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(54) **LAUNDRY DRYING APPLIANCE WITH AMBIENT AIR DEHUMIDIFICATION OPERATION MODE**

WÄSCHETROCKNUNGSGERÄT MIT BETRIEBSMODUS ZUR UMGEBUNGSLUFTENTFEUCHTUNG

APPAREIL DE SÉCHAGE DE LINGE AVEC UN MODE D'OPÉRATION DE DÉSHUMIDIFICATION D'AIR AMBIENT

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## Description

### Field of the invention

[0001] The solution according to embodiments of the present invention generally relates to household and/or professional laundry treating appliances configured for performing drying operations (e.g., laundry washing/drying machines and drying machines, hereinafter both referred to as "laundry drying appliances" or simply "laundry appliances" for the sake of conciseness).

### Background of the invention

[0002] Laundry appliances (such as laundry washing/drying machines and drying machines) configured to dry laundry generally comprise a laundry chamber configured for housing a laundry load (including articles such as clothes and other textiles) and for causing drying air circulating therethrough to remove moisture from the laundry load.

[0003] DE3710615 discloses a washing and drying machine with a drawer receptacle provided in the upper housing region. When the machine is to operate as a washing machine, a washing-agent flush-in tray is inserted into the drawer receptacle, and when it is to operate as a laundry drier, the washing-agent flush-in tray is taken out of the drawer receptacle and replaced by a lint separator.

[0004] EP2843100 discloses a laundry washing/drying appliance comprising a laundry chamber for containing laundry to be washed/dried, an air circulation system adapted to cyclically circulate drying air through the laundry chamber during a drying process, and a washing products dispensing conduit adapted to dispense washing products into the laundry chamber during a washing process. An amount of drying air within the laundry chamber is allowed to leave the air circulation system during the drying process.

[0005] A class of laundry appliances provides to dry the laundry load inside the laundry chamber by circulating drying air through the laundry chamber in a substantially closed air circuit. This air circuit provides that (damp) air leaving the laundry chamber is passed through a demisting unit, where it is demisting, and then through a heating unit, where it is heated up to form dry and hot air that is then fed again inside the laundry chamber for evaporating moisture from the laundry load.

[0006] Laundry appliances are known whose operation is configured to be switched between a standard "laundry drying mode" directed to dry laundry inside the laundry chamber and an "ambient air dehumidification mode" directed to remove humidity from the room wherein the laundry drying appliance is located.

[0007] EP2684994 discloses a dryer having a dryer housing comprising a housing front face for supplying objects to a drying chamber, and a processing air channel for guiding processing air and located inside the housing.

An exhaust air duct guides exhaust air from the chamber. The face comprises a recess region, where an adapter and another adapter are insertable into the recess region. A normal drying process of the objects in the chamber is carried out during utilization of the former adapter. A space containing the dryer is dehumidified during utilization of the latter adapter.

### Summary of the Invention

[0008] The Applicant has found that the known laundry appliances capable of selectively drying laundry inside the laundry chamber or removing humidity from the room wherein the laundry drying appliance is located are affected by drawbacks.

[0009] For example, the solution disclosed in EP2684994 is not efficient, because of the increased complexity due to the requirement of using two different adapters to be selectively inserted in a dedicated recess area. In addition to the increased complexity, this solution is affected by the further disadvantage of forcing the user to find a place where storing either of the two adapters which is not in use.

[0010] The Applicant has faced the problem of devising a satisfactory solution able to overcome the above-discussed drawbacks.

[0011] In particular, one or more aspects of the solution according to specific embodiments of the invention are set out in the independent claims, with advantageous features of the same solution that are indicated in the dependent claims, with any advantageous feature provided with reference to a specific aspect of the solution according to an embodiment of the invention that applies *mutatis mutandis* to any other aspect thereof.

[0012] An aspect of the solution according to one or more embodiments of the invention relates to a laundry drying appliance.

[0013] The laundry appliance comprises a cabinet.

[0014] The laundry appliance further comprises a laundry chamber rotatably enclosed within the cabinet for containing laundry to be dried.

[0015] The laundry appliance further comprises a drying air flow system for passing said air through the laundry chamber, said drying air flow system comprising an air demisting unit configured to demisting said air.

[0016] The laundry appliance further comprises a filter seat arranged within the drying flow system for removably receiving an air filter.

[0017] The air filter is movable from a first position wherein it is inserted into said filter seat to filter drying air leaving the laundry chamber, to a second position wherein it is removed from said filter seat and detached from the appliance and viceversa;

[0018] The laundry drying appliance is configured to operate in a laundry dryer mode when the air filter is in the first position, and in an ambient air dehumidification mode to dehumidify air in the ambient outside the cabinet when the air filter is said second position.

**[0019]** The laundry drying appliance further comprises a movable wall system arranged within said filter seat and operable, by moving said air filter from one to the other of said first and second positions, to configure the drying air flow system such that:

- when the filter is said first position, the drying air flow system is configured to circulate drying air in a substantially closed air circuit, through the laundry chamber and the air filter, and
- when the filter is said second position, the laundry chamber is put in fluid communication with the ambient outside the cabinet by means of an air introduction opening and an air exhausting opening provided by the movable wall system in the filter seat.

**[0020]** Said movable wall system is configured so that, when the air filter is in said second position, the operation of the movable wall system causes the volume of the filter seat to be split in:

- a first volume portion comprising said air introduction opening and guiding air from the ambient outside the cabinet to the laundry chamber, and
- a second volume portion comprising said air exhausting opening and guiding air from the laundry chamber to the ambient outside the cabinet substantially without mixing with air flowing in the first volume portion.

**[0021]** In this way, the switching between the laundry dryer operative mode and the vambient air dehumidification operative mode of the laundry appliance can be easily performed in a very efficient way. Indeed, the movable wall system is advantageously adapted to accordingly configure the drying air flow system of the laundry appliance by simply inserting or removing the air filter unit from the filter seat, without having to be forced to manage different dedicated adapters.

**[0022]** Moreover, the proposed solution does not require the provision of a dedicated opening in the casing of the laundry appliance for accessing the drying air flow in order to change its configuration, because in the proposed solution said configuration can be easily performed by accessing the drying air flow through the filter seat.

**[0023]** According to an embodiment of the present invention, the movable wall system comprises first and second wall members pivotally coupled to the filter seat and configured to be rotated between:

- a folded position, in which said first and second wall members are substantially kept toward a ceiling portion of the filter seat by the air filter when the air filter is in the first position, and
- an unfolded position, in which said first and second wall members hang from the ceiling portion and extend towards a floor portion of the filter seat, when

the air filter is in the second position.

**[0024]** According to another embodiment, the movable wall system comprises first and second wall members pivotally coupled to the filter seat and configured to be rotated between:

- a folded position, in which said first and second wall members are substantially kept toward a floor portion of the filter seat by the air filter when the air filter is in the first position, and
- an unfolded position, in which said first and second wall members extend from the floor portion toward a ceiling portion of the filter seat, when the air filter is in the second position.

**[0025]** According to an embodiment of the present invention, the filter seat comprises a seat opening provided between said ceiling portion and said floor portion to receive the air filter therein.

**[0026]** According to an embodiment of the present invention, the second wall member of the movable wall system comprises said air introduction opening and air exhausting opening formed thereon to partly obstructing the seat opening when the air filter is in the second position.

**[0027]** According to an embodiment of the present invention, said first wall member and said second wall member are configured to be rotated from the unfolded position to the folded position when said air filter element is being inserted in the filter seat through said seat opening to reach said first position.

**[0028]** According to an embodiment of the present invention, said first wall member forms an angle comprised between 90° and 115° with respect to the ceiling portion of the filter seat when the first wall member is in the unfolded position.

**[0029]** According to an embodiment of the present invention, said second wall member comprises a profiled member on a first face of the second wall member facing inside the filter seat when the second wall member is in the unfolded position.

**[0030]** According to an embodiment of the present invention, said profiled member is configured as a cam of a cam system comprising a follower provided as a profiled edge of the first wall member, so that the rotation of the second wall member toward the folded position causes a corresponding rotation of the first wall member toward the folded position.

**[0031]** According to an embodiment of the present invention, said profiled member of said second wall member has a chamfered shape protruding from said first face of the second wall member.

**[0032]** According to an embodiment of the present invention, said profiled member of said second wall member has a shape substantially corresponding to an oblique triangular prism.

**[0033]** According to an embodiment of the present in-

vention, said second wall member comprises at least one elastic element biased in such a way that the second wall member is rotated from the folded position to the unfolded position when the filter element is being extracted from the filter seat.

**[0034]** According to an embodiment of the present invention, said drying air flow system comprises an air heating unit configured to heat up air demohumidified by the demohumidifying unit.

**[0035]** According to an embodiment of the present invention, said air demohumidifying unit comprises an evaporation unit and said air heating unit comprises a condenser unit, of a heat pump system.

**[0036]** According to an embodiment of the present invention said air demohumidifying unit comprises an evaporation unit and said air heating unit comprises a condenser unit, of a heat pump system which is designed for condensing an amount of moisture ranging from 8 liters/day to 12 liters/day from an ambient at 32°C and 80% of relative humidity. Said 'day' being intended as a time of 24 hours.

**[0037]** In a preferred embodiment said heat pump system is designed for condensing an amount of moisture ranging from 9 liters/day to 11 liters/day from an ambient at 32°C and 80% of relative humidity. Said 'day' being intended as a time of 24 hours. According to an embodiment of the present invention, said air demohumidifying unit comprises an air/air heat exchanger unit and said air heating unit comprises a heating resistor.

**[0038]** According to an embodiment of the present invention, said air demohumidifying unit comprises an air/water exchanger unit and said air heating unit comprises a heating resistor.

**[0039]** According to an embodiment of the present invention, said cabinet comprises sidewalls and a box-like structure acting as worktop arranged on the sidewalls so as to close the inner volume of the cabinet from above.

**[0040]** According to an embodiment of the present invention said air demohumidifying unit comprises an evaporation unit and said air heating unit comprises a condenser unit, of a heat pump system and the evaporation unit and/or the condenser unit is/are arranged within a volume of a box-like structure acting as worktop arranged on cabinet sidewalls so as to close the inner volume of the cabinet from above, said box-like structure having an height ranging from 2 cm to 8 cm and a width and/or a length ranging from 45 cm to 65 cm.

**[0041]** In another embodiment of the present invention, said box-like structure is formed by walls having a thickness ranging from 0,1 cm to 1 cm.

**[0042]** According to an embodiment of the present invention, said box-like structure comprising an air duct forming part of said drying air flow system, said filter seat being arranged within the air duct for removably receiving the air filter therein.

**[0043]** According to an embodiment of the present invention, said box-like structure comprises:

- an upper wall defining said ceiling portion of the filter seat;
- a lower wall defining said floor portion of the filter seat.

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**[0044]** Another aspect of the present invention relates to a worktop configured to form the top wall of a laundry drying appliance cabinet by being arranged on sidewalls thereof so as to close the inner volume of the cabinet from above.

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**[0045]** The worktop comprises:

- a box-like structure formed by an upper wall, a lower wall and a plurality of lateral walls arranged substantially perpendicularly to the upper and lower walls so as to form a worktop inner volume;
- an air duct arranged within said worktop inner volume and provided with an air demohumidifying unit configured to demohumidify air circulating within said air duct;
- an air inlet aperture for introducing air into said air duct, and an air outlet for exhausting air from said air duct;
- an air filter seat arranged in fluid communication with the air duct and adapted to receive an air filter therein;
- said air filter being movable from a first position wherein it is inserted into said filter seat to a second position wherein the air filter is removed from said filter seat and detached from the appliance, and vice-versa

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**[0046]** The worktop comprises a movable wall system arranged within said filter seat, said movable wall system being operable by moving the air filter from one to the other of said first and second positions to configure the air duct such that:

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a) when said air filter is in said first position:

- said air inlet aperture is put in fluid communication with said air outlet aperture by means of said air filter;
- air entering the air duct through said air inlet aperture is driven towards the air outlet aperture by means of said air duct, passing through said air filter;

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b) when said air filter is in said second position:

- said inlet aperture and said air outlet aperture are put in fluid communication with the ambient outside the worktop inner volume by means of an air introduction opening and an air exhausting opening provided by the movable wall system in the filter seat;
- air entering the air duct through said air inlet aperture is exhausted to the ambient outside the

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worktop inner volume through said air exhausting opening;

- said air outlet aperture is supplied with air coming from the ambient outside the worktop inner volume through said air introduction opening substantially without mixing with air entering the air duct through said air inlet aperture and being exhausted to the ambient outside the worktop inner volume through said air exhausting opening;

**[0047]** The proposed worktop comprising the movable wall system can be easily installed in a standard laundry drying appliance by simply replacing the old worktop with the proposed one. In this way, a standard laundry appliance can be enriched with the possibility of operating in an ambient air dehumidification operative mode without having to modify the component housed in the cabinet.

**[0048]** According to an embodiment of the present invention, said air duct is further provided with an air heating unit configured to heat up air demoi-  
sturized by the demoi-  
sturizing unit.

**[0049]** According to an embodiment of the present invention, said upper wall comprises a removable portion located at the movable wall system for accessing said movable wall system.

**[0050]** According to an embodiment of the present invention, said movable wall system is at least partially coupled to said removable portion of the upper wall.

**[0051]** Another aspect of the present invention relates to a method to operate a laundry drying appliance in a laundry dryer mode so as to dry laundry contained in the laundry chamber, or in an ambient air dehumidification mode to dehumidify air in the ambient outside the cabinet of the appliance.

**[0052]** The method comprises:

- providing the air filter in the first position thereby configuring the drying air flow system to circulate drying air, in a substantially closed air circuit, through the laundry chamber, or
- providing the air filter in the second position thereby putting the laundry chamber in fluid communication with the ambient outside the cabinet by means of the air introduction opening and the air exhausting opening provided by the movable wall system in the filter seat.

