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(54) **Support device for air filters for drying or washing/drying machines, air filter for drying machines or washing/drying machines provided with said support device and drying or washing/drying machine provided with said filter**

(57) Support device for perfuming cartridges for air filters for drying machines or washing/drying machines, comprising: a supporting structure (210) adapted to support at least one perfuming cartridge (220, 230, 235),

wherein said support structure (210) is adapted to be assembled in a removable way to an air filter (1) of a drying or washing/drying machine (100).

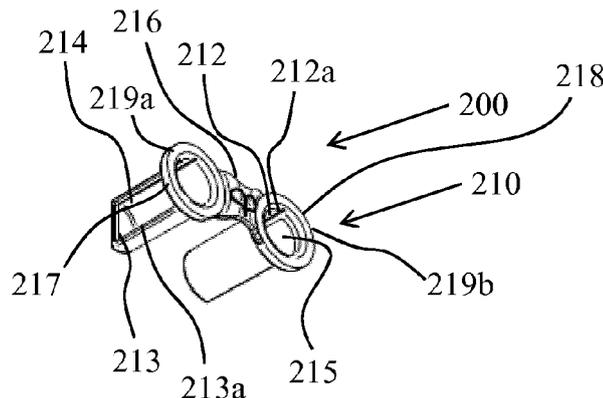


FIG. 4a

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Description**[FIELD OF THE INVENTION]**

[0001] The present invention relates to a support device, particularly adapted to support perfuming cartridges for air filters of drying or washing/drying machines.

[0002] The present invention also relates to an air filter for drying or washing/drying machines provided with such support device, as well as a drying or washing/drying machine, comprising said air filter.

[PRIOR ART]

[0003] The drying machines are known per se and normally comprise a drum in which are accommodated the clothes that are dried by an air flow generated by a fan and heated by an electrical resistor or a condenser device in a machine with heat pump.

[0004] The hot air flow passes through the clothes in the drum, subtracting the moisture, and then passes through a filter to remove any possible impurities or fluff in the airflow.

[0005] Moreover, the said air flow passes through a heat exchanger, where it cools as a result of the heat exchange with more fresh ambient air, and condenses releasing water that flows into a drip tray usually placed in the bottom part of the machine; from the drip tray, the water is carried by a pump into a removable container normally located in the upper part of the machine, in an easily accessible position by a user, which provides for removal and the periodic emptying of said container.

[0006] It is clear that the drying machines known to the state of the art may also be devoid of the drip tray; in such cases, they present only the container for collecting the condensed water, said container being usually placed in the bottom part of the machine itself.

[0007] Machines are also known in which the moist air coming from the drum does not condense, but it is discharged outside the machine.

[0008] As a result, the drying machines known to the state of the art comprise:

- a frame that accommodates a drum for the containment of the clothes to dry,
- first means for the passage through the drum of heated air,
- a filter to remove impurities or fluff in the air flow coming from the drum.

[0009] In addition, these drying machines can also include heat exchanger means crossed by the air coming from the drum, which can be optionally associated with a container for collecting the condensed water.

[0010] In particular, it is known a filter to eliminate impurities or fluff in the air flow so formed as to have a structure such as to contain a filter element. Usually, this filter has an opening that allows to facilitate the entrance

into the filter of the entire air flow coming from the drum, in such a way as to obtain the elimination of impurities or fluff in such airflow. Furth more, this filter is generally shaped in such a way as to be placed inside a dedicated housing of the machine, usually formed below the inlet of the drum.

[0011] The italian utility model application n. T02010U000184, in the name of the same Applicant, describes a filter to remove impurities or fluff in the air flow of a drying machine, said filter comprising a first frame and a second frame which contain within them a filter element, said first and second frame being connected to each other along respective first adjacent edges so that the filter can be opened in a book-like fashion, said first and second frame comprising respective second edges with strips, each of said strips comprising a grabbing hole and coupling means which allow to maintain in a closed condition the filter.

[0012] The Applicant has realized that it would be desirable to associate to the air filters for drying and washing/drying machines a perfuming system, so as to perfume the air used for drying the clothes and make more pleasant the sensation of wearing said clothes once completed the drying step.

[0013] The Applicant has also realized that the clothes perfume during the drying is particularly pleasant and convenient for the clothes that must then be stored for periods of time more or less long, in drawers or closets.

[PURPOSE AND ABSTRACTS OF THE INVENTION]

[0014] Aim of the present invention is therefore to provide a support device, in particular adapted to support cartridges such as perfuming cartridges for air filters of drying or washing/drying machines that has a simple and low cost structure and, at the same time, does not require substantial changes to the structure of the filter to be used.

[0015] This and further aims are substantially achieved by a support device as described in the attached claims.

[0016] The basic idea of the present invention relates to the arrangement of a support device for air filter for drying or washing/drying machines, comprising a support structure adapted to support at least one perfuming cartridge, wherein said support structure is adapted to be mounted in a removable way to an air filter of a drying or washing/drying machine.

[0017] Preferably said support structure is adapted to engage into at least one grabbing hole of said filter.

[0018] Preferably said support structure has at least one guide portion; in particular, said guide portion may advantageously comprise at least one groove, for slidably inserting/extracting said at least one cartridge.

[0019] Preferably said support structure comprises:

- a first housing portion for housing a first perfuming cartridge;

a second housing portion for housing a second perfuming cartridge;
 a connecting portion for connecting said first and second housing portion.

[0020] Preferably said filter comprises two separable frames for opening said filter, each one having a respective grabbing hole, each one of said housing portions being associated with a respective one of said grabbing holes when said device is mounted to said filter.

[0021] Preferably, when the device is mounted to said filter, said connecting portion extends across a line of separation of the frames of said filter.

