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(54) **Laundry drier**

(57) A laundry drier (1) having a casing (2); a laundry loading-unloading opening (3); a door (4) closing the opening (3); a condensation collecting device (6) for condensed water extracted from the laundry; a removable tank (9); a pump (7) for feeding the condensed water from the condensation collecting device (6) to the removable tank (9); and an overflow portion (26), which fluidly connects the removable tank (9) to the condensation collecting device (6), is built within the door (4) and is connected to the condensation collecting device (6) by a valve (24) which is only open when the door (4) is closed.

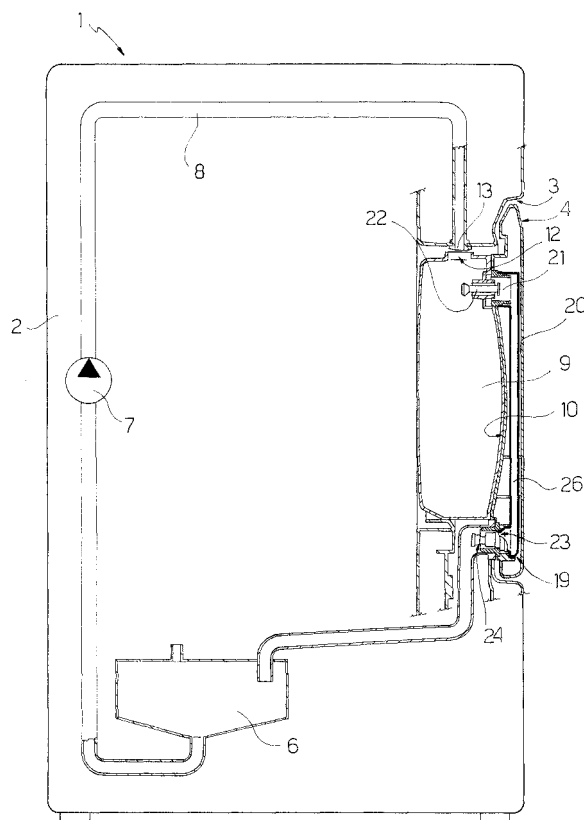


Fig.6

Description

[0001] The present invention relates to a laundry drier.

[0002] More specifically, the present invention relates to a laundry drier of the type comprising a casing; a laundry loading-unloading opening; a door closing said opening; a condensation collecting device for condensed water extracted from the laundry; a removable tank; a liquid circulation device connecting the condensation collecting device to the removable tank to convey the condensed water from the condensation collecting device to the removable tank; and an overflow line fluidly connecting the removable tank to the condensation collecting device.

[0003] In driers of the type described above, such as, for example, the drier disclosed in EP-0789105, the overflow line normally forms part of the removable tank itself, and is defined by a groove formed on the outside of the removable tank to conduct overflow water from the removable tank into the condensation collecting device. Though cheap and straightforward, this solution has the major drawback of condensed water flowing uncontrolled and unconfined within the drier, and dripping on the outside of the removable tank, if the removable tank is extracted after water is fed along the overflow from the removable tank into the condensation collecting device.

[0004] To eliminate this drawback, it has been proposed to fit the casing of the drier with an overflow line completely separate from the removable tank and connecting the removable tank outlet to the condensation collecting device. This solution, however, is structurally complicated and therefore unpractical and expensive.

[0005] In driers of the type described above, such as, for example, the drier disclosed in EP-0789105, the mounting of the removable tank requires the provision of a casing adapted to receive the tank in a removable manner and is not only very complicated and bulky from the structural point of view, but also in no way "user friendly" and ergonomic.

[0006] It is an object of the present invention to provide a drier of the type described above, designed to eliminate the aforementioned drawbacks.

[0007] According to the present invention, there is provided a laundry drier as claimed in the accompanying Claims.

[0008] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a plan view of a preferred embodiment of the drier according to the present invention; Figure 2 shows a larger-scale, partial front view of the Figure 1 drier; Figure 3 shows an exploded view in perspective of a detail in Figure 2; Figures 4 and 5 show respective larger-scale details of Figure 3; Figure 6 shows a schematic lateral view of the figure 1 drier; and

Figure 7 shows a larger-scale detail of Figure 3 in a different operating position.

[0009] Number 1 in Figure 1 indicates as a whole a laundry drier comprising a parallelepiped-shaped casing 2 designed to rest on the floor and housing a known laundry drying drum (not shown); a laundry loading-unloading opening 3; and a door 4 hinged to a front wall of casing 2 to rotate to and from a closed position closing opening 3 and the drying drum (not shown).

[0010] Drier 1 also comprises a known hot-air-generating device 5 for circulating hot air inside the drum (not shown) to dry the laundry; and a condensation collecting device comprising a tank 6 located at the bottom of casing 2 to collect the condensed water extracted from the laundry by the hot air flowing through it.

[0011] The drier also comprises a liquid circulation device which, in the embodiment shown, comprises, in turn, a pump 7 for drawing the condensed water from tank 6 and feeding it along a feed line 8 into a reservoir 9, which forms part of drier 1 and comprises a tank fitted removably to, and projecting from, an inner wall 10 of door 4 facing opening 3.

