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(54) **A LAUNDRY DRYER COMPRISING A FILTER ASSEMBLY AND A METHOD TO CLEAN A FILTER ASSEMBLY**

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SÈCHE-LINGE COMPRENANT UN ENSEMBLE FILTRE ET PROCÉDÉ POUR NETTOYER UN ENSEMBLE FILTRE

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(73) Proprietor: **Electrolux Appliances Aktiebolag  
105 45 Stockholm (SE)**

(72) Inventors:  
• **DAL MOLIN, Rudy  
33080 Porcia (PN) (IT)**  
• **EDENIUS, Michael  
33080 Porcia (PN) (IT)**  
• **MAZZAROTTO, Nadir  
33080 Porcia (PN) (IT)**

• **MISSIO, Gabriele  
33080 Porcia (PN) (IT)**  
• **REID, Nicola  
33080 Porcia (Pordenone) (IT)**  
• **ROSSI, Giuseppe  
33080 Porcia (PN) (IT)**

(74) Representative: **Electrolux Group Patents  
AB Electrolux  
Group Patents  
S:t Göransgatan 143  
105 45 Stockholm (SE)**

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## Description

**[0001]** The present invention relates to a laundry dryer comprising a filter assembly having a cleaning device and to a method to clean such a filter assembly by means of the cleaning device.

**[0002]** Laundry dryers usually comprise filter systems for collecting fluff or lint which is detached from the laundry to be treated in the drying process. Typically, a prior art tumble dryer provides a filter system which is accessible for control and/or maintenance by opening a door of the tumble dryer. An air flow is provided inside the tumble dryer that enters the filter system. Fluff or lint (in general foreign substances) that is carried by the air flow from the laundry to be dried is filtered out by the filter system, such that air that leaves the filter system is substantially free from lint or fluff. Said air can be heated up again and conveyed to the laundry treatment chamber of the tumble dryer. Alternatively, the air can be vented outside the dryer.

**[0003]** If the accumulation of the foreign substance on the filter system becomes greater than a pre-set level, the foreign substance can interfere with the discharge of the air from the drum by reducing the circulation of air from to the drum; thus, the filter system in the dryer should be cleaned periodically.

**[0004]** The way in which the operation of cleaning of the filter is performed depends on the type of filter system used. For example, some dryer includes below the laundry loading/unloading door a plinth having a plinth door to be opened in order to reach the filter system and clean the same using a suitable tool, leaving the filter system in place. Alternatively, the filter system cleaning is carried out as the user separates the filter system from the dryer after finishing a drying cycle, removes the foreign substance from the filter system, and again mounts the filter system into the dryer. Further cleaning operations of known type provide for removing foreign substances through a fluid sprayed onto the fluffed filter system. The activation of the fluid spraying operation is generally automatic, i.e. activated by the laundry drying control unit algorithm. Such automatic filter cleaning operation requires the provision of complex arrangements in the dryer architecture which, however, always need a user to remove the washed-off fluff from the machine.

**[0005]** Filter cleaning carried out manually with an external tool or by removing completely the filter system is not only cumbersome but also generally not liked by the user, who tries to postpone it. Due to this, because the filter cleaning may not be carried out every time the dryer is operated, until the filter is cleaned, a failure to secure adequate air flow rate required for drying due to the foreign substance interfering with the air flow being discharged from the drum can be obtained, thereby reducing the overall efficiency of the drying machine and even causing the laundry not to be as dried as the user desires at the end of a drying cycle.

**[0006]** Further, in case the cleaning of the filter system

requires an external tool, such as a brush, the latter can be lost or misplaced. In case the filter system needs to be removed from the laundry dryer in order to be cleaned, this may cause damages to the filter system itself in case of improper handling.

**[0007]** US 9 052 142 B2 discloses a dryer including a cabinet, a drum rotatably provided in the cabinet, a duct that defines a flow passage for air exiting the drum, and a filter assembly located at a position relative to the flow passage and contacting air that has exited the drum. The filter assembly includes a case defining the filter assembly, a filter portion configured to filter foreign substance from the air contacting the filter assembly, a brush frame configured for rotational movement relative to the case about a rotational axis, and a brush that is supported by the brush frame and configured to separate the foreign substance from the filter portion. A first distance from a first side of the case to the rotational axis of the brush frame is longer than a second distance from a second side of the case to the rotational axis of the brush frame.

**[0008]** US 2007/256317 discloses a lint screen assembly for a clothes dryer has a scraper blade within an open frame which mounts a lint screen panel to enable scraping out accumulated lint therefrom. The scraper blade is pivotable from a stowed position to an on-edge operative position and guided when being stroked across the lint screen panels by pivot pins captured in slots in opposite side members of the open frame.

**[0009]** US 2014/157621 A1 discloses a method for controlling a laundry treating apparatus including a drum for holding laundry, a connection duct for exhausting air from an inside of the drum, an exhaust duct provided parallel to a length direction of the drum connected to the connection duct, a filter assembly with a filter unit provided to the exhaust duct for filtering the air and a brush for removing foreign matter from the filter unit, a brush drive unit for making the brush to reciprocate a section of the filter unit, and a position sensing unit for sensing a position of the brush.

**[0010]** EP 2 055 825 A1 discloses an appliance having a drum traversed by drying air provoking from a drying air circuit including a blower, and a lint filter provided with a lint scraping unit. The scraping unit is displaced relative to the lint filter and maintained in a position in the machine. The scraping unit scrapes a lint on the lint filter and compresses the lint in a storage zone. The lint filter has a visualization unit for signalling filling of the storage zone by the scraped lint. The scraping unit prevents closing of an access door to the drum when the storage zone is filled.

**[0011]** DE 10 2008 009780 A1 discloses a filter cleaning apparatus and a ductless dryer adopting the same, the dryer having a main body, a drum rotatably mounted at the main body, a hot air supplying unit supplying hot air into the drum, a heat exchanger condensing and removing moisture contained in air exhausted from the drum, a circulation duct conducting the air exhausted from the drum to the heat exchanger, a filter installed in the

circulation duct and filtering foreign substances contained in the air discharged from the drum, and a filter cleaning apparatus removing the foreign substances caught by the filter, thereby enhancing a user's convenience and reducing indoor air contamination which may occur in the course of removing the foreign substances.

**[0012]** JP 4 245653 B1 discloses a laundry drier including a blower for sucking external air from an external air intake, blowing the air into an inner tub for storing clothes and exhausting it from an exhaust port, the secondary filter body composed of a secondary filter fixed to a secondary frame body fixed to the external air intake, and a primary filter body inserted into a body so as to face the secondary filter body, wherein the primary filter body is provided with a dust removing brush body whose end abuts on the back side end part of the secondary filter when the primary filter body is mounted on the body, and the downstream surface side of the primary filter body is divided into a forward dust storage part and a backward dust storage part by the dust removing brush body. When the primary filter body is inserted into and removed from the body, the dust of the secondary filter body is removed, and the dust is surely received by the storage part before the dust and the storage part after the dust

**[0013]** The goal of the present invention is therefore to render available a laundry dryer including a filter assembly and a method to clean a filter assembly in a laundry dryer in which the cleaning operations of the filter assembly are simplified with respect to the prior art of record.

**[0014]** Preferably, the cleaning of the filter assembly does not require additional tool(s) external to the dryer which needs to be stored away and retrieved at the time of cleaning.

**[0015]** Further, the act of cleaning is preferably relatively easy and quick.

**[0016]** According to a first aspect, the invention relates to a method to clean a filter assembly in a laundry dryer, wherein the laundry dryer comprises:

- o a cabinet;
- o a drum rotatably supported in the cabinet;
- o a duct defining a flow passage for process air exiting the drum;
- o a filter assembly;
- o said cabinet including a seat to house said filter assembly, said seat being positioned downstream said drum in the flowing direction of the process air and said filtering assembly being positioned at least partially in the duct so as to filter process air flowing therein;
- o said filter assembly including:

- a frame having a first and a second end portions and defining, at the first end portion thereof, a storage portion adapted to store filtered material for several drying cycles without being emptied;

- a filter supported by the frame and defining a first filtering surface;
- a cleaning device for cleaning the first filtering surface including a translatable wiper to wipe the first filtering surface, said cleaning device including a manually operable handle which is connected to the wiper and movable from a first configuration wherein the manually operable handle is substantially completely housed in said seat, to a second configuration;

the method comprising:

- o providing in a first position said manually operable handle in said first configuration;
- o moving said manually operable handle in the second configuration where it protrudes from said seat before translating the wiper from said first position wherein the wiper is located at the second end portion of said frame towards the first end portion of the frame by operating said manually operable handle;
- o wiping said first filtering surface by means of said wiper during translating so as to move filtered material attached to said first filtering surface towards the first end portion of the frame; and
- o collecting said filtered material in said storage portion;
- o removing said filter assembly from said seat in order to remove said filtered material from said storage portion.

**[0017]** According to a second aspect, the invention relates to a laundry dryer comprising:

- o a cabinet;
- o a drum rotatably supported in the cabinet;
- o a duct defining a flow passage for process air exiting the drum;
- o a filter assembly;
- o said cabinet including a seat to house said filter assembly, said seat being positioned downstream said drum in the flowing direction of the process air and
- o said filtering assembly being removably housed in said seat and positioned at least partially in the duct so as to filter process air flowing therein;
- o said filter assembly including:
  - a frame having a first and a second end portions and defining a storage portion at the first end portion thereof, said storage portion being apt to store and keep therein collected filtered material for several drying cycles without being emptied;
  - a filter supported by the frame and defining a first filtering surface;

- a cleaning device for cleaning the filtering surface including a wiper to wipe the first filtering surface and a manually operable handle which is connected to the wiper, wherein the wiper is translatable from a first position wherein the wiper is located at the second end portion of said frame to a second position wherein the wiper is located at the first end portion of the frame, and wherein the wiper is so construed to wipe said first filtering surface during translating so as to move filtered material attached to said first filtering surface towards the first end portion of the frame in the storage portion
- said handle being movable from a first configuration wherein the manually operable handle is substantially completely housed in said seat to a second configuration wherein said handle protrudes from said seat.

**[0018]** In the following, when relative terms such as "front", "back", "rear", "lateral", "top", "bottom", etc. are used, they refer to the normal operational position of the laundry dryer when in use, e.g. located on a floor which usually is (substantially) horizontal. Thus, a horizontal plane is a plane parallel to the floor where the dryer is located. The location of a loading/unloading door of the laundry dryer, usually used to load and unload laundry from the dryer and generally coupled to a front wall of the cabinet in order to access the drum, defines the "front" of the dryer itself. Given the horizontal plane on which the laundry is located, "top" and "bottom" - as their normal common meaning - refer to the position of an object along a vertical axis. The vertical axis is defined as an axis perpendicular to the horizontal plane, such as the floor.

**[0019]** With the terms "laundry dryer" or "dryer" both an appliance having drying functions only, or a combined washer-dryer appliance, which is capable of performing both washing and drying cycles, are meant.

**[0020]** The dryer includes a cabinet or bearing structure, comprising preferably a basement, a front wall and a rear wall. The front and rear wall are preferably mounted on the basement, which is standing on a surface, such as the floor. The front wall may advantageously be provided with a through opening, at which a door is mounted to access the interior of the cabinet in order to locate or remove the laundry. Lateral walls connect the front and the rear wall to form, together with a top wall, a closed volume.

**[0021]** The basement rests on a floor and its vertical distance from the floor may be advantageously adjusted through regulating feet provided on the lower surface of the basement facing the floor.

**[0022]** The basement defines in turn a plinth region of the dryer. The plinth has a plinth inner volume, that is, the volume inside the cabinet delimited by the cabinet walls and located at the plinth region. The plinth may be perforated, or including a perforated element, so as to

enable cooling air to be taken in and expelled, if needed. The plinth can be provided with portions for supporting operational components of the laundry dryer that are needed for carrying on a laundry drying process on laundry, such as air conduits, motors and so on.

**[0023]** The laundry dryer of the invention includes a drum, in which the load, e.g. clothes or other laundry, to be dried is placed. The drum further preferably includes a mantle defining a front end and a rear end, the front end facing the front wall of the cabinet, and preferably the opening therein realized and closed by the door for loading and unloading the laundry, and a rear end facing the rear wall of the cabinet.

**[0024]** The drum of the dryer of the invention may be closed drum, i.e. the rear end is closed by a back wall or a flange, which rotates as a single piece together with the mantle when the drum is driven into rotation. Alternatively, it can be an open drum, where the closure of the rear end of the drum is given by a back wall which is stationary, that is, it does not rotate with the drum and it is preferably integral to the cabinet. Thus, the back wall of the drum can be either attached to the drum and rotate with the same, or attached to the cabinet and be still.

**[0025]** Within the cabinet, the drum is rotatably mounted for rotating, preferably according to a substantially horizontal or tilted rotation axis. For example, at least one drum support assembly for rotatably supporting the drum in its rotation around this given rotation axis is provided for within the cabinet.

**[0026]** The drum is fluidly connected to a duct defining a flow passage for process air exiting the drum. Indeed, relatively dry and warm process air flows on the laundry located in the drum so as to dry the same. The then humid cooler process air needs to be removed from the drum so that, for example, additional dry air can flow in.

**[0027]** The drum is part of a process air circuit, in particular a closed-loop circuit in case of a condensed dryer or an open circuit in case of a vented dryer, which in both cases includes a process air duct for channelling a stream of process air to dry the load. The process air duct may be connected with its two opposite ends to the drum. In this embodiment, hot dry air is fed into the drum, flowing over the laundry, and the resulting humid (and to a lower temperature cooled down) air exits the same. In case of a closed-loop drying air circuit, the humid air stream, rich in water vapour, is then fed into a humidity removal element and/or a hot air generator, such as a heat exchanger. The resulting cool dry air is then heated up before re-entering again in the drying chamber by means of a hot drying air generator, which can be for example a condenser of the heat pump system or an air/air exchanger, and the whole loop is repeated till the end of the drying cycle. Furthermore, the hot drying air generator may comprise an electrical or gas powered heating device. In a vented dryer, ambient air is taken into the dryer via an inlet duct, such air is heated up by a hot drying air generator, such as condenser of a heat pump system and/or an electrical or gas powered heating device, before en-

tering the drum. Heated air flowing through and on humid laundry contained in the drum, removes humidity from laundry. Humid air stream exiting the drum may be optionally dehumidified by an evaporator of a heat pump system, or an air-air type heat exchanger as explained above, before being exhausted outside the dryer.

**[0028]** Preferably, the hot or drying air generator is located in a basement of the cabinet.

**[0029]** In an embodiment, the duct is guiding the process air from the drum. A section of the duct, preferably a front duct section, guides the process air coming out of the drum downwards towards the basement of the laundry dryer and deflects the process air flow from the downward direction to a horizontal direction. 'Downward' direction may include flow path sections that are vertical and/or (partially) inclined to the vertical or even partially horizontal - however with the net effect that in the channel section unit the process air is guided downward from a higher to a lower altitude level (in the normal operation orientation of the laundry treatment apparatus). Preferably the process air deflected to the horizontal flow direction is either vented to the outside or enters into the hot or drying air generator. In this latter case, then the process air then re-enters the drum, via for example a rear wall of the same, which can be perforated.

**[0030]** Further, preferably, the process air duct may include a fan to blow the process air flowing into the process air duct.

**[0031]** The process air duct is also provided with a filter assembly, which is arranged along the duct, before the vent in case of a vented dryer, so that fluff is not disposed to the outside, or upstream the hot or drying generator, in case of a condensed dryer, to prevent the fluff and/or lint particles from reaching and clogging up the generator and/or the fan.

**[0032]** Any filter assembly can be used in the present invention, as long as it includes a first filtering surface supported by a frame.

**[0033]** In the same way, the first filtering surface may have any shape, it may for example include a mesh or net having a proper size to block the typical fluff or particles generated by the laundry. As an example, the filter assembly may include a flat first filtering surface having a square shape. The filtering surface may be substantially vertical. Alternatively, the filtering surface may be tilted with respect to a vertical plane, or more than a filtering surface may be present. Further, the frame defines an inner frame volume. For example, the frame may have a box-like shape the walls of which surround an inner volume. The walls may be open or closed.

**[0034]** Alternatively, the filter assembly may include a substantially wedge-shaped filtering cartridge, which can be for example fitted in removable manner into an air-filtering cartridge seat realized on the annular frame that delimits the laundry loading/unloading opening on the front wall of the cabinet so as to cover/close the whole seat. In this case, the filtering surface may be tilted with respect to a vertical plane due to the wedge-shape of the

cartridge.

**[0035]** The frame includes a first and a second end, for example a top and a bottom end if the frame is disposed vertically or with a major vertical component. At the first end, a storage portion is defined. In this storage portion, or fluff collector, lint and fluff filtered by the filter assembly is collected, as better detailed below. The storage portion can be a volume defined by the frame, for example, in case of a box-like frame, an end portion of the same.

**[0036]** Further, the frame of the filter assembly includes a cleaning device apt to clean the first filtering surface, where, as mentioned, fluff, particles, dust and other material may be present, filtered from the process air leaving the drum and entering the duct. This material is filtered by the first filtering surface of the filter assembly, which is preferably properly dimensioned and positioned into the duct so that substantially the whole dimension in cross section of the duct is covered by the filtering surface. In this way, most of the foreign material present in the process air is removed by the first filtering surface.

**[0037]** Due to the filtering action, the first filtering surface becomes with time covered by the filtered material which has been removed from the process air flowing in the duct. In order to maintain efficiency of the dryer, the collected material on the filtering surface needs to be periodically removed.

**[0038]** The means to remove such material from the first filtering surface include in the present invention the cleaning device, which comprises a wiper to wipe the first filtering surface.

**[0039]** The movement which creates the wiping action by the wiper is a translation. The wiper is indeed translated onto the filtering surface in order to clean the same.

The wiper is translatable from a first position wherein the wiper is located at the second end portion of the frame, for example at the top of the same, to a second position wherein the wiper is located at the first end portion of the frame, where the storage portion is located, which might also be the bottom of the frame. During the translation from the second to the first end portion of the frame, the wiper wipes the first filtering surface and drags in its movement the filtered material present on it. The filtered material therefore reaches the storage portion due to the translation of the wiper and it is accumulated therein.

**[0040]** Preferably the frame is box-like. More preferably, one surface of the box is the first filtering surface. Preferably, the wiper moves within the box.

**[0041]** The first filtering surface is therefore easily cleaned by a simple movement, such as a translation, of the wiper. This movement can be for example a downwards movement pushing the wiper downwards. In order to perform the movement effectively, that is, in order for the movement to clean the filtering surface, the wiper could have, during the translation, a bar-shape. The bar may be positioned parallel to the storage portion and in the wiping action the bar is moved along the filtering surface. In order to move the bar, for example by hand, an

arm forming with the bar a T shape may be connected to the bar. The additional arm might also include a handle.

**[0042]** There is no need to remove any component of the filter assembly during and at the end of the wiping action. The wiper allows the collection of the filtered material into the storage portion, where fluff and lint can remain for several drying cycles. Only when the storage portion is full, removal of one or more parts of the filter assembly is needed in order to empty the storage portion.

**[0043]** The invention in the first or second aspect may contain one or more of the following characteristics.

**[0044]** Preferably, the method comprises:

- o translating said wiper back towards said second end portion while keeping said filtered material in said storage portion.

