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(54) **Laundry treating machine comprising a cover supported by a hinge**

(57) The present invention relates to a laundry treating machine (1) comprising a casing (2) accommodating a laundry chamber (7) suitable for receiving laundry to be treated and a closing door (8) provided for allowing access to the chamber, said machine being provided with a cover (20) which is removably connected to said casing (2) by means of at least one hinge (30, 30') supporting said cover (20) in rotation around a rotation axis (X), so that it can swing between a closed position and an

opened position around said rotation axis. Said hinge (30, 30') comprises at least two rotation pins (35, 36, 36') which, in a dismounted configuration of said cover (20), have respective distinct axes (Y, Z), and, in a mounted configuration of said cover (20), when they are coupled to at least two respective seats (37, 38, 38'), said at least two rotation pins (35, 36, 36') have said respective axes (Y, Z) moved closer than in said dismounted configuration of said cover (20).

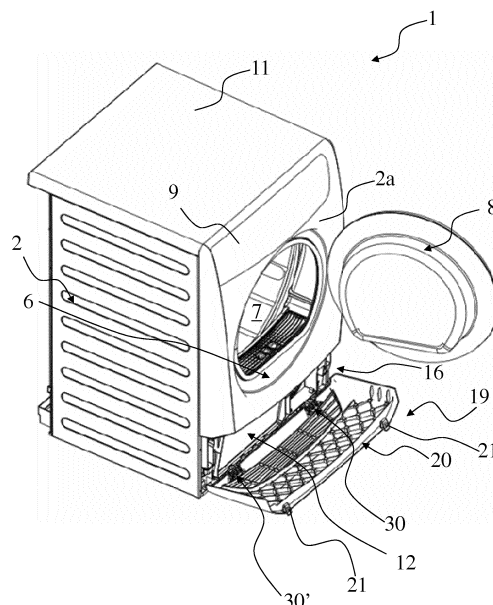


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates in general to the technical field of the household appliance.

[0002] In particular, the invention relates to the technical field of laundry treating machines, which typically are household appliance for washing and/or drying goods, for instance clothes.

[0003] More on particular, the present invention relates to laundry treating machines provided with a cover giving access to internal parts of the machine.

BACKGROUND ART

[0004] Laundry treating machines capable of carrying out a treating process on laundry generally comprise a casing that houses a laundry container, like a rotating drum, where laundry to be treated is received.

[0005] Laundry treating machines may comprise laundry washing machines, laundry drying machine or laundry washing and drying machines, i.e., machines provided for performing both washing and drying operations of laundry in a single machine. Laundry treating machines of known type typically comprise, further to a main closing door for allowing access to a inner laundry chamber (such as a rotating drum), i.e., to place in it laundry to be treated, a cover associated to the casing which may be opened to reach specific parts of the machine arranged inside the casing.

[0006] For example, in laundry washing machine of known type, a cover is arranged on the lower part of the front upright side wall of the casing which gives access to the filter of the draining water circuit. The filter may be advantageously removed and cleaned.

[0007] Analogously, in laundry drying machine of condenser type, a cover is typically arranged on the lower part of the front upright side wall of the casing which gives access to a condensing device, like an air-air heat exchanger, or to a water condensing tank. When necessary, the condensing device may be advantageously removed and cleaned. Also the tank may be periodically removed and emptied.

[0008] Covers of known type are usually pivotally coupled to the front upright side wall of the machine casing along an horizontal pivoting axis. In jargon, these covers are also called "rotable plinth".

[0009] Covers are typically connected to the casing by means of hinges.

[0010] The cover may therefore swing and be displaced between a first, or closed, position and a second, or opened, position. When the cover is in its opened position, it typically projects from the front upright side wall and rests on or close to the floor.

[0011] The covers above described belonging to the known art, however, pose some drawbacks.

[0012] One of such drawbacks lies in that a user may

accidentally hit the cover when the latter lies in the opened position because in this position the cover protrudes outwardly from the front upright side wall of the machine casing.

[0013] This may cause breaking of the cover and/or breaking of the hinges connecting the cover to the casing, thus determining maintenance and repairing costs.

[0014] Furthermore, the user hitting the cover may have physical injury.

[0015] Breaking of the cover, or of the hinges, may also happen when the cover in its opened position is incorrectly used as a shelf and the user accidentally puts heavy items on it.

[0016] This may happens, for example, when a laundry treating machine is placed on top of another laundry treating machine, typically when a laundry drying machine is placed on top of a laundry washing machine. The cover of the laundry drying machine in its opened position, in fact, projects horizontally as a shelf. Also, breaking of the cover may happen if accidentally a child hangs on the cover while it is in its opened position.

[0017] Breaking of a hinge connecting the cover to the casing is particularly frustrating because at least a part of it is formed as a member piece of a more complex component such as the laundry treating machine basement, and therefore, such breaking is very often irreparable, unless the whole basement or the whole cover is substituted. Another drawback of the cover of known type is represented by the fact that the cover may impede easy maintenance operations when it is required to access to the parts inside the machine even if in its opened position. A user or a maintenance worker has to keep him/herself at a certain distance from the machine so as not to hurt against the cover in its opened position. This position of the cover may limit the possibility to access the inner parts inside the casing which are behind the cover itself. So, it would be desirable to detach the cover from the casing, at least in some situations.

[0018] Still another drawback of known covers lies in that the opening rotational movement of the cover itself around its hinges is quite sudden once a lock device keeping the cover in its closed position has been unlocked. This may cause the user to be hit by the cover and/or the cover to hit the floor thereby damaging its front side.

[0019] Furthermore, a drawback of known laundry treating machines lies in that the hinges must be designed with a low clearance, in order to avoid vibrations of the cover during the operation of the laundry treating machines. However, this low clearance can cause frequent breaking of hinges in case of accidental hits to the cover.

[0020] The main object of the present invention is therefore to overcome said drawbacks.

[0021] In particular, it is one object of the present invention to provide a laundry treating machine with increased reliability compared to the machines of known type.

[0022] Another object of the present invention is to provide a laundry treating machine which is safer compared to the machines of known type.

[0023] A further object of the present invention is to provide a laundry treating machine which is more user-friendly compared to the machines of known type.

[0024] Still another object of the invention is to provide a laundry treating machine which can be serviced and/or repaired in an easier manner.

[0025] Furthermore, an object of the present invention is to provide a laundry treating machine wherein the opening rotational movement of the cover around its hinges is not sudden.

[0026] A further object of the present invention is to provide a laundry treating machine wherein the hinges have low clearance, in order to avoid vibrations, and they are capable of carrying accidental hits to the cover better than known laundry treating machines.

[0027] 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.

DISCLOSURE OF INVENTION

[0028] The Applicant found that the above objects are achieved by a laundry treating machine comprising a casing accommodating a laundry chamber suitable for receiving laundry to be treated and a closing door provided for allowing access to the chamber, said machine being provided with a cover which is removably connected to said casing by means of at least one hinge supporting said cover in rotation around a rotation axis, so that it can swing between a closed position and an opened position around said rotation axis, **characterized in that** said at least one hinge comprises at least two rotation pins which, in a dismounted configuration of said cover, have respective distinct axes, and, in a mounted configuration of said cover, when they are coupled to at least two respective seats, said at least two rotation pins have said respective axes moved closer than in said dismounted configuration of said cover.

