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(54) **FRONT-LOADING LAUNDRY WASHING MACHINE**

VORDERLADER-WASCHMASCHINE

MACHINE À LAVER LE LINGE À CHARGEMENT PAR L'AVANT

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(73) Proprietor: **Indesit Company S.p.a.**
60044 Fabriano (AN) (IT)

(72) Inventors:
- **BATTAGLIA, Matteo**
  24036 Ponte San Pietro (BG) (IT)
- **STOPPONI, Andrea**
  62024 Matelica (MC) (IT)
- **CESARI, Luca**
  62024 Matelica (MC) (IT)
- **FLUMINI, Rodolfo**
  60044 Fabriano (AN) (IT)
- **MENGHI, Alessandro**
  47900 Rimini (IT)

(74) Representative: **Dini, Roberto et al**
Metroconsult S.r.l.
Via Sestriere 100
10060 None (TO) (IT)

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Description

DESCRIPTION

[0001] The present invention relates to a laundry washing machine according to the preamble of claim 1.

[0002] The invention is applicable to the field of front-loading laundry washing machines (in particular washing and washing/drying machines) and faces the problem of water dripping from an open door.

[0003] In front-loading washing machines, a door closes the load opening through which the laundry to be washed is loaded into a rotary drum arranged inside a wash tub. The inner portion of the door touches the wet laundry and the wash water, and therefore said portion is wet at the end of the washing.

[0004] The Applicant has found that, when opening the door, water drops may fall onto the floor in front of the washing machine.

[0005] This dripping is even more evident and troublesome in such washing machines as those known, for example, from patents GB 1110375 and GB 2260770, which by the way have never apparently been placed on the market. In such machines, the detergent dispenser is arranged inside the door and is sprayed with water during the washing in order to carry the detergent contained therein into the tub.

[0006] JP0671086 and JP2001314695 disclose top-loading washing machines wherein the internal surface of the lid is shaped so as to reduce water dripping.

[0007] The main object of the present invention is therefore to reduce the dripping of water from the door of a front-loading washing machine when the latter is opened.

[0008] This object is achieved through a laundry washing machine incorporating the features set out in the appended claims.

[0009] In general terms, the present invention is based on the idea of fitting the door with suitable means for collecting the water dripping from it.

[0010] Advantageously, said collecting means are controlled automatically as the door is opened, thus preventing any dripping from the door even if the user forgets to operate them.

[0011] The collecting means are advantageously arranged within a housing obtained in the door frame, in particular in the lower half thereof, and are extracted through the effect of springs or other extraction means when the door is opened.

[0012] Further objects and advantages of the present invention will become apparent from the following description and from the annexed drawings, wherein:

- Fig. 1 shows a front-loading laundry washing machine according to the present invention;
- Fig. 2 shows a door of a front-loading laundry washing machine according to the present invention;
- Figs. 3a, 3b and 3c show three views of a water collecting drawer according to an embodiment of the present invention;
- Fig. 4 is a sectional view of the lower portion of a closed door according to the present invention;
- Fig. 5 is a sectional view of the lower portion of an open door according to the present invention;
- Fig. 6 shows an open door according to the present invention and a detail thereof;
- Figs. 7 and 8 show a door of a front-loading laundry washing machine according to variants of the present invention.

[0013] For clarity, in the present description the same reference numbers will be used for designating identical or equivalent items shown in the annexed drawings.

[0014] Fig. 1 shows a front-loading laundry washing machine 1.

[0015] Machine 1 is of the type wherein the washing agent dispenser is arranged within the door.

[0016] Machine 1 comprises a cabinet 2 in which a wash tub is arranged in a known manner. Inside the latter, a perforated drum 3 rotates about a substantially horizontal axis.

[0017] The laundry to be washed is placed inside drum 3 through a load opening 4 on the front side of cabinet 2.

[0018] Load opening 4 is closed by a door 5 comprising an inner surface 51 protruding from a frame 52 in the direction of the axis of drum 3.

[0019] When door 5 is closed, the inner surface is inserted into the load opening and enters at least partly into the tub and into drum 3. Frame 52 abuts against the cabinet, adjacent to load opening 4.

[0020] The rotation of door 5 is ensured in a known manner by a hinge 53 which constrains door 5 to cabinet 2.

[0021] In order to keep the door closed during the operation of the machine, door 5 is fitted in a known manner with a catch 54 adapted to engage into a hook 21 of cabinet 2.

[0022] In the preferred embodiment described below, the inner surface of door 5 comprises a washing agent dispenser 55.

[0023] Dispenser 55 has upper apertures 56 for loading washing agents (e.g. softener, detergent...) and lower apertures 57 for draining a watery solution containing the washing agents.

[0024] When loading the washing machine, the user pours washing agents into respective compartments of the dispenser through apertures 56, checking the levels of said washing agents through transparent inspection windows 58.

[0025] When the wash cycle is started, water is supplied into the dispenser in order to carry the washing agents into the tub (through lower apertures 57).

[0026] At the end of the wash cycle, the inner surface of door 5 has become wet, and a certain quantity of water may have remained within dispenser 55.

[0027] In order to collect water dripping from door 5

when the latter is opened, according to the invention the lower half of frame 52 comprises collecting means adapted to collect water dripping from inner surface 51 or from dispenser 55. Figs. 2 and 6 show an example of embodiment of a door according to the invention.

[0028] In the lower half of frame 52, door 5 comprises a housing 7 which houses an extractable drawer 8.

[0029] Drawer 8, some detailed views of which are shown in Figs. 3a, 3b and 3c, can contain water. However, when dripping onto a rigid surface such as the plastic surface of drawer 8, water may splash out of the drawer.

