



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.07.2017 Bulletin 2017/27

(51) Int Cl.:
D06F 39/08 (2006.01) **D06F 39/14** (2006.01)
D06F 37/28 (2006.01) **D06F 58/20** (2006.01)
D06F 58/24 (2006.01) **D06F 58/22** (2006.01)

(21) Application number: **15203074.8**

(22) Date of filing: **30.12.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(71) Applicant: **Electrolux Appliances Aktiebolag**
105 45 Stockholm (SE)

(72) Inventor: **SANTAROSSA, Marco**
33080 Porcia (IT)

(74) Representative: **Electrolux Group Patents**
AB Electrolux
Group Patents
105 45 Stockholm (SE)

(54) **LAUNDRY TREATING MACHINE**

(57) The invention relates to a laundry treating machine (100) comprising (105) provided with a laundry loading opening (115) for accessing a laundry treatment chamber (110) and a loading door (125) hinged to the cabinet for selectively closing or opening the laundry loading opening, the cabinet (105) further comprising a swivelling door (140) hinged to the cabinet and openable to allow access to an inner region of the machine within the cabinet, a closure mechanism being provided to keep the swivelling door closed when the swivelling door is abutted against the cabinet (105), characterized in that

the closure mechanism comprises at least a magnet (170) located either at the swivelling door or at the cabinet, and wherein, when said swivelling door (140) is kept in abutment against said cabinet by the magnetic force of said at least a magnet (170), a spacing is present between said magnet (170) and a surface either of said cabinet (105) or of said swivelling door, so that said magnet does not contact said cabinet or the swivelling door, respectively, and said swivelling door remains closed on said cabinet due to magnetic attraction.

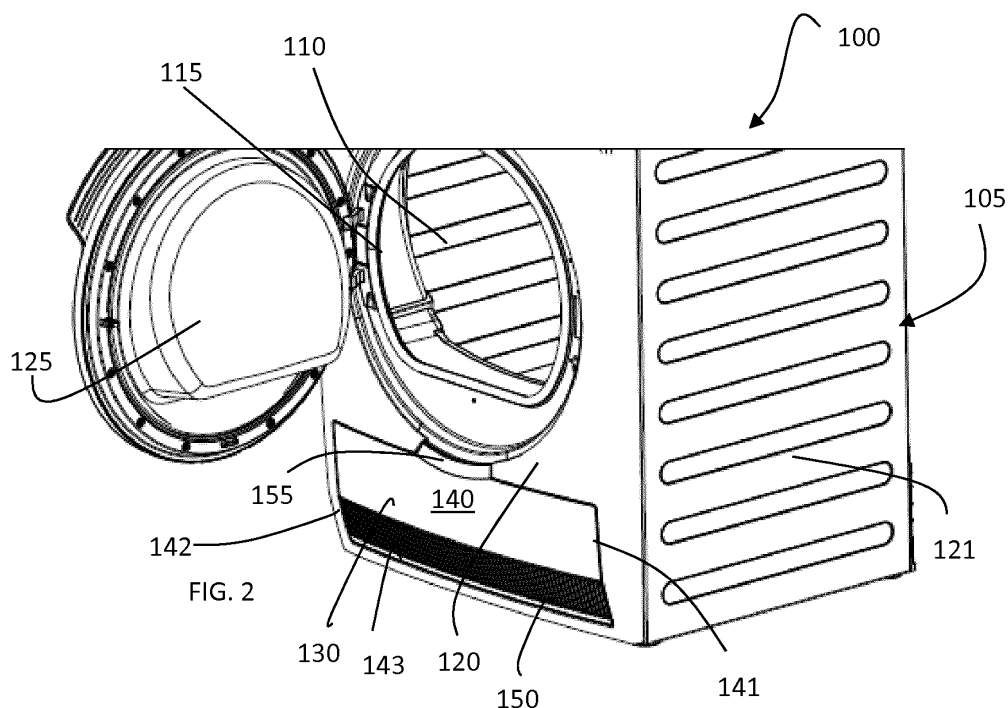


FIG. 2

Description

Field of the invention

[0001] The present invention relates in general to household appliance for treating laundry, i.e. laundry treating machines like laundry washing and/or drying machine.

Background art

[0002] In laundry treating machines like laundry washer-dryers and dryers, one known solution calls for accommodating the drying air moisture condensing system in the bottom part of the appliance, below the tumbler or (in the case of washing and drying machines) the tub. The moisture condensing system may comprise a single air-air heat exchanger where the moisture-laden drying air, which during the drying operation comes from the laundry treatment chamber, is cooled down by a flow of cooling air taken in from the outside environment, so as to cause condensation of the moisture. Alternatively, it may comprise two or more heat exchangers, including an evaporator and a condenser, of a heat pump system.

[0003] The bottom part of the appliance cabinet (i.e. the plinth) may be perforated so as to enable the cooling air to be taken in and expelled.

[0004] The plinth advantageously comprises an openable plinth door, typically hinged at one side to the remaining of the appliance cabinet or to the machine frame, for enabling the access to the inner region of the cabinet and, in particular, to the moisture condensing system, e.g. in order to empty the condense water collection tank, for cleaning the condensing system or generally for maintenance purposes. Commonly, a lock device is provided, for keeping the plinth door closed, and operable to unlock the plinth door. Advantageously, the lock device, which is arranged at least partially inside the appliance cabinet, is operable by a user via a release member such as a slider or button or similar device, which is conveniently located in the rim of the machine laundry loading door. In this way, being the release member hidden when the loading door is closed, the appliance aesthetic is not impaired, and also it is ensured that when the loading door is closed and the appliance is operating, the user cannot inadvertently open the plinth door and access the moisture condensing system. The release button actuates a locking element such as a tooth that engages/disengages a corresponding seat formed in the plinth door at the top thereof, proximate to the upper corner of the free side thereof, i.e., the side of the plinth door that is not hinged to the appliance cabinet.

[0005] An example of such a lock and corresponding plinth door is for example given in the European patent application EP 2647745 in the name of the same Applicant.

[0006] However, the provision of a lock requires the construction and the assembly of many different compo-

nents. Further, like all movable mechanical parts, breakage of the lock could take place, with consequent impossibility to open or close the plinth door.

Summary of the invention

[0007] The Applicant has noticed that in laundry treating machines having a swivelling door openable by a lock device having a release mechanism, due to standard location of the lock device as described with reference to the prior art, the user needs to have a previous knowledge of the release member position of the release member and of how to operate the same, knowledge that can be acquired for example by reading the machine manual or by having being told by someone.

[0008] However, it is known that users prefers that appliances are as easy as possible in their usage and that the consultation of the user manual is an event that is required as rarely as possible.

[0009] The provision of the release member on the exterior of the cabinet - so that it is visible - is not a feasible or preferred solution either, because the user could open the swivelling door also during the laundry treating machine functioning, e.g. during a drying or washing cycle, with the possible risk of coming into contact with parts that may cause an injury to the user, such moving or hot parts present in the interior of the cabinet.

[0010] Further, the provision of mechanical locks may lead to malfunctioning of the same, due to the movable parts therein present.

[0011] Therefore, the goal of the invention is to provide a laundry treating machine having a swivelling door, for example to access a heat exchanger, a filter or a condensate canister of the machine, whose way of opening is reliable, simple, easy to understand and with a low risk of breakage during use.