[0012] More specifically, as shown in Figures 2 and 3, reservoir 9 is substantially truncated-cone-shaped, is fitted with its wide side 11 facing wall 10, and has a hole 12 at the top which, when door 4 is closed and reservoir 9 projects inside the drying drum (not shown), is aligned with an outlet 13 of feed line 8, so that the water drawn from tank 6 by pump 7 flows into reservoir 9 by force of gravity.

[0013] Hole 12 also acts as a pour opening by which to pour the condensed water out of reservoir 9 when this is detached from door 4.

[0014] Reservoir 9 is fitted to door 4 by two brackets 14 integral with wall 10 and each engaging a respective recess 15 formed on a corresponding side of reservoir 9, and is locked in position on wall 10 by two catches 16, which are fitted to reservoir 9, engage respective slots 18 formed in wall 10, and are released manually by the user acting on a lever (not shown) built into a handgrip 17 for easy handling of reservoir 9 by the user.

[0015] In particular, as shown in Figure 7, within recess 15 an elongated protrusion 15a is provided which protrudes transversely from the respective side of reservoir 9 and, when reservoir 9 is mounted on door 4, slidably engages a respective guide 14a provided on the inner surface of the respective bracket 14 in a position facing the other guide 14a.

[0016] As shown in dotted lines in Figure 7, each guide 14a has a funnel-shaped upper inlet portion and an enlarged lower portion. When reservoir 9 has been lowered in a substantially vertical mounting direction into engagement with door 4 and is supported by brackets 14, protrusions 15a engage, with a transverse play, the enlarged lower portions of the respective guides 14a so as to hook reservoir 9 to door 4, but to allow reservoir 9, still resting on brackets 14, to tilt through a predetermined angle of

about 10-15° in relation to door 4 (Figure 2) about a substantially horizontal axis extending transversely to the mounting direction and parallel to wall 10 for insertion of catches 16 into slots 18. In other words, protrusions 15a, when engaged in the respective lower portions of guides 14a, define, with said lower portions, a virtual hinge allowing reservoir 9 to assume spontaneously and automatically, when lowered, a backwards inclined position. To this end, the upper surface of each bracket 14 and the upper surface of each recess 15 are equally curved in order to allow reservoir 9 to tilt freely about the axis of the aforementioned virtual hinge without losing contact with brackets 14 so as to be always supported thereby.

[0017] As shown in Figure 6, drier 1 also comprises an overflow line 19 connecting reservoir 9 to tank 6 to feed overflow water from reservoir 9 back into tank 6.

[0018] Particularly, as shown in Figures 4 and 5, overflow line 19 comprises a portion 26, which may be mounted on door 4, but which, in the embodiment shown, is built within door 4. Portion 26 consists of a L-shaped pipe of substantially rectangular cross section and is fitted to wall 10 between wall 10 itself and an outer panel 20 of door 4. With particular reference to Figures 3, 4 and 5, at the top end, overflow passage 26 has an inlet 21 aligned with a hole in wall 10 and communicating, when reservoir 9 is fitted to door 4, with the inside of reservoir 9 via a valve 22, which is inserted through an opening in side 11 of reservoir 9, close to hole 12, and is movable between an open position, when reservoir 9 is fitted to door 4 (Figure 1), and a closed position when reservoir 9 is detached from door 4 (Figure 3).

[0019] Insertion of valve 22 into inlet 21 is carried out during the mounting of reservoir 9 onto door 4 simultaneously with the insertion of catches 16 into slots 18 described above.

[0020] Valve 22 prevents water leaking from side 11 of reservoir 9, when the water level in reservoir 9 reaches the level of valve 22 and reservoir 9 is detached from door 4 to be emptied.

[0021] At the opposite end, close to the bottom of door 4, portion 26 has an outlet 23 aligned with an opening through wall 10 and closed by a valve 24, which is movable between a closed position (Figures 2, 3, 5) when door 4 is open, and an open position (not shown) when door 4 is closed. In the open position, valve 24 connects outlet 23 of portion 26 to a pipe (shown in figure 6) of overflow line 19 communicating directly with tank 6.

[0022] Valve 24 automatically closes the outlet of portion 26, when door 4 is opened, to prevent water leakage in the event the water level inside reservoir 9 has reached the level of valve 22 and overflow line 19 is full.

[0023] On the wall facing opening 3 and on the opposite side to side 11, reservoir 9 has a window 25 of transparent material to enable the user to check the water level inside reservoir 9 and empty it in time.

[0024] In a preferred embodiment, drier 1 comprises a float (not shown) located inside tank 6 and connected to pump 7 to activate it when the water level inside tank

6 exceeds a given level. If reservoir 9 is full, any water pumped by pump 7 to reservoir 9 flows back into tank 6 along overflow line 19. In which case, as opposed to being reduced by pump 7, the water level inside tank 6 is increased by the continual inflow of water extracted from the laundry; and the increase in the water level is detected by the float, which stops drier 1.

[0025] Operation of drier 1 as a whole is clear from the foregoing description, with no further explanation required.