[0022] Preferably said support structure comprises at least an engaging portion with said filter, said engaging portion being associable with said filter by inserting at least a part of the device towards the inside of said filter from the outside thereof.

[0023] Preferably said engaging portion comprises at least one collar adapted to be coupled to said at least one grabbing hole of said filter.

[0024] Preferably said support structure comprises at least one engaging portion for engagement with said filter, said engaging portion being associable with said filter by inserting at least a part of the device towards the outside of said filter from the inside thereof.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0025] Some examples of preferred and advantageous embodiments are described for purely illustrative purposes and not limiting, with reference to the attached drawings, in which:

- figure 1 shows a block diagram of a drying machine according to the invention;
- figures 2a and 2b represent, respectively, a first and a second perspective view of a filter for removing impurities or fluff present in the air flow of the drying machine of figure 1;
- figures 3a and 3b are respectively a perspective view of a first and a second detail of the filter of figures 2a and 2b;
- figure 4a shows a schematic perspective view of a first embodiment of a support device according to the invention;
- figures 4b-4c show schematic perspective views of an air filter for drying or washing/drying machines in which the support device of figure 4a is mounted;
- figure 5a shows a schematic perspective view of a second embodiment of a support device according to the invention;
- figures 5b-5c show schematic perspective views of an air filter for drying or washing/drying machines in which the support device of figure 5a is mounted.

[DETAILED DESCRIPTION OF THE INVENTION]

[0026] With reference to the attached figures, with 200 has been generally indicated a support device according to the invention; with 1 has been indicated a filter according to the invention and with 100 has been indicated a drying machine according to the invention.

[0027] The following description will refer to, for purely illustrative purpose, a drying machine. However, it should be noted that the invention also extends in a similar manner to a washing/drying machine.

[0028] The drying machine 100 comprises a casing 101 which houses a drum 102 for containing clothes (not shown) to dry, said drum 102 being accessible from the outside through a door 103 provided usually with gaskets (not shown).

[0029] In addition, the drying machine 100 includes first means 104, 105 for the passage of heated air inside of said drum 102. In particular, said first means can comprise an electrical resistor 104 and a fan 105 (as shown in figure 1), or a heat pump.

[0030] The drying machine 100 also comprises second means 106 heat exchangers crossed by the air coming from the drum 102; preferably, said second means comprise an exchanger 106 where the moist air coming from the drum 102 condenses.

[0031] The drying machine 100 moreover comprises at least one container 107 for collecting the condensed water produced by said heat exchanger second means 106.

[0032] In particular, at the outlet of the drum 102 moist air passes through a filter 1 to eliminate the impurities or fluff in the air flow; then the hot and moist air is cooled by heat exchange with fresh air (normally at ambient temperature) in said second means 106, said fresh air possibly being carried by a second fan (not shown in figure 1).

[0033] The condensed water into a drip tray 108 is pumped by a pump 109 in the container 107, where it is collected. However, it is clear that the drying machine 100 according to the present invention may also have the container 107 in the bottom part of the machine 100; in this case, the drying machine 100 can also be devoid of the drip tray 108 and/or pump 109.

[0034] If the machine 100 provided for a vented drying process, there would not be condensation of the moist air and the machine would not then be provided with the drip tray 108, the pump 109 and the container 107. The moist air would be in fact evacuated outside the machine through adapted canalization.

[0035] The just described one is a basic schematic description of a drying machine, adapted to understand how it works; in reality the drying machine 100 may be provided with further components that in this description are omitted for simplicity.

[0036] Figures 2a and 2b represent, respectively, a first and a second perspective view of the filter 1, which the support device 200 according to the invention (not shown in figures 2a, 2b) can be applied to.

[0037] In these figures it can be seen that the filter 10 comprises a first frame 10 and a second frame 20 which contain within a filter element F (schematically represented only in figure 2a), for example comprising a small fine net of porous plastic material, said first 10 and second frame 20 being connected to each other along respective first adjacent edges 11, 21 so that the filter 1 can be opened in a book-like fashion.

[0038] Substantially, the connection along said first edges 11, 21 allows to said first 10 and second frame 20 to rotate around a Xaxis, shown in figure 2b with a dash-dot line.

[0039] The particular shape of the filter 1 according to the present invention facilitates the removing operations of impurities or fluff collected within said filter 1; in fact, the possibility to open in a book-like fashion the filter 1 allows easy extraction of the filter element F in order to recondition, in particular, by removing the impurities or fluff that it retained.

[0040] According to the present invention, the first 10 and second frame 20 comprise respective second edges 12, 22 provided with strips 13, 23, each of said strips 13, 23 comprising:

- a grabbing hole 14, 24;
- engagement means 15, 25 to keep in a closed condition the filter 1.

[0041] In particular, said closing position of the filter 1 is shown in figure 2a, while figure 2b shows the filter 1 in an opening position. Moreover, these figures show the first strip 13 comprising a first grabbing hole 14 and the second strip 23 comprising a second grabbing hole 24.

[0042] The particular embodiment described above of the filter 1 allows at the same time to facilitate the removal of the filter 1 from the housing in which it is located inside the drying machine 100, to facilitate the opening operations of the filter 1 and to facilitate the removing operations of impurities or fluff collected within the filter 1 itself.

[0043] In fact, the grabbing holes 14, 24 of said strips 13, 23 allow the user to insert the fingers in order both to remove filter 1 from the drying machine 100 and in order to obtain a disengagement of the engagement means 15, 25 and get the opening of the filter 1. In particular, in order to obtain this opening the user will be sufficient to carry out a mutual separation movement of the holes 14, 24 so as to obtain the release of said engagement means 15, 25.

