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(54) **LAUNDRY DRYER**

WÄSCHETROCKNER

SÉCHOIR À LINGE

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Description

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

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

[0003] As it is known, rotary-drum household 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 which is housed in axially rotating manner inside the casing so to rotate about a substantially horizontally-oriented longitudinal reference axis, directly 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; a 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 rapidly dry the laundry; and finally 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 household laundry dryers currently on the market, the rotatable drum furthermore consists in a substantially cylindrical, rigid tubular body which is generally made of metal material and extends substantially horizontally inside the boxlike casing, locally aligned to the laundry loading/unloading opening. This rigid tubular body may be furthermore structured for resting on a number of idle supporting rollers which are arranged at the two axial ends of the tubular body locally parallel to the drum longitudinal reference axis, and are fixed to the boxlike casing in free revolving manner so as to allow the tubular body to freely rotate about its horizontally-oriented longitudinal reference axis. The circular front rim of the tubular body surrounds the laundry loading/unloading opening and is coupled in substantially airtight and axially rotating manner to the front wall of the boxlike casing; whereas the circular rear rim of the tubular body abuts against the rear wall of the boxlike casing and is coupled in substantially airtight and axially rotating manner directly to said rear wall.

[0005] The closed-circuit, hot-air generator in turn comprises: an air recirculating conduit which extends on the bottom of the boxlike casing and has a first end directly connected to a first air-vent realized in the rear wall of the boxlike casing, within the perimeter of the rear rim

of the tubular body, and a second end directly connected to a second air-vent realized on the annular frame that delimits the laundry loading/ unloading opening on the front wall of the appliance casing; and an electrically-powered centrifugal fan which is located along the air recirculating conduit and is structured to produce an air-flow which flows in closed loop through the air recirculating conduit and the rotatable drum.

The stream of hot air produced by the hot-air generator generally enters into the tubular body via the first air-vent realized in the rear wall of the boxlike casing, flows inside the tubular body for the entire length of the latter, and finally comes out of the tubular body via the second air-vent realized on the annular frame that delimits the laundry loading/unloading opening on the front wall of the casing.

[0006] The closed-circuit, hot-air generator furthermore comprises: an air-cooling device which is located along the air recirculating conduit, and is structured to cool the moist air arriving from the rotatable drum, so as to cause the condensation of the surplus moisture inside the airflow; an air-heating device which is located along the air recirculating conduit, downstream of the air-cooling device and which is structured for heating the dehumidified airflow arriving from the air-cooling device and directed back to the rotatable drum, so that the airflow directed back into the rotatable drum is heated to a temperature preferably, though not necessarily, higher than or equal to that of the moist air flowing out of the same rotatable drum.

[0007] The closed-circuit, hot-air generator is finally provided with an air-filtering member which is arranged along the air recirculating conduit, upstream of the air-cooling device, to prevent the fluff and/or lint particles from reaching and clogging up the air-cooling device, the air-heating device and the centrifugal fan.

[0008] In some of the rotary-drum household laundry dryers currently on the market, the air-filtering member consists in a substantially wedge-shaped air-filtering cartridge which is fitted in removable manner into the air-vent realized on the annular frame that delimits the laundry loading/unloading opening on the front wall of the casing, so as to cover/close the whole air-vent. When the porthole door is in the wide-opened position, the user is allowed to manually extract the wedge-shaped filtering cartridge from the air-vent realized on the annular frame that delimits the laundry loading/unloading opening for periodical cleaning.

[0009] GB2116068 discloses a wedge-shaped air-filtering cartridge for laundry driers which is dimensioned for being inserted/plugged into the air-vent realized on the annular frame that delimits the laundry loading/unloading opening, so as to cover/close the whole air-vent, and which is structured to restrain the fluff and/or lint particles in suspension into the airflow. This air-filtering cartridge basically consists in a substantially bag- or pocket-shaped rigid air-filtering shell which has a substantially V-shaped cross section and is dimensioned for being in-

serted/plugged into the air-vent realized on the annular frame that delimits the laundry loading/ unloading opening, so as to cover/close the whole air-vent.

[0010] The bag-shaped rigid air-filtering shell is divided into two complementary valve-like pieces which are laterally hinged to one another at the bottom of the bag- or pocket-shaped air-filtering shell, so that the air-filtering shell is openable in a book-like manner; and each valve-like piece is provided with a substantially flat, large permeable-to-air sidewall which is structured to restrain the fluff and/or lint particles within the bag-shaped rigid shell.

[0011] To improve air-filtering capabilities, in DE8437357U1 each valve-like piece of the air-filtering shell is furthermore provided with an additional permeable-to-air panel or septum which is similarly structured to restrain the fluff and/or lint particles, and is laterally and permanently hinged to the upper edge of the valve-like piece that delimits the upper mouth of the bag- or pocket-shaped air-filtering shell, so as to be foldable towards the inside of the bag- or pocket-shaped air-filtering shell for covering the whole permeable-to-air sidewall of the same valve-like piece.

[0012] The DE8437357U1 air-filtering cartridge therefore implements a two-stage filtration of the airflow circulating into the laundry dryer.

[0013] Unluckily, the DE8437357U1 air-filtering cartridge is relatively complicated to open without randomly scattering the fluff and/or lint particles all around the air-filtering cartridge, and is therefore particularly unpleasant to the user. The particular structure of the air-filtering cartridge, in fact, forces the fluff and/or lint particles to accumulate on respective faces of the valve-like pieces and of the corresponding additional permeable-to-air panels, which respectively turn upwards and downwards, i.e. opposite to one another, when the air-filtering cartridge is wide opened in book-like manner on a horizontal plane,

[0014] JP 2008 079855 A discloses a drum type washing/drying machine having a double filter structure wherein one filter is nested in the other and, to remove the outer filter, it is needed to first remove the inner filter.

[0015] Aim of the present invention is to provide a laundry dryer having an air-filtering cartridge which is easier to extract and clean.

[0016] In compliance with the above aims, according to the present invention there is provided a laundry dryer having an air-filtering cartridge as claimed in Claim 1 and preferably, though not necessarily, in any one of the dependent Claims.

[0017] A non-limiting embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figure 1 is a perspective view, with parts removed for clarity, of a rotary-drum household laundry dryer realized in accordance with the teachings of the present invention;
- Figure 2 is a section view of the Figure 1 laundry dryer with parts removed for clarity;

- Figure 3 is a perspective view of a first embodiment of the air-filtering member of the Figure 1 laundry dryer;
- Figures 4 is a section view of the Figure 3 air-filtering member;
- Figures 5 and 6 show two partly-exploded perspective views of the Figure 3 air-filtering member;
- Figure 7 is a perspective view of a second embodiment of the air-filtering member of the Figure 1 laundry dryer;
- Figures 8 is a section view of the Figure 7 air-filtering member;
- Figures 9 and 10 show two partly-exploded perspective views of the Figure 7 air-filtering member.

[0018] With reference to Figures 1 and 2, reference number 1 indicates as a whole a rotary-drum household 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, substantially vertically-oriented, front and rear walls 2a and 2b; a substantially cylindrical rotatable drum 3 which is structured for housing the laundry to be dried, and is fixed in axially rotating manner inside the boxlike casing 2, directly facing a laundry loading/ unloading pass-through opening formed on the 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 the porthole door 4 rests completely against the front wall 2a to close the laundry loading/unloading opening and substantially airtight seal the rotatable drum 3.

[0019] Inside the boxlike casing 2, the laundry dryer 1 additionally comprises an electrically-powered motor assembly 5 which is structured for driving into rotation the rotatable drum 3 about the drum longitudinal reference axis; a 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 rapidly dries the laundry located inside the drum 3; an electronic central control unit (not shown in the drawing) controls the motor assembly 5, 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, a further control unit 7 may be provided for controlling the operation of compressor 19.

[0020] With reference to Figure 2, in particular, the rotatable drum 3 preferably consists in a substantially cylindrical-shaped, rigid tubular body 3 which is preferably made of metal material and extends inside the boxlike casing 2 coaxial to a preferably substantially horizontally-oriented, longitudinal reference axis L while remaining locally 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 the tubular body 3 with their rotation axis locally substantially parallel to the longitudinal reference axis L of tubular body 3, and are fixed to the boxlike casing 2 in free revolving manner so as to allow the tubular body 3 to freely rotate about its longitudinal reference axis L inside the boxlike casing 2. Even if it is here described a drum supported by rotatable rollers, it should be understood that the present invention covers also an arrangement wherein the drum is supported by a shaft mechanically connected to the drum rear wall, i.e. the wall opposite to the drum front wall which is provided with an opening for loading/unloading laundry into/from the drum. Said shaft is also provided to rotate the drum.

[0021] 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 same front wall 2a, preferably with the interposition of a first circular sealing gasket. The circular rear rim 3r of tubular body 3 instead abuts against the rear wall 2b of boxlike casing 2 and is coupled in substantially airtight and axially rotating manner directly to the same rear wall 2b with the interposition of a second circular sealing gasket. Front and rear circular sealing gaskets are therefore substantially coaxial to the longitudinal reference axis L of tubular body 3.

[0022] The stream of hot air produced by the hot-air generator 6 preferably enters into 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 finally 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.

[0023] In other words, the stream of hot air produced by hot-air generator 6 preferably enters into tubular body 3 via a first air-vent 9 which is incorporated in the rear wall 2b of casing 2 locally aligned/faced 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 a second preferably substantially slot-shaped, air-vent 10 which is preferably incorporated in the annular frame that, on front wall 2a, delimits the laundry loading/ unloading opening of boxlike casing 2.

[0024] With reference to Figures 1 and 2, the hot-air generator 6 in turn is structured for gradually 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 from rotatable drum 3; and finally feeding the heated, dehumidified air back into the rotatable drum 3, where it flows over, to rapidly dry, the laundry inside the drum.

[0025] In other words, hot-air generator 6 provides for continually dehumidifying and heating the air circulating

inside rotatable drum 3 to rapidly dry the laundry inside the drum, and basically comprises:

- an air recirculating conduit 11 which has a first end in direct communication with, i.e. fluidly connected to, the air-vent 9 located in the rear wall 2b of casing 2, and a second end in direct communication with, i.e. fluidly connected to, the air-vent 10 preferably located in the annular frame that delimits the laundry loading/unloading opening on front wall 2a;
- an electrically-powered centrifugal fan 12 (part of its volute is shown in Figures 1 and 2) or other type of air circulating pump, which is located along recirculating conduit 11 to produce, inside recirculating conduit 11, an airflow f which flows through the rotatable drum 3 and over the laundry inside drum 3;
- an air-cooling device 13 which is located along the air recirculating conduit 11 preferably, though not necessarily, upstream of the centrifugal fan 12, and is structured to cool the moist air arriving from rotatable drum 3, so as to cause the quick condensation of the surplus moisture inside the airflow f; and
- an air-heating device 14 which is located along the air recirculating conduit 11, downstream of the air-cooling device 13 and preferably also upstream of the centrifugal fan 12, and which is structured for heating the dehumidified airflow f arriving from the air-cooling device 13 and directed back to rotatable drum 3, so that the airflow f directed back into the 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 the same rotatable drum 3.

[0026] With reference to Figure 2, the hot-air generator 6 lastly comprises a preferably substantially wedge-shaped, air-filtering cartridge 15 which is fitted in removable manner into the air-vent 10 preferably realized on the annular frame that delimits, on front wall 2a, the laundry loading/unloading opening of casing 2. This air-filtering cartridge 15 is dimensioned so as to cover/close the whole air-vent 10, i.e. the entrance of the air recirculating conduit 11, and it is structured to restrain the fluff and/or lint particles in suspension into the airflow f so to prevent the same fluff and/or lint particles from reaching and clogging up the air-cooling device 13, the air-heating device 14 and the centrifugal fan 12 located along the air recirculating conduit 11.

[0027] With reference to Figures 1 and 2, in the example shown, in particular, the outer boxlike casing 2 preferably, though not necessarily, comprises a substantially parallelepiped-shaped lower supporting basement 16 which is structured for resting on the floor; and a substantially parallelepiped-shaped upper boxlike cabinet 17 which is rigidly fixed to the top of the lower supporting basement 16 and it is structured so as to house the rotatable drum 3.

[0028] In other words, the rotatable drum 3 extends

inside the upper boxlike cabinet 17, immediately above the supporting basement 16; the laundry loading/unloading opening of boxlike casing 2 is realized in the front wall of the upper boxlike cabinet 17; and the porthole door 4 is hinged to the front wall of the same upper boxlike cabinet 17.

[0029] The lower supporting basement 16, in turn, is preferably, though not necessarily, structured for internally housing a central/intermediate section of the air recirculating conduit 11, and the air-cooling device 13, the air-heating device 14 and the centrifugal fan 12 of hot-air generator 6 are preferably located inside said central/intermediate section of the air recirculating conduit 11. Thus the lower supporting basement 16 is preferably, though not necessarily, structured for internally housing part of the hot-air generator 6.