**[0045]** The wiping action, that is, the wiping of the filtering surface can be performed several times, in the same cleaning cycle after a drying cycle or in a different one, keeping the collected filtered material in the storage portion. Cleaning of the filter assembly after a drying cycle is therefore quick.

**[0046]** Preferably the wiper is operated by hands. In order to firmly grip the wiper and translate the same, a handle is preferably provided.

**[0047]** When the storage portion is full, the filter assembly needs to be removed from the seat where it is housed in order to remove the filtered material. The seat is positioned in a portion of the cabinet. Preferably, the seat is in a position where it is easily accessible by the user, for both easily gripping the wiper and for removing the filter assembly.

**[0048]** Preferably, the manually operable handle is movable from a first configuration wherein the manually operable handle is positioned at the second end portion of said frame to a second configuration, and wherein the method comprises:

- o providing in said first position said manually operable handle in said first configuration; and
- o moving said manually operable handle in the second configuration where it protrudes at least partially from said frame before said step of translating the wiper from the first position towards the first end portion of the frame.

**[0049]** A handle might be present in order to facilitate the translational movement of the wiper. The handle is movable from a first configuration to a second configuration, both configurations being available when the wiper is positioned in the first position at the second end portion of the frame. Before starting the wiping motion, the handle - while the wiper stays in the first position - needs to be moved from the first to the second configuration.

**[0050]** The first configuration of the handle is a "hidden" configuration, where it is completely housed in the seat

where the filter assembly is also housed. This can take place for example bending, folding or retracting the handle. Before starting the wiping action, the handle is moved from the first configuration to a second configuration where it is visible, that is, it protrudes, from the seat.

**[0051]** Preferably, in said second configuration said manually operable handle defines an axis substantially perpendicular to an axis of said wiper and wherein the method includes:

- o pushing said wiper downwards by operating said manually operable handle so as to slide said wiper on said first filtering surface.

**[0052]** The configuration obtained can be an L configuration or a T configuration, where the wiper is a bar and the handle an arm attached to the bar and perpendicular to it.

**[0053]** Preferably, said manually operable handle is hinged on said wiper, and wherein the method includes:

- o rotating said manually operable handle so as to bring it from the first to the second configuration before sliding.

**[0054]** A possible way in which the handle has a first and a second configuration, the first configuration being a "hidden" configuration, is by having a hinge between the wiper and the handle so that the two can fold on each other.

**[0055]** Preferably, said filter assembly includes a second filtering surface facing the first filtering surface, wherein said wiper is positioned between said first and second filtering surfaces and wherein the method includes wiping said first and said second filtering surfaces by means of said wiper during translating.

**[0056]** In case of the presence of two filtering surfaces on the filtering assembly, for example in case of a shell like filtering assembly, a single wiper may wipe both filtering surfaces.

**[0057]** Preferably, said dryer includes a plinth door to access to a plinth portion of the cabinet, and wherein the method includes:

- opening said plinth door so as to operate the wiper.

**[0058]** Often, dryers have the filter assembly positioned at the plinth. Therefore, in order to perform the wiping action, the plinth door needs preferably to be open in order to grip the handle attached to the wiper.

**[0059]** Preferably, said dryer includes a plinth door to access to a plinth portion of the cabinet, and said cabinet includes a loading/unloading aperture to allow access to the drum and a loading/unloading door to close said aperture, said manually operable handle being located within a seat realized in a surface of said loading/unloading aperture, and wherein the method includes:

- opening said loading/unloading door in order to access said manually operable handle;
- moving said manually operable handle from said first to said second configuration; and
- pulling or pushing said manually operable handle so as to wipe said first filtering surface.

**[0060]** Another common position for the filter assembly is within a seat formed at the loading/unloading aperture of the dryer. In order to perform a cleaning action of the filtering surface, the door of the dryer is opened and the handle moved from the "hidden" configuration to the second configuration. Then, preferably the handle is pressed downwards or pushed upwards in order to translate the wiper and wipe the first filtering surface.

**[0061]** Preferably, said filter assembly includes a second filtering surface facing the first filtering surface, wherein said wiper is positioned between said first and second filtering surfaces so as to move filtered material attached to said first and second filtering surfaces towards the first end portion of the frame in the storage portion. More preferably, said wiper includes a first wiping element apt to wipe said first filtering surface, a second wiping element in contact with said second filtering surface apt to wipe said second filtering surface, and a connector to connect the first and the second wiping elements, said connector being air-permeable in a given direction.

**[0062]** In an embodiment, the filter assembly includes two filtering surfaces, for example positioned one in front of the other to define the wiper seat. The wiper portion is thus preferably positioned within the wiper seat, that is, between the two filtering surfaces. The wiping portion may therefore include a first and a second wiping element in order to wipe both surfaces during the wiping movements.

**[0063]** Even more preferably, the translational movement of said first wiping element is identical to the translational movement of said second wiping element.

**[0064]** In case the two wiping portions perform the same movement - while moved - on the first and the second surface, in order to strengthen their connection, a connector may be positioned between the first and the second wiping elements. The connector keeps the two wiping elements firmly fixed one to the other. In order not to disturb the flow of process air, preferably the connector is air permeable, so that the flow of process air flowing through the duct can pass the connector without being blocked by it. The same movement is possible for example if the first and the second wiping element are integral one to the other, being part of the same physical object.

**[0065]** The wiper is operated manually, therefore a handle allows a facilitated grip onto the cleaning device. The cleaning device of the invention comprises a wiper portion to wipe the first filtering surface, and a manually operable handle portion connected to the wiper portion. When the manually operable handle portion is actuated, for example handled by a user, movements of the man-

ually operable handle portions result in movements of the wiper portion, in particular to wipe the first filtering surface. The wiping takes place due to the contact between the wiping portion and the first filtering surface. Such contact can be a friction contact, that is, preferably scratching, scraping or brushing of the first filtering surface takes place during the wiping movement. Thus manual movements of a user gripping the manually operable handle portion result in wiping of the first filtering surface due to a consequent movement of the wiper portion.

**[0066]** The manually operable handle is movable from a first configuration wherein the manually operable handle is positioned at the second end portion of said frame to a second configuration, where it protrudes at least partially from said frame. When no wiping action is performed, preferably the handle is substantially "hidden" within the frame so that the normal operations of the laundry dryer are not impacted. Preferably, said manually operable handle is movable in relation to the wiper from a retracted configuration allowing the cleaning device to be placed at the second end portion of said frame to an extended configuration allowing the cleaning device to be manually moved towards the first end portion of said frame.

**[0067]** Preferably, said manually operable handle is movable from an angled configuration wherein it forms an angle different from 180 ° with said wiper, to a parallel configuration where the manually operable handle and the wiper are parallel to each other allowing the cleaning device to be manually moved towards said first end portion of the frame.

**[0068]** Preferably, said manually operable handle is movable from a folded configuration allowing the cleaning device to be placed at the second end portion of said frame to an unfolded configuration allowing the cleaning device to be protruding from said frame.

**[0069]** The transition between the resting position to the wiping position(s) is preferably performed by the user and his/her action on the manually operable handle portion, that is, on his/her handling of the manually operable handle portion. The manually operable handle portion is moved from one position to the other so that it is first "hidden" in the wiper seat (hidden when there is no need of wiping) and then it protrudes from the latter (when wiping is needed).

**[0070]** In this way an easy wiping is performed, due to the fact that - when not used - the cleaning device is substantially "hidden" and the standard usage of the dryer does not change or require special adaptation. The wiping itself is very simple because in the wiping position the cleaning device is very easily handled by the user via the manually operable handle portion.

**[0071]** As mentioned, the manually operable handle portion is in the resting position substantially "hidden" in the wiper seat, and then in the wiping position it protrudes from the wiper seat to be easily handled by the user. The manually operable handle portion - in an embodiment - in order to transition from the resting to the wiping posi-

tion, may be moved from a retracted to an extended position, so that in the first one it can be housed in the wiper seat, while in the latter it may protrude from the wiper seat. The manually operable handle portion can be for example of the telescopic type.

**[0072]** In a different embodiment, in order to move from the resting to the wiping position, that is, from a position where the manually operated handle portion is within the wiper seat to a position where it extends from the same, the manually operated handle may be angled differently in the two positions. In the resting position, the manually operable handle portion and the wiper portion are aligned along two axes which are incident. For example, they can form a rather small angle so that the handle portion can be folded and positioned within the wiper seat. In the wiping position, handle and wiper portion can be brought to an extended configuration, where handle portion and wiper portion are substantially parallel to each other and the manually operable handle portion protrudes from the wiper seat.

**[0073]** In a further different embodiment, the wiper and handle portions change their mutual configuration in order to transition from the resting to the wiping position.

**[0074]** Preferably, said manually operable handle is air permeable in a given direction.

**[0075]** Due to the fact that the filter assembly is housed at least partially in the duct where the process air flow is present, in order to have an efficient drying, the flow should not be "disturbed" too much by the filter assembly presence. In order to do so, avoidable blocks of the flow are minimized.

**[0076]** Preferably, the direction in which the manually operable handle is air permeable is the direction perpendicular to the flow of the process air, or to the main direction of flow of the process air.

**[0077]** Preferably, said wiper includes a bar.

**[0078]** Even more preferably, the bar is substantially horizontal. Preferably the bar is parallel to a bottom surface of the storage portion.

**[0079]** Preferably, said wiper when located in said first and second position remains substantially parallel to itself.

**[0080]** The wiping action involves translations, therefore the wiper at start and end points of the movement remains parallel to itself.

**[0081]** Preferably, said frame includes a guide and said wiper and/or said manually operable handle includes a guided element to guide the cleaning device during sliding within the frame.

**[0082]** Preferably, the frame is substantially box-like within which the wiper slides (i.e. performs translations). In order to keep the wiper in place within the box, that is, in order to keep the wiper from oscillating or displacing during the translation within the frame, preferably guides are provided in the frame so that the wiper and/or the handle are guided in the wiping movement.

**[0083]** Even more preferably, the translational movement of said first wiping element is identical to the trans-

lational movement of said second wiping element.

**[0084]** In case the two wiping portions perform the same movement - while moved - on the first and the second surface, in order to strengthen their connection, a connector may be positioned between the first and the second wiping elements. The connector keeps the two wiping elements firmly fixed one to the other. In order not to disturb the flow of process air, preferably the connector is air permeable, so that the flow of process air flowing through the duct can pass the connector without being blocked by it. The same movement is possible for example if the first and the second wiping element are integral one to the other, being part of the same physical object.

**[0085]** The wiper is operated manually, therefore a handle allows a facilitated grip onto the cleaning device. The cleaning device of the invention comprises a wiper portion to wipe the first filtering surface, and a manually operable handle portion connected to the wiper portion. When the manually operable handle portion is actuated, for example handled by a user, movements of the manually operable handle portions result in movements of the wiper portion, in particular to wipe the first filtering surface. The wiping takes place due to the contact between the wiping portion and the first filtering surface.

Such contact can be a friction contact, that is, preferably scratching, scraping or brushing of the first filtering surface takes place during the wiping movement. Thus manual movements of a user gripping the manually operable handle portion result in wiping of the first filtering surface due to a consequent movement of the wiper portion.

**[0086]** The manually operable handle is movable from a first configuration wherein the manually operable handle is positioned at the second end portion of said frame to a second configuration, where it protrudes at least partially from said frame. When no wiping action is performed, preferably the handle is substantially "hidden" within the frame so that the normal operations of the laundry dryer are not impacted. More preferably, said wiper includes a first and a second distal ends, said first and second distal ends being coupled to said guide in said frame for translating said wiper. In an embodiment, the ends of the wiper, which in case of a horizontal wiper are at the same height, are inserted in guides of the frame so that the wiper can be easily translated in the frame, for example up and down.

**[0087]** Preferably, said wiper and/or said manually operable handle includes a ridge, said ridge being coupled to said guide in said frame for translating said wiper.

**[0088]** In an alternative or additional embodiment, the handle is positioned in the guide, for example by having a protrusion such a ridge.

**[0089]** The filter assembly might be located at the aperture closed by a door of the dryer. In this configuration, in order to operate the wiper, the door of the laundry is opened. In order to clean the filter assembly to remove the filtered material from the storage portion, the filter assembly is removed from the seat.

**[0090]** Preferably, said filter assembly includes an in-

indicator to signal that the wiper does not reach the first portion of the frame.

**[0091]** This indication hints to the fact that the storage portion is full, therefore the accumulated filtered material does not allow the wiper to reach the first end portion where the storage portion is located.

**[0092]** Preferably, each of said first and second wiping elements defines a first and a second end, respectively, and wherein said connector or said manually operable handle includes any of:

- o a wall with perforations connecting the first and second wiping elements;
- o a plurality of ribs connecting said first and said second elements;
- o a first and a second crosspiece connecting said first and second wiping elements at their respective first and second ends.

**[0093]** In order to realize a connector which is air permeable, several possibilities arise. For example, the connector may include perforations, or it may include ribs or crosspieces connecting the two wiping elements.

**[0094]** Preferably, the connector is air permeable in the direction perpendicular to the direction of the main flow of the process air. For example, the connector may be air permeable in a direction substantially perpendicular to a plane including the first filtering surface. The connector may be air permeable in a direction perpendicular to a plane defining the inlet of the wiper seat.

**[0095]** Preferably, said manually operable handle in said first configuration extends along a substantially horizontal plane.

**[0096]** In the resting position, the wiper and the handle are preferably horizontal, that is, preferably parallel to a surface where the laundry dryer is located.

**[0097]** Preferably, said connector in said first configuration includes a surface which is substantially perpendicular to the process air flow.

**[0098]** Being the connector preferably air permeable, this configuration does not block the air flow.

**[0099]** Preferably, said manually operable handle is pivotably connected to the wiper.

**[0100]** In this way the orientation between wiper and handle can change and the handle can move from the hidden to the visible configuration.

**[0101]** Preferably, said filter assembly is removably housed in said wiper seat.

**[0102]** When the storage portion is full of filtered material, there is the need to remove such material to keep a proper wiping taking place. A removal of the filter assembly is therefore advisable to discharge the storage portion.

**[0103]** Preferably, said cabinet includes a loading/unloading aperture to allow access to the drum and a door to close said aperture, an inlet of said wiper seat being formed on a surface area delimiting said aperture.

**[0104]** The aperture for loading and unloading laundry

in the dryer is easily accessible by the user and thus it is a good location for the filter assembly.

**[0105]** Preferably, said filter assembly has a shell-like structure and said first and second filtering surfaces are one facing the other. More preferably, said shell-like structure is openable.

**[0106]** Shell-like filters are known in the art and they have a wide filtering surface.

**[0107]** Preferably, said filter assembly comprises the first filtering surface and a non-filtering surface facing the first filtering surface.

**[0108]** In a different embodiment, the filter assembly includes also a non-filtering surface. This non filtering surface could be for example attached to a door or to a wall of the duct where the process air flows.

**[0109]** Preferably, said cabinet includes a rotatable door and said filter assembly is positioned behind said rotatable door.

**[0110]** There is the need to access the filter assembly and therefore, if located within the cabinet, means to reach the filter assembly are preferably provided for.

**[0111]** Preferably, said filter assembly is attached to said rotatable door. More preferably it is attached to the rotatable door by the non-filtering surface.

**[0112]** Aperture of the door therefore implies at least a partial removal of the filter assembly from the cabinet, because it follows the door to which it is attached in its opening movement. The filter assembly is thus positioned in a better position for viewing and handling for the user. Reaching the filter assembly in order for example to clean the same is thus simplified.

**[0113]** Preferably, said cabinet includes a loading/unloading aperture to allow access to the drum and a door to close said aperture, said rotatable door being located below said loading/unloading aperture. More preferably, said rotatable door is a plinth door giving access to a plinth volume within the cabinet or a door accessible by opening said plinth door.

**[0114]** The plinth is a common location for the filtering assembly.

**[0115]** More preferably, said rotatable door is hinged to a front wall of said cabinet defining a rotatable axis, said rotatable axis being substantially horizontal.

**[0116]** Preferably, said non-filtering surface is located behind said rotatable door. More preferably, said non-filtering surface is attached to said rotatable door.

**[0117]** The filter assembly, if placed in the plinth is easily reachable opening the plinth door. It is even easier to reach if the filter assembly is directly attached to the rotatable door because, by opening the rotatable door itself, the filter assembly is brought closer to the user and at the same time it is more visible. Actuation or cleaning of the same are therefore easier.

**[0118]** Preferably, said filter assembly defines a portion of said duct for said process air.

**[0119]** Preferably, said non - filtering surface is a portion of a delimiting wall of said duct.

**[0120]** The filter assembly may form part of the duct

itself and thus one wall of the duct may also be a wall of the frame of the filter assembly.

**[0121]** Preferably, said filter assembly includes a first and a second shell-like structure both having filtering surfaces, said second shell-like structure being inserted within the first shell-like structure.

**[0122]** The filter assembly of the invention may have different shapes, may include for example a double shell structure in case of an enhanced filtering is desired.

**[0123]** Preferably, said cleaning device is apt to wipe a filtering surface located in said first and/or second shell-like structure.

**[0124]** The wiper may wipe any filtering surface of the filter assembly.

**[0125]** Preferably, the laundry dryer includes:

- o a plinth as base portion of said cabinet, said plinth defining an inner plinth volume within said cabinet and, said filter assembly being located in said inner plinth volume;
- o an actuator, adapted to force said wiper to perform said translation with respect to said frame when actuated, said actuator being located remote from said filter assembly;
- o a connecting element, to connect the actuator and the wiper, so that movements of the actuator are transformed in the translational movement of the wiper.

**[0126]** The wiper may be actuated remotely, that is, the wiper can be moved from a position which may be remote from the actual position of the wiper. For example, the filter assembly can be located in the plinth portion and an actuator - including the manually operable handle portion can be located in another region of the dryer. A connecting element connects the actuator and the wiper portion so that movements of the actuator stir movement of the wiper portion. In this way, the filter assembly can be placed in the most optimal position for filtering purposes, while the wiping can be performed from a position which can be comfortable for the user to reach.

**[0127]** Preferably, said actuator is adapted to perform linear translations.

**[0128]** Linear translations of the actuator becomes linear translations of the wiper.

**[0129]** Preferably, said cabinet includes a loading/unloading aperture to allow access to the drum and a door to close said aperture, an inlet of said duct being formed on a rim of said aperture, and wherein said actuator is located in said inlet.

**[0130]** For example, the actuator may be located at the loading/unloading door so that, in order to operate it, the door has to be opened. The actuator cannot be operated by accident, because during the normal functioning of the dryer, or when the drier is switched off, is hidden and protected by the loading/unloading door.

**[0131]** Preferably, said actuator includes a manually operable handle.

**[0132]** Operating the actuator is therefore easier.

**[0133]** Preferably, said connecting element includes a bar. The bar of the connecting element is preferably then pivoted on manually operable handle of the actuator or on the wiper.