[0029] Advantageously, compared to the machines of known type, the laundry treating machine of the invention has increased reliability, it is safer and more user-friendly, and it can be serviced and/or repaired in an easier manner.

[0030] In a preferred embodiment of the invention, said respective axes of said at least two rotation pins are substantially parallel to each other.

[0031] Preferably, said respective axes of said at least two rotation pins substantially coincide to said rotation axis of said cover.

[0032] Advantageously, said at least two rotation pins have low manufacture cost and make the assembly of the cover easy.

[0033] Preferably, said at least one of said at least two

rotation pins is mounted or formed on a elastically deformable arm extending from a body of said at least one hinge.

[0034] Advantageously, the elastically deformable arm allows the rotation pins mounted or formed thereon to carry accidental hits to the cover better than known laundry treating machines, without breaking. In other words, the hinge according the invention is not a totally rigid component, but it allows an elastic deformation.

[0035] Furthermore, the elastically deformable arm allows to have a coupling without clearance between the rotation pins and the seats. More precisely, the elastically deformable arm allows to recover the clearance between the rotation pins and the seats, i.e. to make it zero. Therefore, advantageously, the vibrations of the cover during the operation of the laundry treating machine are extremely low.

[0036] Preferably, said elastically deformable arm is associated with a central portion of said at least two rotation pins.

[0037] According to a preferred embodiment of the invention, said elastically deformable arm is made of a plastic material.

[0038] Preferably, said at least one hinge is substantially entirely made of a plastic material.

[0039] Advantageously, said hinge can be obtained by a cheap process, preferably an injection moulding process.

[0040] In a preferred embodiment of the invention, said body of said at least one hinge is associated with said casing of said machine and said at least two respective seats are mounted or formed on said cover.

[0041] Advantageously, in case of an accidental hit to the cover, the machine's component which is most subjected to breaking is the hinge (in particular, the elastically deformable arms and the rotation pins thereof), and not the cover (which has a cost much higher than the hinge), due to the structure of the invention. The broken hinge can be easily replaced with a new one.

[0042] In a preferred embodiment of the invention, said machine includes three rotation pins, named a central rotation pin and two lateral rotation pins, which are rotatably received in three respective seats, wherein in said dismounted configuration of said cover the two lateral rotation pins having a substantially common axis which is distinct from the axis of said central rotation pin.

[0043] Preferably, said central rotation pin and said two lateral rotation pins are mounted on respective elastically deformable arms, and in said mounted configuration of said cover said elastically deformable arms are so configured to be moved with respect to the dismounted configuration, so that all the axes of said central rotation pin and of said two lateral rotation pins are substantially placed along said rotation axis of said cover.

[0044] Preferably, said hinge is so configured that in said dismounted configuration of said cover the axis of said central rotation pin is placed below the axis of said two lateral rotation pins, and in said mounted configura-

tion of said cover the axis of said central rotation pin is moved upwards and the axis of said two lateral rotation pins is moved downwards.

[0045] Preferably, said seat receiving said central rotation pin comprises an element for moving upwards the axis of said central rotation pin, and said seats receiving said two lateral rotation pins comprise elements for moving downwards the common axis of said two lateral rotation pins.

[0046] Preferably, said elements of said seats comprise shaped arms extending from a body of said cover.

[0047] Preferably, said body of said cover comprises a guiding member for at least one of said two lateral rotation pins.

[0048] Preferably, said guiding member comprises a groove provided on an arm extending from said body of said cover.

BRIEF DESCRIPTION OF THE DRAWINGS

[0049] Further features and advantages of the present invention shall become clearer from the following detailed description of a preferred embodiment thereof, made with reference to the attached drawings and given as an indication and not for limiting purposes.

[0050] In particular, the attached drawings are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification. The drawings together with the description serve to explain the principles of the invention. In the drawings, corresponding characteristics and/or components are identified by the same reference numbers. In such drawings:

- figure 1 schematically shows a perspective view of a laundry drying machine according to the invention, wherein a cover is shown in its opened position;
- figure 2 schematically shows a perspective view of the laundry drying machine of figure 1, but wherein the cover is shown in its closed position;
- figure 3 schematically shows a perspective view of the cover of the laundry drying machine of figures 1 and 2, together with two hinges mounted thereon (mounted configuration of the cover on the hinges);
- figure 3a schematically shows an enlarged view of the circled detail of figure 3;
- figure 4 schematically shows a perspective view of the cover of the laundry drying machine of figures 1 and 2, together with two hinges in a dismounted configuration of the cover;
- figure 4a schematically shows an enlarged view of the circled detail of figure 4;

- figure 5 schematically shows a front elevation view of the cover of figures 1-4;
- figure 6 schematically shows a cross sectional view of the cover of figure 5, taken according to the plane VI - VI of figure 5;
- figure 7 schematically shows a perspective view of the cover of the laundry drying machine of figures 1-6;
- figure 7a schematically shows an enlarged view of the circled detail of figure 7;
- figure 8 schematically shows a perspective view of one of the hinges of figures 2-4;
- figure 9 schematically shows a front elevation view of the hinge of figure 8;
- figure 10 schematically shows a longitudinal sectional view of the cover and of one of the hinges of figure 4, in a dismounted configuration of the cover;
- figure 10a schematically shows an enlarged view of the circled detail of figure 10.

DETAILED DESCRIPTION OF THE INVENTION

[0051] The present invention has proved to be particularly successful when applied to a laundry drying machine of condenser type provided with an air-air heat exchanger and a collecting tank for the condensed water, which is showed in the attached drawings; however it is clear that the present invention can be applied to any type of laundry treating machine, such as laundry washing machines or laundry washing and drying machines, or laundry drying machines of heat pump or vented type having a cover which gives access to internal parts of the machine.

[0052] With initial reference to figures 1 and 2, a laundry drying machine according to the invention is shown, which is globally indicated with reference numeral 1. The laundry drying machine 1, hereinafter also referred to as dryer 1, comprises a casing 2 formed by a basement portion 10 from which two couples of upright side walls arranged perpendicularly one another (on the dryer front and rear part, and on the lateral side thereof, respectively) extend upwardly. A top portion 11 closes the upper part of the box-like structure formed by the basement portion 10 and the upright side walls, thereby completing the machine casing 2.

[0053] In the present description and in the following claims, the words "top", "bottom", "above", "below", "upwards", "downwards" or the like, refer to the relative positions of portions of the dryer 1 with respect to the ground.

[0054] A laundry chamber comprising a rotatable drum

7 is provided within the casing 2. A front door 8, pivotally coupled to the front upright side wall 2a, is provided for allowing access to the drum interior region to place laundry to be dried therein. Door 8 is partly received into a seat 6 formed on the front upright side wall 2a when the door 8 is in its closed position.