Claims

1. A laundry drier comprising a casing (2); a laundry loading-unloading opening (3); a door (4) closing said opening (3); a condensation collecting device (6) for condensed water extracted from the laundry; a removable tank (9) fitted to an inner wall (10) of the door (4) facing the loading-unloading opening (3); support means (14, 15) for removably supporting the tank (9) on the inner wall (10) of the door (4); a liquid circulation device (7) connecting the condensation collecting device to the removable tank (9) to convey the condensed water from the condensation collecting device (6) to the removable tank (9); and an overflow line (19) fluidly connecting the removable tank (9) to the condensation collecting device (6) and comprising an overflow portion (26) provided in or on the door (4); the drier (1) being **characterized in that** the overflow portion (26) is fluidly connected to the condensation collecting device (6) by a valve (24) which is open when the door (4) is closed.
2. A drier as claimed in Claim 1, wherein the overflow portion (26) has an outlet end (23); said valve (24) being located on the door (4), at said outlet end (23).
3. A drier as claimed in Claim 1 or 2, wherein the support means (14, 15) comprise two recesses (15) formed on respective sides of the tank (9); and two brackets (14) protruding from the inner wall (10) and each removably engaging a respective said recess (15).
4. A drier as claimed in claim 3, wherein the recesses (15) and the brackets (14) are designed so as to allow the recesses (15) to become engaged by the relevant brackets (14) by moving the tank (9) in relation to the door (4) in a substantially vertical mounting direction.
5. A drier as claimed in Claim 3 or 4, and further comprising connecting means (14a, 15a, 16, 18) for removably connecting the tank (9) to the door (4).
6. A drier as claimed in Claims 4 and 5, wherein the connecting means (14a, 15a, 16, 18) comprise hooking means (14a, 15a) provided on at least one of

said recesses (15) and on the relevant bracket (14) to hook the tank (9) to the door (4) so as to allow the tank (9) to tilt in relation to the door (4) about an axis extending transversely to said mounting direction to and fro a mounting position; and releasable locking means (16, 18) to lock the tank (9) to the door (4) in the mounting position.

7. A drier as claimed in any one of the foregoing Claims, wherein the overflow portion (26) is connected to the removable tank (9) by a further valve (22) which closes when the removable tank (9) is detached from the door (4).
8. A drier as claimed in Claim 7, wherein the overflow portion (26) has an inlet end (21); said further valve (22) being located on the removable tank (9) to co-operate with said inlet end (21) when the removable tank (9) is fitted to the door (4).
9. A drier as claimed in any one of the foregoing Claims, wherein the removable tank (9) has a top fill opening (12) communicating with a feed line (8) of the liquid circulation device (7) when the door (4) is closed.
10. A drier as claimed in any one of the foregoing Claims, wherein the removable tank (9) has a window (25) of transparent material through which the fill level of the removable tank (9) is visible from the outside.
11. A drier as claimed in any one of the foregoing Claims, wherein the overflow portion (26) is built within the door (4).
12. A laundry drier comprising a casing (2); a laundry loading-unloading opening (3); a door (4) for closing said opening (3); a tank (9); and support means (14, 15) for removably supporting the tank (9) on an inner wall (10) of the door (4) facing the loading-unloading opening (3); the drier (1) being **characterized in that** the support means (14, 15) comprise two recesses (15) formed on respective sides of the tank (9); and two brackets (14) protruding from the inner wall (10) and each removably engaging a respective said recess (15).
13. A drier as claimed in claim 12, wherein the recesses (15) and the brackets (14) are designed so as to allow the recesses (15) to become engaged by the relevant brackets (14) by moving the tank (9) in relation to the door (4) in a substantially vertical mounting direction.
14. A drier as claimed in Claim 12 or 13, and further comprising connecting means (14a, 15a, 16, 18) for removably connecting the tank (9) to the door (4).
15. A drier as claimed in Claims 13 and 14, wherein the

connecting means (14a, 15a, 16, 18) comprise hooking means (14a, 15a) provided on at least one of said recesses (15) and on the relevant bracket (14) to hook the tank (9) to the door (4).

16. A drier as claimed in Claim 15, wherein the hooking means (14a, 15a) comprise at least one guide (14a) and a protrusion (15a) engaging the guide (14a) to slide therealong in said mounting direction.
17. A drier as claimed in Claim 16, wherein the protrusion (15a) is an elongated protrusion (15a) in the mounting direction.
18. A drier as claimed in one of Claims 15 to 17, wherein the hooking means (14a, 15a) comprise, for each said recess (15), a protrusion (15a) which protrudes transversely from the respective side of the tank (9); and, for each bracket (14), a guide (14a), which is provided on an inner surface of the bracket (14) in a position facing the guide (14a) of the other bracket (14), extends in the mounting direction and is slidably engaged by the relevant protrusion (15a).
19. A drier as claimed in one of Claims 15 to 18, wherein the hooking means (14a, 15a) are configured so as to allow the tank (9) to tilt in relation to the door (4) about an axis extending transversely to said mounting direction to and fro a mounting position; and releasable locking means (16, 18) to lock the tank (9) to the door (4) in the mounting position.
20. A drier as claimed in Claim 19, wherein the hooking means (14a, 15a) comprise, for each said recess (15), a protrusion (15a) which protrudes transversely from the respective side of the tank (9); and, for each bracket (14), a guide (14a), which is provided on an inner surface of the bracket (14) in a position facing the guide (14a) of the other bracket (14), extends in the mounting direction and is slidably engaged by the relevant protrusion (15a).
21. A drier as claimed in one of Claims 16 to 20, wherein each guide (14a) has a funnel-shaped upper inlet portion and an enlarged lower portion, which are designed to accommodate with a transverse play the relevant protrusion (15a) when the tank (9) is supported on the brackets (14) to allow the tank (9) to tilt about a substantially horizontal axis in relation to the brackets (14) through a predetermined angle.
22. A drier as claimed in Claim 21, wherein each bracket (14) and the relevant recess (15) contact each other along surfaces which are curved about said axis to allow the tank (9) to tilt about said axis when supported by said brackets (14).