**[0134]** Further advantages of the present invention will be better understood with nonlimiting reference to the appended drawings, where:

- Fig. 1 is a perspective view of a laundry dryer realized according to the present invention;
- Fig. 2 is a schematic view of an air process duct in the dryer of the invention;
- Fig. 3 is a perspective view of a laundry dryer of Fig. 1 in a partially disassembled configuration;
- Fig. 4 is a perspective view of the dryer of Fig. 1 and Fig. 3 where the a wall of the cabinet has been removed;
- Fig. 5 is a perspective view of the dryer of figure 1, 3 and 4;
- Fig. 6 is a perspective view of another embodiment of the dryer of the invention;
- Fig. 7 is a perspective view of the dryer of figure 6;
- Fig. 8 is a perspective view of the dryer of figure 6 or 7 including the first embodiment of the filter assembly in a first configuration;
- Fig. 9 is a perspective view of the dryer of figures 6 - 8 including the first embodiment of the filter assembly in a second configuration;
- Fig. 10 is a perspective view of the dryer of figures 6 - 9 including the first embodiment of the filter assembly in a third configuration;
- Fig. 11 is a perspective view of the first embodiment of the filter assembly included in the dryer of figures 6 - 10 in the configuration of figure 8;
- Fig. 12 is a perspective view of the first embodiment of the filter assembly of figure 11 included in the dryer of figures 6 - 10 in the configuration of figure 9;
- Fig. 13 is a perspective view of the first embodiment of the filter assembly of figure 11 and 12 included in the dryer of figures 6 - 10 in the configuration of figure 10;
- Fig. 14 is a perspective view of the first embodiment of the filter assembly of figures 11 - 13 included in the dryer of figures 6 - 10 in a disassembled config-

uration;

- Figs. 15 - 20 are perspective views of a second embodiment of the filter assembly in different configurations;
- Fig. 21 is a perspective view of a dryer including a third embodiment of the filter assembly;
- Fig. 22 is a perspective exploded view of a portion of the dryer of figure 21 having the third embodiment of the filter assembly;
- Fig. 23 is a perspective view of the dryer of figure 21 including the third embodiment of the filter assembly in a further configuration; and
- Fig. 24 is an additional perspective exploded view of the portion of the dryer of figure 21 having the third embodiment of the filter assembly.

**[0135]** With initial reference to Fig. 1, a laundry dryer realized according to the present invention is globally indicated with 1.

**[0136]** Laundry dryer 1 comprises an outer box cabinet 2, preferably but not necessarily parallelepiped-shaped, and a drying chamber, such as a drum 3 (visible only in figs. 3 - 4), for example having the shape of a hollow cylinder, for housing the laundry and in general the clothes and garments to be dried. The drum 3 is preferably rotatably fixed to the cabinet 2. Access to the drum 3 is achieved for example via a door 4, further referred also as the loading/unloading door, preferably hinged to cabinet 2, which can open and close a loading/unloading aperture 5 realized on the cabinet itself.

**[0137]** More in detail, cabinet 2 generally includes a front wall 20, a rear wall 21 and two sidewalls 25, all mounted on a basement 24. Preferably, the basement 24 is realized in plastic material. Preferably, basement 24 is molded via an injection molding process. Preferably, on the front wall 20, the door 4 is hinged so as to access the drum. The cabinet, with its walls, defines the volume of the laundry dryer 1. The basement 24 rests on a floor and its vertical distance from the floor may be advantageously adjusted through regulating feet (not shown) provided on the lower surface of the basement facing the floor. The dryer 1, and in particular basement 24, defines an horizontal plane (X,Y) which is substantially the plane of the ground on which the dryer 1 is situated, thus it is considered to be substantially horizontal, and a vertical direction Z perpendicular to the plane (X,Y).

**[0138]** Laundry dryer 1 also preferably comprises an electrical motor assembly (not shown) for rotating, on command, revolving drum 3 along its axis inside cabinet 2.

**[0139]** In the drum 3 of the laundry dryer 1, the load, e.g. clothes or other laundry, to be dried is placed via the door 4 provided on the front wall 20 of the cabinet. The

drum preferably includes a mantle defining a front end 3a which is facing the front wall 20 of the casing and a rear end 3b facing the rear wall 21 of the casing (visible only in figure 15).

**[0140]** With now reference to the schematic view of figure 2, the drum 3 is fluidly connected to a duct defining a process air circuit 18 (depicted with a series of arrows in figure 2). The process air circuit 18 involves the circulation - first - of relatively dry and warm process air, inside the drum 3, on the laundry located therein so as to dry it and - second - of humid cooler process air, outside the drum 3. New dry and warm process air enters the drum 3 and the circuit is repeated until desired, preferably until the laundry is dried. When the humid process air exits the drum 3, it may be channeled in different ways, depending on the dryer type.

**[0141]** If the dryer 1 is a condensed dryer, the circuit 18 of the process air is a closed-loop circuit and the humid process air leaving the drum 3 is first dried by passing through a humidity removal element and/or a hot air generator, such as a heat exchanger 19. The resulting cool dry air is then heated up by means of the hot air generator 19 before re-entering again the drum 3. Preferably, the hot air generator is a heat pump and the humid air is first passing through an evaporator where the water contained in it is removed and then it is heated in a condenser before returning into the drum 3.

**[0142]** If the dryer 1 is a vented dryer, the circuit of the process air is open, i.e. ambient air is taken into the drier, heated up and entered into the drum 3 while the humid process air leaving the drum 3 is exhausted outside the dryer 1. This open circuit is not depicted in the drawings.

**[0143]** Preferably, the hot or drying air generator (e.g. heat pump 19) is located in a basement 24 of the cabinet.

**[0144]** The duct forming the process air circuit 18 includes a first portion 18a having an inlet 16 connected with the front end 3a of the drum. This first portion 18a receives the air coming from the drum 3. The inlet 16 of the first portion 18a of the duct is located preferably at a surface 17 contouring a rim of loading/unloading aperture 5, as visible in fig. 3. Further, preferably, this first portion 18a of the duct is substantially vertical, that is, the process air flowing within the first portion 18a has the longest component of motion along a vertical axis. The process air coming from the drum 3 thus, flowing substantially horizontally, or having a motion with a longest horizontal component, needs to turn by substantially 90° at the loading/unloading aperture 5 so that it can flow within the first portion 18a of the duct via inlet 16. This situation is schematically depicted in fig. 2.

**[0145]** Further, the first portion 18a of the duct extends from the inlet 16 into the basement 24. The duct then preferably continues with a second portion 18b which extends in the basement 24 and runs substantially horizontally, or with a longer horizontal component, so that the process air, at the end of the first portion 18a, performs a further 90° bend to continue its flow.

**[0146]** The process air then either preferably passes

through the rear end 3b into the interior side of the drum 3, so the circuit 18 is a closed loop circuit as depicted. There, the air absorbs moisture or humidity from the laundry and, thus, dries the laundry. Alternatively, the process air is directed outside the dryer 1 via a vent (not visible in the attached drawings).

**[0147]** The dryer 1 is adapted to provide circulation of air, preferably with variable temperature. The process air flow is preferably generated in a region below the basement, e.g. in the duct of the process air circuit 18, for example by means of a fan (not depicted in the drawings).

**[0148]** The duct defining the process air circuit 18 is also provided with a filter assembly, preferably situated in proximity of or at the front wall 20 of the cabinet 2, with the purpose of stopping the fluff and/or lint particles detached from the laundry during the drying process to reach undesired locations and flowing with the process air. For example, in a vented dryer, the filter assembly is situated upstream the vent such that the fluff and/or lint is stopped from reaching outside the dryer together with the humid process air leaving the drum 3 and being exhausted outside. In a condensed dryer, the filter assembly is situated upstream the hot or drying generator 19 for stopping the fluff and/or lint from reaching and clogging up said generator.

**[0149]** The duct 18 thus guides the process air leaving the drum 3 towards the filter assembly. The filter assembly is preferably arranged in such a way that the process air passes there through, reaches the end of the first portion 18a of the duct and flows within the second portion 18b, and advantageously reaches the region below the basement, where it is again sucked in by the fan.

**[0150]** Preferably, the filter assembly is arranged below the drum 3.

**[0151]** In the dryer of figure 3 - 5, at the rim surface 17 of loading/unloading aperture 5, and more preferably at the inlet 16 of the conduit 18, a seat 8 is formed. The seat extends from the surface 17 into the conduit 18 and it preferably extends downwards into the basement 24.

**[0152]** In the seat 8, a first embodiment of the filter assembly 80 is positioned. The filter assembly 80 is inserted in a removable manner inside the seat 8. The filter assembly 80 includes an inlet 41 which is positioned substantially at the inlet 16 of the conduit 18, e.g. flush or in very close proximity to the rim surface 17.

**[0153]** The filter assembly 80 is shown in enlarged view and detached from the dryer 1 in figures 15 - 20.

**[0154]** The filter assembly 80 includes a substantially wedge-shaped filtering cartridge. In detail, the filter assembly 80 includes a frame 31 which comprises a shell or cartridge 112. The shell 112 includes a first part 116 and a second part 118. The first part 116 and the second part 118 of the shell 112 are hinged to each other. For example, the two parts are connected via hinge 124.

**[0155]** The first part 116 and the second part 118 are both defining filtering surfaces. Preferably, the first and second parts are covered or coverable by a filtering net so as to form filtering surfaces. The filtering nets are not

explicitly shown in Figs. 14 - 17. Each of the filtering nets extends within one plane.

**[0156]** For example, shell 112 includes two filtering surfaces, one per part. For example, the filtering surfaces may be formed by a perforated grid. One portion of the perforated grid may be an integrated part of the first part 116, forming a first filtering surface 32, while the other portion of the perforated grid may be an integrated part of the second part 118 forming a second filtering surface 32'. The portions of the perforated grid are arranged at the first and second outer parts 116 and 118, respectively, opposite to the outer hinge 124. In a closed state of the filter assembly 30', the two filtering surfaces 32, 32' are substantially parallel one to the other and facing each other. An inner volume 40 of the frame 31 is thus defined between the first and second part 116, 118.

**[0157]** Preferably, the shell 112 is positioned inside the seat 8 so that the first and second filtering surface 32, 32' are substantially vertical.

**[0158]** The frame 31 defines an upper part, including inlet 41, and a lower part 42, being substantially vertically oriented.

**[0159]** The lower part 42 defines a fluff collector or storage portion 50, where the lint or filtered material is collected when removed from the first and second filtering surfaces 32, 32'. The fluff collector 50 is opened when the shell 112 is opened, via hinge 124. Thus, shell 112 includes the fluff collector 50 at its bottom end and the fluff collector is apt to collect the fluff or lint or any other filtered material from the first and second filtering surface 32, 32'. The filtered material falls into the fluff collector 50 by gravity.

**[0160]** In total, the filter assembly 80 includes two filtering surfaces 32, 32'.

**[0161]** Further, the filter assembly 80 includes a cleaning device 33 apt to clean the first and the second filtering surface 32, 32' of fluff or other materials deposited on it. The cleaning device 33 comprises a wiper 330 to wipe the first and second filtering surface 32, 32'.

**[0162]** Preferably, the wiper is made of plastic material.

**[0163]** The wiper 330 cleans the filtering surface by means of movement of the same, as detailed below.

**[0164]** The movements performed by the wiper 330 onto the first and second filtering surface 32, 32' of frame 31 are, in the first embodiment of the filter assembly 80, sliding movements, that is, the wiper 330 translates onto the first and second filtering surface 32, 32' in order to remove fluff or other filtered material from it.

**[0165]** In this embodiment, the wiper 330 includes a rigid element, bar 331, which has a shape matching a portion of the shape of the inner volume 40 created by the frame 31. Therefore, depending on the shape of the frame 31, the shape of the wiper 330 follows accordingly. The bar 331 is preferably disposed substantially horizontally, having a length equal or slightly shorter than the length of the frame 31.

**[0166]** Bar 331 is apt to be translated from top to bottom or from bottom to top in the shell 112, therefore scratching

the first and second filtering surface 32, 32' to remove filtered material from the same. In Figs. 15, 16 and 20, the bar 331 is shown at the top or upper part having inlet 41 of the shell 112. Fig. 20 has part 116 removed in order to better show the position of the bar 331. In Figs. 18 and 19, the bar 331 is shown at the bottom 42 of the shell 112, where the fluff collector 50 is positioned. Fig. 19 has part 116 removed in order to better show the position of the bar 331. Intermediate position between the bar 331 at the top or bottom of shell 112 is depicted in figure 17.

**[0167]** In order to properly clean the surfaces 32, 32', bar 331 includes parallel opposite walls 335, 336, in contact with first and second filtering surfaces 32, 32', so that, when the wiper 330 translates, e.g. slides, in shell 112 from top to bottom or vice versa, the walls 335, 336 scratch first and second filtering surfaces 32, 32'.

**[0168]** In order to stabilize bar 331, walls 335, 336 are preferably connected by crosspieces 339. Therefore, preferably bar 331 includes two separated walls 335, 336 connected by crosspieces 339 and separated by an empty gap.

**[0169]** Wiper 330, in addition to bar 331, includes a handle 338. Handle 338 is preferably an elongated element and it is hinged to the bar 331 at a hinge point 337. The hinge point 337 is preferably located in the middle of bar 331 along its length. Preferably, handle 338 is hollow, that is, the elongated element is formed by a peripheral wall and has a through hole in its center.

**[0170]** The handle 338 can be moved between a first and a second configuration, shown in figures 15, 20 (folded configuration) and figures 16, 17 and 19 (open configuration).

**[0171]** In the folded configuration, the wiper 330 is positioned at the upper part of the frame 31, that is, at inlet 41. In this configuration, the bar 331 is substantially horizontal and the handle 338 is folded so that its longitudinal axis is also substantially horizontal. Handle and bar are thus substantially parallel to each other. Handle 338 in this configuration is preferably completely hidden in frame 31 and thus in seat 8.

**[0172]** Due to the construction of the bar 331 and of the handle 338, process air entering in conduit 18 from the inlet 16 can flow in the filter assembly 80 due to the fact that both bar 331 and handle 338 are air permeable in a plane perpendicular to the direction of flow of process air.

**[0173]** Before starting a wiping action, that is, a translation of the bar 331 onto the first and second filtering surface 32, 32', the handle 338 changes its configuration into an open configuration. To reach the open configuration, handle 338 is rotated around the pivot point 337, so that the final configuration of the wiper 330, bar and handle, is a T configuration. The handle 338 is in the open configuration substantially vertical.

**[0174]** In this configuration, handle 338 protrudes from frame 31 and seat 8.

**[0175]** In order to perform a wiping action, the handle 338 is then moved, translated downwards, so that the bar

331 with walls 335, 336, scratches first and second filtering surfaces 32, 32'. The removed fluff is collected in the fluff collector 50 at the bottom of the frame 31.

**[0176]** The translation of bar 331 terminates when the bar 331 reaches the fluff collector 50.

**[0177]** The functioning of the dryer 1 is as follows.

**[0178]** During the drying cycles, the filter assembly 80 is positioned in the seat 8 and the wiper 330 is at the top portion of frame 31, extending substantially at the inlet 41 of frame 31. Handle 338 is in the folded configuration.

**[0179]** Air in the process circuit can flow in duct 18 due to the air permeable bar 331 and handle 338.

**[0180]** At the end of the drying cycle, the loading/unloading door 4 is opened and the seat 8 at the rim surface 17 is visible. The filter assembly 80 is reachable from the loading/unloading aperture 5. The handle 338 can be moved from the folded to the open configuration, rotating the handle 338 around pivot point 337.

**[0181]** The wiper 330 is thus pushed downwards till bar 331 reaches the fluff collector 50. In this way, the first and second filtering surfaces 32, 32' are cleaned by walls 335, 336 and filtered material deposited in them ends up in the fluff collector 50 formed by the bottom part of frame 31.

**[0182]** Before another drying cycle can start, the wiper 330 is pulled and brought back in the upper position. Handle 338 is folded away.

**[0183]** In case the fluff collector 50 is full, or for maintenances purposes, the filter assembly 80 can be totally removed from seat 8. In this way, the fluff collected at the bottom part of frame 31 can be removed.

**[0184]** A different embodiment of the dryer, dryer 1', is now described with reference to figure 6 - 10. Characteristics identical to those of dryer 1 are indicated with the same reference number.

**[0185]** The basement 24 defines a plinth region 7 of the dryer 1'. The plinth region 7 defines a plinth inner volume, that is, the volume inside the cabinet 2 delimited by the cabinet walls and located at the plinth region 7. Preferably the plinth region 7 includes a perforated portion, for example it may include a perforated element 71 on the front wall 20, so as to enable cooling air to be taken in and/or expelled from/to the plinth inner volume, if needed. The plinth region 7 can be provided with portions and/or elements and/or components for supporting operational components of the laundry dryer 1' that are needed for carrying on a laundry drying process on laundry, such as air conduits, motors and so on.

**[0186]** Preferably, the cabinet 2 includes a plinth door 60, such as a rotatable door, to access the plinth inner volume. Preferably, the plinth door 60 is hinged to the cabinet 2 and its rotation axis is substantially horizontal. The plinth door 60 is preferably hinged at the front door 20 of the cabinet 2.

**[0187]** Upon opening the plinth door 60, a further door 61 - called first door 61 - is present. This first door 61 is accessible only opening the plinth door 60. Preferably this further door 61 is also rotatable along an axis which

is substantially horizontal. The first door 61 is situated behind the plinth door 60, such that the plinth 7 is accessible by opening both doors. Further, plinth door 60 and first door 61 are located substantially below the loading/unloading aperture 5 and door 4.

**[0188]** In the first portion 18a of duct 18, a filter assembly 90 is positioned. Filter assembly 90 is placed inside the plinth region 7.

**[0189]** In the example illustrated in the enclosed drawings of figs. 6 - 14, the filter assembly 90 is advantageously arranged below the drum 3. Preferably, the filter assembly 90 is contained for its majority within the plinth region 7. Further, the filter assembly 90 is arranged within the first portion 18a of the duct of the process air circuit 18, for example below the inlet 16 of the duct itself. The filter assembly 90 according to one embodiment of the invention is depicted in enlarged view in figs. 11 - 14 and includes a first filtering surface 32, in the present embodiment substantially flat, supported by a frame 31. Preferably, the filtering surface 32 is substantially vertical. The frame 31 is in this embodiment a box-like container which forms a part of the first portion 18a of the duct and the first filtering surface 32 is a side or wall of the box-like container. The box-like container 31 includes an inlet 41 for the process air, positioned on top of the frame, and surrounding walls which prevent the process air to leave the container with the exception of the wall having the first filtering surface 32. The filtering surface 32 is preferably substantially perpendicular to the inlet 41 of the box-like container. The process air therefore, entering the inlet 41 from above, is forced to perform a 90° turn to change direction from a downwards direction to a substantially horizontal direction and is apt to leave the box-like container via the filtering surface 32. The first filtering surface 32 separates the first portion 18a of the duct 18 and the second portion 18b of the duct, that is, the first filtering surface 32 puts in fluid communication the first portion 18a and second portion 18b of the duct 18.

**[0190]** Preferably, the inlet 41 is located at the top of the frame 31. A bottom part 42 is also defined, opposite to inlet 41. The bottom part 42 is not used as an outlet, on the contrary, the outlet from the filter assembly 30 is via the first filtering surface 32, as better detailed below.

**[0191]** The bottom part defines a fluff collector 50 for the collection of the filtered material removed from first filtering surface 32.

