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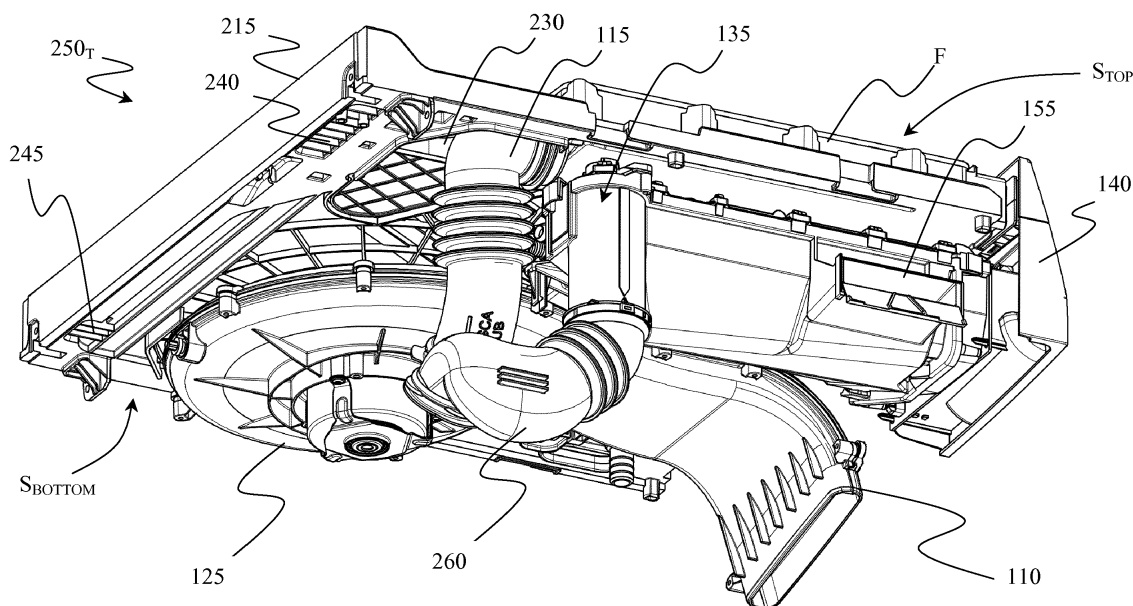
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(54) **Laundry appliance having a water filter**

(57) A laundry washing/drying appliance (100) is proposed. The laundry washing/drying appliance (100) comprises a laundry chamber (105) for containing laundry to be washed/dried, an air circulation system (110-120) adapted to cyclically circulate drying air through the laundry chamber (105) during a drying process, and a washing products dispensing conduit (135) adapted to dis-

pense washing products into the laundry chamber (105) during a washing process. An amount of drying air ( $C_{AIR}$ ) within the laundry chamber (105) is allowed to leave the air circulation system during the drying process. Said washing products dispensing conduit (135) comprises, along at least part thereof, a water well (145) for holding fluff carried with said amount of drying air ( $C_{AIR}$ ) down.



**Figure 2C**

## Description

### Field of the invention

[0001] The solution according to embodiments of the invention generally relates to household and/or professional laundry washing/drying appliances (hereinafter, washer/dryers for the sake of conciseness) operable to perform both washing and drying processes. More particularly, such solution relates to washer/dryers provided with heat pump devices.

### Background of the invention

[0002] Each washer/dryer generally comprises a laundry chamber configured for housing a laundry load (including articles such as clothes and other textiles), and a (closed) air circulation system adapted, during a drying process, to circulate drying air through the laundry chamber (so as to allow removal of moisture from the laundry load).

[0003] In order to achieve that, a class of washer/dryers are provided with heat pump devices.

[0004] Broadly speaking, each heat pump device substantially makes use of a refrigerant circuit for effectively transferring thermal energy from a first side at a lower temperature (also referred to as cool side), to a second side at a higher temperature (also referred to as hot side). A common type of heat pump device exploits physical properties of a refrigerant fluid (or refrigerant), which is made to flow in the refrigerant circuit, and comprises a compressor, a pressure-lowering device (e.g., an expansion valve), and a heat exchanger assembly - i.e. a first heat exchanger (where the refrigerant absorbs heat) and a second heat exchanger (where the refrigerant releases heat), both of them arranged within the air circulation system.

[0005] During a drying process performed by a usual washer/dryer provided with heat pump device, the drying air leaving the laundry chamber with decreased temperature and increased humidity (or dump air) with respect to the incoming hot drying air, is passed through the first heat exchanger, where it is further cooled down and dehydrated, and then through the second heat exchanger where, upon reheating, it forms the hot drying air, thereafter the drying air is fed again inside the laundry chamber for evaporating moisture from the laundry load.

[0006] However, heat pump-based washer/dryers have been experiencing a certain attractiveness decrease, mainly due to heat pump drawbacks. Indeed, cooling capacity at cool side of the heat pump device could be, or become over time, not high enough to efficiently cool down the dump air, which could result in overheating of the drying air at hot side of the heat pump device. Thus, an undesired overheating of the washer/dryer, and especially of electric/electro-mechanic/electronic components housed therein, is typically experienced, which sets reliability issues. For these rea-

sons, washer/dryers based on other de-moisturizing and heating solutions - e.g., those based on air-air heat exchanger/heating resistor assembly, are often preferred, wherein heating and cooling capacities balancing can be achieved by adjusting electric power provided to the heating resistor.

[0007] In order to substantially avoid (or at least limit) overheating issues afflicting heat pump-based washer/dryers, the Applicant has recently devised an expedient by which relatively fresh ambient air is allowed to enter the washer/dryer (and the air circulation system) and to mix with the drying air (which allows cooling down thereof), and a certain amount of compensation air is allowed to exit the air circulation system (and to vent outside the washer/dryer) for compensating the ambient air added thereto. Said compensation air is not re-circulated through the laundry chamber but, in fact, exhausted outside the washer/dryer.

[0008] According to Applicant expedient, compensation air is channeled through a washing products dispensing conduit (that, during a washing process in standard washer/dryers, typically allows dispensing washing products into the laundry chamber from a washing products loading tray), and is vented outside the washer/dryer through the loading tray. This allows avoiding excessive amount of space (and costs) than other possible compensation air venting approaches (e.g., provision of a dedicated venting arrangement).

### Summary of the Invention

[0009] The Applicant has found that, although providing optimal results against washer/dryer overheating, while avoiding any increases of space amounts and/or costs, such expedient could prove not fully satisfactory.