[0030] Preferably, though not necessarily, the lower supporting basement 16 is moreover structured to directly support the drum-supporting rollers 8. In other words, the idle rollers 8 that support in free revolving manner the tubular body 3 are preferably fixed in axially rotating manner directly to the top of the lower supporting basement 16.

[0031] With reference to Figures 1 and 2, the hot-air generator 6 furthermore preferably, though not necessarily, consists in a heat-pump type, closed-circuit, hot-air generator 6, and is therefore provided with a heat-pump circuit 18 which comprises a first and a second air/refrigerant heat exchanger, both located inside the air recirculating conduit 11 preferably upstream of the centrifugal fan 12.

[0032] The first air/refrigerant heat exchanger, traditionally referred to as the "evaporator" of the heat-pump circuit 18, is located inside the air recirculating conduit 11, and it is structured to remove/absorb heat from the airflow *f* arriving from rotatable drum 3, thus forming the air-cooling device 13 of the hot-air generator 6. The second air/refrigerant heat exchanger, traditionally referred to as the "condenser" of the heat-pump circuit 18, is instead located inside the air recirculating conduit 11 downstream of the first air/refrigerant heat exchanger 13, and it is structured to release heat to the airflow *f* arriving from the first air/refrigerant heat exchanger 13, thus forming the air-heating device 14 of the hot-air generator 6.

[0033] In the example shown, in particular, the first and second air/refrigerant heat exchangers 13 and 14 are recessed one after the other inside the central/intermediate section of air recirculating conduit 11 which is integrated into the lower supporting basement 16 of boxlike casing 2.

[0034] In addition to the above, the heat-pump circuit 18 furthermore comprises: an electrically-powered refrigerant compressing device 19 which is interposed between the refrigerant-outlet of air/refrigerant heat exchanger 13 and the refrigerant-inlet of air/refrigerant heat exchanger 14, and it is structured for compressing the gaseous-state refrigerant directed towards heat exchanger 14 so that refrigerant pressure and temperature

are much higher at the refrigerant-inlet of heat exchanger 14 than at the refrigerant-outlet of heat exchanger 13; and an expansion valve or similar known passive/operated refrigerant expansion device (for example a capillary tube, a thermostatic valve or an electrically-controlled expansion valve) which is interposed between the refrigerant-outlet of the air/refrigerant heat exchanger 14 and the refrigerant-inlet of the air/refrigerant heat exchanger 13, and it is structured so as to cause a rapid expansion of the refrigerant directed towards the air/refrigerant heat exchanger 13, so that refrigerant pressure and temperature are much higher at the refrigerant-outlet of heat exchanger 14 than at the refrigerant-inlet of air/refrigerant heat exchanger 13.

[0035] According to a different embodiment not shown, the hot air generator 6 may comprise an electric heater as air-heating device 14 and an air-air type heat exchanger as air-cooling device 13, where the airflow *f* is cooled by air taken from and exhausted to the environment surrounding the laundry machine. An appropriate air pumping device is further arranged to pump ambient air through the air-air type heat exchanger. With reference to Figures 1 and 2, the centrifugal fan 12 of hot-air generator 6, in turn, is preferably, though not necessarily, located on the back of the supporting basement 16, i.e. on the rear wall 2b of the boxlike casing 2, and it is structured so as to produce an airflow *f* that flows from the central/intermediate section of the air recirculating conduit 11 to the air-vent 9 located in rear wall 2b of casing 2.

[0036] In the example shown the centrifugal fan 12 of the hot-air generator 6 is preferably at least partly housed/recessed into the lower supporting basement 16 of casing 2, i.e. into the rear wall 2b of the boxlike casing 2, roughly at the end of the central/intermediate section of the air recirculating conduit 11, and the outer volute or impeller housing of the centrifugal fan 12 is shaped/structured so as to directly communicate with, i.e. be fluidly connected to, both the central/intermediate section of the air recirculating conduit 11 and the air-vent 9 integrated in the rear wall 2b of casing 2.

[0037] With reference to Figures 3 to 6, the air-filtering cartridge 15 in turn comprises:

- a first substantially bag- or pocket-shaped, air-filtering shell or vessel 20 which is dimensioned for being inserted/plugged in manually extractable manner into the air-vent 10 which is preferably realized on the annular frame that delimits, on front wall 2a, the laundry loading/unloading opening of casing 2, so as to substantially fill up the whole clear section of the air-vent 10, and which is both permeable to air and structured to restrain the fluff and/or lint particles in suspension into the airflow *f* that enters into the air recirculating conduit 11 through the air-vent 10;
- a second, completely separated, substantially bag- or pocket-shaped, air-filtering shell or vessel 30 which is fitted/recessed into the first substantially bag- or pocket-shaped, air-filtering shell or vessel

20, so as to be passed through by substantially the same airflow f that crosses the first air-filtering shell or vessel 20, and which is similarly both permeable to air and structured to restrain the fluff and/or lint particles in suspension into the airflow f that enters into the air recirculating conduit 11; and

- an extraction-aid member which is fixed/associated to one of the two completely-separated, air-filtering shells or vessels 20 and 30, and is structured so as to allow the manual extraction of both air-filtering shells or vessels 20 and 30 at a time from the air-vent 10.

[0038] With reference to Figures 4 and 6, in the example shown the upper rim of the air-filtering shell or vessel 20 is preferably bent outwards so as to form an outwards projecting peripheral flange 21 which encircles the upper mouth of the air-filtering shell or vessel 20 and it is shaped/structured so as to rest in abutment on the border of the annular frame of front wall 2a that delimits the air-vent 10. The upper mouth of the air-filtering shell or vessel 20 is furthermore preferably shaped/ structured so as to substantially mate the shape of the air-vent 10 realized on the annular frame that delimits, on front wall 2a, the laundry loading/unloading opening of the boxlike casing 2.

[0039] Preferably the air-filtering shell or vessel 20 is furthermore provided with two preferably substantially flat, reciprocally-faced, permeable-to-air sidewalls 22 which are structured to restrain the fluff and/or lint particles in suspension into the airflow f that crosses the air-vent 10.

[0040] With reference to Figure 4, in the example shown, the preferably substantially flat, reciprocally-faced, permeable-to-air sidewalls 22 of the air-filtering shell or vessel 20 are preferably substantially specularly inclined to the center-plane M of the air-filtering shell or vessel 20, so that the air-filtering shell or vessel 20 has a substantially V- or U-shaped cross-section.

[0041] In addition to the above, the substantially bag- or pocket-shaped, air-filtering shell or vessel 20 is moreover divided into two complementary valve-like pieces 23 which are selectively separable to one another, and each valve-like piece 23 preferably incorporates a respective permeable-to-air sidewall 22 of the air-filtering shell or vessel 20. Preferably the two valve-like pieces 23 are furthermore laterally hinged to one another preferably approximately at the bottom of the air-filtering shell or vessel 20, i.e. opposite to the upper mouth of the air-filtering shell or vessel 20, for reciprocal rotation about a transversal reference axis A preferably substantially parallel to the permeable-to-air sidewalls 22 of the air-filtering shell or vessel 20, so that the whole air-filtering shell or vessel 20 is openable in a book-like manner about reference axis A.

[0042] In the example shown, the two valve-like pieces 23 of the air-filtering shell or vessel 20 are preferably pivotally jointed to one another via a pair of connecting

hinges 24 which are aligned to the reference axis A and are located approximately on the bottom of the air-filtering shell or vessel 20, i.e. opposite to the upper mouth of the air-filtering shell or vessel 20. Furthermore the articulation axis of the two connecting hinges 24, i.e. the rotation axis A of the two valve-like pieces 23, preferably substantially lies on the center-plane M of the air-filtering shell or vessel 20.

[0043] With reference to Figures 3, 5 and 6, the air-filtering shell or vessel 20 is preferably finally provided with a snap-on locking mechanism 25 which is structured for selectively rigidly anchoring/fixing the two complementary valve-like pieces 23 of the air-filtering shell or vessel 20 to one another when the same valve-like pieces 23 are reciprocally coupled to form/compose the air-filtering shell or vessel 20, thus preventing any unintended opening of the air-filtering shell or vessel 20.

[0044] With reference to Figures 3 to 6, in turn, the upper rim of the second air-filtering shell or vessel 30 is preferably bent outwards so as to form an outwards projecting peripheral flange 31 which encircles the upper mouth the air-filtering shell or vessel 30 and is shaped/structured so as to rest in abutment on the outwards projecting peripheral flange 21 of the air-filtering shell or vessel 20. The upper mouth of the second air-filtering shell or vessel 30 is furthermore preferably shaped/ structured so as to substantially mate the shape of the upper mouth of the first air-filtering shell or vessel 20.

[0045] Similarly to the first air-filtering shell or vessel 20, the second air-filtering shell or vessel 30 is preferably furthermore provided with two preferably substantially flat, reciprocally-faced, permeable-to-air main sidewalls 32 which are structured to restrain the fluff and/or lint particles in suspension into the airflow f that crosses the air-vent 10, and each of which is moreover locally faced and superimposed to a respective permeable-to-air sidewall 22 of the first air-filtering shell or vessel 20.

[0046] With reference to Figure 4, in the example shown, the preferably substantially flat, reciprocally-faced, permeable-to-air sidewalls 32 of the second air-filtering shell or vessel 30 are preferably substantially specularly inclined to the center-plane of the second air-filtering shell or vessel 30, so that the second air-filtering shell or vessel 30 has a substantially V- or U-shaped cross-section similar to that of the first air-filtering shell or vessel 20. Preferably the center-plane of the second air-filtering shell or vessel 30 is furthermore locally substantially coincident to the center-plane M of the first air-filtering shell or vessel 20.

[0047] In addition to the above, the substantially bag- or pocket-shaped, air-filtering shell or vessel 30 is moreover divided into two complementary valve-like pieces 33 which are selectively separable to one another, and each valve-like piece 33 preferably incorporates a respective permeable-to-air sidewall 32 of the air-filtering shell or vessel 30. Preferably the two valve-like pieces 33 are furthermore laterally hinged to one another pref-

erably approximately at the bottom of the second air-filtering shell or vessel 30, i.e. opposite to the upper mouth of the second air-filtering shell or vessel 20, for reciprocal rotation about a transversal reference axis B preferably substantially parallel to the permeable-to-air sidewalls 32 of the second air-filtering shell or vessel 30, and therefore locally substantially parallel to rotation axis A of the valve-like pieces 23 of the first air-filtering shell or vessel 20, so that the whole second air-filtering shell or vessel 30 is openable in a book-like manner about reference axis B.

[0048] In the example shown, in particular, the two valve-like pieces 33 of the second air-filtering shell or vessel 30 are preferably pivotally jointed to one another via a pair of connecting hinges 34 which are aligned to the reference axis B and are located approximately on the bottom of the second air-filtering shell or vessel 30, i.e. opposite to the upper mouth of the air-filtering shell or vessel 30. Furthermore the articulation axis of the two connecting hinges 34, i.e. the rotation axis B of the two valve-like pieces 33, preferably substantially lies on the center-plane of the second air-filtering shell or vessel 30.

[0049] With reference to Figures 3 to 6, the air-filtering cartridge 15 preferably furthermore comprises a substantially platelike-shaped, permeable-to-air upper lid 35 which is rigidly associated/fixed to the top of the second air-filtering shell or vessel 30 so as to close the upper mouth of the same air-filtering shell or vessel 30, and which is furthermore preferably shaped/dimensioned so as to close/ cover the whole air-vent 10.

[0050] In the example shown, the permeable-to-air upper lid 35 is preferably rigidly associated/fixed to the outwards projecting peripheral flange 31 of the second air-filtering shell or vessel 30.

[0051] Furthermore, similarly to the second air-filtering shell or vessel 30, the permeable-to-air upper lid 35 is preferably divided into two preferably substantially plate-like-shaped and permeable-to-air, complementary pieces 36 which are selectively separable to one another, and each of which is permanently rigidly fixed to a respective valve-like piece 33 of the second air-filtering shell or vessel 30, so as to allow the second air-filtering shell or vessel 30 to open in a book-like manner.

[0052] Preferably, the permeable-to-air upper lid 35 furthermore comprises a manually-operated snap-on locking mechanism 37 which is structured for selectively rigidly anchoring/fixing the two complementary pieces 36 to one another when they are reciprocally coupled to form/compose the permeable-to-air upper lid 35, thus preventing any unintended opening of the second air-filtering shell or vessel 30.

[0053] In the example shown, the snap-on locking mechanism 37 is preferably incorporated into the two complementary pieces 36 of the permeable-to-air upper lid 35. Furthermore each complementary piece 36 of the permeable-to-air upper lid 35 is preferably realized in one piece with a respective valve-like piece 33 of the second, substantially bag- or pocket-shaped, air-filtering shell or

vessel 30.

