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(54) **Low-noise household clothes drying machine**

Geräuscharmer Haushaltstrockner

Sèche-linge domestique silencieux

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(73) Proprietor: **Electrolux Home Products Corporation N.V.**
1130 Brussels (BE)

(72) Inventor: **Arreghini, Luigi**
30020, Portogruaro (VE) (IT)

(74) Representative: **Baumgartl, Gerhard Willi et al**
Electrolux Rothenburg GmbH
Factory and Development
90327 Nürnberg (DE)

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Description

[0001] The present invention refers to an improved kind of clothes drying machine, preferably of the type for use in households, which is provided with improved means for circulating the drying air that are improved to ensure high energy efficiency and low-noise operation.

[0002] The machines, which the present invention refers to, are generally known in the art. They have on the other hand been described, along with a detailed discussion of a technical nature on the advantages and the drawbacks of a number of different variations in the design and general embodiment thereof, in EP 1 475 474 A1 filed by this same Applicant with the title "Household Clothes Drying Machine with Improved Fan Arrangement".

[0003] It should however be right away appreciated that, while the above-cited Europeans patent application refers to condenser-type clothes drying machines, which are well known in their peculiarities to all those skilled in the art, so that they do not need any further explanation here, the present invention applies in the broadest sense to the generality of clothes drying machines of the tumbler-type, i.e. provided with a rotating drum and flown through by a flow of appropriately heated-up drying air, which is blown into and through the rotating drum via an appropriate opening to eventually leave said drum through a second air-removal opening. In this sense, the present invention therefore applies also to the so-called exhaust-type clothes drying machines, in which the air is taken from the outside ambient, duly heated up, blown into the rotating drum, removed from the same rotating drum and, eventually, exhausted again into the outside ambient, as opposed to what occurs in condenser-type clothes drying machines, in which the air is on the contrary caused to circulate in a closed-loop circuit that includes a suitable condenser arrangement, so as this is illustrated symbolically in Figure 1.

[0004] Both condenser-type and exhaust-type clothes drying machines share - further to the rotating drum - a common operating feature, i.e. the circumstance that in both cases there are provided an air delivery or inflow conduit and an outflow conduit, along with related openings arranged in the walls of the drum, through and in which the drying air is caused to circulate with the aid of means largely known as such in the art.

[0005] Therefore, what actually differentiates the two above-mentioned kinds of clothes drying machine designs is the way in which the drying air is caused to circulate, i.e. following an open-loop pattern from and into the surrounding ambient in the case of exhaust-type machines, and a closed-loop pattern in the case of condenser-type machines, regardless of the kind of condensation process used and the way in which this also occurs.

[0006] Both types of clothes drying machines, however, share a common typical drawback, as well. This is represented by the rather remarkable noise that they generate during their operation. This noise is largely

known to be produced mainly by the rotating drum, due to basically two distinct circumstances:

>>> the first one of these circumstances is brought about by the fact that, as the drum rotates, the drying load therein is continuously lifted from the bottom thereof to immediately fall back again thereonto, and this process, jointly with the fact that the drum is made of metal, i.e. a material that inherently has no sound-deadening property, is a first major source of noise, which weighs in a particularly heavy manner during the initial phases of the drying process, when the clothes to be dried are still wet and, therefore, cannot be prevented from falling rather heavily back onto the bottom of the drum;

>>> the second one of these circumstances refers to the fact that the forced flow of the air in the conduits which it is due to flow through, and which are usually made of metal, too, gives rise to a peculiar kind of rumbling noise that is again practically impossible to eliminate.

[0007] In view of reducing, i.e. dampening the overall noise effect so generated by clothes drying machines, a number of solutions have been proposed and disclosed in as many patent publications, which have anyway failed to solve the above-cited problem in a radical manner; one of the most effective solutions in this connection is disclosed in the European patent No. EP 1577435; according to this solution, to the cylindrical inner metal wall of the drum there is applied, on the inside, an additional layer of sound-deadening material.

[0008] However, this solution proves only partially effective, since the circular planar surfaces of the drum are not similarly covered by corresponding sound-deadening surfaces (in fact, they cannot be covered with such layers, since the need arises in this case for an adequate space to be provided for the air intake and outflow openings). Furthermore, the air conduits are fully disregarded by the above-cited invention, so that the clothes drying machine concerned is far from proving adequately silenced.

[0009] In addition, and in connection with condenser-type clothes drying machines only, a further usually neglected drawback should be duly pointed out here. Reference is made here to the fact that the coupling between the drying air delivery conduit and the related inflow opening in the drum, as well as the coupling between the drying air exhaust conduit and the related outflow opening in the drum are provided with appropriate annular gaskets, e.g. of felt or some other low-friction and highly deformable material, as indicated at G1 and G2, respectively, in Figure 2.

[0010] These gaskets, however, give generally rise to air leakages, which may reach values of up to approx. 20 percent of the total air flow rate.

[0011] Even in exhaust-type clothes drying machines, anyway, the problem of drying air leaking through the

gaskets between the conduits and the drum is a rather serious and generally acknowledged one. As a matter of fact, if the exhaust air, instead of being totally conveyed ed exhausted into the outside ambient, comes to be partly released inside the machine, this would imply serious as far as the safety and operativeness, the functional state of the machine itself are concerned, owing to the high moisture content in the exhaust air flowing out of a drying drum.

[0012] As far as condenser-type clothes drying machines are concerned, in which the drying air is recovered and continuously circulated in a closed-loop circuit, basically to the purpose of recovering the thermal energy contained therein, the above-cited problem has a different purport. These machines are in fact so designed as to desirably allow the totality of the moisture contained in the drying air to be removed therefrom, so as to ensure a quick and perfect drying of the clothes. However, for this aim to be reached, it is of the utmost importance that the flow of the drying air is entirely conveyed into and through the condenser. Now, this most obviously implies that there are no losses and/or leakages of drying air at the gaskets provided as sealing means between the drying air circulation conduits and the drum.