[0010] Indeed, the Applicant has noticed that the compensation air leaving the laundry chamber, after having dried laundry, and flowing up to the washing product dispensing conduit carries, with it, fluff (such as lint and other residual laundry load fabrics).

[0011] Thus, fluff may be dispersed partly within the washer/dryer and partly outside the washer/dryer, and/or it may accumulate within the loading tray, and mix to the washing products upon loading thereof into the loading tray. This could impair washing process.

[0012] The Applicant has faced the problem of devising a satisfactory solution able to overcome such drawbacks.

[0013] 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).

[0014] An aspect of the solution according to one or more embodiments of the invention relates to a laundry washing/drying appliance. The laundry washing/drying

appliance comprises 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. Said washing products dispensing conduit comprises, along at least part thereof, a water well for holding fluff carried with said amount of drying air down.

**[0015]** According to an embodiment of the invention, the washing products dispensing conduit comprises a bulged conduit portion adapted to be at least partially filled with a predefined amount of water so as to form said water well.

**[0016]** According to an embodiment of the invention, the laundry washing/drying appliance further comprises a control unit configured to cause said predefined amount of water to at least partially fill said bulged conduit portion before starting the drying process.

**[0017]** According to an embodiment of the invention, said control unit is further configured to cause restoring of said predefined amount of water within the water well at predefined time intervals during the drying process.

**[0018]** According to an embodiment of the invention, said predefined time intervals depend on at least one between temperature of said amount of drying air and duration of the drying process.

**[0019]** According to an embodiment of the invention, after the drying process, said control unit is further configured to completely replace said predefined amount of water within the bulged conduit portion so as to allow removal of fluff accumulated therewithin.

**[0020]** According to an embodiment of the invention, the laundry washing/drying appliance further comprises a washing products loading tray fluidly connected to the washing products dispensing conduit, said amount of drying air flowing, free from fluff, at least partly into said loading tray and hence venting outside the appliance.

**[0021]** According to an embodiment of the invention, the laundry washing/drying appliance further comprises an overflow-preventing system fluidly connected to the laundry chamber for preventing washing products from overflowing out of the appliance, said amount of drying air flowing, free from fluff, at least partly into said overflow-preventing system and hence venting inside the appliance.

**[0022]** According to an embodiment of the invention, the laundry washing/drying appliance further comprises an air duct for allowing ambient air to enter the air circulation system and to mix with the drying air thereby avoiding overheating thereof, said amount of drying air leaving the air circulation system substantially compensating the ambient air added thereto.

**[0023]** According to an embodiment of the invention, the laundry washing/drying appliance further comprises

first and second heat exchangers of a heat pump device arranged within the air circulation system. Thanks to this arrangement, the drying air leaving the laundry chamber with decreased temperature and increased humidity with respect to the incoming drying air is first passed through the first heat exchanger, where it is cooled down and demisterized, and then through the second heat exchanger, where it is heated-up and fed again into the laundry chamber.

**[0024]** Another aspect of the solution according to one or more embodiments of the invention relates to a method for operating a laundry washing/drying appliance. The laundry washing/drying appliance comprises 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, 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 being allowed to leave the air circulation system during the drying process. The method comprises forming, along at least part of said washing products dispensing conduit, a water well for holding fluff carried with said amount of drying air down.

**[0025]** According to an embodiment of the invention, the washing products dispensing conduit comprises a bulged conduit portion, and said forming a water well comprises at least partially filling the bulged conduit portion with a predefined amount of water.

**[0026]** According to an embodiment of the invention, said at least partially filling the bulged conduit portion takes place before starting the drying process.

**[0027]** According to an embodiment of the invention, the method further comprises restoring said predefined amount of water within the water well at predefined time intervals during the drying process.

**[0028]** According to an embodiment of the invention, said predefined time intervals depend on at least one between temperature of said amount of drying air and duration of the drying process.

**[0029]** According to an embodiment of the invention, the method further comprises, after the drying process, completely replacing said predefined amount of water within the bulged conduit portion so as to allow removal of fluff accumulated therewithin.

**[0030]** Thanks to the proposed invention, fluff dispersion inside and/or outside the washer/dryer and/or fluff accumulation within the loading tray is substantially avoided, or at least drastically reduced. Thus, mixing between fluff and washing products is prevented, and optimal washing processes can take place.

#### **Brief description of the annexed drawings**

**[0031]** These and other features and advantages of the invention will be made apparent by the following description of some exemplary and non limitative embodiments thereof; for its better intelligibility, the following de-

scription should be read making reference to the attached drawings, wherein:

**Figure 1** conceptually shows a cross-sectional view of a washer/dryer according to an embodiment of the invention;

**Figure 2A** shows a perspective and partly exploded front view of a practical implementation of the washer/dryer of **Figure 1** according to an embodiment of the invention;

**Figures 2B-2C** show top and bottom perspective views with partly removed parts, respectively, of a worktop of the washer/dryer of **Figure 2A** according to an embodiment of the invention, and

**Figure 2D** shows a perspective and enlarged view of a part of a washing products dispensing conduit visible in **Figure 2C**.

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

[0032] With reference to the drawings, **Figure 1** conceptually shows a cross-sectional view of a washer/dryer **100** according to an embodiment of the invention.

[0033] The washer/dryer **100** comprises a laundry chamber **105** (i.e., a tub and a rotating drum housed therein, not illustrated) adapted to contain a laundry load to be washed/dried, and an air circulating system adapted to cyclically circulate drying air through the laundry chamber **105** (during a drying process).

[0034] The air circulating system comprises a delivery duct **110** fluidly connected to an input opening **IN<sub>105</sub>** of the laundry chamber **105** for feeding it with drying air, and a return duct **115** fluidly connected to a main output opening **OUT<sub>105</sub>** of the laundry chamber **105** for taking moisture-laden drying air deriving from drying process (dump air).

[0035] Between (and connecting) the delivery **110** and return **115** ducts, a main duct **120** is provided, which houses first **HE<sub>1</sub>** and second **HE<sub>2</sub>** heat exchangers (e.g., evaporator and condenser members, respectively) of a heat pump device, as well as a motor-driven fan **125**, e.g. arranged downstream the second heat exchanger **HE<sub>2</sub>**. As usual, under fan **125** action, the dump air leaving the laundry chamber **105** with decreased temperature and increased humidity with respect to the incoming hot drying air, is first passed (through the return duct **115**) through the first heat exchanger **HE<sub>1</sub>**, where it is further cooled down and de-moisturized (heat pump cool side). The de-moisturized air is then passed through the second heat exchanger **HE<sub>2</sub>** (heat pump hot side), where it is heated-up, thereafter the corresponding hot, de-moisturized air (i.e., the drying air), is fed again (through the delivery duct **110**) into the laundry chamber **105**.