[0030] To prevent this drawback, drawer 8 contains an absorbing material 81 which can be easily removed in order to clean the drawer.

[0031] The term "absorbing material" refers to any material which can absorb water; in particular, the absorbing material may be a natural or synthetic absorbing sponge, e.g. made of reticular polyurethane, preferably having a density of about 30 - 35 Kg/m^3. When using an absorbing sponge, it has been observed that the drops falling onto the sponge are not absorbed immediately; instead, they are only absorbed after a certain time, in the meantime they remain suspended on the top surface of the sponge.

[0032] If the height of the sponge is the same as that of drawer 8, the drops will move (or even bounce) and may fall onto the floor. To solve this problem, according to an embodiment of the invention the absorbing sponge is shallower than drawer 8, so that an empty space of a few millimeters (preferably 5-10 mm) remains between the edge of the absorbing material and the edge of drawer 8.

[0033] Also advantageously, the sponge is so shaped as to increase the surface exposed to water drops; this is obtained through a concave face.

[0034] According to an embodiment of the invention, the sponge has a concave face on one side and a flat face on the opposite side. This solution offers the double advantage that drop retention is increased thanks to a larger absorbing surface and that the sponge is polarized and cannot be installed incorrectly.

[0035] As an alternative to using a single suitably shaped absorbing sponge, it is also possible to insert in drawer 8 two overlaid sponge layers having different technical characteristics. An absorbing sponge (having either flat or concave faces) is laid on the bottom of drawer 8; a filtering sponge (e.g. filtered polyurethane) is then laid over said absorbing sponge.

[0036] The filtering sponge is characterized in that water will not dwell on its outer surface, but will flow through it immediately, without essentially bouncing or moving on the surface. For this reason, the filtering sponge can reach the top edge of drawer 8, so that the absorbing sponge and the filtering sponge together essentially take up the whole volume of drawer 8. Advantageously, the filtering sponge and the absorbing sponge make up one piece, since the two materials are glued or co-moulded together and then cut to size.

[0037] Drawer 8 has two housings 82 adapted to keep two coil springs 83 in position. The opposite end of springs 83 engages into corresponding tapered surfaces 72 inside housing 7.

[0038] When the door is closed, frame 52 engages with cabinet 2, thus forcing drawer 8 to stay within housing 7, as shown in Fig. 4. When the door is opened, springs 83 translate drawer 8 out of door 5, thus collecting water dripping from the latter, as shown in Fig. 5.

[0039] For the purpose of optimizing water collection, housing 7 takes up a large portion (preferably more than 50%) of the depth of frame 52, thereby allowing to use a drawer 8 as big as possible.

[0040] Dispenser 55 also has a drain aperture 57a located on inner surface 51 at a distance from frame 52 that is shorter than the width of the portion of drawer 8 projecting from housing 7 when the door is open.

[0041] This position of aperture 57a ensures that, when the door is opened, water that has possibly remained within dispenser 55 falls into drawer 8, wherein it is collected.

[0042] Fig. 6 shows a detail of door 5 with drawer 8 extracted; the detail shows in particular that drawer 8 extends past the drain aperture 57a in order to collect the water.

[0043] The advantages of the present invention are apparent from the above description. In particular, it is clear that the presence of collecting means, in particular a drawer, in the lower half of the door allows to collect water dripping from the door when it is opened.

[0044] The above-described preferred embodiment should be understood as a nonlimiting example of application of the present invention. As a matter of fact, it is clear that many changes may be made thereto by those skilled in the art without departing from the teachings of the present invention.

[0045] For example, instead of comprising a drawer and a sponge, the collecting means may consist, more in general, of an extractable device, e.g. a plastic laminar support, on which a sponge or another absorbing material is secured.

[0046] Likewise, the means that control the extraction of drawer 8 may comprise leaf springs or elastic means of a different kind, provided that they are adapted to extract the extractable device, e.g. drawer 8, from its housing when the door is opened.

[0047] The motion of the extractable device may be of different kinds as well, i.e.: translational, rotational or rotational-translational.

[0048] In a variant of the invention, the extractable device may be a drawer 8 hinged to the door through one or several springs capable of causing a rotation of the door about a vertical axis, as shown in Fig. 7. According to this embodiment, the elastic means that generate said rotation must be calibrated to extract the drawer as necessary for collecting dripping water: an excessive or insufficient opening action would place the drawer in a position which would not ensure an effective collection of

dripping water.

[0049] According to another embodiment, shown in Fig. 8, drawer 9 is hinged to the door in such a manner as to be rotatable about a horizontal axis. In this case as well, there are elastic means that cause the drawer to be extracted when the door is opened.

[0050] From the above-described examples of embodiment it is apparent that the motion of the extractable device is controlled by control means essentially consisting of extraction means and locking means, the latter being adapted to keep the extractable device within its housing.

[0051] In the above-described examples, the extraction means are essentially elastic means, e.g. springs, which push extractable device 8 out of housing 7. The locking means consist of a contact surface of the extractable device which engages with the cabinet as the extractable device closes when door 5 is closed. In the examples of Figs. 1 to 8, the extractable device is a drawer 8 entirely contained in frame 52 of door 5. Alternatively, the extractable device may be located in the inner surface of door 5, i.e. in an area not abutting against cabinet 2. In such a case, for the purpose of closing the extractable device again it will be possible to provide an appendix extending towards the door frame, thus abutting against cabinet 2 when door 5 is closed.

[0052] According to a further embodiment, the control means controlling the motion of the extractable device comprise a peg which can translate freely within the frame and a system of levers and hinges adapted to transfer the motion of said peg to said extractable device. As the door is closed, the peg is pushed into the frame and the system of levers and hinges transfers that motion to the extractable device, e.g. by rotating, translating, or rotating and translating it with movements similar to those described with reference to Figs. 1 to 8.