[0054] As an alternative, the permeable-to-air upper lid 35 may be permanently rigidly associated/fixed to one of the two valve-like pieces 33 of the second air-filtering shell or vessel 20, and be structured for selectively coupling in a rigid and stable, though easily releasable manner to the edge of the other valve-like piece 33 of the second air-filtering shell or vessel 30, i.e. the portion of the outwards projecting peripheral flange 31 integral to the second/other valve-like piece 33 of the second air-filtering shell or vessel 30.

[0055] Preferably the permeable-to-air upper lid 35 is provided with a manually-graspable portion which is structured for allowing the user to manually extract the second air-filtering shell or vessel 30 from the first air-filtering shell or vessel 20. In the example shown, in particular, a central portion of the permeable-to-air upper lid 35 is preferably provided with a couple of large pass-through holes 35a dimensioned for allowing the user to insert his/her fingers into the permeable-to-air upper lid 35.

[0056] With reference to Figures 3 to 6, the extraction-aid member of the air-filtering cartridge 15 in turn comprises at least one protruding tailpiece 26 which is shaped/ structured for being manually graspable by the user, and which extends upwards from the upper rim of the air-filtering shell or vessel 20, i.e. from the peripheral flange 21 of the first air-filtering shell or vessel 20, so as to engage in pass-through manner a slot or indentation 31a realized on the peripheral flange 31 of the second air-filtering shell or vessel 30 and/or on the permeable-to-air upper lid 35, if present, and project upwards above the second air-filtering shell or vessel 30 or above the permeable-to-air upper lid 35, if present. When the air-filtering cartridge 15 is fitted into an air-vent 10 the extraction-aid member remains visible and slightly protrudes from the air vent 10 such that a user can see it and grasp it when the air-filtering cartridge 15 has to be removed, for example for cleaning operations.

[0057] In the example shown, the extraction-aid member of the air-filtering cartridge 15 consists in a preferably substantially flat, winglet or flap 26 that protrudes upwards from the upper edge of one of the two valve-like pieces 23 of the first air-filtering shell or vessel 20 locally parallel to rotation axis B, preferably approximately at the centre of the same upper edge. The distal end of said winglet or flap 26 is preferably shaped/structured for being manually graspable by the user.

[0058] With reference to Figures 7 to 10, according to an alternative embodiment, the air-filtering cartridge 15 comprises:

- a first substantially bag- or pocket-shaped, air-filtering shell or vessel 120 which is dimensioned for being inserted/plugged in manually extractable manner into the air-vent 10 which is preferably realized on the annular frame that delimits, on front wall 2a, the laundry loading/unloading opening of casing 2, so

- as to substantially fill up the whole clear section of the air-vent 10, and which is both permeable to air and structured to restrain the fluff and/or lint particles in suspension into the airflow *f* that enters into the air recirculating conduit 11 through the air-vent 10;
- a second, completely separated, substantially bag- or pocket-shaped, air-filtering shell or vessel 130 which is fitted/recessed into the first substantially bag- or pocket-shaped, air-filtering shell or vessel 120, so as to be passed through by substantially the same airflow *f* that crosses the first air-filtering shell or vessel 120, and which is similarly both permeable to air and structured to restrain the fluff and/or lint particles in suspension into the airflow *f* that enters into the air recirculating conduit 11; and
 - an extraction-aid member which is fixed/associated to one of the two completely-separated, air-filtering shells or vessels 120 and 130, and is structured so as to allow the manual extraction of both air-filtering shells or vessels 120 and 130 at a time from the air-vent 10.

[0059] With reference to Figures 8 and 9, in the example shown the upper rim of the air-filtering shell or vessel 120 is preferably bent outwards so as to form an outwards projecting peripheral flange 121 which encircles the upper mouth of the air-filtering shell or vessel 120 and it is shaped/structured so as to rest in abutment on the border of the annular frame of front wall 2a that delimits the air-vent 10. The upper mouth of the air-filtering shell or vessel 120 is furthermore preferably shaped/structured so as to substantially mate the shape of the air-vent 10 realized on the annular frame that delimits, on front wall 2a, the laundry loading/unloading opening of the boxlike casing 2.

[0060] Preferably the air-filtering shell or vessel 120 is furthermore provided with two preferably substantially flat, reciprocally-faced, permeable-to-air sidewalls 122 which are structured to restrain the fluff and/or lint particles in suspension into the airflow *f* that crosses the air-vent 10.

[0061] With reference to Figure 8, in the example shown, in particular, the substantially flat, reciprocally-faced, permeable-to-air sidewalls 122 of the air-filtering shell or vessel 120 are preferably substantially specularly inclined to the center-plane N of the air-filtering shell or vessel 120, so that the air-filtering shell or vessel 120 has a substantially V- or U-shaped cross-section.

[0062] In addition to the above, the substantially bag- or pocket-shaped, air-filtering shell or vessel 120 is moreover divided into two complementary valve-like pieces 123 which are selectively separable to one another, and each valve-like piece 123 preferably incorporates a respective permeable-to-air sidewall 122 of the air-filtering shell or vessel 120. Preferably the two valve-like pieces 123 are furthermore laterally hinged to one another preferably approximately at the bottom of the air-filtering shell or vessel 120, i.e. opposite to the upper mouth of the air-

filtering shell or vessel 120, for reciprocal rotation about a transversal reference axis C preferably substantially parallel to the permeable-to-air sidewalls 122 of the air-filtering shell or vessel 120, so that the whole air-filtering shell or vessel 120 is openable in a book-like manner about reference axis C.

[0063] In the example shown, the two valve-like pieces 123 of the air-filtering shell or vessel 120 are preferably pivotally jointed to one another via a pair of connecting hinges 124 which are aligned to the reference axis C and are located approximately on the bottom of the air-filtering shell or vessel 120, i.e. opposite to the upper mouth of the air-filtering shell or vessel 120. Furthermore the articulation axis of the two connecting hinges 124, i.e. the rotation axis C of the two valve-like pieces 123, preferably substantially lies on the center-plane N of the air-filtering shell or vessel 120.

[0064] With reference to Figures 7, 9 and 10, the air-filtering shell or vessel 120 is preferably finally provided with a snap-on locking mechanism 125 which is structured for selectively rigidly anchoring/fixing the two complementary valve-like pieces 123 of the air-filtering shell or vessel 120 to one another when the same valve-like pieces 123 are reciprocally coupled to form/compose the air-filtering shell or vessel 120, thus preventing any unintended opening of the air-filtering shell or vessel 120.

[0065] With reference to Figures 8 to 10, in turn, the upper rim of the second air-filtering shell or vessel 130 is preferably bent outwards so as to form an outwards projecting peripheral flange 131 which encircles the upper mouth the air-filtering shell or vessel 130 and is shaped/structured so as to rest in abutment on the outwards projecting peripheral flange 121 of the air-filtering shell or vessel 120. The upper mouth of the second air-filtering shell or vessel 130 is furthermore preferably shaped/structured so as to substantially mate the shape of the upper mouth of the first air-filtering shell or vessel 120.

[0066] Similarly to the first air-filtering shell or vessel 120, the second air-filtering shell or vessel 130 is preferably furthermore provided with two preferably substantially flat, reciprocally-faced, permeable-to-air main sidewalls 132 which are structured to restrain the fluff and/or lint particles in suspension into the airflow *f* that crosses the air-vent 10, and each of which is moreover locally faced and superimposed to a respective permeable-to-air sidewall 122 of the first air-filtering shell or vessel 120.

[0067] With reference to Figure 8, in the example shown, the substantially flat, reciprocally-faced, permeable-to-air sidewalls 132 of the second air-filtering shell or vessel 130 are preferably substantially specularly inclined to the center-plane of the second air-filtering shell or vessel 130, so that the second air-filtering shell or vessel 130 has a substantially V- or U-shaped cross-section similar to that of the first air-filtering shell or vessel 120. Preferably the center-plane of the second air-filtering shell or vessel 130 is furthermore locally substantially coincident to the center-plane N of the first air-filtering

shell or vessel 120.

[0068] In addition to the above, the substantially bag- or pocket-shaped, air-filtering shell or vessel 130 is moreover divided into two complementary valve-like pieces 133 which are selectively separable to one another, and each valve-like piece 133 preferably incorporates a respective permeable-to-air sidewall 132 of the air-filtering shell or vessel 130. Preferably the two valve-like pieces 133 are furthermore laterally hinged to one another preferably approximately at the bottom of the second air-filtering shell or vessel 130, i.e. opposite to the upper mouth of the second air-filtering shell or vessel 120, for reciprocal rotation about a transversal reference axis D preferably substantially parallel to the permeable-to-air sidewalls 132 of the second air-filtering shell or vessel 130, and therefore locally substantially parallel to rotation axis C of the valve-like pieces 123 of the first air-filtering shell or vessel 120, so that the whole second air-filtering shell or vessel 130 is openable in a book-like manner about reference axis D.

[0069] In the example shown, the two valve-like pieces 133 of the second air-filtering shell or vessel 130 are preferably pivotally jointed to one another via a pair of connecting hinges 134 which are aligned to the reference axis D and are located approximately on the bottom of the second air-filtering shell or vessel 130, i.e. opposite to the upper mouth of the air-filtering shell or vessel 130. Furthermore the articulation axis of the two connecting hinges 134, i.e. the rotation axis D of the two valve-like pieces 133, preferably substantially lies on the center-plane of the second air-filtering shell or vessel 130.

[0070] With reference to Figures 7 to 10, the air-filtering cartridge 15 preferably furthermore comprises a substantially platelike-shaped, permeable-to-air upper lid 135 which is rigidly associated/fixed to the top of the second air-filtering shell or vessel 130 so as to close the upper mouth of the same air-filtering shell or vessel 130, and which is furthermore preferably shaped/dimensioned so as to close/ cover the whole air-vent 10.

[0071] In the example shown, the permeable-to-air upper lid 135 is preferably rigidly associated/fixed to the outwards projecting peripheral flange 131 of the second air-filtering shell or vessel 130.

[0072] Furthermore, similarly to the second air-filtering shell or vessel 130, the permeable-to-air upper lid 135 is preferably divided into two preferably substantially plate-like-shaped and permeable-to-air, complementary pieces 136 which are selectively separable to one another, and each of which is permanently rigidly fixed to a respective valve-like piece 133 of the second air-filtering shell or vessel 130, so as to allow the second air-filtering shell or vessel 130 to open in a book-like manner.

[0073] Preferably, the permeable-to-air upper lid 135 furthermore comprises a manually-operated snap-on locking mechanism 137 which is structured for selectively rigidly anchoring/fixing the two complementary pieces 136 to one another when they are reciprocally coupled to form/compose the permeable-to-air upper lid 135, thus

preventing any unintended opening of the second air-filtering shell or vessel 130.

[0074] In the example shown, the snap-on locking mechanism 137 is preferably incorporated into the two complementary pieces 136 of the permeable-to-air upper lid 135. Furthermore each complementary piece 136 of the permeable-to-air upper lid 135 is preferably realized in one piece with a respective valve-like piece 133 of the second, substantially bag- or pocket-shaped, air-filtering shell or vessel 130.

[0075] As an alternative, the permeable-to-air upper lid 135 may be permanently rigidly associated/fixed to one of the two valve-like pieces 133 of the second air-filtering shell or vessel 120, and be structured for selectively coupling in a rigid and stable, though easily releasable manner to the edge of the other valve-like piece 133 of the second air-filtering shell or vessel 130, i.e. the portion of the outwards projecting peripheral flange 131 integral to the second/other valve-like piece 133 of the second air-filtering shell or vessel 130.

[0076] Preferably the permeable-to-air upper lid 135 is provided with a manually-graspable portion which is structured for allowing the user to manually extract the second air-filtering shell or vessel 130 from the first air-filtering shell or vessel 120. In the example shown, in particular, a central portion of the permeable-to-air upper lid 135 is preferably provided with a couple of large pass-through holes 135a dimensioned for allowing the user to insert his/her fingers into the permeable-to-air upper lid 135.

[0077] With reference to Figures 7 to 10, the extraction-aid member of the air-filtering cartridge 15 comprises at least one manually-operated coupling device 138 which is structured to selectively attach/fix the two air-filtering shells or vessels 120 and 130 to one another in a rigid and stable, though easily detachable manner.

[0078] The at least one manually-operated coupling device 138 is preferably fixed/associated to one of the two air-filtering shells or vessels 120 and 130 of the air-filtering cartridge 15, and it is structured to selectively hook and retain the remaining of the two air-filtering shells or vessels 120 and 130 so as to clamp/secure the two air-filtering shells or vessels 120 and 130 to one another in a rigid and stable, though easily detachable manner. The manually-operated coupling device 138 is configured to be movable from a fastening position in which it clamps/secures the two air-filtering shells or vessels 120 and 130 to one another and a releasing position in which the coupling device 138 releases one of the air-filtering shells or vessels 120 and 130 from the other.