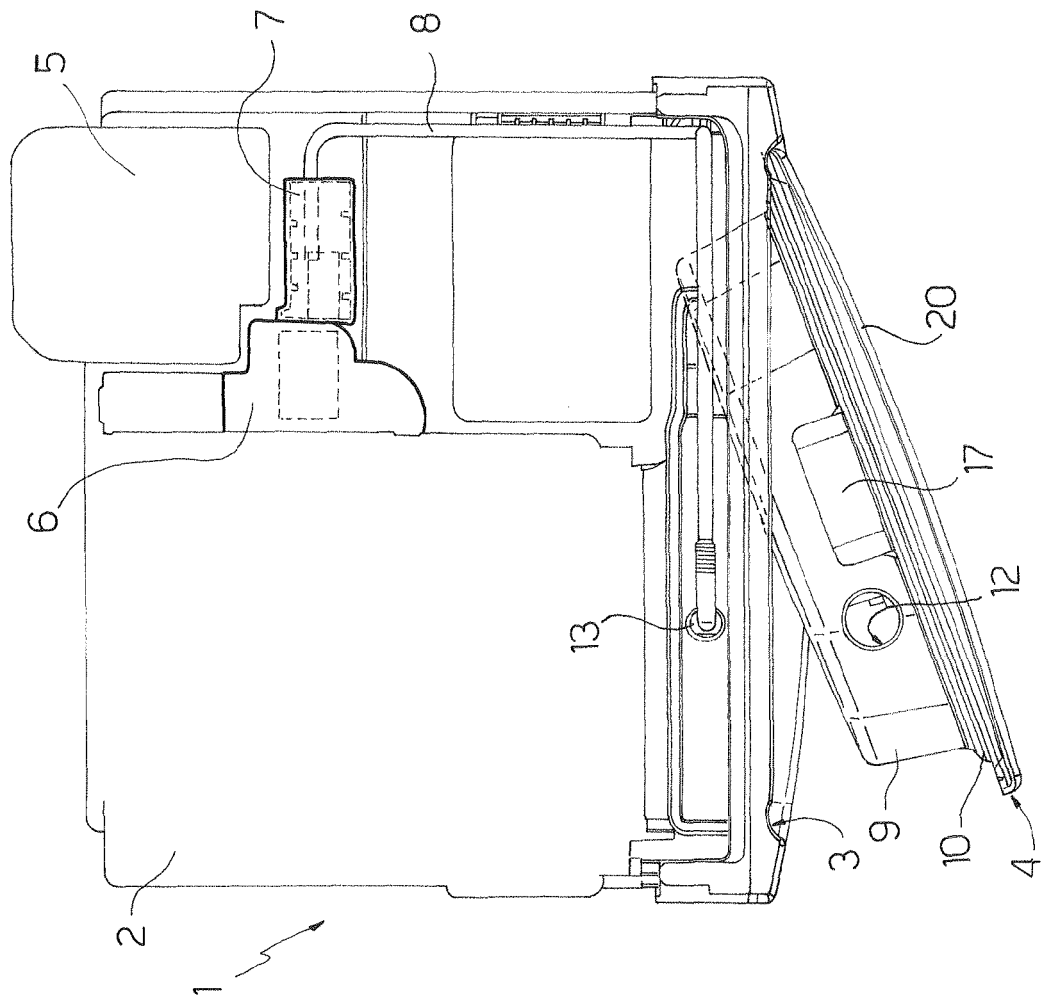


Fig.1

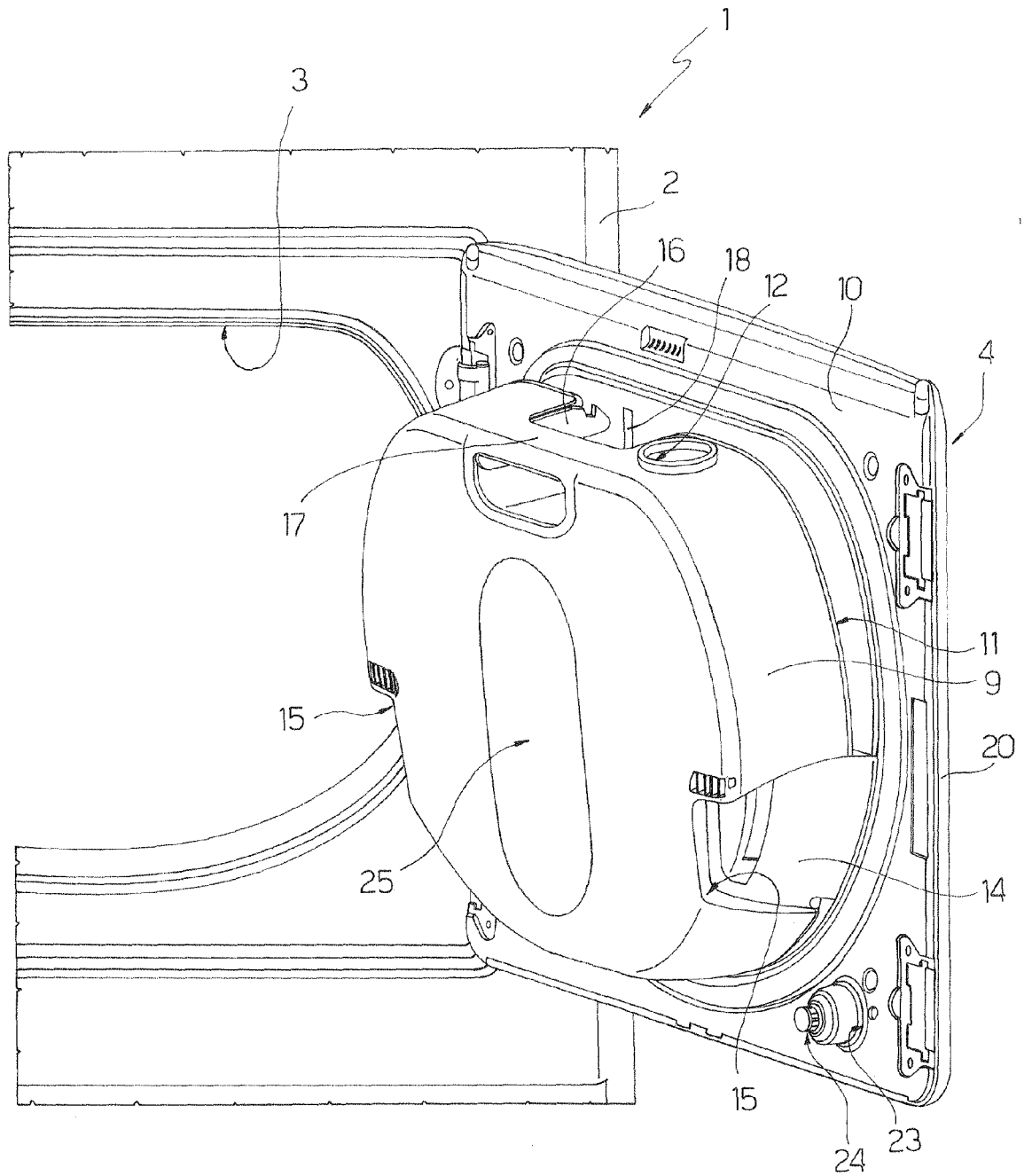