Claims

1. Front-loading laundry washing machine wherein a cabinet (2) has a load opening (3) which can be closed by means of a door (5) constrained to said cabinet (2), said door (5) comprising an inner surface (51) adapted to be at least partly inserted into said opening (3) and a frame (52) adapted to engage with said cabinet (2), **characterized in that** said door (5) comprises collecting means arranged in the lower half of said door (5) for collecting water dripping from said door when the latter is opened, and **in that** said collecting means comprise an extractable device (8).

2. Laundry washing machine according to claim 1, wherein said extractable device (8) is a drawer.

3. Laundry washing machine according to claim 1 or 2, **characterized in that** said collecting means comprise control means adapted to control the movement of said extractable device, said control means being at least partially located on said frame (52) and comprising in particular elastic means (83) adapted to extract said extractable device from a housing (7) obtained in said frame (52).

4. Laundry washing machine according to claim 3, **characterized in that** said elastic means (83) are adapted to translate said extractable device (8) out of said housing (7).

5. Laundry washing machine according to claim 3, **characterized in that** said extractable device (8) is hinged to said door (5) and that said elastic means are adapted to generate a rotation of said extractable device (8) about a horizontal axis or about a vertical axis.

6. Laundry washing machine according to any of claims 3 to 5, **characterized in that** said control means comprise a surface of said extractable device (8) which is adapted to engage with said cabinet (2).

7. Laundry washing machine according to any of claims 3 to 5, **characterized in that** said control means comprise a peg which can translate freely within said frame (52) and a system of levers and hinges adapted to transfer the motion of said peg to said extractable device (8).

8. Laundry washing machine according to any of the preceding claims, **characterized in that** said door (5) comprises a washing agent dispenser (55).

9. Laundry washing machine according to claim 8, when dependent on any of claims 3 to 7, **characterized in that** said dispenser (55) comprises a drain aperture (57a) located on the bottom of said dispenser (55) at a distance from said frame (52) shorter than the width of the portion of said drawer (8) projecting over said housing (7) when said door (5) is open.

10. Laundry washing machine according to any of the preceding claims, **characterized in that** said collecting means are controlled automatically as said door is opened.

11. Laundry washing machine according to any of the preceding claims, **characterized in that** said collecting means comprise an absorbing material (81), said absorbing material (81) comprising in particular an absorbing sponge, preferably made of reticular polyurethane.

12. Laundry washing machine according to claim 11, **characterized in that** said sponge is shallower than said drawer (8).

13. Laundry washing machine according to claim 11 or 12, **characterized in that** said sponge has a concave face, said sponge having in particular a flat face opposite to said concave face.

14. Laundry washing machine according to any of claims 11 to 13, **characterized in that** said collecting means comprise an absorbing sponge for retaining the water and a filtering sponge, preferably made of filtered polyurethane, laid over said absorbing sponge for percolating the water to the absorbing sponge, in particular said absorbing sponge and said filtering sponge essentially taking up the whole volume of said extractable device.

15. Door for a front-loading laundry washing machine, comprising an inner surface (51) projecting out relative to a frame (52), **characterized by** comprising collecting means located in the lower half of said door (52) for collecting water dripping from said door when the latter is opened, the collecting means comprising an extractable device (8), and by comprising a housing (7) for the extractable device (8) and control means adapted to control the movement of said extractable device, said control means being at least partly located on said frame (52).

Patentansprüche

1. Frontladewäschewaschmaschine, worin ein Gehäuse (2) eine Ladeöffnung (3) besitzt, welche mittels einer Tür (5), die an dem Gehäuse (2) einhängt, geschlossen werden kann,
wobei die Tür (5) eine Innenseite (51), angepasst zum zumindest teilweisen Einführen in die Öffnung (3), und einen Rahmen (52) angepasst zum in Eingriff bringen mit dem Gehäuse (2), umfasst,
dadurch gekennzeichnet, dass die Tür (5) in der unteren Hälfte der Tür (5) angeordnete Sammelmittel aufweist zum Sammeln des von der Tür tropfenden Wassers, wenn die Tür geöffnet wird und die Sammelmittel eine ausziehbare Vorrichtung (8) aufweisen.

2. Wäschewaschmaschine nach Anspruch 1,
worin die ausziehbare Vorrichtung (8) ein Schubfach ist.

3. Wäschewaschmaschine nach Anspruch 1 oder 2,
dadurch gekennzeichnet, dass die Sammelmittel Steuerungsmittel, angepasst zum Steuern der Bewegung der ausziehbaren Vorrichtung, aufweisen,
wobei die Steuerungsmittel zumindest teilweise auf dem Rahmen (52) angeordnet sind und insbesondere elastische Mittel (83) angepasst zum Ausziehen der ausziehbaren Vorrichtung aus einem Behälter (7), der in dem Rahmen (52) enthalten ist, aufweisen.

4. Wäschewaschmaschine nach Anspruch 3,
dadurch gekennzeichnet, dass die elastischen Mittel (83) angepasst sind um die ausziehbare Vorrichtung (8) aus dem Behälter (7) zu verschieben.

5. Wäschewaschmaschine nach Anspruch 3,
dadurch gekennzeichnet, dass die ausziehbare Vorrichtung (8) klappbar zu der Tür (5) ist und die elastischen Mittel angepasst sind um eine Rotation der ausziehbaren Vorrichtung (8) um eine horizontale Achse oder um eine vertikale Achse zu erzeugen.

6. Wäschewaschmaschine nach einem der Ansprüche 3 bis 5,
dadurch gekennzeichnet, dass die Steuerungsmittel eine Oberfläche der ausziehbaren Vorrichtung (8), welche angepasst ist um mit dem Gehäuse (2) in Eingriff gebracht zu werden, aufweist.