[0013] In condenser-type clothes drying machines, therefore, a loss of a significant portion of the drying air at or through these gaskets generates a corresponding loss of energy efficiency, which is heavily detrimental as far as the quality and the performance levels of currently produced clothes drying machines are concerned, which are actually required to generally qualify on the marketplace for such properties as a high energy efficiency, low-noise operation and a low level of moisture released into the surrounding ambient.

[0014] From JP 2000225289 A a clothes dryer provided with heat insulating means is divulged to improve the drying efficiency. Said insulating means comprise outer and inner layers, wherein a thin air layer is formed in the gap between said outer and inner layers.

[0015] However, the "dual structure", as expressly described and divulged, obviously implies a machine structure which is only partially effective since the insulating means are provided at only parts of the whole case.

[0016] From CN 1 467 332 A (database WIP XP002326359) a rotary drum with noise insulating parts is divulged which surrounds its external surface. However, this patent applies especially to a washing machine, therefore it is not optimised for a use on a dryer; and even more there is no provision to avoid the leakage of the heat air flow.

[0017] It would therefore be desirable, and it is actually a main purpose of the present invention, to provide a clothes drying machine of either the condenser type or the exhaust type, which is particularly quiet, i.e. silent in most of the parts thereof, in which the drying air is due to circulate, as well as throughout the operation thereof, regardless of the phase of the drying process being carried out.

[0018] It would be further desirable, and it is another purpose of the present invention, to provide a clothes drying machine, in particular of the condenser type, in which the above-described losses and leaks of moisture-laden air from the drying air circulation circuit are avoided in a radical, total manner.

[0019] According to the present invention, these aims, along with further ones that will be apparent from the following description, are reached in a clothes drying machine incorporating the features as recited in the appended claims.

[0020] Anyway, features and advantages of the present invention will be more readily understood from the description that is given below by mere way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 3 is a median vertical-section view through the axis of the drum of a first embodiment of a clothes drying machine according to the present invention, as illustrated in a symbolical manner;
- Figure 4 is a similar view as the one appearing in Figure 3 of an improved embodiment of a clothes drying machine according to the present invention;
- Figure 5 is a similar view as the one appearing in Figure 3 of a further improved embodiment of a clothes drying machine according to the present invention;
- Figure 6 is a vertical-section view along the line A-A in Figure 5;
- Figure 7 is a perspective, cut-away view of the basic parts and items of the present invention as referred to the clothes drying machine illustrated in Figure 5.

[0021] In a clothes drying machine according to a prior-art embodiment there is provided a drum 1 adapted to hold the clothes to be dried, to which there is associated a delivery conduit 2 letting the drying air into the drum through an appropriate inflow opening 3, an air outlet or exhaust conduit 4 removing the drying air from the interior of the drum through a corresponding outflow opening 5, wherein said conduits 2 and 4 are joined to each other via a condenser 6, which is adapted to cause the moisture contained in the drying air flowing therethrough to condense, said condenser being furthermore flown through by a flow of "cold" air, i.e. air taken in from the outside ambient and sent to said condenser 6 via a corresponding cooling conduit (not shown).

[0022] It should of course be appreciated that, as already pointed out hereinbefore, the condenser 6, along with said cooling conduit associated therewith, is cited here to mere illustrative and exemplifying purposes in connection with an embodiment and a particularly advantageous application of the present invention, since these parts might equally be omitted, i.e. not necessarily be provided, in the case that the clothes drying machine is of the exhaust type.

[0023] According to the present invention, said drum

is entirely muffled and enclosed in a substantially closed container 8, with the sole exceptions that shall be pointed out further on in this description, being preferably in the shape of a cylinder so as to as far as possible closely follow the contour of the drum contained therein, while avoiding to occupy any excessive additional space inside the outer casing of the clothes drying machine, so as this is better illustrated in Figure 3.

[0024] This cylindrical container 8 is provided with related parallel bases 9 and 10; in each one of these bases there is provided a related opening 11, 12, through which the corresponding air delivery conduit 2 and outlet conduit 4 are allowed to pass. The connection at which said air delivery conduit 2 flows into the corresponding inflow opening 11 is of the sealed, i.e. air-tight type; the same applies as far as the connection at which said air outlet conduit 4 flows into the corresponding outflow opening 12 is concerned.

[0025] In addition, said cylindrical container 8 is suspended inside the outer casing of the clothes drying machine with the aid of means that are largely known as such in the art (not shown in the Figures).

[0026] Briefly stated, said container 8 does not only contain the drum 1 thereinside, but also the portions 2A and 4A of the air delivery conduit 2 and the air outlet conduit 4, which penetrate into and extend beyond the respective openings 11 and 12.

[0027] In this way, said container 8 proves effective in enabling the desired result to be fully attained, since it encloses the entire drum thereinside, so that the noise generated in said drum, and leaking out towards the outside ambient, is deadened in a most effective, radical manner.

[0028] Moreover, it also enables a significant energy saving effect to be attained, as well, since it forms a kind of heat shield, or barrier, preventing the heat from being capable of directly transferring from the drum into the surrounding ambient. Furthermore, as this is most clearly illustrated in Figures 3, 4 and 5, between said conduit portion 2A and the corresponding inflow opening 3, and similarly between the conduit portion 4A and the respective outflow opening 5 there may be omitted the use of any gasket or similar sealing means, such as for instance the felt gaskets G 1 and G2 used in prior-art clothes drying machines and shown in Figure 2.