**[0192]** The first filtering surface 32 may be in the form of a mesh or net having a proper size to block the typical fluff or particles generated by the laundry. The mesh or filter is not depicted in the drawing otherwise it would cover all other elements. Therefore, in the drawings, first filtering surface 32 appears "open", but it should be interpreted as covered by a net or a mesh, or any other structure apt to filter material flowing in the process air flowing in duct 18.

**[0193]** Preferably, the filtering surface 32 is positioned substantially vertically, or with a small tilt with respect to the vertical direction. The frame 31 thus defines an upper

portion, which is the portion of the frame having the top most vertical position (i.e. the portion including the inlet 41).

**[0194]** In the filter assembly 90 of figs. 11 - 14 a single filtering surface 32 is present.

**[0195]** The frame 31 may also comprise a non-filtering surface 37 facing the first filtering surface 32. In this configuration, the frame 31 is defining an inner volume 40 between the first filtering surface 32 and the non-filtering surface 37, but one surface only, the filtering one, is subjected to the flow of process air in order to filter it. The non-filtering surface 37, in other words, in this embodiment, is a wall of the box-like container or frame 31 which is opposite and facing the first filtering surface 32 (which forms another wall of the box like container 31) and directs the flow of process air.

**[0196]** In this embodiment, the non-filtering surface 37 is attached to the first door 61. By opening this further first door 61, the filter assembly 30 can be, for example, rotated from a position where the first filtering surface is substantially vertical to a position where the first filtering surface is tilted with respect to a vertical plane. Further, rotation of the first door 61 causes rotation of the whole filtering assembly 30 which is attached to the door 61.

**[0197]** In this embodiment, therefore, the filtering surface 32 is substantially facing and even more preferably parallel to the first door 61 to which the non-filtering surface 37 is attached. Both first door 61 and filtering surface 32 are preferably vertical, that is, they define substantially vertical planes or planes only slightly tilted with respect to a vertical plane. Between the two surfaces, i.e. non filtering surface 37 and filtering surface 32, the inner volume 40 is defined.

**[0198]** In a non-depicted embodiment, the first door 61 is not attached to the non-filtering surface 37. The filter assembly 90 may still be rotatable, for example with a rotation axis also parallel to the horizontal axis around which the plinth door 60 and the first door 61 rotates, however the rotations of the doors 60, 61 and of the filter assembly 30 are independent. Therefore, in order to move into a position in which the first filtering surface is tilted with respect to a vertical plane, in this non depicted embodiment the first door 61 is first rotated and then the filter assembly is rotated as well.

**[0199]** In all embodiments, rotation of the filter assembly, attached or not to the first door 61, implies that the filter assembly 90 reaches a tilted position where the inlet 41 of the frame is directed outwards, that is, the inlet 41 is facing the exterior of the cabinet 2.

**[0200]** Further, the filter assembly 90 includes a cleaning device 33 apt to clean the first filtering surface 32 of fluff or other materials deposited on it. The cleaning device 33 comprises wiper 330.

**[0201]** The wiper 330 of this embodiment is realized as the wiper of the first embodiment 80 and thus not further detailed.

**[0202]** The movements performed by the wiper 330 onto the first filtering surface 32 of frame 31 are sliding

movements, that is, the wiper 330 translates onto the first filtering surface 32 in order to remove fluff or other filtered material from it.

**[0203]** The wiper 330 includes a rigid element, bar 331, which has a shape matching a portion of the shape of the inner volume 40 created by the frame 31. Therefore, depending on the shape of the frame 31, the shape of the wiper 330 follows accordingly. The bar 331 is preferably disposed substantially horizontally, having a length equal or slightly shorter than the length of the frame 31.

**[0204]** Wiper also includes handle 338 as in embodiment 80.

**[0205]** Bar 331 is apt to be translated from top to bottom or from bottom to top in the shell 112, therefore scratching the first filtering surface 32 to remove filtered material from the same. In Figs. 8, and 11, the bar 331 is shown at the top or upper part having inlet 41 of the frame 31. In Figs. 10 and 13, the bar 331 is shown at the bottom 42 of the frame 31, where the fluff collector 50 is positioned.

**[0206]** In order to properly slide in frame 31, the wiper 330 preferably includes a ridge 340 formed along the handle 338. Preferably, it includes two ridges at the two opposite sides of handle, facing filtering and non filtering surfaces 32, 37, respectively.

**[0207]** The frame 31 includes in turn two grooves 341, in each of which a ridge 340 can be inserted. Ridge and groove are preferably vertically oriented, so as to guide the sliding of the wiper 330 in frame 31.

**[0208]** In order to properly clean the surface 32, bar 331 includes parallel opposite walls 335, 336, in contact with first filtering surfaces 32, and non-filtering surface 37, so that, when the wiper 330 translates, e.g. slides, in frame 31 from top to bottom or vice versa, the walls 335 scratches first filtering surface.

**[0209]** In order to stabilize bar 331, walls 335, 336 are preferably connected by crosspieces 339. Therefore, preferably bar 331 includes two separated walls 335, 336 connected by crosspieces 339 and separated by an empty gap.

**[0210]** The handle 338 can be moved between a first and a second configuration, shown in figures 11, 8 (folded configuration) and figures 9 and 12 (open configuration).

**[0211]** In the folded configuration, the wiper 330 is positioned at the upper part of the frame 31, that is, at inlet 41. In this configuration, the bar 331 is substantially horizontal and the handle 338 is folded so that its longitudinal axis is also substantially horizontal. Handle and bar are thus substantially parallel to each other. Handle 338 is thus preferably completely hidden in frame 31.

**[0212]** Due to the construction of the bar 331 and of the handle, process air entering in conduit 18 from the inlet 16 can flow in the filter assembly 80 due to the fact that both bar 331 and handle 338 are air permeable in a plane perpendicular to the direction of flow of process air.

**[0213]** Before starting a wiping action, that is, a translation of the bar 331 onto the first filtering surface 32, the handle 338 is rotated around the pivot point 337, so that

the final configuration of the wiper 330 is a T configuration. The handle is now substantially vertical.

**[0214]** In this configuration, handle 338 protrudes from frame 31.

**[0215]** In order to perform a wiping action, the handle is then moved, translated downwards, so that the bar 331 with walls 335, 336, scratches first filtering surfaces 32. The removed fluff is collected in the fluff collector 50 at the bottom of the frame 31.

**[0216]** The translation of bar 331 terminates when the bar 331 reaches the fluff collector 50.

**[0217]** The operation of the filter assembly 90 is as follows.

**[0218]** During the drying cycle, or outside a wiping action, the wiper 330 is positioned inside the frame 31, inserted in the same. Bar 331 is horizontally arranged substantially at the inlet 41 of the frame 31. The whole assembly is located within the plinth inner volume and it forms a portion of the conduit 18. The first filtering surface 32 filters the flowing process air in circuit 18 and filtered material accumulates on it. The first filtering surface 32 is preferably substantially vertical of with a large vertical component. Handle 338 is folded and substantially horizontal, preferably it does not extend outside the frame 31 but it is completely contained therein.

**[0219]** In this configuration, inlet 16 of the conduit 18 and inlet 41 of the filter assembly 90 are one below the other, being part of the same conduit.

**[0220]** At the end of a drying cycle, or every time there is a need of cleaning the first filtering surface 32 of the filter assembly from the filtered material which has accumulated during the drying cycle, the plinth door 60 is opened. The opening takes place preferably with a rotation of the plinth door 60 around a horizontal axis. This configuration is shown in figure 8. Behind the plinth door 60, the first door 61 is present. Attached to the first door, the filter assembly 90 is located. Alternatively, the filter assembly is freely rotatable around a horizontal axis.

**[0221]** Opening the first door 61, that is, preferably rotating the same around a horizontal axis, removes the assembly 90 from the inner volume of the plinth 7 and the inlet 41 of the frame 31 is oriented outwards (see figure 8).

**[0222]** In order to wipe the first filtering surface 32, the wiper is actuated. The actuation is performed for example by hand. The handle 338 is brought in the open substantially vertical position and then it is pushed downwards till bar 331 reaches the fluff collector 50. This translation causes a wiping of the first filtering surface 32.

**[0223]** The fluff and lint is thus collected in the fluff collector 50.

**[0224]** Before the dryer 1' can restart operation, the wiper 330 is brought back in the initial upper position, the door 61 rotated again so that the filtering surface 32 is back to a vertical position, as well as the door 60 should close the plinth 7.

**[0225]** A third embodiment of the filter assembly 80' is depicted in figures 14 - 17.

**[0226]** In this embodiment, characteristics identical to those of the first or second embodiment 80, 90 are referred with the same reference numerals.

**[0227]** Filter assembly 80' includes a frame 31 having the same characteristics as in the second embodiment 90. As in the second embodiment 90, the fluff collector 50 is a portion of frame 31, and in particular it includes its bottom portion 42. Therefore filtered material from the first filtering surface 32 is collected within frame 31, at the bottom of the same.

**[0228]** Frame 31 has a box shape as in the second embodiment of the filter assembly 90. The first filtering surface 32 is preferably vertical and it is preferably one of the walls of the box defined by the frame 31. For other characteristics of frame 31 and filtering surface 32, reference is made to the second embodiment of the filter assembly 90.

**[0229]** The filter assembly 80' further comprises a wiper 330 apt to wipe the first surface 32. The wiper 330 includes a T-shaped element including a substantially horizontal bar 331 and a vertical bar 333 fixed in the middle of the horizontal bar and protruding upwards. The T-shaped element is translatable, that is, it can be slid onto the first filtering surface 32, from the bottom 42 of the frame 31 to an upper portion of the same. The bar 331 is slidable from bottom to top or from top to bottom, that is to say, the movement of the bar 331 are along a vertical direction. The movement is wide enough so that the whole first filtering surface is wiped. Preferably, the width of the bar 331 is equal or slightly smaller than the width of the frame, so that the bar 331 matches a portion of the inner shape of the frame 31, for a smooth sliding. For example, the wiper 330 may start the movement from the bottom 41 of the frame 31 and end the movement at the top of the frame 32 or vice - versa. The configuration with the bar 331 of wiper 330 at the bottom is depicted in figure 23, while the assembly 80" with the bar at the top of the frame is shown in figure 21 (although the wiper is not visible). A configuration in which the wiper 330 is positioned between the top and the bottom of the frame is depicted in figures 22 and 24.

**[0230]** Further, the filter assembly 80' comprises an actuator 81. The actuator is positioned in seat 8 realized at the inlet 16 of duct 18. When not actuated, preferably, the actuator 81 remains completely contained within seat 8, realized at the rim surface 17 of the loading/unloading opening 5. When actuated, the actuator 81 protrudes from the seat 8, as detailed below. The actuator 81 includes an elongated element defining a longitudinal axis. When the actuator 81 is not operated, the longitudinal axis of the elongated element is substantially horizontal and the elongated element substantially lies in the inlet 16. In this configuration, the T-shaped element of wiper 330 is at the top of frame 31. When actuated, the longitudinal axis of the elongated element is substantially vertical and the elongated element protrudes from the inlet 16. In this configuration, the T-shaped element of wiper 330 can be in any position between the top and the bottom

of frame 31.

**[0231]** The actuator 81 is connected to the wiper 330 by means of a connector 82, including a pivot element 336'. The pivot element 336' connects the wiper 330, and in particular vertical bar 333, and the elongated element of actuator 81 so that the elongated element can oscillate around the pivot element 336' with respect to the T-shaped element of wiper 330.

**[0232]** The actuation of the actuator 81 includes the following movements. A first movement is a rotation, so that the elongated element is rotated around pivot element 336' and vertical bar 333 and elongated element of actuator 81 become one the geometrical extension of the other along a vertical axis. Further, the actuator is pushed, that is, it is translated, in a vertical movement, that is, downwards. This second movement of the actuator results in movement of the wiper 330 and more precisely in a translation the wiper 330 downwards.

**[0233]** The operation of the filter assembly 80' is as follows.

**[0234]** When no wiping is needed, the actuator 81 is positioned in the seat 8 and does not protrude from the same. The longitudinal axis of the elongated element is substantially horizontal. The wiper 330 is located at the top of the frame 31. In this configuration door 61 cannot be opened. The filtering surface 32 is substantially vertical.

**[0235]** The loading/unloading door 4 is opened, for example to download laundry from the drum 3. At the end of the download, the user may actuate the actuator 81, rotating the elongated element around pivot element 336' and then pushing the elongated element downwards, performing a vertical translation. By translating the actuator 81, the connector 82 (pivot element 336', which during the translation is not used as a pivot) attached to the wiper 330 slides the T-shaped element in the frame 31 so that the bar 331 scrapes the first filtering surface 32 from top to bottom in a vertical sliding. The fluff is collected in the fluff collector 50 within the frame 31. The end position of the wiper 330 is reached on the bottom side 42 of the frame 31.

**[0236]** In order to remove the fluff collected in the fluff collector 50, the wiper 330 may be totally extracted from the seat 8. In this configuration, the door 61 can be opened and the fluff collector 50 within the frame 31 may be reached. The opening of the first door 61 can take place also for example for maintenance purposes.

**[0237]** Further, before starting a new drying cycle, the wiper 330 needs to be reinserted in the frame 31.

**[0238]** The above configuration in which the wiper 330 is actuated by means of an actuator via a connector can be realized also using a filter assembly not attached to door 61.

## Claims

1. A method to clean a filter assembly in a laundry dryer

(1), wherein the laundry dryer (1) comprises:

- o a cabinet (2);
- o a drum (3) rotatably supported in the cabinet;
- o a duct (18) defining a flow passage for process air exiting the drum;
- o a filter assembly (80, 80', 90);
- o said cabinet (2) including a seat (8) to house said filter assembly, said seat (8) being positioned downstream said drum (3) in the flowing direction of the process air and said filtering assembly being positioned at least partially in the duct (18) so as to filter process air flowing therein;
- o said filter assembly including (80, 80', 90):

- a frame (31) having a first and a second end portions and defining, at the first end portion thereof, a storage portion (50) adapted to store filtered material for several drying cycles without being emptied;
- a filter (116, 118) supported by the frame (31) and defining a first filtering surface (32);
- a cleaning device (33) for cleaning the first filtering surface (32) including a translatable wiper (330) to wipe the first filtering surface (32), said cleaning device (33) including a manually operable handle (338) which is connected to the wiper (330) and movable from a first configuration wherein the manually operable handle (338) is substantially completely housed in said seat (8), to a second configuration;

the method comprising:

- o providing in a first position said manually operable handle (338) in said first configuration;
- o moving said manually operable handle (338) in the second configuration where it protrudes from said seat (8) before translating the wiper (330) from said first position wherein the wiper (330) is located at the second end portion of said frame (31) towards the first end portion of the frame (31) by operating said manually operable handle (338);
- o wiping said first filtering surface (32) by means of said wiper (330) during translating so as to move filtered material attached to said first filtering surface (32) towards the first end portion of the frame (31); and
- o collecting said filtered material in said storage portion (50);
- o removing said filter assembly (80, 80', 90) from said seat (8) in order to remove said filtered material from said storage portion (50).

2. The method according to claim 1, comprising:

- o translating said wiper (330) back towards said second end portion while keeping said filtered material in said storage portion (50).

3. The method according to claim 1 or 2, wherein in said second configuration said manually operable handle (338) defines an axis substantially perpendicular to an axis of said wiper (330) and wherein the method includes

- o Pushing said wiper (330) downwards by operating said manually operable handle (338) so as to slide said wiper (330) on said first filtering surface (32).

4. The method according to any of the preceding claims, wherein said manually operable handle (338) is hinged on said wiper (330), and wherein the method includes:

- o Rotating said manually operable handle (338) so as to bring it from the first to the second configuration before sliding.

5. The method according to any of the preceding claims, wherein said filter assembly (80) includes a second filtering surface (32') facing the first filtering surface (32), wherein said wiper (330) is positioned between said first and second filtering surfaces (32, 32') and wherein the method includes wiping said first and said second filtering surfaces (32, 32') by means of said wiper (330) during translating.

6. The method according to any of the preceding claims, wherein said dryer includes a plinth door (60) to access to a plinth portion of the cabinet (2), and wherein the method includes:

- opening said plinth door (60) so as to operate the wiper (330).

7. The method according to any of the claims 1 to 5, wherein said dryer (1) includes a plinth door (60) to access to a plinth portion of the cabinet (2), and said cabinet (2) includes a loading/unloading aperture (5) to allow access to the drum (3) and a door (4) to close said aperture (5), said manually operable handle (338) being located within the seat (8) realized in a surface (17) of said loading/unloading aperture (5), and wherein the method includes:

- opening said door (4) in order to access said manually operable handle (338);
- moving said manually operable handle (338) from said first to said second configuration; and
- pulling or pushing said manually operable handle (338) so as to wipe said first filtering surface (32).

8. A laundry dryer (1) comprising:

- o a cabinet (2);
- o a drum (3) rotatably supported in the cabinet;
- o a duct (18) defining a flow passage for process air exiting the drum;
- o a filter assembly (80, 80', 90);
- o said cabinet (2) including a seat (8) to house said filter assembly (80, 80', 90), said seat (8) being positioned downstream said drum (3) in the flowing direction of the process air and said filtering assembly being removably housed in said seat (8) and positioned at least partially in the duct (18) so as to filter process air flowing therein;
- o said filter assembly (80, 80', 90) including:

- a frame (31) having a first and a second end portions and defining a storage portion (50) at the first end portion thereof, said storage portion being apt to store and keep therein collected filtered material for several drying cycles without being emptied;
- a filter (116, 118) supported by the frame (31) and defining a first filtering surface (32);
- a cleaning device (33) for cleaning the filtering surface (32) including a wiper (330) to wipe the first filtering surface (32) and a manually operable handle (338) which is connected to the wiper (330), wherein the wiper (330) is translatable from a first position wherein the wiper (330) is located at the second end portion of said frame (31) to a second position wherein the wiper (330) is located at the first end portion of the frame (31), and wherein the wiper (330) is so construed to wipe said first filtering surface (32) during translating so as to move filtered material attached to said first filtering surface towards the first end portion of the frame in the storage portion (50);
- said handle (338) being movable from a first configuration wherein the manually operable handle (338) is substantially completely housed in said seat (8) to a second configuration wherein said handle (338) protrudes from said seat (8).

9. The laundry dryer (1) according to claim 8, wherein said filter assembly includes a second filtering surface (32') facing the first filtering surface (32), wherein said wiper (330) is positioned between said first and second filtering surfaces (32, 32') so as to move filtered material attached to said first and second filtering surfaces (32, 32') towards the first end portion of the frame in the storage portion (50).

10. The laundry dryer (1) according to claim 9, wherein

said wiper (330) includes a first wiping element apt to wipe said first filtering surface (32), a second wiping element in contact with said second filtering surface (32') apt to wipe said second filtering surface (32'), and a connector to connect the first and the second wiping elements, said connector being air-permeable in a given direction.

11. The laundry dryer (1) according to any claim 8 to 10, wherein said manually operable handle (338) is movable in relation to the wiper (330) from a retracted configuration allowing the cleaning device (33) to be placed at the second end portion of said frame (31) to an extended configuration allowing the cleaning device (33) to be manually moved towards the first end portion of said frame (31).