[0055] The dryer 1 also comprises a hot-air-generating device (not shown) for generating a drying air stream passing through the laundry drum 7 to dry the laundry contained therein.

[0056] The dryer 1 here described is of the condenser type, i.e., of the type in which drying air is re-circulated through the drum 7 in a closed loop, and comprises a condensing device 12 arranged along the drying air path downstream the laundry drum 7 considering the direction of the drying air flow. The hot air produced by the hot-air-generating device removes moisture from laundry in the drum 7 and the moist air then passes through the condensing device 12.

[0057] The moist air passing through the condensing device 12 is cooled by a separate air cooling flow passing through the condensing device 12 itself. The cooled and dehumidified air is then conveyed again to the drum 7 in a closed loop circuit.

[0058] Therefore, the condensing device 12 condenses the water vapour of the moist air and the water formed therein is collected in a housing arranged below the condensing device, not illustrated.

[0059] In the preferred embodiment of the invention here described the condensing device 12 comprises an air-air heat exchanger. In a further preferred embodiment of the invention the condensing device may comprise an evaporator of a heat pump. In this case moist air passes the evaporator and is cooled by the evaporator itself. The evaporator condenses the water vapour of the moist air and the water formed therein is collected in a housing arranged below the evaporator. Condensation water from the collecting housing is preferably conveyed to an extractable moisture tank 9 located at the upper portion of the dryer 1.

[0060] The moisture tank 9 is preferably in the form of a drawer slidably arranged on said upper portion of the dryer 1 so that it can be easily and periodically emptied by a user.

[0061] Condensation water from the collecting housing is conveyed to the extractable moisture tank 9 by means of a water-removing unit, not illustrated, associated to the collecting housing.

[0062] In different embodiments, the moisture tank may be arranged below the condensing device 12, more preferably in the form of a slidable tank.

[0063] The condensing device 12 is preferably arranged on the bottom part 16 of the dryer 1. More preferably the condensing device 12 is received on a basement portion 10 arranged in a bottom part of the casing 2. The condensing device 12 is preferably slidably arranged over the basement portion 10 of the dryer 1 so that it can be easily and periodically extracted by a user

for its cleaning.

[0064] A cover 20 is provided, preferably at the bottom part 16 of the dryer 1, for allowing/preventing access to the condensing device 12.

5 [0065] The cover 20 is usually maintained in a first operating condition, or closed position, as illustrated for example in figure 2. In such position the access to the inner operational parts of the machine is prevented.

10 [0066] The cover 20 is preferably kept locked safely in this position by means of a lock device 19. The lock device 19 may be de-activated in order to allow the opening of the cover 20 by acting on resilient tabs 21 arranged on the cover 20, preferably on an edge thereof.

15 [0067] In different embodiments, nevertheless, the lock device may be of different type or even absent.

[0068] When the condensing device 12 has to be extracted for its cleaning, the cover 20 is moved in a second operating condition, or opened position, as illustrated for example in figure 1.

20 [0069] The cover 20, therefore, swings from the closed position to the opened position, and vice-versa.

[0070] For this purpose, the dryer 1 preferably comprises two hinges 30, 30' which connect the cover 20 to the casing 2.

25 [0071] The two hinges 30, 30' are preferably identical one to the other, apart from the position. For this reason only one of the two hinges 30, 30' will be described in detail hereinafter.

30 [0072] The hinges 30, 30' allow the cover 20 to be rotated from the closed position to the opened position and, vice-versa, from the opened position to the closed position around a rotation axis X (visible in figure 9), which is substantially horizontal.

35 [0073] According to a feature of the present invention, when the cover 20 moves beyond the opened position, the cover 20 is safely disconnected from the casing 2.

40 [0074] With "safely disconnected" it is meant that the cover 20 is detached from the casing 2 without any damaging to its structure or to the casing 2 structure, i.e., without breaking, as will be better described later.

45 [0075] Typically, the cover 20 may be moved beyond the maximum opened position if the dryer 1 does not rest on the floor. Instead, the cover 20 may move beyond the opened position when the dryer 1 is positioned on top of another appliance, for example on top of a laundry washing machine. Once the cover 20 has been safely detached, it may be advantageously re-attached to the casing 2 thus integrally restoring its functionality.

50 [0076] Advantageously, if someone accidentally puts heavy items on the cover 20 when it is in its opened position or hits the cover 20, the cover 20 safely detaches from the casing 2, without any damaging. Analogously, if accidentally a child hangs on the cover 20, the cover 20 safely detaches from the casing 2 without any damaging.

55 [0077] Furthermore, even if the cover 20 is in its opened position it could be an obstacle to the removal of the condensing device 12, or an obstacle to further

maintenance operations inside the casing 2. In this case, advantageously, the cover 20 may be preferably intentionally detached from the casing 2 (for example, by rotating it beyond the opened position) and re-attached when operations are concluded. The same advantages above mentioned may be obtained in different embodiments in which the cover opens differently, for example when the cover is connected to the casing with hinges positioned vertically so that the cover swings with respect to a vertical axis instead of a horizontal axis.

[0078] Advantageously, if the user accidentally hits the cover 20, the cover 20 is safely detached from the casing 2 without damaging of the cover 20 or the hinges 30, 30' and without any physical injury for the user.

[0079] Furthermore, the cover 20 may be still intentionally detached from the casing 2 through its rotation beyond the opened position.

[0080] Hereinafter, with particular reference to figures 3, 3a, 4, 4a, 8-10 and 10a, construction and functioning of a preferred embodiment of the hinge 30 according to the invention is described.

[0081] The hinge 30 comprises a body 31 which is associated with the casing 2, preferably on the basement portion 10 thereof. Preferably the body 31 is removably connected to the casing 2.

[0082] The body 31 is advantageously connected to the casing 2 through its insertion into a receiving seat (not illustrated in detail) opportunely realized on the basement portion 10 of the casing 2. The body 31 is preferably slidably arranged in the receiving seat and here maintained by means of a blocking tongue 33 realized at an end 31a of the body 31, as better visible in figure 10.

[0083] In this way, the body 31 may be easily attached or detached from the casing 2. This facilitates mounting and/or substitution of the body 31. It is clear that in different embodiments the connection of the first body to the casing may be obtained in any other ways, for example by means of screws, adhesives, snap-in fasteners, etc..

[0084] According to a feature of the present invention, the hinge 30 comprises at least two rotation pins which, in a dismounted configuration of the cover 20, have respective distinct axes respectively.

[0085] In the preferred embodiment illustrated in figures 8 and 9, the rotation pins are three, named a central rotation pin 35 and two lateral rotation pins 36 and 36'. In the dismounted configuration of the cover, the two lateral rotation pins 36, 36' have a common axis Z which is distinct from the axis Y of the central rotation pin 35. Preferably, the distinct axes Y and Z are substantially parallel to each other.

[0086] The rotation pins 35, 36 and 36' are arranged at a free end 31b of the body 31. Preferably, the rotation pins 35, 36 and 36' are cylindrically shaped.