[0029] As a matter of fact, any air that may possibly escape thereat will not be released into the surrounding ambient, but is rather retained inside the container 8.

[0030] The solution illustrated above is anyway such as to allow for a number of further advantageous improvements. With reference to Figure 4, one of these improvements consists in designing the delivery conduit 2 so that a section thereof features a portion that it shares with the base 9, which it extends through, wherein this common portion may be an outwardly facing portion 2B of the conduit 2.

[0031] In a fully similar manner, a section of the outlet conduit 4 features a portion that it shares with the base

10, which it extends through., wherein this common portion may be an outwardly facing portion 4B of the conduit 4.

[0032] It will of course be appreciated that the present invention is by no means limited to the above described embodiment and related improvements, since it may be embodied in a number of other manners, such as in the case in which said portion of the base 9 is in common with a portion of the conduit 2 that faces inwardly, rather than outwardly. A similar solution is easily obtained also as far as the outlet conduit 4 is concerned.

[0033] The illustrations in Figures 3 and 4 are just symbolical views and are used to represent in a simple and readily appreciable manner what is actually the core of the present invention. Figure 5, on the contrary, is a view illustrating an embodiment of the present invention, which is closer to a real machine and provides further construction-related advantages. In this Figure, in fact, there is illustrated a clothes drying machine, in which said container 8 is constituted by a substantially cylindrical wrapper, i.e. side wall which, further to containing the drum 1 and other members and parts associated therewith, as described in greater detail below, is not provided with any base, i.e. front and rear walls of its own, but shuts both frontally and at the rear by abutting against respective portions 16 and 17 of the front wall and the rear wall, respectively, of the outer casing of the machine.

[0034] In addition, the axis X of the cylindrical contour of said container 8 is most suitably caused to coincide with the axis of the drum 1, which is conventionally made in the shape of a cylinder, and which is driven to rotate about an axis of rotation that in turn coincides with said axis X.

[0035] The construction of the machine is in this manner made simpler and less expensive; moreover, the cylindrical wrapper of the container 8, being so connected rigidly to the front and rear wall of the outer casing of the machine, has the effect of increasing the structural robustness thereof.

[0036] With reference to Figures 5 and 6, the drive motor 7 used to rotatably drive the clothes holding drum is also included, jointly with the driving belt 18 used to transmit motion from the motor pulley to the exterior of the drum 1 in a manner largely known as such in the art, inside the container 8.

[0037] It can be readily appreciated that, in the totality of the embodiments illustrated in Figures 3 to 7, no use is made of any gasket or sealing means, such as felts or the like, between the inflow and outflow openings 3 and 5 of the drum 1 and the delivery and outlet or exhaust conduit 2 and 4, respectively. This circumstance, further to enabling the construction of the machine to be simplified to a greater extent, can be accepted without this implying any risk for the proper operation or functional efficiency of the machine to be impaired, since any air that may possibly leak through the connections and the conduits in its way into and out of the drum is anyway retained inside the container 8, so that it cannot escape outside.

[0038] In an advantageous manner, said motor 7 is mounted on the inner surface of the container 8, to which it is secured with the aid of generally known fastening means. Furthermore, for it to be adapted to accommodate said motor 7, said container 8 is shaped so as to feature a suitably shaped niche-like accommodation 19, so that the container 8 practically behaves as a "skin" that encloses solely the drum and the motor, further to obviously a part of the delivery and exhaust conduits. It therefore does not add any particular complication to the construction and the operation of the machine.

[0039] With reference to Figures 5 and 7, a further improvement consists in providing the wall of the drum with a number of perforations 20, so that any air that may possibly leak into the gap or hollow space 21 between the drum 1 and said container 8, is allowed, by passing through said perforations 20, to flow back again into the drum and contribute to the drying process.

[0040] A further advantage of such solution lies in the fact that the air flowing back into the drum through said perforations impinges upon the clothes, i.e. the drying load from outside, thereby favouring a more rapid and uniform drying effect, since the main flow of drying air passes through the drum in an axial direction and, therefore, impinges in a preferential manner upon those portions of clothes or drying items that lie in the central zone of the drum, while it does so in a more limited manner as far as the drying items are concerned, which lie in zones that are closer to the wall of the same drum.

Claims

1. Front-loading clothes drying machine comprising a drum (1) holding the clothes to be dried, an inflow opening (3) that opens into said drum, a delivery conduit (2) that conveys the drying air into said drum through said inflow opening, an outflow opening (5) adapted to allow the drying air to flow from the interior of said drum out to the exterior thereof, an outlet or exhaust conduit (4) that removes the drying air from the interior of said drum through said outflow opening, a motor (7) adapted to rotatably drive said drum in a selective manner, containment means (8) adapted to enclose said rotating drum (1) and said drive motor (7), along with a respective driving belt (18) provided to transmit motion from said motor to said drum, within a common space that is closed, i.e. sealed outwardly, **characterized in that** said containment means (8) comprises also

- a portion (2A) of said air delivery conduit (2), which penetrates said containment means (8) to debouch into said drum, and
- a portion (4A) of said air outlet conduit (4), which penetrates said containment means (8) to debouch into said drum,

therewithin.

