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(54) **Rotary-drum laundry dryer**

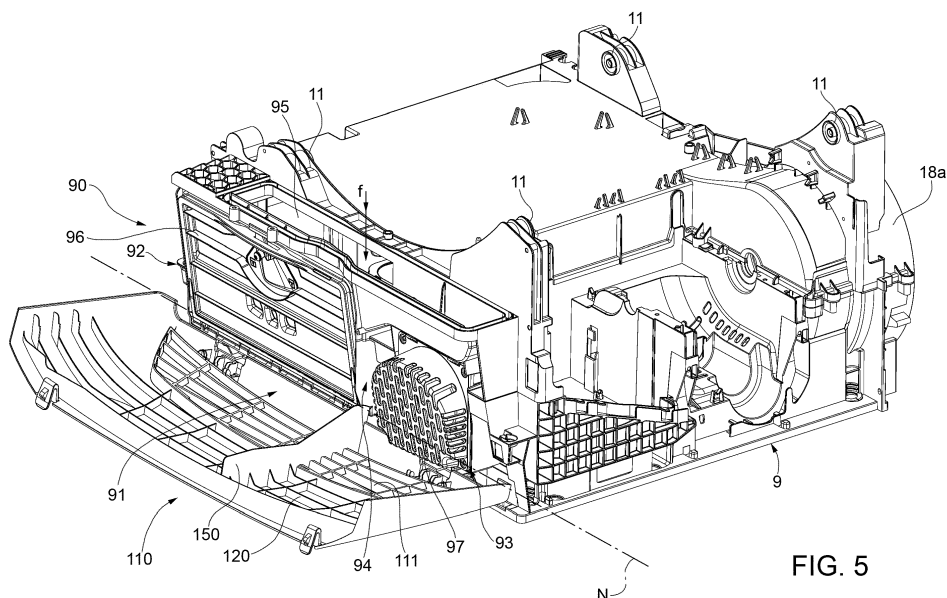
(57) "A Rotary-drum laundry dryer (1) comprising a cabinet (10) containing a revolving drum (3) structured for housing the laundry to be dried, a hot-air generator (6) structured to circulate a stream of hot air through said revolving drum (3), and a lower supporting base (9) which is structured for resting on the floor and for housing at least part of the hot-air generator (6).

The hot-air generator (6) in comprising: an air recirculating conduit (12) having its two ends connected to the revolving drum (3); air circulating means (13) which are located along the air recirculating conduit (12) and are structured to produce, inside the air recirculating con-

duit (12), an airflow (f) which flows through the revolving drum (3) and over the laundry inside the drum (3).

A lower supporting base (9) comprises a front chamber (93), which houses a cooling fan assembly (96), said front chamber (93) being closed by a first protection covering element (97).

The rotary-drum laundry dryer (1) is characterized by the fact it comprises a second protection covering element (110) of the cooling fan assembly (96); the second protection covering element (110) being superposed to the first protection covering element (97)."



**FIG. 5**

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## Description

**[0001]** The present invention relates to a rotary-drum laundry dryer.

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

**[0003]** It is well known in the art that today's rotary-drum home laundry dryers comprise: a substantially parallelepiped-shaped outer boxlike casing able to rest on the floor; a substantially cylindrical revolving drum able to house the laundry to be dried, and in turn which is housed in axially rotating manner inside the casing to rotate about its horizontally-oriented longitudinal axis, directly facing a laundry loading/unloading opening formed on the front wall of the casing; a door hinged to the front wall of the casing to rotate to and from a closing position in which the door rests completely against the front wall of the casing to close the laundry loading/unloading opening and airtight seal the revolving drum; and an electric motor assembly which rotates the revolving drum about its longitudinal axis inside the casing.

**[0004]** Home laundry dryers of the above kind are also provided with an open-circuit (or a closed-circuit), hot-air generator which is structured to circulate inside the revolving drum a stream of hot air having a low moisture content, and which flows through the revolving drum and over the laundry inside the drum to rapidly dry the laundry; and with an electronic central control unit which controls both the motor assembly and the hot-air generator to perform one of the user-selectable drying cycles stored in the same central control unit.

