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(54) **Laundry treating machine**

Wäschebehandlungsmaschine

Machine à traiter le linge

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Description

[0001] The present invention refers to a laundry treating machine, such as a dryer or a washer/dryer machine, suitable for applying a steam treatment to laundry.

[0002] Laundry treating machines having means for applying a steam treatment to laundry are known and are normally provided with a rotating drum having an inner region for receiving laundry to be treated, with means for conveying air from and to the drum and with a condenser for removing moisture from air coming out from the drum after having treated the laundry. A steam generator is further provided for evaporating an amount of water, or other laundry treating substances, and directing the steam so produced inside the drum inner region. Such treatment can be useful for removing odours from laundry or for relaxing and remove wrinkles from clothes.

[0003] In laundry treating machine of known type, the steam generator is supplied with treating liquors by a single tank that can be filled manually by a user and/or, automatically by the machine itself collecting condensate obtained in a condenser that removes moisture from air coming out from the drum. One of these machines is disclosed in the European Patent Application No. EP 1579052.

[0004] A drawback of the known laundry treating machines consists in that a steam treatment can be performed only whether a sufficient amount of treating liquor is available in the tank supplying the steam generator. Therefore the user has to remember to refill manually such tank before starting the appropriate steam treating program or, if the machine can refill the tank automatically with condensate, the user has to perform first a laundry drying program in order to allow the condenser to produce liquor to be evaporated. This is particularly annoying and time-consuming for a user who would rather have a machine suitable for promptly performing a laundry steam treatment.

[0005] A further drawback of known laundry treating machines consists in that a complex machine control program must be provided controlling the liquor level in the single tank available because the latter can be refilled both periodically by the user both automatically by the machine. The control program must be suitable for informing the user whether and with which amount of liquor he/she has to refill the tank when a predetermined amount of liquor is already present in the tank because of previous steam treating or laundry drying operations. In addition a drying program might not be performed unless the control program advises the user to empty the tank if the liquor level in the latter is too high. Such control programs can be the cause of frequent and undesired malfunctioning of the laundry treating machine. EP 1 564 325 discloses a clothes drying machine with a humidity generator that is supplied with condensate liquor by means of an hydraulic circuit comprising two tanks arranged in series. Such arrangement, however, cannot allow said machine to work when one of said tank is removed from its housing, i.e. from the machine, for example when said tank must be periodically emptied and accidentally left disconnected from the machine body.

[0006] The aim of the present invention is therefore to solve the noted problems and thus providing a laundry treating machine having an improved reliability with respect to known machines.

[0007] Another object of the present invention is to provide a laundry treating machine allowing the user to perform a steam treating operation without performing a laundry drying operation first.

[0008] A further object of the invention is to provide a laundry treating machine providing an efficient recovery of condensate extracted from laundry in order to use it for steam treating clothes.

[0009] Advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realised and attained as particularly pointed out in the appended claims.

[0010] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate a possible embodiment of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

[0011]

Figure 1 shows a perspective view of a laundry treatment machine according to the invention with a disassembled cabinet;
Figure 2 shows a rear perspective view of the laundry treating machine of figure 1 without the cabinet;
Figure 3 shows, in a perspective view, a particular of the secondary tank.

[0012] With reference to the drawings, a laundry treating machine according to the invention, such as a laundry dryer or a laundry washer/dryer, comprises a drum 1 rotatably mounted inside a cabinet 2 which is shown in an exploded view in figure 1. The drum 1 has an inner region 3 adapted to receive articles to be treated through a loading opening 4 formed in the front portion of the drum 1.

[0013] Arranged at a base region 5 of the machine a condenser 9 is provided for cyclically drying laundry treating air that enters the inner drum region 3 through openings 11 formed on a rear portion 8 of the drum 1 (see figure 2) and exiting the latter from a conveyer 7 placed on the loading opening 4. Condenser 9 is cooled by an airflow that enters the machine from an inlet opening 10 on the machine back side (see figure 2) and that is exhausted through an outlet opening 6 at the front side of

the laundry treating machine. The condenser cooling airflow and the laundry treating air are pumped by fans not shown in the drawings, in addition treating air is heated before entering the drum 1 in a known manner.

[0014] Liquor extracted by the condenser 9 from moist air exiting the drum inner region 3 is collected in a tray 12. A pump 13 and a pipe 17 convey the condensate from the tray 12 to a principal tank 14, which is removably associated to the machine and preferably placed in an upper region of the cabinet 2, so as to be easily extracted by a user.

