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(54) **Reversible door assembly for a front loading laundry treating machine**

(57) The present invention refers to a reversible door for a front loading laundry treating machine (19). A door assembly according to the invention comprises a frame portion (1, 221) extending around an axis X, a door plug (5, 225) having an asymmetrical shape relative to said axis X, a hinge (3) and a lock (4). Said door assembly is **characterised in that** each of said hinge (3), lock (4) and door plug (5, 225) is mounted only on such frame portion (1, 221) such that they can be removed from the door assembly independently on one another.

A method for reversibly mounting a door assembly on a front loading laundry treating machine (19) is also disclosed.

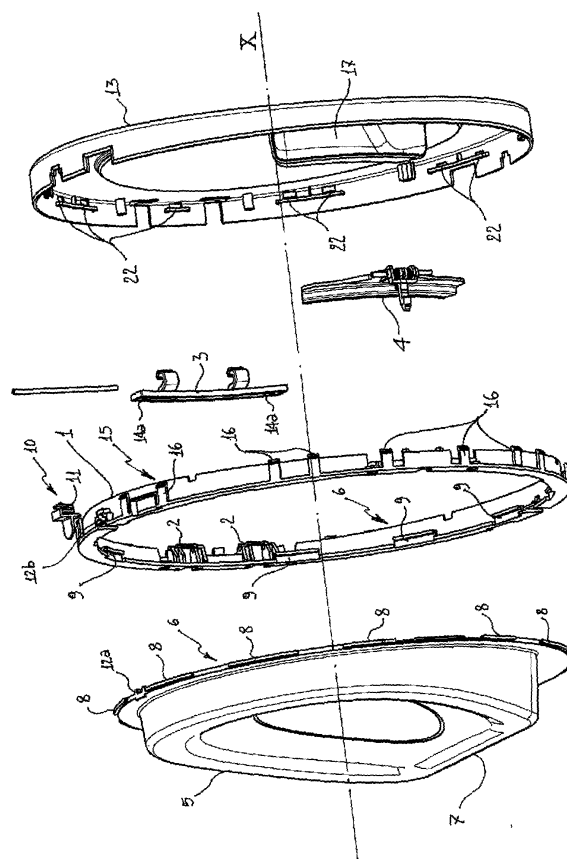


Fig. 1

Description

[0001] The present invention refers to a reversible door for a front loading laundry treating machine and to a method for reversibly mounting said door assembly on a front loading laundry treating machine.

[0002] Installation of front loading laundry treating machines, like laundry washing machines, laundry driers or laundry washing-drying machines, often poses the problem to choose a location suitable to allow the front loading door to be opened without encountering impediments. Since the opening direction of loading door is chosen by the manufacturer when assembling the laundry treating machine, it may happen that such machine cannot be properly located by a user.

[0003] In order to solve this problem, manufacturers of laundry treating appliances have provided machines in which the loading door can be reversed so as to allow the user to place the appliance where he/she desires.

[0004] US 7,363,781 discloses a front loading washing machine having a reversible door. According to such disclosure door reversing operations consist in removing the hinge that pivotally connects door to the appliance, reversing the door 180° and then re-attaching the hinge in a new position which is 180° rotated with respect to its initial position. If the plug associated to the door and extending within the appliance loading aperture when the door is in a closed position has an asymmetrical shape, it must be removed from the door and rotated 180° before the reversed door is mounted on the hinge.

[0005] All these operations are rather complex to be performed and may cause the user to be confused when he/she re-assembles all dismantled components. In particular, according to door arrangement disclosed in US 7,363,781, a position change of an asymmetrical plug cannot be performed if the door is mounted on the hinge. This disadvantageously causes the user not only to face the difficulty of re-assembling a huge number of pieces but also to perform such re-assembling with a pre-determined order, i.e. by changing first the position of the asymmetrical plug and then mounting the door on the hinge. It may happen that a user overlooks one or more re-assembling steps thereby compromising efficient working of the appliance. This is particularly disadvantageous when the plug is provided with air ducts as in case of a door for a front loading laundry drier.