[0087] In particular, preferably, the rotation pins 35, 36 and 36' are mounted on respective elastically deformable arms 35a, 36a and 36a', extending from the body 31, as better visible in figure 8. Alternatively, the rotation pins

35, 36 and 36' are formed on the respective elastically deformable arms 35a, 36a and 36a'.

[0088] The elastically deformable arms 35a, 36a and 36a' can elastically deform so that they may move, without breaking, in a direction substantially perpendicular to the axes Y and Z.

[0089] Preferably, the elastically deformable arms 35a, 36a and 36a' are made of a plastic material. More preferably, the hinges 30, 30' are substantially entirely made of a plastic material, so that they can be obtained by an injection moulding process.

[0090] As better visible in figure 8, the elastically deformable arms 35a, 36a and 36a' are associated with a central portion of the central rotation pin 35 and of the two lateral rotation pins 36 and 36', respectively.

[0091] In a mounted configuration of the cover 20, the elastically deformable arms 35, 36 and 36' are moved so that all the axes Y and Z of the rotation pins 35, 36 and 36' are substantially placed along the rotation axis X of the cover 20.

[0092] In the mounted configuration of the cover 20, the rotation pins 35, 36 and 36' are received into respective seats 37, 38 and 38' projecting from the lower edge 20a of the cover 20 on a back side thereof, as better visible in figures 5-7, 7a.

[0093] The respective seats 37, 38 and 38' are configured for rotatably receiving the rotation pins 35, 36 and 36', in the mounted configuration of the cover 20. When the cover 20 swings in a position beyond the opened position, the rotation pins 35, 36 and 36' disengage the respective seats 37, 38 and 38'.

[0094] The seats 37, 38 and 38' are substantially aligned along a same axis, which coincides with the rotation axis X of the cover 20 around the casing 2. In this way, in the mounted configuration of the cover 20, all the axes Y and Z of the rotation pins 35, 36 and 36' are substantially placed along the rotation axis X of the cover 20.

[0095] In the illustrated preferred embodiment of figure 9, it is clearly visible that, in the dismounted configuration of the cover 20, the axis Y of the central rotation pin 35 is placed below the axis Z of the two lateral rotation pins 36 and 36'. In particular, the axis Y of the central rotation pin 35 is placed above the rotation axis X of the cover 20, while the axis Z of the two lateral rotation pins 36 and 36' is placed below the rotation axis X of the cover 20. Therefore, in the mounted configuration of the cover 20, the axis Y of the central rotation pin 35 is moved upwards and the axis Z of the two lateral rotation pins is moved downwards, so that the axes Y and Z of the rotation pins 35, 36 and 36' are substantially placed along the rotation axis X of the cover 20.

[0096] Indeed, the seat 37 comprises an element for moving upwards the axis Y of said central rotation pin 35, and the seats 38 and 38' comprise an element for moving downwards the axis Z of the two lateral rotation pins 36 and 36'.

[0097] The element for moving upwards of the seat 37 comprises shaped arms 37a extending from a body 22

of the cover 20. In the preferred embodiment illustrated in figure 7a, four shaped arms 37a are provided, which are embodied as four first tongues having the same shape and arranged parallel to each other. The four shaped arms 37a comprise a curved profile on which a lower portion of the rotation pin 35 rests. Obviously, a different number of first tongues can be provided, including one single first tongue.

[0098] The element for moving downwards of the seats 38 and 38' comprises shaped arms 38a and 38a', respectively, extending from the body 22 of the cover 20. In the preferred embodiment illustrated in figure 7a, two shaped arms 38a are provided, which are embodied as two second tongues having the same shape and arranged parallel to each other. Furthermore, two shaped arms 38a' are provided, which are embodied as two third tongues having the same shape and arranged parallel to each other. The two shaped arms 38a and the two shaped arms 38a' comprise a curved profile on which an upper portion of the rotation pins 36 and 36' rest. Obviously, a different number of second and third tongues can be provided, including one single second tongue and one single third tongue.

[0099] Furthermore, the body 22 of the cover 20 preferably comprises a guiding member for the lateral rotation pin 36. Alternatively, the body 22 comprises guiding members for both the lateral rotation pins 36 and 36'.

[0100] The guiding member for the lateral rotation pin 36 comprises a groove 40a provided on an arm 40 extending from the body 22 of the cover 20. In the preferred embodiment illustrated in figure 7a, the arm 40 is embodied as a fourth tongue arranged parallel to the second tongues 38a, at a predetermined distance from the more external of the two second tongues 38a. The groove 40a is defined by two substantially parallel fins, extending laterally from the fourth tongue. Preferably, the groove 40a is sized to receive the lateral rotation pin 36, i.e. the distance between the two fins is sized accordingly.

[0101] The operation of the hinges 30 and 30' is hereinafter described.

[0102] The hinges 30, 30' are associated with the base-ment portion 10 of the casing 2.

[0103] The cover 20 is removably connected - preferably by snapping - to the casing 2 by means of the hinges 30, 30'. The hinges 30, 30' support the cover 20 in rotation around the rotation axis X.

[0104] In particular, the cover 20 is mounted on the hinges 30, 30' so that the rotation pins 35, 36 and 36' are received by snapping into the seats 37, 38 and 38'.

[0105] Since the seats 37, 38 and 38' are substantially aligned along a same axis (which coincides with the rotation axis X of the cover 20 around the casing 2), the rotation pins 35, 36 and 36' having two distinct axes Y and Z must be moved to be received in the seats 37, 38 and 38', respectively.

[0106] Therefore, when the rotation pins 35, 36 and 36' are brought near to the seats 37, 38 and 38', they begin to engage the shaped arms 37a, 38a and 38a' of

the seats 37, 38 and 38'. The shaped arms 37a move upwards the rotation pin 35 and the shaped arms 38a and 38a' move downwards the rotation pins 36 and 36', until a lower portion of the rotation pin 35 rests on the curved profile of the shaped arms 37a and an upper portion of the rotation pins 36 and 36' rest on the curved profile of the shaped arms 38a and 38a'.

[0107] In the above-described mounting step of the cover 20, the elastically deformable arms 35a, 36a and 36a' (carrying the rotation pins 35, 36 and 36', respectively) elastically deform and move, without breaking, in a direction substantially perpendicular to the rotation axis X. In particular, the elastically deformable arm 35a moves upwards and the elastically deformable arms 36a and 36a' move downwards.

[0108] It is thus obtained the mounted configuration of the cover 20, wherein the axes Y and Z of the rotation pins 35, 36 and 36' are substantially placed along the rotation axis X of the cover 20.

[0109] In the mounted configuration of the cover 20, the cover 20 can swing between the closed position (see figure 2, for example) and the opened position (see figure 1, for example).

[0110] During the above-described swinging of the cover 20, the rotation pins 35, 36 and 36' are maintained pressed against the seats 37, 38 and 38' thanks to the elastic stress of the elastically deformable arms 35a, 36a and 36a', deformed from their starting position.