[0015] A secondary tank 16 is provided to be in fluid communication with the condensate collecting tray 12 by means of the pipe 17. Valving means 18 control the condensate flow towards the principal tank 14 and the secondary tank 16. Said valving means 18 can be in the form of a solenoid valve driven by the laundry treating machine electronics according to a preset operative program or in the form of a manually operable valve. The latter embodiment, as shown in the attached figures, is preferably carried out by placing valving means 18 in the machine front panel such that a user can easily reach it. Pipe 17 branches in a plurality of conduits 19, 20 each of them reaching one of the tanks 14, 16. As a further multiple-way conduit solution for conveying condensate towards the tanks 14, 16, a plurality of pipes, each dedicated to a single tank, can be provided between the condensate tray 12 and the tanks 14, 16.

[0016] Secondary tank 16 is also hydraulically connected with a pipe 23 to an inlet opening of a steam generator 22 of known type, such that liquor contained in the tank 16 can be evaporated. Steam produced by the generator 22 flows through a pipe 24 into the inner drum region 3 for treating laundry.

[0017] When valving means 18 are in an open position, condensate liquor available in the tray 12 during or after a laundry drying operation is pumped by the pump 13 in the pipe 17 and divided between the principal tank 14 and the secondary tank 16. In this way a portion of the total amount of liquid extracted from laundry is saved in the secondary tank 16 and made available to be reused for a subsequent steam treatment. When valving means 18 are in a closed position all the amount of condensate liquor pumped from the tray 12 is flowed into the principal tank 14 though a opening 25 that is placed at the pipe 19 outlet when the machine is in use. Said opening 25 serves also as overflow opening allowing the condensate to be discharged when the tank is full. Discharged liquor is collect by a hopper 15 on which the principal tank 14 is mounted. The hopper 15 is in fluid connection with the condensate collecting tray 12 by means of a discharge pipe 26 which is shown only in part in figure 2. In this way, condensate liquor can be recirculated from and to the tray 12 and the tank 14 in a closed hydraulic loop until its amount causes the laundry treating machine to be switched off by an appropriate and known safety system to avoid undesired and dangerous flooding. Such safety system, of known type, preferably comprises a floating member placed in the condensate collecting tray 12 and a switch that is activated by the floating member for turning off the laundry machine when the liquor level in tray 12 reaches a preset value.

[0018] Similarly, an overflow opening 27 is provided also in the secondary tank 16 such that when the tank 16 is almost full of liquor, the latter can be discharged into the hopper 15 on which the tank 16 is mounted. Therefore, as described above for liquor discharged from the principal tank 14, also the amount of liquor exceeding the capacity of the secondary tank 16 can be recirculated in a closed hydraulic loop between the condensate collecting tray 12 and the secondary tank 16 by means of pump 13.

[0019] Evidently, if valving means 18 are in an open position, condensate liquor discharged from principal and/or secondary tanks 14, 16 is recirculated from/to collecting tray 12 and both tanks 14, 16. This is particularly advantageous for retarding the moment in which the laundry machine is switched off automatically by the above described safety system preventing the machine from being flooded by an excessive amount of condensate liquor. When valving means 18 are open, the laundry machine maximum capacity of collecting liquor (substantially given by the inner volume of tanks 14, 16 and by the volume of collecting tray 12) is completely dedicated to receive condensate liquor.

[0020] Secondary tank 16 is also provided with a filler 21, placed at the machine front, allowing the user to fill the tank 16 manually. This is useful both when the user desires to perform a laundry steam treatment without having carried out drying operations before, both when the he/she desires to add chemical substances to liquor that has to be evaporated. Such substances can be, for example, scent imparting chemicals, conditioning or laundry relaxing compositions.

[0021] Even if the present invention has been disclosed describing a laundry treating machine having two tanks, it is obvious for the skilled man to apply the same inventive concept disclosed herein for providing a machine having more than two tanks.

[0022] Conclusively it can be stated that with a laundry treating machine according to the invention a user can perform a steam treatment without performing each time a laundry drying cycle so as to produce a sufficient amount of condensate to be evaporated during the steam treatment. As a further advantage tank refilling operations by the user are greatly reduced because liquor extracted from laundry can be efficiently used for steaming laundry articles. The present machine allows the user to introduce additives, perfumes and other useful treating substances in order to improve laundry steam treatment.