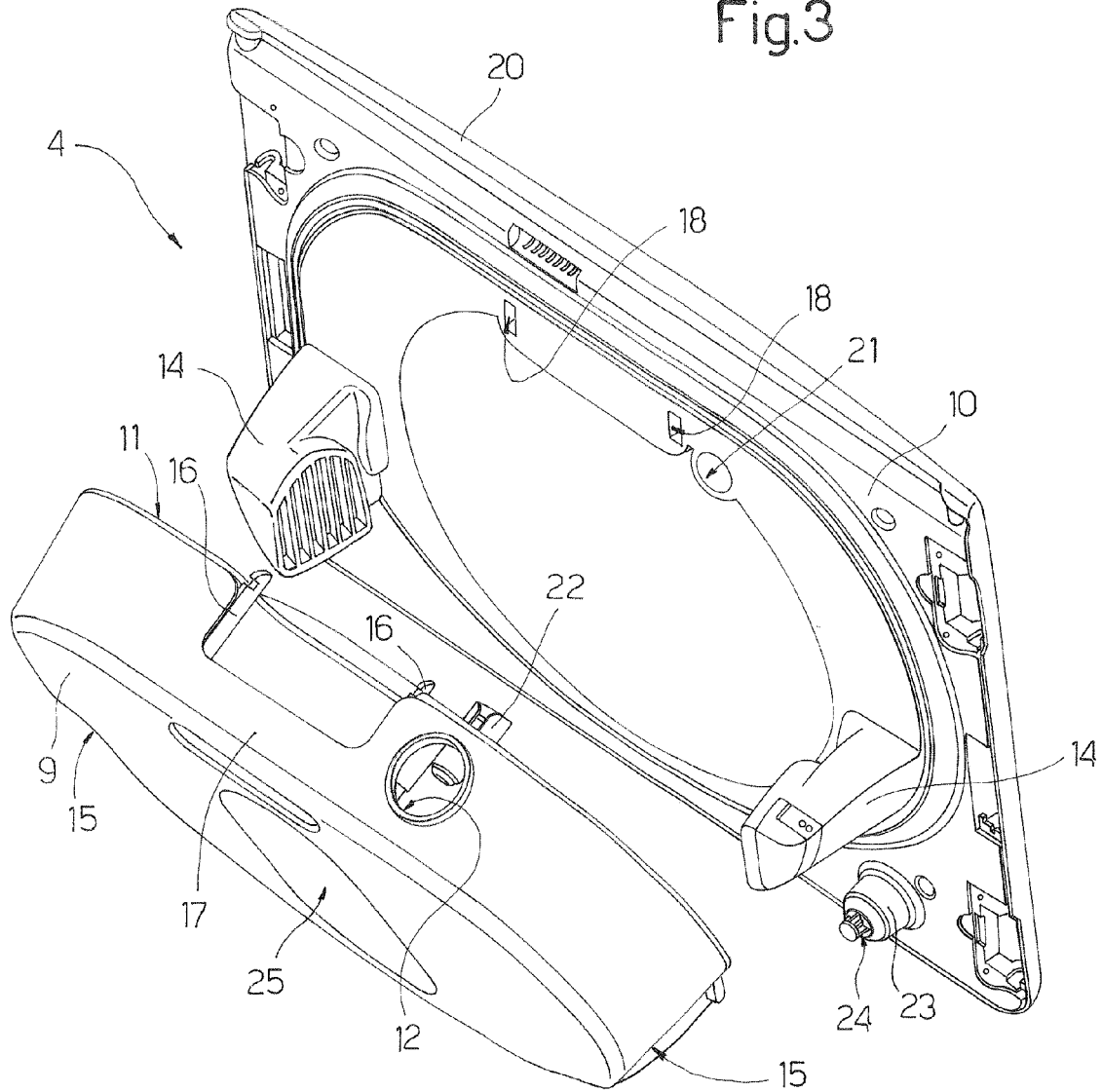
