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(54) Rotary-drum laundry dryer

(57) Rotary-drum laundry dryer (1) comprising an outer casing (2) having a front wall (2a) and a rear wall (2b), a rotatable drum (3) which is structured for housing the laundry to be dried and is fixed in axially rotating manner inside the casing (2), and a hot-air generator (6) structured to circulate a stream of hot air through the rotatable drum (3); said rotatable drum (3) comprising a substantially cylindrical, tubular body (3) having its front rim (3f) coupled in axially rotating manner to the front wall (2a) of the casing (2) and its rear rim (3r) coupled in substantially airtight and axially rotating manner to the rear wall (2b) of the casing (2) with the interposition of a rear circular sealing gasket (10); the rotary-drum laundry dryer (1) being characterized in that said substantially cylindrical, tubular body (3) is structured for resting on a number of idle supporting rollers (8) which are arranged approximately at the two axial ends of the tubular body (3) so as to allow the tubular body (3) to rotate about its longitudinal reference axis (L) inside the casing (2), and the rear wall (2b) of the casing (2) comprises: a substantially vertically-oriented supporting bulkhead (14) which is made of plastic material and has a permeable-to-air central portion (14c) which is aligned/faced to the rear mouth of the tubular body (3) delimited by said rear rim (3r); a lid or cover (18) which is fixed in substantially airtight manner to the outer face of the supporting bulkhead (14) immediately above said permeable-to-air central portion (14c) of the supporting bulkhead (14), and is shaped so as to form, together with said supporting bulkhead (14), an inner cavity (19) which is fluidly connected to the hot-air generator (6) and to the inside of said tubular body (3); and a substantially cylindrical gasket-supporting collar (16) which protrudes from the inner face of the supporting bulkhead (14) towards the tubular body (3) while remaining substantially coaxial to the rear rim (3r) of said tubular body (3), and has a nominal diameter greater than that of the rear rim (3r) of the tubular body (3); the rear circular sealing gasket (10) being firmly fixed in abutment against the gasket-supporting collar (16) and the gasket-supporting collar (16) being realized in one piece with said supporting bulkhead (14).

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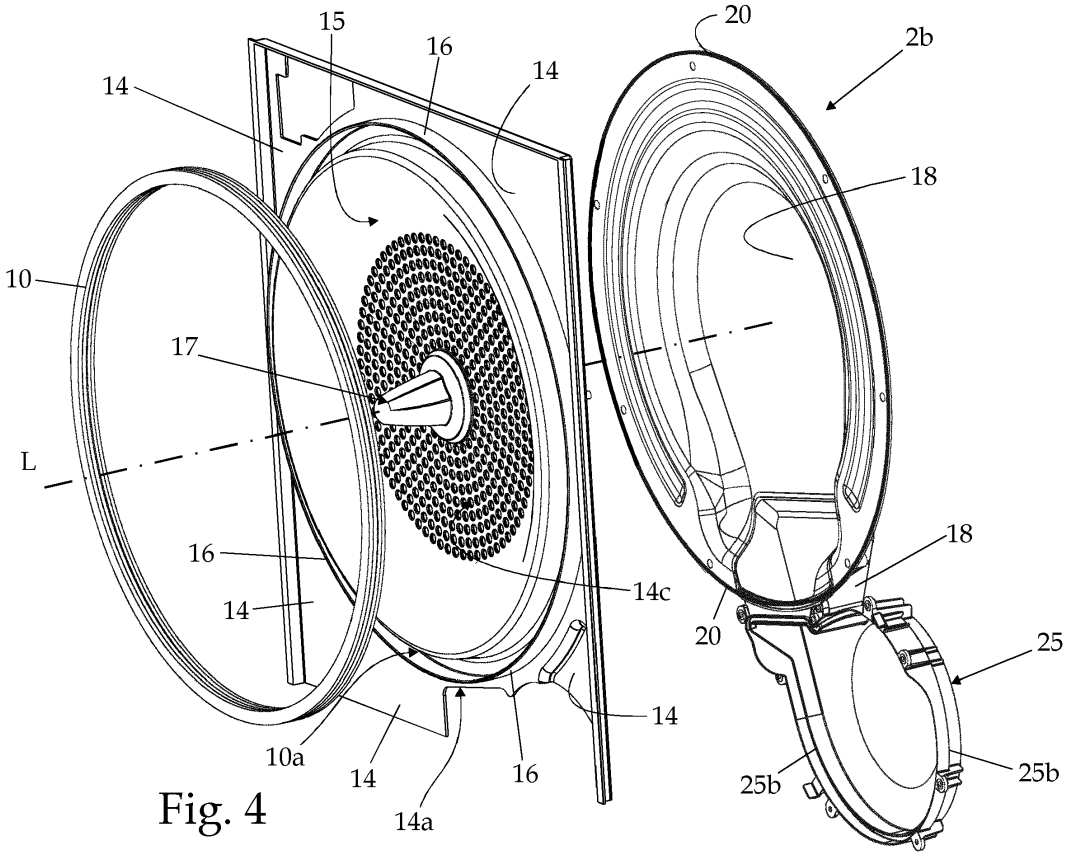
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Fig. 4

Description

[0001] The present invention relates to a rotary-drum laundry dryer.

[0002] In particular, the present invention relates to a rotary-drum home laundry dryer to which the following description refers purely by way of example without implying any loss of generality.

[0003] As is known, rotary-drum laundry dryers currently on the market generally comprise: a substantially parallelepiped-shaped, outer boxlike casing structured for resting on the floor; a substantially cylindrical rotatable drum which is structured for housing the laundry to be dried and is housed in axially rotating manner inside the casing to rotate about an horizontally-oriented longitudinal reference axis, facing a laundry loading/unloading opening formed in the front wall of the casing; a porthole door hinged to the front wall of the casing to rotate to and from a closing position in which the door rests completely against the front wall of the casing to close the laundry loading/unloading opening and airtight seal the rotatable drum; an electrically-powered motor assembly which is housed inside the casing and is structured for driving into rotation the rotatable drum about its longitudinal reference axis; an open-circuit or closed-circuit, hot-air generator which is housed inside the casing and is structured to circulate inside the rotatable drum a stream of hot air which has a very low moisture content and flows through the rotatable drum and over the laundry inside the drum to dry the laundry; and an electronic central control unit which controls both the motor assembly and the hot-air generator to perform, on command, one of the user-selectable drying cycles stored in the same central control unit.

[0004] In most of the rotary-drum home laundry dryers currently on the market, the rotatable drum furthermore consists in a substantially cylindrical, rigid tubular body which extends substantially horizontally inside the boxlike casing, aligned to the laundry loading/unloading opening, and is structured for resting on a number of idle supporting rollers which are arranged at the two axial ends of the tubular body parallel to the drum longitudinal reference axis, and may be fixed to the appliance casing in free revolving manner so as to allow the tubular body to rotate about its horizontally-oriented longitudinal reference axis.

[0005] The front rim of the tubular body surrounds the laundry loading/unloading opening and is coupled in axially rotating manner to the front wall of the boxlike casing; whereas the rear rim of the tubular body abuts against the rear wall of the boxlike casing and is coupled in axially rotating manner to said rear wall.