Claims

1. Laundry treating machine comprising: a drum (1) having an inner region (3) for receiving laundry to be

treated; air conveying means (7, 11) for conveying treating air from and to said drum inner region (3); a condenser (9) for removing moisture from laundry treating air; collecting means (12, 14, 16, 17, 19, 20) for receiving condensate produced by the condenser (9); a steam generator (22) in fluid connection with the collecting means (12, 14, 16, 17, 19, 20) and with the drum inner region (3) for directing steam in said region (3); said machine being **characterised in that** said collecting means (12, 14, 16, 17, 19, 20) comprise a multiple-way conduit (17, 19, 20) directing said condensate towards a plurality of tanks (14, 16), said conduit (17, 19, 20) being provided with valving means (18) for controlling condensate flow towards said tanks (14, 16).

2. Laundry treating machine according to claim 1 wherein said multiple-way conduit (17, 19, 20) defines a first hydraulic circuit comprising a principal tank (14) in fluid connection with said condenser (9) and a second hydraulic circuit comprising a secondary tank (16) supplying liquor to said steam generator (22).

3. Laundry treating machine according to claim 2 wherein the principal tank (14) is removably associated to the machine and the secondary tank (16) has a user accessible filler (21).

4. Laundry treating machine according to any preceding claim wherein each of said tanks (14, 16) has an overflow opening (25, 27) for discharging condensate when the tank (14, 16) is full, said tanks (14, 16) being mounted on a hopper (15) in fluid connection with said multiple-way conduit (17, 19, 20) for recirculating said condensate through said tanks (14, 16) in a closed hydraulic loop.

5. Laundry treating machine according to any preceding claim wherein said valving means (18) comprises a manually operable valve or a solenoid valve.

6. Laundry treating machine according to any preceding claim wherein said collecting means (12, 14, 16, 17, 19, 20) comprises pumping means (13).

Patentansprüche

1. Wäschebehandlungsmaschine, umfassend: eine Trommel (1) mit einem inneren Bereich (3) zur Aufnahme von zu behandelnder Wäsche, Luftfördermittel (7, 11) zur Beförderung von Behandlungsluft von und zu dem inneren Bereich (3) der Trommel, einen Kondensator (9) zur Entfernung von Feuchtigkeit aus der Wäschebehandlungsluft, ein Sammelmittel (12, 14, 16, 17, 19, 20) zur Aufnahme von Kondensat, das vom Kondensator (9) erzeugt worden ist, einen Dampferzeuger (22) in Fluidverbindung mit dem Sammelmittel (12, 14, 16, 17, 19, 20) und mit dem inneren Bereich (3) der Trommel, um Dampf in den Bereich (3) zu lenken, **dadurch gekennzeichnet, dass** das Sammelmittel (12, 14, 16, 17, 19, 20) eine Mehrwegeleitung (17, 19, 20) umfasst, die das Kondensat zu einer Vielzahl von Tanks (14, 16) hin lenkt, wobei die Leitung (17, 19, 20) mit einem Ventilmittel (18) zur Steuerung von Kondensatströmung zu den Tanks (14, 16) versehen ist.

2. Wäschebehandlungsmaschine nach Anspruch 1, wobei die Mehrwegeleitung (17, 19, 20) einen ersten Hydraulikkreislauf, der einen Haupttank (14) in Fluidverbindung mit dem Kondensator (9) umfasst, und einen zweiten Hydraulikkreislauf, der einen Sekundärtank (16) umfasst, der dem Dampferzeuger (22) Flotte zuführt, definiert.

3. Wäschebehandlungsmaschine nach Anspruch 2, wobei der Haupttank (14) der Maschine entfernbar zugeordnet ist und der Sekundärtank (16) eine benutzerzugängliche Füllvorrichtung (21) hat.

4. Wäschebehandlungsmaschine nach einem der vorhergehenden Ansprüche, wobei jeder der Tanks (14, 16) eine Überlauföffnung (25, 27) zum Austragen von Kondensat, wenn der Tank (14, 16) voll ist, hat, wobei die Tanks (14, 16) auf einem Trichter (15) in Fluidverbindung mit der Mehrwegeleitung (17, 19, 20) montiert sind, um das Kondensat durch die Tanks (14, 16) in einem geschlossenen hydraulischen Kreislauf zu rezirkulieren.