7. Wäschewaschmaschine nach einem der Ansprüche 3 bis 5,
dadurch gekennzeichnet, dass die Steuerungsmittel einen Zapfen, welcher innerhalb des Rahmens (52) frei versetzt werden kann und ein System von Hebeln und Scharnieren angepasst zum Übertragen der Bewegung des Zapfens auf die ausziehbare Vorrichtung (8), aufweisen.

8. Wäschewaschmaschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Tür (5) eine Waschmittelabgabevorrichtung (55) aufweist.

9. Wäschewaschmaschine nach Anspruch 8,
wenn abhängig von einem der Ansprüche 3 bis 7,
dadurch gekennzeichnet, dass die Abgabevorrichtung (55) eine Ablassöffnung (57a), die unterhalb der Abgabevorrichtung (55) in einem Abstand von dem Rahmen (52), kürzer als die Breite des Abschnittes des Schubfaches (8) über dem Behälter (7), wenn die Tür (5) offen ist, aufweist.

10. Wäschewaschmaschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Sammelmittel automatisch gesteuert werden, wenn die Tür geöffnet wird.

11. Wäschewaschmaschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Sammelmittel ein absorbierendes Material (81) umfassen,
wobei das absorbierende Material (81) insbesondere einen absorbierenden Schwamm, vorzugsweise hergestellt aus netzartigem Polyurethan, umfasst.

12. Wäschewaschmaschine nach Anspruch 11, **dadurch gekennzeichnet, dass** der Schwamm seichter als das Schubfasch (8) ist.

13. Wäschewaschmaschine nach Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** der Schwamm eine konkave Seite besitzt,
wobei der Schwamm insbesondere eine flache Seite gegenüber der konkaven Seite besitzt.

14. Wäschewaschmaschine nach einem der Ansprüche 11 bis 13,
dadurch gekennzeichnet, dass die Sammelmittel umfassen einen absorbierenden Schwamm zum Behalten des Wassers und einen Filterschwamm, vorzugsweise hergestellt aus gefiltertem Polyurethan, welches über dem absorbierenden Schwamm zum Durchsickern des Wassers in den absorbierenden Schwamm, wobei insbesondere der absorbierende Schwamm und der Filterschwamm im Wesentlichen das gesamte Volumen der ausziehbaren Vorrichtung einnehmen.

15. Tür für eine Frontladewäschewaschmaschine umfassend eine Innenseite (51), die aus einem Rahmen (52) relativ herausragt,
gekennzeichnet durch Umfassen von in der unteren Hälfte der Tür (52) angeordneten Sammelmittel zum Sammeln des von der Tür tropfenden Wassers, wenn die Tür geöffnet wird,
wobei die Sammelmittel eine ausziehbare Vorrichtung (8) aufweisen und **gekennzeichnet durch** Umfassen eines Behälters (7) für die ausziehbare Vorrichtung (8) und Steuerungsmittel angepasst zum Steuern der Bewegung der ausziehbaren Vorrichtung (8),
wobei die Steuerungsmittel zumindest teilweise auf dem Rahmen (52) angeordnet sind.

Revendications

1. Machine à laver le linge à chargement par l'avant dans laquelle une enceinte (2) présente une ouverture de chargement (3) qui peut être fermée au moyen d'une porte (5) retenue à ladite enceinte (2), ladite porte (5) comprenant une surface intérieure (51) adaptée pour être, au moins partiellement, insérée dans ladite ouverture (3) et une structure (52) adaptée pour s'engager avec ladite enceinte (2), **caractérisée en ce que** ladite porte (5) comporte des moyens de collecte agencés dans la moitié inférieure de ladite porte (5) en vue de recueillir l'eau s'égouttant à partir de ladite porte lorsque cette dernière est ouverte, et **en ce que** lesdits moyens de collecte comprennent un dispositif extractible (8).

2. Machine à laver le linge selon la revendication 1, dans laquelle ledit dispositif extractible (8) est un tiroir.

3. Machine à laver le linge selon la revendication 1 ou 2, **caractérisée en ce que** lesdits moyens de collecte comportent des moyens de commande adaptés pour commander le déplacement dudit dispositif extractible, lesdits moyens de commande étant, au moins partiellement, placés sur ladite structure (52) et comportant, en particulier, des moyens élastiques (83) adaptés pour extraire ledit dispositif extractible hors d'un logement (7) réalisé dans ladite structure (52).

4. Machine à laver le linge selon la revendication 3, **caractérisée en ce que** lesdits moyens élastiques (83) sont adaptés pour translater ledit dispositif extractible (8) hors dudit logement (7).

5. Machine à laver le linge selon la revendication 3, **caractérisée en ce que** ledit dispositif extractible (8) est articulé sur ladite porte (5) et **en ce que** lesdits moyens élastiques sont adaptés pour générer une rotation dudit dispositif extractible (8) autour d'un axe horizontal ou autour d'un axe vertical.

6. Machine à laver le linge selon l'une quelconque des revendications 3 à 5, **caractérisée en ce que** lesdits moyens de commande comprennent une surface dudit dispositif extractible (8) qui est adaptée pour s'engager avec ladite enceinte (2).

7. Machine à laver le linge selon l'une quelconque des revendications 3 à 5 , **caractérisée en ce que** lesdits moyens de commande comportent une broche qui peut se translater librement à l'intérieur de ladite structure (52) et un système de leviers et de charnières adapté pour transférer le mouvement de ladite broche au dit dispositif extractible (8).

8. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ladite porte (5) comporte un distributeur d'agent de lavage (55).