**[0005]** In today's high-end rotary-drum home laundry dryers, the hot-air generator is usually a closed-circuit, heat-pump type, hot-air generator that comprises: an air recirculating conduit presenting its two ends connected to the revolving drum, on opposite sides of the latter; an electrically-operated centrifugal fan located along the air recirculating conduit to produce, inside the latter, an air-flow which flows through the revolving drum; and finally a heat-pump assembly provided with two heat exchangers located one after the other, along the air recirculating conduit.

**[0006]** For instance, EP-2034084 discloses a heat-pump type, rotary-drum home laundry dryer of the aforementioned kind.

**[0007]** Normally, a rotary-drum home laundry dryer, in particular a dryer equipped with a heat pump, comprises an extra-fan assembly for cooling a component of the machine, in particular a part of the heat pump circuit. In particular, such an extra-fan assembly is used for cooling the compressor of the heat pump and/or an auxiliary heat exchanger. The extra-fan assembly is normally covered by a protection covering element formed on the front wall of a supporting base (socle), very often in a single, unitary piece therewith.

**[0008]** If this fan covering element is damaged such

an element no longer serves to protect the user against accidental contact with the fan or, conversely, to protect the fan from contacts with items that could damage it. Moreover, a damaged covering element would alter the aesthetics of the front wall of the dryer, and the replacement of the covering element would require the substitution of the entire front wall or the supporting base (socle) in case the protection covering element is made in a single, unitary piece with said front wall or the supporting base (socle).

**[0009]** Therefore, an aim of the present invention is to increase the safety of the rotary-drum home laundry dryer by introducing a special door (whose width is preferably substantially equal to the cabinet width) which covers in turn the covering element that protects the extra-fan assembly, and thus giving an improvement of the safety even in the case where the protection cover is accidentally damaged.

**[0010]** A further aim of the present invention is to simplify the maintenance of the rotary-drum home laundry dryer by making the extra-fan protection elements easily to be substituted.

**[0011]** Thus, according to the present invention, a rotary-drum laundry dryer is made according to what claimed in Claim 1 or in any other Claim directly or indirectly dependent from Claim 1.

**[0012]** A non-limiting embodiment of the present invention will now be described by way of example with reference to the accompanying drawings, wherein:

- Figure 1 shows in isometric view a rotary-drum home laundry dryer made in accordance with the teachings of the present invention;
- Figure 2 shows in isometric view, and with parts removed for the sake of clarity, a rotary-drum home laundry dryer made in accordance with the teachings of the present invention;
- Figure 3 shows an isometric view of the lower supporting base or socle of the laundry-dryer of Figure 1, with parts removed for the sake of clarity;
- Figure 4 shows an exploded isometric view, and with parts removed for the sake of clarity the lower supporting base or socle of the laundry-dryer illustrated in Figure 3;
- Figure 5 shows a partly-exploded isometric view, and with parts removed for the sake of clarity of an embodiment of the lower supporting base (or socle) of the laundry-dryer illustrated in Figures 3, 4;
- Figure 6 shows a further partly-exploded isometric view, and with parts removed for the sake of clarity of the embodiment illustrated in Figure 5;
- Figure 7 shows a first isometric view of a first covering element illustrated in the embodiment shown in figure 5, 6;
- Figure 8 shows a second isometric view of the first covering element illustrated in the embodiment shown in figure 5, 6;
- Figure 9 shows a third isometric view of the first cov-

ering element illustrated in the embodiment shown in figure 5, 6;

- Figure 10 shows a top view of the first covering element of Figures 7, 8, 9;
- Figure 11 shows a bottom view of the first covering element of Figures 7, 8, 9;
- Figure 12 shows a rear view of the first covering element of Figures 7, 8, 9;
- Figure 13 shows a front view of the first covering element of Figures 7, 8, 9;
- Figure 14 shows a right view of the first covering element of Figures 7, 8, 9;
- Figure 15 shows a left view of the first covering element of Figures 7, 8, 9;
- Figure 16 shows a top view of a second covering element of Figures 1, 2, 5, 6;
- Figure 17 shows a bottom view of the second covering element of Figures 1, 2, 5, 6;
- Figure 18 shows a rear view of the second covering element of Figures 1, 2, 5, 6;
- Figure 19 shows a front view of the second covering element of Figures 1, 2, 5, 6;
- Figure 20 shows a right view of the second covering element of Figures 1, 2, 5, 6;
- Figure 21 shows a left view of the second covering element of Figures 1, 2, 5, 6;
- Figure 22 shows a top view of an assembly comprising the first covering element and the second covering element;

