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

WASCHMASCHINE MIT FRONTEINSCHUB

MACHINE À LAVER À CHARGEMENT FRONTAL

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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) wherein the dispenser of washing agents (detergent, softener, etc.) is arranged in the door that closes the load opening of the machine: the invention also concerns the problem of the noise produced by such machines.

[0003] Laundry washing machines are known from GB 1,110,375 and GB 2,260,770 wherein the washing agent dispenser is inserted in the door that closes the load opening.

[0004] In these machines, the hydraulic supply system comprises a duct which carries water from the household water main to the dispenser, through the gasket that surrounds the load opening between the tub and the cabinet of the washing machine.

[0005] In both solutions, the duct is secured in just two points: to the control valve that regulates the water supply From the household water main on one side, and to a nozzle inserted in the gasket on the other side.

[0006] These machines suffer from the problem that such a hydraulic system makes them very noisy and/or inefficient. If the duct is flexible, when the machine is operating it will be moved violently by the vibrations of the oscillating assembly to which it is connected through the gasket, thus becoming very noisy. If on the contrary the duct is a rigid one, it will not be able to absorb the vibrations of the oscillating assembly, thus leading to damage caused to the gasket or to the duct itself. The use of a rigid duct in the above-mentioned known configuration would not eliminate the noise due to the mechanical stress undergone by the connections between the duct and the gasket or the control valve.

[0007] It is the object of the present invention to solve the above-mentioned noise and/or efficiency problems suffered by the solutions known in the art of laundry washing machines with washing agent dispenser in the door that closes the load opening.

[0008] This object is achieved through a laundry washing machine incorporating the features set out in the appended claims, which are intended as an integral part of the present, description.

[0009] In particular, the idea that ensures the achievement of this object is to constrain the duct that carries water to the dispenser to the cabinet of the washing machine.

[0010] Further objects and advantages of the present invention will become apparent from the following description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

- Fig. 1 is an axonometry projection of a laundry washing machine according to the present invention;
- Fig. 2 is a longitudinal-section view of a laundry

washing machine according to the present invention;

- Fig. 3 shows an element of the hydraulic system of a laundry washing machine according to the present invention.

[0011] Fig. 1 shows a washing machine 1 from which the front wall and the upper wall (including the electronic unit and control panels) of the external structure, also called cabinet 2, have been removed for clarity.

[0012] Inside the latter, there is an oscillating assembly which comprises a tub 3 and a drum 4 turning within the tub.

[0013] Washing machine 1 is of the front-loading type: the laundry is therefore placed into the drum through a load opening located on the front side of cabinet 2.

[0014] The opening is surrounded by a bellows-type plastic gasket 6, which connects cabinet 2 to tub 3, thus filling up the existing interspace and preventing any water leakage from the tub.

[0015] The load opening is closed by a door 7, which incorporates a washing agent dispenser 8. The latter has upper apertures 81 on which water is precipitated through a hydraulic system adapted to carry water from the household water main to dispenser 8.

[0016] In the example of Figs. 2 and 3, dispenser 8 has three apertures 81, which are associated with respective compartments adapted to contain different washing agents. e.g. softener, liquid detergent or powder detergent.

[0017] When the door is closed, i.e. when it is in the position shown in Fig. 2, filling apertures 81 are located in the area circumscribed externally by gasket 6, in front of the tub 3.

[0018] In the area corresponding to filling apertures 81, gasket 6 has a seat 61 adapted to contain a distributor 9, shown in Fig. 3. The latter essentially consists of a hollow body 90 within which there are channels 92 connecting water inlets 91 to water outlets 93.

[0019] In the example of Fig. 3 distributor 9 has two inlets 91 and four outlets 93, but of course the number of inlets and outlets may vary from the example of Fig. 3. By adjusting the water flow to inlets 91, it is possible to select one or more outlets 93 through which water must precipitate onto one or more apertures 81 of dispenser 8, whereby carrying the washing agents contained therein into the tub.

[0020] Water is supplied to distributor inlets 91 through a pair of corrugated pipes 10 connected thereto.

[0021] On the end opposite to inlets 91, pipes 10 are connected to a three-way solenoid valve 11 (i.e. having one inlet and two outlets) which regulates the water flow in both pipes 10 under the control of the electronic control unit of the washing machine.

[0022] According to a preferred embodiment of the present invention, corrugated pipes 10 are made of polypropylene; at the respective ends, they are provided with co-moulded fittings made of EPDM rubber, which ensure perfect water tightness and a stable connection between

corrugated pipes 10 and solenoid valve 11 and between corrugated pipes 10 and distributor 9.