[0036] In order to compensate insufficient cooling capacity at cool side with respect to heating capacity at hot side, which could result in dangerous overheating - especially of electric/electro-mechanic/electronic compo-

nents (such as the control unit **CU** that is typically configured to manage washer/dryer **100** operation) arranged near or within the air circulation system - a secondary air duct **130** is provided that fluidly connects the air circulation system with the surrounding environment - preferably, as illustrated, with the outside of the washer/dryer **100**.

[0037] Therefore, by means of the secondary air duct **130**, relatively cool ambient air **A<sub>AIR</sub>** is taken from the outside of the washer/dryer **100** and fed/channelled into the air circulation system. In order to achieve that, the secondary air duct **130** fluidly connects the outside of the washer/dryer **100** with the main duct **120**, at a proper input region thereof - preferably, at (e.g., after, as illustrated) the second heat exchanger **HE<sub>2</sub>**, so that no ambient air **A<sub>AIR</sub>** treatment is required by the heat pump device, thus resulting in low power consumption thereof. Anyway, different main duct **120** input region arrangements are possible, for example between the first **HE<sub>1</sub>** and second **HE<sub>2</sub>** heat exchangers, or at (e.g., before) the first heat exchanger **HE<sub>1</sub>**.

[0038] The ambient air **A<sub>AIR</sub>** entering the air circulation system mixes with (thereby cooling down) the (drying) air circulating therewithin. This avoids overheating issues.

[0039] A secondary output opening **OUT<sub>105,S</sub>** of the laundry chamber **105** is provided for allowing a predefined amount of the dump air within it to leave the air circulation system (and to vent outside and/or inside the washer/dryer **100**), so as to substantially compensate/balance the ambient air **A<sub>AIR</sub>** added thereto. In order to achieve compensation, the amounts of drying air allowed to leave the air circulation system (hereinafter, compensation air **C<sub>AIR</sub>**) and the amount of ambient air **A<sub>AIR</sub>** allowed to enter thereto should be made substantially equal (e.g., by properly shaping and sizing the secondary air duct **130** and the secondary output opening **OUT<sub>105,S</sub>** one another).

[0040] In the example at issue, venting of the compensation air **C<sub>AIR</sub>** takes place by channeling, wherein a venting duct **135** is provided that fluidly connects the secondary output opening **OUT<sub>105,S</sub>** of the laundry chamber **105** to the surrounding environment.

[0041] The venting duct **135** may be a dedicated duct/path/channel, or it may advantageously comprise (as herein illustrated) a washing products dispensing conduit that, in conventional washer/dryers, allows dispensing washing products from a washing products loading tray **140**. In other words, the same washing products dispensing conduit that, during a washing process, allows feeding the laundry chamber **105** with the washing products, is also used, in the example at issue, to allow the compensation air **C<sub>AIR</sub>** to leave the air circulation system (and preferably, to be vented outside the washer/dryer **100**) during a drying process. As should be promptly apparent, flowing of the compensation air **C<sub>AIR</sub>** up to the washing products dispensing conduit **135** is allowed by proper fan **125** arrangement along the air circulation sys-

tem (as herein illustrated) - on the contrary, in the known solutions, fan arrangement is instead intended to generate air depressions at the main output opening **OUT**<sub>105</sub> causing the dump air to be blown mainly (theoretically, only) into the return duct **115**.

**[0042]** Venting of the compensation air **C**<sub>AIR</sub> outside the washer/dryer can take place through the loading tray **140**, both when, in order to allow washing products loading, it is opened, and when it is closed (as better discussed in the following). In both case, the fluff-laden compensation air **C**<sub>AIR</sub> leaving the laundry chamber **105** and flowing up to the washing products dispensing conduit **135** may cause fluff to accumulate within, thereby dirtying, the loading tray **140**. Such fluff may mix to washing products and negatively affect washing process. In addition, fluff dispersed outside the washer/dryer can dirt the ambient where the washer/dryer is placed. In order to avoid such events, or at least limit them, the washing products dispensing conduit **135** comprises, along at least part thereof, a water well **145** for holding fluff carried with the compensation air **C**<sub>AIR</sub> down (as will be better discussed in the following).

**[0043]** A practical implementation of the washer/dryer **100** is shown, according to an embodiment of the invention, in the perspective and partly exploded front view of **Figure 2A** (which will be discussed with joint reference to **Figure 1**). Hereinafter, references denoting components of the washer/dryer **100** in their conceptual representation of **Figure 1** will also denote the same components in their practical implementation represented from **Figure 2A** on.

**[0044]** The washer/dryer **100** comprises a substantially parallelepiped-shaped cabinet **205**, having a front panel **205<sub>F</sub>**, two side panels **205<sub>S</sub>** (only one visible in the figure), and a bottom panel. The cabinet **205** encloses an inner compartment (not visible) housing the laundry chamber **105** and accessible through an access door **210** (shown in closed configuration).

**[0045]** A top panel **205<sub>T</sub>** closes the cabinet **205** from above, and defines a ready-to-mount worktop incorporating/housing the air circulation system. In this respect, reference will be also made to **Figures 2B-2C**, the latter showing, according to an embodiment of the invention, top and bottom perspective views with partly removed parts, respectively, of the worktop **205<sub>T</sub>**.

**[0046]** The worktop **205<sub>T</sub>** comprises, at a front thereof, the washing products loading tray **140** (shown in the closed configuration), and a removable filter unit **F**, preferably arranged on the washing products loading tray **140**. The filter unit **F** is configured to filter the dump air from fluff before being passed through the first **HE**<sub>1</sub> and second **HE**<sub>2</sub> heat exchangers.

**[0047]** The worktop **205<sub>T</sub>** comprises a, e.g. a plastic, base element **215** shaped and sized so as to define a number of housing sections adapted to house corresponding components of the air circulation system, and a cover assembly (globally denoted by number reference **220**) for top covering the base element **215** and delimiting

air paths therebetween (as discussed below).