[0006] The stream of hot air produced by the hot-air generator usually enters into the tubular body via an intake air-vent realized in the rear wall of the boxlike casing, within the perimeter of the rear rim of the tubular body, flows inside the tubular body for the entire length of the latter, and finally comes out of the tubular body via an escape air-vent usually realized on the annular frame that delimits the laundry loading/unloading opening on the front wall of the casing.

[0007] To avoid air leakages from the two axial ends of the tubular body, a first circular sealing gasket is generally interposed between the front rim of the tubular body and the front wall of the casing, whereas a second circular sealing gasket is generally interposed between the rear rim of the tubular body and the rear wall of the appliance casing.

[0008] In most of the rotary-drum home laundry dryers currently on market, the first circular sealing gasket is usually recessed into a circular groove realized on the front wall of the casing and is firmly fixed to the bottom of the groove so as to remain stationary when the rotatable drum rotates about its longitudinal reference axis. The second circular sealing gasket instead is usually fixed to a cylindrical supporting collar which in turn is generally clinched to the rear wall of the boxlike casing coaxial to the rear rim of the tubular body. Alike the first circular sealing gasket, the second circular sealing gasket is firmly to the inner surface of the cylindrical supporting collar so as to remain stationary when the rotatable drum rotates about its longitudinal reference axis.

[0009] Since the back of the rotatable drum consists in the rear wall of the boxlike casing and remains stationary during rotation of the rotatable drum, most of the laundry dryers referred above are also provided with an anti-entangling nose that protrudes from the rear wall of the casing roughly at centre of the rear rim of the tubular body, and extends inside the tubular body substantially parallel to the drum longitudinal reference axis. This nose is shaped/dimensioned so to prevent, when the drum rotates, the laundry from entangling on the rear wall of the casing and block the hot-air intake vent located on said wall.

[0010] Aim of the present invention is to simplify the structure of the rear wall of the boxlike casing so as to significantly reduce the appliance production costs and simplifying the drying machine assembling procedure.

[0011] In compliance with the above aims, according to the present invention there is provided a rotary-drum laundry dryer comprising an outer casing having a front wall and a rear wall, a rotatable drum which is structured for housing the laundry to be dried and is fixed in axially rotating manner inside the casing, and a hot-air generator structured to circulate a stream of hot air through the rotatable drum; said rotatable drum comprising a substantially cylindrical, tubular body having its front rim coupled in axially rotating manner to a front bulkhead and its rear rim coupled in substantially airtight and axially rotating manner to the rear wall of the casing with the interposition of a rear circular sealing gasket; the rotary-drum laundry dryer being characterized in that the rear wall of the casing comprises:

- a substantially vertically-oriented supporting bulkhead which has a permeable-to-air central portion

which is aligned/faced to a rear mouth of the tubular body delimited by said rear rim, and rests on a lower supporting basement or socle of the outer casing;

- a lid or cover which is fixed in substantially airtight manner to the outer face of the supporting bulkhead above said permeable-to-air central portion of the supporting bulkhead, and is shaped so as to form, together with said supporting bulkhead, an inner cavity which is fluidly connected to the hot-air generator and to the inside of said tubular body; and
- a substantially cylindrical gasket-supporting collar which protrudes from the inner face of the supporting bulkhead towards the tubular body while remaining substantially coaxial to the rear rim of said tubular body, and has a diameter greater than that of the rear rim of the tubular body;

the rear circular sealing gasket being fitted in abutment against the gasket-supporting collar and the gasket-supporting collar being realized in one piece with said supporting bulkhead.

[0012] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said substantially vertically-oriented supporting bulkhead is made of plastic material.

[0013] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said gasket-supporting collar is realized in one piece with said supporting bulkhead via an injection molding process.

[0014] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that the supporting bulkhead is furthermore provided with an inwards-protruding, substantially sink-shaped bulge which is aligned/ faced to the rear mouth of the tubular body; in that the permeable-to-air central portion of the supporting bulkhead is located on the bottom of said sink-shaped bulge; and in that the lid or cover is shaped so as to cover said sink-shaped bulge to form the inner cavity of the rear wall of the casing.

[0015] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that the substantially sink-shaped bulge of the supporting bulkhead is substantially circular in shape and is arranged on the supporting bulkhead so to be substantially coaxial to the rear rim of tubular body, and has a diameter lower than that of both the rear rim of tubular body and the circular sealing gasket.

[0016] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that the substantially sink-shaped bulge of the supporting bulkhead is shaped/ dimensioned so as to form, together with the gasket-supporting collar, a substantially circular-shaped annular seat or groove which is arranged coaxial to the rear mouth of tubular body and is shaped/dimensioned to permanently house the rear circular sealing gasket.

[0017] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized by also comprising an anti-entangling nose which protrudes from the inner face of the supporting bulkhead, extends inside the tubular body and is properly shaped/dimensioned so as to prevent, when the tubular body rotates, the entangling of the damp laundry located into the rotatable drum.

[0018] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said anti-entangling nose is realized in one piece with said supporting bulkhead and said gasket-supporting collar.

[0019] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said anti-entangling nose consist in a substantially ogival-shaped bulge or recess which is realized approximately at center of the portion of the supporting bulkhead delimited/encircled by the gasket-supporting collar, and protrudes inside the tubular body.

[0020] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said anti-entangling nose is substantially frustoconical in shape.

[0021] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said anti-entangling nose extends inside the tubular body while remaining substantially coaxial to the longitudinal reference axis of said tubular body.

[0022] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that the hot-air generator comprises: an air recirculating conduit having a first end fluidly connected to the inner cavity formed inside the rear wall of the casing, and a second end fluidly connected to the front mouth of the tubular body delimited by said front rim; and a centrifugal fan located along the air recirculating conduit and structured to produce an airflow which flows through the air recirculating conduit and the rotatable drum.

[0023] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said centrifugal fan is at least partly housed/recessed into the lower supporting basement or socle of the outer casing, and is fluidly connected to the inner cavity formed inside the rear wall of the casing.

[0024] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that that said centrifugal fan comprises an impeller housing shaped/structured so to be fluidly connected to the inner cavity located inside the rear wall of casing; and a impeller which is housed in axially rotating manner inside the impeller housing so to generate, when rotating about its longitudinal reference axis, an airflow that flows to the inner cavity or vice versa.

[0025] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that a lower side edge of the supporting bulkhead is shaped so to match with the portion of the impeller housing which is incorporated in the lower supporting basement or socle.

[0026] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that at least a portion of the impeller housing of the centrifugal fan is realized in one piece with said lid or cover.

[0027] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said lid or cover is made of plastic material.

[0028] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that the hot-air generator furthermore comprises a heat-pump assembly structured for continuously cooling air circulating inside the rotatable drum for removing moisture therefrom, and then heating said air.

[0029] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that said substantially cylindrical-shaped, tubular body is structured for resting on a number of idle supporting rollers which are arranged approximately at the two axial ends of the tubular body, and are preferably, though not necessarily, fitted/fixed to the casing in free revolving manner, so as to allow the tubular body to freely rotate about its longitudinal reference axis inside the casing.

[0030] Preferably, though not necessarily, the rotary-drum laundry dryer is furthermore characterized in that at least a portion of the impeller housing of the centrifugal fan is realized in one piece with said lid or cover via an injection molding process.