[0079] In the example shown, the manually-operated coupling device 138 is fixed/associated to the permeable-to-air upper lid 135 which, in turn, is rigidly fixed to the second air-filtering shell or vessel 130, and it is structure to selectively hook and retain the first air-filtering shell or vessel 120 so as to clamp/ secure the two air-filtering shells or vessels 120 and 130 to one another in a rigid and stable, though easily detachable manner.

[0080] With reference to Figures 7 to 10, in the example shown the manually-operated coupling device 138 consists in a clipping arm 138 which is hinged to the upper lid 135 of the second air-filtering shell or vessel 130 so as to be able to rotate about a reference axis locally substantially tangent to the outer surface of the permeable-to-air upper lid 135 and preferably also parallel to the rotation axis D of the two valve-like pieces 133, between

- a fastening position the clipping arm 138 lays down on the outer surface of the permeable-to-air upper lid 135 with the distal end clipped onto a portion of the upper rim of the air-filtering shell or vessel 120, i.e. of the peripheral flange 121 of the first air-filtering shell or vessel 120, so as to couple/connect the two air-filtering shells or vessels 120 and 130 to one another in a rigid and stable, though easily detachable manner; and
- unfastening releasing position in which the clipping arm 138 preferably stands in a locally upright position with respect to the permeable-to-air upper lid 135 with the distal end detached from the upper rim of the air-filtering shell or vessel 120, i.e. from the peripheral flange 121 of the first air-filtering shell or vessel 120, completely disconnecting the second air-filtering shell or vessel 130 from the first air-filtering shell or vessel 120.

[0081] In an alternative embodiment, the clipping arm 138 could be hinged to the upper rim of the air-filtering shell or vessel 120, i.e. to the peripheral flange 121 of the first air-filtering shell or vessel 120, and selectively clip on either the upper rim of the second air-filtering shell or vessel 130, i.e. to the peripheral flange 131 of the second air-filtering shell or vessel 130, or the permeable-to-air upper lid 135 rigidly fixed/associated to the second air-filtering shell or vessel 130.

[0082] General operation of the rotary-drum household laundry drier 1 is clearly inferable from the above description, with no further explanation required.

[0083] In the first embodiment of the air-filtering cartridge 15, the user has to grab with a hand the protruding tailpiece 26, i.e. the winglet or flap 26, and then pull it upwards to extract the two air-filtering shells or vessels 120 and 130 at a time from the air-vent 10.

[0084] In the second embodiment of the air-filtering cartridge 15, the user has to leave the clipping arm 18 in the fastened position, grab with a hand the manually-graspable portion 135a of the permeable-to-air upper lid 135, and then pull it upwards to extract the two air-filtering shells or vessels 120 and 130 at a time from the air-vent 10.

[0085] The advantages connected to the particular structure of the air-filtering cartridge 15 are large in number.

[0086] First of all, extraction and cleaning of the air-filtering cartridge 15 are much easier to do by the user.

[0087] Furthermore in both embodiments of the air-filtering

cartridge 15, the fluff and/or lint particles tends to accumulate/settle on the inner faces of the valve-like pieces 23, 33, 123, 133 of the first and second air-filtering shell or vessels 20, 120 and 30, 130. Thus the fluff and/or lint particles remains inside/above both first and second air-filtering shells or vessels 20, 120 and 30, 130 when the user disassembles/ opens the air-filtering cartridge 15 for periodical cleaning, greatly simplifying such operation.

[0088] Clearly, changes may be made to the rotary-drum household laundry drier 1 as described herein without, however, departing from the scope of the present invention.

[0089] For example, the air-cooling device 13 of hot-air generator 6 may comprise an air/air heat exchanger which is located inside the air recirculating conduit 11, preferably upstream of the centrifugal fan 12, and is structured for using the external fresh air to cool down the airflow f arriving from rotatable drum 3; whereas the air-heating device 14 of hot-air generator 6 may consist in a resistor which is located inside the air recirculating conduit 11, downstream of the air/air heat exchanger and preferably also downstream of centrifugal fan 12.

Claims

1. Laundry dryer (1) comprising an outer casing (2) having a front wall (2a) provided with a laundry loading/unloading pass-through opening, and an air-filtering cartridge (15) which is fitted in removable manner into an air-vent (10) which is passed through by a laundry drying airflow (f), said air-filtering cartridge (15) comprising a first substantially bag- or pocket-shaped, air-filtering shell or vessel (20, 120) which is dimensioned for being inserted/plugged into said air-vent (10) and is structured to restrain the fluff and/or lint particles in suspension into the airflow (f); the laundry dryer being **characterized in that** the air-filtering cartridge (15) furthermore comprises:

- a second, completely separated, substantially bag- or pocket-shaped, air-filtering shell or vessel (30, 130) which is fitted/recessed into said first air-filtering shell or vessel (20, 120) so as to be crossed by substantially the same airflow (f) that crosses the first air-filtering shell or vessel (20, 120), and which is structured to restrain the fluff and/or lint particles in suspension into the airflow (f); and

- a graspable extraction-aid member (26, 138) which is fixed/associated to one of the two completely-separated, air-filtering shells or vessels (20, 30; 120, 130), and is structured so as to allow the manual extraction of both air-filtering shells or vessels (20, 30; 120, 134) at a time from the air-vent (10).

2. Laundry dryer according to Claim 1, **characterized in that** the upper rim (31) of the second air-filtering shell or vessel (30) is shaped/structured so as to rest in abutment on the upper rim (21) of the first air-filtering shell or vessel (20); and **in that** the graspable extraction-aid member (26, 138) comprises at least one protruding tailpiece (26) which is shaped/structured for being manually graspable by a user, and which extends upwards from the upper rim (21) of the first air-filtering shell or vessel (20) so as to engage in pass-through manner a slot or indentation (31a) realized on the upper rim (31) of the second air-filtering shell or vessel (30), and then project upwards above the second air-filtering shell or vessel (30).
3. Laundry dryer according to Claim 2, **characterized in that** the graspable extraction-aid member (26, 138) consists in a winglet or flap (26) that protrudes upwards from the upper edge (21) of the first air-filtering shell or vessel (20) and has its distal end shaped/structured for being manually graspable by the user.
4. Laundry dryer according to Claim 1, **characterized in that** the graspable extraction-aid member (26, 138) comprises at least one manually-operated coupling device (138) which is structured to selectively attach/fix the two air-filtering shells or vessels (120, 130) to one another in a rigid and stable, though easily detachable manner.
5. Laundry dryer according to Claim 4, **characterized in that** the manually-operated coupling device (138) is fixed/associated to one (130) of the two air-filtering shells or vessels (120) and (130), and it is structured to selectively hook and retain the remaining of the two air-filtering shells or vessels (120, 130) so as to clamp/secure the two air-filtering shells or vessels (120, 130) to one another in a rigid and stable, though easily detachable manner,
6. Laundry dryer according to any one of the foregoing claims, **characterized in** air-filtering cartridge (15) furthermore comprises a permeable-to-air upper lid (35, 135) which is rigidly associated/fixed to the top of the second air-filtering shell or vessel (30, 130) so as to close the upper mouth of the second air-filtering shell or vessel (30, 130).
7. Laundry dryer according to Claims 5 and 6, **characterized in that** the manually-operated coupling device (138) is stably fixed/associated to the permeable-to-air upper lid (135) and is structured to selectively hook and retain the first air-filtering shell or vessel (120) so as to clamp/secure the two air-filtering shells or vessels (120, 130) to one another in a rigid and stable, though easily detachable manner.
8. Laundry dryer according to Claim 7, **characterized in that** the manually-operated coupling device (138) consists in a clipping arm (138) which is hinged to the permeable-to-air upper lid (135) of the second air-filtering shell or vessel (130) so as to be able to rotate about a reference axis locally substantially tangent to the outer surface of the permeable-to-air upper lid (135), to and from a fastening position the clipping arm (138) lays down on the outer surface of the permeable-to-air upper lid (135) with the distal end clipped onto a portion of the upper rim (121) of the first air-filtering shell or vessel (120), so as to couple/connect the two air-filtering shells or vessels (120, 130) to one another in a rigid and stable, though easily detachable manner.
9. Laundry dryer according to any one of the foregoing claims, **characterized in that** each of said first and the second air-filtering shells or vessels (20, 120; 30, 130) is provided with two reciprocally-faced, permeable-to-air sidewalls (22, 122; 32, 132) which are structured to restrain the fluff and/or lint particles in suspension into the airflow (f) that crosses the air-vent (10).
10. Laundry dryer according to any one of the foregoing claims, **characterized in that** each of said first and the second air-filtering shells or vessels (20, 120; 30, 130) is divided into two valve-like pieces (23, 123; 33, 133) which are selectively separable to one another, and which are laterally hinged to one another so that the first and the second air-filtering shells or vessels (20, 120; 30, 30) are openable in a book-like manner.
11. Laundry dryer according to Claims 9 and 10, **characterized in that** each valve-like piece (23, 123; 33, 133) of the first and second air-filtering shell or vessel (20, 120; 30, 130) incorporates a respective permeable-to-air sidewall (22, 122; 32; 132).
12. Laundry dryer according to Claim 10 or 11, **characterized in that** the first air-filtering shell or vessel (20, 120) is provided with a snap-on locking mechanism (25, 125) which is structured for selectively rigidly anchoring/fixing the two valve-like pieces (23, 123) of the first air-filtering shell or vessel (20; 120) to one another when the same valve-like pieces (23, 123) are reciprocally coupled to form/compose the air-filtering shell or vessel (20, 120).
13. Laundry dryer according to Claims 9, 10 or 11, **characterized in that** each permeable-to-air sidewall (32, 132) of the second air-filtering shell or vessel (30, 130) is arranged locally faced and superimposed to a respective permeable-to-air sidewall (22, 122) of the first air-filtering shell or vessel (20, 120).

14. Laundry dryer according to Claims 6 and any claim 10 to 12, **characterized in that** said permeable-to-air upper lid (35, 135) is divided into two complementary pieces (36, 136) which are selectively separable to one another, and each of which is permanently rigidly fixed to a respective valve-like piece (33, 133) of the second air-filtering shell or vessel (30, 130), so as to allow the second air-filtering shell or vessel (30, 130) to open in a book-like manner.
15. Laundry dryer according to Claim 14, **characterized in that** the permeable-to-air upper lid (35, 135) furthermore comprises a manually-operated snap-on locking mechanism (37, 137) which is structured for selectively rigidly anchoring the two complementary pieces (36, 136) of the permeable-to-air upper lid (35, 135) to one another when they are reciprocally coupled to form/compose the permeable-to-air upper lid (35, 135).

Patentansprüche

1. Wäschetrockner (1), der einen Außenmantel (2) mit einer Vorderwand (2a) umfasst, die eine Durchgangsöffnung zum Wäschebeladen/-entladen aufweist und eine Luftfilterpatrone (15), die entnehmbar in einen Luftschacht (10) eingesetzt wird, durch den ein Wäschetrocknungsluftstrom (f) fließt, wobei die Luftfilterpatrone (15) eine erste, im Wesentlichen beutel- oder taschenförmige Luftfilterschale oder -gefäß (20, 120) umfasst, die bzw. das dafür konzipiert ist, in den Luftschacht (10) eingefügt/einsteckt zu werden, und so strukturiert ist, dass sie/es die schwebenden Flusen- und oder Fusselpartikel im Luftstrom (f) bindet; wobei der Wäschetrockner **dadurch gekennzeichnet ist, dass** die Luftfilterpatrone (15) ferner Folgendes umfasst:
- eine zweite, vollständig getrennte, im Wesentlichen beutel- oder taschenförmige Luftfilterschale oder -gefäß (30, 130), die bzw. das in die bzw. das erste Luftfilterschale oder -gefäß (20, 120) eingepasst/eingelassen ist, so dass im Wesentlichen der gleiche Luftstrom (f) dadurch hindurchfließt, der durch die bzw. das erste Luftfilterschale oder -gefäß (20, 120) hindurchfließt, und die bzw. das so strukturiert ist, dass sie/es die schwebenden Flusen- und oder Fusselpartikel im Luftstrom (f) bindet; und
 - ein ergreifbares Entnahmehilfselement (26, 138), das an einer der zwei vollständig getrennten Luftfilterschalen oder -gefäße (20, 30; 120, 130) befestigt/angebracht ist und so strukturiert ist, dass die manuelle Entnahme beider Luftfilterschalen oder -gefäße (20, 30; 120, 130) zu einem bestimmten Zeitpunkt aus dem Luft-

schacht (10) ermöglicht wird.