**[0048]** Preferably, the base element **215** comprises housing sections **215<sub>F</sub>**, **215<sub>HE1</sub>**, **215<sub>HE2</sub>**, for housing the filter unit **F**, the first heat exchanger **HE**<sub>1</sub>, and the second heat exchanger **HE**<sub>2</sub>, respectively. As visible in the figures, such housing sections **215<sub>F</sub>**, **215<sub>HE1</sub>**, **215<sub>HE2</sub>** take most of a worktop top surface **S**<sub>TOP</sub>, exception made for (left and right) corner regions of the base element **215** (intended to other purposes, as discussed below). A first covering panel **220<sub>1</sub>** of cover the assembly **220** (**Figure 2A**) covers the base element **215** with the exception of the left corner region thereof - the space between the base element **215** (i.e., the housing sections **215<sub>HE1</sub>**, **215<sub>HE2</sub>**) and the first covering panel **220<sub>1</sub>** delimiting an air path that substantially identifies, together with the air path through the filter unit **F**, the main duct **120**. A second covering panel **220<sub>2</sub>** is instead provided on the first covering panel **220<sub>1</sub>** for aesthetical issues.

**[0049]** The base element **215** comprises, e.g. at a substantially central part of the housing section **215<sub>HE2</sub>**, a base opening **225**, which is fluidly connected to the fan **125** (e.g., rigidly fixed to the base element **215**, underneath it) and to the delivery duct **110** for allowing the drying air to be fed into the laundry chamber **105**. Preferably, the base opening **225** opens down to a fan **125** input, whereas the delivery duct **110**, arranged underneath the base element **215** as well, has a first end connector for connection with a fan **125** output, and a second end connector (for example, an elongated-shaped connector, as illustrated) for connection with an opening of a bellow (not shown) that, as usual in washer/dryers, seals gap between the drum and the access door **210**.

**[0050]** The base element **215** also comprises, e.g. at the left corner region thereof, a further base opening **230**, which allows connection of the return duct **115** (carrying the dump air within it) from the output opening **OUT**<sub>105</sub> of the laundry chamber **105** to the filter unit **F**.

**[0051]** As better discussed in the following, the base opening **230** also allows passage of un-channeled air circulating within the washer/dryer **100** (outside the air circulating system).

**[0052]** During a drying process, the dump air leaving the laundry chamber **105** is first fed (through the return duct **115**) through the filter unit **F**, and the filtered dump air output therefrom is then passed through the first heat exchanger **HE**<sub>1</sub>, where it is de-moisturized (with the condensed moisture that is properly collected and drained by a slot grid **235** of the base element **215** on which the first heat exchanger **HE**<sub>1</sub> rests). The de-moisturized air is then passed through the second heat exchanger **HE**<sub>2</sub>, where it is heated-up, thereafter such drying air is fed again (through the base opening **225**, the fan **125** and the delivery duct **110**) into the laundry chamber **105** (i.e., from a front thereof through the bellow opening).

**[0053]** The base element **215** comprises (e.g., at the right corner thereof) an air passage **240** (preferably, an air grid vertically extending between opposite top **S**<sub>TOP</sub> and bottom **S**<sub>BOTTOM</sub> surfaces of the base element **215**)

for allowing input of the ambient air **A<sub>AIR</sub>**, and (e.g., at the left corner thereof) a further air passage **245**, similar to the air passage **240**, for allowing un-channeled air within the cabinet **205** (such as further ambient air intended to cool down the compressor heat pump) to be vented outside the washer/dryer **100**.

**[0054]** As best visible in **Figure 2B**, the base element **215** further comprises a (preferably, bottleneck) portion **250** fluidly connecting the housing section **215<sub>HE2</sub>** (or any other main duct **120** input region, as discussed above) to the air passage **240**, so as to allow the ambient air **A<sub>AIR</sub>** to be channeled into the air circulation system and to mix with the drying air.

**[0055]** Thus, the air passage, **240**, the bottleneck portion **250** and the space between the base element **215** (i.e., the right corner region thereof) and the first covering panel **220<sub>1</sub>** identify, as a whole, the secondary air duct **130**.

**[0056]** As discussed above, the drying air/ambient air **A<sub>AIR</sub>** mixture is fed to the laundry chamber **105**, thereafter a predefined amount thereof (compensation air **C<sub>AIR</sub>**) is allowed to flow into the loading tray **140** (free from fluff, thanks to the water well **145** provided along the washing products dispensing conduit **135**) and hence vented outside the washer/dryer **100** (as discussed herebelow).

**[0057]** Preferably, assuming a closed configuration of the loading tray **140** during the drying process, at least part of the compensation air **C<sub>AIR</sub>** leaving the laundry chamber **105** and flowing, through the washing products dispensing conduit **135**, up to the loading tray **140** is vented through interstices of the loading tray **140** (not distinguishable) allowing opening/closing movements thereof.

**[0058]** Preferably, compensation air **C<sub>AIR</sub>** venting is further achieved by means of an overflow-preventing system typically provided in washer/dryers for preventing liquids (e.g., washing products and/or water) from overflowing out of the washer/dryer **100**, for example through the loading tray **140**, upon a fault occurrence (e.g., water pump closure fail). The overflow-preventing system, *per se* well known in the art, comprises a draining channel **155** (part of which visible in **Figure 2C**), preferably arranged at a side of the loading tray **140** and at predefined height. When, as a result of a fault, the liquids, rising up within the laundry chamber **105**, reach the loading tray **140**, they reach a limit level (given by said predefined height), and the exceeding liquids are drained (through the draining channel **155**) to a proper liquid vessel (not shown) arranged within the washer/dryer **100**, where a liquid detection system (also not shown) is provided. Upon detection of a predefined liquids amount, the liquid detection system completely stops washer/dryer **100** operation, thereby preventing liquids from overflowing out of the washer/dryer **100** via the loading tray **140** and from causing flooding of the user premises where the washer/dryer **100** is placed.

**[0059]** Thus, during normal operation of the washer/dryer **100** the compensation air **C<sub>AIR</sub>** (or a part thereof) can flow (free from fluff, thanks to the water well **145**)

through the overflow-preventing system **155**, and vent inside the washer/dryer **100**.

**[0060]** As visible in **Figure 2C**, the washing products dispensing conduit **135** preferably comprises a bulged conduit portion **260** adapted to be at least partially filled with a predefined amount of water so as to form said water well **145** (in this respect, see also **Figure 2D**, the latter showing a perspective, enlarged view of a part of the washing products dispensing conduit **135**).