2. Clothes drying machine according to claim 1, **characterized in that** said containment means (8) comprise a rear wall or base (9) and a front wall or base (10), and that said rear base (9) shares a portion of the surface thereof with a portion (2B) of the air delivery conduit (2), and/or that said front base (10) shares a portion of the surface thereof with a portion (4B) of the air outlet conduit (4).
3. Machine according to claim 1, **characterized in that** said containment means (8) are constituted by a substantially cylindrical wrapper having an axis that coincides with the axis of said drum, said substantially cylindrical wrapper being closed frontally by a portion (16) of the inner surface of the front wall of the outer casing of the machine, and being further closed at the rear by a portion (17) of the inner surface of the back wall of the outer casing of the machine.
4. Machine according to any of the preceding claims, **characterized in that** said motor (7) is firmly secured onto the inner wall of said containment means (8).
5. Machine according to claim 4 **characterized in that** a portion of the cylindrical surface of said containment means (8) is given a niche-like conformation (19) that is adapted to accommodate said motor (7).
6. Machine according to any of the preceding claims, **characterized in that** no gasket or sealing means is provided between the inflow opening (3) letting air into said drum and said air delivery conduit (2).
7. Machine according to any of the preceding claims, **characterized in that** no gasket or sealing means is provided between the outflow opening (5) letting air out of said drum and said air outlet conduit (4).
8. Machine according to any of the preceding claims, **characterized in that** a plurality of perforations (20) are provided in the outer wall of said rotating drum (1).

Patentansprüche

1. Frontlader-Wäschetrocknermaschine, die eine Trommel (1) umfasst, welche die zu trocknende Wäsche aufnimmt; ferner eine Einflussöffnung (3), die sich in diese Trommel öffnet; eine Zuführungsleitung (2), welche die Trocknungsluft durch die Einflussöffnung in die Trommel befördert; eine Ausflussöffnung (5), die dazu dient, die Trocknungsluft vom Inneren der Trommel nach außerhalb derselben strömen zu lassen; eine Auslass- oder Abluftleitung (4), die die

Trocknungsluft vom Inneren der Trommel durch die Ausflussöffnung entfernt; einen Motor (7), der dazu geeignet ist, die Trommel wahlweise rotierend anzutreiben; Behältermittel (8), die dazu geeignet sind, die rotierende Trommel (1) und den Antriebsmotor (7) zu umschließen, mit einem zugehörigen Treibriemen (18), der dazu vorgesehen ist, die Bewegung von dem Motor auf die Trommel zu übertragen, in einem gemeinsamen Raum, der geschlossen, d. h. nach außen hin abgedichtet ist, **dadurch gekennzeichnet, dass** das Behältermittel (8) in sich zusätzlich Folgendes umfasst:

- einen Abschnitt (2A) der Luftzuführungsleitung (2), der das Behältermittel (8) durchdringt, um in die Trommel auszutreten, und
 - einen Abschnitt (4A) der Abluftleitung (4), der das Behältermittel (8) durchdringt, um in die Trommel auszutreten.
2. Kleidertrocknermaschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Behältermittel (8) eine Rückwand oder -basis (9) und eine Frontwand oder -basis (10) umfasst und dass die Rückbasis (9) einen Abschnitt ihrer Oberfläche mit einem Abschnitt (2B) der Luftzuführungsleitung (2) teilt und/oder dass die Frontbasis (10) einen Abschnitt ihrer Oberfläche mit einem Abschnitt (4B) der Abluftleitung (4) teilt.
 3. Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Behältermittel (8) aus einer im wesentlichen zylindrischen Hülle zusammengesetzt ist, die eine mit der Achse der Trommel zusammenfallende Achse aufweist, wobei die im wesentlichen zylindrische Hülle an der Vorderseite durch einen Abschnitt (16) der Innenfläche der Frontwand des Außengehäuses der Maschine abgeschlossen wird und ferner an der Rückseite durch einen Abschnitt (17) der Innenfläche der Rückwand des Außengehäuses der Maschine abgeschlossen wird.
 4. Maschine gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der Motor (7) fest an der Innenwand des Behältermittels (8) montiert ist.
 5. Maschine gemäß Anspruch 4, **dadurch gekennzeichnet, dass** ein Abschnitt der zylindrischen Oberfläche des Behältermittels (8) eine nischenartige Ausgestaltung (19) erfährt, die dazu geeignet ist, den Motor (7) aufzunehmen.
 6. Maschine gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** zwischen der Einflussöffnung (3), welche die Luft in die Trommel einlässt, und der Luftzuführungsleitung (2) kein Dichtungs- oder Versiegelungsmittel vorgesehen

hen ist.

7. Maschine gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** zwischen der Ausflussöffnung (5), welche die Luft aus der Trommel herauslässt, und der Abluftleitung (4) kein Dichtungs- oder Versiegelungsmittel vorgesehen ist.

8. Maschine gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** in der Außenwand der rotierenden Trommel (1) eine Mehrzahl von Perforationen (20) vorgesehen ist.

Revendications

1. Sèche-linge à chargement frontal comprenant un tambour (1) retenant les vêtements à sécher, une ouverture d'afflux (3) qui s'ouvre dans ledit tambour, un conduit de délivrance (2) qui convoie l'air de séchage dans ledit tambour à travers ladite ouverture d'afflux, une ouverture d'écoulement (5) apte à permettre à l'air de séchage de s'écouler de l'intérieur dudit tambour vers l'extérieur de celui-ci, un conduit de sortie ou d'échappement (4) qui retire l'air de séchage de l'intérieur dudit tambour à travers ladite ouverture d'écoulement, un moteur (7) apte à entraîner en rotation ledit tambour d'une manière sélective, des moyens de confinement (8) aptes à renfermer ledit tambour tournant (1) et ledit moteur d'entraînement (7) conjointement avec une courroie d'entraînement respective (18) réalisée pour transmettre le mouvement dudit moteur audit tambour, dans un espace commun qui est fermé, c'est-à-dire scellé vers l'extérieur, **caractérisée en ce que** ledit moyen de confinement (8) comprend également

- une portion (2A) dudit conduit de délivrance d'air (2), qui pénètre dans ledit moyen de confinement (8) pour déboucher dans ledit tambour, et

- une portion (4A) dudit conduit de sortie d'air (4) qui pénètre dans ledit moyen de confinement (8) pour déboucher dans ledit tambour,

dans celui-ci.