12. The laundry dryer (1) according to any claim 8 to 10, wherein said manually operable handle (338) is movable either from an angled configuration wherein it forms an angle different from 180° with said wiper (330), to a parallel configuration where the manually operable handle (338) and the wiper (330) are parallel to each other allowing the cleaning device (33) to be manually moved towards said first end portion of the frame (31), or from a folded configuration allowing the cleaning device (33) to be placed at the second end portion of said frame (31) to an unfolded configuration allowing the cleaning device (33) to be protruding from said frame (31).

13. The laundry dryer (1) according to any of the claims 8 - 12, wherein said cabinet (2) includes a rotatable door (4, 60), being either a plinth door (60) or a loading/unloading door (4) closing a loading/unloading aperture (5) realized on the cabinet (2) to allow access to the drum (3), and said filter assembly (80, 80', 90) is positioned behind said rotatable door (4, 60).

14. The laundry dryer (1) according to claim 13, wherein said filter assembly (80', 90) is attached to said rotatable door being a rotatable plinth door (60).

15. The laundry dryer according to claim 14, wherein said cabinet (2) includes a loading/unloading aperture (5) to allow access to the drum (3) and a loading/unloading door (4) to close said aperture (5), said rotatable plinth door (60) being located below said loading/unloading aperture (5).

## Patentansprüche

1. Verfahren zum Reinigen einer Filteranordnung in einem Wäschetrockner (1), wobei der Wäschetrockner (1) Folgendes umfasst:

o ein Gehäuse (2),  
 o eine Trommel (3), die in dem Gehäuse drehbar getragen ist,  
 o einen Kanal (18), der einen Strömungsdurchlass für Prozessluft definiert, welche die Trommel verlässt,  
 o eine Filteranordnung (80, 80', 90),  
 o wobei das Gehäuse (2) einen Sitz (8) beinhaltet, um die Filteranordnung unterzubringen, wobei der Sitz (8) prozessabwärts der Trommel (3) in der Strömungsrichtung der Prozessluft positioniert ist und die Filteranordnung zumindest teilweise in dem Kanal (18) positioniert ist, so dass darin strömende Prozessluft gefiltert wird,  
 o wobei die Filteranordnung (80, 80', 90) Folgendes beinhaltet:

- einen Rahmen (31), der einen ersten und einen zweiten Endabschnitt aufweist und an seinem ersten Endabschnitt einen Aufbewahrungsabschnitt (50) definiert, der dafür eingerichtet ist, ausgefiltertes Material ohne Entleerung über mehrere Trocknungszyklen aufzubewahren,
- einen Filter (116, 118), der von dem Rahmen (31) getragen wird und eine erste Filterfläche (32) definiert,
- ein Reinigungsgerät (33) zum Reinigen der ersten Filterfläche (32), das einen verschiebbaren Wischer (330) beinhaltet, um die erste Filterfläche (32) abzuwischen, wobei das Reinigungsgerät (33) einen manuell bedienbaren Griff (338) beinhaltet, der mit dem Wischer (330) verbunden ist und von einer ersten Gestaltung, in der der manuell bedienbare Griff (338) im Wesentlichen vollständig in dem Sitz (8) untergebracht ist, in eine zweite Gestaltung beweglich ist,

wobei das Verfahren Folgendes umfasst:

- o Bereitstellen des manuell bedienbaren Griffs (338) in der ersten Gestaltung an einer ersten Position,
- o Bewegen des manuell bedienbaren Griffs (338) in die zweite Gestaltung, wo er aus dem Sitz (8) hervorsteht, bevor der Wischer (330) von der ersten Position, an der sich der Wischer (330) an dem zweiten Endabschnitt des Rahmens (31) befindet, durch Bedienen des manuell bedienbaren Griffs (338) hin zum ersten Endabschnitt des Rahmens (31) verschoben wird,
- o Abwischen der ersten Filterfläche (32) mittels des Wischers (330) während des Verschiebens derart, dass ausgefiltertes Material, das an der ersten Filterfläche (32) haftet, zum ersten Endabschnitt des Rahmens (31) bewegt wird, und
- o Sammeln des ausgefilterten Materials in dem

Aufbewahrungsabschnitt (50),  
 o Entfernen der Filteranordnung (80, 80', 90) von dem Sitz (8), um das ausgefilterte Material von dem Aufbewahrungsabschnitt (50) zu entfernen.

2. Verfahren nach Anspruch 1, Folgendes umfassend:

- o Versetzen des Wischers (330) zurück zum zweiten Endabschnitt, während das ausgefilterte Material in dem Aufbewahrungsabschnitt (50) verbleibt.

3. Verfahren nach Anspruch 1 oder 2, wobei der manuell bedienbare Griff (338) in der zweiten Gestaltung eine Achse definiert, die im Wesentlichen senkrecht zu einer Achse des Wischers (330) liegt, und wobei das Verfahren Folgendes beinhaltet:

- o Herabdrücken des Wischers (330) durch Bedienen des manuell bedienbaren Griffs (338) derart, dass der Wischer (330) auf der ersten Filterfläche (32) gleitet.

4. Verfahren nach einem der vorhergehenden Ansprüche, wobei der manuell bedienbare Griff (338) an den Wischer (330) angelenkt ist und wobei das Verfahren Folgendes beinhaltet:

- o Drehen des manuell bedienbaren Griffs (338) derart, dass er vor dem Gleiten von der ersten in die zweite Gestaltung gebracht wird.

5. Verfahren nach einem der vorhergehenden Ansprüche, wobei die Filteranordnung (80) eine zweite Filterfläche (32') beinhaltet, die der ersten Filterfläche (32) zugewandt ist, wobei der Wischer (330) zwischen der ersten und der zweiten Filterfläche (32, 32') positioniert ist und wobei das Verfahren das Abwischen der ersten und der zweiten Filterfläche (32, 32') mittels des Wischers (330) während des Verschiebens beinhaltet.

6. Verfahren nach einem der vorhergehenden Ansprüche, wobei der Trockner eine Sockelklappe (60) für den Zugang zu einem Sockelabschnitt des Gehäuses (2) beinhaltet und wobei das Verfahren Folgendes beinhaltet:

- o Öffnen der Sockelklappe (60) derart, dass der Wischer (330) bedient wird.

7. Verfahren nach einem der Ansprüche 1 bis 5, wobei der Trockner (1) eine Sockelklappe (60) für den Zugang zu einem Sockelabschnitt des Gehäuses (2) beinhaltet und das Gehäuse (2) eine Lade-/Entnahmeöffnung (5) beinhaltet, um den Zugang zur Trommel (3) zu ermöglichen, sowie eine Tür (4) zum Ver-

schließen der Öffnung (5), wobei sich der manuell bedienbare Griff (338) in dem Sitz (8) befindet, der in einer Oberfläche (17) der Lade-/Entnahmeöffnung (5) umgesetzt ist, und wobei das Verfahren Folgendes beinhaltet:

- o Öffnen der Tür (4) für den Zugang zu dem manuell bedienbaren Griff (338),
- o Bewegen des manuell bedienbaren Griffs (338) von der ersten in die zweite Gestaltung und
- o Ziehen oder Drücken des manuell bedienbaren Griffs (338) derart, dass die erste Filterfläche (32) abgewischt wird.

**8. Wäschetrockner (1), Folgendes umfassend:**

- o ein Gehäuse (2),
- o eine Trommel (3), die in dem Gehäuse drehbar getragen ist,
- o einen Kanal (18), der einen Strömungsdurchlass für Prozessluft definiert, welche die Trommel verlässt,
- o eine Filteranordnung (80, 80', 90),
- o wobei das Gehäuse (2) einen Sitz (8) beinhaltet, um die Filteranordnung (80, 80', 90) unterzubringen, wobei der Sitz (8) prozessabwärts der Trommel (3) in der Strömungsrichtung der Prozessluft positioniert ist und die Filteranordnung entnehmbar in dem Sitz (8) untergebracht ist und zumindest teilweise in dem Kanal (18) positioniert ist, so dass darin strömende Prozessluft gefiltert wird,
- o wobei die Filteranordnung (80, 80', 90) Folgendes beinhaltet:

- einen Rahmen (31), der einen ersten und einen zweiten Endabschnitt aufweist und an seinem ersten Endabschnitt einen Aufbewahrungsabschnitt (50) definiert, wobei der Aufbewahrungsabschnitt dafür eingerichtet ist, aufgefangenes ausgefiltertes Material ohne Entleerung über mehrere Trocknungszyklen aufzubewahren,
- einen Filter (116, 118) der von dem Rahmen (31) getragen wird und eine erste Filterfläche (32) definiert,
- ein Reinigungsgerät (33) zum Reinigen der ersten Filterfläche (32), das einen verschiebbaren Wischer (330) zum Abwischen der ersten Filterfläche (32) und einen manuell bedienbaren Griff (338) beinhaltet, der mit dem Wischer (330) verbunden ist, wobei der Wischer (330) von einer ersten Position, an der sich der Wischer (330) an dem zweiten Endabschnitt des Rahmens (31) befindet, zu einer zweiten Position verschiebbar ist, wobei sich der Wischer (330) am ersten

Endabschnitt des Rahmens (31) befindet und wobei der Wischer (330) derart konstruiert ist, dass er die erste Filterfläche (32) während des Verschiebens derart abwischt, dass ausgefiltertes Material, das an der ersten Filterfläche haftet, zum ersten Endabschnitt des Rahmens in dem Aufbewahrungsabschnitt (50) bewegt wird,

- wobei der Griff (338) von einer ersten Gestaltung, in der der manuell bedienbare Griff (338) im Wesentlichen vollständig in dem Sitz (8) untergebracht ist, in eine zweite Gestaltung beweglich ist, in welcher der Griff (338) aus dem Sitz (8) hervorsticht.

**9. Wäschetrockner (1) nach Anspruch 8, wobei die Filteranordnung eine zweite Filterfläche (32') beinhaltet, die der ersten Filterfläche (32) zugewandt ist, wobei der Wischer (330) derart zwischen der ersten und der zweiten Filterfläche (32, 32') positioniert ist, dass ausgefiltertes Material, das an der ersten und der zweiten Filterfläche (32, 32') haftet, zum ersten Endabschnitt des Rahmens in dem Aufbewahrungsabschnitt (50) bewegt wird.**

**10. Wäschetrockner (1) nach Anspruch 9, wobei der Wischer (330) ein erstes Wischerelement beinhaltet, das dafür eingerichtet ist, die erste Filterfläche (32) abzuwischen, ein zweites Wischerelement in Kontakt mit der zweiten Filterfläche (32'), das dafür eingerichtet ist, die zweite Filterfläche (32') abzuwischen, und ein Verbindungsstück zum Verbinden des ersten und des zweiten Wischerelements, wobei das Verbindungsstück in einer gegebenen Richtung luftdurchlässig ist.**

**11. Wäschetrockner (1) nach einem der Ansprüche 8 bis 10, wobei der manuell bedienbare Griff (338) im Verhältnis zu dem Wischer (330) von einer zurückgezogenen Gestaltung, die das Platzieren des Reinigungsgeräts (33) an dem zweiten Endabschnitt des Rahmens (31) ermöglicht, zu einer ausgefahrenen Gestaltung, die das manuelle Bewegen des Reinigungsgeräts (33) zum ersten Endabschnitt des Rahmens (31) ermöglicht, beweglich ist.**

**12. Wäschetrockner (1) nach einem der Ansprüche 8 bis 10, wobei der manuell bedienbare Griff (338) entweder von einer angewinkelten Gestaltung, in der er einen Winkel mit dem Wischer (330) bildet, der nicht 180° beträgt, zu einer parallelen Gestaltung, bei welcher der manuell bedienbare Griff (338) und der Wischer (330) parallel zueinander liegen, was das manuelle Bewegen des Reinigungsgeräts (33) zum ersten Endabschnitt des Rahmens (31) ermöglicht, oder von einer zusammengeklappten Gestaltung, die das Platzieren des Reinigungsgeräts (33) am zweiten Endabschnitt des Rahmens (31) ermöglicht,**

zu einer ausgeklappten Gestaltung, die das Hervorstehen des Reinigungsgeräts (33) aus dem Rahmen (31) ermöglicht, beweglich ist.

13. Wäschetrockner (1) nach einem der Ansprüche 8 bis 12, wobei das Gehäuse (2) eine drehbare Tür/Klappe (4, 60) beinhaltet, die entweder eine Sockelklappe (60) oder eine Lade-/Entnahmetür (4) ist, die eine Lade-/Entnahmeöffnung (5) verschließt, die an dem Gehäuse (2) umgesetzt ist, um den Zugang zu der Trommel (3) zu ermöglichen, und die Filteranordnung (80, 80', 90) hinter der drehbaren Tür/Klappe (4, 60) angeordnet ist. 5 10
14. Wäschetrockner (1) nach Anspruch 13, wobei die Filteranordnung (80', 90) an der drehbaren Tür/Klappe angebracht ist, die eine drehbare Sockelklappe (60) ist. 15
15. Wäschetrockner nach Anspruch 14, wobei das Gehäuse (2) eine Lade-/Entnahmeöffnung (5) beinhaltet, um den Zugang zur Trommel (3) zu ermöglichen, und eine Lade-/Entnahmetür (4), um die Öffnung (5) zu verschließen, wobei sich die drehbare Sockelklappe (60) unter der Lade-/Entnahmeöffnung (5) befindet. 20 25

## Revendications

1. Procédé pour nettoyer un ensemble filtre dans un sèche-linge (1), dans lequel le sèche-linge (1) comprend : 30
- o un châssis (2) ; 35
  - o un tambour (3) supporté en rotation dans le châssis ;
  - o un conduit (18) définissant un passage d'écoulement pour l'air de traitement sortant du tambour ; 40
  - o un ensemble filtre (80, 80', 90) ;
  - o ledit châssis (2) incluant une assise (8) pour loger ledit ensemble filtre, ladite assise (8) étant positionnée en aval dudit tambour (3) dans la direction d'écoulement de l'air de traitement et ledit ensemble filtre étant positionné au moins partiellement dans le conduit (18) de manière à filtrer l'air de traitement s'écoulant dans celui-ci ; 45
  - o ledit ensemble filtre (80, 80', 90) incluant : 50
- un cadre (31) ayant des première et seconde parties d'extrémité et définissant, au niveau de la première partie d'extrémité de celui-ci, une partie de stockage (50) adaptée pour stocker du matériau filtré pendant plusieurs cycles de séchage sans être vidée ; 55
  - un filtre (116, 118) supporté par le cadre

(31) et définissant une première surface de filtration (32) ;

- un dispositif de nettoyage (33) pour nettoyer la première surface de filtration (32) incluant un joint racleur (330) pouvant effectuer une translation pour racleur la première surface de filtration (32), ledit dispositif de nettoyage (33) incluant une poignée actionnable manuellement (338) qui est raccordée au joint racleur (330) et mobile d'une première configuration dans laquelle la poignée actionnable manuellement (338) est logée sensiblement complètement dans ladite assise (8), vers une seconde configuration ;

le procédé comprenant :

- o la fourniture dans une première position de ladite poignée actionnable manuellement (338) dans ladite première configuration ;
- o le déplacement de ladite poignée actionnable manuellement (338) dans la seconde configuration où elle fait saillie depuis ladite assise (8) avant d'effectuer une translation du joint racleur (330) de ladite première position dans laquelle le joint racleur (330) est situé au niveau de la seconde partie d'extrémité dudit cadre (31) vers la première partie d'extrémité du cadre (31) en actionnant ladite poignée actionnable manuellement (338) ;
- o le raclage de ladite première surface de filtration (32) au moyen dudit joint racleur (330) pendant la translation de manière à déplacer le matériau filtré fixé à ladite première surface de filtration (32) vers la première partie d'extrémité du cadre (31) ; et
- o la collecte dudit matériau filtré dans ladite partie de stockage (50) ;
- o le retrait dudit ensemble filtre (80, 80', 90) de ladite assise (8) afin de retirer ledit matériau filtré de ladite partie de stockage (50).

2. Procédé selon la revendication 1, comprenant :

- o la translation dudit joint racleur (330) de retour vers ladite seconde partie d'extrémité tout en gardant ledit matériau filtré dans ladite partie de stockage (50).

3. Procédé selon la revendication 1 ou 2, dans lequel dans ladite seconde configuration ladite poignée actionnable manuellement (338) définit un axe sensiblement perpendiculaire à un axe dudit joint racleur (330) et dans lequel le procédé inclut

- o le fait de pousser ledit joint racleur (330) vers le bas en actionnant ladite poignée actionnable

- manuellement (338) de manière à faire coulisser ledit joint racleur (330) sur ladite première surface de filtration (32).
4. Procédé selon l'une quelconque des revendications précédentes, dans lequel ladite poignée actionnable manuellement (338) est articulée sur ledit joint racleur (330), et dans lequel le procédé inclut :
- ola rotation de ladite poignée actionnable manuellement (338) de manière à la faire passer de la première à la seconde configuration avant qu'elle coulisse.
5. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit ensemble filtre (80) inclut une seconde surface de filtration (32') faisant face à la première surface de filtration (32), dans lequel ledit joint racleur (330) est positionné entre lesdites première et seconde surfaces de filtration (32, 32') et dans lequel le procédé inclut le raclage desdites première et seconde surfaces de filtration (32, 32') au moyen dudit joint racleur (330) pendant la translation.
6. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit sèche-linge inclut une porte socle (60) pour accéder à une partie de socle du châssis (2), et dans lequel le procédé inclut :
- l'ouverture de ladite porte socle (60) de manière à actionner le joint racleur (330).
7. Procédé selon l'une quelconque des revendications 1 à 5, dans lequel ledit sèche-linge (1) inclut une porte socle (60) pour accéder à une partie de socle du châssis (2), et ledit châssis (2) inclut une ouverture de chargement/déchargement (5) pour permettre un accès au tambour (3) et une porte (4) pour fermer ladite ouverture (5), ladite poignée actionnable manuellement (338) étant située à l'intérieur de l'assise (8) réalisée dans une surface (17) de ladite ouverture de chargement/déchargement (5), et dans lequel le procédé inclut :
- l'ouverture de ladite porte (4) afin d'accéder à ladite poignée actionnable manuellement (338) ;
- le déplacement de ladite poignée actionnable manuellement (338) de ladite première à ladite seconde configuration ; et
- le fait de tirer ou pousser ladite poignée actionnable manuellement (338) de manière à racler ladite première surface de filtration (32).
8. Sèche-linge (1) comprenant :
- o un châssis (2) ;

o un tambour (3) supporté en rotation dans le châssis ;

o un conduit (18) définissant un passage d'écoulement pour l'air de traitement sortant du tambour ;

o un ensemble filtre (80, 80', 90) ;

o ledit châssis (2) incluant une assise (8) pour loger ledit ensemble filtre (80, 80', 90), ladite assise (8) étant positionnée en aval dudit tambour (3) dans la direction d'écoulement de l'air de traitement et ledit ensemble filtre étant logé de manière amovible dans ladite assise (8) et positionné au moins partiellement dans le conduit (18) de manière à filtrer l'air de traitement s'écoulant dans celui-ci ;

o ledit ensemble filtre (80, 80', 90) incluant :

- un cadre (31) ayant des première et seconde parties d'extrémité et définissant une partie de stockage (50) au niveau de la première partie d'extrémité de celui-ci, ladite partie de stockage étant apte à stocker et garder en son sein du matériau filtré collecté pendant plusieurs cycles de séchage sans être vidée ;
- un filtre (116, 118) supporté par le cadre (31) et définissant une première surface de filtration (32) ;
- un dispositif de nettoyage (33) pour nettoyer la surface de filtration (32) incluant un joint racleur (330) pour racler la première surface de filtration (32) et une poignée actionnable manuellement (338) qui est raccordée au joint racleur (330), dans lequel le joint racleur (330) peut effectuer une translation d'une première position dans laquelle le joint racleur (330) est situé au niveau de la seconde partie d'extrémité dudit cadre (31) vers une seconde position dans laquelle le joint racleur (330) est situé au niveau de la première partie d'extrémité du cadre (31), et dans lequel le joint racleur (330) est conçu pour racler ladite première surface de filtration (32) pendant la translation de manière à déplacer le matériau filtré fixé à ladite première surface de filtration vers la première partie d'extrémité du cadre dans la partie de stockage (50) ;

o ladite poignée (338) étant mobile d'une première configuration dans laquelle la poignée actionnable manuellement (338) est logée sensiblement complètement dans ladite assise (8) vers une seconde configuration dans laquelle ladite poignée (338) fait saillie depuis ladite assise (8).