[0044] In particular, said engagement means comprise:

- at least one protrusion 15 associated with the first strip 13 of the first frame 10;
- at least a recess 25 formed on the second strip 23 of the second frame 20, said recess 25 being adapted to receive the protrusion 15 of the first strip 13 of the first frame 10.

[0045] In figures 3a and 3b, which respectively represent a perspective top view of the first frame 10 (and the first strip 13) and a perspective bottom view of the second frame 20 (and the second strip 23), said at least one protrusion 15 and at least one recess 25 can be observed with greater precision.

[0046] In particular, from figures 2b, 3a and 3b can be seen that said at least one protrusion 15 is associated with a free end 13E of the first strip 13 and said at least one recess 25 is associated with a free end 23E of the second strip 23.

[0047] Preferably, said at least one protrusion 15 is formed on a upper face 13S of the first strip 13, in particular next to the free end 13E of the first strip 13; in a complementary way, said at least one recess 25 is formed on a lower face 23I of said second strip 23, in particular next to the free end 23E of the second strip 23.

[0048] It is clear that the first 13 and second strip 23 can comprise a plurality of protrusions 15 and/or recesses 25; in addition, each of said first 13 and second strip 23 can comprise one or more protrusions 15 and/or one or more recesses 25.

[0049] In a preferred embodiment, said first 13 and second strip 23 comprise corresponding parts 16, 26 that allow to maintain the correct alignment between the first 10 and second frame 20 when the filter 1 is closed (as shown in figure 2a). In particular, the corresponding parts comprise:

- an opening 16 formed on the first strip 13, in particular next to the free end 13E of the first strip 13;
- a tooth 26 formed on the second strip 23 and adapted to be inserted in said opening 16, in particular, said tooth 26 being formed next to the free end 23E of the second strip 23.

[0050] In addition, the first 13 and second strip 23 may be realized as a single piece respectively with said first 10 and second frame 20, for example during the molding operations of said first 10 and second frame 20, which are usually made of plastic material such as, for example, polypropylene approximately 30% talc filled; alternatively, said first 13 and second strip 23 may be realized separately from the first 10 and second frame 20 and then be associated with them.

[0051] Preferably, said first 13 and second strip 23 are positioned substantially perpendicularly to said first 10 and second frame 20.

[0052] In a preferred realization, the free ends 13E, 23E of said first 13 and second strip 23 are wavy type, in such a way as to increase the mutual contact surface.

[0053] In addition, each of said strips 13, 23 has a plurality of slots 17, 27, in particular in order to allow adequate air flow coming from the drum 102 of the drying machine 100.

[0054] Preferably, the filter 1 has a substantially V-shaped section, that is to say, it is realized in such a manner as to have a maximum size in correspondence

of said second edges 12, 22 and/or of said strips 13, 23, the size of said filter 1 shrinking more and more until reaching a minimum value next to said first edges 11 and 21.

[0055] For this purpose, preferably the first 10 and/or the second frame 20 have side walls 18, 28 (visible in particular in figures 2b, 3a and 3b) that shrink next to said first edges 11, 21.

[0056] In the attached drawings, the strips 13, 23 are associated with said first 10 and second frame 20 at opposite ends with respect to first edges 11, 21; however, it is clear that it is not necessary that said second edges 12, 22 correspond to the ends of said first 10 and second frame 20 opposite with respect to first edges 11, 21. As a result, it is clear that the strips 13, 23 can be associated to different points with respect to the ends of said first 10 and second frame 20.

[0057] As can be seen in particular in figure 1, the filter 1 is positioned below the opening that can be occluded from door 103 of the drying machine 100, in such a way as to be easily accessible by a user as a result of the opening of said door 103; preferably, said filter 1 is housed in a duct C for the recirculation of air inside the drying machine 100.

[0058] According to the invention, the filter 1 may be associated with one or more cartridges (such as perfuming cartridges) by means of a adapted support device 200 in order to perfume the air introduced into the drum 102 and give therefore a perfume particularly pleasant to cloths loaded in the drum 102 itself.

[0059] The device 200 (figures 4a-4c, 5a-5c) comprises a support structure 210 adapted to support a perfuming cartridge 220, 230, 235 housed in said support structure 210.

[0060] The perfuming substance contained in the at least one perfuming cartridge 220, 230, 235 may be present in liquid form confined by at least one wall permeable to the perfume particles released from said perfuming substance. Alternatively the perfuming substance may be in solid form, in gel form or even in powder form.

[0061] In the case of perfuming substance in liquid form or gel form with permeable wall, the walls adjacent to the support are impermeable to said particles, while the free wall, that is the wall facing the internal cavity defined by the frames 10, 20 is made of permeable material.

[0062] From the point of view of the manufacturing process of perfuming cartridge, note the following.

[0063] It is preferably realized a containment shell by thermoforming, having open structure delimited by impermeable walls. This structure is then filled with a perfuming substance, for example in liquid form or in gel form. Said open structure is then closed by gluing a closure wall of permeable material. To the closing wall is finally applied a protective film; the latter is meant to prevent the perfuming substance will be dispersed before the device is mounted to a filter and should carry out its perfuming action. The protective film must be removed by the user just before the perfuming action should be

carried out that is, for example, just before or just after the mounting of the device to support 200 on the filter 1.

[0064] Advantageously, the support structure 210 is adapted to be mounted in a removable manner to the filter 1.

[0065] In particular, the support structure 210 is adapted to engage at least one of said grabbing holes 14, 24 of the filter 1.

[0066] In the preferred embodiment, the support structure 210 has at least one guide portion 212, 213, preferably comprising at least one groove 212a, 213a, for slidably inserting/extracting the at least one cartridge 220, 230.