5. Wäschebehandlungsmaschine nach einem der vorhergehenden Ansprüche, wobei das Ventilmittel (18) ein manuell betätigbares Ventil oder ein Solenoidventil umfasst.

6. Wäschebehandlungsmaschine nach einem der vorhergehenden Ansprüche, wobei das Sammelmittel (12, 14, 16, 17, 19, 20) ein Pumpmittel (13) umfasst.

Revendications

1. Machine à traiter le linge, comprenant : un tambour (1) ayant une région intérieure (3) pour recevoir du linge à traiter ; un moyen de transport d'air (7, 11) pour transporter de l'air de traitement depuis et vers ladite région intérieure (3) du tambour ; un condenseur (9) pour éliminer l'humidité de l'air de traitement du linge ; un moyen de collecte (12, 14, 16, 17, 19, 20) pour recevoir le condensat produit par le condenseur (9) ; un générateur de vapeur (22) en connexion fluidique avec le moyen de collecte (12, 14, 16, 17, 19, 20) et avec la région intérieure (3) du tambour pour diriger de la vapeur dans ladite région

(3) ;
ladite machine étant **caractérisée en ce que** ledit moyen de collecte (12, 14, 16, 17, 19, 20) comprend un conduit à plusieurs voies (17, 19, 20) conduisant ledit condensat vers une pluralité de réservoirs (14, 16), ledit conduit (17, 19, 20) étant pourvu d'un moyen de soupape (18) pour réguler le flux de condensat vers lesdits réservoirs (14, 16).

2. Machine à traiter le linge selon la revendication 1, dans laquelle ledit conduit à plusieurs voies (17, 19, 20) définit un premier circuit hydraulique comprenant un réservoir principal (14) en connexion fluidique avec ledit condenseur (9) et un deuxième circuit hydraulique comprenant un réservoir secondaire (16) fournissant de la liqueur audit générateur de vapeur (22).

3. Machine à traiter le linge selon la revendication 2, dans laquelle le réservoir principal (14) est associé de manière amovible à la machine et le réservoir secondaire (16) présente une charge de remplissage (21) accessible par l'utilisateur.

4. Machine à traiter le linge selon l'une quelconque des revendications précédentes, dans laquelle chacun desdits réservoirs (14, 16) présente une ouverture de débordement (25, 27) pour décharger du condensat lorsque le réservoir (14, 16) est plein, lesdits réservoirs (14, 16) étant montés sur une trémie (15) en connexion fluidique avec ledit conduit à plusieurs voies (17, 19, 20) pour faire circuler ledit condensat à travers lesdits réservoirs (14, 16) dans une boucle hydraulique fermée.

5. Machine à traiter le linge selon l'une quelconque des revendications précédentes, dans laquelle ledit moyen de soupape (18) comprend une soupape à commande manuelle ou une électrovanne.

6. Machine à traiter le linge selon l'une quelconque des revendications précédentes, dans laquelle ledit moyen de collecte (12, 14, 16, 17, 19, 20) comprend un moyen de pompage (13).