9. Sèche-linge (1) selon la revendication 8, dans lequel

ledit ensemble filtre inclut une seconde surface de filtration (32') faisant face à la première surface de filtration (32), dans lequel ledit joint racleur (330) est positionné entre lesdites première et seconde surfaces de filtration (32, 32') de manière à déplacer le matériau filtré fixé auxdites première et seconde surfaces de filtration (32, 32') vers la première partie d'extrémité du cadre dans la partie de stockage (50).

10. Sèche-linge (1) selon la revendication 9, dans lequel ledit joint racleur (330) inclut un premier élément racleur apte à racler ladite première surface de filtration (32), un second élément racleur en contact avec ladite seconde surface de filtration (32') apte à racler ladite seconde surface de filtration (32'), et un élément de raccordement pour raccorder les premier et second éléments racleurs, ledit élément de raccordement étant perméable à l'air dans une direction donnée.

11. Sèche-linge (1) selon l'une quelconque des revendications 8 à 10, dans lequel ladite poignée actionnable manuellement (338) est mobile par rapport au joint racleur (330) d'une configuration rétractée permettant au dispositif de nettoyage (33) d'être placé au niveau de la seconde partie d'extrémité dudit cadre (31) vers une configuration déployée permettant au dispositif de nettoyage (33) d'être déplacé manuellement vers la première partie d'extrémité dudit cadre (31).

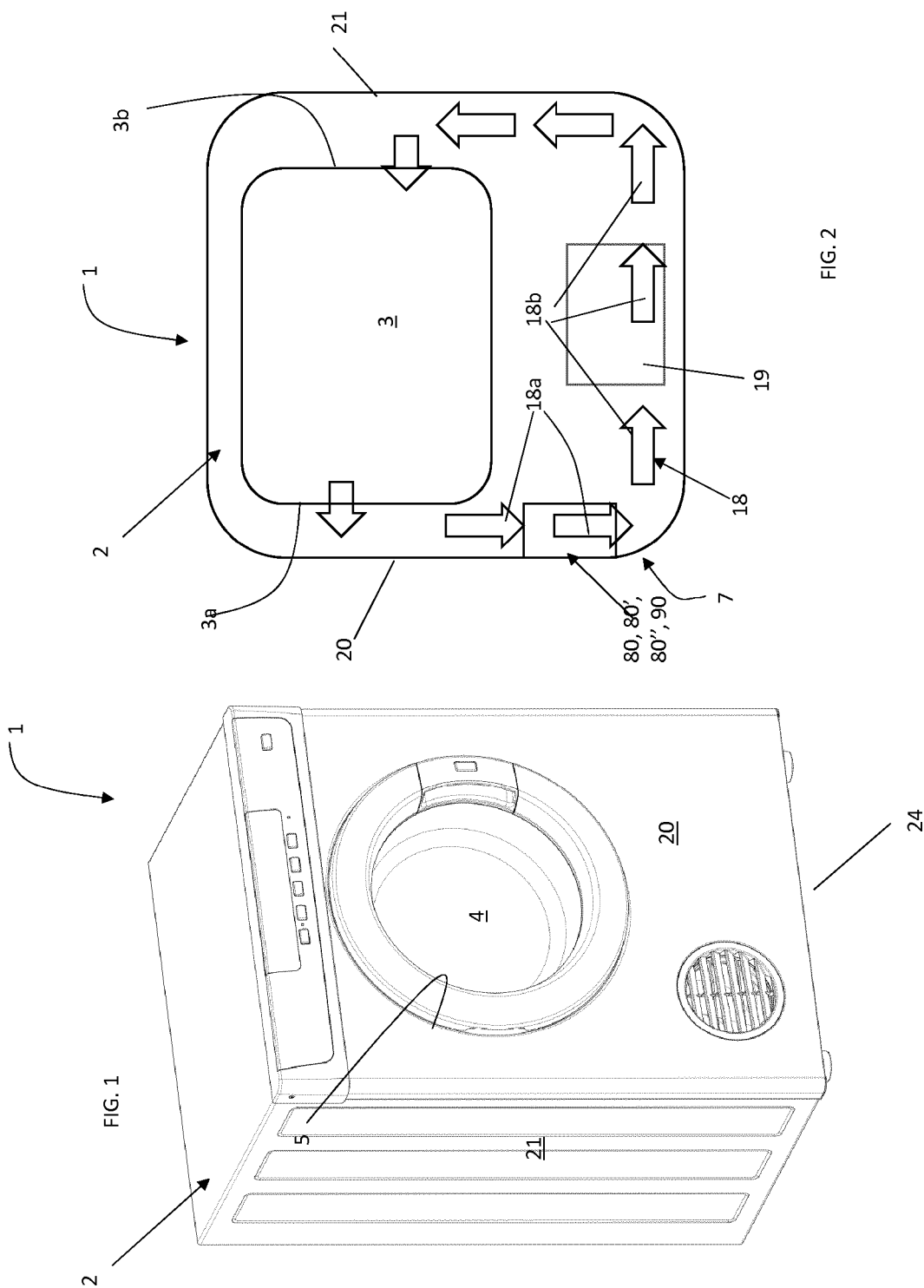
12. Sèche-linge (1) selon l'une quelconque des revendications 8 à 10, dans lequel ladite poignée actionnable manuellement (338) est mobile soit d'une configuration inclinée dans laquelle elle forme un angle différent de 180° avec ledit joint racleur (330), vers une configuration parallèle où la poignée actionnable manuellement (338) et le joint racleur (330) sont parallèles l'un à l'autre permettant au dispositif de nettoyage (33) d'être déplacé manuellement vers ladite première partie d'extrémité du cadre (31), soit d'une configuration pliée permettant au dispositif de nettoyage (33) d'être placé au niveau de la seconde partie d'extrémité dudit cadre (31) vers une configuration dépliée permettant au dispositif de nettoyage (33) de faire saillie depuis ledit cadre (31).

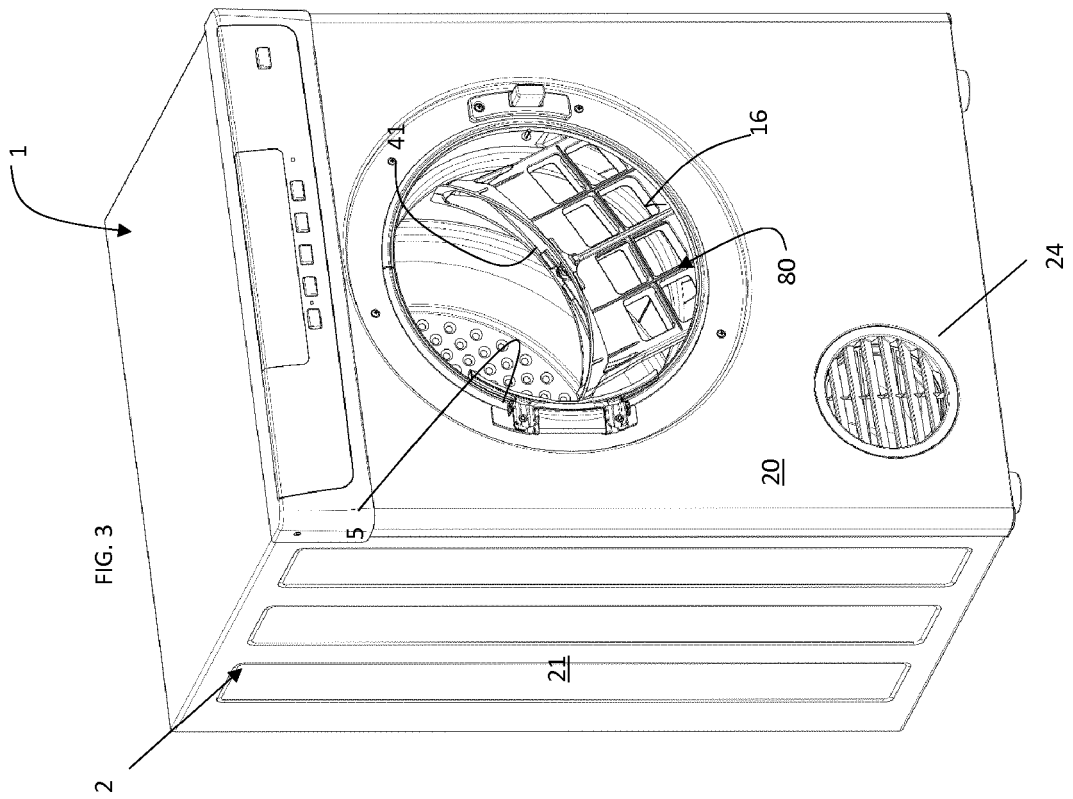
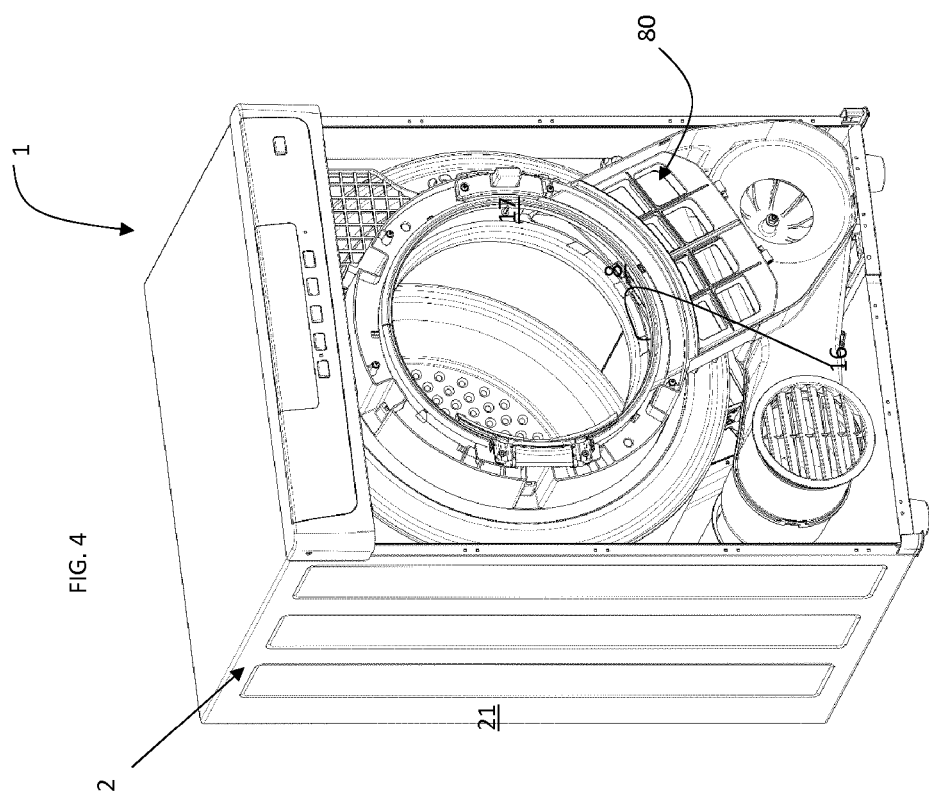
13. Sèche-linge (1) selon l'une quelconque des revendications 8 à 12, dans lequel ledit châssis (2) inclut une porte rotative (4, 60), étant soit une porte socle (60) soit une porte de chargement/déchargement (4) fermant une ouverture de chargement/déchargement (5) réalisée sur le châssis (2) pour permettre un accès au tambour (3), et ledit ensemble filtre (80, 80', 90) est positionné derrière ladite porte rotative (4, 60).

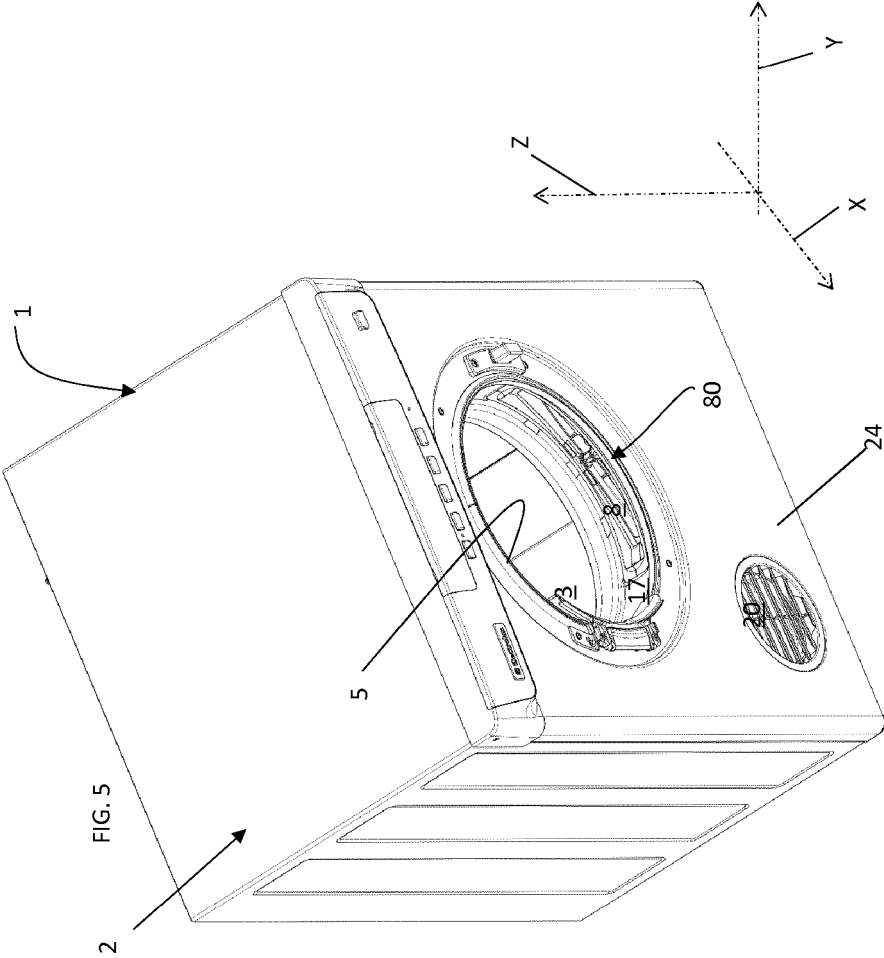
14. Sèche-linge (1) selon la revendication 13, dans le-

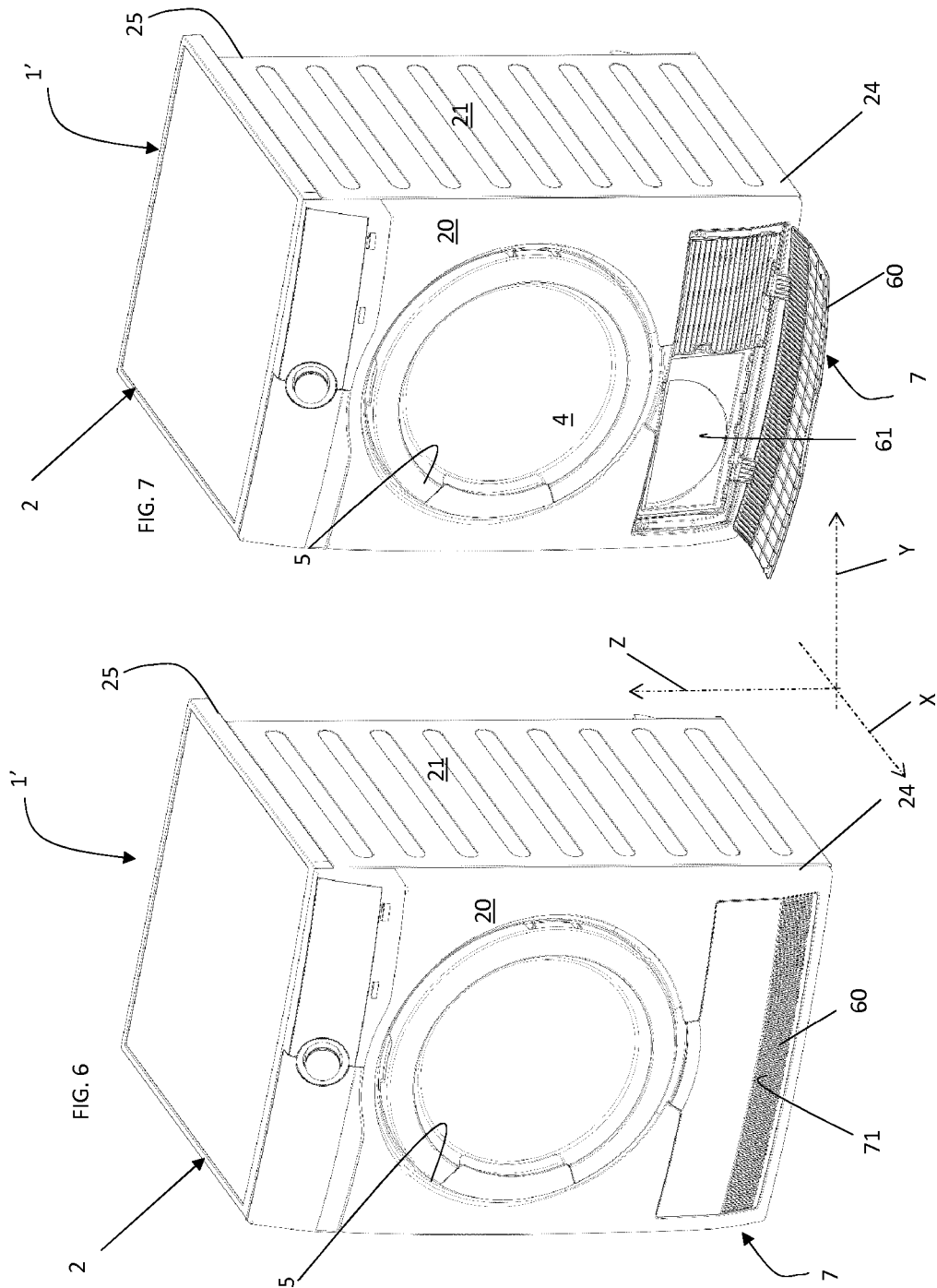
quel ledit ensemble filtre (80', 90) est fixé à ladite porte rotative étant une porte socle rotative (60).