[0067] The at least one groove 212a, 213a may include, for example, at least two sections, each adapted to house a respective edge of the at least one cartridge 220, 230.

[0068] In one embodiment, the support device 200 is adapted to support two perfuming cartridges 220, 230. In this embodiment the support structure 210 includes:

a first housing portion 214 for housing the first perfuming cartridge 220;

a second housing portion 215 for housing the second perfuming cartridge 220;

a connecting portion 216 for connecting said first and second housing portion 214, 215.

[0069] In use, that is when the device 200 is mounted to the filter 1, each housing portion 214, 215 is associated with a respective one of said grabbing holes 14, 24.

[0070] In particular, to associate the support device 200 to the filter 1, the housing portions 214, 215 may be inserted, particularly from the top, into the respective grabbing holes 14, 24.

[0071] In this embodiment, when the device 200 is mounted to the filter 1, the connecting portion 216 extends across a line of separation Z of the frames 10, 20.

[0072] By way of example, the connecting portion 216 may be realized as a substantially plate-like element, that extends on a plane which is substantially orthogonal to a predominant development direction of said housing portions 214, 215. For example, in use, the housing portions 214, 215 are disposed along a substantially vertical direction, while the connection portion 216 extends substantially along a horizontal plane. The connecting plate-like element 16 conveniently presents a slightly curved shape that, advantageously, is sufficiently distant from the filter to allow the grab by the user and at the same time is not too far away from the filter to avoid protrude excessively and to intercept and damage the clothes that move into the inside of the drum during the drying.

[0073] Preferably, the support structure 210 includes at least one engaging portion 217, 218, 218a to said filter 1.

[0074] In one embodiment (Figures 4a-4c), this engaging portion 217, 218, can be associated with the filter 1 by inserting said engaging portion 217, 218 towards the

inside of the filter 1 from the outside thereof.

[0075] In particular, the at least one engaging portion 217, 218 comprises at least one collar 219a, 219b, adapted to be coupled with at least one of said grabbing holes 14, 24 of the filter 1.

[0076] In practice, it is initially inserted the at least one perfuming cartridge 220, 230, 235 in the respective support device 200. Subsequently the support device 200 is mounted to the filter 1 by inserting from the outside of the same filter 1 the at least one perfuming cartridge 220, 230, 235, in at least one respective grabbing hole 14, 24 of the filter 1 until the engaging portion 217, 218 (including for example the collar 219a, 219b) comes in contact with the profile defining the grabbing hole 14, 24. In addition to or in the alternative, the insertion may conclude when the connecting portion 216 comes in contact with the strips 13, 23.

[0077] This execution can be provided for both single cartridge support devices 20 and support devices adapted to support a pair of cartridges.

[0078] It should be noted that the cartridge (or cartridges) and the relative support must have such a shape and size to allow the insertion into the grabbing hole (or holes) 14, 24.

[0079] In one alternative embodiment, the engaging portion 218a is associated with the filter 1 by the insertion of a part of the device 200 towards the outside of the filter 1 from the inside thereof.

[0080] This alternative embodiment is preferably implemented in devices adapted to support a single perfuming cartridge 235.

[0081] Preferably, as schematically shown in figures 5a -5c, the engaging portion 218a may comprise an engaging portion 218b adapted to be secured to the profile of one of the holes 14, 24 of the filter 1.

[0082] By way of example, the engaging portion 218a can be realized with snap/bayonet engagement.

[0083] In the case where the single cartridge solution is provided, it is expected a possible increase in the size of the same (for example an increase in axial length) so as to give a similar capacity and a similar duration of devices equipped with dual cartridge.

[0084] It should be noted that the single cartridge solution has at least the following advantages:

- a) the filter 1 can be quickly and easily removed, without the support device 200 and the cartridge prevent or impede this operation;
- b) after removal, the filter 1 can be opened (for example to perform a cleaning of the same) without necessarily removing the support device 200 and/or the respective cartridge; therefore also the opening operation of the filter can be carried out in a quick and simple way.

[0085] Advantageously, the support device 200 according to the invention, when it is associated with adapted cartridges, is able to effectively perfume the air intro-

duced into the drum for at least 40 cycles.

[0086] In practice, the support structure 210 is made of one piece of plastic material. It is also possible to provide that, properly modifying the geometry of the support structure 210, the latter can be molded with the first and/or second frame 10, 20 of the filter 1.

[0087] In the light of the above mentioned, it is clear that the support device according to the invention, when it is associated with appropriate cartridges, allows to perfume in an effective and homogeneous manner the clothes loaded in the machine, without requiring any structural changes to the filter itself.

[0088] Therefore important advantages are achieved under the profile of the simplicity of its construction, the economy of realization and adaptability/associability to filters already existing and available on the market.

Claims

1. A support device for drying or washing/drying machines, comprising: a support structure (210) adapted to support at least one cartridge, preferably at least one perfuming cartridge (220, 230, 235), wherein said support structure (210) is adapted to be removably mounted to an air filter (1) of a drying or washing/drying machine (100).
2. A device according to claim 1, wherein said support structure (210) is adapted to engage into at least one grabbing hole (14, 24) of said filter (1).
3. A device according to claim 1 or 2, wherein said support structure (210) has at least one guide portion (212, 213), preferably comprising at least one groove (212a, 213a), for slidably inserting/extracting said at least one cartridge (220, 230).
4. A device according to any one of the preceding claims, wherein said support structure (210) comprises:
 - a first housing portion (214) for housing a first perfuming cartridge (220);
 - a second housing portion (215) for housing a second perfuming cartridge (230);
 - a connecting portion (216) for connecting said first and second housing portions (214, 215).
5. A device according to claim 4, wherein said filter (1) comprises two separable frames (10, 20) for opening said filter (1) in a book-like fashion, each one having a respective grabbing hole (14, 24), each one of said housing portions (214, 215) being associated with a respective one of said grabbing holes (14, 24) when said device (200) is mounted to said filter (1).
6. A device according to claim 4 or 5, wherein, when

said device (200) is mounted to said filter (1), said connecting portion (216) extends across a line of separation (Z) of the frames (10, 20) of said filter (1).