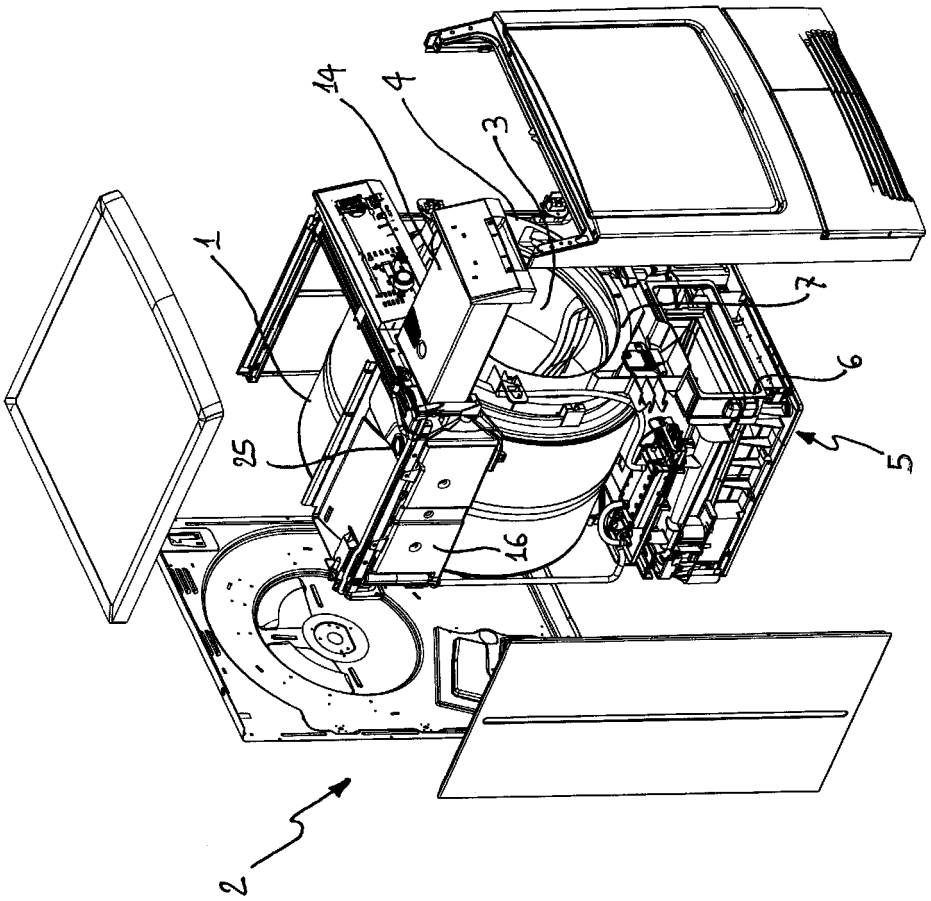

Fig. 1

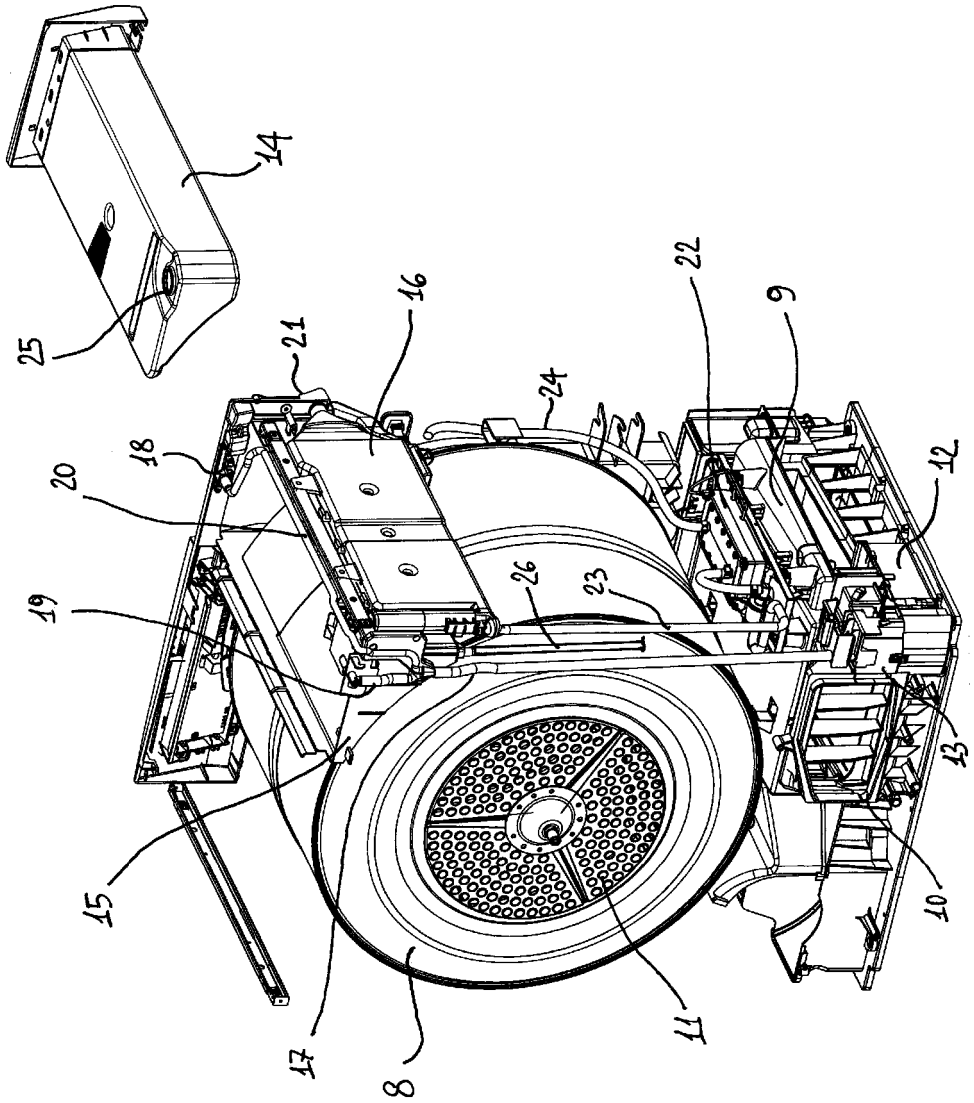

Fig. 2

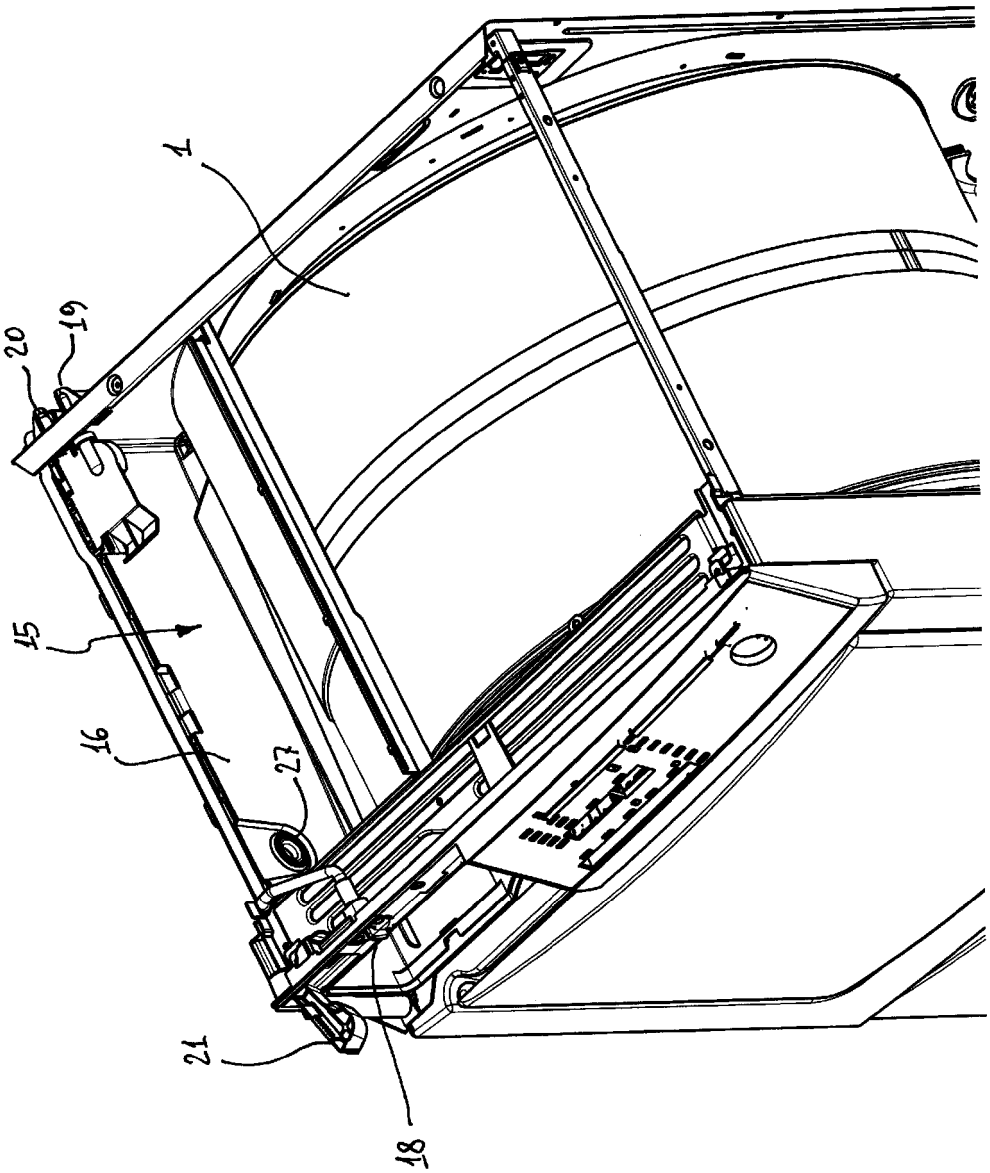

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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