[0006] A reversible door for a laundry dryer is disclosed in US 2006/0265959. In such disclosure the complexity of door construction causes the operation for reversing the door to be complicated. In order to carry out the door reversing operation a user must remove not only the whole door from the appliance but he/she must also disassemble the door itself and reconfiguring its assembly. Such operation may result to be impracticable by a normal user and it may disadvantageously require the intervention of expert technicians.

[0007] The aim of the present invention is therefore to solve the noted problems and thus providing a door as-

sembly whose position relative to the laundry treating machine can be reversed so as to make it openable either from right to left or from left to right.

[0008] An object of the present invention is to provide a door assembly whose opening direction can be reversed quickly and easily even by an unskilled user, the same door assembly requiring a minimum number of components to be disassembled.

[0009] Another object of the present invention is to provide a door assembly wherein the position of a door plug can be changed without need to remove the door assembly from the laundry treating machine.

[0010] A further object of the invention is to provide a method for reversing a door assembly requiring few operations easy to be carried out.

[0011] Still another object of the invention is to provide a front loading laundry treating machine having a door which can be reversed between left and right hand orientations.

[0012] Advantages, objects, and features of the invention will be set forth in part in the description and drawings which follow and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention.

The objects and advantages of the invention may be realised and attained as particularly pointed out in the appended claims.

[0013] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate a possible embodiment of the invention and together with the description serve to explain the principles of the invention.

[0014] In the drawings:

[0015] Figure 1 shows an exploded view of a door assembly according to a first embodiment of the invention;

[0016] Figure 2 shows an exploded view of a door assembly according to a second embodiment of the invention,

[0017] Figure 3 shows a perspective view of a front loading laundry treating machine comprising door assembly of figure 2;

[0018] With reference to figure 1, a reversible door assembly according to a first embodiment of the invention comprises a frame portion 1 extending around an axis X and provided with coupling means 2 adapted to receive a hinge 3 for pivotally and removably associating door assembly to a front loading laundry treating machine 19 (figure 3). Further fixing means 14a, 14b are provided on the hinge 3 and on the machine front cabinet wall 21 for associating hinge 3 on the front loading laundry treating machine 19. Frame portion 1 has substantially an annular shape whose extension corresponds to that of a laundry treating machine loading aperture 18 (figure 3) through which laundry to be treated is loaded into the machine 19.

[0019] A lock 4 is removably mounted on the frame portion 1 by means of screws not shown in the drawings. Lock 4, known per se, extends through an appropriate

hole 20 formed on a support 27 which is provided on the front loading machine cabinet for ensuring that door remains closed when said machine 19 is working.

[0020] Door assembly comprises a door plug 5 that extends, at least partly, within a loading aperture 18 of a laundry treating machine 19 when the door is in a closed position. In this way laundry to be treated is maintained within the machine treating chamber 21. Door plug 5 may also be provided with one or more air conduits in case the door assembly is applied in a machine suitable for drying laundry. Door plug 5 has an asymmetrical shape relative to axis X as shown in figure 1 wherein it is provided with a cylindrical portion having a flat sidewall 7. Door plug 5 may be made, at least partly, of a transparent material, i.e. a material having the property of transmitting light without appreciable scattering so that bodies lying beyond are seen clearly. Glass or translucent plastics are suitable material for door plug 5.

[0021] In a first embodiment of the present invention as shown in figure 1, door plug 5 is slidably associated to the frame portion 1 such that it can be rotated relative to said frame portion 1 without the need to remove the plug 5 from the frame 1. To this aim guiding means 6 are provided on an edge portion of door plug 5 and on the frame portion 1. Preferably guiding means 6 comprise one or more ribs 8 that are received in one or more channels 9. Ribs 8 and channels 9 can be made either in the frame portion 1 or in the door plug 5. Ribs 8 and channels 9 may be shaped so as to interfere one another when coupled; In this way plug 5 can be secured to frame portion 1. Door plug 5, hinge 3 and lock 4 are associated to the frame portion 1 independently on one another, such that each of them can be removed from the frame 1 without need to remove the other two at the same time.

[0022] Locking means 10 are provided for releasably fixing the relative position between the frame portion 1 and the door plug 5. In figure 1 locking means 10 are in the form of an insert 11 that is received in conjugated seats 12a, 12b formed in the door plug 5 and in the frame portion 1.