[0012] According to a first aspect, the invention relates to a laundry treating machine comprising a cabinet provided with a laundry loading opening for accessing a laundry treatment chamber and a loading door hinged to the cabinet for selectively closing or opening the laundry loading opening, the cabinet further comprising a swivelling door hinged to the cabinet and openable to allow access to an inner region of the machine within the cabinet, a closure mechanism being provided to keep the swivelling door closed when the swivelling door is abutted against the cabinet, characterized in that the closure mechanism comprises at least a magnet located either at the swivelling door or at the cabinet, and wherein, when said swivelling door is kept in abutment against said cabinet by the magnetic force of said at least a magnet, a spacing is present between said magnet and a surface either of said cabinet or of said swivelling door, so that said magnet does not contact said cabinet or the swivelling door, respectively, and said swivelling door remains closed on said cabinet due to magnetic attraction.

[0013] According to a second aspect, the invention relates to a laundry treating machine comprising a cabinet

provided with a laundry loading opening for accessing a laundry treatment chamber and a loading door hinged to the cabinet for selectively closing or opening the laundry loading opening, the cabinet further comprising a swivelling door hinged to the cabinet and openable to allow access to an inner region of the machine within the cabinet, a closure mechanism being provided to keep the swivelling door closed when the swivelling door is abutted against the cabinet, characterized in that the closure mechanism comprises at least a magnet located at one of the swivelling door or the cabinet, and a reed sensor located at the other of the swivelling door or the cabinet to detect the presence of the magnet when said swivelling door is proximal to said cabinet.

[0014] The laundry treating machine of the invention may include a washing machine, a drier or a combined washer-dryer. The laundry treating machine commonly includes a washing and/or drying chamber, that is a treatment chamber, where the laundry can be located in order to be washed and/or dried; the chamber can be rotated around a chamber axis during the washing and/or drying operations. Further, the laundry treating machine may be a front-loading machine, which means that the axis of rotation of the laundry chamber is positioned in a horizontal manner or slightly tilted with respect to a horizontal plane, or a top laundry treating machine, where the axis of the laundry chamber is substantially vertical.

[0015] In a preferred embodiment, the laundry treating machine is a dryer and more preferably it is a front loading laundry dryer.

[0016] The laundry treating machine comprises a cabinet preferably including a front wall, a rear wall, side walls, top wall and a base section or basement. The front or top wall may comprise a user panel to command the functioning of the appliance by the user. The cabinet defines the limit between the internal volume of the laundry treating machine and the outside to the laundry treating machine. Further, preferably, the cabinet includes a laundry loading door hinged to the cabinet itself, e.g. to the front wall in case of a front loading machine, which is openable in order to introduce the laundry in the laundry chamber, or to the top wall in case of a top loading machine. The laundry loading door thus opens or closes a laundry loading opening realized in the cabinet, such as for example in the front wall of the same.

[0017] The basement has, among others, the function of housing several components of the machine, such as a portion of a drying air conduit, heat exchangers, a motor for rotating the chamber, a fan, etc. Further, it has also the function of supporting some of the walls of the cabinet. The rear wall is fixed to the basement when the appliance is in an assembled position.

[0018] The basement can be realized in any material; preferably it is realized in plastic material. Further, the walls of the casing can also be realized in any material, preferably the rear wall is realized in plastic. Preferably, at least one of the two lateral walls is realized in metal, at least for a portion thereof, more preferably at least a

portion of the front wall of the cabinet is realized in metal. In the basement a front side, a back side and two lateral sides can be defined as well, which are contiguous to the front, rear and lateral walls of the cabinet, respectively, when the appliance is fully assembled.

[0019] The basement is generally positioned on a floor and rests substantially horizontally when the machine is in a standard operating condition. The basement defines a basement plane, which is substantially parallel to the plane where it rests, e.g. a horizontal plane.

[0020] The basement for example may be divided in an upper and a lower shell. The upper and lower shells define the outer boundaries of the basement, dividing a volume "inside" of the basement and an "outside" to the basement.

[0021] The part of cabinet surrounding the basement is also called "plinth" in the technical field of reference.

[0022] The laundry treating machine further comprises an additional door, called a swivelling door, also hinged to the cabinet, for accessing a portion - such as components - of the laundry treating machine located inside the cabinet. For example, the swivelling door may give access to one or more heat exchangers of the laundry treating machine, or to a condense canister in order to check or empty the same, to a fan for moving process drying air, etc. The swivelling door is preferably kept closed during a laundry treating machine washing and/or drying cycle for security reasons, due to the fact that it may give access to components of the laundry treating machine which might be in movement or might reach a relatively high temperature when the laundry treating machine is in function. On the other hand, the swivelling door needs to be openable when the laundry treating machine is not in function in order to access the above mentioned inner components of the laundry treating machine for example for cleaning, checking or maintenance purposes.

[0023] In order to keep the swivelling door closed during the machine functioning, the swivelling door preferably includes a closure mechanism which keeps the swivelling door closed when it is abutted against the cabinet.

[0024] Preferably, said closure mechanism includes at least a magnet. It is preferred that in the laundry treating machine the amount of movable parts which have to be fabricated, assembled and are suitable of malfunctioning is minimized. Therefore, preferably the closure of the swivelling door is assured not by the presence of a mechanical lock, but preferably by the presence of one or more magnets which, with their attraction force, keeps the swivelling door closed when it is in abutment or in close proximity to the cabinet. The magnet can be located either in the swivelling door or in the cabinet of the laundry treating machine.

[0025] When said swivelling door is closed and said magnet is located at the swivelling door, said magnet is facing a portion of surface of said cabinet; alternatively, when said magnet is located at said cabinet, said magnet is facing a portion of surface of said swivelling door. According to the invention, a spacing is present between

said magnet and said portion of surface. The spacing is present in order, on one hand, to avoid damages to a possible paint coating of the cabinet or of the swivelling door, which could be splinted by the continuous bumps of the magnet hitting the cabinet surface at the swivelling door closure, and, on the other hand, to avoid noise caused by the swivelling door closure onto the cabinet.

[0026] A simple and reliable closure mechanism of the swivelling door is thus realized.

[0027] According to the second aspect, a reed sensor is present to detect the presence of the magnet. When the swivelling door is closed on the cabinet, or proximal to be closed, below a given distance between the position of the magnet and the position of the reed sensor, the reed sensor is apt to "sense" the presence of the magnet. Therefore, the reed sensor may detect whether the swivelling door is closed on the cabinet or not, detecting whether the magnet is located below a given distance. A further security is thus implemented, avoiding that the laundry treating machine may start operation, that is, may start a washing and/or drying cycle, when the swivelling door is open. For this purpose, the reed sensor may send signals to a central unit of the laundry treatment machine regarding the status of the swivelling door (either open or closed).

[0028] According to the first or the second aspect, the invention may include, alternatively or in combination, any of the following characteristics.