2. Sèche-linge selon la revendication 1, **caractérisé en ce que** lesdits moyens de confinement (8) comprennent une paroi arrière ou base (9) et une paroi avant ou base (10), **en ce que** ladite base arrière (9) partage une portion de sa surface avec une portion (2B) du conduit de délivrance d'air (2) et/ou **en ce que** ladite base avant (10) partage une portion de sa surface avec une portion (4B) du conduit de sortie d'air (4).

3. Machine selon la revendication 1, **caractérisée en ce que** lesdits moyens de confinement (8) sont constitués par une enveloppe sensiblement cylindrique ayant un axe qui coïncide avec l'axe dudit tambour, ladite enveloppe sensiblement cylindrique étant fermée frontalement par une portion (16) d'une surface intérieure de la paroi frontale du boîtier extérieur de la machine et étant fermée en outre à l'arrière par une portion (17) de la surface intérieure de la paroi arrière du boîtier extérieur de la machine. 5
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4. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ledit moteur (7) est solidement fixé à la paroi intérieure desdits moyens de confinement (8). 15
5. Machine selon la revendication 4, **caractérisée en ce qu'**une portion de la surface cylindrique dudit moyen de confinement (8) est réalisée en une forme semblable à une niche (19) qui est apte à recevoir ledit moteur (7). 20
6. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**aucun joint d'étanchéité ni moyen de scellement n'est prévu entre l'ouverture d'afflux (3) laissant rentrer l'air dans ledit tambour et ledit conduit de délivrance d'air (2). 25
7. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**aucun joint d'étanchéité ni moyen de scellement n'est prévu entre l'ouverture d'écoulement (5) laissant l'air s'échapper dudit tambour et ledit conduit de sortie d'air (4). 30
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8. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**une pluralité de perforations (20) sont réalisées dans la paroi extérieure dudit tambour tournant (1). 40

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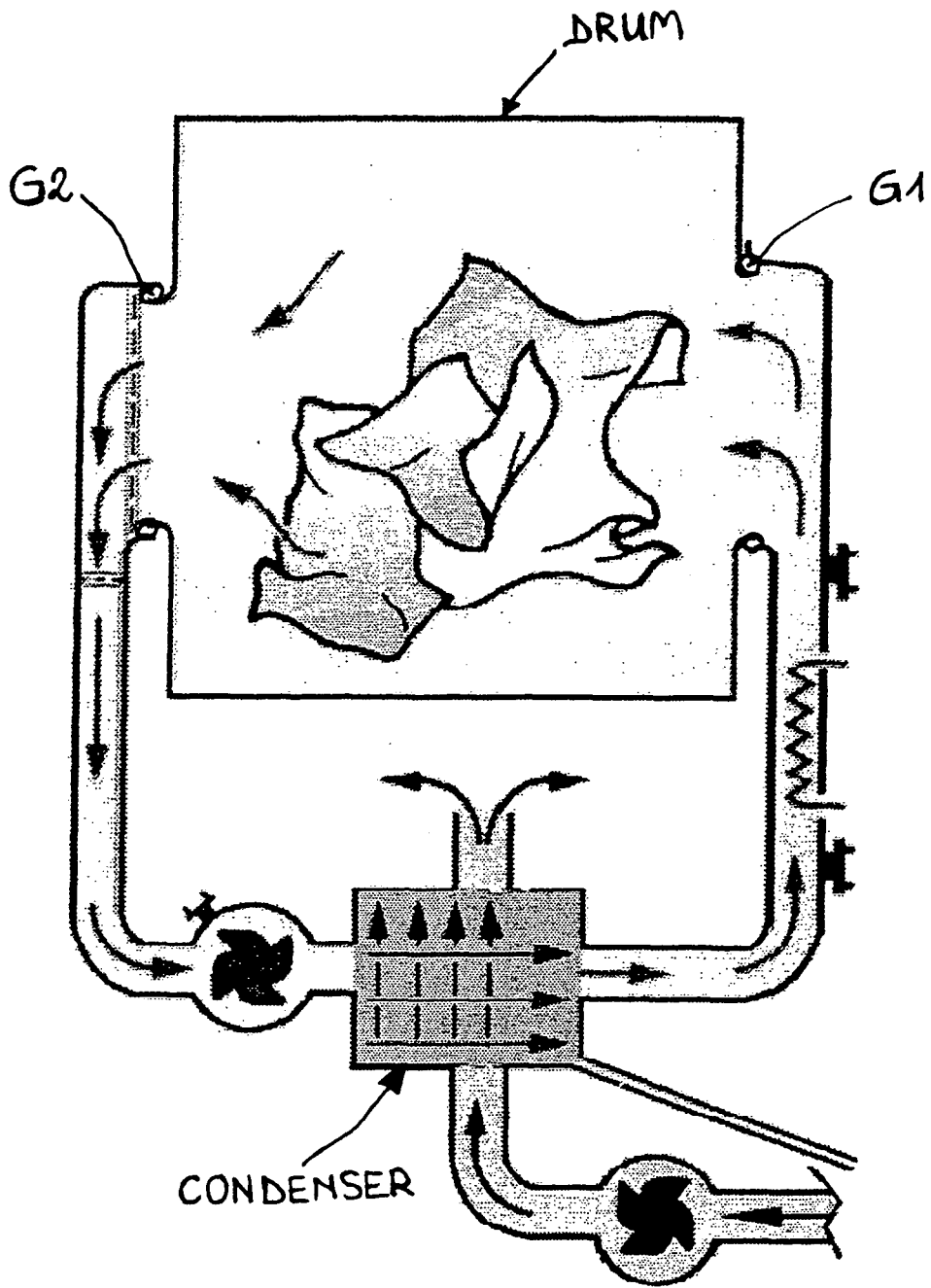