[0111] The fact that the elastically deformable arm 35a urges downwards the rotation pin 35 and the elastically deformable arm 36a and 36a' urge upwards the rotation pins 36 and 36', i.e. the rotation pin 35 and the rotation pins 36 and 36' are urged in opposed directions, allows that the rotation pins 35, 36 and 36' are maintained in engagement with the seats 37, 38 and 38' during the swinging of the cover 20 between the closed position and the opened position.

[0112] If the cover 20 swings in a position beyond the opened position, the rotation pins 35, 36 and 36' are disengaged from the seats 37, 38 and 38', so that the cover 20 detaches from the casing 2 without breaking.

[0113] In particular, when the cover 20 swings in a position beyond the opened position, the rotation pins 35, 36 and 36' come out of the shaped arms 37a, 38a and 38a', i.e. out of the above-described curved profiles of the shaped arms 37a, 38a and 38a' wherein, in the mounted configuration of the cover 20, a lower portion of the rotation pin 35 and an upper portion of the rotation pins 36 and 36' rest.

[0114] When the rotation pins 35, 36 and 36' come out of the seats 37, 38 and 38', the elastically deformable arms 35a, 36a and 36a' return in their starting, not-deformed configuration, corresponding to the dismounted configuration of the cover 20.

[0115] The cover 20, therefore, is safely detached from the casing 2 without any breaking or damage to the hinges 30 and 30', the cover 20 or the casing 2.

[0116] The cover 20 may be easily re-attached to the

casing 2 by inserting again the the rotation pins 35, 36 and 36' of the hinges 30, 30' into the seats 37, 38 and 38' of the cover 20.

[0117] Advantageously, the cover 20 - as the hinges 30, 30' - is made of a plastic material, and is preferably obtained by an injection moulding process.

[0118] It has thus been shown that the present invention allows all the set objects to be achieved. In particular, it makes it possible to obtain a laundry treating machine with increased reliability compared to the machines of known type.

[0119] Clearly, changes may be made to the cover, the hinges and the laundry treating machine as described herein. For example, the cover could be positioned in any lateral side of the machine and it could open rotating around an axis with any desired direction other than the horizontal one as here described.

[0120] Furthermore, the hinges here described advantageously comprise three rotation pins. In different embodiments, nevertheless, the number of rotation pins may be different, even just two rotation pins.

[0121] Furthermore, it has been described and illustrated the preferred embodiment wherein the axis Y of the central rotation pin 35 is placed above the rotation axis X of the cover 20, while the axis Z of the two lateral rotation pins 36 and 36' is placed below the rotation axis X of the cover 20. Clearly, it is provided also an opposed embodiment wherein the axis Y of the central rotation pin 35 is placed below the rotation axis X, while the axis Z of the two lateral rotation pins 36 and 36' is placed above the rotation axis X. This embodiment and its operation is totally analogous to the preferred described and illustrated embodiment.

[0122] Although an illustrative embodiment of the present invention have been described herein with reference to the attached drawings, it is to be understood that the present invention is not limited to the specific embodiment illustrated and described herein, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the following claims.

Claims

1. A laundry treating machine (1) comprising a casing (2) accommodating a laundry chamber (7) suitable for receiving laundry to be treated and a closing door (8) provided for allowing access to the chamber, said machine being provided with a cover (20) which is removably connected to said casing by means of at least one hinge (30,30') supporting said cover in rotation around a rotation axis (X), so that it can swing between a closed position and an opened position around said rotation axis, **characterized in that** said at least one hinge (30,30') comprises at least two

rotation pins (35; 36,36') which, in a dismounted configuration of said cover, have respective distinct axes (Y;Z), and, in a mounted configuration of said cover, when they are coupled to at least two respective seats (37; 38,38'), said at least two rotation pins have said respective axes moved closer than in said dismounted configuration of said cover.

2. Machine (1) according to claim 1, wherein said respective axes (Y;Z) of said at least two rotation pins (35; 36,36') are substantially parallel to each other.

3. Machine (1) according to claim 1 or 2, wherein, in said mounted configuration of said cover (20), said respective axes (Y;Z) of said at least two rotation pins substantially coincide to said rotation axis (X) of said cover.

4. Machine (1) according to any one of the previous claims, wherein said at least one of said at least two rotation pins (35; 36,36') is mounted or formed on a elastically deformable arm (35a; 36a,36a') extending from a body (31) of said at least one hinge.

5. Machine (1) according to claim 4, wherein said elastically deformable arm (35a; 36a,36a') is associated with a central portion of said at least two rotation pins (35;36,36').

6. Machine (1) according to claim 4 or 5, wherein said elastically deformable arm (35a; 36a,36a') is made of a plastic material.

7. Machine (1) according to claim 6, wherein said at least one hinge (30,30') is substantially entirely made of a plastic material.

8. Machine (1) according to any one of the previous claims, wherein said body (31) of said at least one hinge is associated with said casing of said machine and said at least two respective seats (37; 38,38') are mounted or formed on said cover (20).

9. Machine (1) according to any one of the previous claims, including three rotation pins (35; 36,36'), named a central rotation pin and two lateral rotation pins, which are rotatably received in three respective seats (37; 38,38'), wherein in said dismounted configuration of said cover the two lateral rotation pins (36,36') have a substantially common axis (Z) which is distinct from the axis (Y) of said central rotation pin (35).

10. Machine (1) according to claim 9, wherein said central rotation pin (35) and said two lateral rotation pins (36,36') are mounted on respective elastically deformable arms (35a; 36a,36a'), and in said mounted configuration of said cover said elastically deforma-

ble arms are so configured to be moved with respect to said dismounted configuration, so that all the axes of said central rotation pin and of said two lateral rotation pins are substantially placed along said rotation axis (X) of said cover (20).

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11. Machine (1) according to claim 10, wherein said hinge (30,30') is so configured that in said dismounted configuration of said cover the axis (Y) of said central rotation pin (35) is located below the common axis (Z) of said two lateral rotation pins (36,36'), and in said mounted configuration of said cover the axis (Y) of said central rotation pin (35) is moved upwards and the common axis (Z) of said two lateral rotation pins (36,36') is moved downwards. 10 15
12. Machine (1) according to claim 11, wherein said seat (37) receiving said central rotation pin (35) comprises an element (37a) for moving upwards the axis (Y) of said central rotation pin, and said seats receiving said two lateral rotation pins comprise elements (38a,38a') for moving downwards the common axis (Z) of said two lateral rotation pins (36,36'). 20
13. Machine (1) according to claim 12, wherein said elements (37a; 38a,38a') of said seats comprise shaped arms extending from a body (22) of said cover. 25
14. Machine (1) according to claim 13, wherein said body (22) of said cover (20) comprises a guiding member for at least one of said two lateral rotation pins. 30
15. Machine (1) according to claim 14, wherein said guiding member comprises a groove (40a) provided on an arm extending from said body of said cover. 35