2. Wäschetrockner nach Anspruch 1, **dadurch gekennzeichnet, dass** der obere Rand (31) der zweiten Luftfilterschale oder -gefäß (30) so geformt/strukturiert ist, um am oberen Rand (21) der ersten Luftfilterschale bzw. -gefäß (20) anzuliegen; sowie dadurch, dass das ergreifbare Entnahmehilfselement (26, 138) mindestens ein hervorstehendes Endstück (26) umfasst, das so geformt/strukturiert ist, dass es durch einen Benutzer manuell ergriffen werden kann und sich ausgehend vom oberen Rand (21) der ersten Luftfilterschale oder -gefäß (20) nach oben erstreckt, um durch einen Schlitz bzw. eine Einkerbung (31a) am oberen Rand (31) der zweiten Luftfilterschale oder -gefäß (30) in diese durchlaufend einzugreifen und anschließend oberhalb der zweiten Luftfilterschale oder -gefäß (30) herauszuragen.
3. Wäschetrockner nach Anspruch 2, **dadurch gekennzeichnet, dass** das ergreifbare Entnahmehilfselement (26, 138) aus einem Hilfsflügel oder einer Klappe (26) besteht, der bzw. die ausgehend von dem oberen Rand (21) der ersten Luftfilterschale oder -gefäß (20) herausragt und dessen distales Ende so geformt/strukturiert ist, dass es durch den Benutzer manuell ergriffen werden kann.
4. Wäschetrockner nach Anspruch 1, **dadurch gekennzeichnet, dass** das ergreifbare Entnahmehilfselement (26, 138) mindestens eine manuell betätigte Kupplungsvorrichtung (138) umfasst, die so strukturiert ist, dass sie die beiden Luftfilterschalen oder -gefäße (120, 130) selektiv starr und stabil, jedoch leicht abnehmbar, aneinander befestigt.
5. Wäschetrockner nach Anspruch 4, **dadurch gekennzeichnet, dass** die manuell betätigte Kupplungsvorrichtung (138) an einem (130) der beiden Luftfilterschalen oder -gefäße (120) und (130) befestigt/angebracht und so strukturiert ist, dass sie die verbleibende der zwei Luftfilterschalen oder -gefäße (120, 130) selektiv einhakt und hält, um die beiden Luftfilterschalen oder -gefäße (120, 130) starr und stabil, jedoch leicht abnehmbar, aneinanderzuklemmen/sichern.
6. Wäschetrockner nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Luftfilterpatrone (15) ferner einen luftdurchlässigen oberen Deckel (35, 135) umfasst, der starr an der Oberseite der zweiten Luftfilterschale oder -gefäß (30, 130) angebracht/befestigt ist, um die obere Mündung der zweiten Luftfilterschale oder -gefäß (30, 130) zu schließen.
7. Wäschetrockner nach den Ansprüchen 5 und 6, **da-**

durch gekennzeichnet, dass die manuell betätigte Kupplungsvorrichtung (138) stabil an dem luftdurchlässigen oberen Deckel (135) befestigt/angebracht und so strukturiert ist, dass sie die erste Luftfilterschale oder -gefäß (120) selektiv einhakt und hält, um die beiden Luftfilterschalen oder -gefäße (120, 130) starr und stabil, jedoch leicht abnehmbar, aneinanderzuklemmen/sichern.

8. Wäschetrockner nach Anspruch 7, **dadurch gekennzeichnet, dass** die manuell betätigte Kupplungsvorrichtung (138) aus einem Klemmarm (138) besteht, der schwenkbar an dem luftdurchlässigen oberen Deckel (135) der zweiten Luftfilterschale oder -gefäß (130) angebracht ist, um sich um eine Referenzachse, die sich im Wesentlichen lokal tangential zu der Außenfläche des luftdurchlässigen oberen Deckels (135) befindet, in eine Befestigungsposition des Klemmarms (138) und aus dieser heraus an der Außenfläche des luftdurchlässigen oberen Deckels (135) drehen zu können, wobei das distale Ende an einen Abschnitt des oberen Rands (121) der ersten Luftfilterschale oder -gefäß (120) geklemmt ist, um die beiden Luftfilterschalen oder -gefäße (120, 130) starr und stabil, jedoch leicht abnehmbar, aneinanderzukoppeln/miteinander zu verbinden.

9. Wäschetrockner nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** jede der ersten und zweiten Luftfilterschalen oder -gefäße (20, 120; 30, 130) mit zwei wechselseitigen luftdurchlässigen Seitenwänden (22, 122; 32, 132) versehen ist, die so strukturiert sind, dass sie die schwebenden Flusen- und oder Fusselpartikel im Luftstrom (f), der durch den Luftschacht (10) fließt, binden.

10. Wäschetrockner nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** jede der ersten und zweiten Luftfilterschalen oder -gefäße (20, 120; 30, 130) in zwei ventilartige Stücke (23, 123; 33, 133) unterteilt ist, die selektiv voneinander getrennt werden können und die seitlich gelenkig aneinander befestigt sind, so dass die ersten und zweiten Luftfilterschalen oder -gefäße (20, 120; 30, 130) wie ein Buch geöffnet werden können.

11. Wäschetrockner nach den Ansprüchen 9 und 10, **dadurch gekennzeichnet, dass** jedes ventilartige Stück (23, 123; 33, 133) der ersten und zweiten Luftfilterschale oder -gefäß (20, 120; 30, 130) jeweils eine luftdurchlässige Seitenwand (22, 122; 32, 132) enthält.

12. Wäschetrockner nach Anspruch 10 oder 11, **dadurch gekennzeichnet, dass** die erste Luftfilterschale oder -gefäß (20, 120) mit einem Einrastme-

chanismus (25, 125) versehen ist, der so strukturiert ist, dass er die beiden ventilartigen Stücke der ersten Luftfilterschale oder -gefäß (20, 120) selektiv starr aneinander verankert/befestigt, wenn dieselben ventilartigen Stücke (23, 123) umgekehrt miteinander verbunden werden, um die Luftfilterschale oder -gefäß (20, 120) zu formen/zu bilden.

13. Wäschetrockner nach den Ansprüchen 9, 10 oder 11, **dadurch gekennzeichnet, dass** jede luftdurchlässige Seitenwand (32, 132) der zweiten Luftfilterschale oder -gefäß (30, 130) so angeordnet ist, dass sie einer jeweiligen luftdurchlässigen Seitenwand (22, 122) der ersten Luftfilterschale oder -gefäß (20, 120) lokal zugewandt ist und auf dieser aufliegt.

14. Wäschetrockner nach den Ansprüchen 6 und einem der Ansprüche 10 bis 12, **dadurch gekennzeichnet, dass** der luftdurchlässige obere Deckel (35, 135) in zwei komplementäre Stücke (36, 136) unterteilt ist, die selektiv voneinander getrennt werden können und von denen jedes dauerhaft fest an einem jeweiligen ventilartigen Stück (33, 133) der zweiten Luftfilterschale oder -gefäß (30, 130) befestigt ist, um die zweite Luftfilterschale oder -gefäß (30, 130) wie ein Buch öffnen zu können.

15. Wäschetrockner nach Anspruch 14, **dadurch gekennzeichnet, dass** der luftdurchlässige obere Deckel (35, 135) ferner einen manuell betätigten Einrastmechanismus (37, 137) umfasst, der so strukturiert ist, dass er die beiden komplementären Stücke (36, 136) des luftdurchlässigen oberen Deckels (35, 135) selektiv fest aneinander verankert, wenn sie umgekehrt miteinander verbunden werden, um den luftdurchlässigen oberen Deckel (35, 135) zu formen/zu bilden.

Revendications

1. Sèche-linge (1) comportant :

un habillage extérieur (2) doté d'une paroi avant (2a) munie d'une ouverture de traversée pour chargement/déchargement de linge, et d'une cartouche (15) de filtration d'air qui est installée de manière amovible dans une prise (10) d'air qui est traversée par un écoulement (f) d'air de séchage de linge, ladite cartouche (15) de filtration d'air comportant une première coque ou cuvette (20, 120) de filtration d'air sensiblement en forme de sac ou de poche, qui est dimensionnée pour être insérée/emboîtée dans ladite prise (10) d'air et est structurée de façon à arrêter les particules de peluche et/ou de feutre en suspension dans l'écoulement (f) d'air ;
le sèche-linge étant **caractérisé en ce que la**

cartouche (15) de filtration d'air comporte en outre :

- une deuxième coque ou cuvette (30, 130) de filtration d'air entièrement séparée sensiblement en forme de sac ou de poche, qui est installée/encastrée dans ladite première coque ou cuvette (20, 120) de filtration d'air de façon à être traversée par sensiblement le même écoulement (f) d'air qui traverse la première coque ou cuvette (20, 120) de filtration d'air, et qui est structurée pour arrêter les particules de peluche et/ou de feutre en suspension dans l'écoulement (f) d'air ; et
- un organe préhensible (26, 138) d'aide à l'extraction qui est fixé/associé à une des deux coques ou cuvettes (20, 30 ; 120, 130) de filtration d'air entièrement séparées, et est structuré de façon à permettre l'extraction manuelle des deux coques ou cuvettes (20, 30 ; 120, 130) de filtration d'air en même temps de la prise (10) d'air.

2. Sèche-linge selon la revendication 1, **caractérisé en ce que** le pourtour supérieur (31) de la deuxième coque ou cuvette (30) de filtration d'air est conformé/structuré de façon à prendre appui sur le pourtour supérieur (21) de la première coque ou cuvette (20) de filtration d'air ; et

en ce que l'organe préhensible (26, 138) d'aide à l'extraction comporte au moins un élément (26) de queue saillant qui est conformé/structuré pour être manuellement préhensible par un utilisateur, et qui s'étend vers le haut à partir du pourtour supérieur (21) de la première coque ou cuvette (20) de filtration d'air de façon à interagir par traversée avec une fente ou indentation (31a) réalisée sur le pourtour supérieur (31) de la deuxième coque ou cuvette (30) de filtration d'air, puis à dépasser vers le haut au-dessus de la deuxième coque ou cuvette (30) de filtration d'air.

3. Sèche-linge selon la revendication 2, **caractérisé en ce que** l'organe préhensible (26, 138) d'aide à l'extraction est constitué d'une ailette ou rabat (26) qui fait saillie vers le haut à partir du bord supérieur (21) de la première coque ou cuvette (20) de filtration d'air et dont l'extrémité distale est conformée/structurée pour être manuellement préhensible par l'utilisateur.

4. Sèche-linge selon la revendication 1, **caractérisé en ce que** l'organe préhensible (26, 138) d'aide à l'extraction comporte au moins un dispositif (138) de couplage actionné manuellement qui est structuré de façon à rattacher/fixer sélectivement les deux coques ou cuvettes (120, 130) de filtration d'air l'une à

l'autre de manière rigide et stable, bien que facilement détachable.

5. Sèche-linge selon la revendication 4, **caractérisé en ce que** le dispositif (138) de couplage actionné manuellement est fixé/associé à une (130) des deux coques ou cuvettes (120) et (130) de filtration d'air, et **en ce qu'il** est structuré de façon à accrocher et à retenir sélectivement la coque restante parmi les deux coques ou cuvettes (120, 130) de filtration d'air de façon à serrer/immobiliser les deux coques ou cuvettes (120, 130) de filtration d'air l'une par rapport à l'autre de manière rigide et stable, bien que facilement détachable.

6. Sèche-linge selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la cartouche (15) de filtration d'air comporte en outre un couvercle supérieur (35, 135) perméable à l'air qui est associé/fixé de façon rigide au sommet de la deuxième coque ou cuvette (30, 130) de filtration d'air de façon à fermer l'embouchure supérieure de la deuxième coque ou cuvette (30, 130) de filtration d'air.

7. Sèche-linge selon les revendications 5 et 6, **caractérisé en ce que** le dispositif (138) de couplage actionné manuellement est fixé/associé de façon stable au couvercle supérieur (135) perméable à l'air et est structuré de façon à accrocher et à retenir sélectivement la première coque ou cuvette (120) de filtration d'air de façon à serrer/immobiliser les deux coques ou cuvettes (120, 130) de filtration d'air l'une par rapport à l'autre de manière rigide et stable, bien que facilement détachable.

8. Sèche-linge selon la revendication 7, **caractérisé en ce que** le dispositif (138) de couplage actionné manuellement est constitué d'un bras (138) d'agrafage qui est articulé au couvercle supérieur (135) perméable à l'air de la deuxième coque ou cuvette (130) de filtration d'air de façon à pouvoir pivoter autour d'un axe de référence sensiblement tangent localement à la surface extérieure du couvercle supérieur (135) perméable à l'air, vers et depuis une position de fixation où le bras (138) d'agrafage repose sur la surface extérieure du couvercle supérieur (135) perméable à l'air, l'extrémité distale étant agrafée sur une partie du pourtour supérieur (121) de la première coque ou cuvette (120) de filtration d'air, de façon à coupler/liar les deux coques ou cuvettes (120, 130) de filtration d'air l'une à l'autre de manière rigide et stable, bien que facilement détachable.

9. Sèche-linge selon l'une quelconque des revendications précédentes, **caractérisé en ce que** chacune desdites première et deuxième coques ou cuvettes

(20, 120 ; 30, 130) de filtration d'air est munie de deux parois latérales (22, 122 ; 32, 132) perméables à l'air se faisant face qui sont structurées de façon à arrêter les particules de peluche et/ou de feutre en suspension dans l'écoulement (f) d'air qui traverse la prise (10) d'air.

