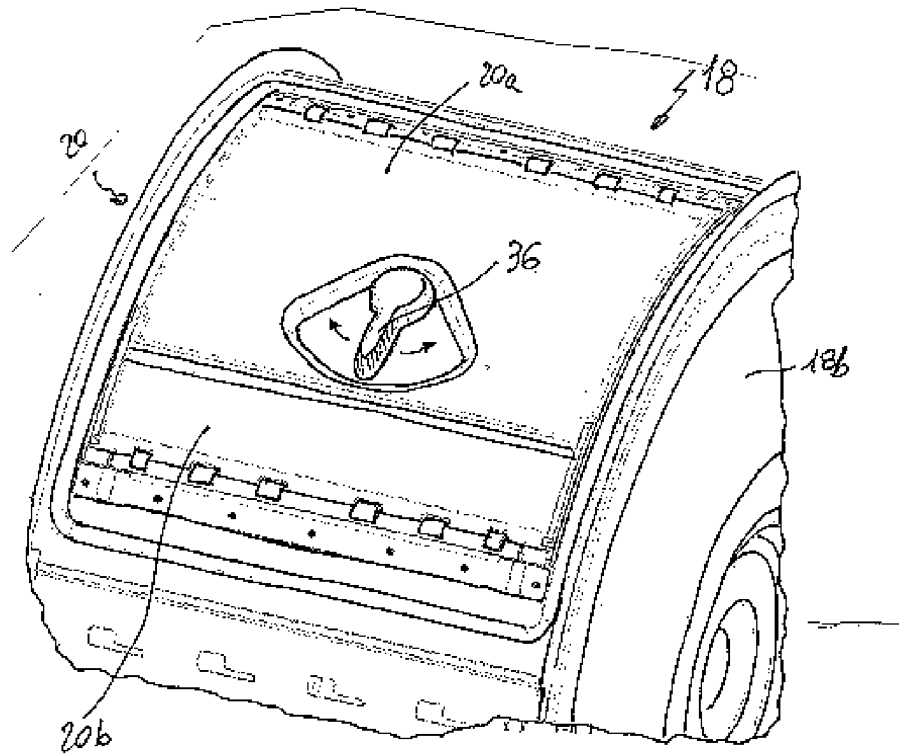


Fig. 4

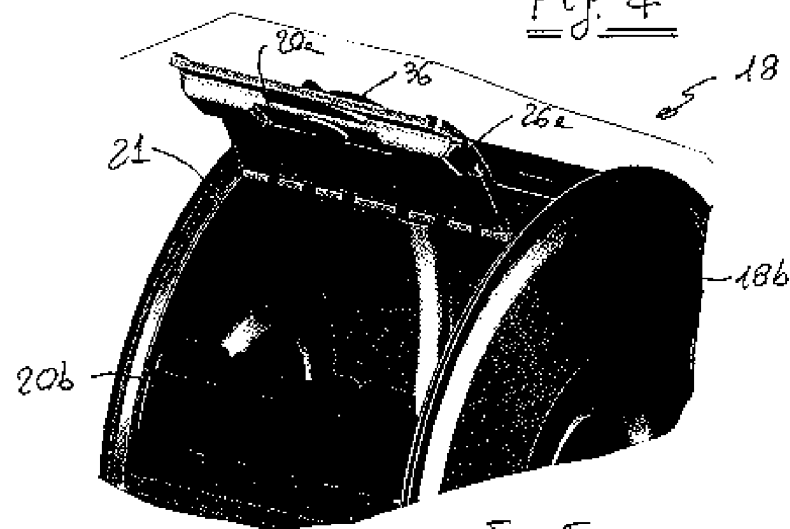


Fig. 5

17 24030051



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 10 1823

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	US 2 140 621 A (THE AMERICAN LAUNDRY MACHINERY COMPANY) 20 December 1938 (1938-12-20)	1-6,8,10	D06F37/10
A	* page 1, column 2, line 15 - page 2, column 2, line 62; figures 1,2 *	9	
X	US 1 433 515 A (E.E. BERTHOLD) 24 October 1922 (1922-10-24)	1-6,8	
A	* the whole document *	7	
X	US 1 794 216 A (M. TROY) 24 February 1931 (1931-02-24)	1-6	
A	* the whole document *	7	
X	US 1 520 234 A (O.R. GASSNER) 23 December 1924 (1924-12-23)	1-5,10	TECHNICAL FIELDS SEARCHED (Int.Cl.7) D06F
A	* the whole document *	9	
X	US 2 438 597 A (C.C. BATINA) 30 March 1948 (1948-03-30)	1,5	
A	* column 4, line 54 - column 5, line 22; figures 1,2 *	2-4,9	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 December 2003	Examiner Courrier, G
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			

EPO FORM 1503 03/02 (P04C01)

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

EP 03 10 1823

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-12-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2140621	A	20-12-1938	NONE	
US 1433515	A	24-10-1922	NONE	
US 1794216	A	24-02-1931	NONE	
US 1520234	A	23-12-1924	NONE	
US 2438597	A	30-03-1948	US 2438737 A	30-03-1948