**[0013]** With reference to Figures 1 and 2, number 1 indicates as a whole a preferably household, rotary-drum laundry dryer which comprises:

- a preferably, though not necessarily, parallelepiped-shaped outer boxlike casing 2 structured for resting on the floor;
- a substantially cylindrical, revolving drum 3 (Figure 2) structured for housing the laundry to be dried, and which is fixed in axially rotating manner inside the boxlike casing 2, directly facing a laundry loading/unloading through opening formed in the front wall of casing 2; and
- a porthole door 4 (Figure 2) hinged to the front wall of casing 2 to rotate about a preferably, though not necessarily, vertically-oriented reference axis, to and from a closing position in which the door 4 rests completely against the front wall to close the laundry loading/unloading opening and substantially airtight seal the revolving drum 3.

**[0014]** Inside the outer boxlike casing 2, the rotary-drum laundry dryer 1 additionally comprises an electric motor 5 which is mechanically connected to the revolving drum 3 for driving into rotation the drum 3 about its longitudinal axis; a closed-circuit, hot-air generator 6 which is structured to circulate through the revolving drum 3 a stream of hot air having a low moisture level, and which

flows over and rapidly dries the laundry located inside drum 3; and finally an electronic central control unit (not shown) which controls both the electric motor 5 and the hot-air generator 6 to perform one of the user-selectable drying cycles preferably, though not necessarily, stored in the same central control unit (not shown).

**[0015]** More specifically, with reference to Figure 2, the outer boxlike casing 2 comprises a substantially parallelepiped-shaped lower supporting base or socle 9 which is structured for resting on the floor and for housing at least part of the hot-air generator 6; and a substantially parallelepiped-shaped upper boxlike cabinet 10 which is rigidly fixed to the top of the lower supporting base or socle 9 and it is structured so as to house the revolving drum 3.

**[0016]** In the example shown, in particular, the revolving drum 3 preferably extends inside the boxlike cabinet 10 coaxial to a substantially horizontally-oriented longitudinal reference axis L, and rests on a number of substantially horizontally-oriented, front and rear idle supporting rollers 11 which are located in pairs substantially at the two axial ends of the revolving drum 3, and are fixed in free revolving manner to the casing 2 so as to allow the revolving drum 3 to freely rotate about its reference axis L inside the boxlike cabinet 10.

**[0017]** In the example shown, in particular, front and rear idle supporting rollers 11 are preferably fixed in free revolving manner directly to the top of the lower supporting base or socle 9.

**[0018]** Thus, the laundry loading/unloading opening of casing 2 is made in the front wall of the upper boxlike cabinet 10, and the porthole door 4 is hinged to the front wall of the aforesaid upper boxlike cabinet 10.

**[0019]** In addition to the above, the lower supporting base or socle 9 is also preferably structured so to directly support the electric motor 5.

**[0020]** With reference to Figures 1-5, the closed-circuit hot-air generator 6 instead preferably comprises a heat-pump which is envisaged for gradually drawing air from revolving drum 3; rapidly cooling down the wet air arriving from the revolving drum 3 so to extract and retain the surplus moisture in the air drawn from revolving drum 3; and then rapidly heating the dehumidified air to a predetermined temperature, normally higher than the temperature of the air coming from revolving drum 3; and finally feeding the heated, dehumidified air back into the revolving drum 3, where the air flows over the laundry inside the drum to rapidly dry said laundry.

**[0021]** In other words, with reference to Figure 3 hot-air generator 6 provides for continually dehumidifying and heating the air circulating inside revolving drum 3 to rapidly dry the laundry inside the drum, and basically comprises:

- an air recirculating conduit 12, the two ends of which are connected to the revolving drum 3 on opposite sides of the latter;
- a centrifugal fan 13 which is located along the air

recirculating conduit 12 to produce, inside the air recirculating conduit 12, an airflow *f* which flows through the revolving drum 3, over the laundry located inside the drum 3; and

- a heat-pump assembly 14 which is able to rapidly cool the airflow *f* coming out from revolving drum 3 for condensing and retaining the surplus moisture in the airflow *f*, and then to rapidly heat the airflow *f* returning back into revolving drum 3, so that the airflow *f* re-entering into revolving drum 3 is heated rapidly to a temperature higher than or equal to that of the airflow *f* coming out of the drum.