[0023] Pipes 10 are constrained to cabinet 2 of the machine by means of a plurality of ties 12 which limit the movement thereof.

[0024] Ties 12, preferably made from plastic material, are located on the front side of cabinet 2, near the load opening and distributor 9, as well as under the top of cabinet 2, in particular at the shoulder of cabinet 2 which supports the top wall thereof. In the example shown in Fig. 2, ties 12 are inserted through holes obtained in a bent edge 77 of cabinet 2, thus ensuring that pipes 10 are clamped to cabinet 2.

[0025] The damping of pipes 10 prevents them from jolting when the machine is operating, thus reducing the noise produced by the machine.

[0026] The ties arranged near distributor 9 have the dual purpose of clamping both pipes 10 and distributor 9. It follows that, when gasket 6 moves through the effect of the laundry being present inside drum 4 and of the vibrations of the oscillating assembly taking place during the operation of the machine, distributor 9 will be kept in a predetermined position above dispenser 8.

[0027] Any malfunctioning of the machine will thus be avoided. As a matter of fact, any movement of distributor 9 caused by vibrations of pipes 10 and of the oscillating assembly might cause water to be mistakenly precipitated onto a compartment of the dispenser 8 which should not be flushed yet (e.g. the softener compartment before the wash cycle is over).

[0028] It should also be noted that ties 12 prevent pipes 10 and the water contained therein from weighing upon gasket 6, thereby deforming it.

[0029] In order to support the water supply pipes 10 at best and to prevent gasket 6 from getting deformed over time, also distributor 9 is secured to cabinet 2. In particular one or more holes (preferably two holes 20 and 30) are obtained in the distributor for the purpose of housing fastening screws inserted through holes obtained in the front wall of cabinet 2: distributor 9 is therefore secured to cabinet 2 through the effect of the tightening force applied to the screws, which presses the front wall of cabinet 2 against distributor 9. If distributor 9 is made from plastic, self-tapping screws may be used.

[0030] The laundry washing machine according to the present invention is thus more efficient and less subject to wear.

[0031] The features and advantages of the present invention are apparent from this description, it is clear, however, that many changes may be made to the above-described non-limiting example. For example, ties 12 may be replaced with any other securing means (such as hooks, collars, forks, etc.), which may be used in any number and in any location as deemed necessary.

[0032] In any case, these securing means must provide as a whole a stable fixing of pipes to cabinet 2 of the washing machine 1: advantageously, pipes 10 may be secured on at least two sides (one of which is the front

wall) of cabinet 2.

[0033] Pipes 10 are preferably flexible, e.g. corrugated plastic pipes (preferably made of polypropylene or PVC), but they may alternatively be replaced wholly or partly with rigid ducts made of any material, including metal materials such as copper.

[0034] The fixing may then be obtained through said securing means or else by welding said pipes to the cabinet of the washing machine.

[0035] Finally, the dispenser and the hydraulic system may be made even simpler, for example by using a single water supply duct as in patents GB 1,110,375 and GB 2,260,770. In this case, the distributor may be at simple nozzle.

Claims

1. Front-loading laundry washing machine comprising:

- an external structure provided with a load opening for placing laundry to be washed into a wash tub (4);
- a door (7) for closing the load opening, comprising a washing agent dispenser (8);
- a gasket (6) surrounding said load opening (5), which includes a passage for water to be supplied to the wash tub (4);
- at least one duct (10) used for conveying water toward the passage in the gasket (6), which extends within said external structure (2) between a first end and a second end:

characterized in that said at least one duct (10) is secured to said structure in at least one point comprised between said first and second ends.

2. Laundry washing machine according to claim 1, **characterised in that** said duct (10) is secured to at least two sides of the external structure.

3. Laundry washing machine according to any or the preceding claims, **characterized in that** said at least one duct (10) is secured to the external structure (2) near the load opening.

4. Laundry washing machine according to any of the preceding claims, **characterised by** comprising a distributor (9) associated with said passage, and that said at least one duct (10) is secured in such a way as to keep said distributor (9) in a predetermined position.

5. Laundry washing machine according to any of the preceding claims, **characterized by** comprising a distributor (9) associated with said passage, and that said distributor (9) is secured to said external structure (2), in particular by means of screws.