#### Brief description of the annexed drawings

**[0053]** These and other features and advantages of the present invention will be made apparent by the following description of some exemplary and non limitative embodiments thereof; for its better intelligibility, the following description should be read making reference to the attached drawings, wherein:

**Figure 1** is a perspective view of a laundry appliance

wherein concepts according to embodiments of the present invention can be applied;

**Figure 2A** conceptually shows how a drying air flow system of the laundry appliance of **Figure 1** is configured when the laundry appliance is in a laundry dryer operative mode according to an embodiment of the present invention when;

**Figure 2B** conceptually shows how the drying air flow system of the laundry appliance of **Figure 1** is configured when the laundry appliance is in an ambient air dehumidification operative mode according to an embodiment of the present invention.

**Figure 3** illustrate a ceiling portion of a filter seat of the laundry appliance provided with a movable wall system according to an embodiment of the present invention;

**Figure 4A** is a perspective view of the filter seat of the laundry appliance showing the movable wall system in a folded position according to an embodiment of the present invention;

**Figure 4B** is a perspective view of the filter seat of the laundry appliance showing the movable wall system in an unfolded position according to an embodiment of the present invention;

**Figure 5** illustrates how an air filter unit and the movable wall system interacts according to an embodiment of the present invention;

**Figures 6A-6C** are enlarged views of a wall member of the movable wall system according to an embodiment of the present invention;

**Figures 7A-7C** are perspective views of an exemplary worktop of the laundry appliance of **Figure 1** according to an embodiment of the present invention.

#### Detailed description of preferred embodiments of the invention

**[0054]** With reference to the drawings, **Figure 1** is a perspective view of a laundry appliance **100** wherein concepts according to embodiments of the present invention can be applied.

**[0055]** The laundry appliance **100** illustrated in **Figure 1** is a laundry washing/drying machine configured to wash and dry laundry. However, it is understood that the concepts of the present invention may be applied to other kinds of laundry appliances capable of drying laundry, such as in case the laundry appliance **100** is a drying machine configured only to dry laundry.

**[0056]** The laundry appliance **100** comprises a cabinet **105**, for example a substantially parallelepiped-shaped cabinet **105**, having a front wall **105(1)**, two side walls **105(s)** (only one visible in **Figure 1**), and a bottom wall (not visible in **Figure 1**).

**[0057]** The cabinet **105** encloses an inner compartment housing a laundry chamber (not visible in **Figure 1**) for containing laundry to be treated (e.g., dried and/or washed) and accessible through an access door **108**

(shown in closed configuration). According to an embodiment of the present invention, the laundry chamber is rotatably enclosed within the cabinet **105**, so that it can rotate with respect to the latter for promoting tumbling of laundry. Preferably, the laundry chamber is a rotatable drum. According to an embodiment of the present invention, the laundry chamber is a rotatable drum housed in a washing tub (not visible in the figures). In the embodiments of the invention in which the laundry appliance **100** is a drying machine configured only to dry laundry, the washing tub is not provided.

**[0058]** As will be described in detail in the following, the laundry appliance **100** comprises a drying air flow system for passing air through the laundry chamber.

**[0059]** The laundry appliance **100** comprises a box-like structure **109** acting as a (e.g., ready-to-mount) worktop (hereinafter simply referred to as "worktop") arranged on the side walls **105(s)** so as to close the inner volume of the cabinet **105** from above. The worktop **109** may be advantageously covered by a covering panel **110** for aesthetic purposes.

**[0060]** According to an embodiment of the present invention, a portion of the drying air flow system for passing air through the laundry chamber is housed inside the worktop **109**.

**[0061]** The laundry appliance **100** comprises a filter seat **111** configured for removably receiving a removable air filter unit **112**. As it will be described in greater detail in the following, the air filter unit **112** is configured in such a way that, when it is inserted in the filter seat **111**, (damp) air coming from the laundry chamber is expediently filtered from fluff.

**[0062]** According to an embodiment of the present invention, the filter seat **111** is located at a front portion of the worktop **109**.

**[0063]** Preferably, the laundry appliance **100** further comprises a drawer **115** for containing one or more laundry treatment agents (or, concisely, treatment agents), such as liquid and powder treatment agents including, but not limited to, washing detergents, rinsing detergents, bleaches and softeners. Advantageously, the drawer **115** is configured to slide into a drawer seat **118**, preferably provided on a top part of the front wall **105(1)** of the cabinet **105**, between an extracted position and a retracted position (shown in **Figure 1**). In the embodiments of the invention in which the laundry appliance **100** is a drying machine configured only to dry laundry, the drawer **115** is not provided.

**[0064]** Preferably, the laundry appliance **100** further comprises a user interface **120**, the user interface **120** being preferably provided on a top part of the front wall **105(f)** of the cabinet **105**.

**[0065]** According to an embodiment of the present invention, the laundry appliance **100** is configured to operate in two different operative modes, and particularly in:

- a laundry dryer operative mode, to dry laundry located in the laundry chamber, and

- an ambient air dehumidification operative mode, to dehumidify air in the ambient outside the cabinet **105**.

**[0066]** According to an embodiment of the present invention, the operation of the laundry appliance **100** can be switched between the laundry dryer operative mode and the ambient air dehumidification operative mode based on the position of the air filter unit **112**, particularly with respect to the filter seat **111**.

**[0067]** According to an embodiment of the present invention, when the air filter unit **112** is in a first position wherein it is inserted into the filter seat **111**, the laundry appliance **100** is configured to operate in the laundry dryer operative mode.

**[0068]** According to an embodiment of the present invention, when the air filter unit **112** is in a second position wherein it is removed from the filter seat **111** and detached from the laundry appliance **100**, the laundry appliance **100** is configured to operate in the ambient air dehumidification operative mode.

**[0069]** **Figure 2A** conceptually shows how the drying air flow system of the laundry appliance **100** - identified with reference **204** - is configured according to an embodiment of the present invention when the laundry appliance **100** is in the laundry dryer operative mode, i.e., when the air filter unit **112** is inserted in the filter seat **111**.

**[0070]** **Figure 2B** conceptually shows how the drying air flow system **204** is configured according to an embodiment of the present invention when the laundry appliance **100** is in the ambient air dehumidification operative mode, i.e., when the air filter unit **112** is removed from the filter seat **111** and detached from the laundry appliance **100**.

**[0071]** When the laundry appliance **100** is in the laundry dryer operative mode, laundry to be dried is expected to be located inside the laundry chamber - the laundry chamber being identified in **Figures 2A** and **2B** with reference **206**. When instead the laundry appliance **100** is in the ambient air dehumidification operative mode, the laundry chamber **206** is expected to be empty.

**[0072]** By making reference to **Figure 2A**, when the laundry appliance **100** is in the laundry dryer operative mode, the drying air flow system **204** is configured to circulate drying air in a substantially closed air circuit through the laundry chamber **206** (containing laundry to be dried) and the air filter unit **112**.

**[0073]** The air flow system **204** comprises a main air duct **210**, a delivery air duct **212** and a return air duct **214**.

**[0074]** The delivery air duct **212** is fluidly connected to an input opening **IN(206)** of the laundry chamber **206** for supplying it with drying air. The return air duct **214** is fluidly connected to an output opening **OUT(206)** of the laundry chamber **206** for taking moisture-laden air (damp air) derived from the laundry drying process.

**[0075]** The main air duct **210** is provided between (and connecting) the delivery air duct **212** and the return air duct **214**. The return air duct **214** is fluidly connected to

an air inlet aperture **IN(210)** of the main air duct **210** for introducing in the main air duct **210** damp air coming from the laundry chamber **206**. The delivery air duct **212** is fluidly connected to an air outlet aperture **OUT(210)** of the main air duct **210** for receiving drying air to be provided to the laundry chamber **206**.

**[0076]** According to an embodiment of the present invention, the main air duct **210** is comprised in the worktop **109**.

**[0077]** According to an embodiment of the present invention, the filter seat **111** is housed in the main air duct **210**.

**[0078]** According to an embodiment of the present invention, the filter seat **111** comprises between a filter seat ceiling portion and a filter seat floor portion a seat opening **216** configured to receive the air filter unit **112**. According to an embodiment of the present invention, when the air filter unit **112** is inserted in the filter seat **111**, the filter unit **112** closes the seat opening **216**, preventing a fluid communication between the inner volume of the filter seat **111** and the ambient outside the laundry appliance **100**. According to an embodiment of the present invention, when the air filter unit **112** is removed from the filter seat **111**, the inner volume of the filter seat **111** is in fluid communication with the ambient outside the laundry appliance **100** through the seat opening **216**.

**[0079]** According to an embodiment of the present invention, the filter seat **111** comprises an air input **IN(111)** for receiving air and an air output **OUT(111)** for exhausting air. The air input **IN(111)** and the air output **OUT(111)** are in fluid communication with the inner volume of the filter seat **111**. When the air filter unit **112** is inserted in the filter seat **111**, air received from the air input **IN(111)** is filtered so that fluff is trapped within the air filter unit **112** body. In this way, air exhausted through the air output **OUT(111)** advantageously does not include (or at least includes a reduced amount) of said fluff.

**[0080]** According to an embodiment of the present invention, the air input **IN(111)** is in fluid communication with the air inlet aperture **IN(210)** of the main air duct **210**, in such a way to allow air coming from the laundry chamber **206** reaching the inner volume of the filter seat **111**. According to a preferred embodiment of the invention, the air input **IN(111)** and the air inlet aperture **IN(210)** coincides.

**[0081]** According to an embodiment of the present invention, the air flow system **204** comprises an air demosturizing unit **220** configured to demosturize air. According to an embodiment of the present invention, the demosturizing unit **220** is housed in the main air duct **210**. According to an embodiment of the present invention, the air demosturizing unit **220** is arranged in the main air duct **210** downstream the filter seat **111**. In this way, the demosturizing unit **220** is configured to receive, and demosturize, air exhausted from the air output **OUT(111)**.

**[0082]** According to an embodiment of the present invention, the air flow system **204** comprises an air heating

unit **230** configured to heat up air. According to an embodiment of the present invention, the air heating unit **230** is housed in the main air duct **210**. According to an embodiment of the present invention, the air heating unit **230** is downstream the air demosturizing unit **220**. In this way, the air heating unit **230** is configured to receive, and heat up, air that has been demosturized by the air demosturizing unit **220**.

**[0083]** According to an embodiment of the present invention, the air demosturizing unit **220** comprises an evaporation unit and said air heating unit **230** comprises a condenser unit, of a heat pump system.

**[0084]** Said heat pump system further comprises a compressor, an expansion valve and a piping arrangement connected thereto so as to drive a refrigerant fluid through the evaporation unit and the condenser unit.

**[0085]** According to another embodiment of the present invention, the air demosturizing unit **220** comprises an air/air heat exchanger unit and the air heating unit **230** comprises a heating resistor.

**[0086]** In particular, said air/air heat exchanger unit may comprise a first path wherein a cooling air flow circulates and a second path, which has no fluid communication with the first path, wherein air exhausted from the air output **OUT(111)** circulates. The cooling air flow can consist in a forced flow of air taken from the ambient surrounding the laundry drying appliance **100**.

**[0087]** More in particular, the heating resistor can be an electric resistor.

**[0088]** According to still another embodiment of the present invention, the air demosturizing unit **220** comprises an air/water exchanger unit and the air heating unit **230** comprises a heating resistor.

**[0089]** In particular, said air/water exchanger unit may comprise a water delivery device that provides for a cool surface in thermal contact with air exhausted from the air output **OUT(111)**.

**[0090]** More particularly, water provided to said air/water exchanger unit can be supplied by water mains which the laundry drying appliance **100** is fluidly connected to.

**[0091]** According to an embodiment of the present invention, the air flow system **204** comprises a motor-driven fan **240** configured to promote air circulation through the air flow system **204** and the laundry chamber **206** (and through the air filter unit **112** when inserted in the filter seat **111**). According to a preferred embodiment of the present invention, the fan **240** is housed in the main air duct **210**, for example between the air heating unit **230** and the air outlet aperture **OUT(210)**. It is understood that the fan **240** may be provided in different positions of the main air duct **210** or generally of the air flow system **204**, provided that it is arranged to promote air circulation through the air flow system **204** and the laundry chamber **206**. In particular, the fan **240** may have its air inlet arranged at the air outlet aperture **OUT(210)** and its air outlet in fluid communication with the input opening **IN(206)** of the laundry chamber **206**.

**[0092]** More in particular, the fan **240** may be a cen-

trifugal fan.

**[0093]** More in particular, the heating resistor can be an electric resistor.

**[0094]** According to a preferred embodiment of the invention, a further filter element **250** is advantageously provided in the air flow system **204**, such as inside the main air duct **210**, for example between the air output **OUT(111)** of the filter seat **111** and the air demisting unit **220**.

**[0095]** When the laundry appliance **100** is in the laundry dryer operative mode (**Figure 2A**), under fan **240** action, damp air leaving the laundry chamber **206** (*i.e.*, air loaded with damp collected from the laundry inside the laundry chamber **206**) flows through the return air duct **214** and reaches the main air duct **210** through the air inlet aperture **IN(210)**. Such air enters the air filter unit **112** housed in the filter seat **111** through the air input **IN(111)**. Corresponding filtered air is exhausted from the air output **OUT(111)** of the filter seat **111** and passes through the air demisting unit **220**, wherein it is cooled down and demisting. The demisting air is then passed through the air heating unit **230**, wherein it is heated up. The resulting demisting and heated air leaves the main duct **210** through the air outlet aperture **OUT(210)**, and reaches the laundry chamber **206** passing through the delivery air duct **212** and the input opening **IN(206)**.

**[0096]** In this way, a substantially closed air circuit is defined, causing drying air circulate through the laundry chamber **206** and the air filter unit **112** so as laundry inside the laundry chamber is dried.

**[0097]** Advantageously, in order to compensate possible insufficient cooling capacity at the air demisting unit **220** with respect to heating capacity at the air heating unit **230**, which could result in dangerous overheating, a secondary air duct **254** may be provided to cause cooler ambient air be mixed with the drying air. For example, said secondary air duct **254** may be in fluid communication with the main air duct **210**, for example between the fan **240** and the air outlet aperture **OUT(210)**. In order to compensate for the additional air provided through the secondary air duct **254**, the laundry chamber **206** may be provided with a secondary output opening **OUT(S)** configured to allow an amount of damp air within the laundry chamber **206** to be vented outside.