10. Sèche-linge selon l'une quelconque des revendications précédentes, **caractérisé en ce que** chacune desdites première et deuxième coques ou cuvettes (20, 120 ; 30, 130) de filtration d'air est divisée en deux éléments (23, 123 ; 33, 133) semblables à des clapets qui sont sélectivement séparables l'un de l'autre et qui sont articulés latéralement l'un à l'autre de telle sorte que les première et deuxième coques ou cuvettes (20, 120 ; 30, 130) de filtration d'air puissent être ouvertes à la manière d'un livre.
11. Sèche-linge selon les revendications 9 et 10, **caractérisé en ce que** chaque élément (23, 123 ; 33, 133) semblable à un clapet des première et deuxième coques ou cuvettes (20, 120 ; 30, 130) de filtration d'air incorpore une paroi latérale respective (22, 122 ; 32, 132) perméable à l'air.
12. Sèche-linge selon la revendication 10 ou 11, **caractérisé en ce que** la première coque ou cuvette (20, 120) de filtration d'air est munie d'un mécanisme (25, 125) de verrouillage à encliquetage qui est structuré de façon à ancrer/fixer sélectivement de manière rigide les deux éléments semblables à des clapets (23, 123) de la première coque ou cuvette (20, 120) de filtration d'air l'un à l'autre lorsque les mêmes éléments semblables à des clapets (23, 123) sont couplés réciproquement pour former/composer la coque ou cuvette (20, 120) de filtration d'air.
13. Sèche-linge selon les revendications 9, 10 ou 11, **caractérisé en ce que** chaque paroi latérale (32, 132) perméable à l'air de la deuxième coque ou cuvette (30, 130) de filtration d'air est disposée localement face et superposée à une paroi latérale (22, 122) respective perméable à l'air de la première coque ou cuvette (20, 120) de filtration d'air.
14. Sèche-linge selon la revendication 6 et l'une quelconque des revendications 10 à 12, **caractérisé en ce que** ledit couvercle supérieur (35, 135) perméable à l'air est divisé en deux éléments complémentaires (36, 136) qui sont sélectivement séparables l'un de l'autre, et dont chacun est fixé définitivement de manière rigide à un élément respectif (33, 133) semblable à un clapet de la deuxième coque ou cuvette (30, 130) de filtration d'air, de façon à permettre à la deuxième coque ou cuvette (30, 130) de filtration d'air de s'ouvrir à la manière d'un livre.
15. Sèche-linge selon la revendication 14, **caractérisé**

en ce que le couvercle supérieur (35, 135) perméable à l'air comporte en outre un mécanisme (37, 137) de verrouillage à encliquetage actionné manuellement, qui est structuré de façon à ancrer sélectivement de manière rigide les deux éléments complémentaires (36, 136) du couvercle supérieur (35, 135) perméable à l'air l'un à l'autre lorsqu'ils sont réciproquement couplés pour former/composer le couvercle supérieur (35, 135) perméable à l'air.