**[0022]** More specifically, with reference to Figure 3, the heat-pump assembly 14 comprises:

- a first air/refrigerant heat exchanger 15 which is located along the air recirculating conduit 12 and is structured for rapidly cooling down the airflow *f* arriving from revolving drum 3 to condense and restrain the surplus moisture in the airflow *f*;
- a second air/refrigerant heat exchanger 16 which is located along the air recirculating conduit 12, downstream of heat exchanger 15, and which is structured for rapidly heating the airflow *f* arriving from heat exchanger 15 and directed back to revolving drum 3, so that the airflow *f* re-entering into revolving drum 3 is heated rapidly to a temperature higher than or equal to that of the air flowing out of revolving drum 3;
- an electrically-powered refrigerant compressing device 17 which is interposed between the refrigerant-outlet of heat exchanger 15 and the refrigerant-inlet of heat exchanger 16, and which is structured for compressing the gaseous-state refrigerant directed towards heat exchanger 16 so that refrigerant pressure and temperature are much higher at the refrigerant-inlet of heat exchanger 16 than at the refrigerant-outlet of heat exchanger 15; and finally
- an expansion valve or similar passive/operated refrigerant expansion device (for example a capillary tube, a thermostatic valve or an electrically-controlled expansion valve) which is interposed between the refrigerant-outlet of heat exchanger 16 and the refrigerant-inlet of heat exchanger 15, and it is structured so as to cause a rapid expansion of the refrigerant directed towards the first air/refrigerant heat exchanger 15, so that refrigerant pressure and temperature are much higher at the refrigerant-outlet of heat exchanger 16 than at the refrigerant-inlet of heat exchanger 15.

**[0023]** The air/refrigerant heat exchanger 15 is conventionally referred to as the "evaporator" or "gas-heater" of the heat-pump assembly 14, and it is structured so that an airflow arriving from the revolving drum 3 and the low-pressure and low-temperature refrigerant directed to the suction of the refrigerant compressing device 17 can flow through it simultaneously, allowing the refrigerant

having a temperature lower than that of the airflow, to absorb heat from the airflow, thus causing condensation of the surplus moisture in the airflow arriving from revolving drum 3.

**[0024]** The air/refrigerant heat exchanger 16, in turn, is conventionally referred to as the "condenser" or "gas-cooler" of the heat-pump assembly 14, and it is structured so that the airflow directed back into revolving drum 3 and the high-pressure and high-temperature refrigerant arriving from the delivery of the refrigerant compressing device 17 can flow through it simultaneously, allowing the refrigerant having a temperature greater than that of the airflow to release heat to the airflow *f*, thus rapidly heating the airflow *f* directed back into the revolving drum 3.

**[0025]** With reference now to Figure 4, the lower supporting base or socle 9 of outer casing 2 is formed by a lower half-hulk or half-shell 9a which is structured for resting on the floor; and by an upper half-hulk or half-shell 9b which is structured for being stacked up on top of, and rigidly coupled to, the lower half-hulk 9a, so to preferably directly support the parallelepiped-shaped upper boxlike cabinet 10 and preferably also the front and rear idle rollers (not shown in Figure 4) that support in free revolving manner the revolving drum 3.

**[0026]** In addition to the above, the lower half-hulk 9a and the upper half-hulk 9b are structured so as to form, when coupled to one another, a substantially horizontally-oriented central section of the air recirculating conduit 12 that is shaped so as to house both the evaporator 15 and the condenser 16 of the heat-pump assembly 14 one after the other along the flowing direction of the airflow *f*.

**[0027]** In other words, the lower half-hulk 9a and upper half-hulk 9b are shaped so as to form the two halves of the substantially horizontally-oriented central section of the air recirculating conduit 12, and are structured so to be substantially airtight coupled one another to compose/form the aforesaid central section of the air recirculating conduit 12 that houses the evaporator 15 and the condenser 16 of the heat-pump assembly 14.