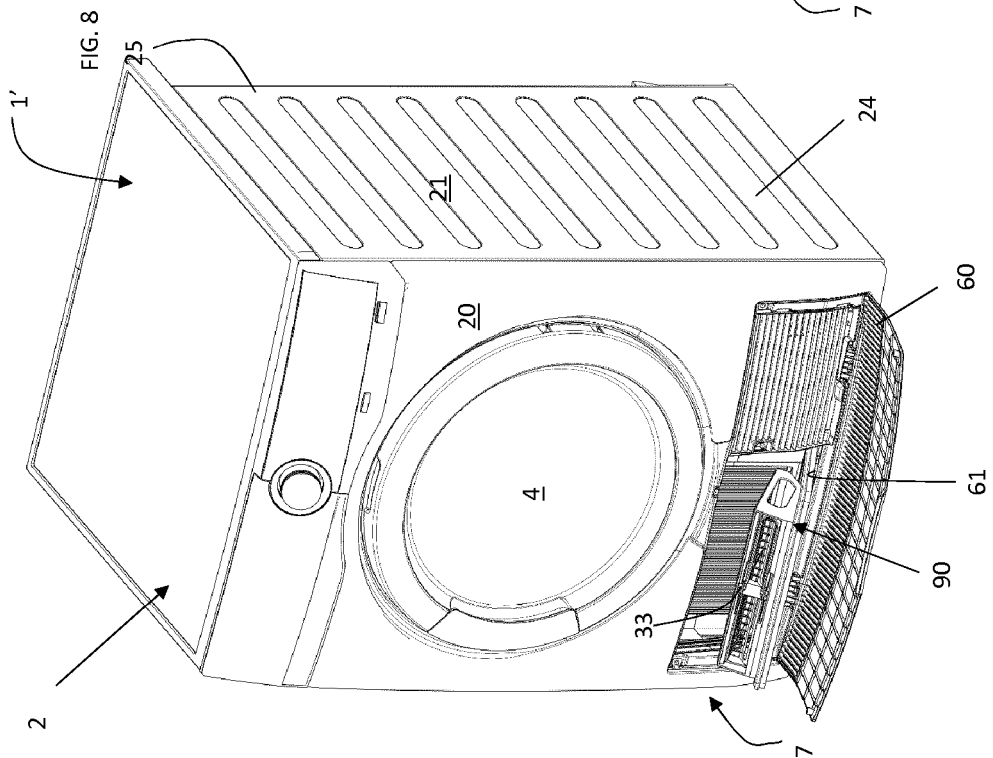
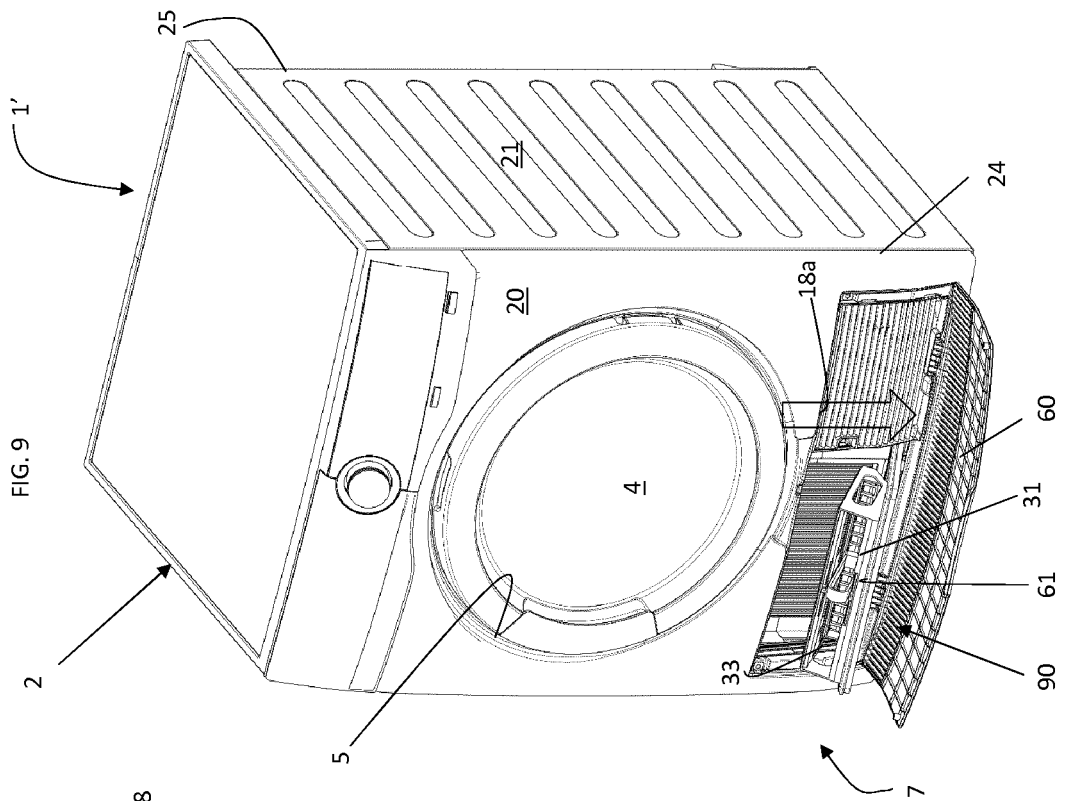
15. Sèche-linge selon la revendication 14, dans lequel ledit châssis (2) inclut une ouverture de chargement/déchargement (5) pour permettre un accès au tambour (3) et une porte de chargement/déchargement (4) pour fermer ladite ouverture (5), ladite porte socle rotative (60) étant située sous ladite ouverture de chargement/déchargement (5).

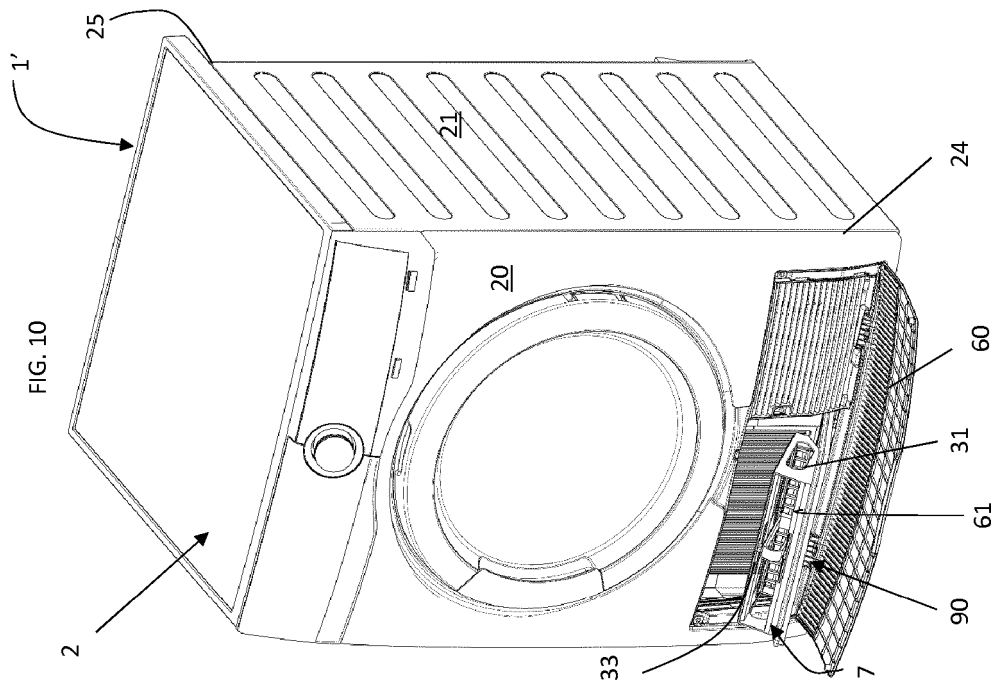
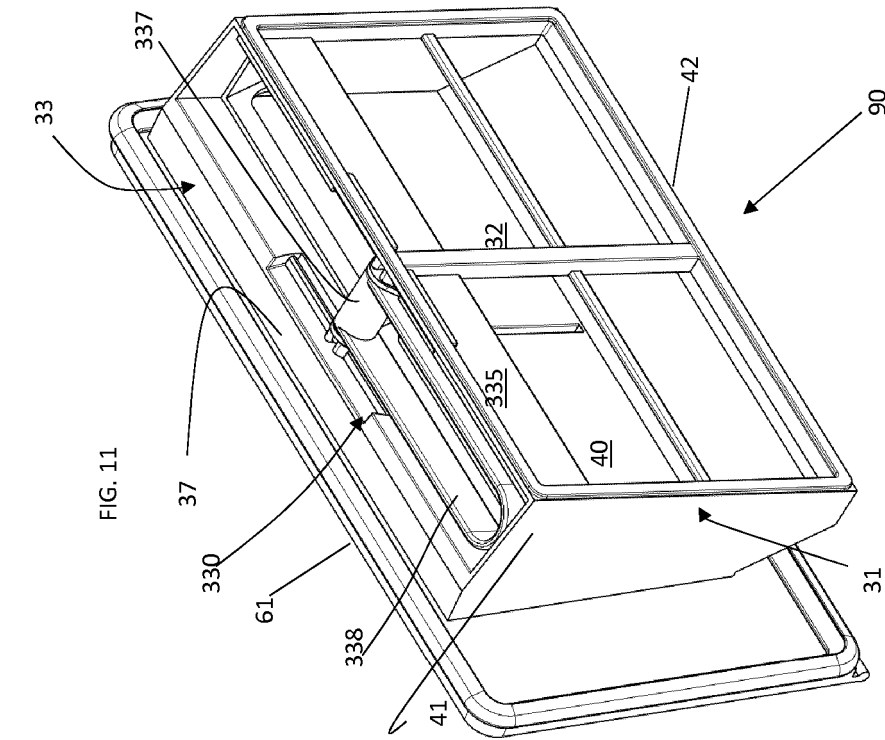












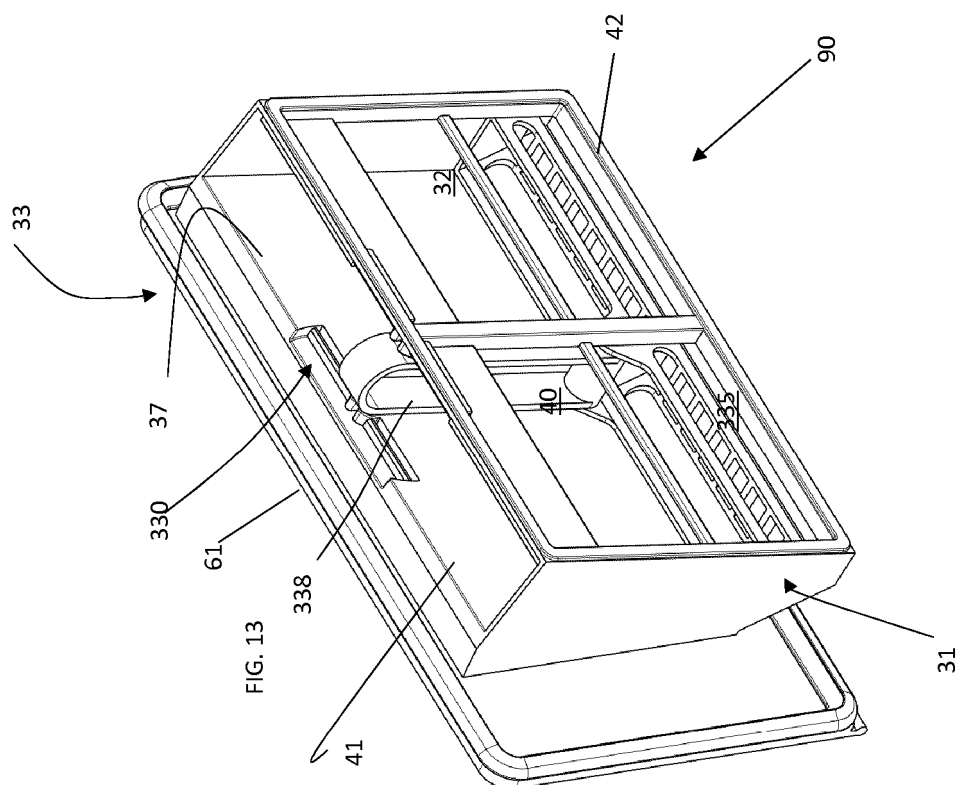
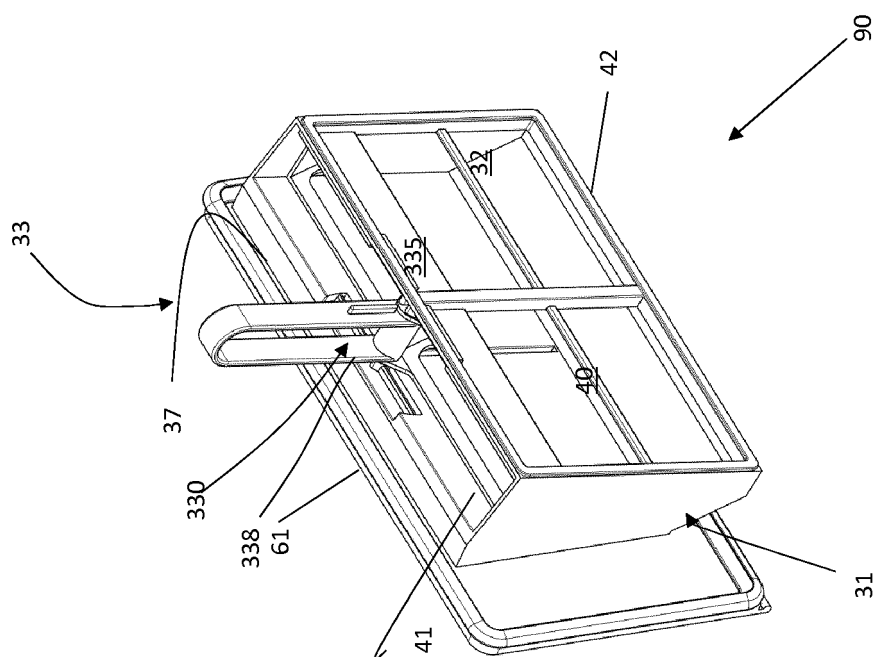
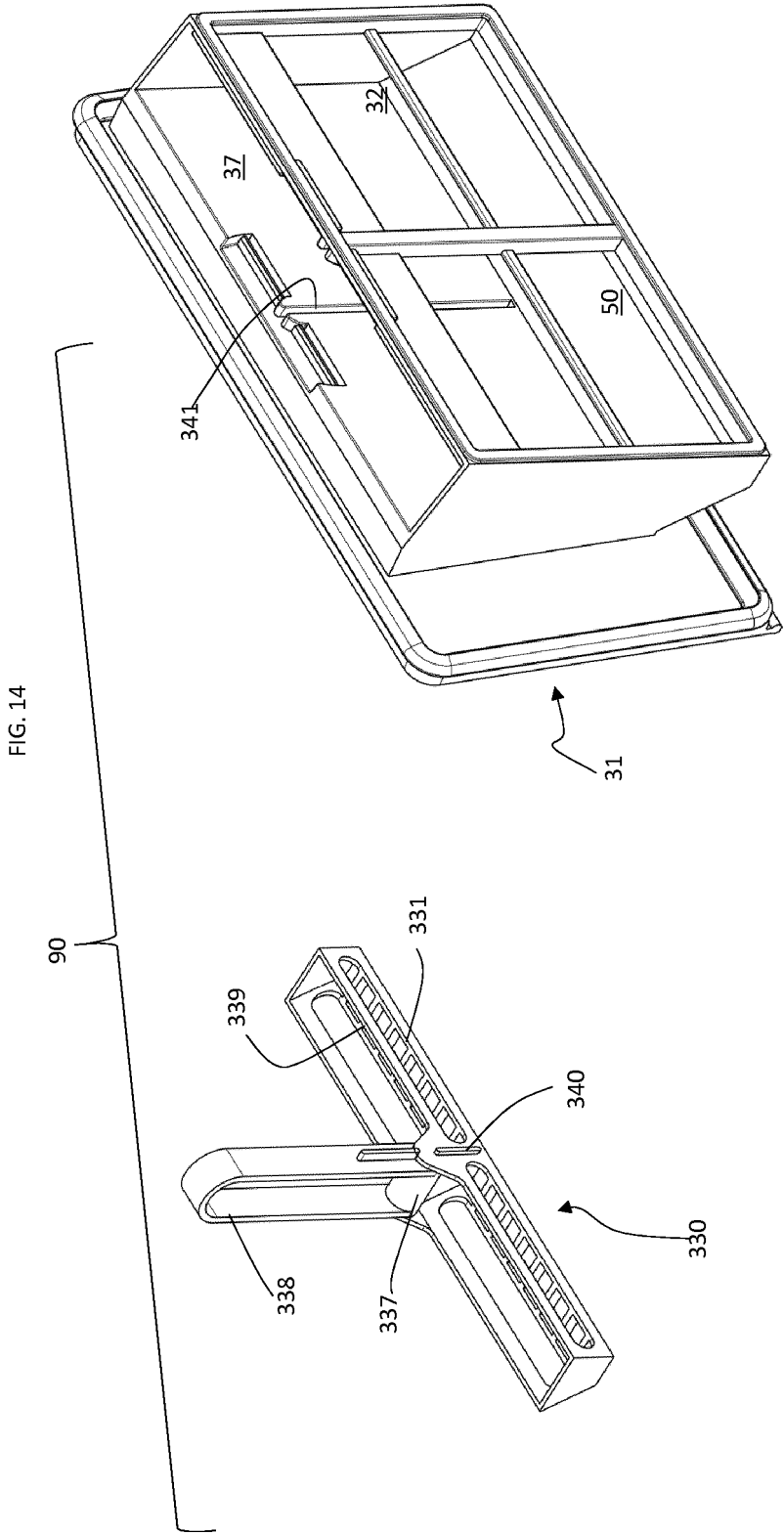
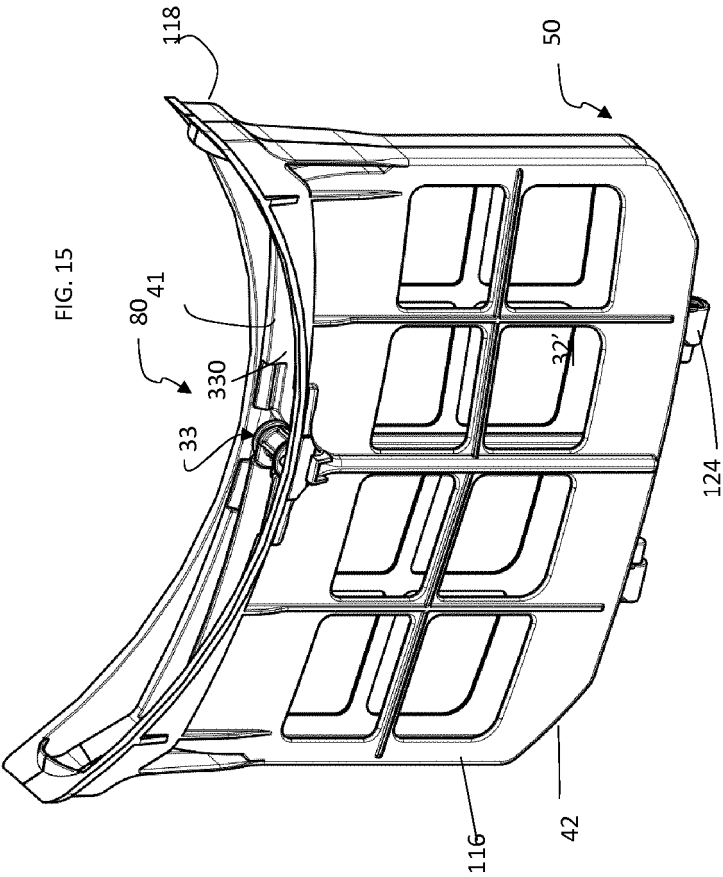
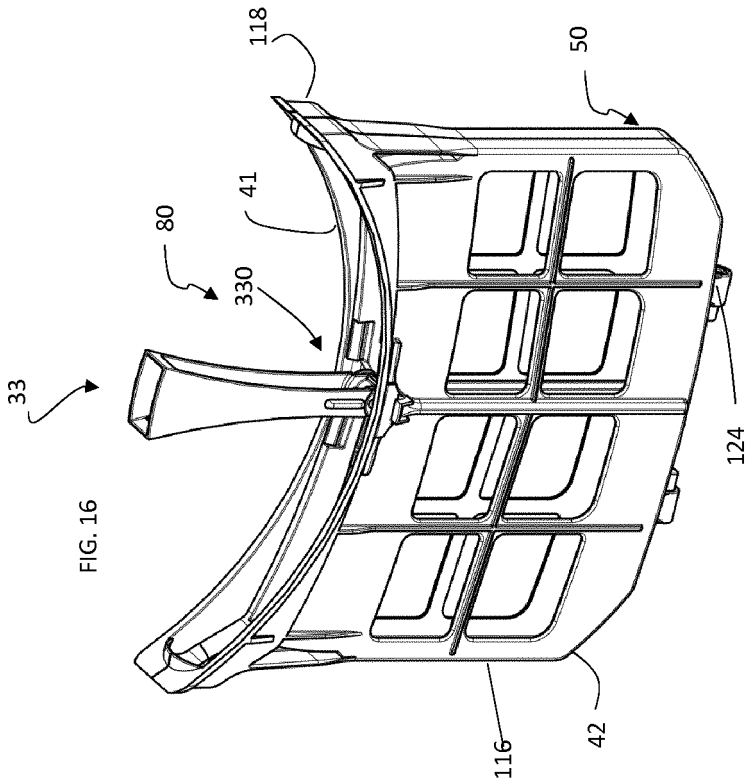
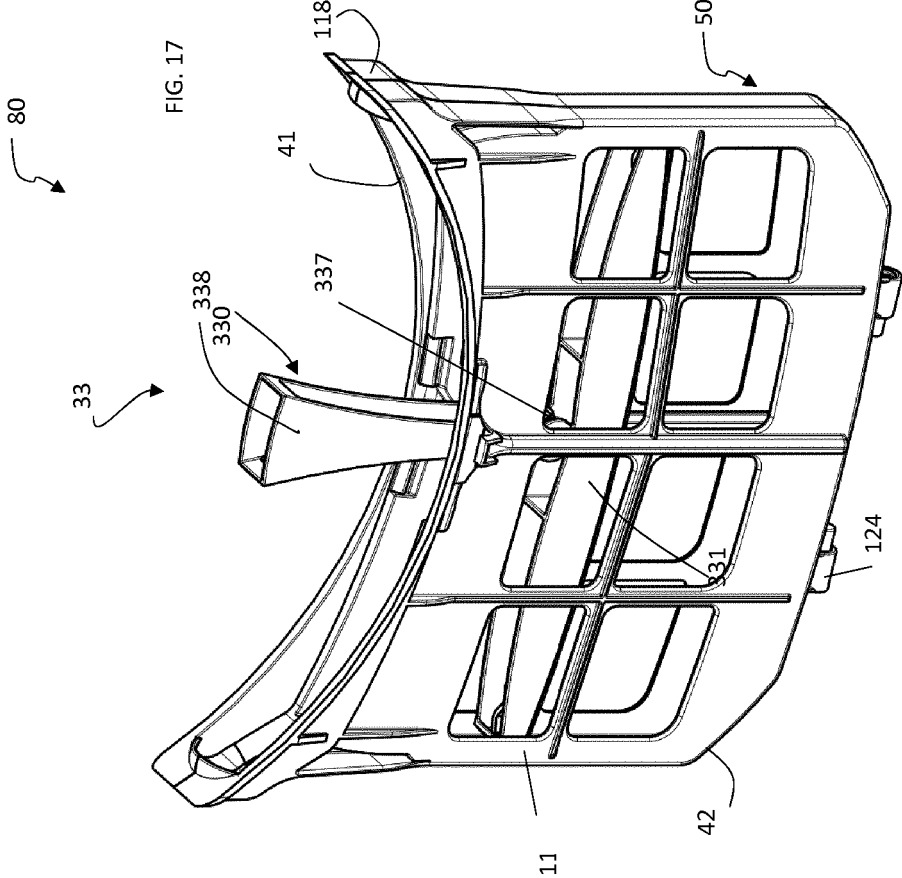
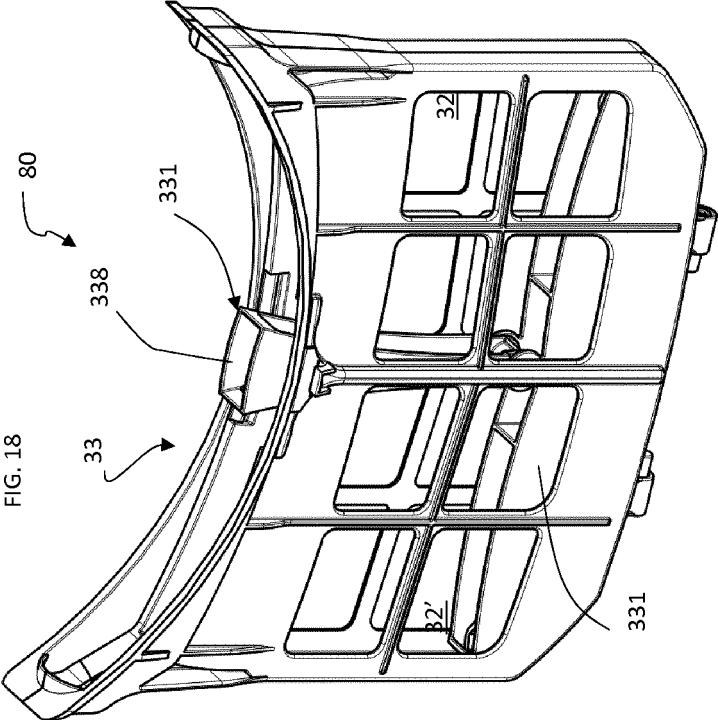