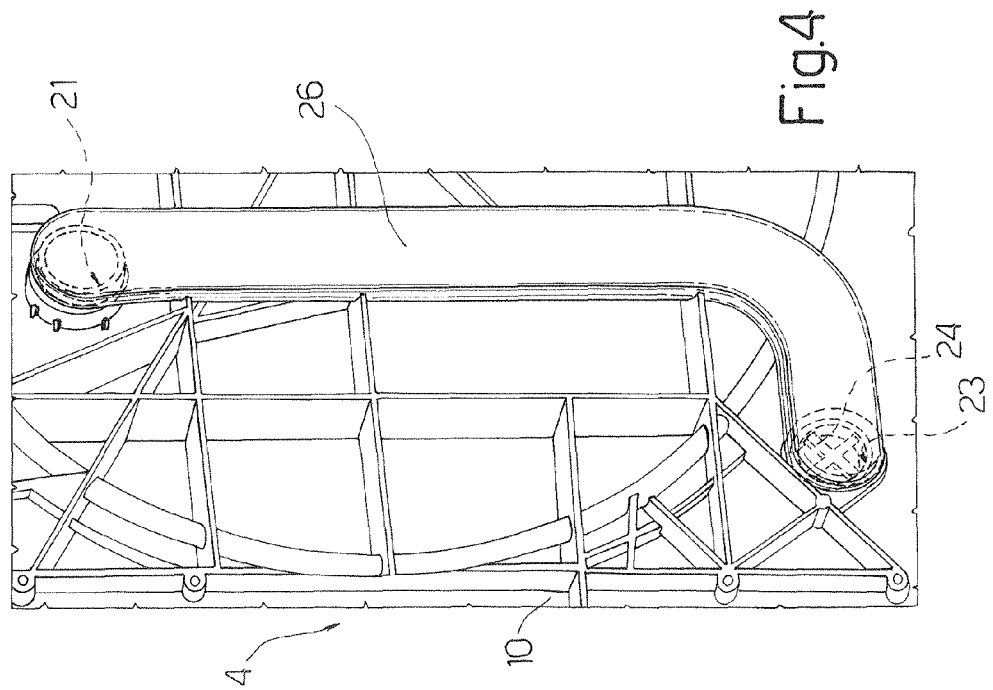
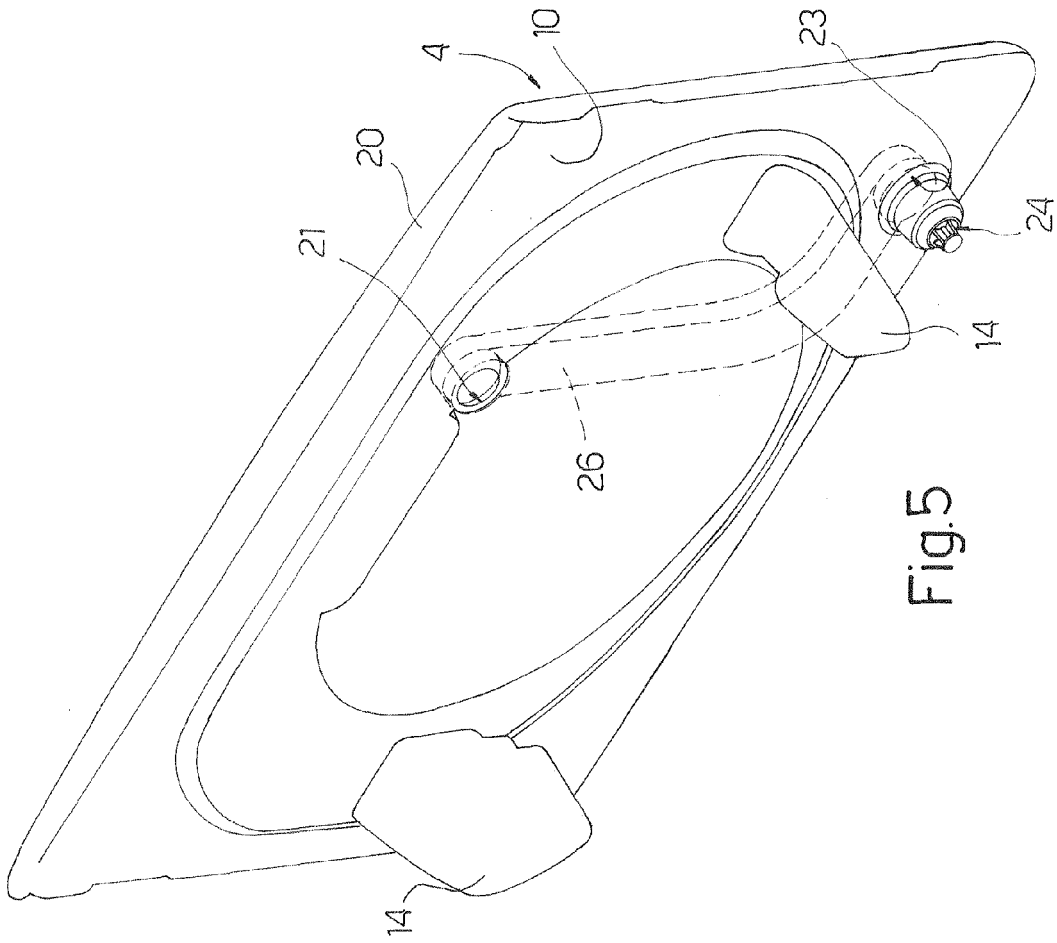