**[0028]** In the example shown, both the lower half-hulk 9a and the upper half-hulk 9b are preferably, though not necessarily, made in plastic material by means of an injection molding process.

**[0029]** With reference again to Figure 3 the electric refrigerant compressing device 17 and the refrigerant expansion device are preferably fixed/recessed directly onto the lower half-hulk 9a of the supporting base or socle 9, beside the aforesaid central section of the air recirculating conduit 12, preferably together with the electric motor 5; whereas the centrifugal fan 13 of hot-air generator 6 is located on the back of the lower supporting base or socle 9 formed by the two half-hulks 9a and 9b, at the end-opening or outlet of the central section of the air recirculating conduit 12.

**[0030]** In particular, the centrifugal fan 13 of hot-air generator 6 protrudes out of the lower supporting base or socle 9 and is preferably, though not necessarily, ar-

ranged on the back of the lower supporting base or socle 9 so to be locally aligned to electric motor 5.

**[0031]** Additionally, in the example shown the lower half-hulk 9a and the upper half-hulk 9b are preferably, though not necessarily, structured so that the central section of the air recirculating conduit 12 is substantially L-shaped, and is oriented so that a first portion of the central section of the air recirculating conduit 12 extends below the revolving drum 3 remaining locally substantially parallel to the longitudinal axis L of revolving drum 3, and that a second transversal portion of the central section of the air recirculating conduit 12 extends below the revolving drum 3 remaining locally substantially perpendicular to the longitudinal axis L of drum 3.

**[0032]** The evaporator 15 and the condenser 16 of the heat-pump assembly 14 are located, one downstream the other, inside the first portion of the aforesaid central section of the air recirculating conduit 12; whereas the refrigerant compressing device 17 and electric motor 5 are aligned one after the other in a direction locally parallel to the longitudinal axis L of revolving drum 3, beside the first portion of the central section of the air recirculating conduit 12.

**[0033]** The centrifugal fan 13 is instead located on the back of the lower supporting base or socle 9, at the end-opening or outlet of the second portion of the central section of the air recirculating conduit 12, preferably locally aligned to the drive shaft 5a of electric motor 5.

**[0034]** In particular, with reference to Figures 3-6, the centrifugal fan 13 of hot-air generator 6 comprises an outer housing or impeller housing 18 which is located on the back of the lower supporting base or socle 9, at the end-opening of the central section of the air recirculating conduit 12, so to directly communicate with, i.e. to be fluidly connected to, the end-opening of the aforesaid central section of the air recirculating conduit 12, and also with the inside of revolving drum 3; and an impeller 19 which is housed in axially rotating manner inside the outer housing 18 to generate the airflow f when rotating about its central axis.

**[0035]** In the example shown, in particular, the impeller 19 is preferably, though not necessarily, rigidly fitted to one of the two axial ends of the drive shaft 5a (Figure 3) of electric motor 5 so to be directly driven into rotation by the latter.

**[0036]** In addition to the above, with reference to Figures 3 and 4, the outer housing 18 of centrifugal fan 13 comprises a first portion 18a made in one piece with the lower half-hulk 9a, and a second portion 18b made in one piece with the upper half-hulk 9b (Figure 4), and these first and second portions 18a and 19b are shaped/structured for being substantially airtight coupled to one another so as to form a substantially circular, cup-shaped casing that at least partly surrounds and covers/encompasses the impeller 19. In addition to the above, the outer housing 18 further comprises a completely separated, rigid cap-shaped cover 18c (Figure 3) which is shaped/structured for being substantially airtight coupled

to the first and second portions 18a and 19b to completely cover and seal the substantially circular, basin-shaped casing formed by the aforesaid first and second portions 18a and 18b. By the way, the second portion ends with a hot air inlet port 10c\* (Figure 3) connected to the revolving drum 3.

**[0037]** In other words, the outer housing 18 of centrifugal fan 13 is spitted into three distinct and separated shells 18a, 18b and 18c which are structured for being substantially airtight coupled to one another to form the volute of the outer housing 18.