[0023] A cover 13 may be associated to the frame portion 1 by means of snap connecting means 15, for example in the form of hooks 16 that clasp corresponding slots 22 provided in the cover 13. Cover 13 is provided with an handle 17 for allowing the user to open and close the door assembly. As an alternative embodiment, cover 13 and frame portion 1 may be formed in a single unitary piece. In case a cover 13 is not present handle 17 is formed on the frame portion 1.

[0024] In figure 2 it is shown a second embodiment of a door assembly according to the invention. Elements composing door assembly that are common both for the first embodiment and to the second one have been indicated in the figures with the same numbers. Reference is made to the description of said first embodiment as far as the features of common elements is concerned.

[0025] Said second embodiment comprises a frame portion 221 on which a hinge 3, a lock 4 and an asym-

metrical door plug 225 are mounted so as to be removable from the frame 221 independently on one another, i.e. each of said hinge 3, lock 4 and plug 225 may be removed from the frame 221 without need to remove other components first.

[0026] In this second embodiment door plug 225 is removably fixed to frame 1 by releasable fastening means 226, such as screws, passing through holes 223a, 223b provided on edge portions of frame 221 and plug 225 respectively. A housing 224 is formed on the frame portion 221 for receiving a handle 17 which is provided on cover 13. Connection between cover 13 and frame portion 221 can be made as described with reference to the first embodiment of the invention shown in figure 1, that is by means of snap connecting means 15, for example in the form of hooks 16 that clasp corresponding slots 22 provided in the cover 13.

[0027] For modifying the position of door plug 225 relative to frame portion 1, one has to remove locking means 10 and fastening means 226 joining them and then separate the plug 225 from the frame 221.

[0028] According to another version of the second embodiment of the invention, asymmetrical plug 225 and frame portion 221 can be slidably coupled through guide means similar to those numbered as 6 in figure 1, even though they are also fixed one another by releasable fastening means 226 as shown in figure 2. In this way, when a modification of the plug 225 position relative to frame 221 is needed, fastening means 226 and locking means 10 must be removed and the plug 225 must be rotated relative to frame portion 221 about axis X by sliding the plug 225 relative to the frame 221. Fastening means (226) and locking means 10 are re-positioned in their respective seats 212a, 212b, 223a, 223b after the plug 225 position has been changed.

[0029] As already described with reference to the first embodiment of the present invention, door plug 225 may be made, at least partly, of a transparent material and can comprise one or more air conduits.

[0030] In figure 3 it is shown a front loading laundry treating machine 19 provided with a door assembly made according to the second embodiment described above with reference to figure 2. Evidently, the same machine 19 may be provided with any other embodiment of door assembly described herein. In figure 3 laundry treating machine 19 is shown in a configuration wherein the door assembly is arranged as designed by a manufacturer. If a user were to reverse the opening of the door this can be simply done by carrying out the following operations. The order of the steps that will be described here after is not mandatory and a man skilled in the art will promptly understand that such order may be changed arriving at the same final result.

[0031] According to the improved method for reversibly mounting to a front loading laundry treating machine 19 a door assembly having the characteristics described above, one has to remove the whole door assembly from the appliance at the hinge 3, by releasing fixing means

14a, 14b and keeping hinge 3 attached to the frame portion 1. As a further operation, locking means 10 and, where present, also fastening means 226 must be released thereby permitting free rotation of door plug 5, 225 relative to frame portion 1, 221. Door plug 5, 225 must be rotated 180° relative to frame portion 1, 221 about axis X. Such operation is carried out by sliding the plug 5, 225 relative to the frame 1, 221, where guiding means 6 are provided for slidably coupling plug 5, 225 and frame portion 1, 221. Once completed the 180° rotation, locking means 10 and, where present, also fastening means 226, must be re-tightened fixing the position of door plug 5, 225 with respect to frame portion 1, 221, the latter being still in its initial position, i.e. the position it had before door reversing operations were started. As further steps, the door assembly must be rotated 180° about axis X from said initial position and the hinge 3 must be re-attached to the machine 19. In this way opening of the door will result inverted.