**[0061]** The washing products dispensing conduit **135** comprises a first end opening **135<sub>1</sub>** with associated a first manifold adapted to be connected to the secondary output opening **OUT<sub>105,S</sub>** of the laundry chamber **105**, and a second end opening **135<sub>2</sub>** with associated a second manifold adapted to be coupled to the washing products loading tray **140** (e.g., by means of a straight conduit portion, visible in **Figure 2C**).

**[0062]** Preferably, as illustrated, the washing products dispensing conduit **135** is shaped such as the first **135<sub>1</sub>** second **135<sub>2</sub>** end openings are sufficiently above a water well maximum level **ML** (substantially given by bulged conduit portion **260** specific geometry) to avoid water overflowing from the water well **145** during the drying process.

**[0063]** Upon compensation air **C<sub>AIR</sub>** flowing into the washing products dispensing conduit **135** (specifically, upon compensation air **C<sub>AIR</sub>** flowing through the free space of the washing products dispensing conduit **135** above the water well **145** and upon compensation air **C<sub>AIR</sub>** skimming over water well **145** surface), fluff is held by the water well **145**. Thus, the compensation air **C<sub>AIR</sub>** is allowed to get out from the loading tray **140** free from fluff.

**[0064]** Advantageously, the control unit **CU** of the washer/dryer **100** is configured to manage water well **145** as well.

**[0065]** Preferably, the control unit **CU** is configured to cause a predefined amount of water to fill (until the water well maximum level), or at least partially fill, said bulged conduit portion **260** before starting the drying process.

**[0066]** Moreover, in order to compensate water well **145** evaporation over time due to compensation air **C<sub>AIR</sub>** heat, the control unit **CU** may be also configured to cause periodic restoring of (the predefined amount of water of) the water well **145** during the drying process, preferably at predefined time intervals. Such predefined time intervals may be pre-set (e.g., by the washer/dryer **100** manufacturer) or dynamically set (for example, by a suitable logic of the control unit **CU**) according to expected and/or detected compensation air **C<sub>AIR</sub>** temperature and/or drying process duration - indeed, compensation air **C<sub>AIR</sub>** temperature and/or drying process duration determine evaporation speed of the water well **145**.

**[0067]** Finally, after the drying process, the control unit **CU** may also be configured to completely replace said predefined amount of water within the bulged conduit portion **260**, so that removal of fluff accumulated therewithin is allowed. By way of example only, replacing of the pre-

defined amount of water can be achieved by means of controlled water injections into the washing products dispensing conduit **135** - just as for common washing processes.

**[0068]** Naturally, in order to satisfy local and specific requirements, a person skilled in the art may apply to the solution described above many logical and/or physical modifications and alterations. More specifically, although the invention has been described with a certain degree of particularity with reference to preferred embodiments thereof, it should be understood that various omissions, substitutions and changes in the form and details as well as other embodiments are possible. In particular, different embodiments of the invention may even be practiced without the specific details (such as the numeric examples) set forth in the preceding description for providing a more thorough understanding thereof; on the contrary, well known features may have been omitted or simplified in order not to obscure the description with unnecessary particulars. Moreover, it is expressly intended that specific elements and/or method steps described in connection with any disclosed embodiment of the invention may be incorporated in any other embodiment as a matter of general design choice.

**[0069]** Moreover, analogous considerations apply if the washer/dryer has a different structure or comprises equivalent components, or it has other operating features. In any case, any component thereof may be separated into several elements, or two or more components may be combined into a single element; in addition, each component may be replicated for supporting the execution of the corresponding operations in parallel. It should also be noted that any interaction between different components generally does not need to be continuous (unless otherwise indicated), and it may be both direct and indirect through one or more intermediaries.

**[0070]** Although in the description explicit reference has been made to a worktop integrating the air circulation system, this should not be construed limitatively. Indeed, the principles of the invention may also be applied to conventional washer/dryers wherein the air circulation system is "distributed" within the inner compartment.

**[0071]** Moreover, although in the present description explicit reference has been made to a washer/dryer whose moisture removal from the dump air is carried out by means of an heat pump device, the principles of the present invention also apply to any other moisture condensing unit suitable for the purpose (e.g., an air-air heat exchanger).

**[0072]** Finally, the solution according to an embodiment of the invention lends itself to be implemented through an equivalent method (by using similar steps, removing some non-essential steps, or adding additional optional steps); moreover, the steps may be performed in a different order, in parallel or overlapped (at least in part).

## Claims

1. Laundry washing/drying appliance **(100)** comprising:
  - a laundry chamber **(105)** for containing laundry to be washed/dried,
  - an air circulation system **(110-120)** adapted to cyclically circulate drying air through the laundry chamber **(105)** during a drying process,
  - a washing products dispensing conduit **(135)** adapted to dispense washing products into the laundry chamber **(105)** during a washing process,
  - an amount of drying air (**C<sub>AIR</sub>**) within the laundry chamber **(105)** being allowed to leave the air circulation system during the drying process,
  - characterized in that**
  - said washing products dispensing conduit **(135)** comprises, along at least part thereof, a water well **(145)** for holding fluff carried with said amount of drying air (**C<sub>AIR</sub>**) down.
2. Laundry washing/drying appliance **(100)** according to Claim 1, wherein the washing products dispensing conduit **(135)** comprises a bulged conduit portion **(260)** adapted to be at least partially filled with a predefined amount of water so as to form said water well **(145)**.
3. Laundry washing/drying appliance **(100)** according to Claim 2, further comprising a control unit **(CU)** configured to cause said predefined amount of water to at least partially fill said bulged conduit portion **(260)** before starting the drying process.
4. Laundry washing/drying appliance **(100)** according to Claim 3, wherein said control unit **(CU)** is further configured to cause restoring of said predefined amount of water within the water well **(145)** at predefined time intervals during the drying process.
5. Laundry washing/drying appliance **(100)** according to Claim 4, wherein said predefined time intervals depend on at least one between temperature of said amount of drying air (**C<sub>AIR</sub>**) and duration of the drying process.
6. Laundry washing/drying appliance **(100)** according to any Claim from 3 to 5, wherein, after the drying process, said control unit **(CU)** is further configured to completely replace said predefined amount of water within the bulged conduit portion **(260)** so as to allow removal of fluff accumulated therewithin.
7. Laundry washing/drying appliance **(100)** according to any of the preceding Claims, further comprising a washing products loading tray **(140)** fluidly connect-

ed to the washing products dispensing conduit (135), said amount of drying air (C<sub>AIR</sub>) flowing, free from fluff, at least partly into said loading tray (140) and hence venting outside the appliance (100).