[0031] A non-limiting embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figures 1 and 2 are two perspective views, with parts removed for clarity, of a rotary-drum laundry dryer realized in accordance with the teachings of the present invention;
- Figure 3 is a section view of the Figure 1 laundry dryer with parts removed for clarity;
- Figure 4 is a partly-exploded perspective view of the rear wall of the Figure 1 laundry dryer with parts removed for clarity; and
- Figure 5 is an enlarged section-view of the back of the lower portion of Figure 1 laundry dryer with parts removed for clarity.

[0032] With reference to Figures 1, 2 and 3, reference number 1 indicates as a whole a rotary-drum laundry dryer which comprises: a preferably, though not necessarily, parallelepiped-shaped, outer boxlike casing 2 which is structured for resting on the floor and is provided with reciprocally-faced front and rear walls 2a and 2b; a substantially cylindrical, rotatable drum 3 structured for housing the laundry to be dried, and which is fixed in axially rotating manner inside the outer casing 2, facing a laundry loading/unloading pass-through opening formed on the preferably substantially vertically-oriented, front wall 2a of casing 2; and a porthole door 4 hinged to the front wall 2a of casing 2 so to be able to rotate about a preferably, though not necessarily, vertically-oriented reference axis, to and from a closing position in which door 4 rests completely against the front wall 2a to close the laundry loading/unloading opening and substantially airtight seal the rotatable drum 3.

[0033] Inside the boxlike casing 2, the laundry dryer 1 additionally comprises an electrically-powered motor assembly (not shown) structured for driving into rotation the rotatable drum 3 about its longitudinal reference axis; an open-circuit or closed-circuit, hot-air generator 6 which is structured to circulate through the rotatable drum 3 a stream of hot air having a low moisture level, and which flows over and dries the laundry located inside the drum 3; and an electronic central control unit (not shown) which controls both the motor assembly and the hot-air generator 6 to perform, on command, one of the user-selectable drying cycles preferably, though not necessarily, stored in the same central control unit.

[0034] With reference to Figure 3, the rotatable drum 3 preferably consists in a substantially cylindrical-shaped, tubular body 3 preferably made of metal material and which extends inside the boxlike casing 2 coaxial to a preferably substantially horizontally-oriented, longitudinal reference axis L while remaining substantially aligned to the laundry loading/unloading opening on the front wall 2a of the boxlike casing 2. The substantially cylindrical-shaped, rigid tubular body 3 is furthermore preferably structured for resting on a number of idle supporting rollers 8 which are arranged approximately at the two axial ends of tubular body 3 with their rotation axis substantially parallel to the longitudinal reference axis L of tubular body 3, and are preferably, though not necessarily, fitted/fixed to the boxlike casing 2 in free revolving manner, so as to allow the tubular body 3 to rotate about its longitudinal reference axis L inside the boxlike casing 2.

[0035] In addition to the above, the circular front rim 3f of tubular body 3 surrounds the laundry loading/unloading opening realized on the front wall 2a of boxlike casing 2 and is coupled in substantially airtight and axially rotating manner to the front wall 2a, preferably with the interposition of a first circular sealing gasket 9. The circular rear rim 3r of tubular body 3 instead abuts against the preferably substantially vertically-oriented, rear wall 2b of boxlike casing 2 and is coupled in substantially airtight and axially rotating manner to said rear wall 2b with the interposition of a second circular sealing gasket 10. Both front and rear circular sealing gaskets 9 and 10 are substantially coaxial with the longitudinal reference axis L of tubular body 3.

[0036] With reference to Figure 3, the stream of hot air produced by the hot-air generator 6 preferably enters into the tubular body 3 through the rear mouth of tubular body 3, i.e. the mouth of tubular body 3 delimited by the rear rim 3r, flows inside tubular body 3 for the entire length of the latter, and comes out of tubular body 3 through the front mouth of tubular body 3, i.e. the mouth of tubular body 3 delimited by the front rim 3f, or vice versa.

[0037] In other words, the stream of hot air produced

by the hot-air generator 6 preferably enters into tubular body 3 via an intake air-vent located in the rear wall 2b of the boxlike casing 2 and aligned to the rear mouth of tubular body 3, i.e. within the perimeter of the rear rim 3r of tubular body 3, and comes out of tubular body 3 via an escape air-vent which is preferably located either on the porthole door 4 that selectively closes the laundry loading/unloading opening of front wall 2a, or on the front wall 2a of the boxlike casing 2, preferably very close to the laundry loading/unloading opening.

[0038] With reference to Figures 1, 2 and 3, in the example shown, the outer boxlike casing 2 preferably comprises a substantially parallelepiped-shaped lower supporting basement or socle 11 which is structured for resting on the floor and preferably also for housing at least part of the hot-air generator 6; and a substantially parallelepiped-shaped boxlike cabinet 12 which is rigidly fixed to the top of the lower supporting basement or socle 11 and it is structured so as to house the rotatable drum 3.

[0039] The laundry loading/unloading opening of the boxlike casing 2 is realized in the front wall of the upper boxlike cabinet 12, and the porthole door 4 is hinged to the front wall of the same upper boxlike cabinet 12. The idle supporting rollers 8 that support in free revolving manner the tubular body 3 are preferably fixed to the top of the lower supporting basement or socle 11.

[0040] As regards tubular body 3, the circular front rim 3f of tubular body 3 surrounds the laundry loading/unloading opening on the front wall of the upper boxlike cabinet 12 and is coupled in substantially airtight and axially rotating manner to the same front wall of the boxlike cabinet 12, preferably with the interposition of the front circular sealing gasket 9. The circular rear rim 3r of tubular body 3 instead abuts against the rear wall of the upper boxlike cabinet 12 and is coupled in substantially airtight and axially rotating manner to the same rear wall of the boxlike cabinet 12 with the interposition of the rear circular sealing gasket 10.

[0041] The stream of hot air produced by the hot-air generator 6, therefore, enters into the tubular body 3 via an intake air-vent located in the rear wall of the upper boxlike cabinet 12 and aligned to the rear mouth of tubular body 3, i.e. within the perimeter of the rear rim 3r of tubular body 3, and comes out of tubular body 3 via an escape air-vent which is preferably located either on the porthole door 4 that closes the laundry loading/unloading opening on the front wall of the upper boxlike cabinet 12, or on the front wall of the upper boxlike cabinet 12. Obviously the arrangement of intake and escape air-vents could be inverted.

[0042] With reference to Figure 3, in the example shown, the circular sealing gasket 9 is preferably, though not necessarily, stationary recessed into a circular groove or seat realized on a front panel or bulkhead 13 which is preferably associated to the front wall of the upper boxlike cabinet 12, i.e. to the front wall 2a of casing 2, so as to completely surround the laundry loading/unloading opening on the front wall of cabinet 12, and the front rim 3f of tubular body 3 abuts against said front circular sealing gasket 9.

[0043] Furthermore, the front bulkhead 13 preferably comprises a substantially funnel-shaped coupling element which surrounds the laundry loading/unloading opening on the front wall of cabinet 12 and is preferably shaped/structured so as to connect the laundry loading/unloading opening on the front wall of cabinet 12 to the front rim 3f of tubular body 3, and the circular sealing gasket 9 is preferably stationary recessed into a circular groove or seat realized on the periphery of the funnel-shaped coupling element of front bulkhead 13

[0044] Furthermore, in the example shown the stream of hot air produced by hot-air generator 6 preferably comes out of tubular body 3 via an escape air-vent realized in the funnel-shaped coupling element of front bulkhead 13 that delimits/ surrounds the laundry loading/unloading opening on the front wall of the upper boxlike cabinet 12, i.e. on the front wall 2a of boxlike casing 2.