**[0038]** The first shell 18a and the second shell 18b are made in one piece, respectively, with the lower half-hulk 9a and with the upper half-hulk 9b, so to be integral with the lower supporting base or socle 9, and are shaped to form a first approximately half-volute of the outer housing 18. The third shell 18c instead consists in a completely separated cup-shaped, rigid cover 18c that forms the remaining, complementary second half-volute of the outer housing 18 of centrifugal fan 13, and which is structured for being substantially airtight coupled to the first half-volute formed by the shells 18a and 18b to complete the outer housing 18 of the centrifugal fan 13.

**[0039]** As shown in Figures 5, 6, 7 a front cavity 91 is provided in a front portion 90 of the lower supporting base or socle 9. In use, the front portion 90 remains immediately beneath the porthole door 4.

**[0040]** Such a front cavity 91 is divided into a first front chamber 92 and a second front chamber 93. A septum 94 separates the first front chamber 92 from the second chamber 93. Preferably, though not necessarily, the septum 94 is integral with the lower half-shell 9a of the socle 9.

**[0041]** In actual use, the first front chamber 92 gives at least partial access to a portion of the hot-air generator and may be occupied by an air filter (not shown) which is able to retain fluff and dust present in the air flowing through the recirculating conduit 12 (airflow f). The airflow f enters the first front chamber 92 passing through the opening 95. Furthermore, the first front chamber 92 can be closed by means of an access door 92a. Preferably, though not necessarily, the access door 92a is hinged on a horizontal axis which is placed on the lowest rim of the first front chamber 92. The access door 92a is able to rotate to and from a closing position in which the access door 92a rests completely against the substantially rectangular rim of the first front chamber 92. Alternatively, the access door 92a may be slidably coupled to the lower supporting base or socle 9.

**[0042]** The air filter possibly contained in the first front chamber 92 is removed therefrom in case the user desires to replace it, or for periodical cleaning. The accessibility to the first front chamber 92 is useful for cleaning the chamber 92 and/or the evaporator 15 from accumulated fluff.

**[0043]** In use, the second front chamber 93 houses a cooling fan assembly 96 (Figure 6) which comprises a box-shaped supporting structure 96a provided with a fan

96b rotated on a horizontal axis M by means of an electric motor (not shown). The electric motor (not shown) is also integrated in the box-shaped supporting structure 96a. The cooling fan assembly 96 forms a sort of cartridge which in use is inserted and housed into the second front chamber 93. The second front chamber 93 is then closed by a protection covering element 97 which allows the flowing of the ambient air toward the electrically-powered refrigerant compressing device 17 for cooling purposes. Of course, the ambient fresh air flow could be directed also toward other components of the heat pump circuit, i.e. for instance the evaporator 15 and/or the condenser 16.

**[0044]** The protection covering element 97 (Figures 7, 8, 9) is set up to the lower supporting base or socle 9 by means of four screws (not shown) so as to be easily mounted/dismounted from the lower supporting base or socle 9, in case of maintenance of the fan assembly 96 and/or the protection covering element 97 itself. Advantageously, the same screws preferably allow fixation of the fan assembly 96 to the lower supporting base or socle 9. In an alternative embodiment not shown in the drawings, the protection covering element 97 can be removably attached to the lower supporting base or socle 9 by snap fastening devices and/or through abutting surfaces. In particular, the protection covering element 97 comprises a cup-shaped main body 97a surrounded by a square-shaped flange 97b. The square-shaped flange 97b is integral with cup-shaped main body 97a. Each corner of the square-shaped flange 97b is provided with a relevant hole 97c for inserting a relevant screw (not shown). If this protection covering element 97 is damaged, or it is removed, an user could accidentally contact the fan or, conversely, the fan could contact items which can damaged it. Moreover, a damaged protection covering element would alter the aesthetics of the front wall of the machine.

**[0045]** The cup-shaped main body 97a presents a semi-ovoid outline (Figure 11) and the maximum width W1 of the upper part 98a of the lateral surface 98 is greater than the maximum width W2 of the lower part 98b of the lateral surface 98. Thus, the bottom surface 99 of the cup-shaped main body 97a slopes downwardly.

**[0046]** Furthermore, as shown in Figures 7, 12, 13 the maximum width W3 of the left side part 98c of the lateral surface 98 is greater than the maximum width W4 of the right part 98b of the lateral surface 98. Thus, the bottom surface 99 of the cup-shaped main body 97a slopes sideways.