[0032] Evidently, in order to simplify door assembly reversing operations, a user can also first release connecting means 10, 226, and 180° rotating door plug 5, 225 relative to frame portion 1, 221 in the manner described above while hinge 3 remains attached to the machine 19 and to the frame portion 1, 221, i.e. while the door assembly is still mounted on the laundry treating machine 19. After such rotation has been performed and connecting means 10, 226 has been re-tightened as described above, hinge 3 may be detached only from the machine 19 and kept fixed onto the frame portion 1, 221 and finally, i.e. after having 180° rotated the whole door assembly from its initial position, hinge 3 may be re-attached to said machine 19 in a position which is opposite to that it had before door reversing operations were started.

[0033] Evidently, the support 27 comprising hole 20 where lock 4 is received when door assembly is in a closed position, must be moved to a position corresponding to the reversed position assumed by lock 4 after having completed the reversing operation of the door assembly.

[0034] Conclusively it can be stated that a door assembly according to the invention is very easy to be reversed so as to change from a left hand to right hand hinge. In this way, even an unskilled user can adapt the door opening direction according to the place where the front loading appliance has to be put thereby allowing the user to take into account the presence of further furniture articles or further appliances close to the front loading machine. The method for reversibly mounting to a front loading laundry treating machine a door assembly has been proved to be quick and reliable.

Claims

1. A reversible door assembly for a front loading laundry treating machine (19) comprising a frame portion (1, 221) extending around an axis X, a door plug (5,

225) having an asymmetrical shape relative to said axis X, a hinge (3) and a lock (4) **characterised in that** each of said hinge (3), lock (4) and door plug (5, 225) is mounted only on such frame portion (1, 221) such that they can be removed from the door assembly independently on one another.

2. A reversible door assembly according to claim 1 wherein said door plug (5, 225) is slidably associated to said frame portion (1) and locking means (10) are provided for releasably fixing relative position between said frame portion (1, 221) and said door plug (5, 225).

3. A door assembly according to claim 2 wherein guiding means (6) are provided on said frame portion (1, 221) and said door plug (5, 225).

4. A door assembly according to claim 3 wherein said guiding means (6) comprises at least one rib (8) and at least one channel (9) adapted to receive said at least one rib (8) therein.

5. A reversible door assembly according to any preceding claim wherein said door plug (5, 225) is removably fixed to said frame portion (1, 221) by releasable fastening means (226).

6. A reversible door assembly according to claim 5 wherein said releasable fastening means (226) are screws.

7. A door assembly according to any preceding claim further comprising a cover (13) associated to the frame portion (1, 221), said cover (13) being provided with an handle (17).

8. A door assembly according to claim 7 wherein said cover (13) and said frame portion (1, 221) are made in a single piece.

9. A door assembly according to any preceding claim wherein said door plug (5, 225) is made, at least partly, in a transparent material.

10. A door assembly according to any preceding claim wherein said door plug (5, 225) comprises at least one air conduit.

11. Front loading laundry treating machine (19) comprising a reversible door assembly according to any claim 1 to 10.

12. Method for reversibly mounting to a front loading laundry treating machine (19) a door assembly comprising a frame portion (1, 221) extending around an axis X, a hinge (3) mounted to said frame portion (1, 221), and a door plug (5, 225) having an asymmet-

rical shape relative to said axis X, connecting means (10, 226) being provided for releasably fixing relative position between said frame portion (1) and said door plug (5) **characterized by** comprising the following steps: (a) removing the door assembly at the hinge (3) from said machine (19); (b) releasing said connecting means (10, 226); (c) rotating said door plug (5, 225) 180° about axis X relative to frame portion (1, 221); (d) re-tightening connecting means (10, 226); (e) rotating the door assembly 180° about axis X from an initial position; (f) re-attaching the hinge (3) to said machine (19).

13. Method according to claim 12 wherein step (a) is performed by releasing fixing means (14a, 14b) associating the hinge (3) on the machine (19) and step (c) is performed keeping the hinge (3) attached to the frame portion (1, 221).

14. Method according to any claim 12 to 14 wherein step (c) is carried out by sliding the door plug (5, 225) relative to the frame portion (1, 221).