9. Machine à laver le linge selon la revendication 8, lorsqu'elle dépend de l'une quelconque des revendications 3 à 7, **caractérisée en ce que** ledit distributeur (55) comporte une ouverture de drainage (57a) située sur la partie inférieure dudit distributeur (55) à une distance de ladite structure (52) plus petite que la largeur de la portion dudit tiroir (8) s'avançant sur ledit logement 7 lorsque ladite porte (5) est ouverte.

10. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée en ce que** lesdits moyens de collecte sont commandés

automatiquement au moment où ladite porte est ouverte.

11. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée en ce que** lesdits moyens de collecte comportent un matériau absorbant (81), ledit matériau absorbant (81) comprenant en particulier une éponge absorbante, constituée, de préférence, de polyuréthane réticulé.

12. Machine à laver le linge selon la revendication 11, **caractérisée en ce que** ladite éponge est plus mince que ledit tiroir (8).

13. Machine à laver le linge selon la revendication 11 ou 12, **caractérisée en ce que** ladite éponge présente une face concave, ladite éponge présentant en particulier une face plate opposée à ladite face concave.

14. Machine à laver le linge selon l'une quelconque des revendications 11 à 13, **caractérisée en ce que** lesdits moyens de collecte comportent une éponge absorbante pour retenir l'eau et une éponge de filtrage constituée, de préférence, de polyuréthane filtré, déposé sur ladite éponge absorbante en vue de réaliser la percolation de l'eau vers l'éponge absorbante, en particulier ladite éponge absorbante et ladite éponge de filtrage occupant essentiellement, la totalité du volume dudit dispositif extractible.

15. Porte destinée à une machine à laver le linge à chargement par l'avant, comprenant une surface intérieure (51) en relief par rapport à une structure (52), **caractérisée par** le fait de comporter des moyens de collecte situés dans la moitié inférieure de ladite porte (52), en vue de collecter l'eau s'égouttant à partir de ladite porte lorsque cette dernière est ouverte, les moyens de collecte comportant un dispositif extractible (8) et par le fait de comporter un logement (7) destiné au dispositif extractible (8) et des moyens de commande adaptés pour commander le déplacement dudit dispositif extractible, lesdits moyens de commande étant, au moins partiellement, placés sur ladite structure (52).