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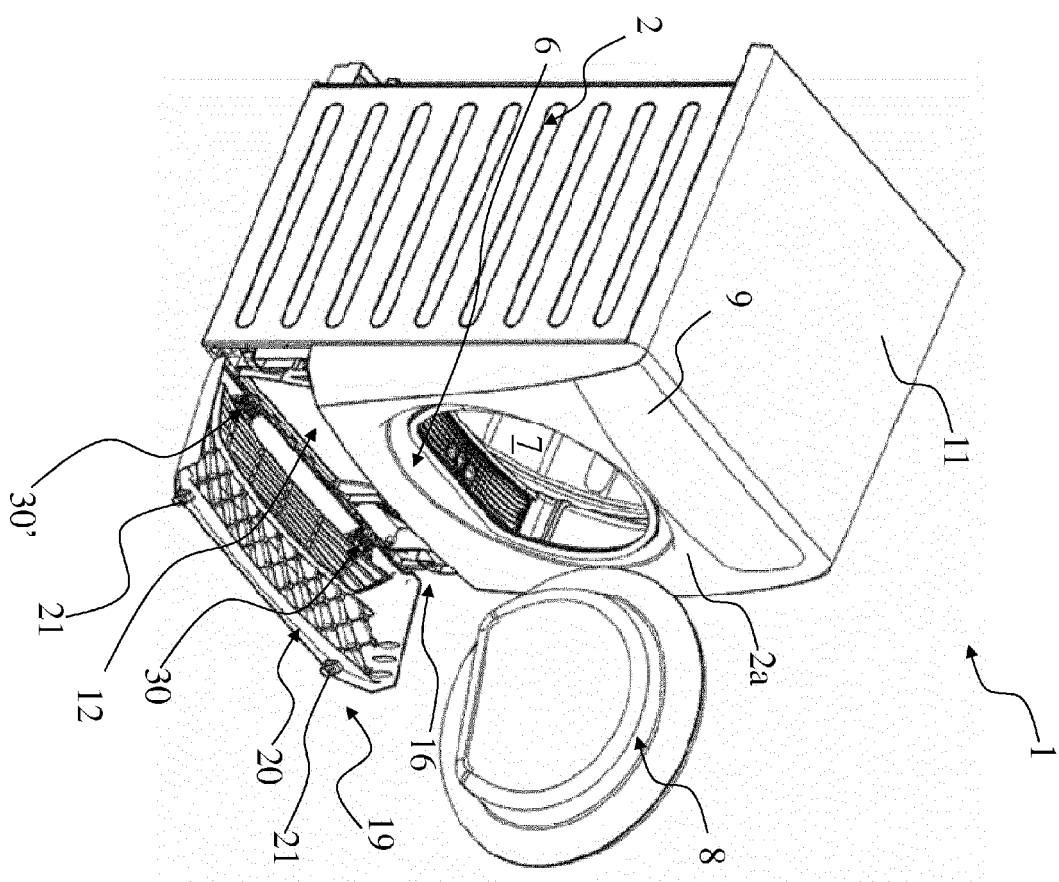