[0045] With reference to Figures 2, 3 and 4, the circular sealing gasket 10 is instead firmly fixed to the rear wall of the upper boxlike cabinet 12, i.e. to the rear wall 2b of the boxlike casing 2, and the intake air-vent of hot-air generator 6 is incorporated into the same rear wall of the upper boxlike cabinet 12, i.e. into the rear wall 2b of the boxlike casing 2.

[0046] The rear wall of the upper boxlike cabinet 12, i.e. the rear wall 2b of casing 2, preferably comprises a substantially vertically-oriented supporting panel or bulkhead 14 which is faced to the rear rim 3r of tubular body 3 and is preferably centrally provided with an inwards-protruding, substantially sink-shaped bulge 15 which is aligned/faced to the rear mouth of tubular body 3 delimited by rear rim 3r. The supporting bulkhead 14 therefore preferably rests on the lower supporting basement or socle 11 of the outer boxlike casing 2.

[0047] The supporting bulkhead 14 is furthermore provided with a substantially cylindrical gasket-supporting collar 16 which protrudes from the inner face of the supporting bulkhead 14 towards the tubular body 3 while remaining substantially coaxial to the longitudinal axis L of tubular body 3, i.e. coaxial to the rear rim 3r of tubular body 3, so as to encircle the sink-shaped bulge 15, and has a nominal diameter greater than that of the rear rim 3r of tubular body 3 so as to encircle the rear rim 3r.

[0048] The circular sealing gasket 10 is encircled and fitted/recessed into the gasket-supporting collar 16 preferably in substantially airtight manner, and is suitably shaped/dimensioned so as to come in abutment against the rear rim 3r of tubular body 3 without interruption all around the perimeter of the latter, so as to avoid any air leakage between the rear rim 3r of tubular body 3 and the supporting bulkhead 14.

[0049] In addition to the above, with reference to Figures 3 and 4, the inwards-protruding, substantially sink-shaped bulge 15 of supporting bulkhead 14 is furthermore preferably suitably shaped/dimensioned so as to form, together with the gasket-supporting collar 16, a

substantially circular-shaped annular seat or groove 10a which is arranged coaxial to the rear mouth of tubular body 3 and is suitably shaped/dimensioned to house the rear circular sealing gasket 10.

[0050] In the example shown, the circular sealing gasket 10 is preferably fixed, and/or force-fitted into and/or glued to the gasket-supporting collar 16. Preferably, though not necessarily, the circular sealing gasket 10 is furthermore suitably shaped/dimensioned so as to also abuts against the beneath-located supporting bulkhead 14 without interruption all around the perimeter of the gasket.

[0051] With reference to Figures 3 and 4, a central portion 14c of the supporting bulkhead 14 delimited/encircled by the gasket-supporting collar 16 is furthermore perforated, or at any rate structured to be permeable to air, so that the stream of hot air flowing along the tubular body 3 is allowed to flow trough the supporting bulkhead 14.

[0052] In other words, the supporting bulkhead 14 is furthermore provided with a perforated, or at any rate permeable to air, central portion 14c which is aligned/faced to the rear mouth of tubular body 3 delimited by rear rim 3r, and the gasket-supporting collar 16 encircles/surrounds the permeable-to-air central portion 14c of the supporting bulkhead 14.

[0053] In the example shown, the perforated, or at any rate permeable to air, central portion 14c of the supporting bulkhead 14 is preferably located at the bottom of the sink-shaped bulge 15 of supporting bulkhead 14, so that the stream of hot air produced by hot-air generator 6 and flowing along tubular body 3 is allowed to flow through the bottom of the sink-shaped bulge 15.

[0054] Furthermore, the supporting panel or bulkhead 14 of rear wall 2b is preferably made of plastic material preferably via an injection molding process, and the gasket-supporting collar 16 and, if present, the sink-shaped bulge 15 are realized in one piece with the same supporting bulkhead 14.

[0055] With reference to Figures 3 and 4, the rotary-drum home laundry dryer 1 preferably, though not necessarily, also comprises a laundry anti-entangling nose 17 which protrudes from the inner face of the supporting bulkhead 14 and extends inside the tubular body 3 preferably while remaining substantially coaxial to the longitudinal reference axis L of tubular body 3, and is shaped/dimensioned so as to prevent, when tubular body 3 rotates, the entangling of the damp laundry located into the rotatable drum 3. The anti-entangling nose 17 is furthermore preferably substantially frustoconical in shape.

[0056] In the example shown, the anti-entangling nose 17, alike the gasket-supporting collar 16, is preferably realized in one piece with the supporting panel or bulkhead 14, and preferably, though not necessarily, consists in a preferably substantially ogival-shaped bulge or recess which is realized approximately at center of the portion of the supporting bulkhead 14 delimited/encircled by the gasket-supporting collar 16, and which protrudes inside the tubular body 3 preferably while remaining substantially coaxial to the longitudinal reference axis L of tubular body 3. Furthermore the ogival-shaped bulge or recess realized at center of the gasket-supporting collar 16 is preferably, though not necessarily, substantially in the shape of a cone.

[0057] In other words, the anti-entangling nose 17 is preferably realized in one piece with the supporting bulkhead 14 and the gasket-supporting collar 16 preferably via an injection molding process.

[0058] In addition to the above, in the example shown the anti-entangling nose 17 is furthermore preferably located on the bottom of the sink-shaped bulge 15 of supporting bulkhead 14.

[0059] With reference to Figures 2, 3 and 4, the rear wall of the upper boxlike cabinet 12, i.e. the rear wall 2b of casing 2, moreover comprises a lid or cover 18 which is firmly fixed to the outer face of the supporting bulkhead 14 above the sink-shaped bulge 15 of bulkhead 14, i.e. above the perforated, or at any rate permeable to air, central portion 14c of the supporting bulkhead 14 circumscribed by the gasket-supporting collar 16, and it is shaped/dimensioned to cover the sink-shaped bulge 15 of the supporting bulkhead 14 so as to form/delimit, together with the supporting bulkhead 14, an inner cavity 19 which is aligned/faced to the rear mouth of tubular body 3 delimited by rear rim 3r, and communicates with, i.e. is fluidly connected to, the inside of tubular body 3 so that the stream of hot air circulating inside the rotatable drum 3 is obliged to flow into, or flow out of, the rear mouth of rotatable drum 3 only via said inner cavity 19.

[0060] The hot-air generator 6, in turn, is structured so as to communicate with, i.e. be fluidly connected to, the inner cavity 19 realized inside the rear wall of the upper boxlike cabinet 12, i.e. inside the rear wall 2b of casing 2, so as to circulate the stream of hot air to and from said inner cavity 19.

[0061] In the example shown, the lid or cover 18 is coupled in substantially airtight manner to the supporting bulkhead 14 preferably with the interposition of an annular sealing gasket 20 which surrounds the perimeter of the sink-shaped bulge 15, so as to form/delimit, together with the supporting bulkhead 14, an inner cavity 19 which is aligned/ faced to the rear mouth of tubular body 3 delimited by rear rim 3r, and which communicates with, i.e. is fluidly connected to, both the inside of tubular body 3 and the hot-air generator 6 so that the stream of hot air circulating inside the rotatable drum 3 is obliged to flow into, or flow out of, the rear mouth of rotatable drum 3 through the inner cavity 19.