**[0098]** According to an embodiment of the present invention, the laundry appliance **100** further comprises a movable wall system **260** arranged within the filter seat **111** and operable, by moving the air filter unit **112** from a position wherein it is inserted into the filter seat **111** to a position wherein it is removed from the filter seat **111** and detached from the laundry appliance **100**, and *vice versa*, to configure the drying air flow system **204**.

**[0099]** According to an embodiment of the present invention, the movable wall system **260** is adapted to configure the drying air flow system **204** to circulate drying air in a substantially closed air circuit through the laundry chamber **206** and the air filter unit **112** when the air filter

unit **112** is inserted into the filter seat **111** (as illustrated in **Figure 2A**).

**[0100]** According to an embodiment of the present invention, the movable wall system **260** is adapted to configure the drying air flow system **204** to put the laundry chamber **206** in fluid communication with the ambient outside the cabinet **105** by means of an air introduction opening **IN(260)** and an air exhausting opening **OUT(260)** provided by the movable wall system **260** when the air filter unit **112** is removed from the filter seat **111** and detached from the laundry appliance **100** (see **Figure 2B**).

**[0101]** By making reference to **Figure 2B**, according to an embodiment of the present invention, the movable wall system **260** is configured to split the inner volume of the filter seat **111** in two volume portions when the air filter unit **112** is removed from the filter seat **111** and detached from the laundry appliance **100**, and particularly in:

- a first volume portion **270** comprising said air introduction opening **IN(260)** and guiding air from the ambient outside the cabinet **105** to the laundry chamber **206**, and
- a second volume portion **280** comprising said air exhausting opening **OUT(260)** and guiding air from the laundry chamber **206** to the ambient outside the cabinet **105** substantially without mixing with air flowing in the first volume portion **270**.

**[0102]** According to an embodiment of the present invention, when the air filter unit **112** is removed from the filter seat **111** and detached from the laundry appliance **100**, the air introduction opening **IN(260)** and the air exhausting opening **OUT(260)** are in fluid communication with the ambient outside the cabinet **105** through the seat opening **216**.

**[0103]** When the laundry appliance **100** is in the ambient air dehumidification operative mode (**Figure 2B**), under fan **240** action, ambient air is sucked inside the first volume portion **270** of the filter seat **111** through the air introduction opening **IN(260)**. This air is exhausted from the air output **OUT(111)** of the filter seat **111** and enters the main air duct **210**, passing through the air demisting unit **220**, wherein it is cooled down and demisting, and through the heating unit **230**, wherein it is heated up. The resulting demisting and heated air leaves the main duct **210** through the air outlet aperture **OUT(210)**, and reaches the laundry chamber **206** passing through the delivery air duct **212** and the input opening **IN(206)**. Advantageously, the provision of a further filter element **250** in the air flow system **204**, in addition to the air filter unit **112**, allows air exhausted from the air output **OUT(111)** to be filtered before reaching the air demisting unit **220** and the heating unit **230**.

**[0104]** When the laundry appliance **100** operates in the ambient air dehumidification operative mode no laundry is expected to be provided in the laundry chamber **206**,

therefore, air leaving the laundry chamber **206** from the output opening **OUT(206)** is dry air. Said dry air flows through the return air duct **214**, and reaches - through the air inlet aperture **IN(210)** - the second volume portion **280** of the filter seat **111**, and then is exhausted in the ambient outside the cabinet **105** through the air exhausting opening **OUT(260)**.

**[0105]** In this way, the ambient where the laundry appliance **100** is located is efficiently dehumidified.

**[0106]** According to an embodiment of the present invention, the movable wall system **260** comprises wall members pivotally coupled to the filter seat **111**. According to an embodiment of the present invention, said wall members are pivotally coupled to the ceiling portion of the filter seat **111**.

**[0107]** In another embodiment, however, said wall members may be pivotally coupled to a floor portion **405** (See **Figure 4A**) of the filter seat **111**.

**[0108]** By making reference to **Figure 3**, in which the ceiling portion of the filter seat **111** is identified with reference **305**, according to an embodiment of the present invention, the movable wall system **260** comprises a first wall member **310(1)** and a second wall member **310(2)** pivotally coupled to the ceiling portion **305** of the filter seat **111**.

**[0109]** According to the embodiment of the invention illustrated in **Figure 3**, the first wall member **310(1)** is pivotally coupled to the ceiling portion **305** by means of two hinge elements **320**, and the second wall member **310(2)** is pivotally coupled to the ceiling portion **305** by means of further two hinge elements **325**. It is understood that similar considerations apply in case the first wall member **310(1)** and/or the second wall member **310(2)** is/are pivotally coupled to the ceiling portion **305** with a different number of hinge elements or with a different kind of coupling elements. Moreover, the concepts of the present invention can be applied to cases in which the first wall member **310(1)** and/or the second wall member **310(2)** is/are coupled to a different portion of the filter seat **111**, such as the floor portion or the side portions of the filter seat **111**.

**[0110]** By making reference to **Figures 4A** and **4B**, illustrating the filter seat **111** with the ceiling portion **305** removed, according to an embodiment of the present invention, the first wall member **310(1)** and the second wall member **310(2)** are configured to be rotated between:

- a folded position (see **Figure 4A**), in which the first wall member **310(1)** and the second wall member **310(2)** are substantially kept toward the ceiling portion **305** of the filter seat **111** by the air filter unit **112** when the air filter unit **112** is in the first position (*i.e.*, when it is inserted into the filter seat **111**), and
- an unfolded position (see **Figure 4B**), in which the first wall member **310(1)** and the second wall member **310(2)** hang from the ceiling portion **305** of the filter seat **111** (as in **Figure 3**), and extend towards the floor portion (identified with reference **405**) of the

filter seat **111** when the air filter unit **112** is in the second position (*i.e.*, when it is removed from the filter seat **111** and detached from the laundry appliance **100**).

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**[0111]** It is underlined that although **Figure 4A** corresponds to the case in which the air filter unit **112** is located inside the filter seat **111** (*i.e.*, when the air filter unit **112** is in the first position), the air filter unit **112** has not been depicted in said figure for the sake of clarity.

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**[0112]** According to an embodiment of the present invention, the air introduction opening **IN(260)** and the air exhausting opening **OUT(260)** are located on the second wall member **310(2)**.

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**[0113]** According to an embodiment of the present invention, when the first wall member **310(1)** and the second wall member **310(2)** are in the unfolded position, the second wall member **310(2)** is arranged to obstruct the seat opening **216**. The obstruction of the seat opening **216** by the second wall member **310(2)** when the latter is in the unfolded position is only partial, because air is advantageously allowed to pass through the air introduction opening **IN(260)** and the air exhausting opening **OUT(260)**.

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**[0114]** As illustrated in **Figure 5**, according to an embodiment of the present invention, the first wall member **310(1)** and the second wall member **310(2)** are configured to be rotated from the unfolded position to the folded position when the air filter unit **112** is being inserted in the filter seat **111** through the seat opening **216**.

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**[0115]** By making reference back to **Figures 3, 4A** and **4B**, according to an embodiment of the present invention, a profiled member **510** is provided on the face of the second wall member **310(2)** facing inside the filter seat **111** when the second wall member **310(2)** is in the unfolded position (said face being identified in the figures with reference **520**). According to an embodiment of the present invention, the profiled member **510** is configured as a cam of a cam system comprising a follower provided as a profiled edge (identified in the figures with reference **530**) of the first wall member **310(1)**. In this way, according to an embodiment of the present invention, a rotation of the second wall member **310(2)** toward the ceiling portion **305** (*i.e.*, toward the folded position) caused by a push of the air filter unit **112** while being inserted in the filter seat **111** causes a corresponding rotation of the first wall member **310(1)** toward the ceiling portion **305** (*i.e.*, toward the folded position).

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**[0116]** In an embodiment wherein the first wall member **310(1)** and a second wall member **310(2)** are pivotally coupled to a floor portion **405** of the filter seat **111**, a rotation of the second wall member **310(2)** toward the floor portion **405** (*i.e.*, toward the folded position) caused by a push of the air filter unit **112** while being inserted in the filter seat **111** causes a corresponding rotation of the first wall member **310(1)** toward the floor portion **405** (*i.e.*, toward the folded position).

**[0117]** According to an embodiment of the present in-

vention, one or more elastic biasing elements are provided (in the embodiment of the invention illustrated in **Figure 3**, two biasing elements, identified with references **330(1)** and **330(2)**) and configured to cause the second wall member **310(2)** to rotate from the folded position to the unfolded position when the air filter unit **112** is being extracted from the filter seat **111**. For example, the biasing elements **330(1)**, **330(2)** may be springs biased in such a way that the second wall member **310(2)** is rotated from the folded position to the unfolded position when the air filter unit **112** is being extracted from the filter seat **111**. Such configuration of one or more elastic biasing elements may be provided also in an embodiment where-  
 in the first wall member **310(1)** and a second wall member **310(2)** are pivotally coupled to a floor portion **405** of the filter seat **111**

**[0118]** Thanks to the proposed solution, the switching between the laundry dryer operative mode and the ambient air dehumidification operative mode of the laundry appliance **100** can be easily performed in a very efficient way. Indeed, the movable wall system **260** according to the embodiments of the present invention is advantageously adapted to accordingly configure the drying air flow system **204** of the laundry appliance **100** by simply switching the wall members **310(1)** and **310(2)** between the folded and unfolded positions, with said switching that is carried out by simply inserting or removing the air filter unit **112** from the filter seat **111**.

**[0119]** Particularly, according to an embodiment of the present invention:

- if an user of the laundry machine **100** provides the air filter unit **112** in the first position (*i.e.*, inside the filter seat **111**), the drying air flow system **204** is configured to circulate drying air, in a substantially closed air circuit, through the laundry chamber **206**, and
- if the user provides the air filter unit **112** in the second position (*i.e.*, removed from the filter seat **111** and detached from the laundry appliance **100**), the laundry chamber **206** is put in fluid communication with the ambient outside the cabinet **105** by means of the air introduction opening **IN(260)** and the air exhausting opening **OUT(260)** provided by the movable wall system **260**.

**[0120]** **Figure 6A** is an enlarged plan view of the second wall member **310(2)** according to an embodiment of the present invention. **Figure 6B** is a sectional view of a portion of the second wall member **310(2)** taken along the section line **B-B** of **Figure 6A**, and **Figure 6C** is a sectional view of the second wall member **310(2)** taken along the section line **C-C** of **Figure 6A**.

**[0121]** According to an embodiment of the present invention, the profiled member **510** of the second wall member **310(2)** has a chamfered shape protruding from the face **520**. The profiled member **510** is advantageously shaped to have a profile such to promote the mutual slid-

ing between the profiled member **510** of the second wall member **310(2)** and the profiled edge **530** of the first wall member **310(1)** when the second wall member **310(2)** moves. The movement of the second wall member **310(2)** being caused by the air filter unit **112** when being inserted in the filter seat **111** for passing from the unfolded to the folded position, or by the biasing elements **330(1)** and **330(2)** when the air filter unit **112** is removed from the filter seat **111** for passing from the folded to the unfolded position.

**[0122]** In the exemplary embodiment of the invention illustrated in the figures, the profiled member **510** has a shape substantially corresponding to an oblique triangular prism. However, similar considerations apply in case the profiled member **510** has a different shape, provided that it is suitable to promote the mutual sliding between the profiled member **510** of the second wall member **310(2)** and the profiled edge **530** of the first wall member **310(1)** when the second wall member **310(2)** moves avoiding, or at least reducing, jamming occurrences.

**[0123]** According to an embodiment of the present invention, the first wall member **310(1)**, and particularly its size and position, is set in such a way that the first wall member **310(1)** forms an angle  $\alpha$  (visible in **Figure 3**) comprised between  $90^\circ$  and  $115^\circ$  with respect to the ceiling portion **305** when the first wall member **310(1)** is in the unfolded position and preferably touches the floor portion **405** of the filter seat **111**.

**[0124]** In order to avoid that the first wall member **310(1)** and the second wall member **310(2)** get jammed in the unfolded position, without being capable of switching to the folded position, the angle  $\alpha$  may be advantageously set higher than  $90^\circ$ , so that the first wall member **310(1)** is not perpendicular to the floor portion **405** of the filter seat **111** when in the unfolded position. For example, according to an embodiment of the present invention this is advantageously obtained by setting the height **H** of the first wall member **310(1)**, *i.e.*, the length thereof perpendicular to its rotation axis, greater than the distance between the ceiling portion **305** and the floor portion **405** of the filter seat **111**.

**[0125]** In the embodiments of the invention described above, a portion of the drying air flow system **204**, and particularly the main air duct **210** and the filter seat **111**, are housed in the volume enclosed by the box-like shaped worktop **109** (see **Figures 1, 2A, 2B**).

**[0126]** In order to show in greater detail the box-like shaped worktop **109** according to an embodiment of the present invention, reference will be now made to **Figure 7A**, which is a perspective view of an exemplary worktop **109** embodiment removed from the laundry appliance **100** and without the covering panel **110**. According to an embodiment of the present invention, the worktop **109** defines a box-like structure formed by an upper wall **705**, a lower wall **740** (visible in **Figure 7B**), and a plurality of lateral walls **708** arranged substantially perpendicularly to the upper wall **705** and to the lower wall **740** so as to form a worktop inner volume.

**[0127]** Figures 7B and 7C are perspective views of the worktop 109 - from behind and from front, respectively - without the upper wall 705 according to an embodiment of the present invention.

**[0128]** According to an embodiment of the present invention, the worktop 109 is shaped and sized so as to define the main air duct 210 and a number of housing sections adapted to house corresponding components of the air flow system 204 included in the main air duct 210.

**[0129]** According to an embodiment of the present invention, the worktop 109 comprises a demoisturizing housing section 720 for housing the air demoisturizing unit 220 and a heating housing section 730 for housing the air heating unit 230 (see also Figures 2A and 2B).