[0029] Preferably, when said magnet is located at said swivelling door, said cabinet includes a counter-element apt to be attracted by the magnetic force produced by said magnet, or, when said magnet is located at said cabinet, said swivelling door includes a counter-element apt to be attracted by the magnetic force produced by said magnet. The counter-element can be arbitrary as long as it is attracted by the magnetic force produced by the magnet. In a laundry treating machine, many metallic elements are often present, as well as circulating currents, so generally it is not necessary to provide a counter-element "ad hoc" in order to have an element attracted by the magnetic force, being it already present in the standard laundry treating machine construction. For example, the counter element could be the cabinet itself or the swivelling door itself, if realized in metal. The counter-element could even include a coating or a paint of a portion of surface of the cabinet or of the swivelling door, the coating or paint may be itself apt to be attracted by the magnetic force produced by said magnet.

[0030] More preferably, said counter - element includes a portion of said cabinet or of said swivelling door realized in metallic material.

[0031] Preferably, the closure mechanism comprises a handle visible from the exterior of the cabinet when said laundry loading door is closed, said magnet being positioned either on said handle or on a portion of said cabinet facing said handle. The swivelling door can be opened by operating a handle formed in the swivelling door. Further, in order to clearly identify the position of

the handle so that the user can easily understand how to operate the swivelling door, the handle is always visible from the outside of the cabinet, e.g. in all operative configurations of the laundry treating machine, with open or closed laundry loading door, the handle remains visible from the outside of the cabinet and it is not, or is only partially, covered by the laundry loading door, in particular when the latter is closed on the laundry loading opening. Advantageously, the magnet is located on the handle or on the cabinet in front of the handle when the swivelling door is closed.

[0032] More preferably, said handle forms with the cabinet a gap located at a rim of said laundry loading opening, wherein access to the gap is hindered by said laundry loading door when the laundry loading door is closed so that insertion of a finger in the gap to pull the handle is not permitted, and wherein a dimension of said gap allows a finger insertion to pull the handle and open the swivelling door when the laundry loading door is open. Advantageously, the swivelling door can be opened only when the laundry loading door is open. However, even if the laundry loading door is closed, the swivelling door can be closed from an open position. The handle of the swivelling door forms a gap with the cabinet of the laundry treating machine and, by inserting a finger or a hand in the gap, a force can be exerted to pull the handle, and thus the swivelling door, away from the cabinet and thus opening the same. However, in a first operative configuration of the laundry treating machine where the laundry loading door is closed on the loading opening of the cabinet, the gap, which is formed between the handle and the cabinet cannot be accessed because the gap is covered by the laundry loading door and therefore the hand of a user cannot access it. Even if a slit is formed between the laundry loading door and the swivelling door, e.g. between the laundry loading door and the handle, when both are in a closed position, in order to allow relative movement of one door with respect to the other, such slit is dimensioned so as to prevent a human finger to access the gap existing between the swivelling door and the cabinet. Such gap might be still partially visible from the outside of the cabinet through the slit also when the laundry loading door is closed, however it cannot be accessed in order to pull the handle by a hand of a user. The slit, however, allows the swivelling door to be moved from an open position to a closed position even if the laundry loading door is in a close position. This because the swivelling door can be moved to a closed position without using the handle provided on it.

[0033] In order to grant or preventing access to the gap formed between the swivelling door and the cabinet when the swivelling door is in a closed position, reference has been made to a "test-finger" having a diameter of 12 millimetres and a length of 80 millimetres as defined in European Norm EN 60529. A slit having at least a dimension along a direction smaller than 12 millimetres therefore does not allow a finger introduction and thus the gap cannot be accessed.

[0034] However, when the laundry loading door is opened, the rim of the laundry loading opening is free and therefore the gap can be easily accessed: a hand or fingers of the user can be introduced in the gap and the swivelling door can be opened pulling the handle. When the laundry loading door is open, the laundry treating machine is not in operation and therefore it is safe to open the swivelling door and to be able to contact or manipulate components of the laundry treating machine present inside the cabinet.

[0035] Preferably, said swivelling door or the cabinet includes a seat to house said magnet, said seat having a depth longer than a height of the magnet in an insertion direction into said seat. In order to house the magnet and keep it in a fixed position during the machine functioning, preferably a seat is realized, either on the swivelling door or on the cabinet, depending on the selected desired location of the magnet. In order to obtain the desired spacing between the magnet and the surface of the swivelling door or of the cabinet, the seat is formed deeper than needed by the dimensions of the magnet, so that, when the magnet is introduced in the seat, it does not fill it up completely, but an end portion of the seat facing the surface either of the swivelling door or of the cabinet is kept magnet-free. Other possibility are anyhow possible to form the required spacing between the magnet and the surface either of the swivelling door or of the cabinet, for example spacers can be introduced.

[0036] More preferably, said seat is realized integral to said swivelling door or the cabinet. In this way, the number of components to be separately realized and then assembled is minimized.

[0037] Preferably, the laundry treating machine includes at least three magnets and at least three seats to house each a magnet. A plurality of magnets allows a better closure of the swivelling door due to the higher attraction force with respect to a single magnet solution and also a better fitting between the door and the cabinet: three magnets in three different locations allow a distribution of the attraction force of the magnets in a wide area so that the whole swivelling door can be attached to the cabinet, without "loose" parts.

[0038] Preferably, said swivelling door includes an upper rim opposite to a lower rim where the swivelling door is hinged to the cabinet, wherein said at least a magnet is located at said upper rim. Even more preferably, at least three magnets are located at the handle and at the two lateral end of the swivelling door. Preferably, the positioning of the magnet is such that the majority of the swivelling door remains closed flush to the front wall of cabinet. It is indeed desired that the whole swivelling door remains flush to the cabinet when closed, so that it cannot be opened by inserting a finger in a slit. A flush swivelling door also improves the aesthetic appearance of the laundry treating machine.

[0039] Preferably, the swivelling door is located at a plinth of the cabinet. More preferably, the swivelling door is located below said laundry loading door and it is hinged

at a lower side of said cabinet. Advantageously, the swivelling door is used to access the inner lower part of the laundry treating machine. It could be used for example to discharge condense water, remove and clean a filter, check the functioning of heat exchangers, etc. Commonly all these components are located at the bottom of the laundry treating machine, where room is available for these relatively bulky components.

[0040] Preferably, the swivelling door is openable to enable access to a laundry treating machine region where at least part of a laundry process air moisture condensing system is arranged. Cleaning and maintenance of the air moisture condensing system can be therefore performed.

[0041] More preferably, the cabinet plinth is provided with perforations for the intake/exhaust of the laundry process air.

[0042] Preferably, said spacing present between said magnet and an external surface of said cabinet or swivelling door has a dimension comprised between 1 and 10 millimetres. Preferably, the magnet used in the laundry treatment machine are commercially available and relatively economical not to increase the overall costs of the machine, Therefore, the magnetic attraction force generated is relatively weak. The stated range is a preferred compromise between the need of a spacing so as to avoid contact of the magnet and the surface of the cabinet or swivelling door and the attraction generated by the magnet.

[0043] Preferably, the swivelling door, on its side facing the cabinet, is at least partially covered by an element formed in elastic material which abuts against said cabinet when the swivelling door is closed. This element is used to have a damping closure of the swivelling door so that preferably only a feeble sound is produced when the swivelling door is abutted against the cabinet. This is particular useful when the cabinet is formed in a metallic material, which creates a high metallic sound when hit. For example, the swivelling door may include a seat where the elastic material is injection moulded over it. This elastic material, if realized on the handle, may also improve the grip of the handle itself. Further, it may function as a "spacer", so that the magnet is not touching a surface of the cabinet, for example when a seat is present. The elastic material can be visible on the cabinet front wall when the swivelling door is in a closed position, so as to visualise where the user can grip such swivelling door to open it.