FIG. 1

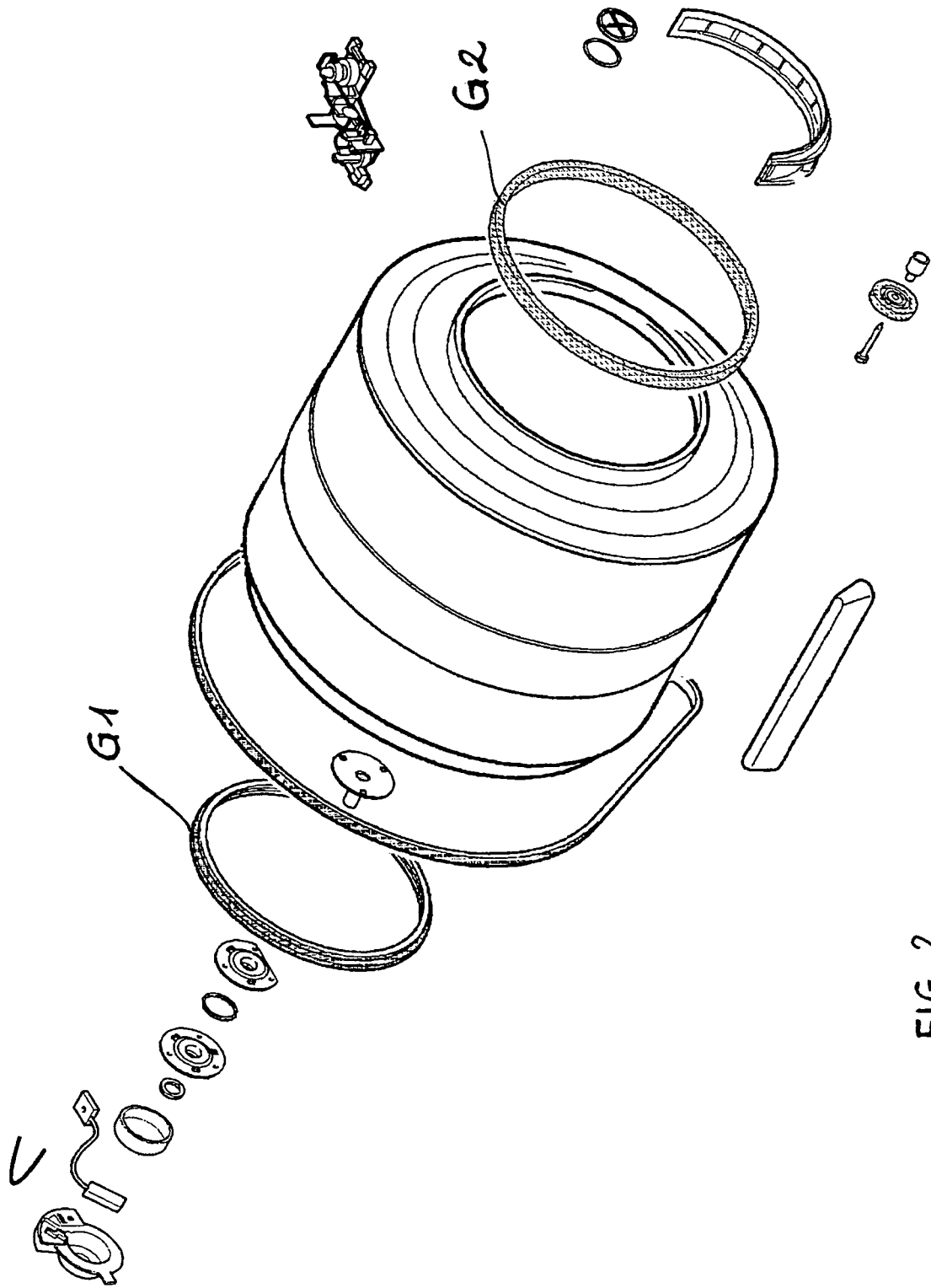