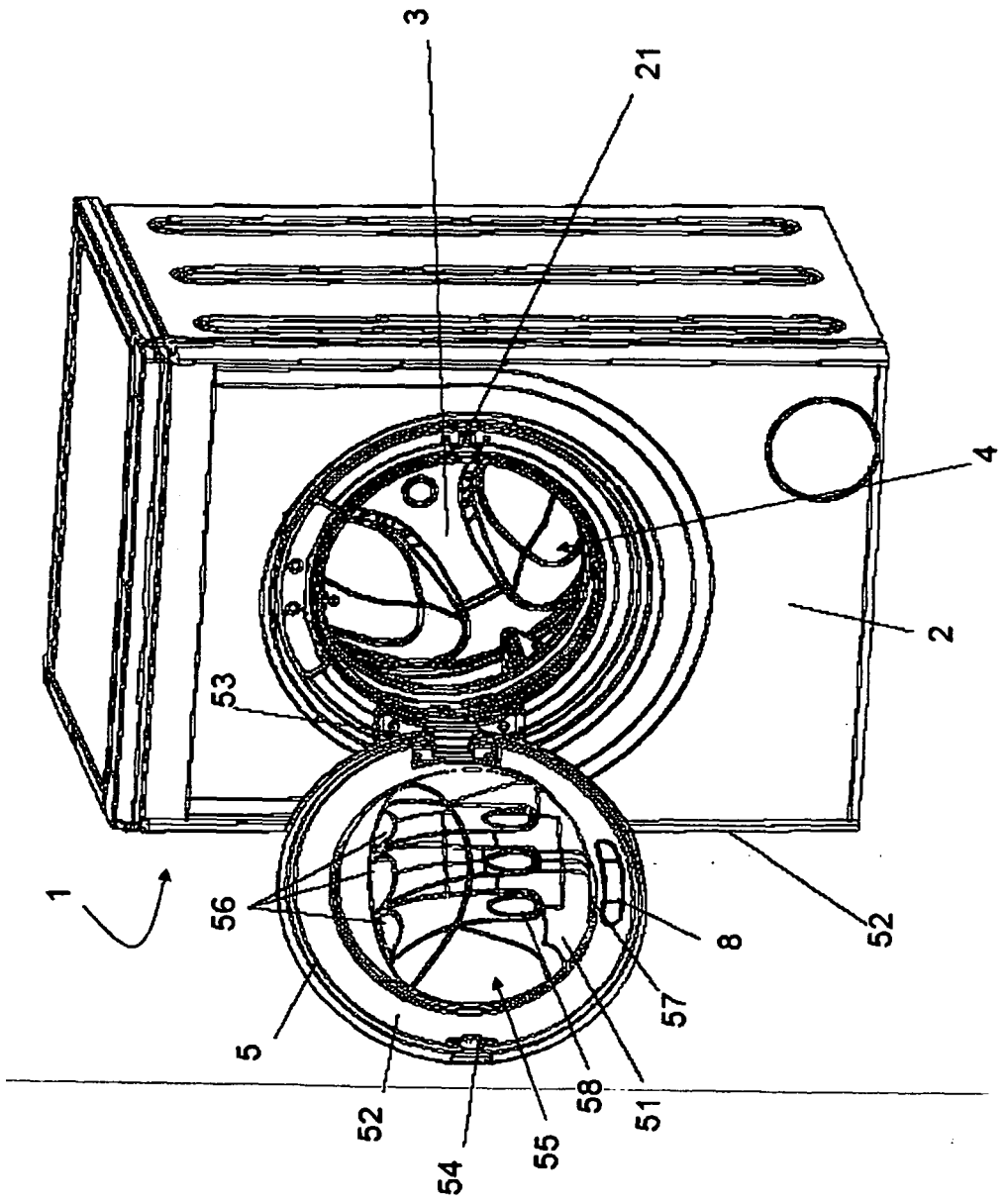

Fig.1

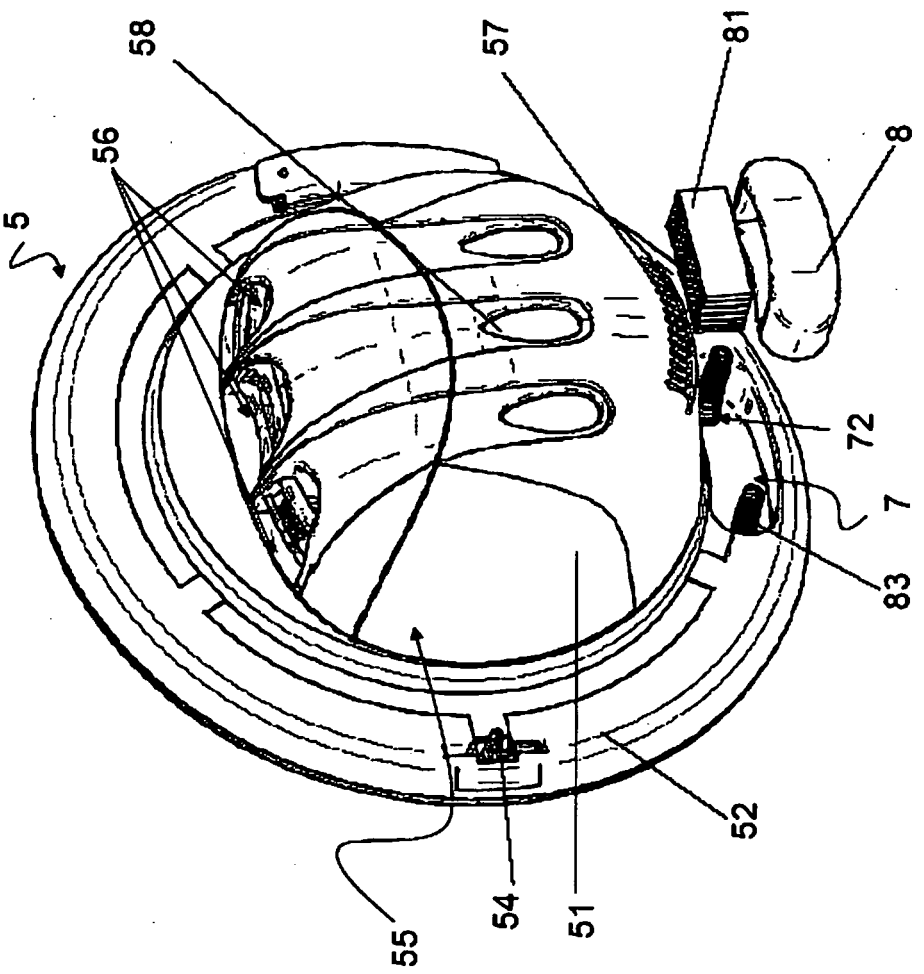

Fig.2

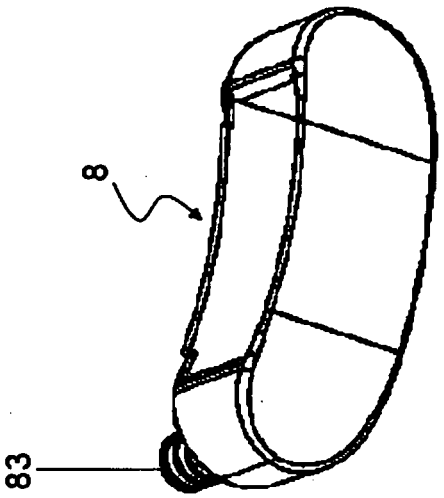

Fig. 3b

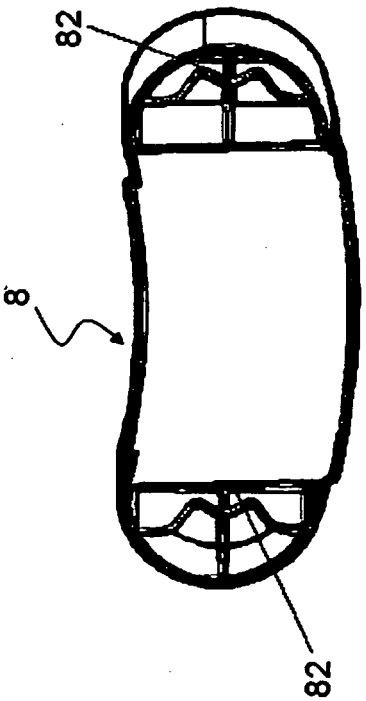

Fig. 3c