[0044] Preferably, the laundry treating machine includes a reed sensor located at one of said swivelling door or said cabinet to detect the presence, in proximity of said cabinet, of a magnet which is arranged at the other of said cabinet or the swivelling door. The reed sensor may include a reed switch, which is an electrical switch operated by an applied magnetic field. It includes for example a pair of contacts on ferrous metal reeds in a glass envelope. The contacts may be normally open, closing when a magnetic field is present, or normally

closed and opening when a magnetic field is applied. The switch may be actuated by bringing a magnet near to the switch. Once the magnet is pulled away from the switch, the reed switch will go back to its original position. Preferably, in order to start the laundry treating machine only when the swivelling door is closed, so that the user is hindered from touching the components present in the interior of the laundry treating machine when in function, the reed sensor may send a warning signal that the swivelling door is open ("no magnet sensed") in case the machine is commanded to start with the swivelling door open. Alternatively, the reed sensor can send a signal relative to the status of the door when the swivelling door is open (or closed) and this signal is checked and used in case the machine is started when this signal indicates an open swivelling door. This signal may trigger a visual or acoustic warning to the user or it may trigger a control unit of the laundry treating machine to block the start of the machine till the swivelling door is closed and the reed sensor is not emitting a "swivelling door open" signal any more.

[0045] For the operation of the reed sensor, there is no need of providing a spacing between the magnet and the surface of the swivelling door or cabinet.

[0046] Preferably, said reed sensor is adapted to send a signal to a control unit to indicate that said swivelling door is open.

[0047] More preferably, said control unit is programmed to trigger a visible or acoustic alarm on a control panel of said laundry treating machine when said reed sensor emits said signal.

[0048] More preferably, said control unit is programmed to block a start of a machine cycle when said reed sensor emits said signal.

Brief description of the drawings

[0049] These and other features and advantages of the present invention will better appear from the reading of the following detailed description of an exemplary and non-limitative embodiment thereof, depicted in the annexed drawings, wherein:

- Fig. 1 is an isometric view of a laundry treating machine according to an embodiment of the present invention in a first operative configuration;
- Fig. 2 is a partial isometric view of the laundry treating machine of figure 1 in a second operative configuration;
- Fig. 3 is an enlarged view of a detail of the laundry treating machine in the operative configuration of figure 2;
- Fig. 4 is an additional view of the detail of figure 3, in a third operative configuration;
- Fig. 5 is an enlarged isometric view of the swivelling door of the laundry treating machine of figures 1 and 2;
- Fig. 6 is a cross section of a plinth of the laundry

treating machine in the operative configuration of figure 1;

- Fig. 7 is a cross section of a plinth of the laundry treating machine in the operative configuration of figure 2;
- Fig. 8 is an enlarged view of a detail of the cross section of figure 6 or 7;
- Fig. 9 is a schematic representation of a control within the laundry treating machine of figure 1.

Detailed description of an exemplary embodiment of the invention

[0050] With initial reference to figures 1 and 2, an isometric view of a laundry treating machine according to an embodiment of the present invention is depicted, in a first and a second operative configuration. The laundry treating machine referred in the following description, globally denoted as 100, may be a laundry dryer or a laundry washer/dryer, but it should be understood that the invention may be applied to a laundry washing machine as well. The laundry treating machine 100 has an external casing or appliance cabinet 105, inside which structural and functional parts of the machine are accommodated, such as a tumbler 110 (or, in the case of a laundry washer/dryer, a drum rotatable within a tub), a moisture condensing system for demisting the drying air, fans, pumps, valves, motors, vibration dampening devices, electronics. A laundry loading opening 115 is formed in a front wall 120 of the cabinet 105, for allowing access to the inner space of the tumbler (or drum) 110; a laundry loading door 125 is provided for closing the load opening 115. The laundry loading opening 115 includes a rim 116 which defines a surface contouring the laundry loading opening 115 which surrounds the laundry opening door 125 when the laundry opening door 125 is in a closed configuration such as the one of figure 1.

[0051] The cabinet 105, in addition to the front wall 120, may include a rear wall (not visible in the figures) and two lateral walls 121, 122. A top wall 123 is also included to close the top of the cabinet 105.

[0052] The laundry treating machine 1 is a front loading machine and preferably it defines a vertical axis Z, along which it extends. Preferably, the front wall 120 is substantially vertical.

[0053] A portion of the front wall 120 may include a control panel 12 where settings of the cycle may be introduced and visual or acoustic signal relative to the status of the cycle or relative to the status and functioning of the laundry treating machine 100 may be displayed, for example by means of LEDs or screen (not visible in the appended drawings).

[0054] Below the laundry loading opening 115, the front wall 120 terminates and the bottom region of the appliance cabinet 105 is formed by a plinth 130. The plinth 130 is a cover for a bottom part of the laundry treating machine 100 where the moisture condensing system is, at least partly, located, for example an air-air heat

exchanger where the moisture-laden drying air, coming from the laundry treatment chamber, is cooled down by a flow of cooling air taken in from the outside environment, so as to cause condensation of the moisture.

[0055] The plinth 130 is for this purpose preferably perforated, so as to enable the cooling air to be taken in and expelled.

[0056] A portion of the plinth 130 is swivably coupled to the cabinet 105 so as to be openable and allow access to the area behind it, and closable when the area behind it is not to be accessed. For example, the plinth 130 is hinged, at its lower side 143, to the cabinet 105 and form a plinth door 140 that can be opened (by the user or by a repairer) for accessing the moisture condensing system, e.g. a tank for collecting the condense water released by the drying air in order to empty it or a filter to be cleaned. The plinth door 140 is preferably perforated, at a bottom band thereof; cooling air for the moisture condensing system is for example taken in (by means of a fan, not visible in the drawings) through the perforations 150 in a first plinth part, and expelled through perforations 150 in a second plinth part. Preferably, the plinth door 140 is located symmetrically with respect to a vertical axis of the front wall 120.

[0057] As visible in Fig. 1, Fig. 2 and in the enlarged views of Figs. 3 and 4, a handle 155 is provided for opening the plinth door 140 when desired. Advantageously, the handle 155 is located centrally with respect to the plinth door 140 and protrudes - for being accessible to a user/operator - from a top edge 144 (see figure 5 where the plinth door 140 is depicted in an enlarged view) of the plinth door 140. As shown in figures 3, 4 and 5, the handle 155 has a contour which follows, at least for a portion, the shape of the rim 116 of the load opening 115. Thus, being the laundry loading opening 115 substantially circular, the handle has a curved shape which may be an arc of circumference. The handle has substantially the form of a flat flap, which is however not geometrically following an external surface of the plinth door, but is slightly recessed with respect to it when the plinth door 140 is closed.

[0058] The handle 155 is visible from the exterior of the cabinet 105 both when the laundry loading door 125 is closed (see the operative configuration of figures 1 and 6) and also when the loading door 125 is open (see the operative configuration of figures 2 and 7). Therefore, there is no doubt for the user of the position of an actuator (i.e. the handle) to open the plinth door 140.