**[0130]** According to an embodiment of the present invention, the ceiling portion 305 of the filter seat 111 is defined by a portion of the upper wall 705 of the worktop 109. According to an embodiment of the present invention, the floor portion 405 of the filter seat 111 is defined by a portion of the lower wall 740 of the worktop 109.

**[0131]** According to an embodiment of the present invention, the upper wall 705 of the worktop 109 is advantageously provided with a removable portion, identified in Figure 7A with reference 750, located at, e.g., above, the movable wall system 260 for allowing an easy access to the movable wall system 260. According to an embodiment of the present invention, the movable wall system 260 is at least partially coupled to said removable portion 750 of the upper wall 705, in such a way to allow an extraction of the movable wall system 260 from the worktop 109. For example, the extraction of the movable wall system 260 from the worktop 109 may be carried out after having removed the covering panel 110 from the worktop 109, or after having removed a corresponding removable portion (not illustrated) of the covering panel 110 aligned with the removable portion 750 of the upper wall 705.

**[0132]** It is understood that the concepts of the present invention can be directly applied in those cases in which (e.g., portions of) the main air duct 210 and/or the filter seat 111 are not housed inside the volume enclosed by the worktop 109, but rather they are located outside the worktop 109, such as for example in different positions within the cabinet 105 of the laundry appliance 100.

## Claims

1. A laundry drying appliance (100) comprising:

- a cabinet (105);
- a laundry chamber (206) rotatably enclosed within the cabinet for containing laundry to be dried;
- a drying air flow system (204) for passing said air through the laundry chamber, said drying air flow system comprising an air demoisturizing

unit (220) configured to demoisturize said air;  
- a filter seat (111) arranged within the drying flow system for removably receiving an air filter (112);

- said air filter being movable from a first position wherein it is inserted into said filter seat to filter drying air leaving the laundry chamber, to a second position wherein it is removed from said filter seat and detached from the appliance and vice-versa;

- said laundry drying appliance being configured to operate in a laundry dryer mode when the air filter is in the first position, and in an ambient air dehumidification mode to dehumidify air in the ambient outside the cabinet when the air filter is said second position;

## characterised in that:

the laundry drying appliance further comprises a movable wall system (260) arranged within said filter seat (111) and operable, by moving said air filter (112) from one to the other of said first and second positions, to configure the drying air flow system (204) such that:

- when the air filter (112) is said first position, the drying air flow system is configured to circulate drying air in a substantially closed air circuit, through the laundry chamber and the air filter, and

- when the filter (112) is said second position, the laundry chamber is put in fluid communication with the ambient outside the cabinet by means of an air introduction opening (IN(260)) and an air exhausting opening (OUT(260)) provided by the movable wall system in the filter seat,

wherein said movable wall system (260) is configured so that, when the air filter (112) is in said second position, the operation of the movable wall system causes the volume of the filter seat (111) to be split in:

- a first volume portion (270) comprising said air introduction opening (IN(260)) and guiding air from the ambient outside the cabinet to the laundry chamber (206), and

- a second volume portion (280) comprising said air exhausting opening (OUT(260)) and guiding air from the laundry chamber to the ambient outside the cabinet substantially without mixing with air flowing in the first volume portion.

2. The laundry drying appliance (100) of claim 1, wherein the movable wall system (260) comprises first and

second wall members (**310(1)**, **310(2)**) pivotally coupled to the filter seat (**111**) and configured to be rotated between:

- a folded position, in which said first and second wall members are substantially kept toward a ceiling portion (**305**) of the filter seat by the air filter when the air filter is in the first position, and
- an unfolded position, in which said first and second wall members hang from the ceiling portion and extend towards a floor portion (**405**) of the filter seat, when the air filter is in the second position.

3. The laundry drying appliance (**100**) of claim 2, wherein:

- the filter seat (**111**) comprises a seat opening (**216**) provided between said ceiling portion and said floor portion to receive the air filter therein;
- the second wall member (**310(2)**) of the movable wall system (**260**) comprises said air introduction opening (**IN(260)**) and air exhausting opening (**OUT(260)**) formed thereon to partly obstructing the seat opening when the air filter (**112**) is in the second position.

4. The laundry drying appliance (**100**) of claim 3, wherein said first wall member (**310(1)**) and said second wall member (**310(2)**) are configured to be rotated from the unfolded position to the folded position when said air filter (**112**) is being inserted in the filter seat (**111**) through said seat opening (**216**) to reach said first position.

5. The laundry drying appliance (**100**) of any of claims 2 to 4, wherein said second wall member (**310(2)**) comprises a profiled member (**510**) on a first face of the second wall member facing inside the filter seat (**111**) when the second wall member is in the unfolded position, said profiled member being configured as a cam of a cam system comprising a follower provided as a profiled edge (**530**) of the first wall member (**310(1)**), so that the rotation of the second wall member toward the folded position causes a corresponding rotation of the first wall member toward the folded position.

6. The laundry drying appliance (**100**) of claim 5, wherein said second wall member (**310(2)**) comprises at least one elastic element (**330(1)**, **330(2)**) biased in such a way that the second wall member is rotated from the folded position to the unfolded position when the filter element (**112**) is being extracted from the filter seat (**111**).

7. The laundry drying appliance (**100**) of any of the preceding claims, wherein said drying air flow system

(**204**) comprises an air heating unit (**230**) configured to heat up air demoisturized by the demoisturizing unit (**220**).

8. The laundry drying appliance (**100**) of claim 7, wherein:

- said air demoisturizing unit (**220**) comprises an evaporation unit and said air heating unit (**230**) comprises a condenser unit, of a heat pump system, or
- said air demoisturizing unit (**220**) comprises an air/air heat exchanger unit and said air heating unit (**230**) comprises a heating resistor, or
- said air demoisturizing unit (**220**) comprises an air/water exchanger unit and said air heating unit (**230**) comprises a heating resistor.

9. The laundry drying appliance (**100**) of any of the preceding claims wherein said cabinet (**105**) comprises sidewalls (**105(s)**) and a box-like structure (**109**) acting as worktop arranged on the sidewalls so as to close the inner volume of the cabinet from above, said box-like structure comprising an air duct (**210**) forming part of said drying air flow system (**204**), said filter seat (**111**) being arranged within the air duct for removably receiving the air filter (**112**) therein.

10. The laundry drying appliance (**100**) of claim 9 when depending on claim 2, wherein said box-like structure (**109**) comprises:

- an upper wall (**705**) defining said ceiling portion (**305**) of the filter seat (**111**);
- a lower wall defining said floor portion (**405**) of the filter seat.

11. A worktop (**109**) configured to form the top wall of a laundry drying appliance cabinet (**105**) by being arranged on sidewalls (**105(s)**) thereof so as to close the inner volume of the cabinet from above, said worktop comprising:

- a box-like structure formed by an upper wall (**705**), a lower wall and a plurality of lateral walls (**708**) arranged substantially perpendicularly to the upper and lower walls so as to form a worktop inner volume;
- an air duct (**210**) arranged within said worktop inner volume and provided with an air demoisturizing unit (**220**) configured to demoisturize air circulating within said air duct;
- an air inlet aperture (**IN(210)**) for introducing air into said air duct, and an air outlet aperture (**OUT(210)**) for exhausting air from said air duct;
- an air filter seat (**111**) arranged in fluid communication with the air duct and adapted to receive an air filter (**112**) therein;

- said air filter (112) being movable from a first position wherein it is inserted into said filter seat to a second position wherein the air filter is removed from said filter seat and detached from the appliance, and viceversa

**characterized by**

a movable wall system (260) arranged within said filter seat, said movable wall system being operable by moving the air filter from one to the other of said first and second positions to configure the air duct such that:

a) when said air filter is in said first position:

- said air inlet aperture (IN(210)) is put in fluid communication with said outlet aperture (OUT(210)) by means of said air filter;  
- air entering the air duct through said air inlet aperture (IN(210)) is driven towards the air outlet aperture (OUT(210)) by means of said air duct, passing through said air filter;

b) when said air filter is in said second position:

- said air inlet aperture (IN(210)) and said air outlet aperture (OUT(210)) are put in fluid communication with the ambient outside the worktop inner volume by means of an air introduction opening (IN(260)) and an air exhausting opening (OUT(260)) provided by the movable wall system (260) in the filter seat;  
- air entering the air duct through said air inlet aperture (IN(210)) is exhausted to the ambient outside the worktop inner volume through said air exhausting opening (OUT(260));  
- said air outlet aperture (OUT(210)) is supplied with air coming from the ambient outside the worktop inner volume through said air introduction opening (IN(260)) substantially without mixing with air entering the air duct through said air inlet aperture and being exhausted to the ambient outside the worktop inner volume through said air exhausting opening (OUT(260)).

12. The worktop (109) of claim 11, wherein said air duct (210) is further provided with an air heating unit (230) configured to heat up air demoisturized by the demoisturizing unit (220).

13. The worktop (109) of claims 11 or 12, wherein said upper wall (705) comprises a removable portion (750) located at the movable wall system (260) for accessing said movable wall system.

14. The worktop (109) of claim 13, wherein said movable wall system (260) is at least partially coupled to said removable portion (750) of the upper wall (705).

5 15. Method to operate a laundry drying appliance (100) according to any of claims 1 to 10 in a laundry dryer mode so as to dry laundry contained in the laundry chamber (206), or in an ambient air dehumidification mode to dehumidify air in the ambient outside the cabinet (105) of the appliance, said method comprising:

- providing the air filter (112) in the first position thereby configuring the drying air flow system (204) to circulate drying air, in a substantially closed air circuit, through the laundry chamber, or  
- providing the air filter (112) in the second position thereby putting the laundry chamber in fluid communication with the ambient outside the cabinet by means of the air introduction opening (IN(260)) and the air exhausting opening (OUT(260)) provided by the movable wall system (260) in the filter seat (111).

**Patentansprüche**

1. Waschguttrocknungsgerät (100), umfassend:

- ein Gehäuse (105),  
- eine Waschgutkammer (206), die drehbar in dem Gehäuse eingeschlossen ist, zur Aufnahme von zu trocknendem Waschgut,  
- ein Trocknungsluftströmungssystem (204) zum Leiten der Luft durch die Waschgutkammer, wobei das Trocknungsluftströmungssystem eine Luftentfeuchtungseinheit (220) umfasst, die zur Entfeuchtung der Luft ausgelegt ist,  
- einen Filtersitz (111), der in dem Trocknungsluftströmungssystem angeordnet ist, um einen Luftfilter (112) entfernbar aufzunehmen,  
- wobei der Luftfilter aus einer ersten Position, in der er in den Filtersitz eingesetzt ist, um die Waschgutkammer verlassende Trocknungsluft zu filtern, in eine zweite Position, in der er von dem Filtersitz entfernt und von dem Gerät gelöst ist, und umgekehrt bewegbar ist,  
- wobei das Waschguttrocknungsgerät dazu ausgestaltet ist, in einem Waschguttrocknermodus zu arbeiten, wenn sich der Luftfilter in der ersten Position befindet, und in einem Umgebungsluftentfeuchtungsmodus, um Luft in der Umgebung außerhalb des Gehäuses zu entfeuchten, wenn sich der Luftfilter in der zweiten Position befindet,



heit (230) umfasst, die dazu ausgelegt ist, durch die Entfeuchtungseinheit (220) entfeuchtete Luft zu erhitzen.

8. Waschguttrocknungsgerät (100) nach Anspruch 7, wobei:

- die Luftentfeuchtungseinheit (220) eine Verdampfungseinheit und die Luftheizeinheit (230) eine Kondensatoreinheit eines Wärmepumpensystems umfasst, oder
- die Luftentfeuchtungseinheit (220) eine Luft/Luft-Wärmetauschereinheit und die Luftheizeinheit (230) einen Heizwiderstand umfasst, oder
- die Luftentfeuchtungseinheit (220) eine Luft/Wasser-Tauschereinheit und die Luftheizeinheit (230) einen Heizwiderstand umfasst.

9. Waschguttrocknungsgerät (100) nach einem der vorhergehenden Ansprüche, wobei der Gehäuse (105) Seitenwände (105(s)) und eine kastenartige Struktur (109) umfasst, die als eine auf den Seitenwänden angeordnete Arbeitsplatte wirkt, um das Innenvolumen des Gehäuses von oben zu verschließen, wobei die kastenartige Struktur einen Luftkanal (210) umfasst, der einen Teil des Trocknungsluftströmungssystems (204) bildet, wobei der Filtersitz (111) in dem Luftkanal zum entfernbaren Aufnehmen des Luftfilters (112) darin angeordnet ist.

10. Waschguttrocknungsgerät (100) nach Anspruch 9, wenn abhängig von Anspruch 2, wobei die kastenartige Struktur (109) Folgendes umfasst:

- eine obere Wand (705), die den Deckenabschnitt (305) des Filtersitzes (111) definiert,
- eine untere Wand, die den Bodenabschnitt (405) des Filtersitzes definiert.