[0062] With particular reference to Figures 3 and 4, in the example shown the sink-shaped bulge 15 of bulkhead 14 is furthermore preferably substantially circular in shape, is arranged on supporting bulkhead 14 so to be substantially coaxial to the longitudinal axis L of the tubular body 3, i.e. coaxial to the rear rim 3r of tubular body 3, and has a nominal diameter lower than that of both the rear rim 3r of tubular body 3 and the circular sealing

gasket 10. Furthermore the substantially circular, sink-shaped bulge 15 is preferably suitably shaped/dimensioned so as to form, together with the gasket-supporting collar 16, the annular seat or groove 10a that houses the rear circular sealing gasket 10.

[0063] Preferably, though not necessarily, the bottom of the substantially circular, sink-shaped bulge 15 of supporting bulkhead 14 is moreover centrally provided with a substantially dish- or basin-shaped circular recess having its concavity faced to the inside of tubular body 3, and the perforated, or at any rate permeable to air, portion 14c of bulkhead 14 is preferably realized at centre of said dish- or basin-shaped circular recess formed on the bottom of the sink-shaped bulge 15 of bulkhead 14.

[0064] The anti-entangling nose 17, in turn, preferably protrudes from the bottom of the sink-shaped bulge 15 of bulkhead 14, substantially at center of the bulge 15, and preferably consists in a substantially ogival-shaped, bulge or recess which is realized approximately at center of the dish- or basin-shaped circular recess formed on the bottom of the substantially circular, sink-shaped bulge 15 of supporting bulkhead 14. Preferably this ogival-shaped bulge or recess is furthermore shaped like an ice-cream cone.

[0065] With reference to Figures 3 and 4, the lid or cover 18 in turn is preferably substantially circular in shape and is firmly fixed to the supporting bulkhead 14 substantially coaxial to the longitudinal axis L of the tubular body 3, so as to form a substantially circular-shaped inner cavity 19 which is substantially coaxial to the longitudinal axis L of the tubular body 3.

[0066] Preferably, though not necessarily, the lid or cover 18 is furthermore substantially dish- or basin-shaped and is firmly fixed to the supporting panel or bulkhead 14 with its concavity facing the bottom of the substantially circular, sink-shaped bulge 15 of bulkhead 14, so as to form, inside the rear wall of the upper boxlike cabinet 12 (i.e. inside the rear wall 2b of the boxlike casing 2), a substantially circular, lenticular-shaped inner cavity 19 which communicates with, i.e. is fluidly connected to, both the inside of tubular body 3 and the hot-air generator 6.

[0067] Alike the supporting bulkhead 14, also the lid or cover 18 is preferably made of plastic material and it is preferably, though not necessarily, realized via an injection molding process.

[0068] With reference to Figures 1, 2, 3, 4 and 5, the hot-air generator 6 of laundry dryer 1 instead preferably, though not necessarily, consists in a closed-circuit, hot-air generator 6 which is structured for drawing air from rotatable drum 3; cooling down the air arriving from rotatable drum 3 so to extract and retain the surplus moisture in the air drawn from rotatable drum 3; heating the dehumidified air to a predetermined temperature normally higher than the temperature of the air drawn out from rotatable drum 3; and feeding the heated, dehumidified air back into the rotatable drum 3, where it flows over, the laundry inside the drum to rapidly dry said laundry.

[0069] In other words, with reference to Figure 3, the hot-air generator 6 provides for continually dehumidifying and heating the air circulating inside rotatable drum 3 to dry the laundry located inside the drum 3, and preferably comprises:

- an air recirculating conduit 21 having a first end in communication with, i.e. fluidly connected to, the inner cavity 19 arranged inside the rear wall 2b of casing 2, and a second end in communication with, i.e. is fluidly connected to, the front mouth of tubular body 3;
- an electrically-powered centrifugal fan 22 or other type of air circulating pump, which is located along the air recirculating conduit 21 and is structured to produce an airflow f which flows in closed loop through the air recirculating conduit 21 and the rotatable drum 3;
- air cooling means 23 which are located along the air recirculating conduit 21 preferably, thought not necessarily, upstream of the air centrifugal fan 22, and are structured to cool the moist air arriving from rotatable drum 3 so as to cause the condensation of the surplus moisture inside the airflow f; and
- air heating means 24 which are located along the air recirculating conduit 21, downstream of the air cooling means 23 and preferably also upstream of the air centrifugal fan 22, and which are structured for heating the dehumidified airflow f arriving from the air cooling means 23 and directed back to rotatable drum 3, so that the airflow f directed back into rotatable drum 3 is heated to a temperature preferably, though not necessarily, higher than or equal to that of the moist air flowing out of rotatable drum 3.

[0070] In the example shown, the second end of the air recirculating conduit 21 communicates with, i.e. is fluidly connected to, the front mouth of tubular body 3 via a pass-trough opening realized in the substantially funnel-shaped coupling element of front bulkhead 13 that delimits/surrounds the laundry loading/unloading opening on the front wall of the upper boxlike cabinet 12, i.e. on the front wall 2a of casing 2.

[0071] Furthermore, in the example shown a central/intermediate section of the air recirculating conduit 21 preferably extends in pass-through manner across the lower supporting basement or socle 11 of casing 2, and the air cooling means 23 and air heating means 24 are preferably completely recessed/housed inside said central/ intermediate section of the air recirculating conduit 21.

[0072] With reference to Figures 3 and 5, the centrifugal fan 22 of hot-air generator 6 is, instead, preferably located on the rear wall 2b of the boxlike casing 2, preferably beneath the rear mouth of tubular body 3, and it is structured so to communicate with, i.e. be fluidly connected to, both the inner cavity 19 formed inside the rear wall of the upper boxlike cabinet 12, i.e. inside the rear wall 2b of casing 2, and the central/intermediate section

of the air recirculating conduit 21, thus to produce an airflow f that flows from the central/intermediate section of the air recirculating conduit 21 to the inner cavity 19, or vice versa.

[0073] In the example shown, the centrifugal fan 22 of the hot-air generator 6 is preferably at least partly housed/recessed into the lower supporting basement or socle 11 of the boxlike casing 2, i.e. into the rear wall 2b of the boxlike casing 2, roughly at the end-opening of the central/intermediate section of the air recirculating conduit 21, so as to communicate with, i.e. be fluidly connected to, said central/intermediate section of the air recirculating conduit 21.

[0074] Furthermore, the centrifugal fan 22 preferably comprises an impeller housing 25 which is located on the lower supporting basement or socle 11, at the end-opening of the central/intermediate section of the air recirculating conduit 21, and is shaped/structured so to communicate with, i.e. be fluidly connected to, both the central/intermediate section of the air recirculating conduit 12 and the inner cavity 19 located inside the rear wall of the upper boxlike cabinet 12, i.e. inside the rear wall 2b of casing 2; and a impeller 26 which is housed in axially rotating manner inside the impeller housing 25 so to generate, when rotating about its longitudinal reference axis A, an airflow f that flows from the central/intermediate section of the air recirculating conduit 21 to the inner cavity 19 or vice versa.