[0059] The handle 155 forms with the cabinet 105 (or the frame of the laundry treating machine) a gap 160. The gap 160 is visible in particular in the sectional side views of figures 6 and 7. The gap has preferably a width, which is defined by a distance between the handle 155 and the cabinet 105 when the plinth door 140 is closed, equal greater than 12 millimetres in order to house one or more fingers of a user. The gap is located at the rim 116 of the loading opening 115.

[0060] The gap 160, when the laundry treating ma-

chine 100 is in the operative position of figures 1 and 6, is covered by the loading door 125, so that the gap is not accessible by a user. Indeed, in the operative configuration of figure 1 and 6, the loading door 125 is located above the gap and a narrow slit 161 having a dimension lower than 12 millimetres is still present between the loading door 125 and the rim 16, so between the door 125 and the gap 160, is not broad enough for the insertion of a finger or any other part of a user's hand. For example, the slit has a breadth, defined as a distance along the vertical direction Z between the laundry loading door 125 and the handle 155 when the laundry loading door 125 is closed, comprised between 1 and 11 millimetres. The user can see the position of the handle 155 also when the laundry loading door 125 is closed, but cannot operate the same because the handle can be grabbed only by means of the gap: there is no other way to pull the handle otherwise. Therefore, when the laundry treating machine 100 is in operation, and the loading door 125 is closed, it is not possible to open the plinth door 140. Indeed, the handle 155 does not offer any protrusions from the exterior of the cabinet which can be used to pull it and thus open the plinth door 140. However when the laundry loading door 125 is closed and the plinth door 140 is opened, the plinth door 140 can be closed.

[0061] Furthermore, when the loading door 125 is open, the gap 160 is visible in the lower part of the circumferential rim 116 of the load opening 115 and it is reachable by the user who can insert his/her hand or fingers and pull the handle 155 in order to open the plinth door 140, as shown in the enlarged view of figure 4 where the plinth door is slightly open.

[0062] Further, the handle 155 includes an element 156 made of elastic material, which is preferably coupled to a seat 157 formed in the handle 155. The element 156 is preferably moulded in the seat 157 and dampens the closure of the plinth door 140 on the cabinet 105. The element 156 abuts against the cabinet front wall 120 when the plinth door 140 is in a closed position as it is visible in Fig. 8. The element 156 may also improve the grip of the handle 155 by a user.

[0063] The plinth door 140 is for example made in plastic material (although other materials can be used, such as sheet metal).

[0064] Furthermore, the handle 155 is part of a closure mechanism located in the plinth door 140. The closure mechanism further comprises preferably one magnet and more preferably three magnets, all indicated with 170 in the figures. The magnets 170 are located one at the handle 155 and two at the opposite lateral sides 141 and 142 of the plinth door 140, as visible in figure 5. In this way the magnetic force is well distributed on some regions of the plinth door perimeter to keep the plinth door 140 perfectly flush with the cabinet front wall 120. The positioning of the magnets allows a full closure of the plinth door 140 every time the plinth door 140 is in the proximity of the cabinet 105 and keeps the door closed till a force against the magnetic attraction, such

as a pulling force on handle 155, overcomes the force generated by the magnets 170.

[0065] Each magnet 170 is preferably housed in a seat 171. The seat can be realized for example integral to the handle 155 or to the plinth door 140. A seat 171 realized in the plinth door is depicted in the enlarged view of figure 8. Each seat 171 has preferably a depth longer than the depth of the magnet 170, so that the magnet does not reach an end rim of the seat 171. In this way, when the plinth door 140 is in contact to the cabinet 105, the magnet does not touch the surface of the cabinet itself, such as the surface of front door 120, a spacing is present therebetween. In this way, substantially no noise is heard at the closure of the plinth door 140 and no damage of a cabinet paint is caused.

[0066] The magnet 170 provided at the handle may not include a seat 171. For example, the magnet may be glued on the handle. Being a seat 171 provided or not on the handle to receive the magnet 170 therein, a spacing between the surface of the cabinet and the magnet may be provided by the presence of the element 156, which functions as a "spacer" between the plinth door 140 and the cabinet 105.

[0067] The provision of at least three magnets 171 (see figure 5) allows a flush closure of the plinth door 140 on the cabinet 105.

[0068] The attraction between the magnet 170 and the front wall 120 of the cabinet is due to the fact that the front cabinet wall is realized in metal. However, according to a non-depicted embodiment, only portions of the front wall may be realized in metal, or metal plates may be positioned on the cabinet 105 in a location facing the magnet when the plinth door 1340 is closed. Alternatively magnets having an opposed pole compared to the pole of magnets arranged either at the cabinet or at the plinth door can be provided in order to generate an attraction force.

[0069] In a non-depicted embodiment, the position of the seats 171 and magnets 170 is reversed: seats 171 and magnets 170 are realized on the cabinet 105 facing the plinth door 140 which is attracted by them when closed.

[0070] Further, the cabinet front wall 120 includes a reed sensor 180, depicted in a schematic view in figures 4 and 9. The reed sensor is apt to sense the presence of the magnet below a given distance. Therefore, the reed sensor 180 is capable of distinguishing between the open position of the plinth door 140 and the closed position of the plinth door 140, in the latter the magnet being closer to the reed sensor and activating the same.

[0071] The reed sensor 180 is advantageously connected to a central unit 10 of the laundry treating machine (see figure 9) in order to send to the central unit at least a status signal of the plinth door 140, such as "plinth door open" or "plinth door closed". The central unit 10 is programmed to command preferably the functioning of the laundry treating machine 100, among others may be programmed to send command signals to the motor(s) in

order to start the a laundry treatment cycle of the same. When the plinth door 140 is open, the reed sensor 180 may send a corresponding signal to the central unit 10. In case it is desired that a cycle of the laundry drying machine 100 is started when the plinth door 140 is still open, the control unit 10 may activate one or more of the LEDs in panel 12 in order to warn the user and/or may block the start of the cycle. The LEDs may be switched off and/or the laundry treating machine 100 may start when the plinth door 140 is closed and the reed signal 100 is not sending any more the signal of "door open" to the control unit 10.