Fig. 1

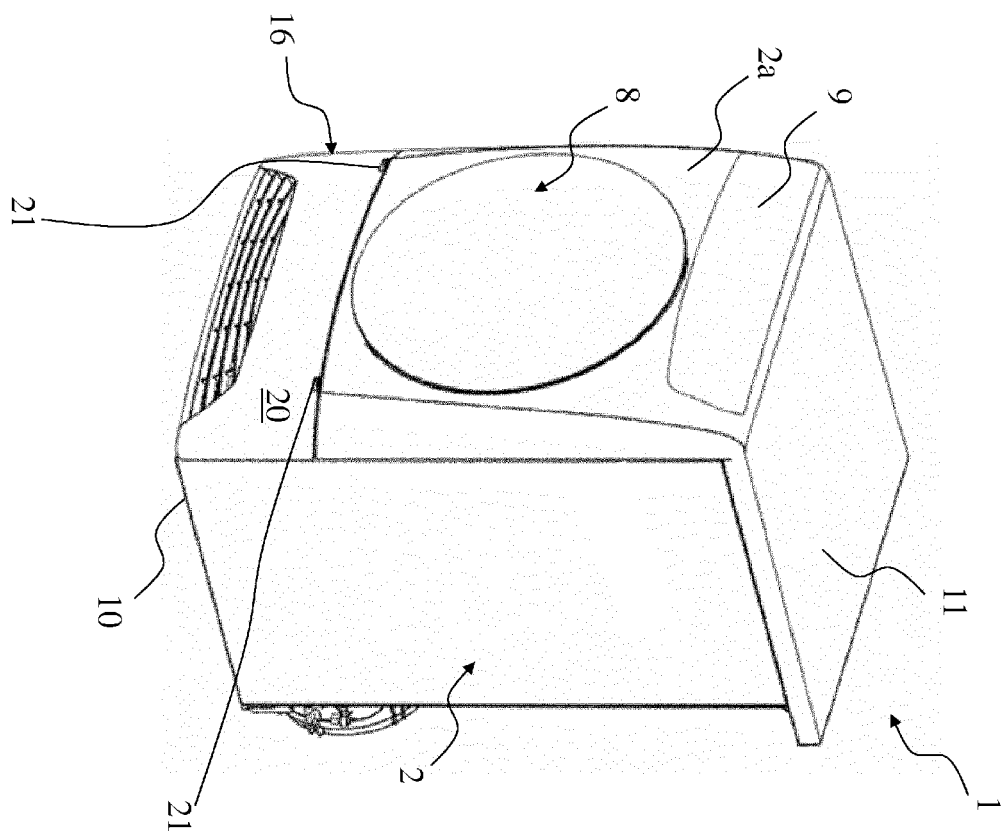
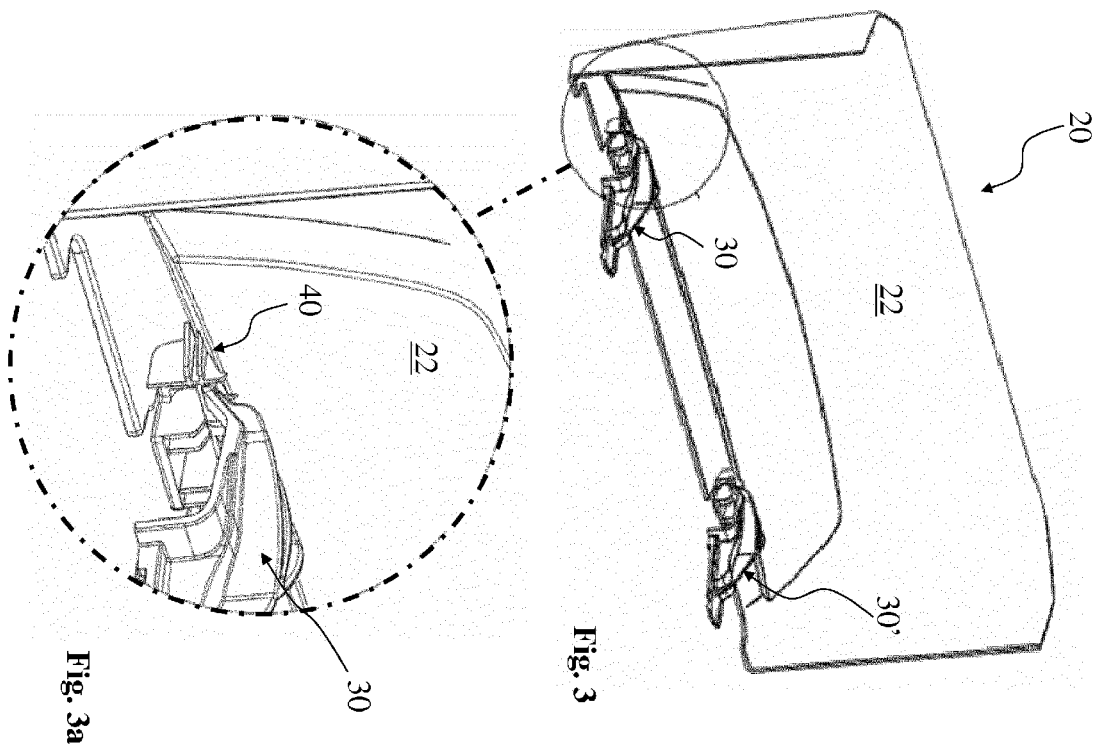
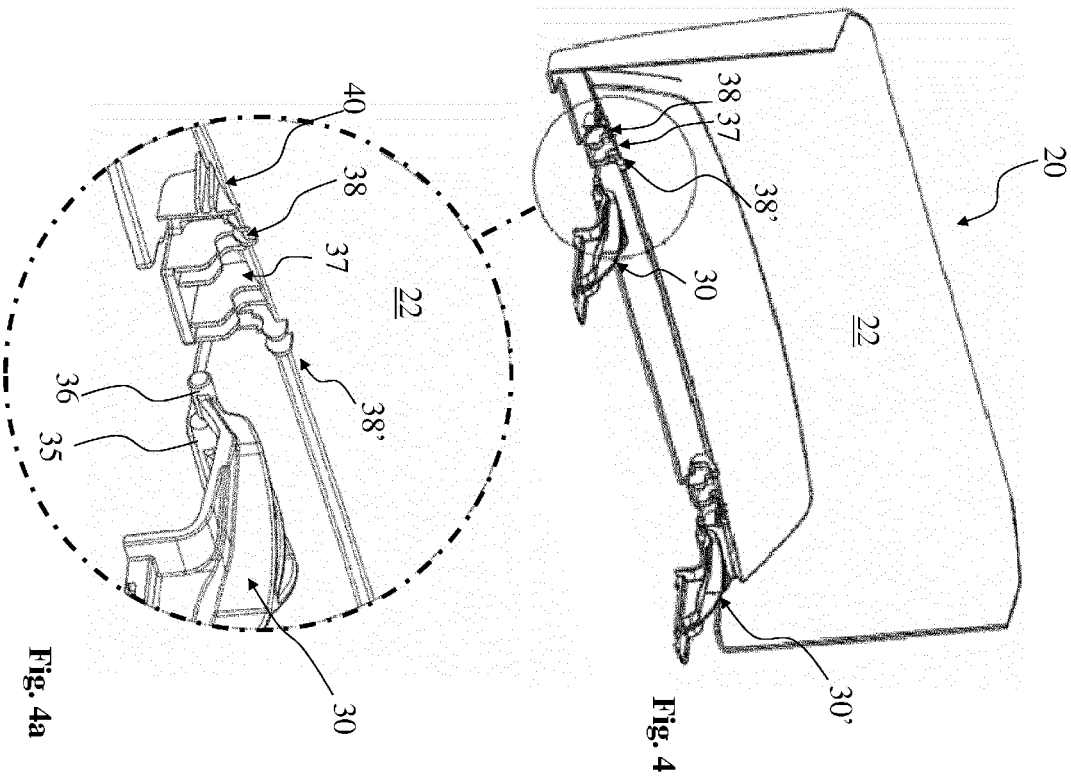
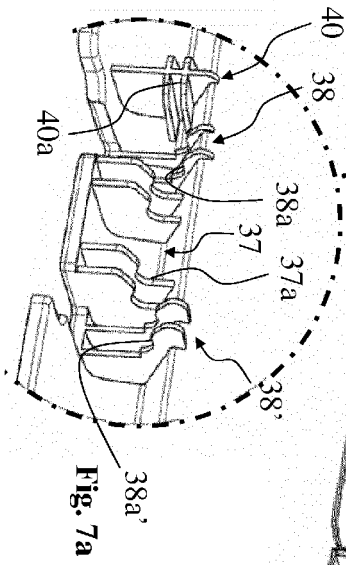
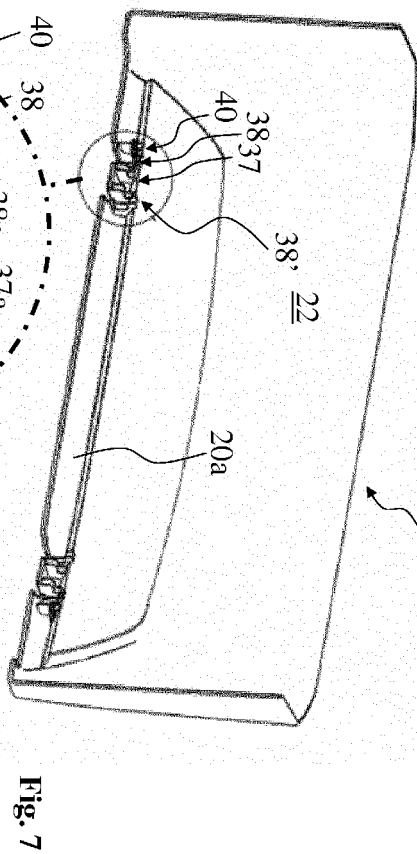
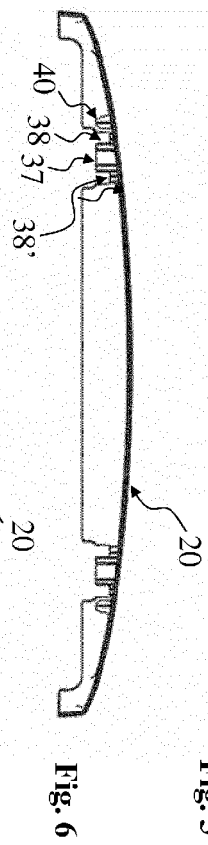
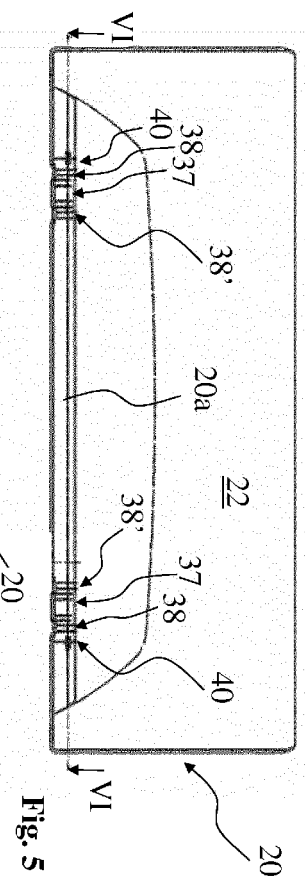