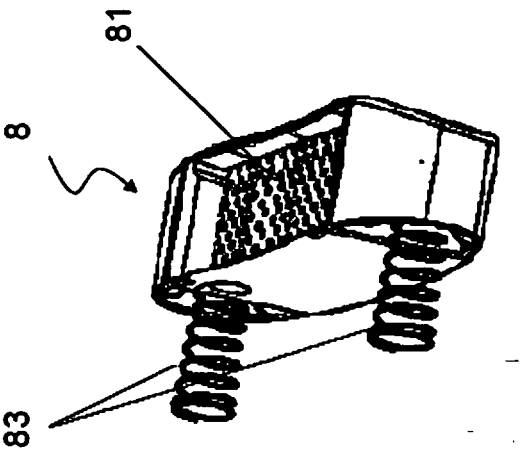

Fig. 3a

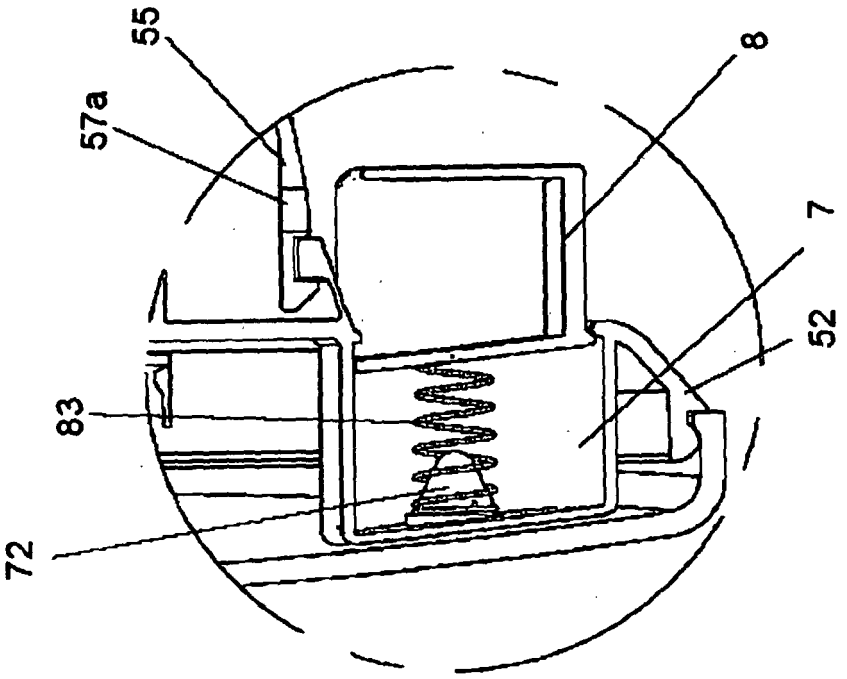

Fig. 5

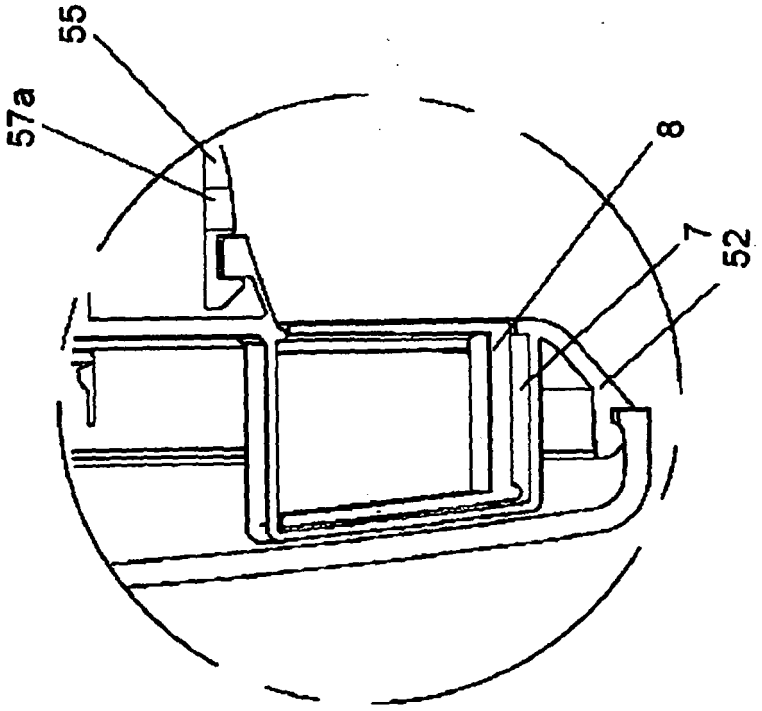

Fig. 4

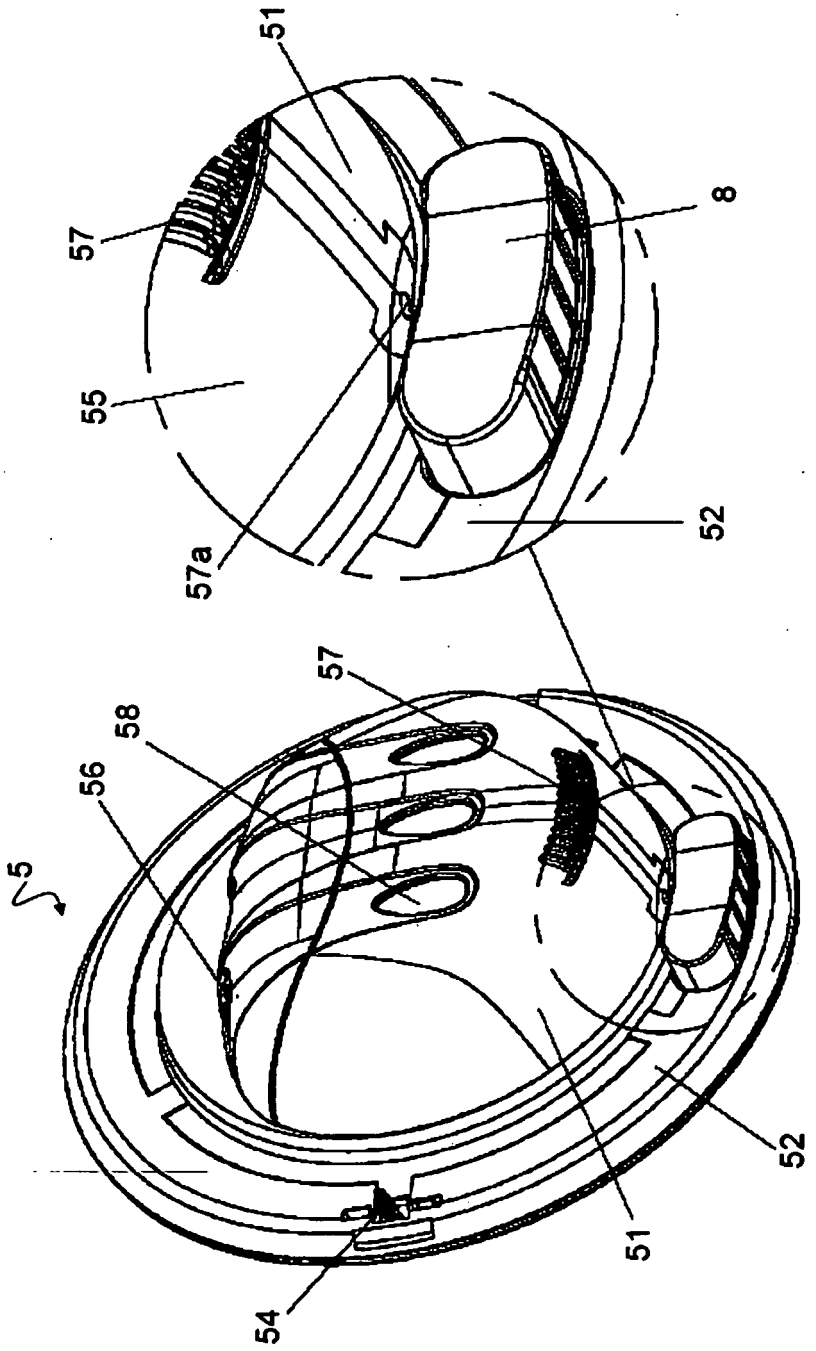

Fig. 6