15 Claims

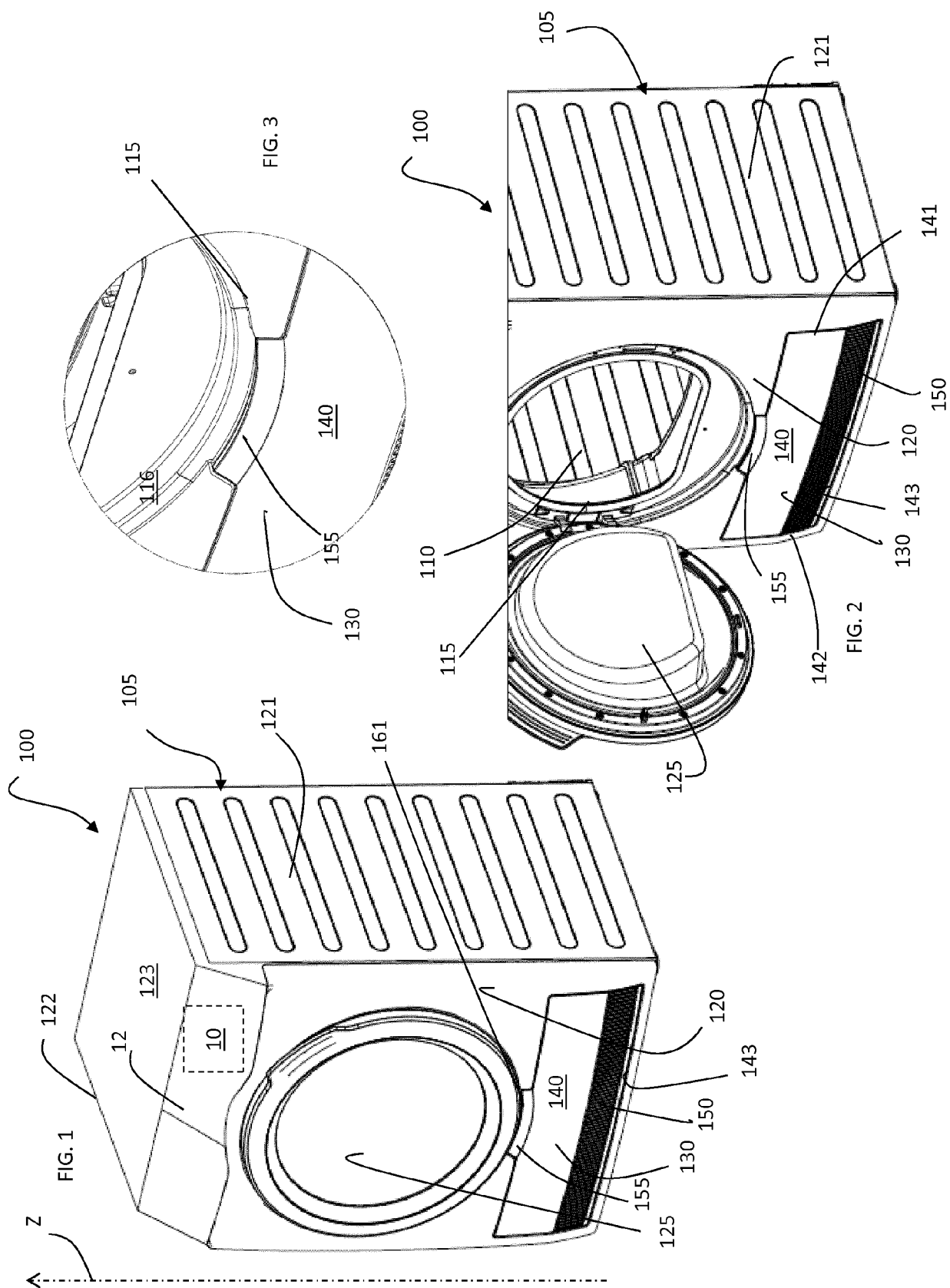
1. A laundry treating machine (100) comprising a cabinet (105) provided with a laundry loading opening (115) for accessing a laundry treatment chamber (110) and a loading door (125) hinged to the cabinet for selectively closing or opening the laundry loading opening, the cabinet (105) further comprising a swivelling door (140) hinged to the cabinet and openable to allow access to an inner region of the machine within the cabinet, a closure mechanism being provided to keep the swivelling door closed when the swivelling door is abutted against the cabinet (105), **characterized in that** the closure mechanism comprises at least a magnet (170) located either at the swivelling door or at the cabinet, and wherein, when said swivelling door (140) is kept in abutment against said cabinet by the magnetic force of said at least a magnet (170), a spacing is present between said magnet (170) and a surface either of said cabinet (105) or of said swivelling door, so that said magnet does not contact said cabinet or the swivelling door, respectively, and said swivelling door remains closed on said cabinet due to magnetic attraction.
2. The laundry treating machine (100) according to claim 1, wherein, when said magnet (170) is located at said swivelling door (140), said cabinet (105) includes a counter-element apt to be attracted by the magnetic force produced by said magnet, or, when said magnet (170) is located at said cabinet, said swivelling door (140) includes a counter-element apt to be attracted by the magnetic force produced by said magnet (170).
3. The laundry treating machine (100) according to claim 1, wherein said counter-element includes a portion of said cabinet (105) or of said swivelling door (140) realized in metallic material.
4. The laundry treating machine (100) according to any of the preceding claims, wherein the closure mechanism comprises a handle (155) visible from the exterior of the cabinet (105) when said laundry loading