6. Laundry washing machine according to any of the preceding claims, **characterised in that** said at least one duct (10) is at least partly flexible,
7. Laundry washing machine according to any of claims 1 to 5, **characterized in that** said at least one duct (10) is rigid.
8. Laundry washing machine according to any of the preceding claims, **characterized in that** said at least one duct (10) is secured to said structure through one or more securing means among the following: hooks, ties, collars, forks.

Patentansprüche

1. Von vorne beschickbare Waschmaschine, umfassend:
- eine externe Struktur, die mit einer Ladeöffnung zum Platzieren von zu waschender Wäsche in einen Waschbottich (4) versehen ist;
 - eine Tür (7) zum Verschließen der Ladeöffnung, wobei die Tür (7) einen Waschmittelspenders (8) umfasst;
 - eine Dichtung (6), die die Ladeöffnung (5) umgibt und die einen Durchlass für in den Waschbottich (4) einzuspeisendes Wasser beinhaltet;
 - zumindest einen Leitungskanal (10), der zum Zuleiten von Wasser zu dem Durchlass in der Dichtung (6) verwendet wird, und der sich in der externen Struktur (2) zwischen einem ersten Ende und einem zweiten Ende erstreckt;
- dadurch gekennzeichnet, dass** der zumindest eine Leitungskanal (10) in zumindest einem zwischen dem ersten und dem zweiten Ende liegenden Punkt an der Struktur befestigt ist.
2. Waschmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** der Leitungskanal (10) an zumindest zwei Seiten der externen Struktur befestigt ist.
3. Waschmaschine nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** der zumindest eine Leitungskanal (10) nahe der Ladeöffnung an der externen Struktur (2) befestigt ist.
4. Waschmaschine nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** die Waschmaschine einen Verteiler (9) umfasst, der mit dem Durchlass verbunden ist, und dass der zumindest eine Leitungskanal (10) in einer solchen Weise be-

festigt ist, dass er den Verteiler (9) in einer vorbestimmten Position hält.

5. Waschmaschine nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** die Waschmaschine einen Verteiler (9) umfasst, der mit dem Durchlass verbunden ist, und dass der Verteiler (9) an der externen Struktur (2) befestigt ist, insbesondere mit Hilfe von Schrauben.
6. Waschmaschine nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** der zumindest eine Leitungskanal (10) zumindest teilweise flexibel ist.
7. Waschmaschine nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** der zumindest eine Leitungskanal (10) biegesteif ist.
8. Waschmaschine nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** der zumindest eine Leitungskanal (10) an der Struktur durch eins oder mehrere der folgenden Befestigungsmittel befestigt ist: Haken, Binder, Stellringe, Gabeln.

Revendications

1. Machine à laver le linge à chargement frontal comprenant :
- une structure externe dotée d'une ouverture de chargement permettant de placer le linge à laver dans une cuve de lavage (4) ;
 - une porte (7) pour fermer l'ouverture de chargement, comprenant un distributeur de produit de lavage (8) ;
 - une garniture d'étanchéité (6) entourant ladite ouverture de chargement (5), laquelle comporte un passage destiné à l'eau à fournir à la cuve de lavage (4) ;
 - au moins un conduit (10) utilisé pour acheminer l'eau vers le passage dans la garniture d'étanchéité (6), lequel s'étend à l'intérieur de ladite structure externe (2) entre une première extrémité et une seconde extrémité;
- caractérisée en ce que** ledit au moins un conduit (10) est fixé à ladite structure en au moins un point compris entre lesdites première et seconde extrémités.
2. Machine à laver le linge selon la revendication 1, **caractérisée en ce que** ledit conduit (10) est fixé à au moins deux côtés de la structure externe.

3. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ledit au moins un conduit (10) est fixé à la structure externe (2) à proximité de l'ouverture de chargement. 5
4. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée par** le fait de comporter un distributeur (9) associé audit passage, et en ce que ledit au moins un conduit (10) est fixé de manière telle que ledit distributeur (9) soit maintenu dans une position prédéterminée. 10
5. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée par** le fait de comporter un distributeur (9) associé au dit passage, et en ce que ledit distributeur (9) est fixé à ladite structure externe (2), en particulier au moyen de vis. 15
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6. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ledit au moins un conduit (10) est souple, au moins partiellement. 25
7. Machine à laver le linge selon l'une quelconque des revendications 1 à 5, **caractérisée en ce que** ledit au moins un conduit (10) est rigide.
8. Machine à laver le linge selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ledit au moins un conduit (10) est fixé à ladite structure par l'intermédiaire d'un ou de plusieurs moyen(s) de fixation parmi les suivants : crochets, liens, colliers, fourches. 30
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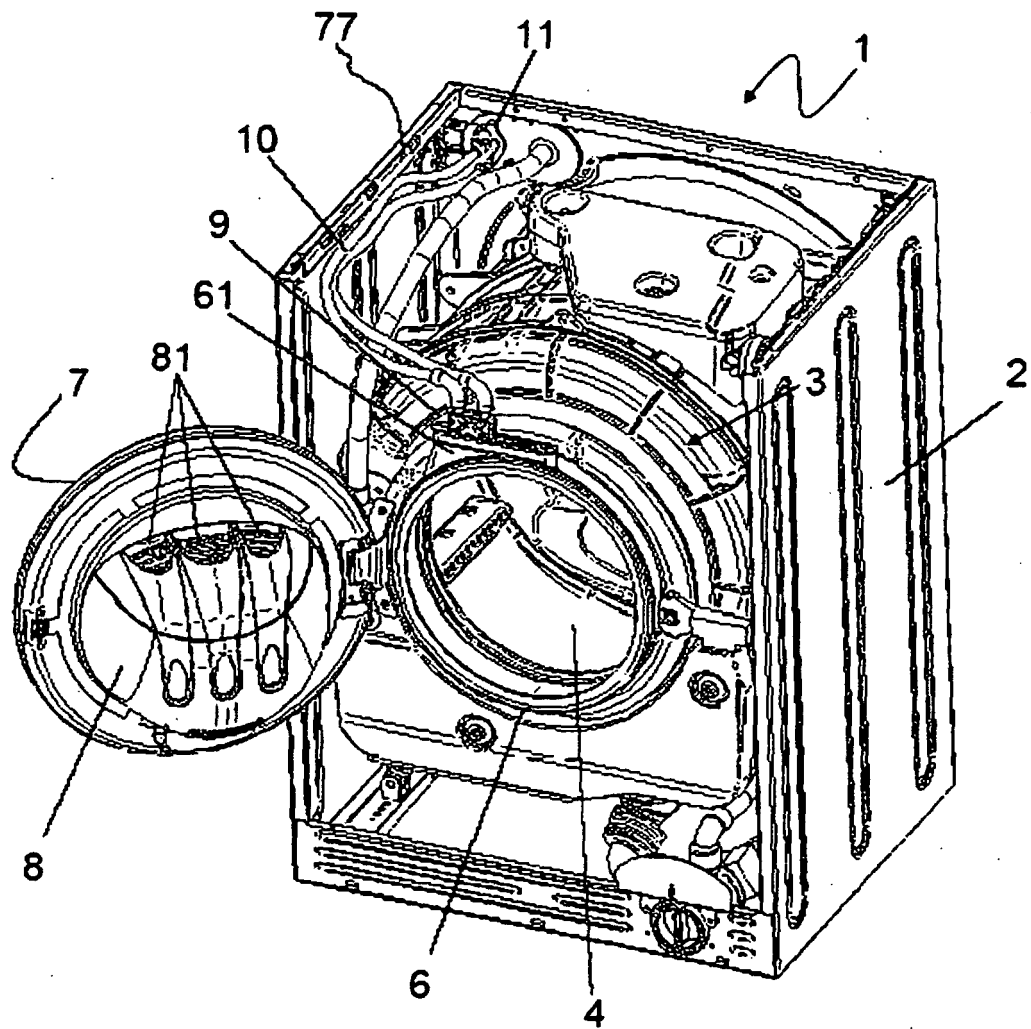