[0075] Preferably, a first portion 25a of the impeller housing 25 is furthermore incorporated in the lower supporting basement or socle 11, whereas a second portion 25b of the impeller housing 25 consists in a separated, cap-shaped rigid cover 25b which is shaped/structured for being substantially airtight coupled to the first portion 25a of the impeller housing 25, so as to form/compose the outer volute of the centrifugal fan 22, and which is furthermore shaped/structured so to communicate with, i.e. be fluidly connected to, the inner cavity 19 located inside the rear wall of the upper boxlike cabinet 12, i.e. inside the rear wall 2b of casing 2.

[0076] With reference to Figures 3, 4 and 5, in the example shown, a portion of the lower side edge 14a of the supporting bulkhead 14 is preferably shaped/structured so to match with the first portion 25a of impeller housing 25 d incorporated in the lower supporting basement or socle 11.

[0077] The second portion 25b of the impeller housing 25 is instead preferably realized in one piece with the lid or cover 18 of the rear wall of boxlike cabinet 12, i.e. of the rear wall 2b of casing 2.

[0078] As regards air cooling means 23 and air heating means 24, in the example shown the hot-air generator 6 is preferably, though not necessarily, provided with a heat-pump assembly structured for continuously cooling and then heating the air circulating inside the air recirculating conduit 21 and the rotatable drum 3. This heat-pump assembly comprises a first and a second air/refrigerant heat exchangers located inside the air recirculating conduit 21, preferably downstream of the centrifugal fan 22. The first air/refrigerant heat exchanger, traditionally referred to as the "evaporator" of the heat-pump circuit, is located inside the air recirculating conduit 21 preferably downstream of the centrifugal fan 22, and is structured to remove/absorb heat from the airflow arriving from rotatable drum 3 so as to remove moisture from said airflow, thus forming the air cooling means 23 of the hot-air generator 6. The second air/refrigerant heat exchanger, traditionally referred to as the "condenser" of the heat-pump circuit, is instead located inside the air recirculating conduit 21 downstream of the first air/ refrigerant heat exchanger 23, and is structured to release heat to the airflow arriving from the first air/refrigerant heat exchanger 23, thus forming the air heating means 24 of the hot-air generator 6.

[0079] As an alternative, the air heating means 24 of hot-air generator 6 may comprise a resistor located inside the air recirculating conduit 21, preferably upstream of the centrifugal fan 22, whereas the air cooling means 23 of hot-air generator 6 may comprise an air/air heat exchanger that uses the external air to cool down the airflow arriving from rotatable drum 3.

[0080] General operation of the rotary-drum home laundry drier 1 is clearly inferable from the above description, with no further explanation required.

[0081] The advantages connected to the particular structure of the rear wall 2b of the boxlike casing 2 are large in number. First of all, a supporting panel or bulkhead 14 preferably made in plastic material and shaped so as to form/incorporate the gasket-supporting collar 16 and optionally also the anti-entangling nose 17, allow to significantly reduce the appliance production costs. Furthermore the one-piece structure greatly simplifies the assembly of the rear wall 2b of the boxlike casing 2.

[0082] Clearly, changes may be made to the rotary-drum home laundry drier 1 as described herein without, however, departing from the scope of the present invention.

[0083] For example, in a less sophisticated non-shown embodiment the laundry anti-entangling nose 17 may consist of a completaly separated, substantially ogival-shaped rigid element which is still preferably made of plastic material, and is rigidly attached to the supporting bulkhead 14 preferably at bottom of the sink-shaped bulge 15 of supporting bulkhead 14, preferably, though not necessarily, via one or more fixing members, such as anchoring screws, rivets or the like, that preferably engage in sequence the body of the supporting bulkhead 14 and the coupling base or socket of said ogival-shaped rigid element.

[0084] According to a non-shown alternative embodiment, the supporting bulkhead 14 of rear wall 2b may lack the sink-shaped bulge 15. In which case the, lid or cover 18 is substantially dish- or basin-shaped and it is firmly fixed to the supporting bulkhead 14 with its concavity facing the supporting bulkhead 14, so as to form, inside the rear wall 2b of the boxlike casing 2, a substan-

tially lenticular-shaped inner cavity 19 which is crossed by the hot air circulating trough tubular body 3.

Claims

1. Rotary-drum laundry dryer (1) comprising an outer casing (2) having a front wall (2a) and a rear wall (2b), a rotatable drum (3) which is structured for housing the laundry to be dried and is fixed in axially rotating manner inside the casing (2), and a hot-air generator (6) structured to circulate a stream of hot air through the rotatable drum (3); said rotatable drum (3) comprising a substantially cylindrical, tubular body (3) having its front rim (3f) coupled in axially rotating manner to a front bulkhead (13) and its rear rim (3r) coupled in substantially airtight and axially rotating manner to the rear wall (2b) of the casing (2) with the interposition of a rear circular sealing gasket (10);
the rotary-drum laundry dryer (1) being **characterized in that** said substantially cylindrical, tubular body (3) is structured for resting on a number of idle supporting rollers (8) which are arranged approximately at the two axial ends of the tubular body (3) so as to allow the tubular body (3) to rotate about its longitudinal reference axis (L) inside the casing (2), and the rear wall (2b) of the casing (2) comprises:

   - a substantially vertically-oriented supporting bulkhead (14) which has a permeable-to-air central portion (14c) which is aligned/faced to a rear mouth of the tubular body (3) delimited by said rear rim (3r), and rests on a lower supporting basement or socle (11) of the outer casing (2);
   - a lid or cover (18) which is fixed in substantially airtight manner to the outer face of the supporting bulkhead (14) above said permeable-to-air central portion (14c) of the supporting bulkhead (14), and is shaped so as to form, together with said supporting bulkhead (14), an inner cavity (19) which is fluidly connected to the hot-air generator (6) and to the inside of said tubular body (3); and
   - a substantially cylindrical gasket-supporting collar (16) which protrudes from the inner face of the supporting bulkhead (14) towards the tubular body (3) while remaining substantially coaxial to the rear rim (3r) of said tubular body (3), and has a diameter greater than that of the rear rim (3r) of the tubular body (3);

   the rear circular sealing gasket (10) being fitted in abutment against the gasket-supporting collar (16) and the gasket-supporting collar (16) being realized in one piece with said supporting bulkhead (14).

2. Rotary-drum laundry dryer according to Claim 1, **characterized in that** the idle supporting rollers (10) are fixed in rotatable manner to the boxlike casing (2) or to the top of the supporting basement or socle (19).

3. Rotary-drum laundry dryer according to Claim 1 or 2, **characterized in that** said substantially vertically-oriented supporting bulkhead (14) is made of plastic material.

4. Rotary-drum laundry dryer according to any Claim 1 to 3, **characterized in that** said gasket-supporting collar (16) is realized in one piece with said supporting bulkhead (14) via an injection molding process.

5. Rotary-drum laundry dryer according to any one of the foregoing claims, **characterized in that** the supporting bulkhead (14) is furthermore provided with an inwards-protruding, substantially sink-shaped bulge (15) which is aligned/ faced to the rear mouth of the tubular body (3); **in that** the permeable-to-air central portion (14c) of the supporting bulkhead (14) is located on the bottom of said sink-shaped bulge (15); and **in that** the lid or cover (18) is shaped so as to cover said sink-shaped bulge (15) to form the inner cavity (19) of the rear wall (2b) of the casing (2).