11. Arbeitsplatte (109), die dazu ausgestaltet ist, die obere Wand eines Waschguttrocknungsgeräthäuses (105) zu bilden, indem sie auf den Seitenwänden (105(s)) davon angeordnet ist, um das Innenvolumen des Gehäuses von oben zu schließen, wobei die Arbeitsplatte Folgendes umfasst:

- eine kastenartige Struktur, die durch eine obere Wand (705), eine untere Wand und eine Vielzahl von Seitenwänden (708) gebildet wird, die im Wesentlichen senkrecht zu der oberen und der unteren Wand angeordnet sind, um ein Arbeitsplatteninnenvolumen zu bilden,
- einen Luftkanal (210), der in dem Arbeitsplatteninnenvolumen angeordnet und mit einer Luftentfeuchtungseinheit (220) versehen ist, die zum Entfeuchten von in dem Luftkanal zirkulierender Luft ausgestaltet ist,

- eine Lufteintrittsöffnung (IN(210)) zum Einführen von Luft in den Luftkanal und eine Luftaustrittsöffnung (OUT(210)) zum Ablassen von Luft aus dem Luftkanal,

- einen Luftfiltersitz (111), der in Fluidverbindung mit dem Luftkanal angeordnet und zur Aufnahme eines Luftfilters (112) darin ausgeführt ist,
- wobei der Luftfilter (112) aus einer ersten Position, in der er in den Filtersitz eingeführt ist, in eine zweite Position, in der der Luftfilter aus dem Filtersitz entfernt und von dem Gerät gelöst ist, und umgekehrt bewegbar ist,

#### gekennzeichnet durch

ein bewegliches Wandsystem (260), das in dem Filtersitz angeordnet ist, wobei das bewegliche Wandsystem durch Bewegen des Luftfilters von einer in die andere der ersten und der zweiten Position betätigbar ist, um den Luftkanal so auszugestalten, dass:

a) wenn sich der Luftfilter in der ersten Position befindet:

- die Lufteintrittsöffnung (IN(210)) mittels des Luftfilters in Fluidverbindung mit der Austrittsöffnung (OUT(210)) gebracht wird,
- die durch die Lufteintrittsöffnung (IN(210)) in den Luftkanal eintretende Luft mittels des Luftkanals durch den Luftfilter hindurch auf die Luftaustrittsöffnung (OUT(210)) zu getrieben wird,

b) wenn sich der Luftfilter in der zweiten Position befindet:

- die Lufteintrittsöffnung (IN(210)) und die Luftaustrittsöffnung (OUT(210)) mittels einer Lufteinführöffnung (IN(260)) und einer Luftauslassöffnung (OUT(260)), die durch das bewegliche Wandsystem (260) in dem Filtersitz bereitgestellt sind, mit der Umgebung außerhalb des Arbeitsplatteninnenvolumens in Fluidverbindung gebracht werden,
- Luft, die durch die Lufteintrittsöffnung (IN(210)) in den Luftkanal eintritt, durch die Luftauslassöffnung (OUT(260)) zur Umgebung außerhalb des Arbeitsplatteninnenvolumens abgeführt wird,
- die Luftaustrittsöffnung (OUT(210)) mit Luft versorgt wird, die von der Umgebung außerhalb des Arbeitsplatteninnenvolumens durch die Lufteinführöffnung (IN(260)) kommt, und zwar im Wesentlichen ohne Mischen mit Luft, die durch die Lufteinlassöffnung in den Luftkanal eintritt und durch die Luftauslassöffnung

- (OUT(260)) zur Umgebung außerhalb des Arbeitsplatteninnenvolumens abgeführt wird.
12. Arbeitsplatte (109) nach Anspruch 11, wobei der Luftkanal (210) ferner mit einer Luftheizeinheit (230) versehen ist, die dazu ausgestaltet ist, durch die Entfeuchtungseinheit (220) entfeuchtete Luft zu erhitzen. 5
13. Arbeitsplatte (109) nach Anspruch 11 oder 12, wobei die obere Wand (705) einen entfernbaren Abschnitt (750) umfasst, der sich an dem beweglichen Wandsystem (260) zum Zugriff auf das bewegliche Wandsystem befindet. 10
14. Arbeitsplatte (109) nach Anspruch 13, wobei das bewegliche Wandsystem (260) mindestens teilweise an den entfernbaren Abschnitt (750) der oberen Wand (705) gekoppelt ist. 15
15. Verfahren zum Betreiben eines Waschgutrocknungsgeräts (100) nach einem der Ansprüche 1 bis 10 in einem Waschgutrocknermodus, um in der Waschkammer (206) enthaltenes Waschgut zu trocknen, oder in einem Umgebungsluftentfeuchtungsmodus, um Luft in der Umgebung außerhalb des Gehäuses (105) des Geräts zu entfeuchten, wobei das Verfahren Folgendes umfasst: 20
- Bereitstellen des Luftfilters (112) in der ersten Position, wodurch das Trocknungsluftströmungssystem (204) zum Zirkulieren von Trocknungsluft in einem im Wesentlichen geschlossenen Luftkreislauf durch die Waschkammer ausgestaltet wird, oder 25
  - Bereitstellen des Luftfilters (112) in der zweiten Position, wodurch die Waschkammer mittels der Lufteinführöffnung (IN(260)) und der Luftauslassöffnung (OUT(260)), die durch das bewegliche Wandsystem (260) in dem Filtersitz (111) bereitgestellt sind, mit der Umgebung außerhalb des Gehäuses in Fluidverbindung gebracht wird. 30

## Revendications

1. Appareil de séchage de linge (100) comprenant : 35
- un caisson (105) ;
  - un compartiment à linge (206) enfermé de manière rotative dans le caisson pour contenir du linge à sécher ;
  - un système de flux d'air de séchage (204) pour faire passer ledit air à travers le compartiment à linge, ledit système de flux d'air de séchage comprenant une unité de déshumidification de 40

l'air (220) conçue pour déshumidifier ledit air ;  
 - un siège de filtre (111) disposé à l'intérieur du système de flux de séchage pour recevoir de manière amovible un filtre à air (112) ;  
 - ledit filtre à air étant mobile d'une première position dans laquelle il est inséré dans ledit siège de filtre pour filtrer l'air de séchage sortant du compartiment à linge, vers une deuxième position dans laquelle il est retiré dudit siège de filtre et détaché de l'appareil et *vice-versa* ;  
 - ledit appareil de séchage de linge étant conçu pour fonctionner dans un mode de séchage du linge lorsque le filtre à air est dans la première position, et dans un mode de déshumidification de l'air ambiant pour déshumidifier l'air dans l'environnement à l'extérieur du caisson lorsque le filtre à air est dans ladite deuxième position ;

## caractérisé en ce que :

l'appareil de séchage de linge comprend en outre un système de paroi mobile (260) disposé à l'intérieur dudit siège de filtre (111) et pouvant être utilisé, en déplaçant ledit filtre à air (112) de l'une vers l'autre desdites première et deuxième positions, pour configurer le système de flux d'air de séchage (204) de sorte que :

- lorsque le filtre à air (112) est dans ladite première position, le système de flux d'air de séchage est configuré pour faire circuler de l'air de séchage dans un circuit d'air sensiblement fermé, à travers le compartiment à linge et le filtre à air, et 35
- lorsque le filtre (112) est dans ladite deuxième position, le compartiment à linge est mis en communication fluide avec l'environnement à l'extérieur du caisson au moyen d'une ouverture d'introduction d'air (IN(260)) et d'une ouverture d'évacuation d'air (OUT(260)) fournies par le système de paroi mobile dans le siège de filtre, 40

ledit système de paroi mobile (260) étant configuré de sorte que, lorsque le filtre à air (112) est dans ladite deuxième position, le fonctionnement du système de paroi mobile entraîne la division du volume du siège de filtre (111) en : 45

- une première partie de volume (270) comprenant ladite ouverture d'introduction d'air (IN(260)) et guidant l'air depuis l'environnement à l'extérieur du caisson jusqu'au compartiment à linge (206), et 50
- une deuxième partie de volume (280) comprenant ladite ouverture d'évacuation d'air (OUT(260)) et guidant l'air depuis le compartiment à linge jusqu'à l'environnement à 55

- l'extérieur du caisson sensiblement sans mélange avec l'air s'écoulant dans la première partie de volume.
2. Appareil de séchage de linge (100) selon la revendication 1, le système de paroi mobile (260) comprenant des premier et deuxième éléments de paroi (310(1), 310(2)) accouplés de façon pivotante au siège de filtre (111) et conçus pour être tournés entre :
- une position repliée, dans laquelle lesdits premier et deuxième éléments de paroi sont sensiblement maintenus vers une partie plafond (305) du siège de filtre par le filtre à air lorsque le filtre à air est dans la première position, et
  - une position non repliée, dans laquelle lesdits premier et deuxième éléments de paroi pendent de la partie plafond et s'étendent vers une partie plancher (405) du siège de filtre, lorsque le filtre à air est dans la deuxième position.
3. Appareil de séchage de linge (100) selon la revendication 2,
- le siège de filtre (111) comprenant une ouverture de siège (216) disposée entre ladite partie plafond et ladite partie plancher pour recevoir le filtre à air à l'intérieur ;
  - le deuxième élément de paroi (310(2)) du système de paroi mobile (260) comprenant ladite ouverture d'introduction d'air (IN(260)) et ladite ouverture d'évacuation d'air (OUT(260)) formées dessus pour obstruer partiellement l'ouverture de siège lorsque le filtre à air (112) est dans la deuxième position.
4. Appareil de séchage de linge (100) selon la revendication 3, ledit premier élément de paroi (310(1)) et ledit deuxième élément de paroi (310(2)) étant conçus pour être tournés de la position non repliée à la position repliée lorsque ledit filtre à air (112) est inséré dans le siège de filtre (111) à travers ladite ouverture de siège (216) pour atteindre ladite première position.
5. Appareil de séchage de linge (100) selon l'une quelconque des revendications 2 à 4, ledit deuxième élément de paroi (310(2)) comprenant un élément profilé (510) sur une première face du deuxième élément de paroi tournée vers l'intérieur du siège de filtre (111) lorsque le deuxième élément de paroi est dans la position non repliée, ledit élément profilé étant configuré comme une came du système de came comprenant un suiveur prenant la forme d'un bord profilé (530) du premier élément de paroi (310(1)), de sorte que la rotation du deuxième élément de paroi vers la position repliée entraîne une rotation correspondante du premier élément de paroi vers la position repliée.
6. Appareil de séchage de linge (100) selon la revendication 5, ledit deuxième élément de paroi (310(2)) comprenant au moins un élément élastique (330(1), 330(2)) sollicité de telle sorte que le deuxième élément de paroi soit tourné de la position repliée à la position non repliée lorsque l'élément de filtre (112) est extrait du siège de filtre (111) .
7. Appareil de séchage de linge (100) selon l'une quelconque des revendications précédentes, ledit système de flux d'air de séchage (204) comprenant une unité de chauffage de l'air (230) conçue pour chauffer l'air déshumidifié par l'unité de déshumidification (220).
8. Appareil de séchage de linge (100) selon la revendication 7,
- ladite unité de déshumidification de l'air (220) comprenant une unité d'évaporation et ladite unité de chauffage de l'air (230) comprenant une unité de condensation, d'un système de pompe à chaleur, ou
  - ladite unité de déshumidification de l'air (220) comprenant une unité échangeur de chaleur air/air et ladite unité de chauffage de l'air (230) comprenant une résistance chauffante, ou
  - ladite unité de déshumidification de l'air (220) comprenant une unité échangeur air/eau et ladite unité de chauffage de l'air (230) comprenant une résistance chauffante.
9. Appareil de séchage de linge (100) selon l'une quelconque des revendications précédentes, ledit caisson (105) comprenant des parois latérales (105(s)) et une structure en forme de boîte (109) faisant office de plan de travail, disposée sur les parois latérales de sorte à fermer le volume intérieur du caisson par le haut, ladite structure en forme de boîte comprenant un conduit d'air (210) faisant partie dudit système de flux d'air de séchage (204), ledit siège de filtre (111) étant disposé à l'intérieur du conduit d'air pour y recevoir de manière amovible le filtre à air (112).
10. Appareil de séchage de linge (100) selon la revendication 9 lorsqu'elle dépend de la revendication 2, ladite structure en forme de boîte (109) comprenant :
- une paroi supérieure (705) définissant ladite partie plafond (305) du siège de filtre (111) ;
  - une paroi inférieure définissant ladite partie plancher (405) du siège de filtre.
11. Plan de travail (109) conçu pour former la paroi supérieure d'un caisson (105) d'appareil de séchage

de linge en étant disposé sur les parois latérales (105(s)) de celui-ci de sorte à fermer le volume intérieur du caisson par le haut, ledit plan de travail comprenant :

- une structure en forme de boîte formée par une paroi supérieure (705), une paroi inférieure et une pluralité de parois latérales (708) disposées sensiblement perpendiculairement aux parois supérieure et inférieure de sorte à former un volume intérieur de plan de travail ;
- un conduit d'air (210) disposé à l'intérieur dudit volume intérieur de plan de travail et pourvu d'une unité de déshumidification de l'air (220) conçue pour déshumidifier l'air circulant à l'intérieur dudit conduit d'air ;
- une ouverture d'entrée d'air (IN(210)) pour introduire de l'air dans ledit conduit d'air, et une ouverture de sortie d'air (OUT(210)) pour évacuer l'air dudit conduit d'air ;
- un siège de filtre (111) à air disposé en communication fluïdique avec le conduit d'air et prévu pour recevoir un filtre à air (112) à l'intérieur ;
- ledit filtre à air (112) étant mobile d'une première position dans laquelle il est inséré dans ledit siège de filtre vers une deuxième position dans laquelle le filtre à air est retiré dudit siège de filtre et détaché de l'appareil, et *vice-versa*

#### caractérisé par

un système de paroi mobile (260) disposé à l'intérieur dudit siège de filtre, ledit système de paroi mobile pouvant être utilisé, en déplaçant le filtre à air de l'une vers l'autre desdites première et deuxième positions, pour configurer le conduit d'air de sorte que :

a) lorsque ledit filtre à air est dans ladite première position :

- ladite ouverture d'entrée d'air (IN(210)) est mise en communication fluïdique avec ladite ouverture de sortie (OUT(210)) au moyen dudit filtre à air ;
- l'air entrant dans le conduit d'air à travers ladite ouverture d'entrée d'air (IN(210)) est entraîné vers l'ouverture de sortie d'air (OUT(210)) au moyen dudit conduit d'air, passant à travers ledit filtre à air ;

b) lorsque ledit filtre à air est dans ladite deuxième position :

- ladite ouverture d'entrée d'air (IN(210)) et ladite ouverture de sortie d'air (OUT(210)) sont mises en communication fluïdique avec l'environnement à l'extérieur du volume intérieur de plan de travail au moyen

d'une ouverture d'introduction d'air (IN(260)) et d'une ouverture d'évacuation d'air (OUT(260)) fournies par le système de paroi mobile (260) dans le siège de filtre ;

- l'air entrant dans le conduit d'air à travers ladite ouverture d'entrée d'air (IN(210)) est évacué vers l'environnement à l'extérieur du volume intérieur de plan de travail par ladite ouverture d'évacuation d'air (OUT(260)) ;
- ladite ouverture de sortie d'air (OUT(210)) est alimentée en air provenant de l'environnement à l'extérieur du volume intérieur de plan de travail par ladite ouverture d'introduction d'air (IN(260)) sensiblement sans mélange avec l'air entrant dans le conduit d'air par ladite ouverture d'entrée d'air et qui est évacué vers l'environnement à l'extérieur du volume intérieur de plan de travail par ladite ouverture d'évacuation d'air (OUT(260)).