7. A device according to claim 2 or to any one of claims 3 to 6 when dependent on claim 2, wherein said support structure (210) comprises at least one engaging portion (217, 218) for engagement with said filter (1), said engaging portion (217, 218) being associable with said filter (1) by inserting at least a part of said device (200) towards the inside of said filter (1) from the outside thereof. 5
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8. A device according to claim 7, wherein said at least one engaging portion (217, 218) comprises at least one collar (219a, 219b) adapted to be coupled to said at least one grabbing hole (14, 24) of said filter (1). 15

9. A device according to claim 2 or to any one of claims 3 to 6 when dependent on claim 2, wherein said support structure (210) comprises at least one engaging portion (218a) for engagement with said filter (1), said engaging portion (218a) being associable with said filter (1) by inserting at least a part of said device (200) towards the outside of said filter (1) from the inside thereof. 20
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10. A device according to claim 9, wherein said engaging portion (218a) comprises an anchoring element (218b) to be secured to the perimetric profile of at least one of said grabbing holes (14, 24). 30

11. An air filter (1) for drying or washing/drying machines (100), comprising a support device (200) according to any one of the preceding claims. 35

12. A machine (100) adapted to carry out at least one drying cycle, said machine (100) being a drying machine or a washing/drying machine, comprising a filter (1) according to claim 11. 40

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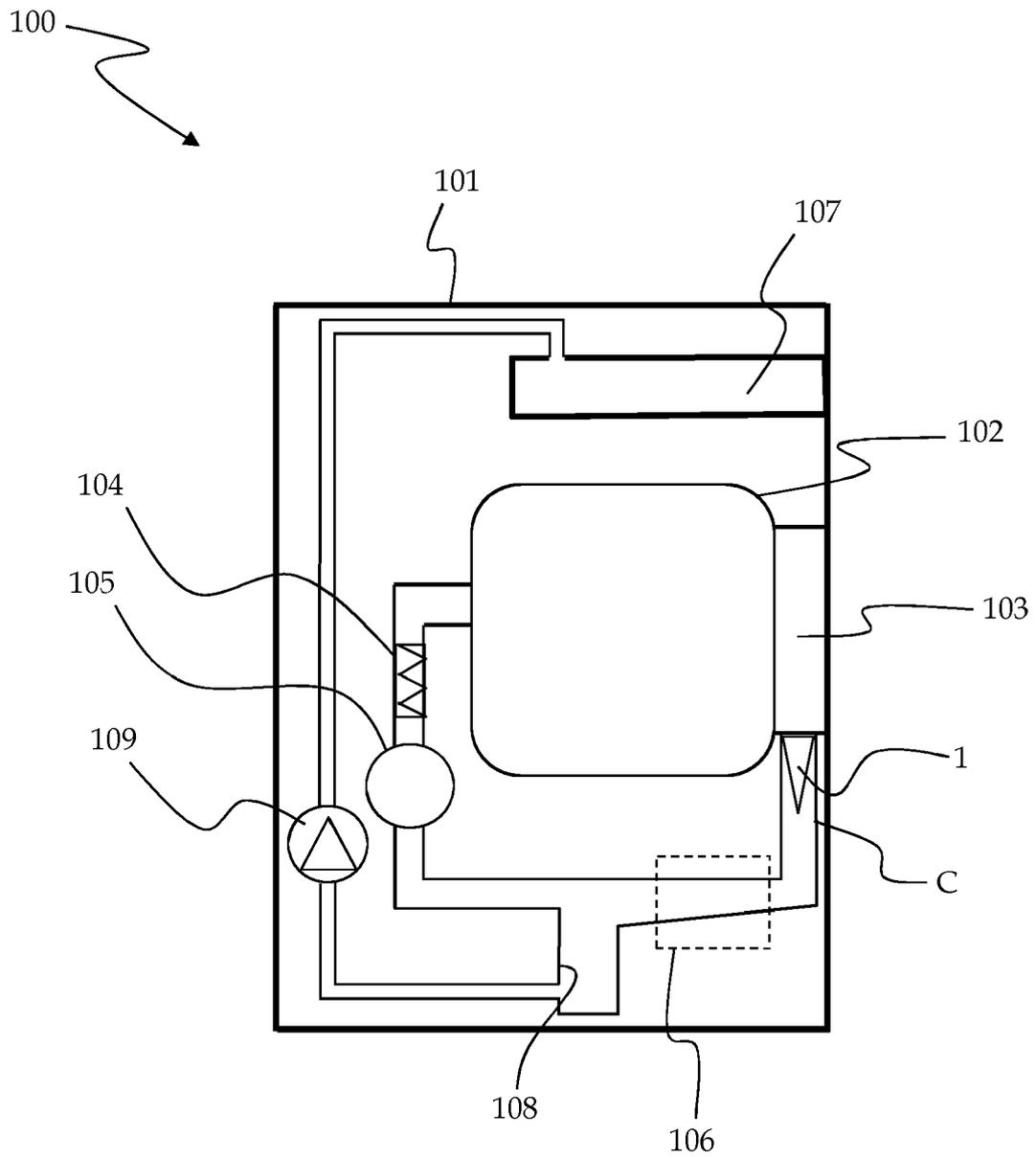