8. Laundry washing/drying appliance (100) according to any of the preceding Claims, further comprising an overflow-preventing system (155) fluidly connected to the laundry chamber (105) for preventing washing products from overflowing out of the appliance (100), said amount of drying air (C<sub>AIR</sub>) flowing, free from fluff, at least partly into said overflow-preventing system (155) and hence venting inside the appliance (100).
9. Laundry washing/drying appliance (100) according to any of the preceding Claims, further comprising an air duct (130) for allowing ambient air (A<sub>AIR</sub>) to enter the air circulation system (110-120) and to mix with the drying air thereby avoiding overheating thereof, said amount of drying air (C<sub>AIR</sub>) leaving the air circulation system (110-120) substantially compensating the ambient air (A<sub>AIR</sub>) added thereto.
10. Laundry washing/drying appliance (100) according to any of the preceding Claims, further comprising first (HE<sub>1</sub>) and second (HE<sub>2</sub>) heat exchangers of a heat pump device arranged within the air circulation system (110-120).
11. Method for operating a laundry washing/drying appliance (100) comprising:
  - a laundry chamber (105) for containing laundry to be washed/dried,
  - an air circulation system (110-120) adapted to cyclically circulate drying air through the laundry chamber (105) during a drying process,
  - a washing products dispensing conduit (135) adapted to dispense washing products into the laundry chamber (105) during a washing process, an amount of drying air (C<sub>AIR</sub>) within the laundry chamber (105) being allowed to leave the air circulation system during the drying process,
  - the method comprising forming, along at least part of said washing products dispensing conduit (135), a water well (145) for holding fluff carried with said amount of drying air (C<sub>AIR</sub>) down.
12. Method according to Claim 11, wherein the washing products dispensing conduit (135) comprises a bulged conduit portion (260), said forming a water well (145) comprising at least partially filling the bulged conduit portion (260) with a predefined amount of water.
13. Method according to Claim 12, wherein said at least

partially filling the bulged conduit portion (260) takes place before starting the drying process.

14. Method according to Claim 13, further comprising restoring said predefined amount of water within the water well (145) at predefined time intervals during the drying process.
15. Method according to Claim 14, wherein said predefined time intervals depend on at least one between temperature of said amount of drying air (C<sub>AIR</sub>) and duration of the drying process.
16. Method according to any Claim from 13 to 15, further comprising, after the drying process, completely replacing said predefined amount of water within the bulged conduit portion (260) so as to allow removal of fluff accumulated therewithin.