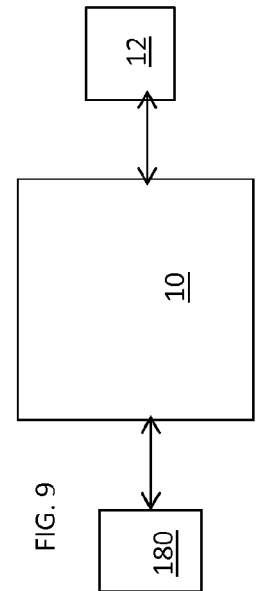
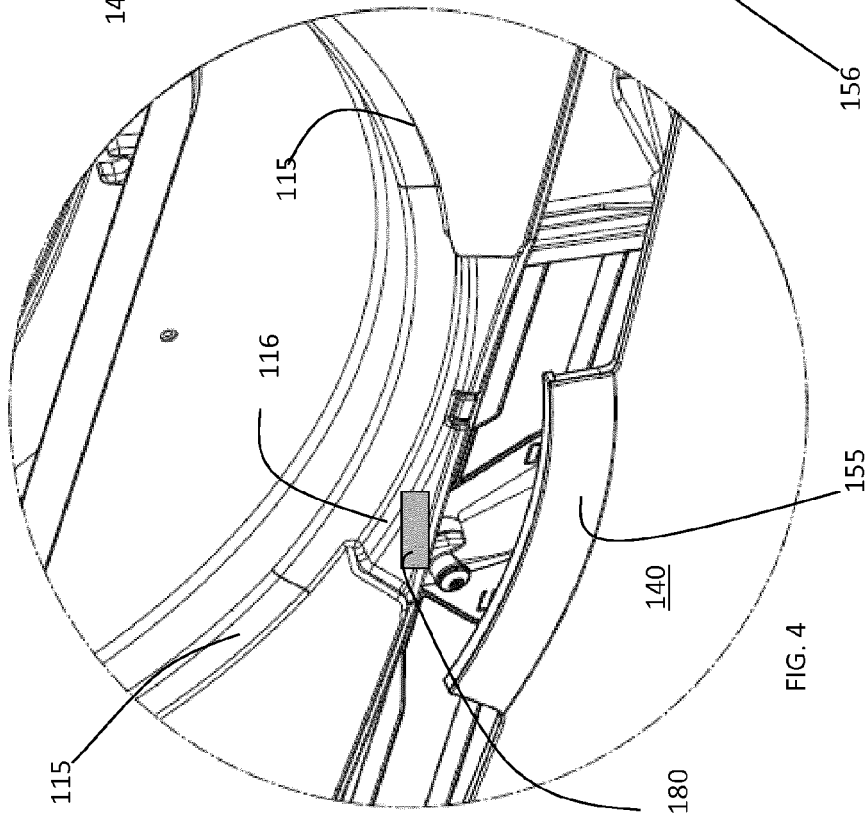
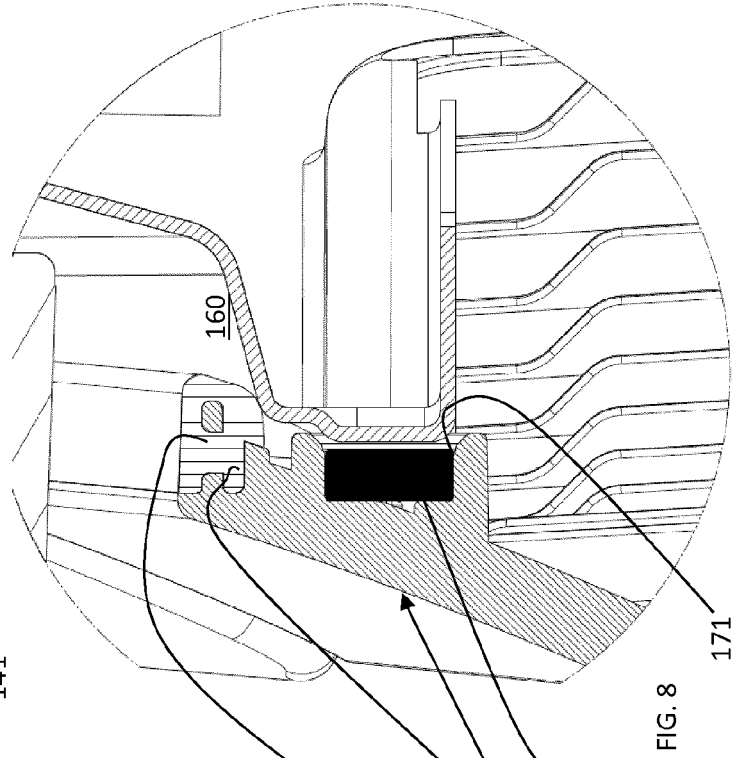
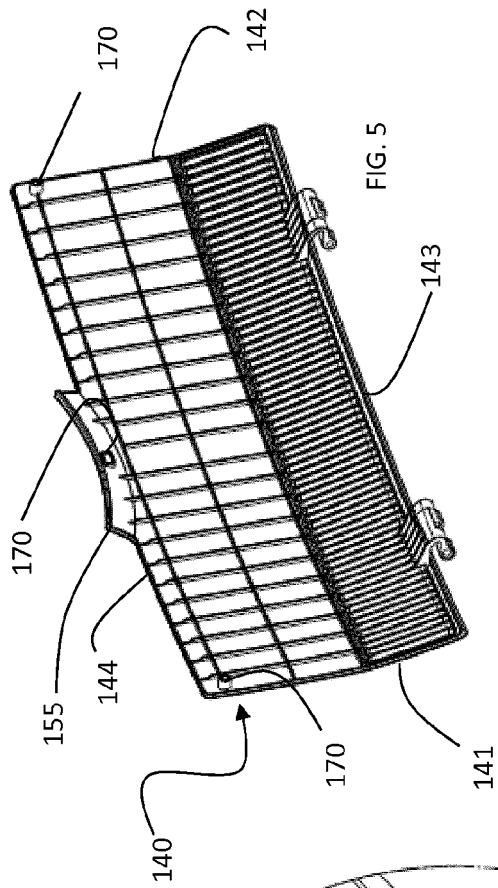
door (125) is closed, said magnet (170) being positioned either on said handle (155) or on a portion of said cabinet (105) facing said handle.