Fig. 1

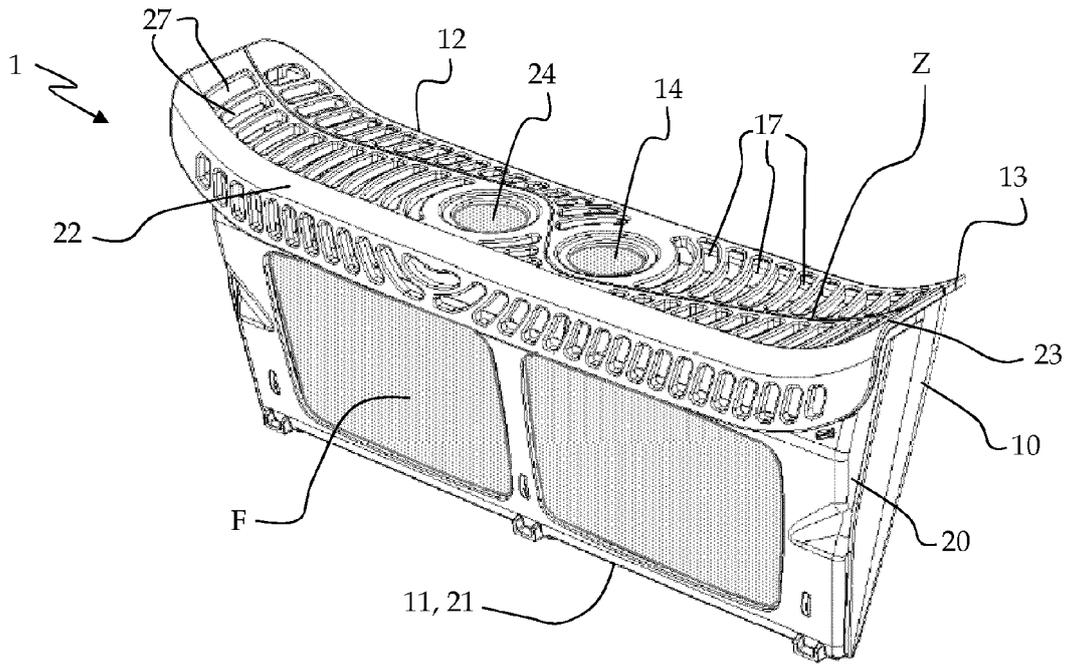


Fig. 2a

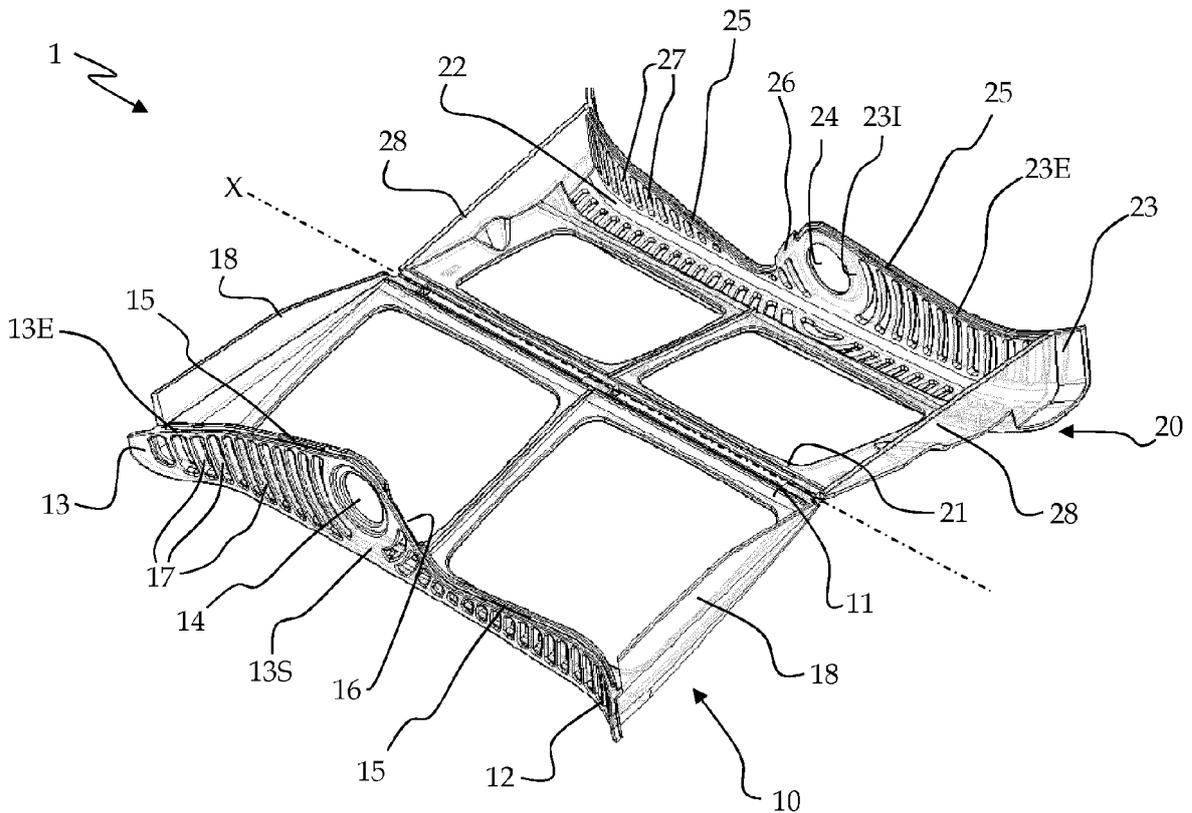


Fig. 2b

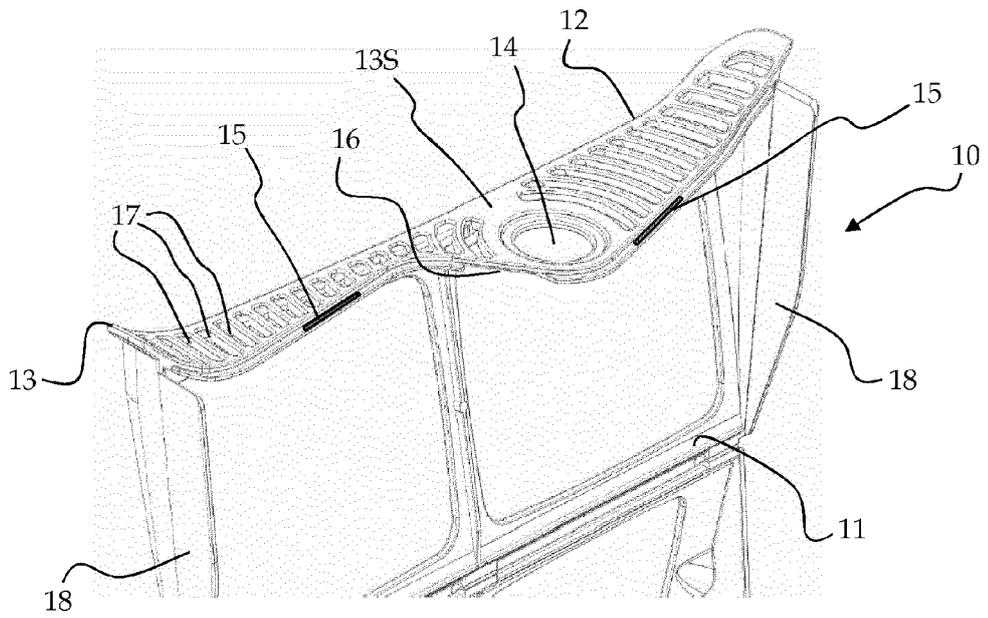


Fig. 3a

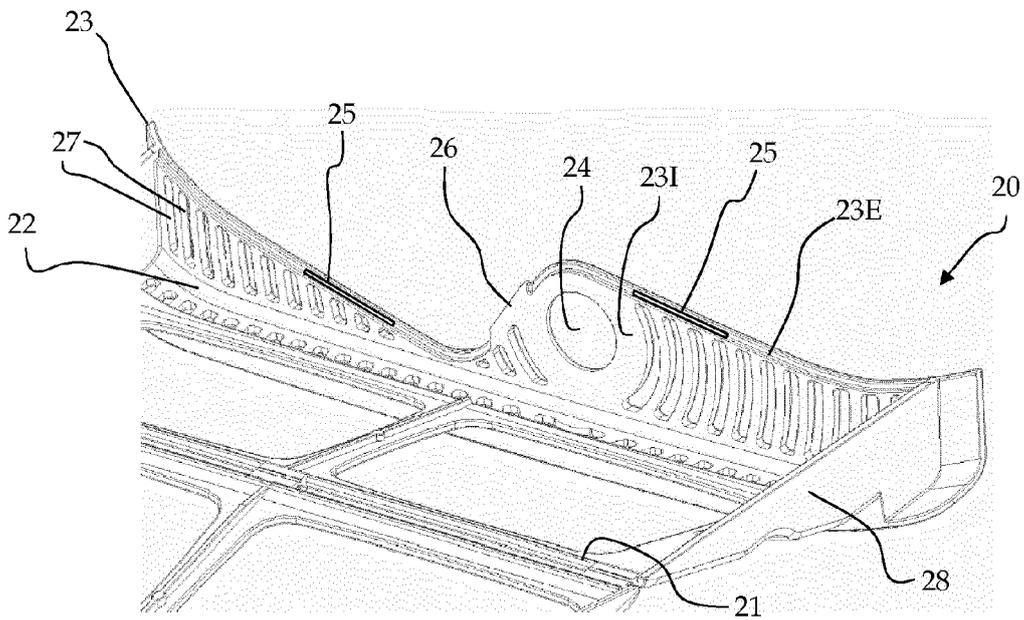