6. Rotary-drum laundry dryer according to Claim 5, **characterized in that** the substantially sink-shaped bulge (15) of the supporting bulkhead (14) is substantially circular in shape and is arranged on the supporting bulkhead (14) so to be substantially coaxial to the rear rim (3r) of tubular body (3), and has a diameter lower than that of both the rear rim (3r) of tubular body (3) and the circular sealing gasket (10).

7. Rotary-drum laundry dryer according to Claim 5 or 6, **characterized in that** the substantially sink-shaped bulge (15) of the supporting bulkhead (14) is shaped/ dimensioned so as to form, together with the gasket-supporting collar (16), a substantially circular-shaped annular seat or groove (10a) which is arranged coaxial to the rear mouth of tubular body (3) and is shaped/dimensioned to house the rear circular sealing gasket (10).

8. Rotary-drum laundry dryer according to any one of the foregoing claims, **characterized by** also comprising an anti-entangling nose (17) which protrudes from the inner face of the supporting bulkhead (14), extends inside the tubular body (3) and is properly shaped/dimensioned so as to prevent, when the tubular body (3) rotates, the entangling of the damp laundry located into the rotatable drum (3).

9. Rotary-drum laundry dryer according to any one of the foregoing claims, **characterized in that** the hot-

air generator (6) comprises: an air recirculating conduit (21) having a first end fluidly connected to the inner cavity (19) formed inside the rear wall (2b) of the casing (2), and a second end fluidly connected to the front mouth of the tubular body (3) delimited by said front rim (3f); and a centrifugal fan (22) located along the air recirculating conduit (21) and structured to produce an airflow (f) which flows through the air recirculating conduit (21) and the rotatable drum (3).

10. Rotary-drum laundry dryer according to Claim 9, **characterized in that** said centrifugal fan (22) is at least partly housed/recessed into the lower supporting basement or socle (11) of the outer casing (2), and is fluidly connected to the inner cavity (19) formed inside the rear wall (2b) of the casing (2).

11. Rotary-drum laundry dryer according to Claim 9 or 10, **characterized in that** said centrifugal fan (22) comprises an impeller housing (25) shaped/structured so to be fluidly connected to the inner cavity (19) located inside the rear wall (2b) of casing (2); and a impeller (26) which is housed in axially rotating manner inside the impeller housing (25) so to generate, when rotating about its longitudinal reference axis (A), an airflow (f) that flows to the inner cavity (19) or vice versa.

12. Rotary-drum laundry dryer according to Claim 11, **characterized in that** a lower side edge (14a) of the supporting bulkhead (14) is shaped so to match with a portion (25a) of the impeller housing (25) which is incorporated in a lower supporting basement or socle (11).

13. Rotary-drum laundry dryer according to Claim 11, **characterized in that** at least a portion (25b) of the impeller housing (25) of the centrifugal fan (22) is realized in one piece with said lid or cover (18).

14. Rotary-drum laundry dryer according to any one of the foregoing claims, **characterized in that** said lid or cover (18) is made of plastic material.

15. Rotary-drum laundry dryer according to any one of the foregoing claims, **characterized in that** the hot-air generator (6) furthermore comprises a heat-pump assembly (23, 24) structured for continuously cooling and then heating the air circulating inside the rotatable drum (3).

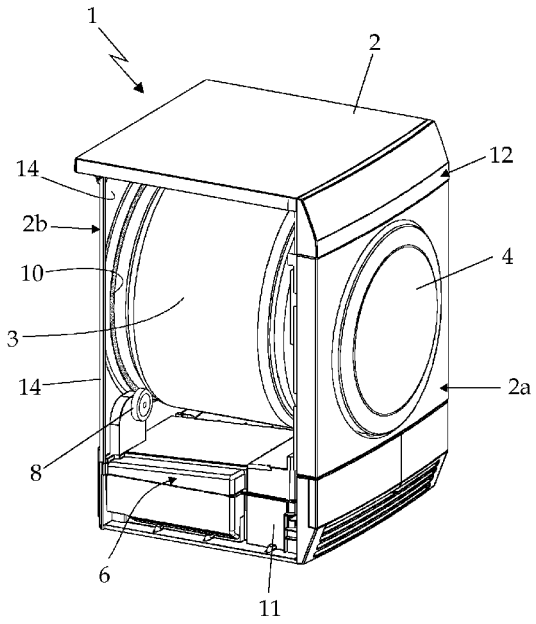

Fig. 1

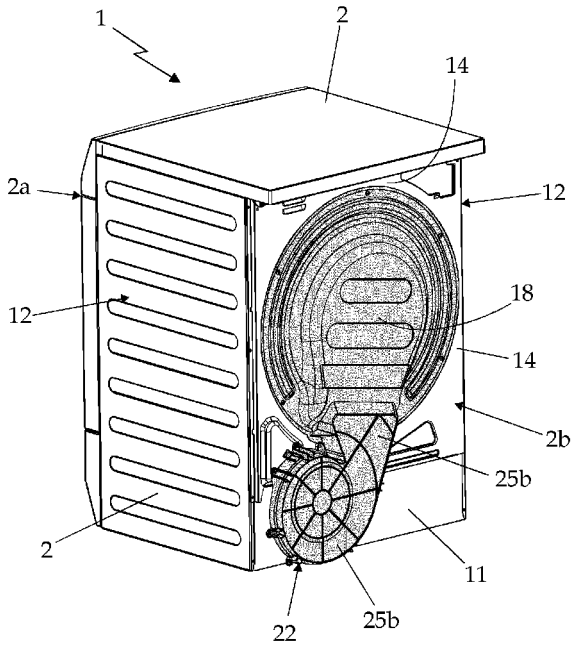

Fig. 2

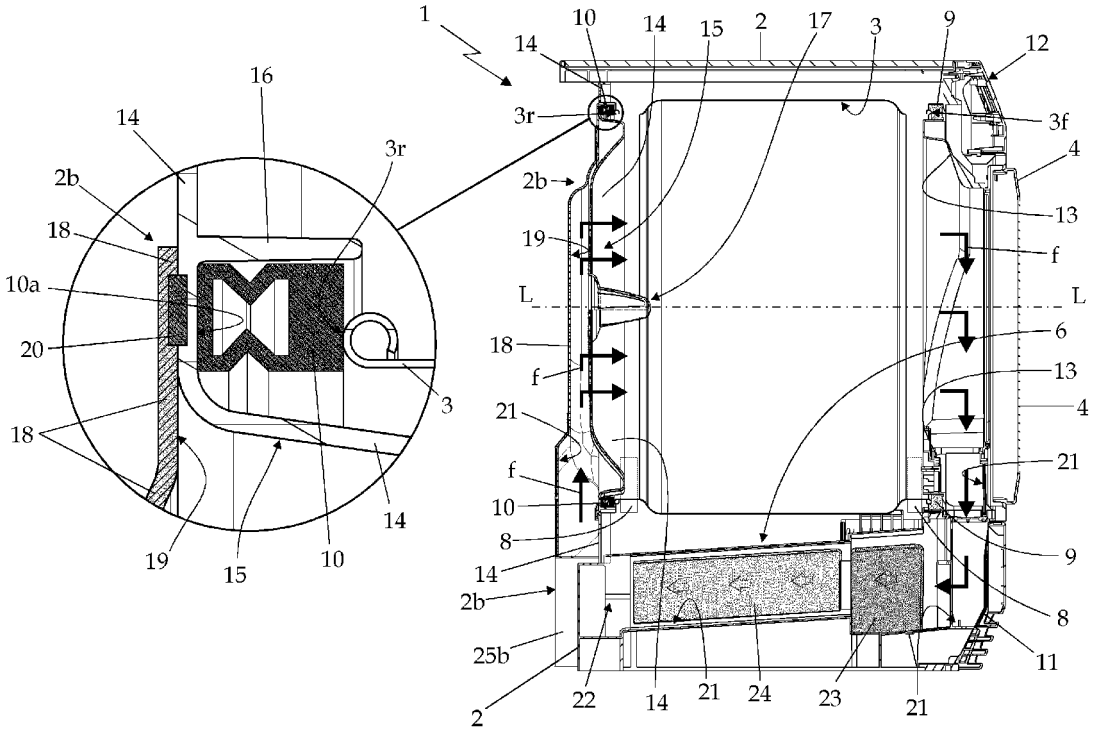
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Fig. 3