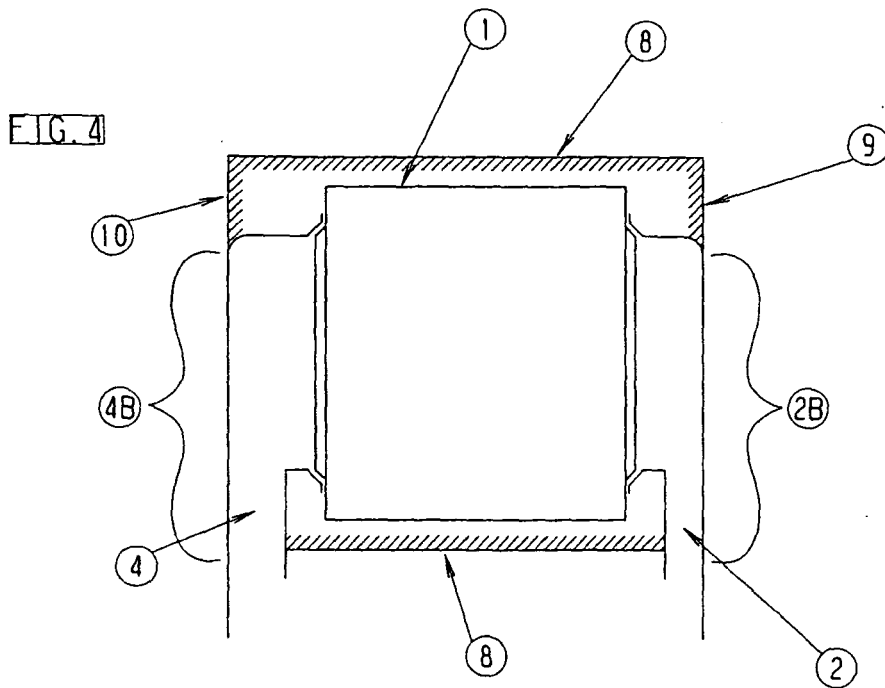
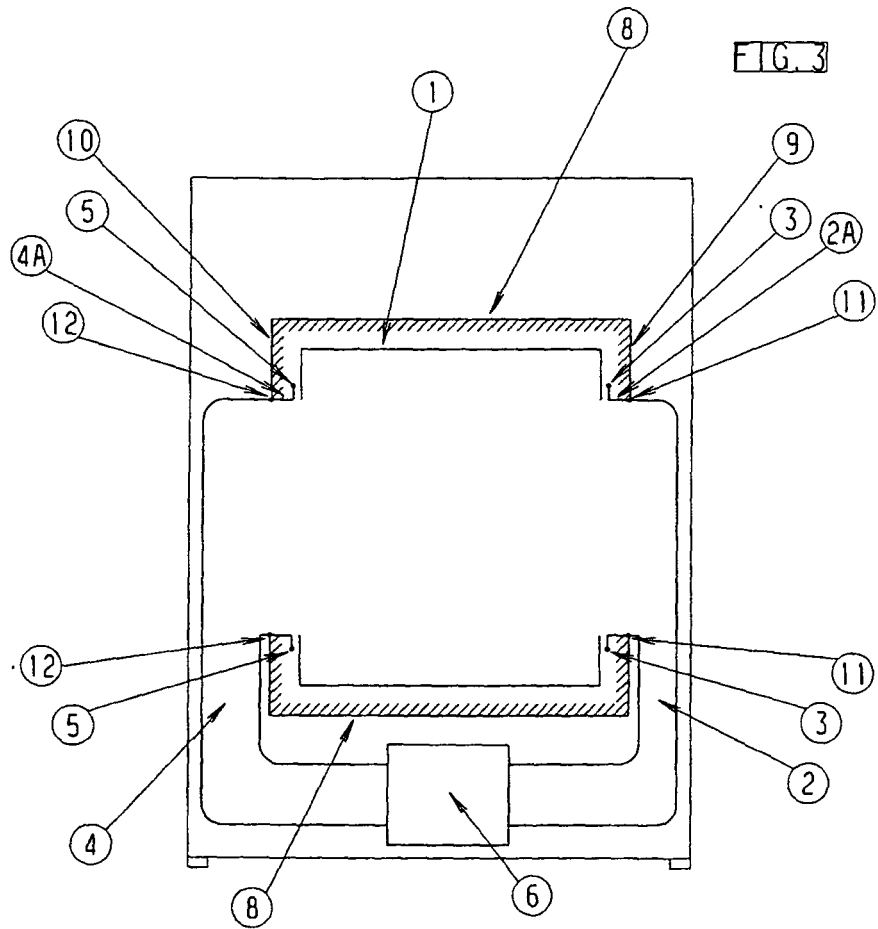