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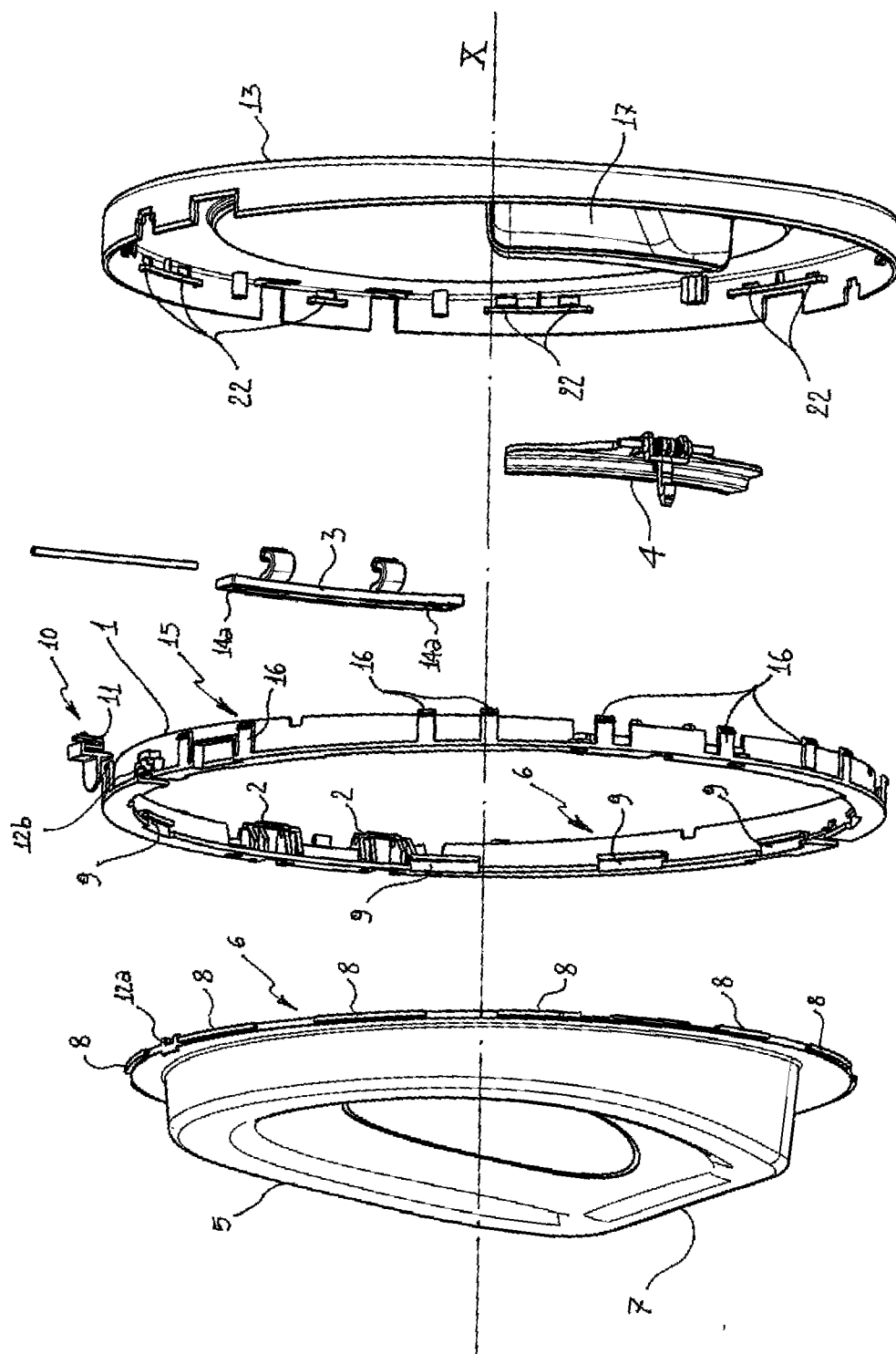