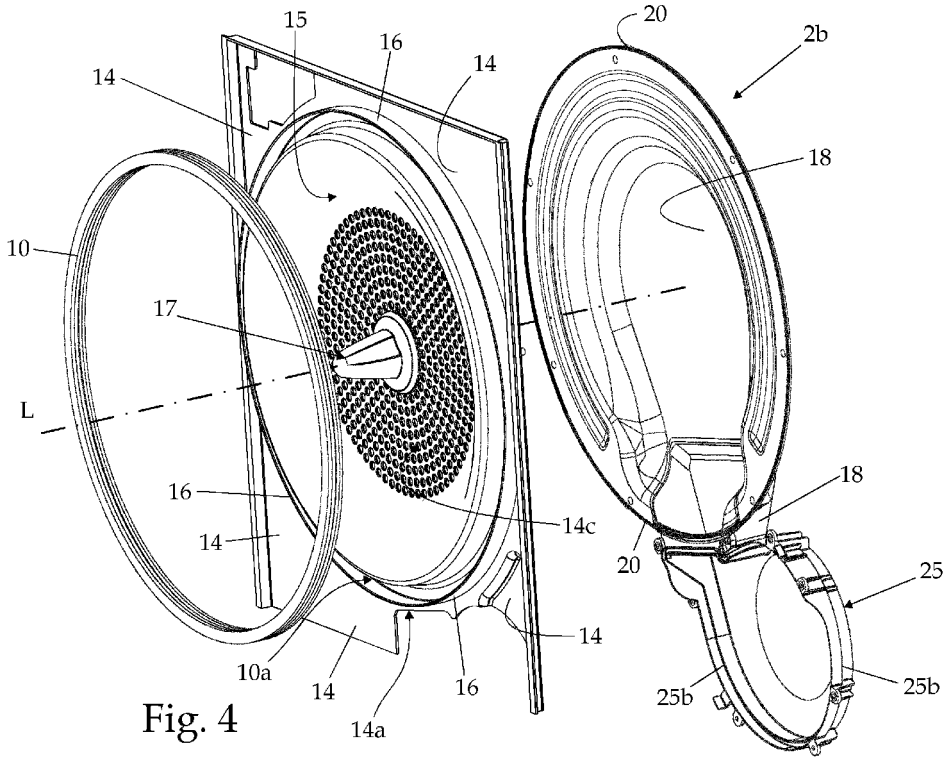
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Fig. 4

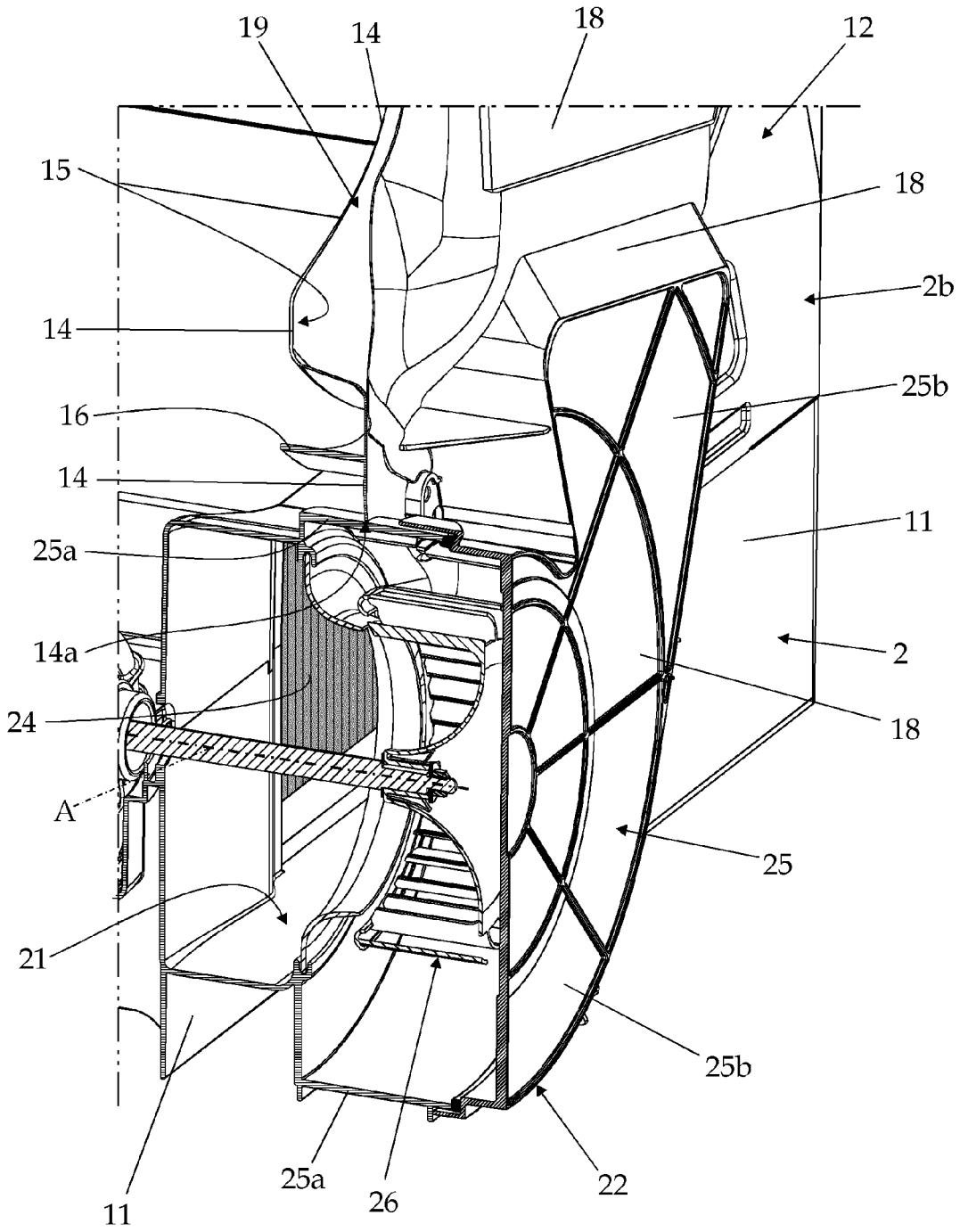
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Fig. 5