Fig. 3b

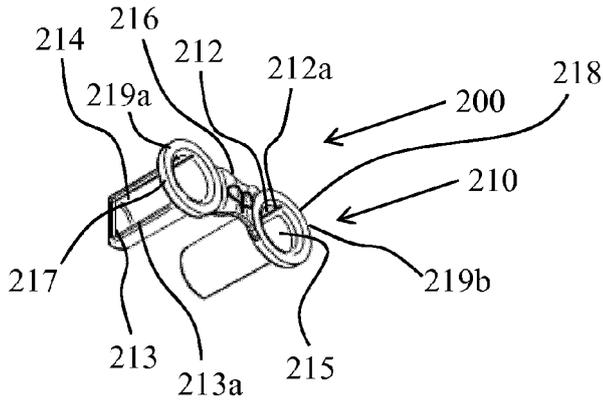


FIG. 4a

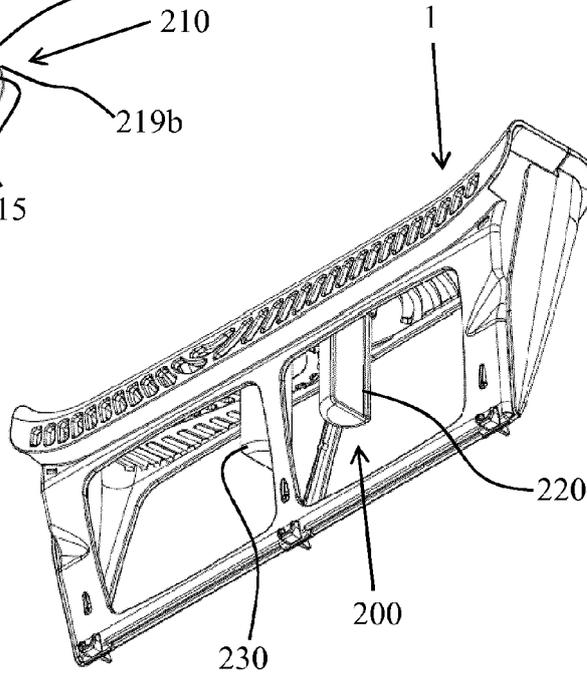


FIG. 4b

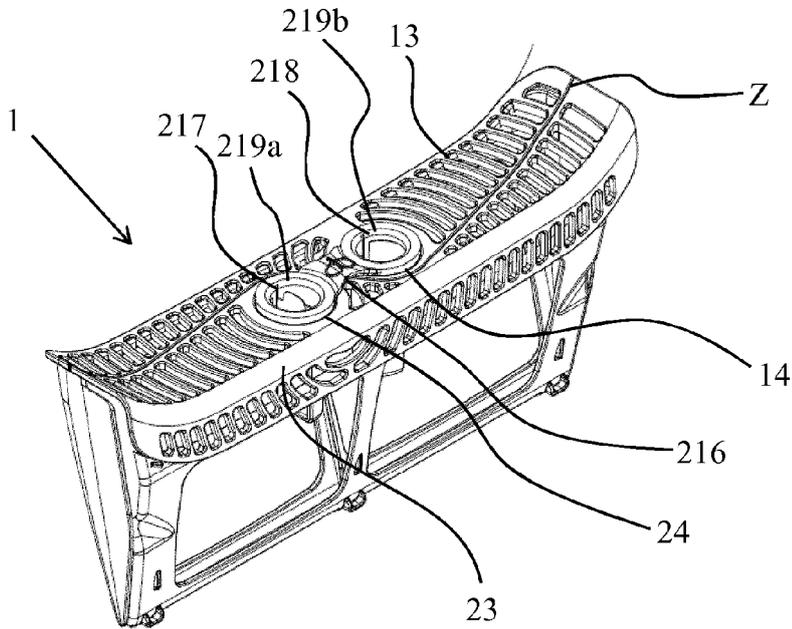


FIG. 4c