12. Plan de travail (109) selon la revendication 11, ledit conduit d'air (210) étant en outre pourvu d'une unité de chauffage de l'air (230) conçue pour chauffer l'air déshumidifié par l'unité de déshumidification (220) .

13. Plan de travail (109) selon la revendication 11 ou 12, ladite paroi supérieure (705) comprenant une partie amovible (750) située au niveau du système de paroi mobile (260) pour accéder audit système de paroi mobile.

14. Plan de travail (109) selon la revendication 13, ledit système de paroi mobile (260) étant au moins partiellement accouplé à ladite partie amovible (750) de la paroi supérieure (705).

15. Procédé pour faire fonctionner un appareil de séchage de linge (100) selon l'une quelconque des revendications 1 à 10 dans un mode de séchage du linge de sorte à sécher du linge contenu dans le compartiment à linge (206), ou dans un mode de déshumidification de l'air ambiant pour déshumidifier l'air dans l'environnement à l'extérieur du caisson (105) de l'appareil, ledit procédé comprenant :

- le placement du filtre à air (112) dans la première position, configurant ainsi le système de flux d'air de séchage (204) pour faire circuler l'air de séchage, dans un circuit d'air sensiblement fermé, à travers la chambre de lavage, ou
- le placement du filtre à air (112) dans la deuxième position, mettant ainsi le compartiment à linge en communication fluïdique avec l'environnement à l'extérieur du caisson au moyen de l'ouverture d'introduction d'air (IN(260)) et de l'ouverture d'évacuation d'air (OUT(260)) pré-

vues par le système de paroi mobile (260) dans  
le siège de filtre (111) .

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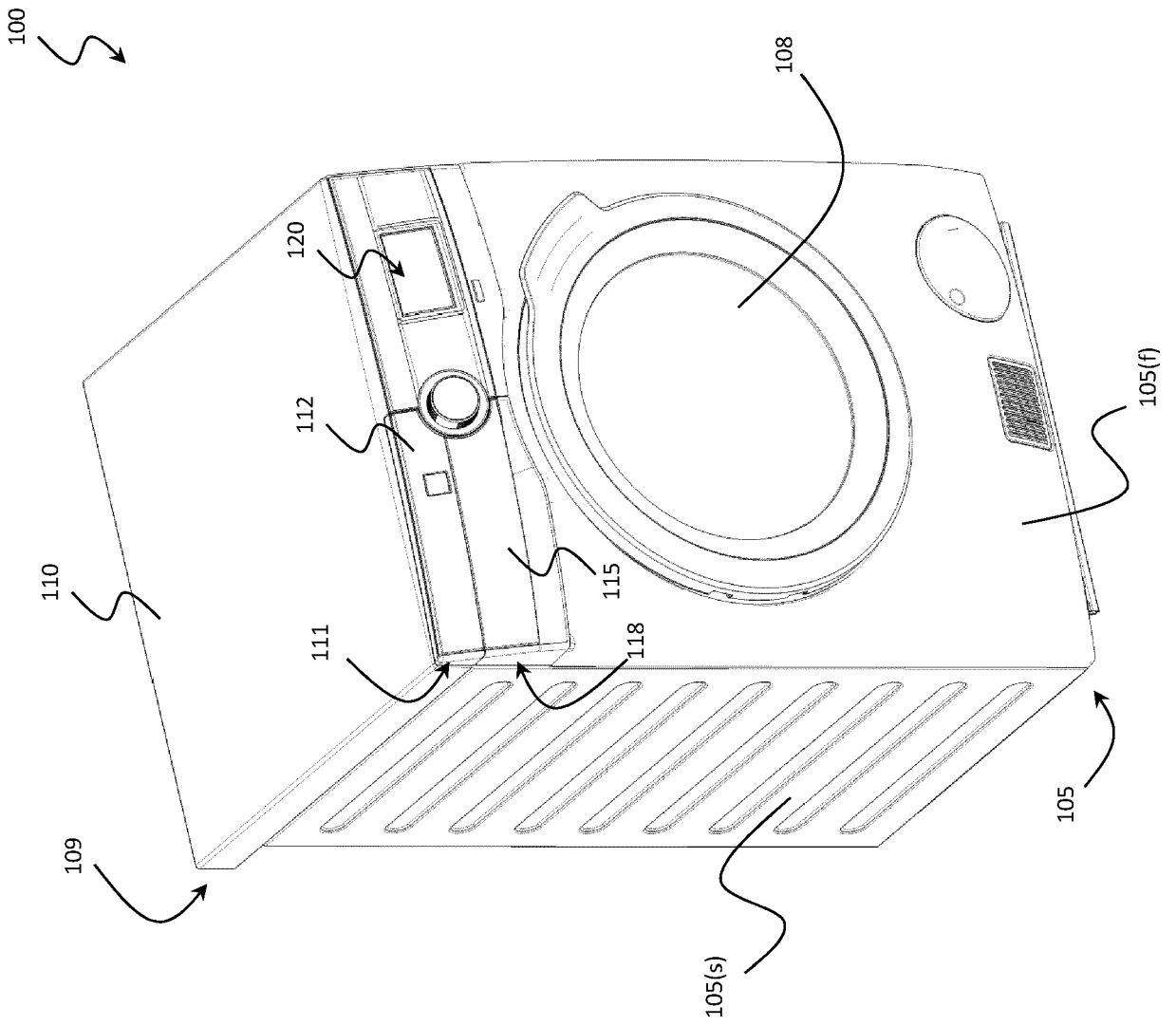