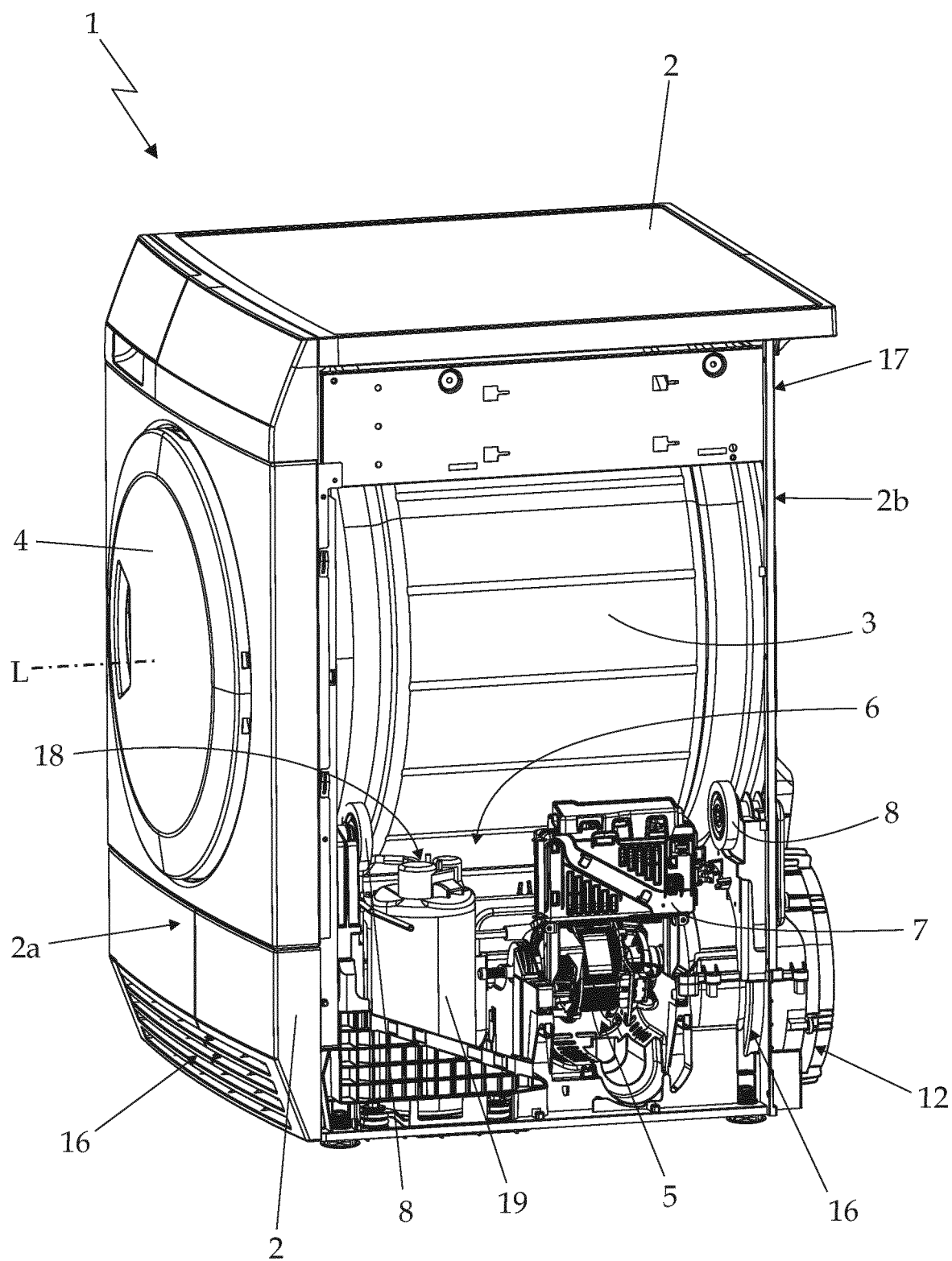


Fig. 1

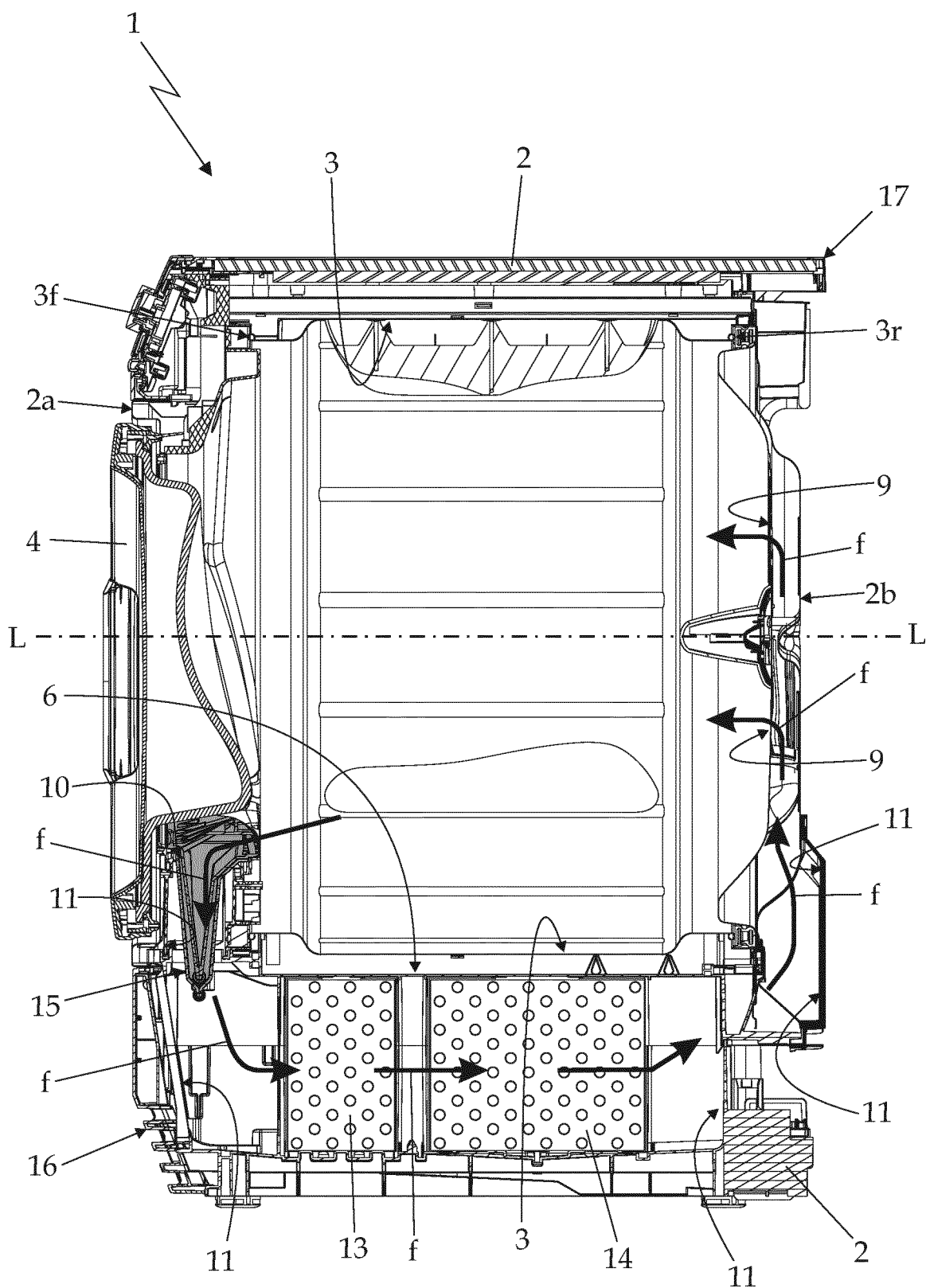


Fig. 2

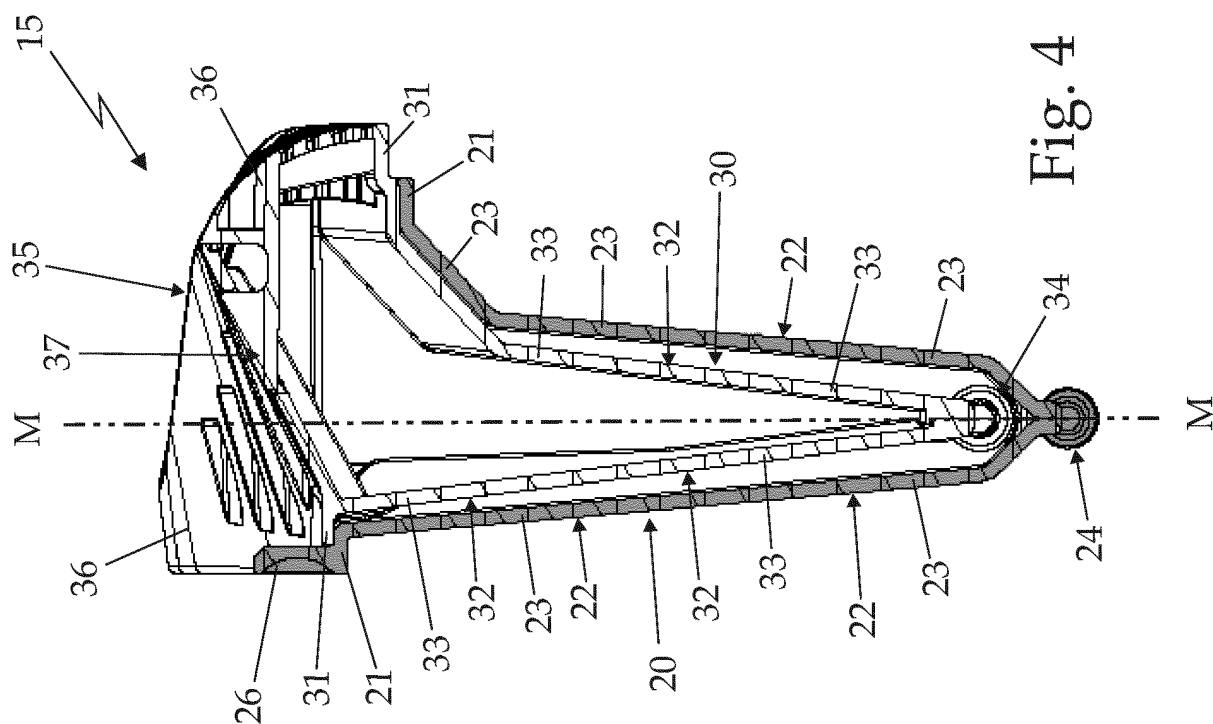


Fig. 4

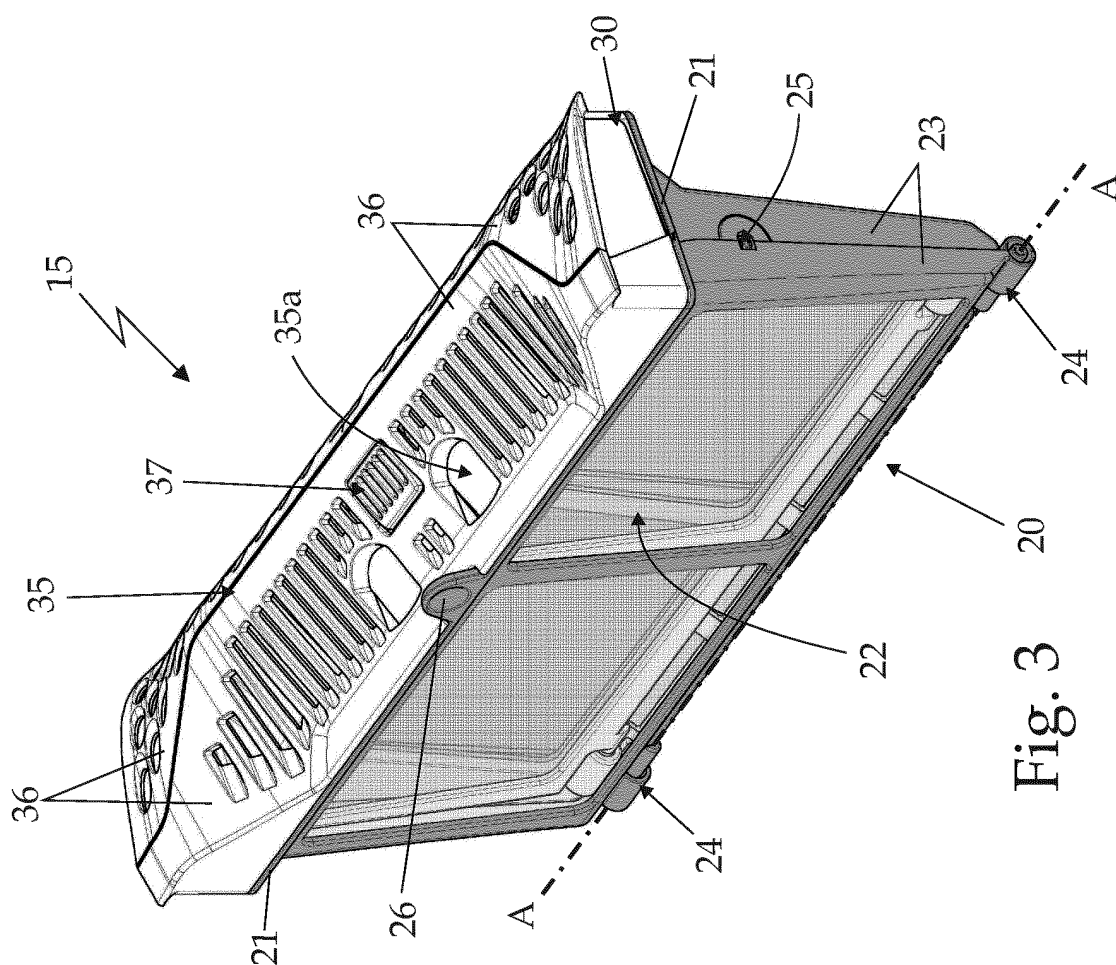
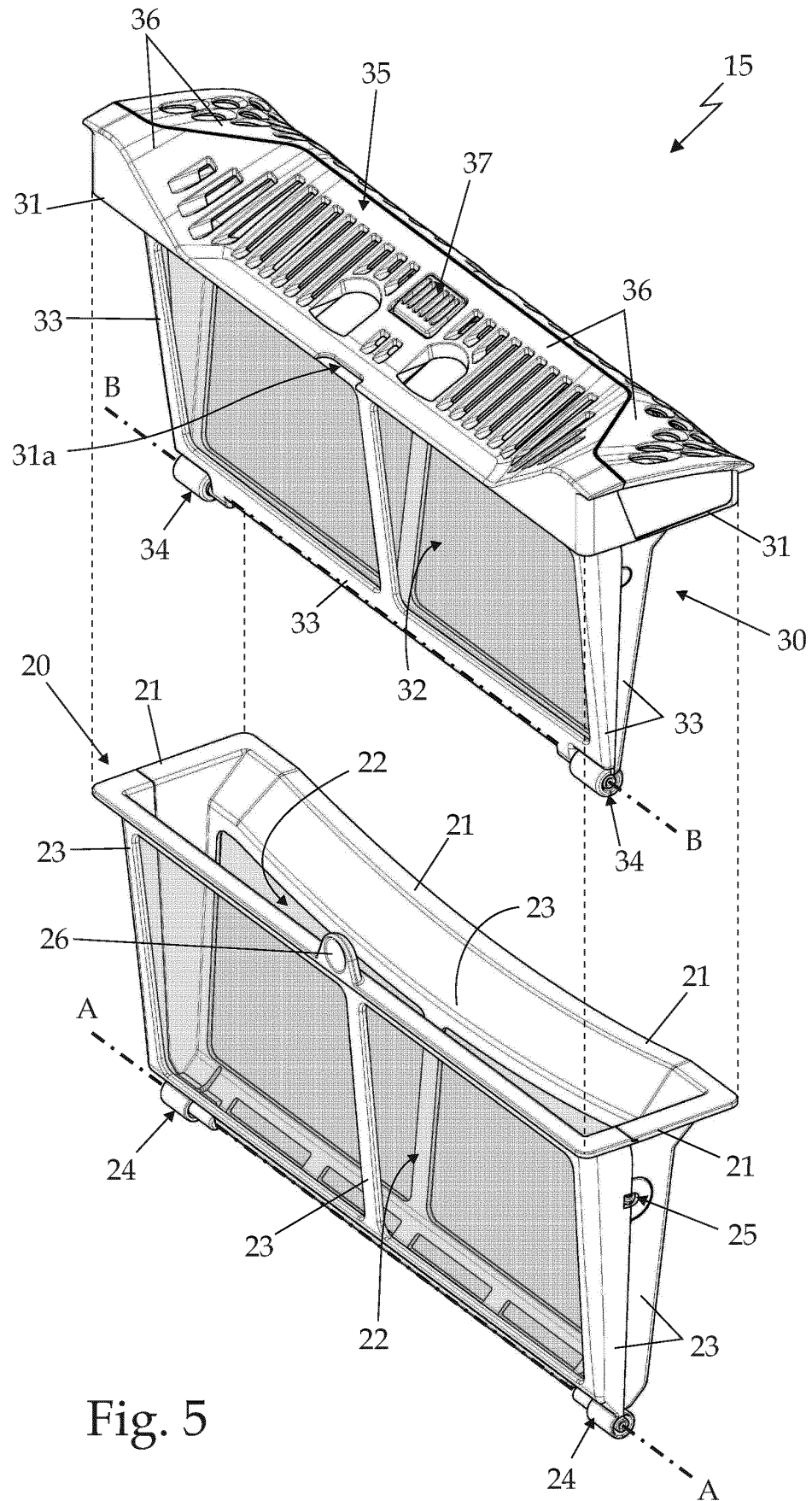