Fig.2

Fig.3





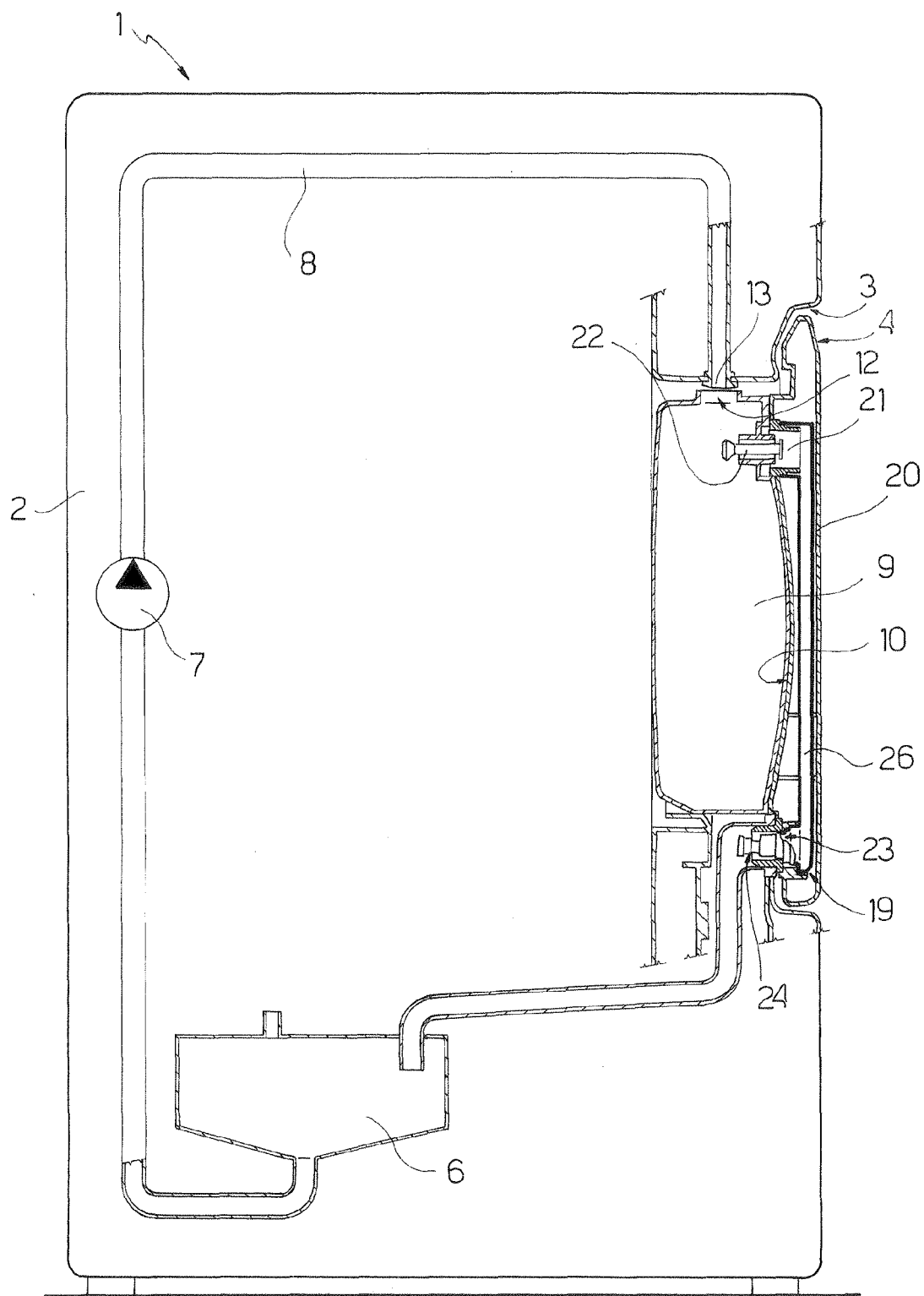


Fig. 6

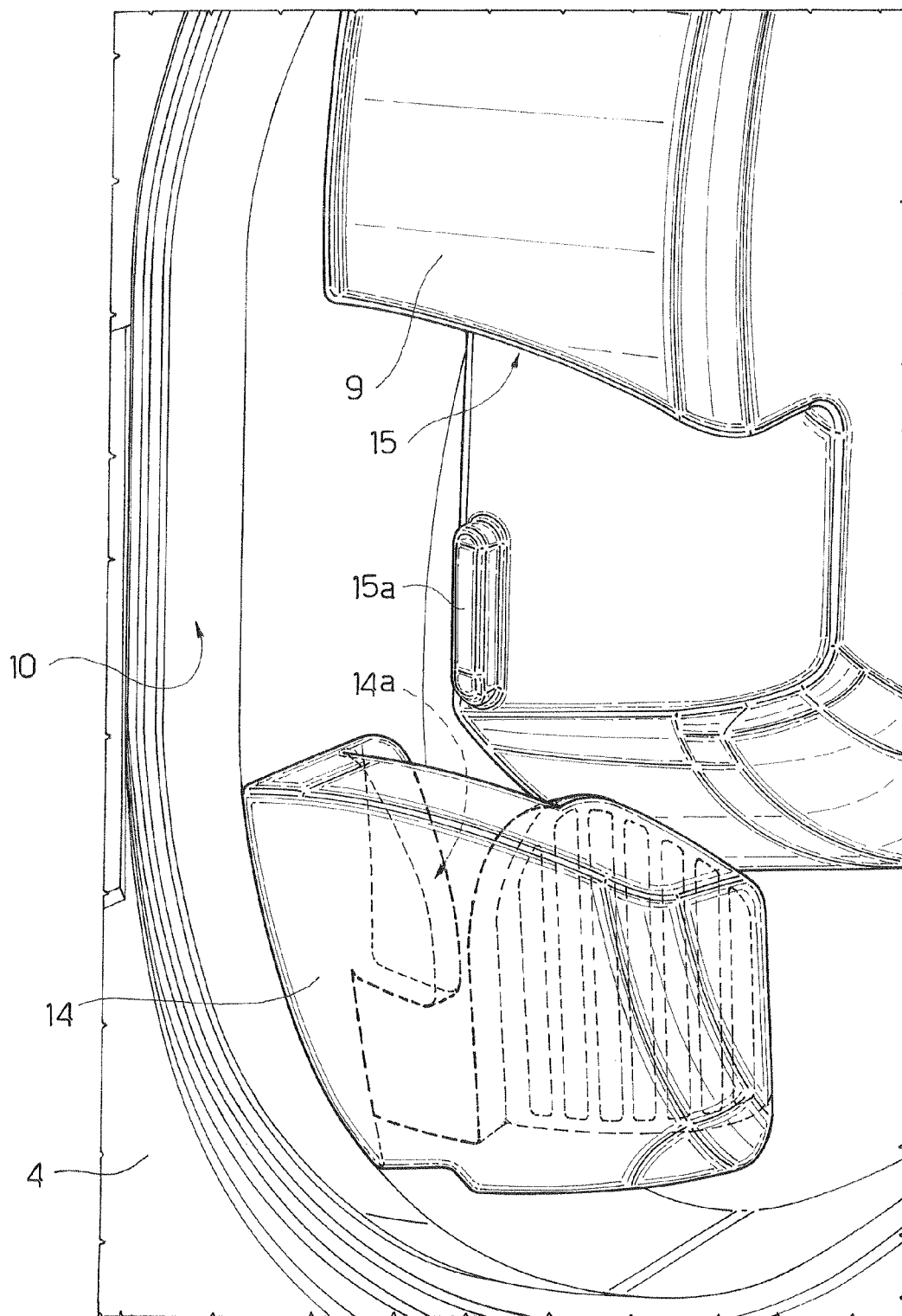


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 08 15 7219

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 0 767 268 A (CANDY SPA [IT]) 9 April 1997 (1997-04-09) * column 4, lines 9-11 * * column 4, line 44 - line 56 * * column 5, line 40 - line 55 * * column 6, line 8 - line 12 * * column 6, line 30 - line 38 * * column 7, line 7 - line 10; claim 3; figure 1 *	1-8, 10-15, 19,22	INV. D06F58/24
A	EP 0 484 225 A (CIAPEM [FR]) 6 May 1992 (1992-05-06) * abstract; figure 2 *	1-22	
A	EP 1 905 883 A (ELECTROLUX HOME PROD CORP [BE]) 2 April 2008 (2008-04-02) * figure 1 *	1-22	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 October 2008	Examiner Westermayer, Wilhelm
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 08 15 7219

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29-10-2008

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REFERENCES CITED IN THE DESCRIPTION

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- EP 0789105 A [0003] [0005]