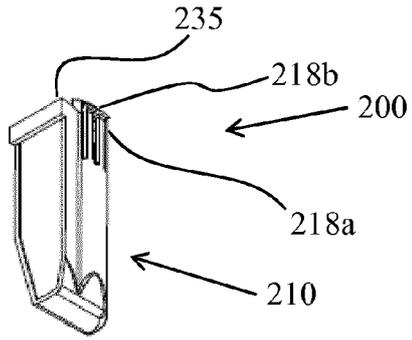


FIG. 5a

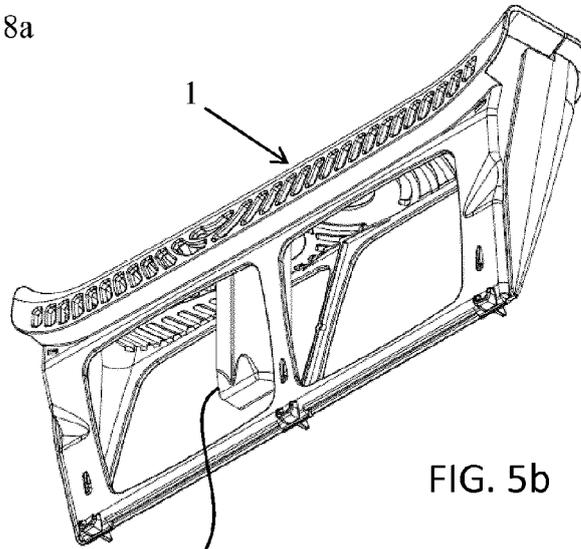


FIG. 5b

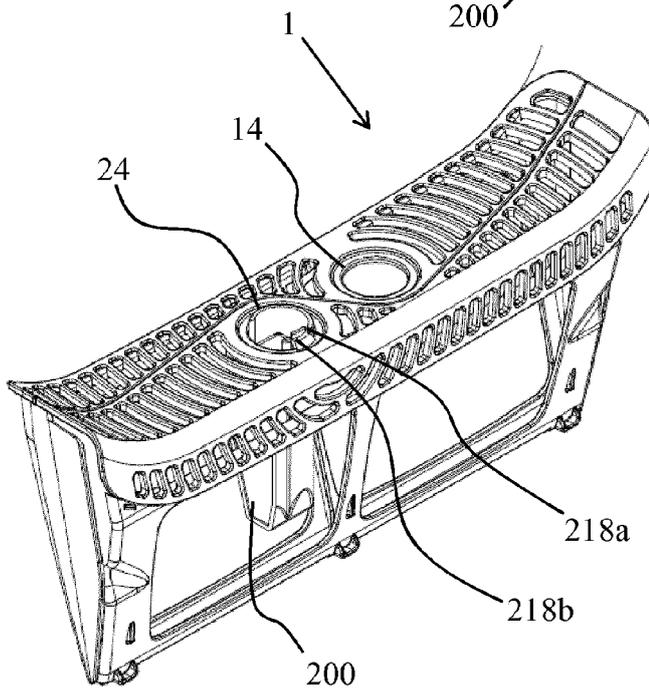


FIG. 5c



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