FIG. 1

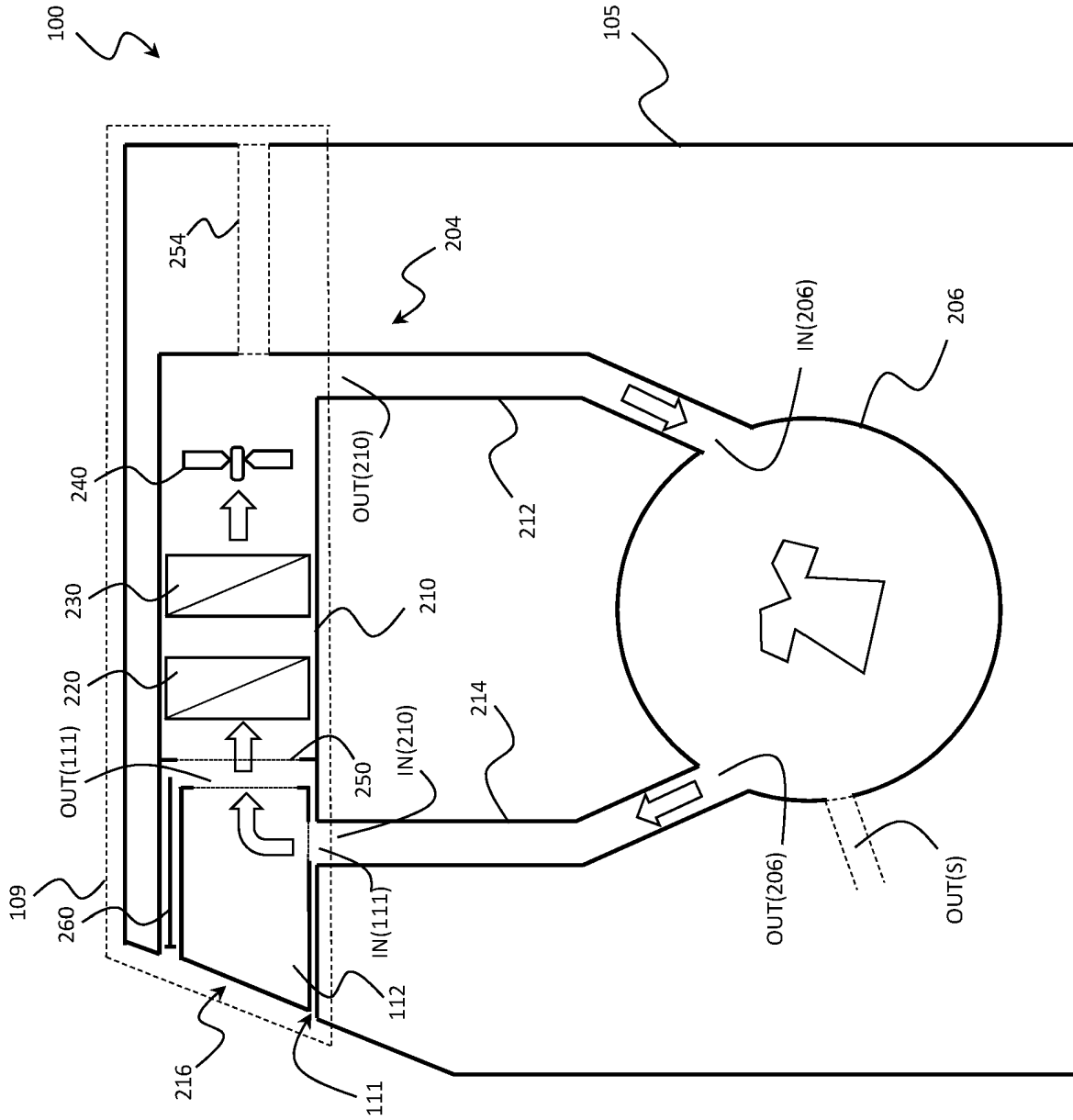


FIG. 2A

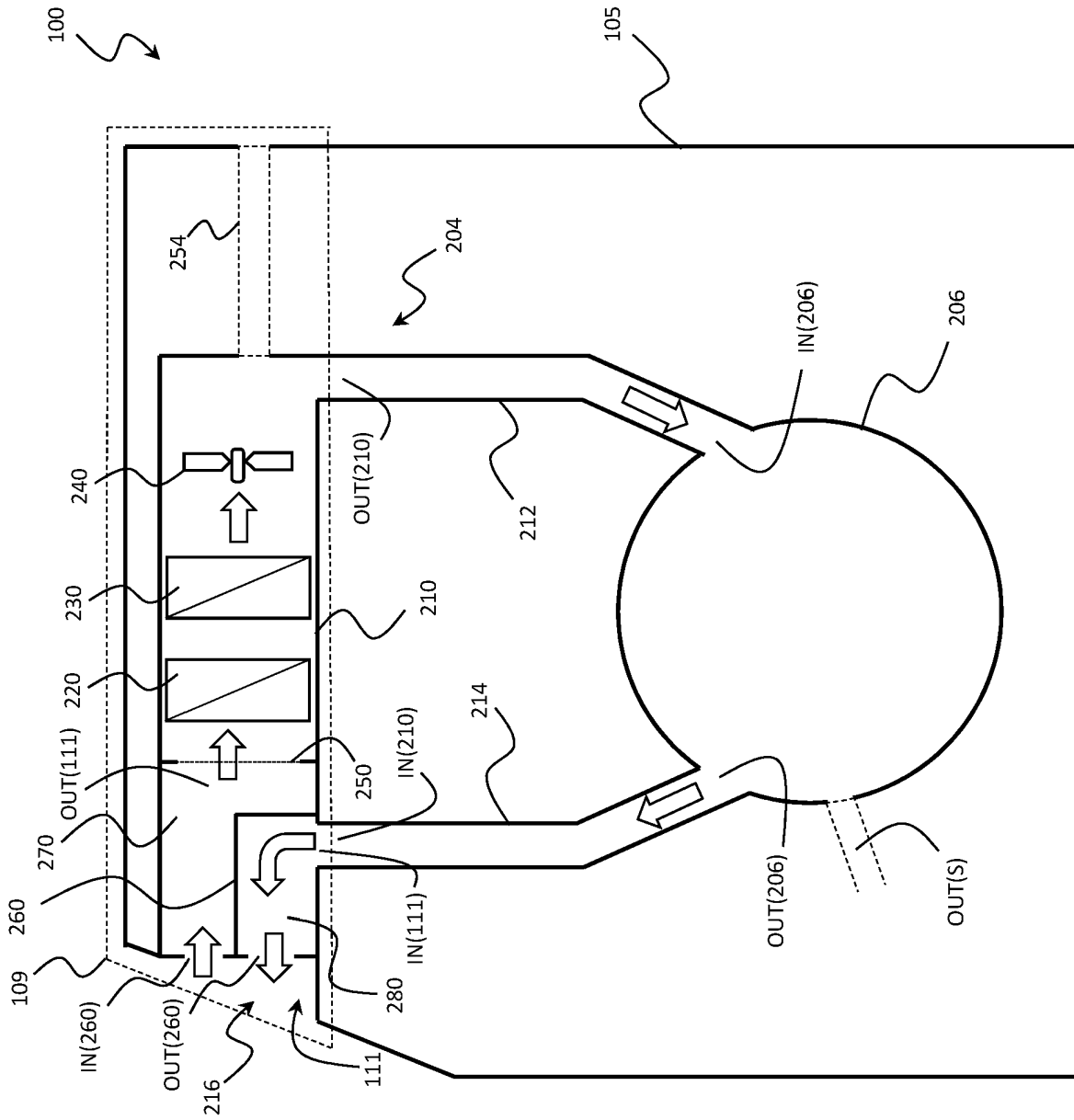


FIG. 2B

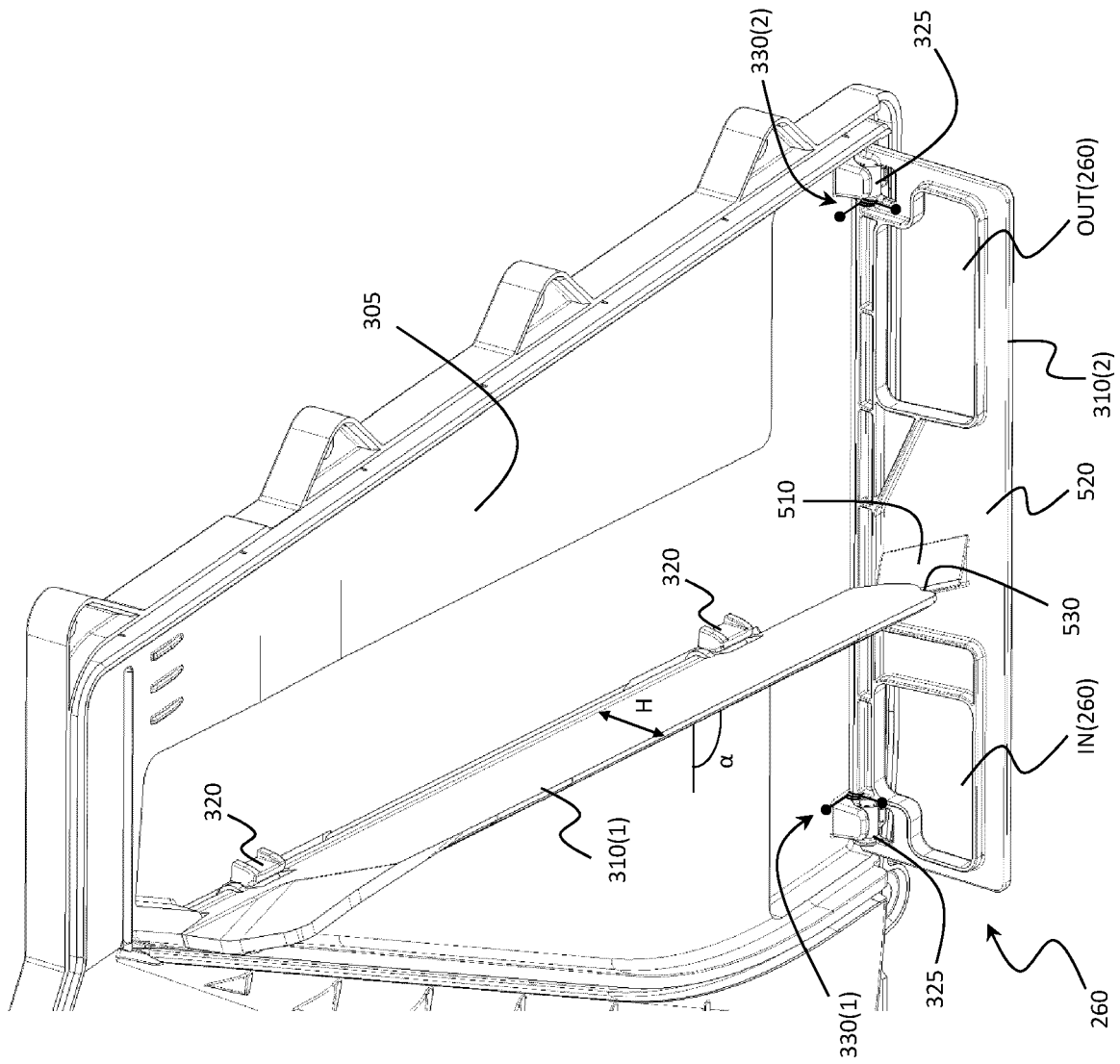


FIG. 3

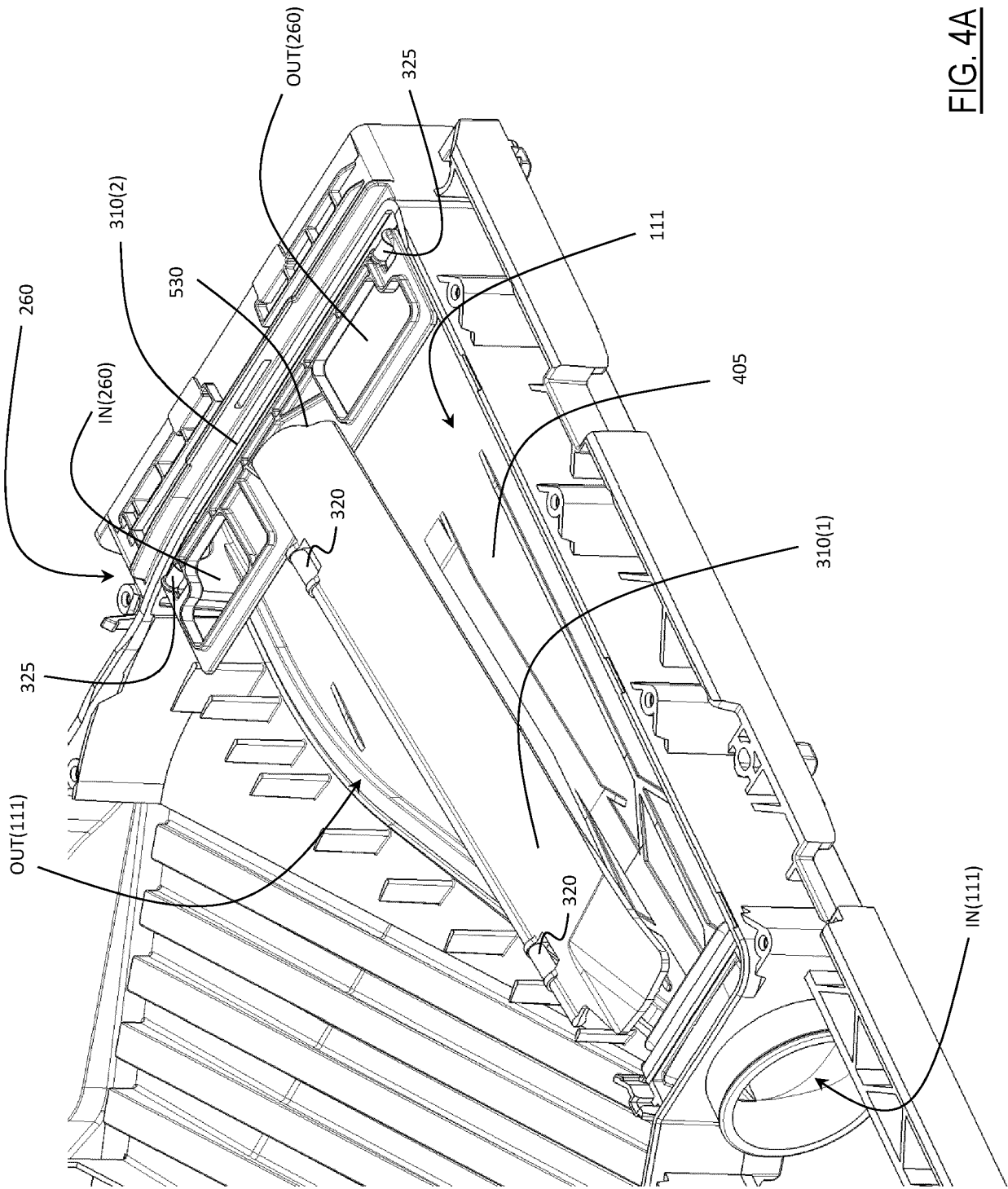


FIG. 4A

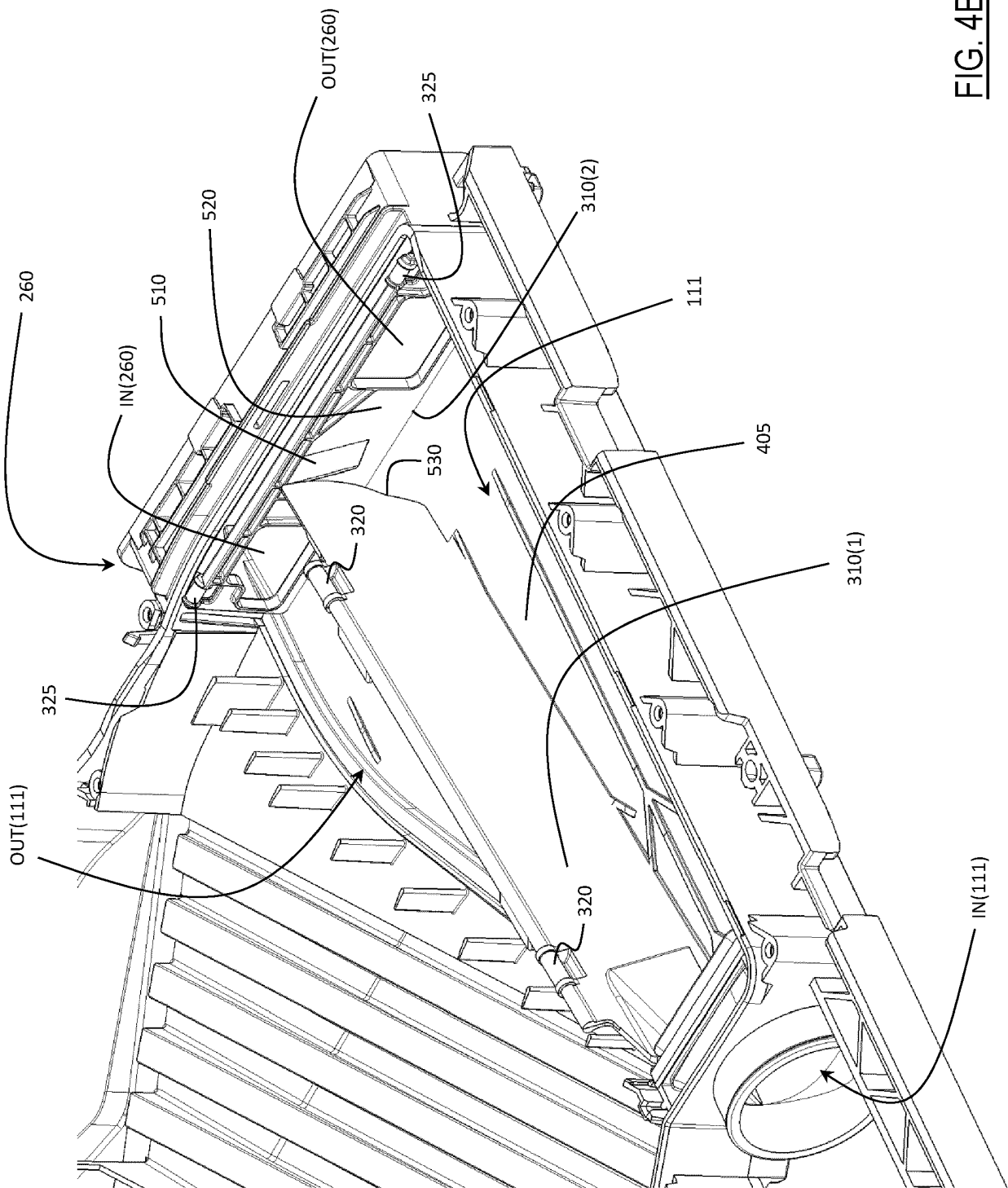


FIG. 4B

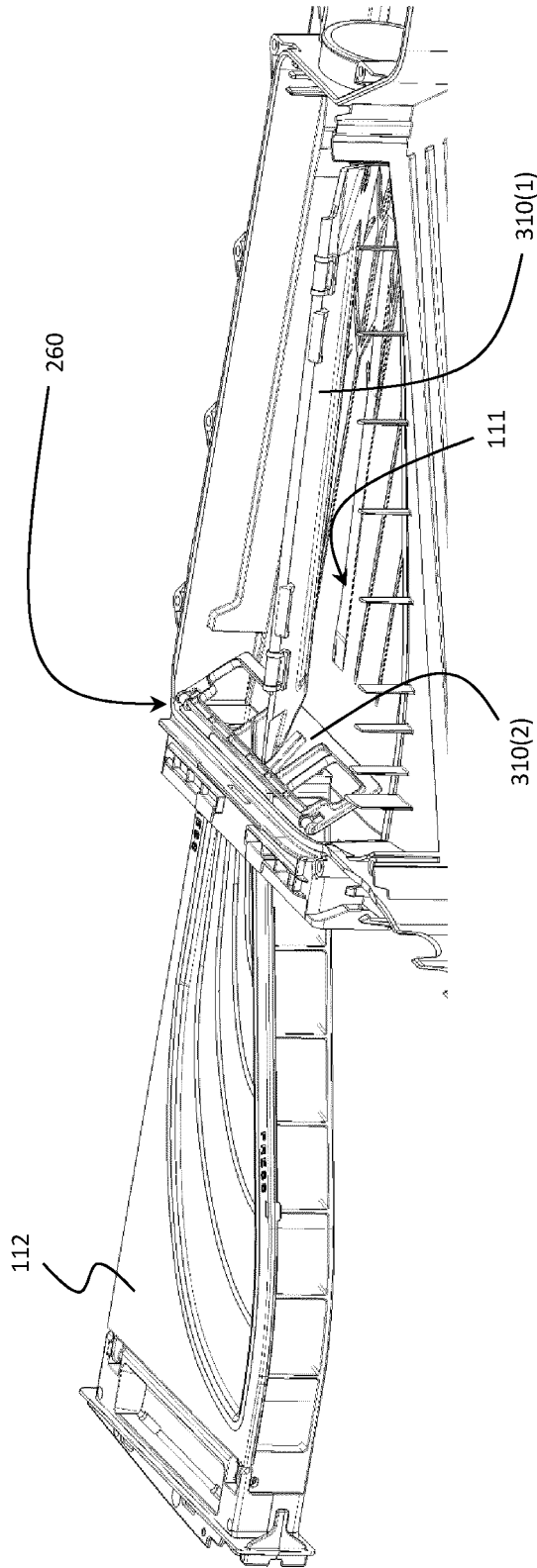


FIG. 5

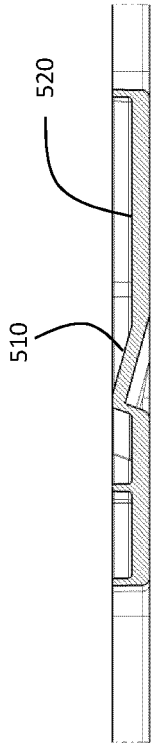