FIG. 2



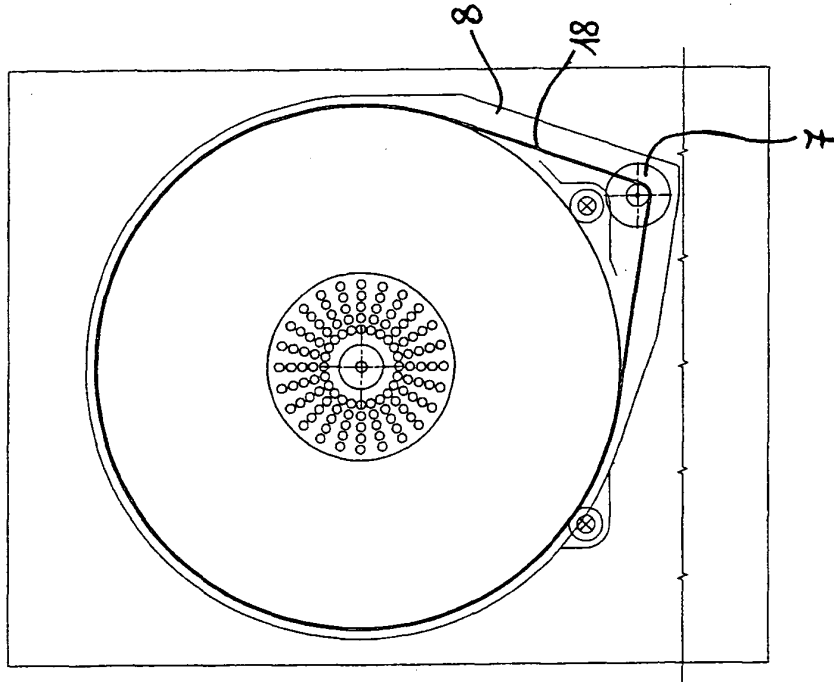


FIG. 6

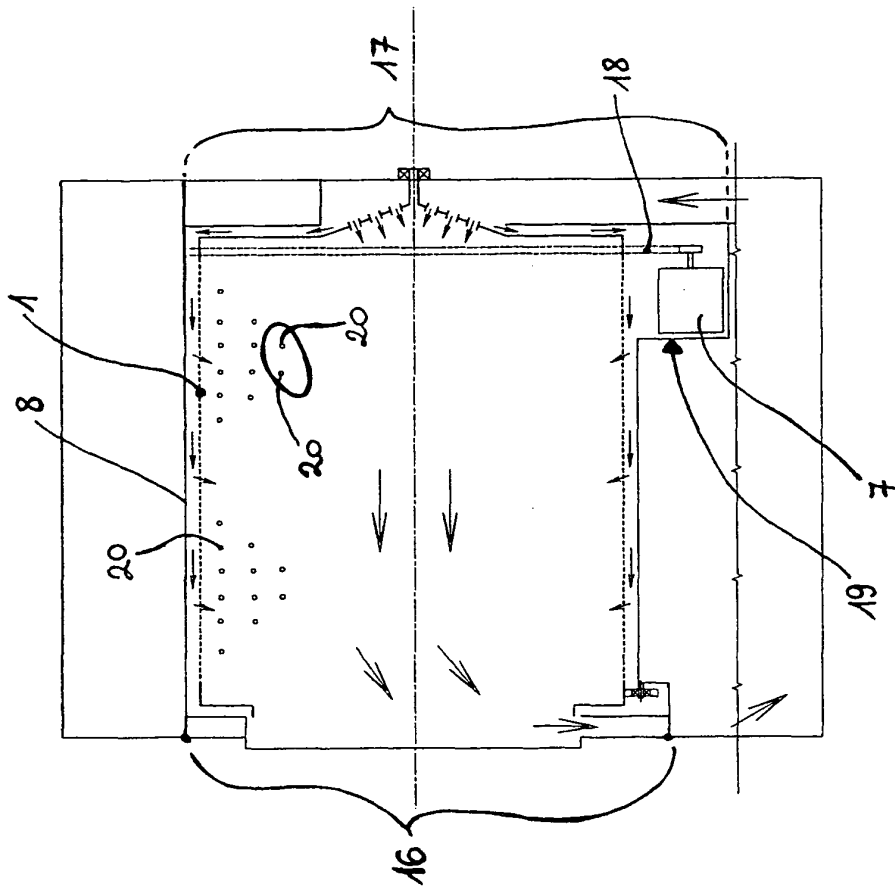


FIG. 5

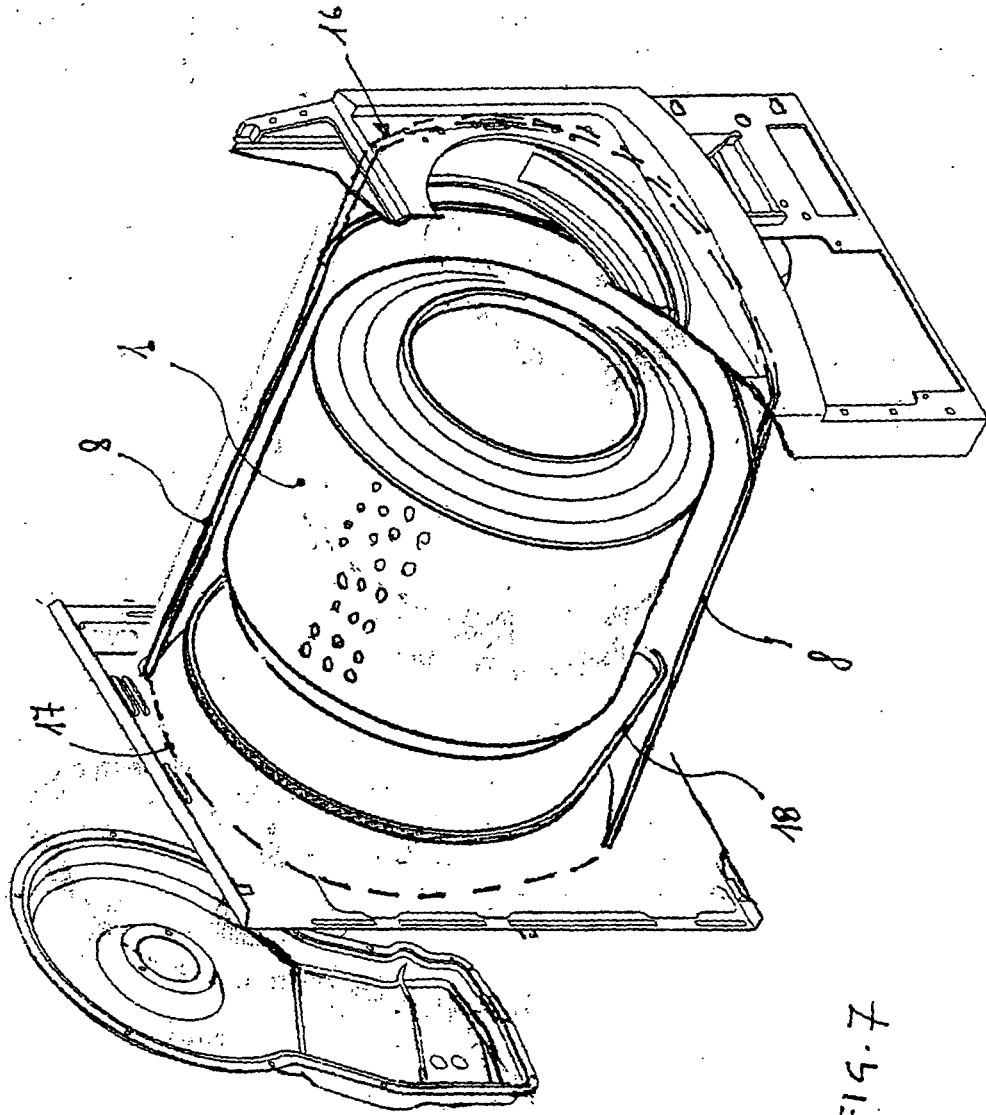


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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