Fig.1

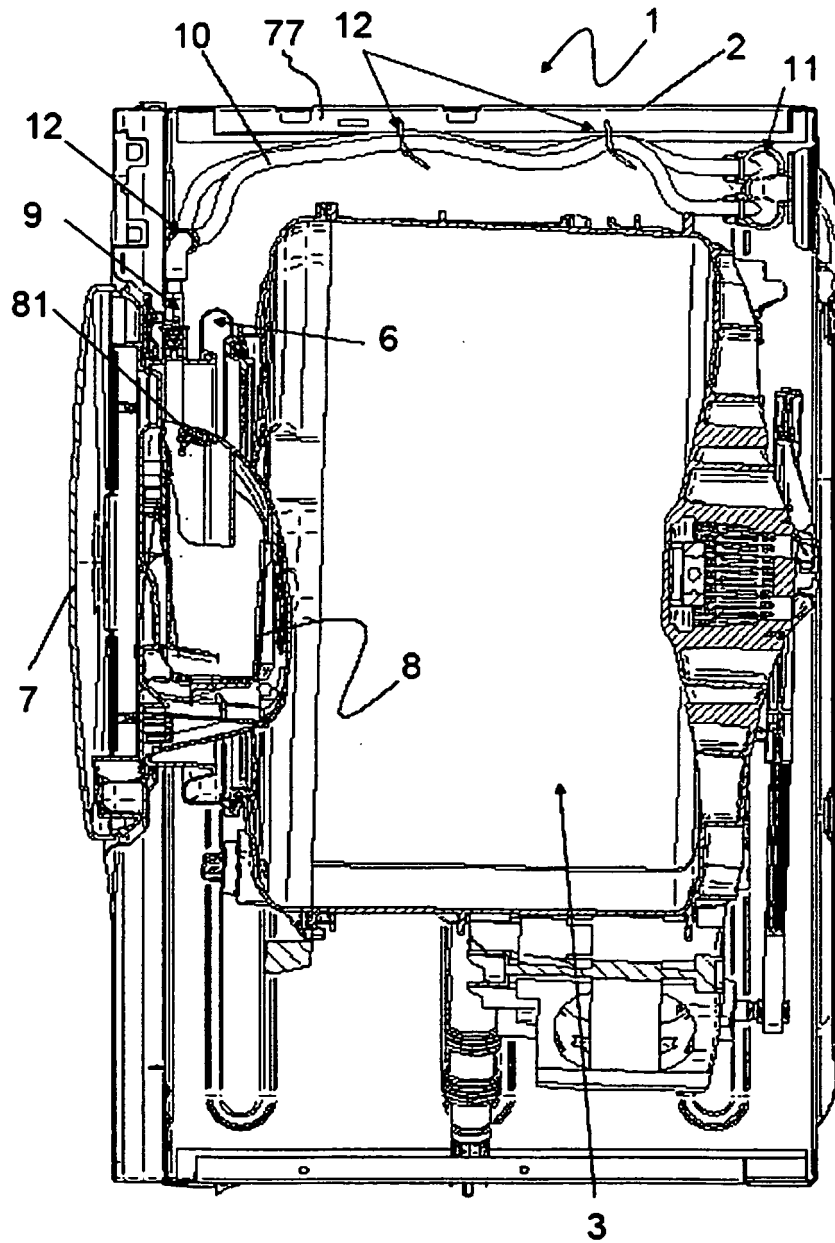


Fig.2

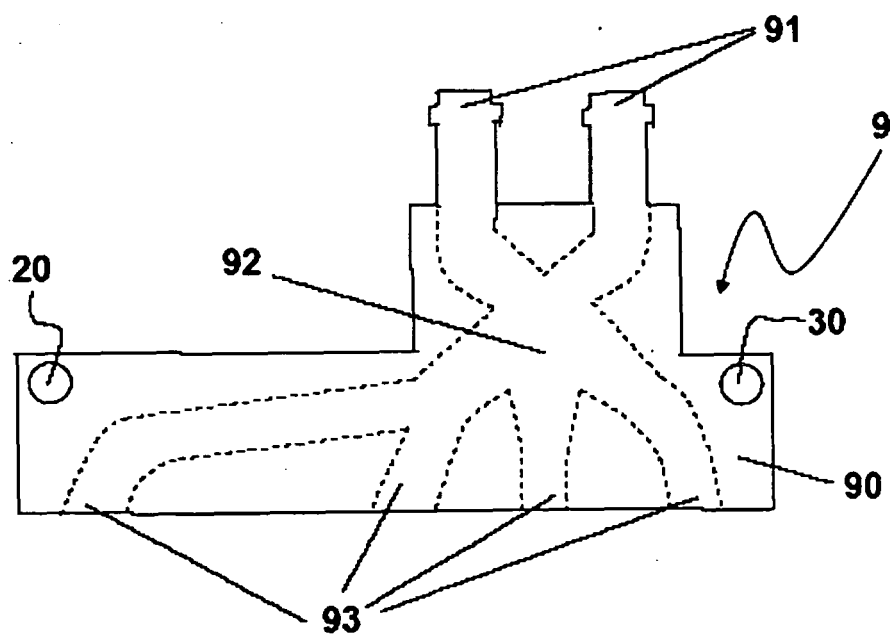


Fig.3

REFERENCES CITED IN THE DESCRIPTION

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