Fig. 1

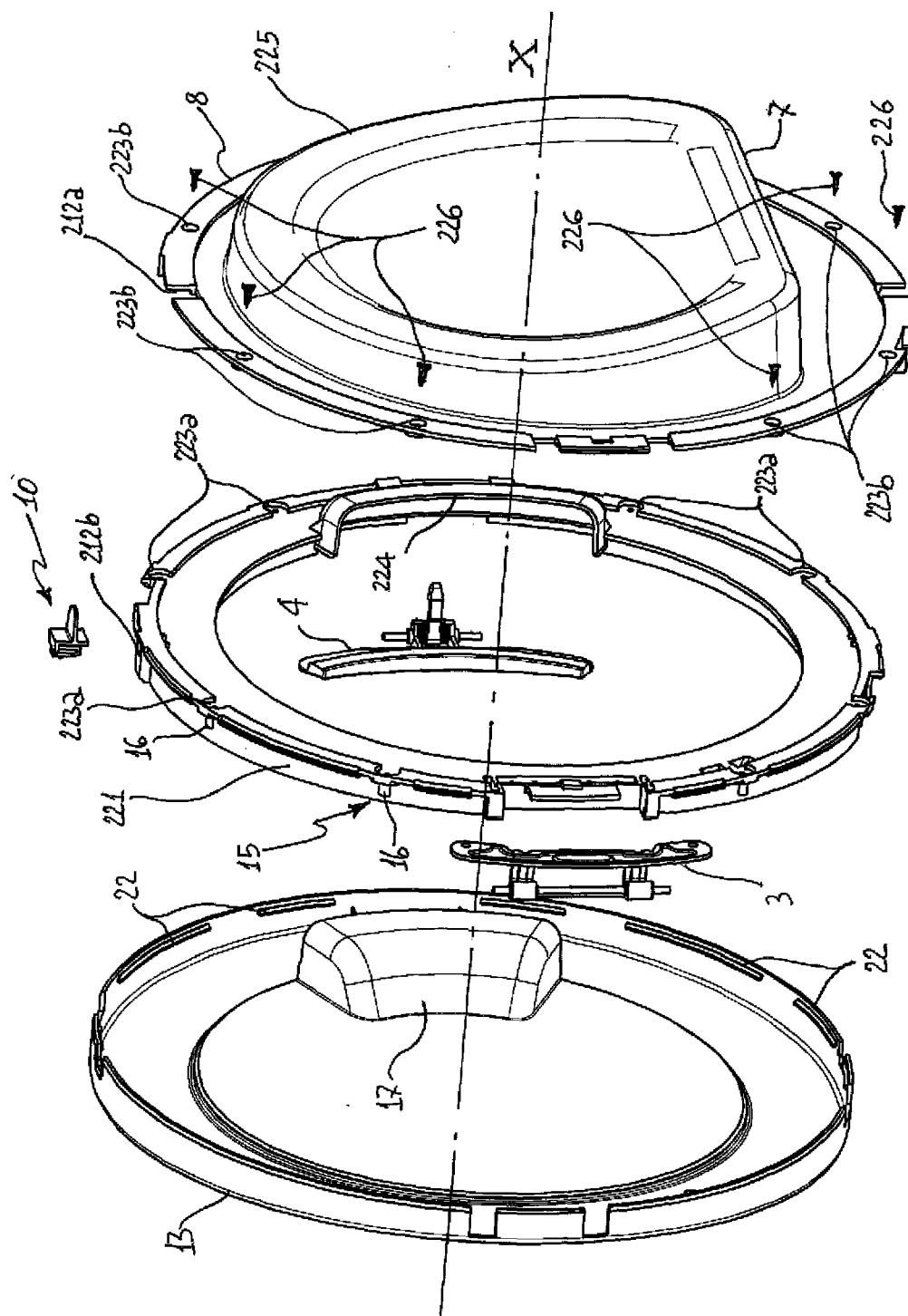


Fig. 2

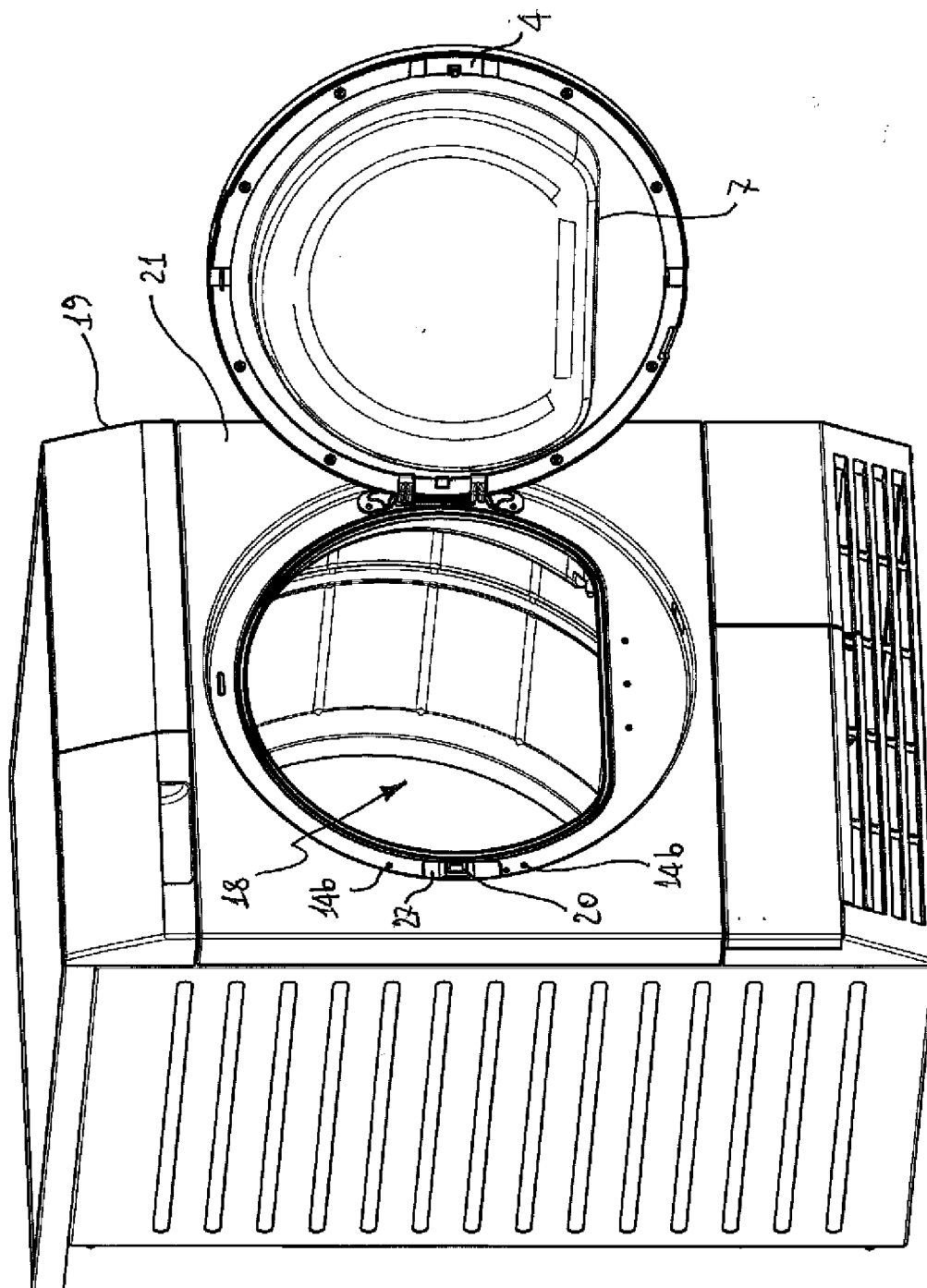


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 08 10 4846

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	WO 2005/014913 A (ARCELIK ANONIM SIRKETI [TR]; AVCI KORKUT [TR]; DAIIOGLU ORHAN [TR]; SEN) 17 February 2005 (2005-02-17) * paragraphs [0006], [0043], [0046]; figures 1-18 * -----	1-14	INV. D06F37/28 D06F39/14
			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 16 January 2009	Examiner Dupuis, Jean-Luc
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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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 7363781 B [0004] [0005]
- US 20060265959 A [0006]