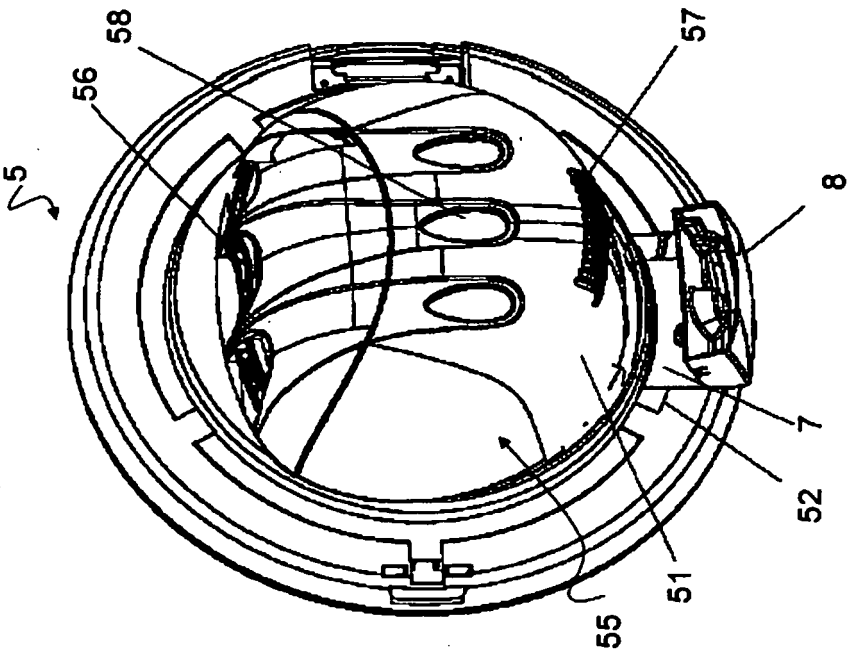

Fig. 8

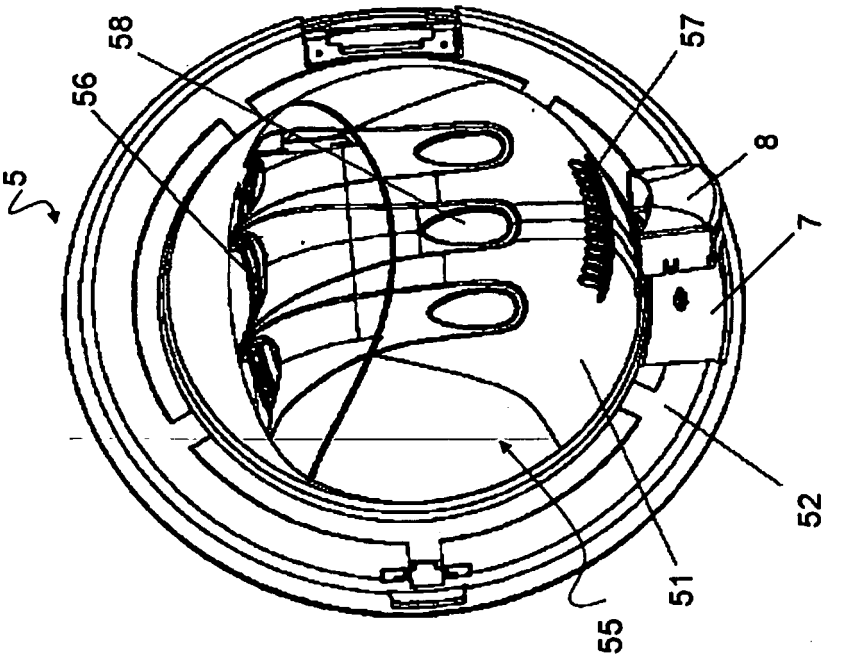

Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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