FIG. 6B

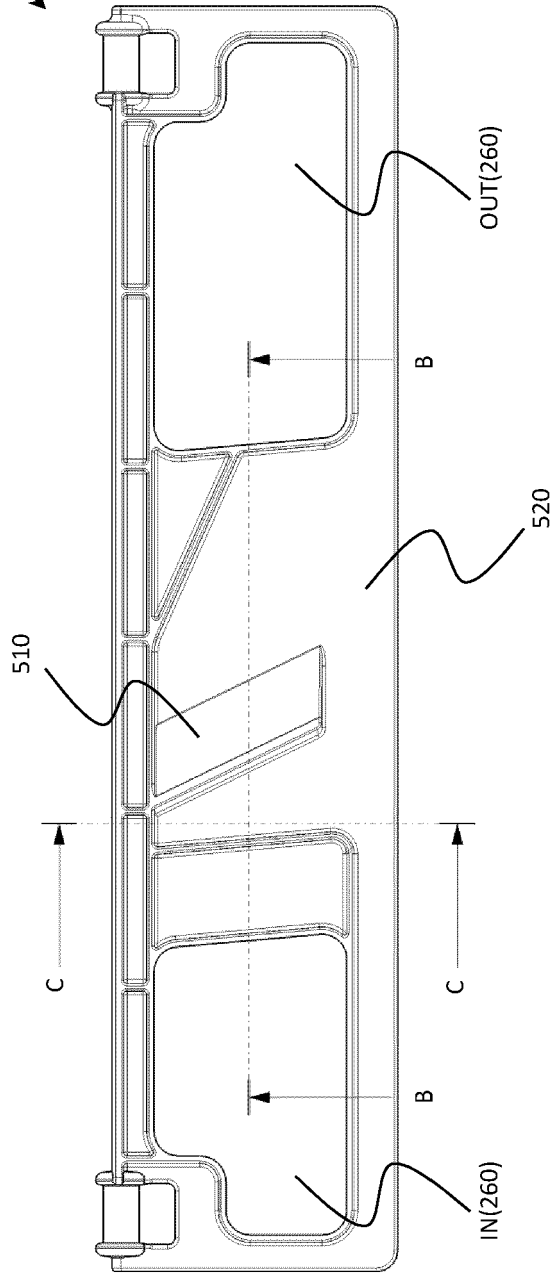


FIG. 6A

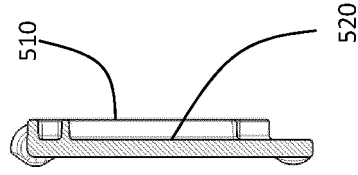


FIG. 6C

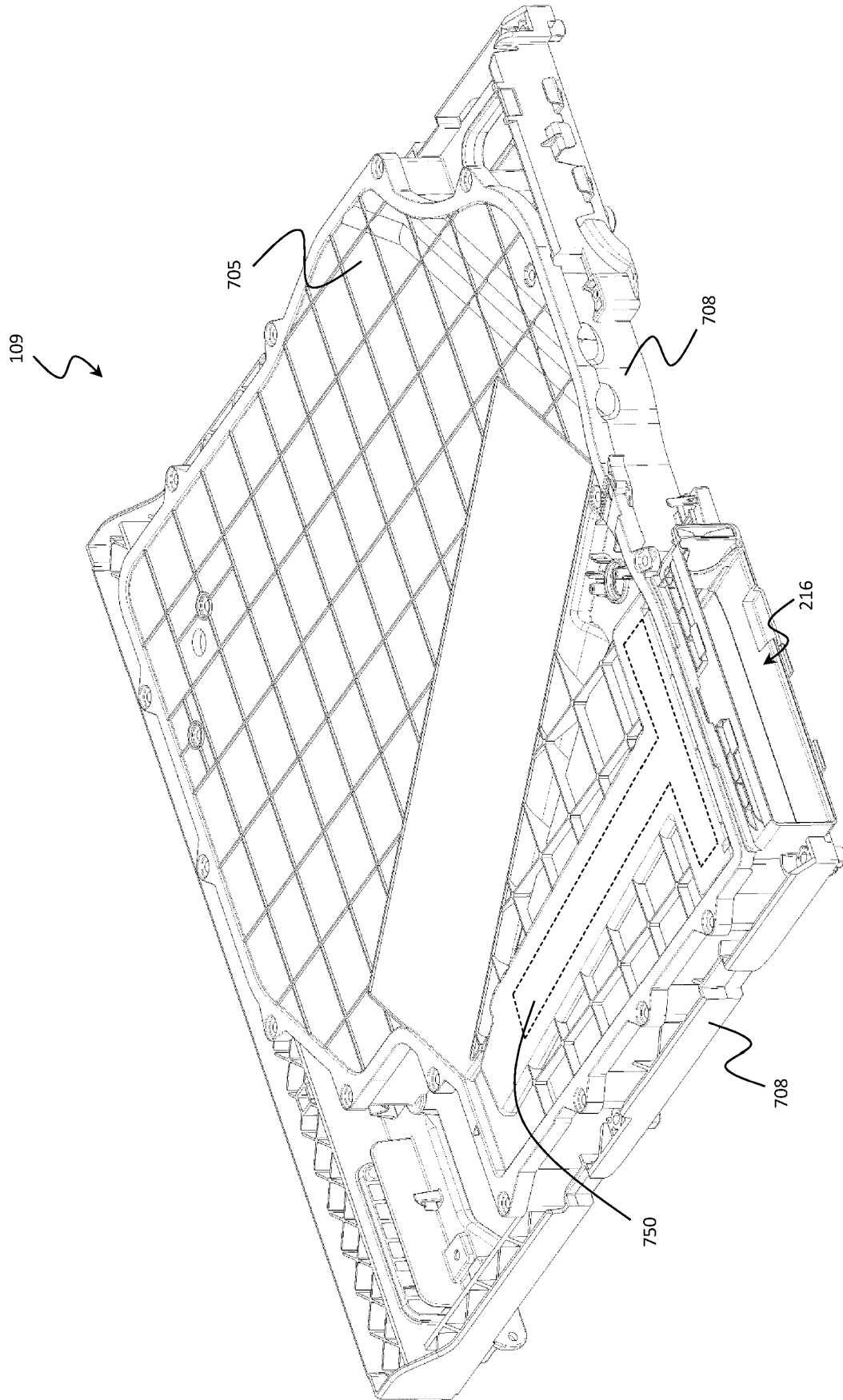


FIG. 7A

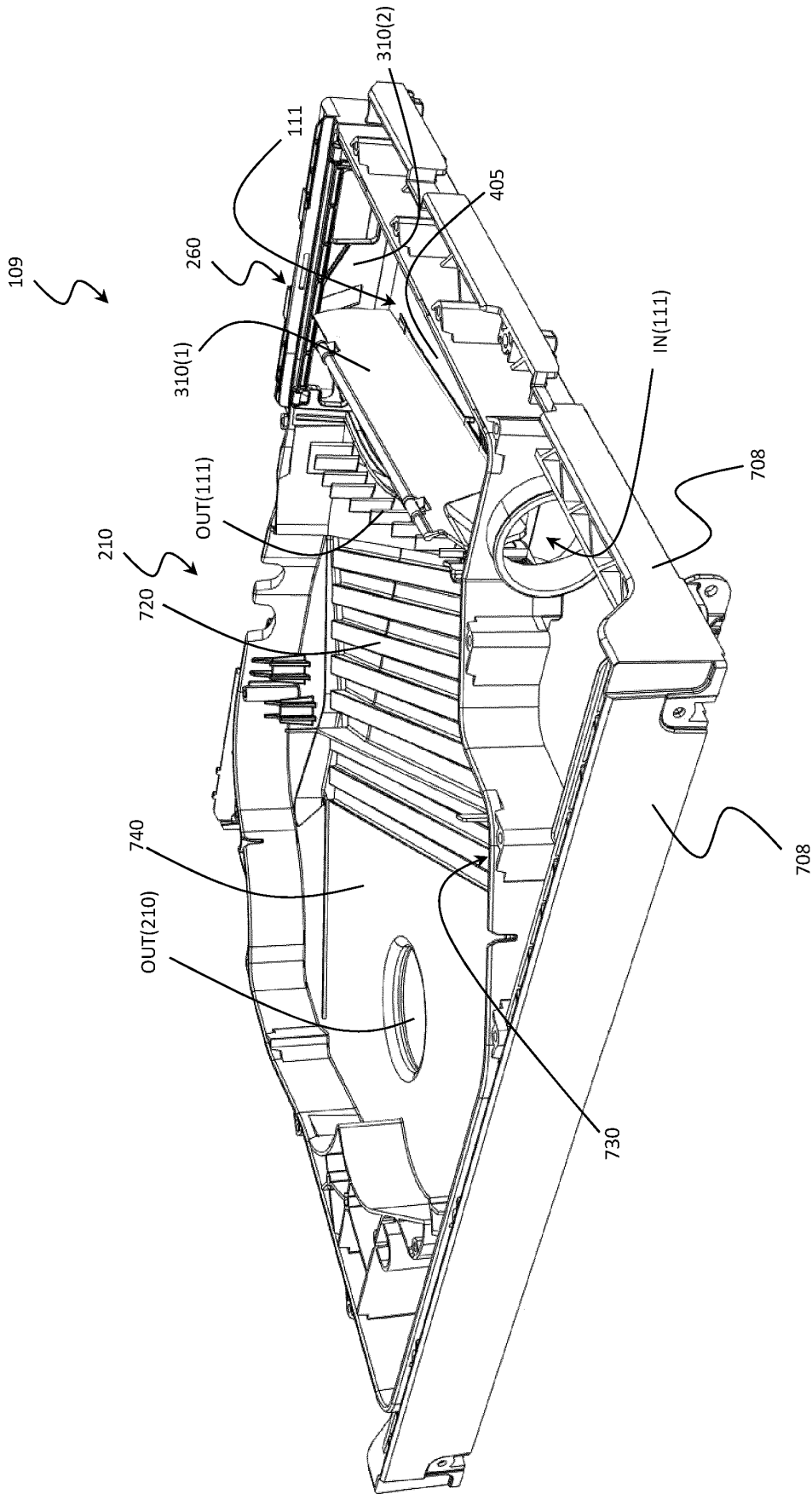


FIG. 7B

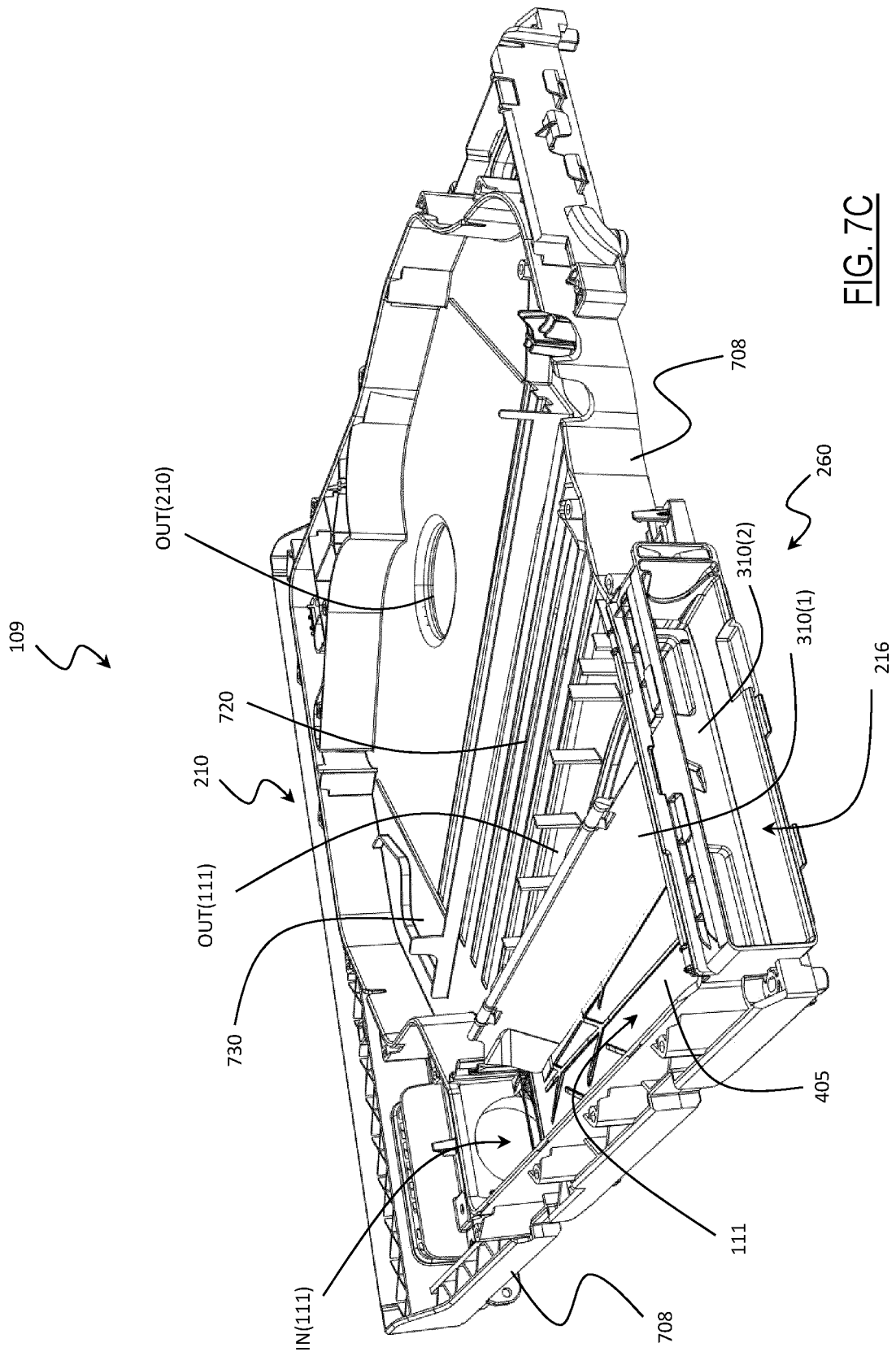


FIG. 7C

**REFERENCES CITED IN THE DESCRIPTION**

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