Fig. 2







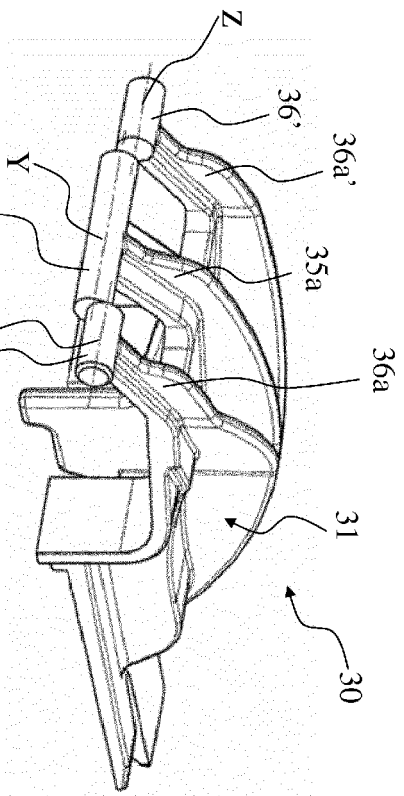


Fig. 8

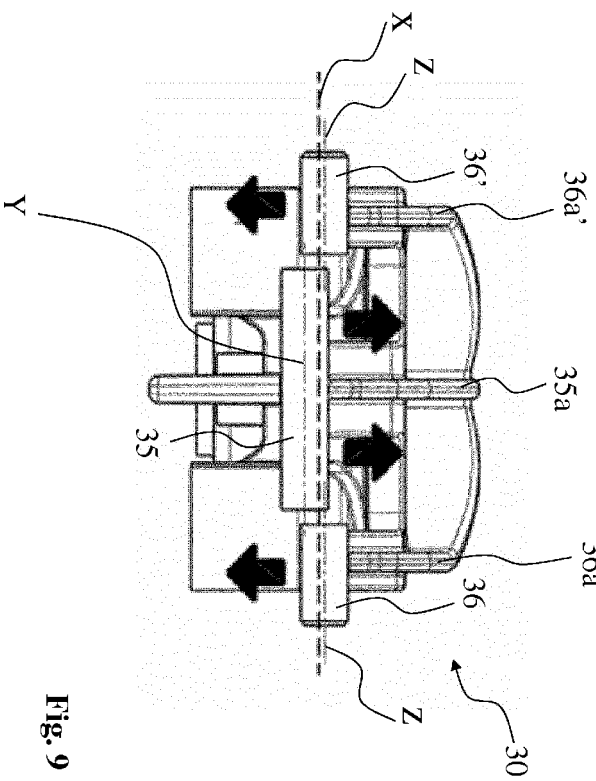
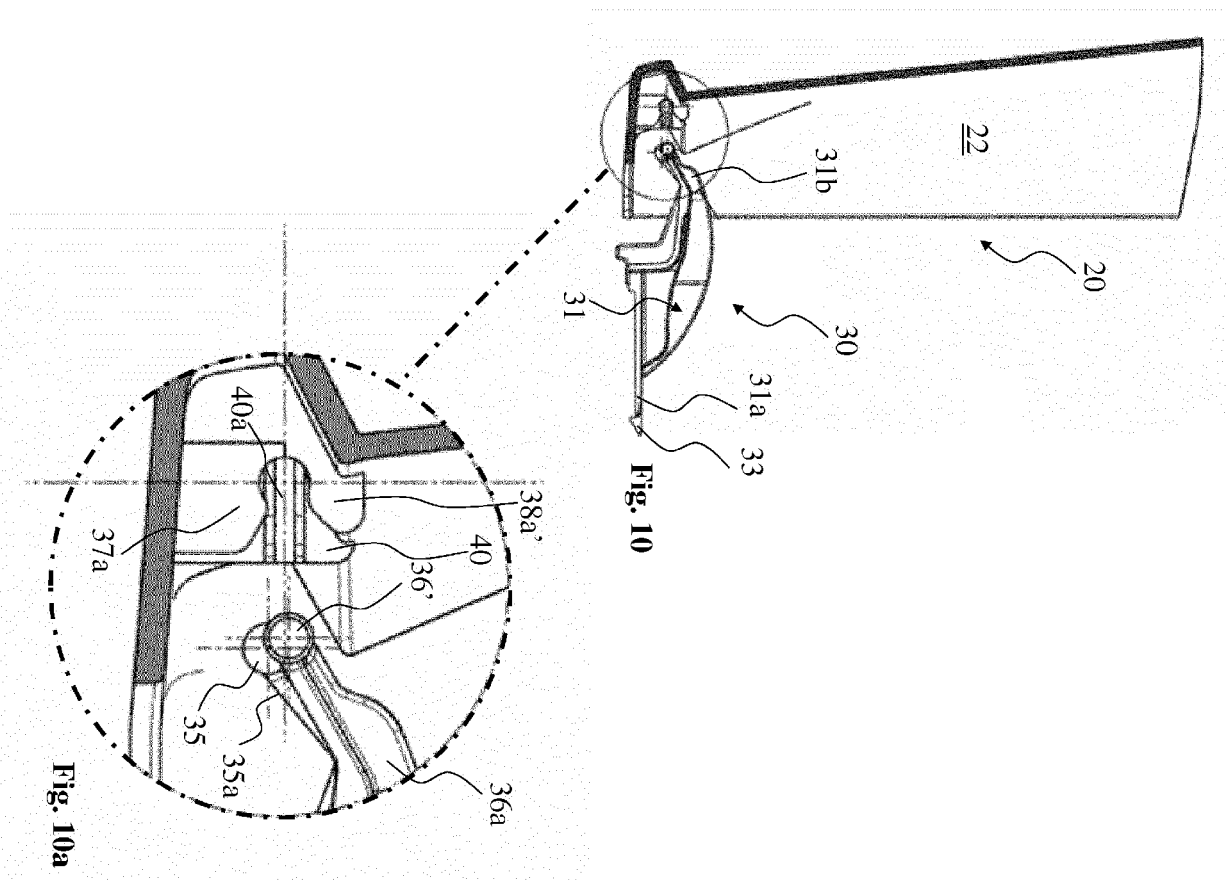


Fig. 9





EUROPEAN SEARCH REPORT

Application Number
EP 13 18 2525

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 73 36 418 U (INDUSTRIE A. ZANUSSI S.P.A.) 24 January 1974 (1974-01-24) * page 2, paragraph 3 - page 3, last line; figures 1,2 *	1	INV. D06F39/12 D06F39/14 D06F58/20 E05D7/10
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A	CN 101 328 673 A (NANJING LG PANDA APPLIANCES CO [CN] NANJING LG PANDA APPLIANCES CO) 24 December 2008 (2008-12-24) * figures *	1	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 January 2014	Examiner Prosig, Christina
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
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22-01-2014

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