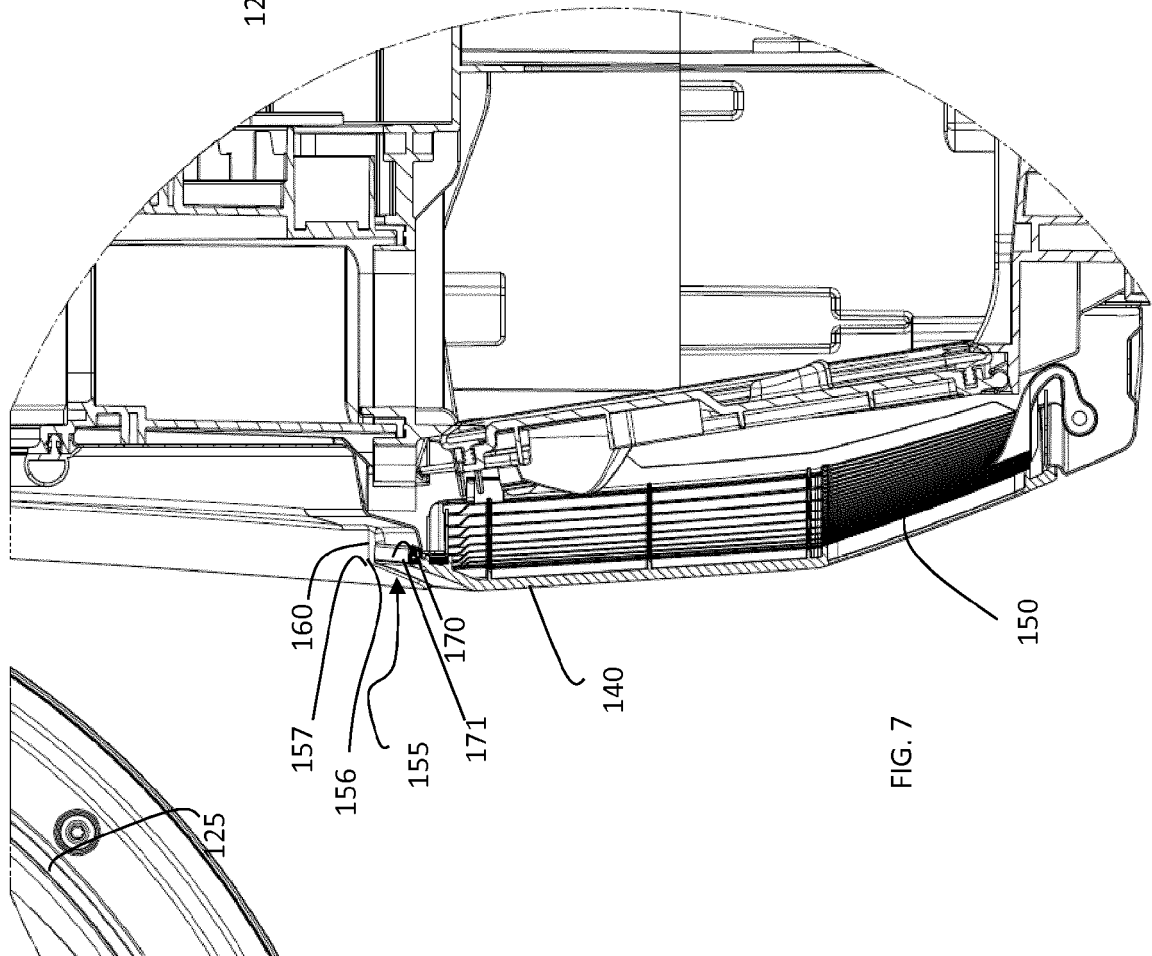
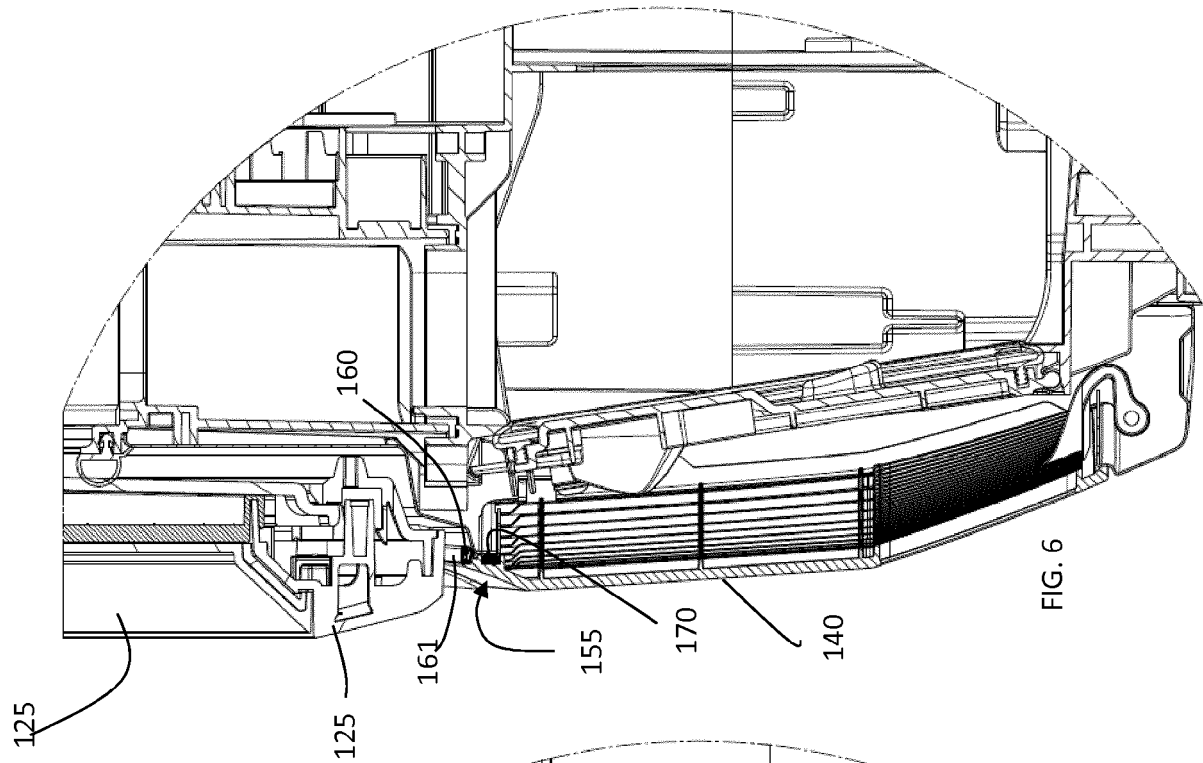
5. The laundry treating machine (100) according to claim 4, wherein said handle (155) forms with the cabinet a gap (160) located at a rim (116) of said laundry loading opening (115), wherein access to the gap (160) is hindered by said laundry loading door (125) when the laundry loading door is closed so that insertion of a finger in the gap to pull the handle (155) is not permitted, and wherein a dimension of said gap (160) allows a finger insertion to pull the handle (155) and open the swivelling door (140) when the laundry loading door (125) is open. 10
6. The laundry treating machine (100) according to any of the preceding claims, wherein said swivelling door (140) or the cabinet (105) includes a seat (171) to house said magnet (170), said seat having a depth longer than a height of the magnet in an insertion direction into said seat. 20
7. The laundry treating machine (100) according to claim 6, wherein said seat (171) is realized integral to said swivelling door (140) or the cabinet (105). 25
8. The laundry treating machine according to claim 6 or 7, including at least three magnets (170) and at least three seats (171) to house each a magnet. 30
9. The laundry treating machine (100) according to any of the preceding claims, wherein said swivelling door (140) includes an upper rim (144) opposite to a lower rim (143) where the swivelling door is hinged to the cabinet (105), wherein said at least a magnet (170) is located at said upper rim. 35
10. The laundry treating machine (100) according to any of the preceding claims, wherein the swivelling door (140) is located at a plinth (130) of the cabinet (105). 40
11. The laundry treating machine (100) according to any of the preceding claims, wherein said swivelling door (140) is located below said laundry loading door (125) and it is hinged at a lower side of said cabinet (105). 45
12. The laundry treating machine (100) according to any of the preceding claims, wherein said spacing present between said magnet (170) and an external surface of said cabinet (105) or swivelling door (140) has a dimension comprised between 1 and 10 millimetres. 50
13. The laundry treating machine (100) according to any of the preceding claims, wherein the swivelling door (140), on its side facing the cabinet, is at least par-

tially covered by an element (156) formed in elastic material which abuts against said cabinet when the swivelling door (140) is closed.

- 5 14. The laundry treating machine (100) according to any of the preceding claims, wherein the swivelling door (140) is openable to enable access to a machine region where at least part of a laundry process air moisture condensing system is arranged.
15. The laundry treating machine (100) according to any of the preceding claims, wherein the swivelling door (140) is provided with perforations (150) for the intake/exhaust of the laundry process air.
16. The laundry treating machine (100) according to any of the preceding claims, including a reed sensor (180) located at one of said cabinet (105) or said swivelling door (140) to detect the presence, in proximity of said cabinet (105), of the magnet (170) which is arranged at the other of said cabinet (105) or said swivelling door (140). 55









EUROPEAN SEARCH REPORT

Application Number
EP 15 20 3074

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 199 60 414 C1 (WHIRLPOOL CO [US]) 15 March 2001 (2001-03-15) * column 1 - column 3; figures 1,2 *	1-16	INV. D06F39/08 D06F39/14 D06F37/28 D06F58/20 D06F58/24 D06F58/22
Y,D	EP 2 647 754 A1 (ELECTROLUX HOME PROD CORP [BE]) 9 October 2013 (2013-10-09) * the whole document *	1-16	
A	DE 10 2013 208851 A1 (BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH [DE]) 20 November 2014 (2014-11-20) * paragraph [0021] *	1-16	
Y	US 2 812 964 A (KNIGHT JAMES L) 12 November 1957 (1957-11-12) * column 4, line 46 - column 4, line 61; figures 1,2 *	1-16	
Y	US 2 690 349 A (TEETOR MACY O) 28 September 1954 (1954-09-28) * column 6, line 12 - column 6, line 33; figure 4 *	1-16	TECHNICAL FIELDS SEARCHED (IPC) D06F
Y	EP 2 392 723 A2 (V ZUG AG [CH]) 7 December 2011 (2011-12-07) * paragraph [0009] - paragraph [0009] *	16	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 June 2016	Examiner Spitzer, Bettina
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 03.82 (P04C01)

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

EP 15 20 3074

5 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.

09-06-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19960414 C1	15-03-2001	DE 19960414 C1	15-03-2001
		EP 1111120 A2	27-06-2001
		ES 2214207 T3	16-09-2004
EP 2647754 A1	09-10-2013	NONE	
DE 102013208851 A1	20-11-2014	NONE	
US 2812964 A	12-11-1957	NONE	
US 2690349 A	28-09-1954	NONE	
EP 2392723 A2	07-12-2011	DK 2392723 T3	15-09-2014
		EP 2392723 A2	07-12-2011
		SI 2392723 T1	31-12-2014

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2647745 A [0005]