Fig. 3



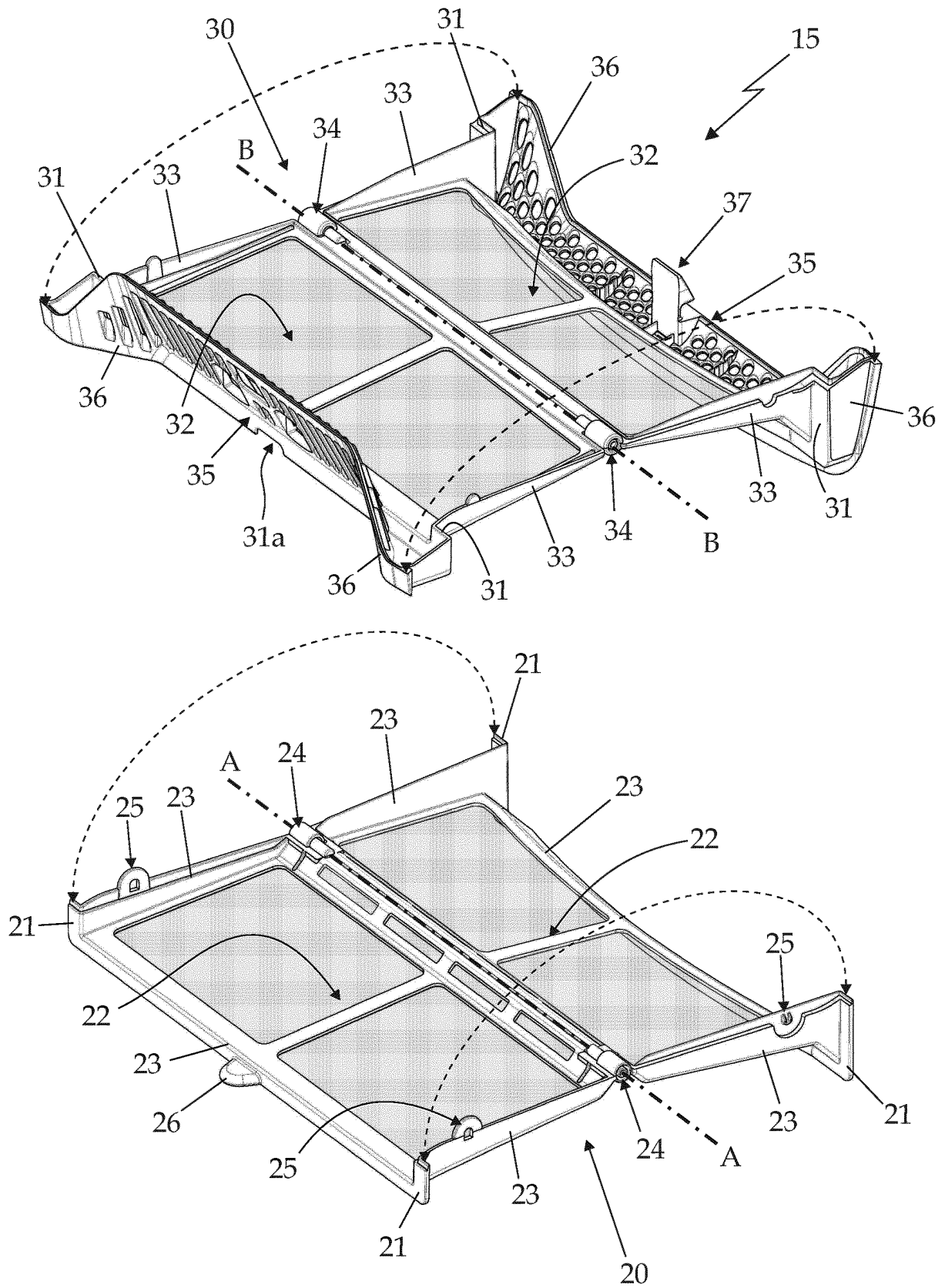
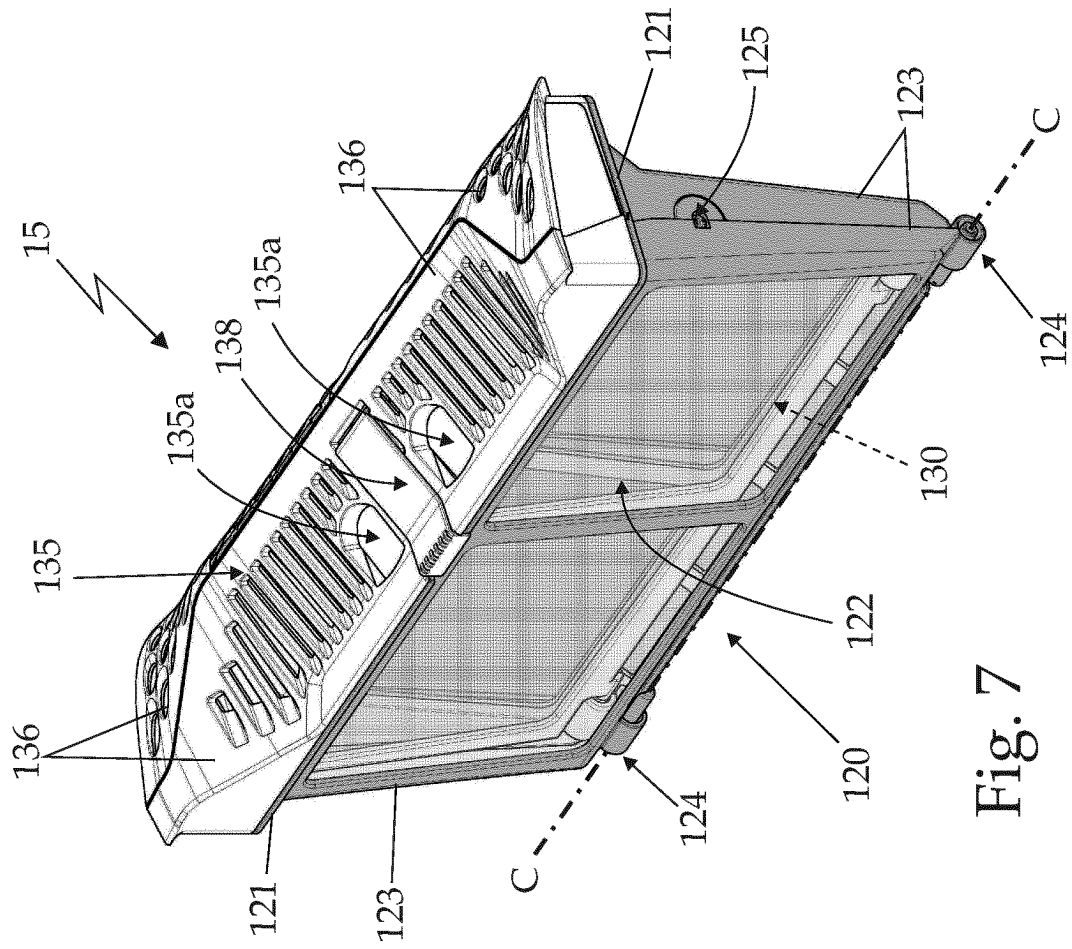
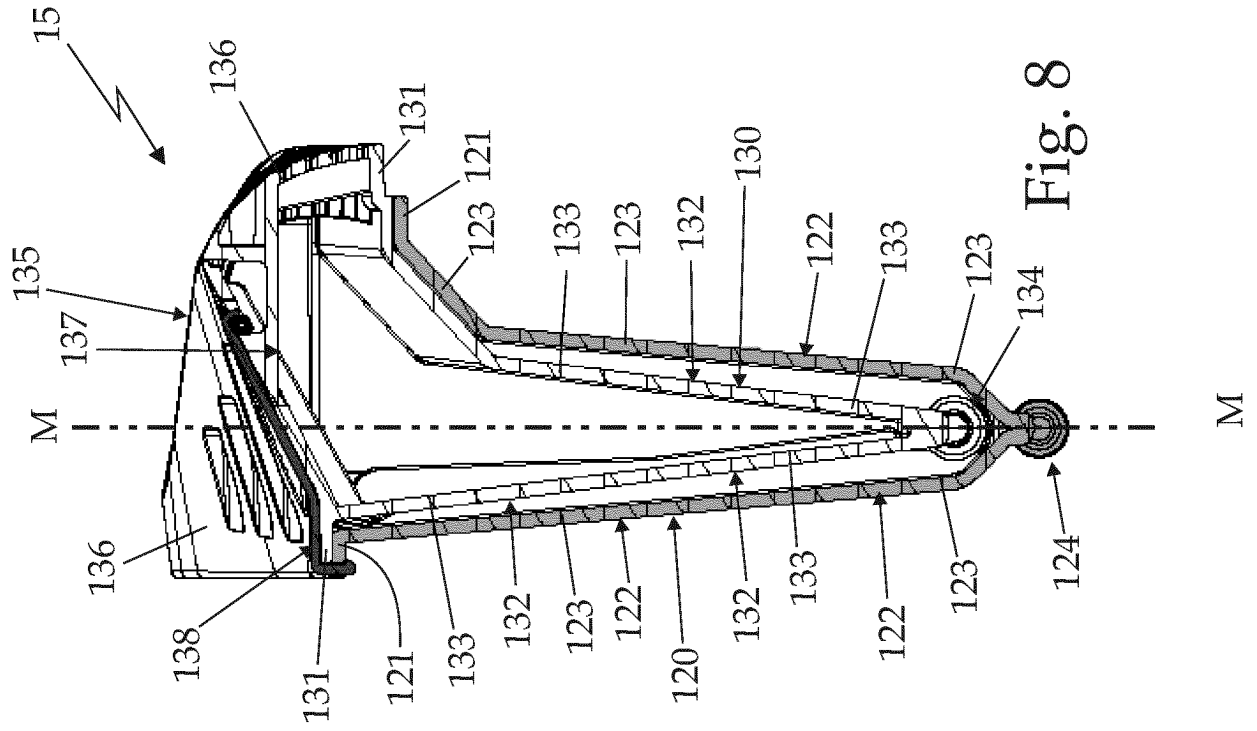


Fig. 6



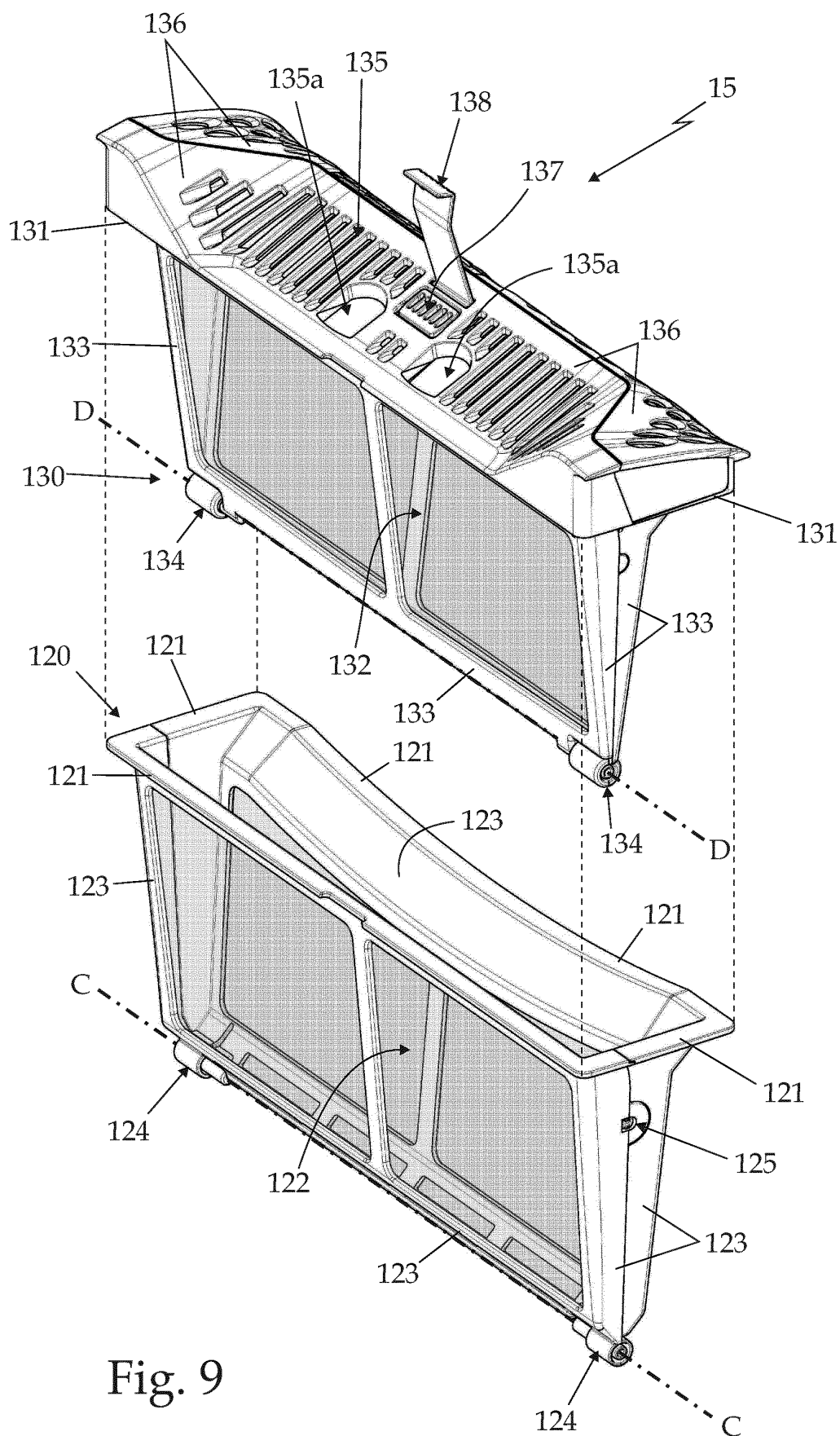


Fig. 9

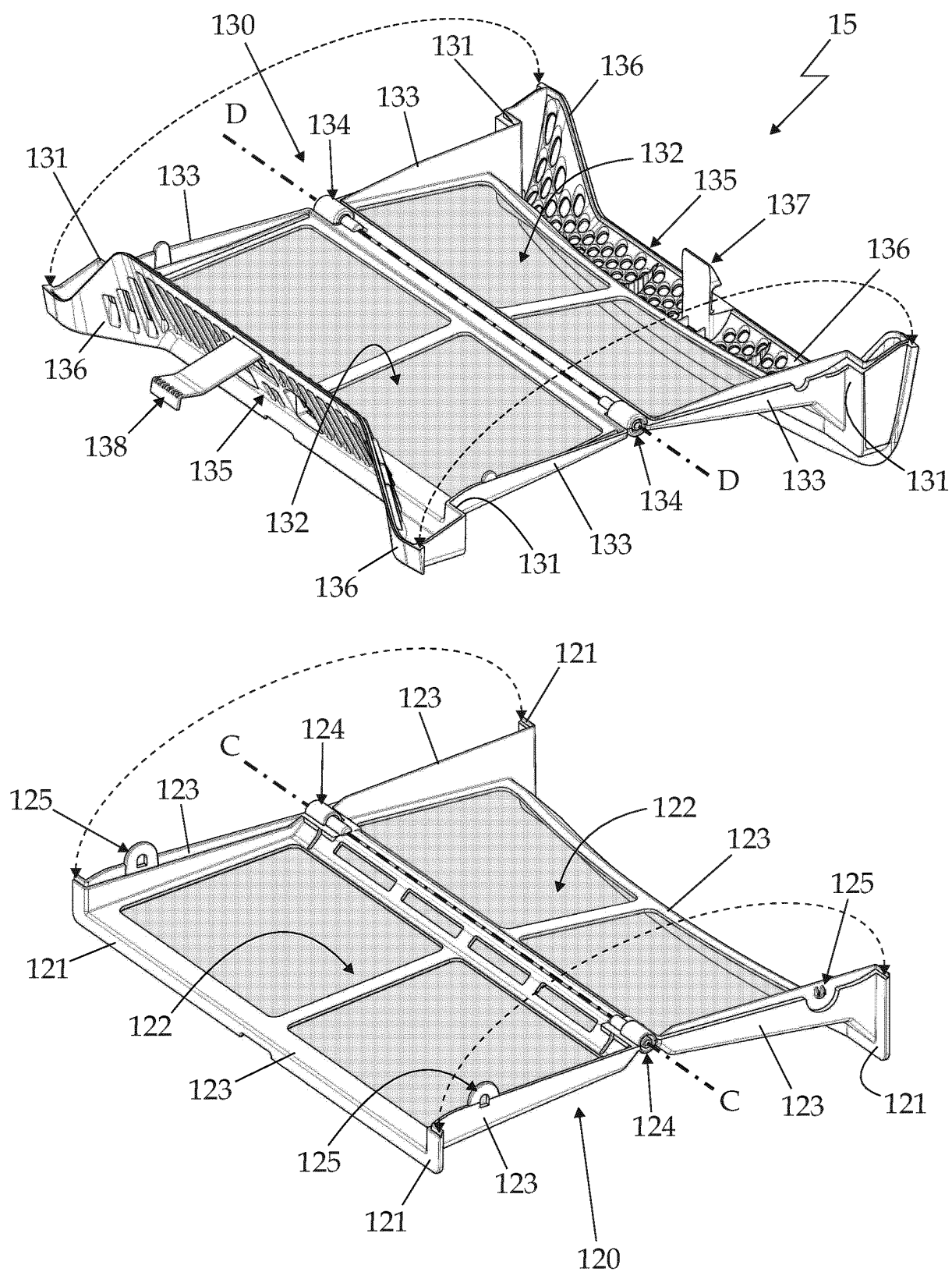


Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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