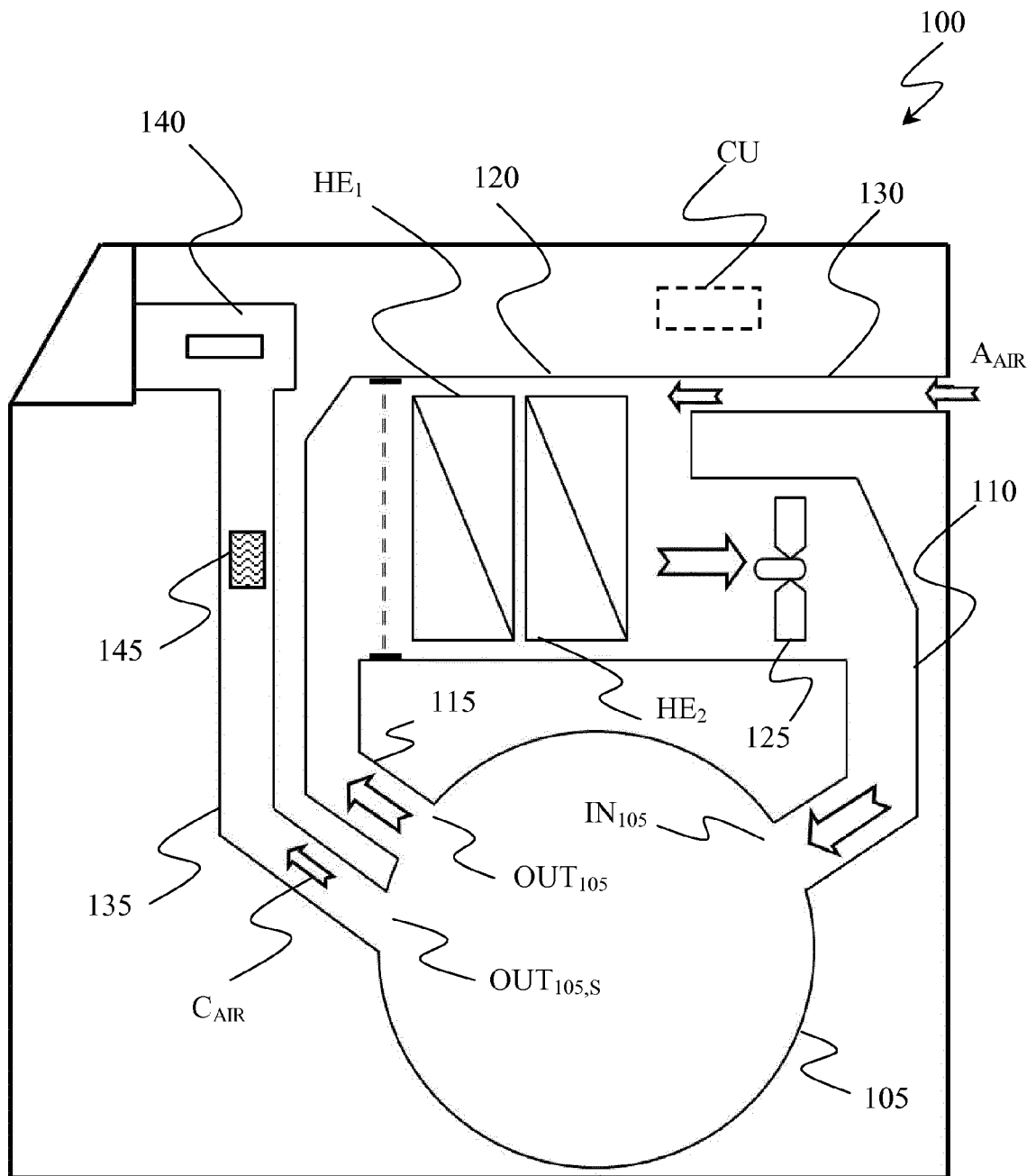


Figure 1

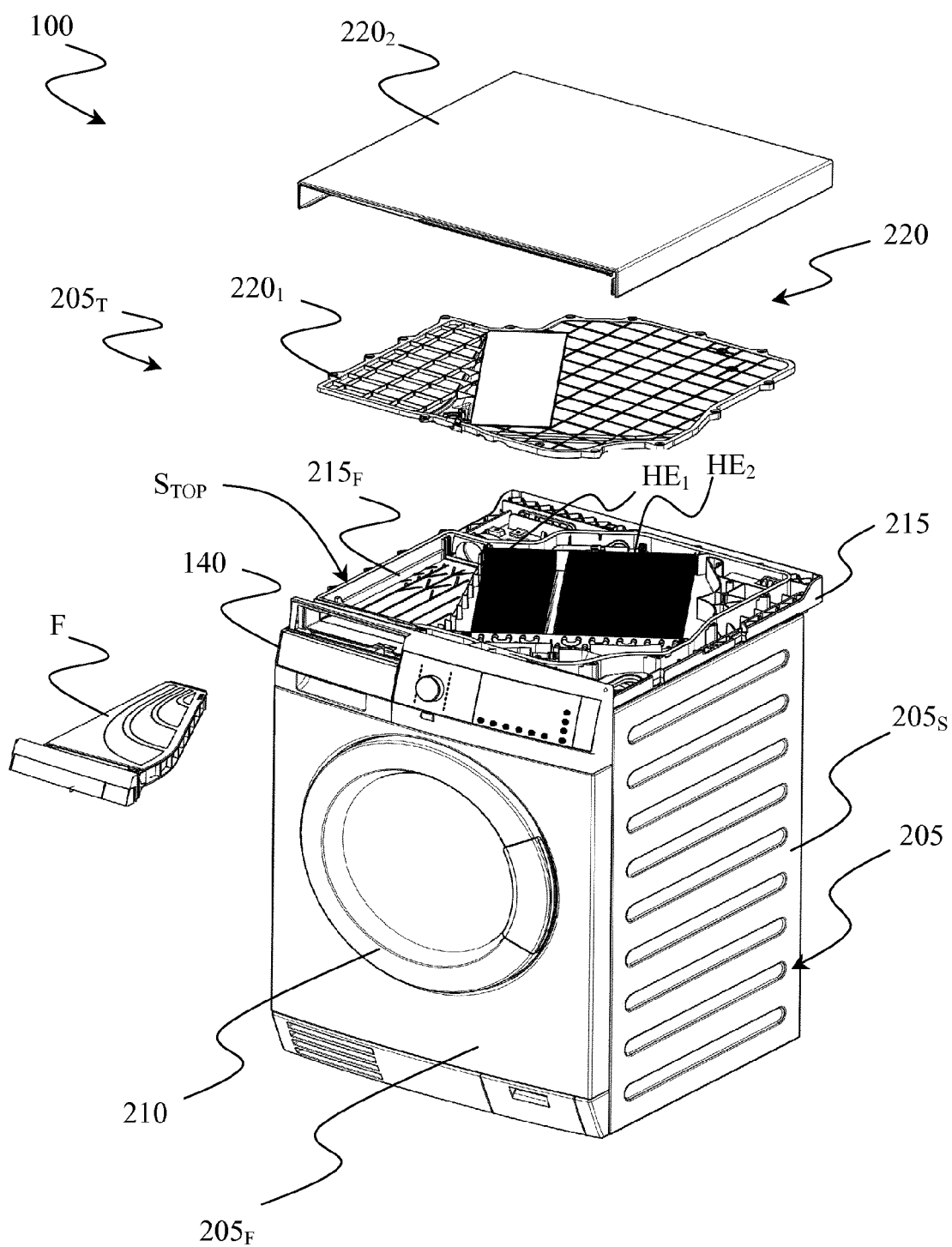


Figure 2A

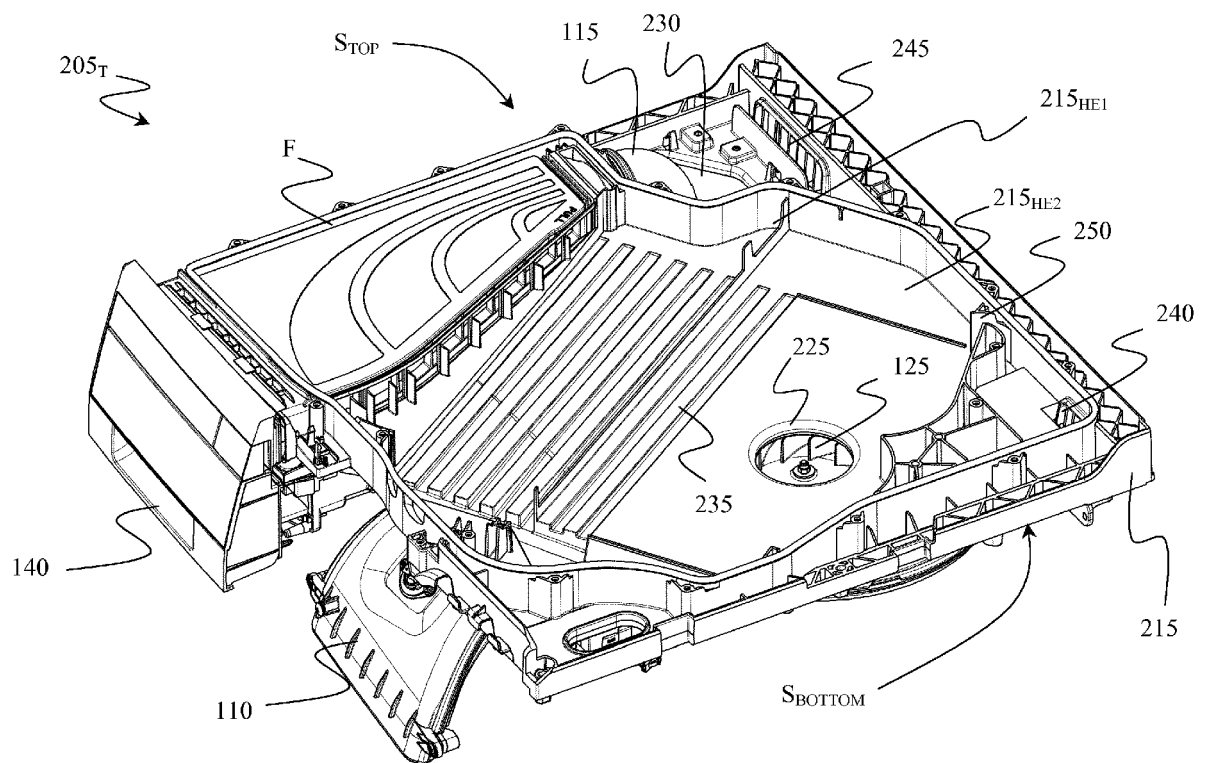


Figure 2B

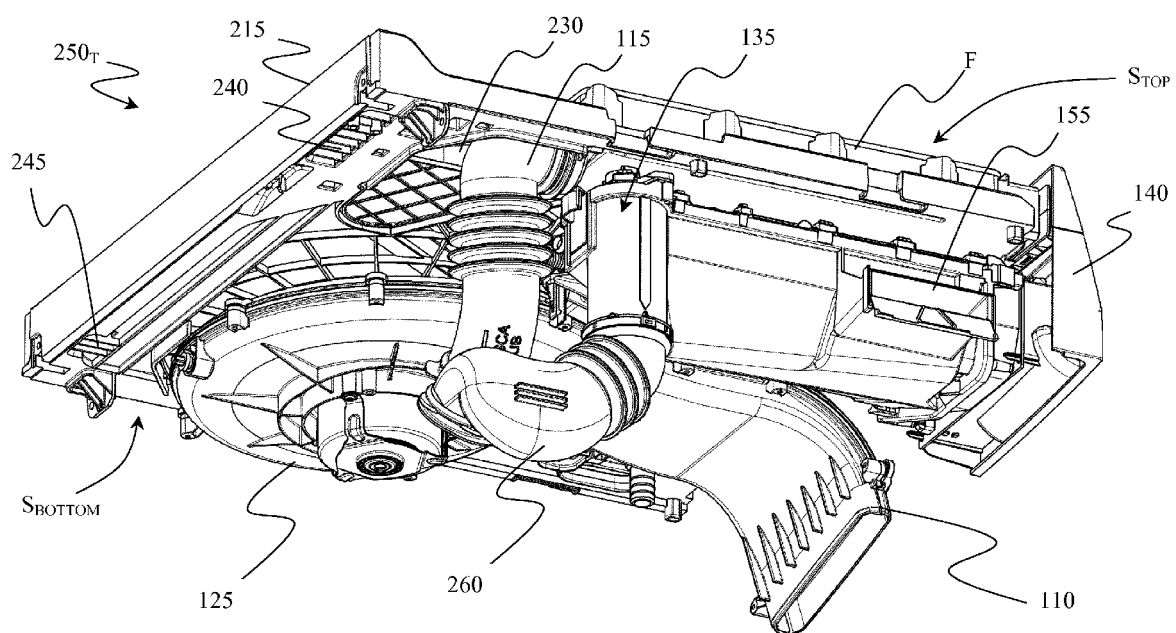


Figure 2C

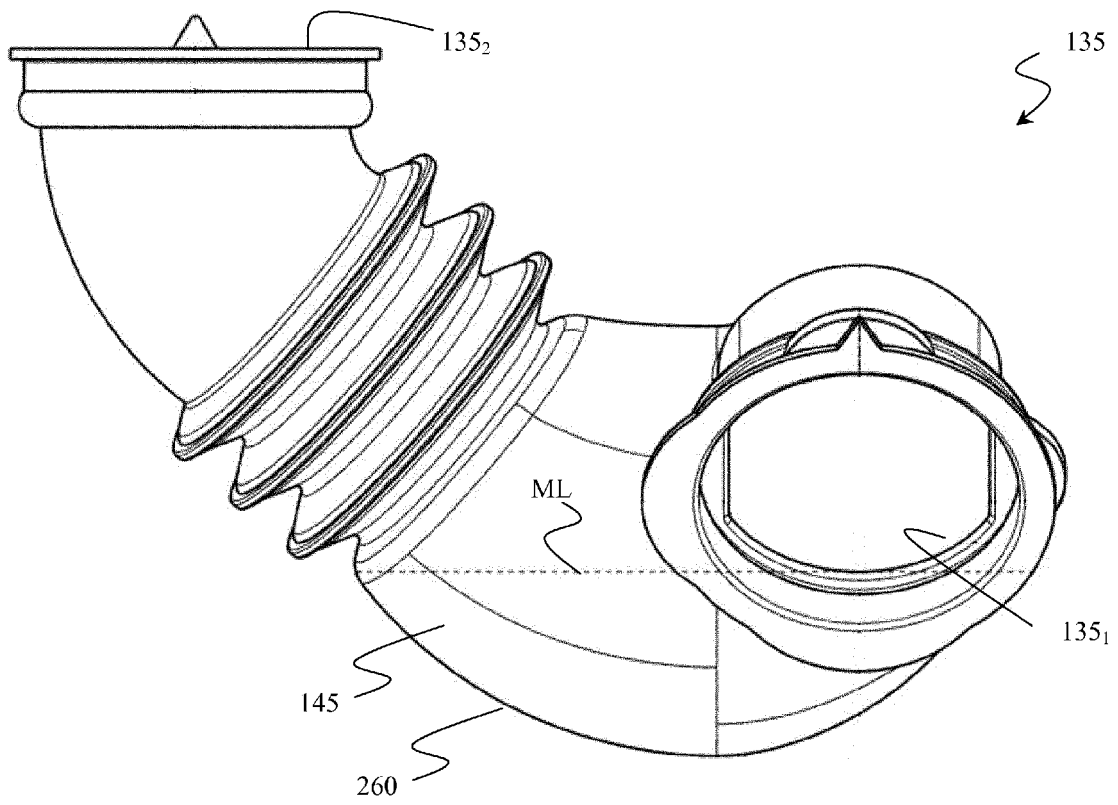


Figure 2D



## EUROPEAN SEARCH REPORT

Application Number  
EP 13 18 2333

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| Munich                                                                                                                                                                                                                     |                                                                                    | 13 February 2014                                                                                                                                                                                                                                                                            | Diaz y Diaz-Caneja                      |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                                |                                                                                    | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or<br>after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding<br>document |                                         |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another<br>document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                    |                                                                                                                                                                                                                                                                                             |                                         |

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