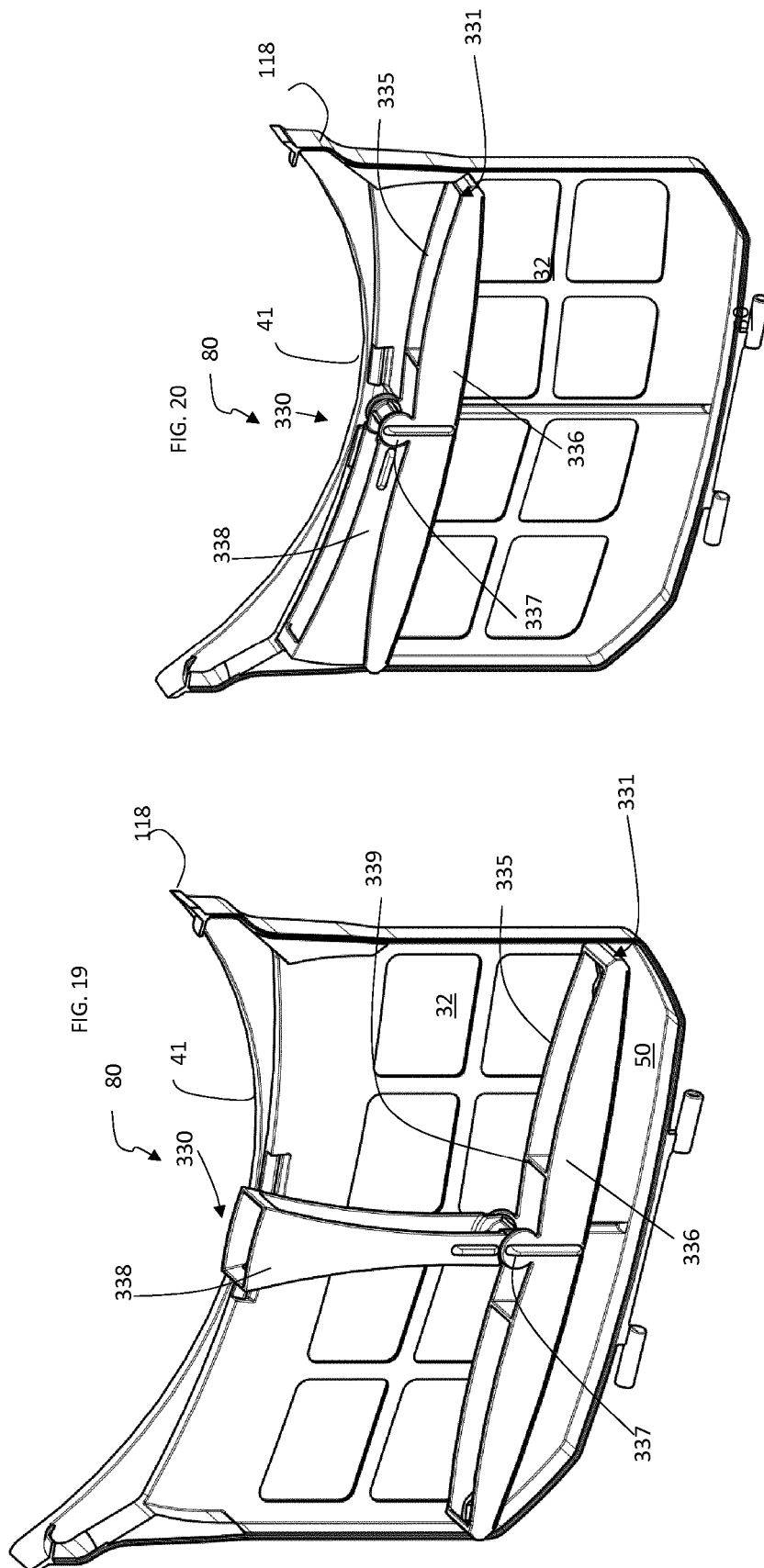
FIG. 12











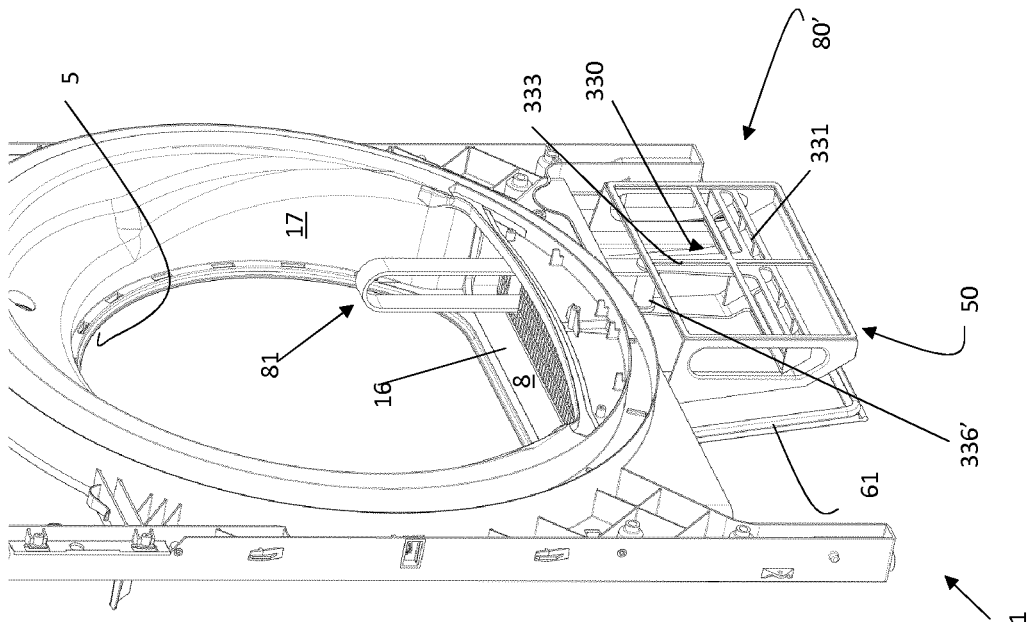


FIG. 22

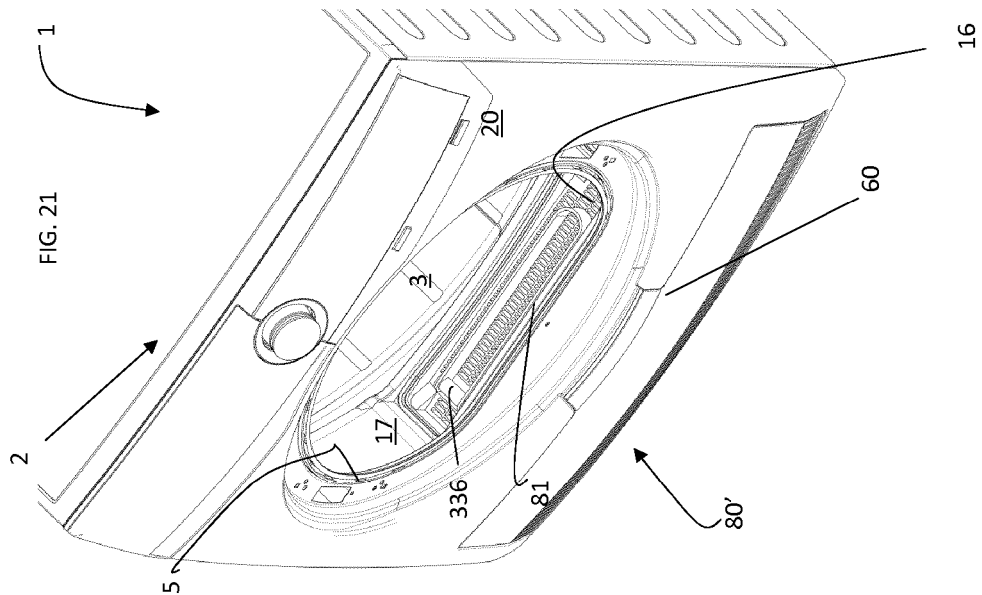


FIG. 21

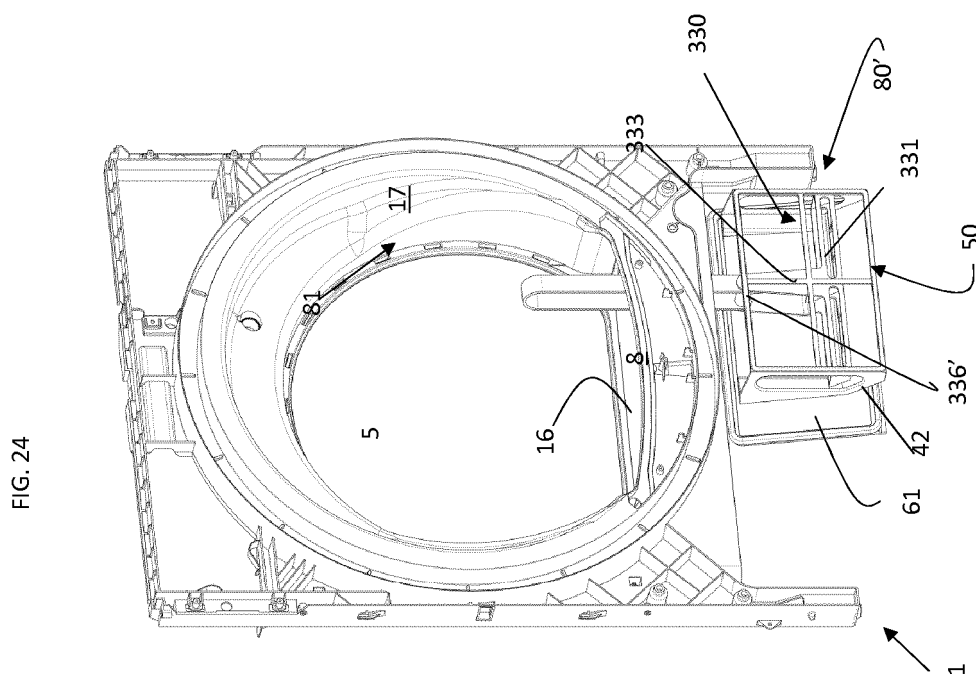


FIG. 24

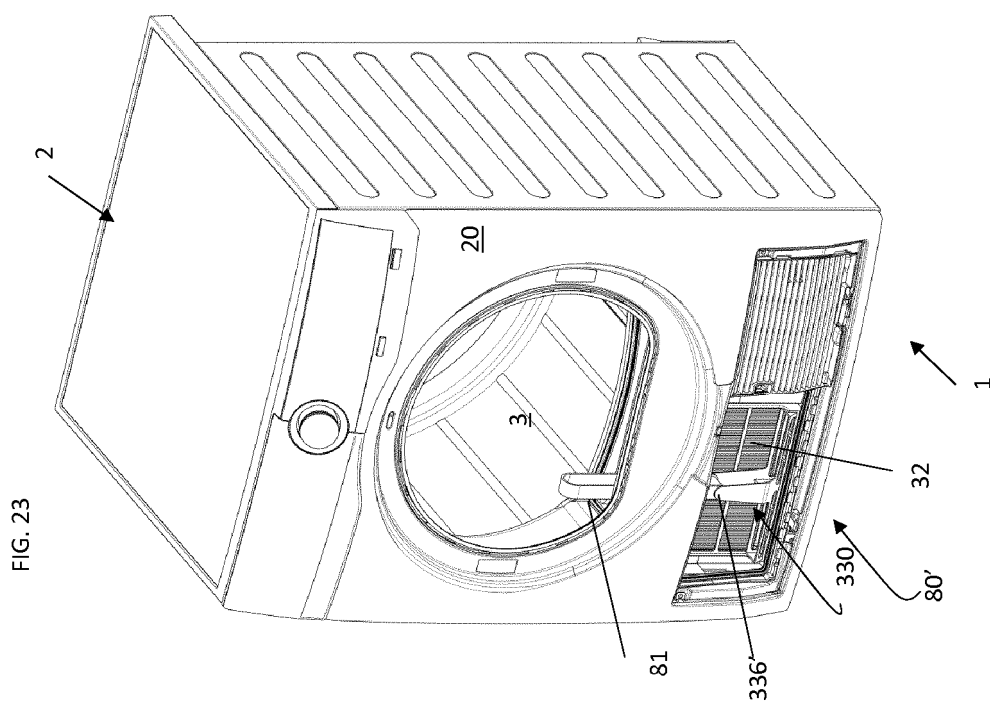


FIG. 23

**REFERENCES CITED IN THE DESCRIPTION**

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