**[0047]** Moreover, the bottom surface 99 is slightly curved as shown in Figures 12, 13.

**[0048]** As shown in Figures 7-15 both the lateral surface 98 and the bottom surface 99 are provided with a number of slots 100. Slots 100 are particularly present on the lower part 98b of the lateral surface 98 in order to improve the cooling air flow. As illustrated in Figure 12 the length of a particular slot 100 in the lower part 98b is substantially equal to the correspondent thickness of the

lower part 98b. In other words (Figure 12), the width of a particular slot 100a provided on the highest point of the lower part 98b is greater than the width of a particular slot 100b provided on the lowest point of the lower part 98a, i.e. each slot 100 substantially occupies the entire width of the corresponding area of the lower part 98b. The aim of such a provision is the increase of the flowing area of the cooling air toward the fan assembly 96 and then to the element to be cooled.

**[0049]** A further protection covering element 110 is shown in Figures 5, 6, 16, whereas in Figure 22 such a further protection covering element 110 is shown in combination with the protection covering element 97.

**[0050]** Preferably, although not necessarily, the further protection covering element 110 is hingedly fixed to the lower supporting base or socle 9 on an axis which substantially coincides with the aforesaid axis N and lies on the lower rim 91a of the front cavity 91 (Figure 5). The width of the further protection covering element 110 is substantially equal to the cabinet width. Moreover, the further protection covering element 110 is laterally bent on correspondence to the lateral vertical sides and is also provided with a grid 111 that at least partially occupies the surface of further protection covering element 110. The further protection covering element 110 is preferably easily detachable from hinges which pivotally connect it to the lower supporting base or socle 9. A barrier 150 is formed on the inner surface of the further protection covering element 110 so as to separate the first front chamber 92 from the second front chamber 93 when the further protection covering element 110 is in its closed position, i.e. as viewed in Figures 1 and 2. The barrier 150 allows improving the airflow path directed towards the cooling fan assembly 96.

**[0051]** A number of internal reinforcing ribs 120 and two hinges 121 are also present on the further protection covering element 110 (Figure 17).

**[0052]** Thus, the ambient fresh air firstly flows through the slots of grid 111 and then through the slots 100 provided on the surface of the protection covering element 97.

**[0053]** As shown in Figure 22 the outline of the protection covering element 97 substantially follows the outline of the further protection covering element 110.

**[0054]** Indeed, the double-slant (downwardly and sideways) of the bottom surface 99 ensures that the outline of the protection covering element 97 substantially follows the outline of the further protection covering element 110 (Figure 22).

**[0055]** The shapes of both covering elements 97, 110 and the relevant slots allow for an optimal cooling airflow.

**[0056]** General operation of the rotary-drum home laundry drier 1 is clearly inferable from the above description, with no further explanation required.

**[0057]** The rotary-drum laundry dryer main object of the inventions presents the following advantages:

- being able to safely use the machine even when the

first covering element is broken or no longer mountable, the second covering element, when in closed position, protects the damaged first covering element;

- the use of the same covering door for different dryer models (i.e. without a loop heat pump) is allowed if the second covering element extends across the entire width of the cabinet;
- the fact that the main door can be opened without the use of special tools is responsible for a remarkable improvement in the assembly procedures and machine maintenance;
- the cooling fan assembly can be easily serviced being the first covering element mounted as separate piece to the lower supporting base or socle.
- the aesthetics of the machine is maintained unchanged even in case of damage to the first covering element of the cooling fan assembly, the second covering element, when in closed position, hides the damaged first covering element.

### Claims

1. Rotary-drum laundry dryer (1) comprising a cabinet (10) containing a revolving drum (3) structured for housing the laundry to be dried, a hot-air generator (6) structured to circulate a stream of hot air through said revolving drum (3), and a lower supporting base (9) which is structured for resting on the floor and for housing at least part of the hot-air generator (6); the hot-air generator (6) in turn comprising: an air recirculating conduit (12) having its two ends connected to the revolving drum (3); air circulating means (13) which are located along the air recirculating conduit (12) and are structured to produce, inside the air recirculating conduit (12), an airflow (f) which flows through the revolving drum (3) and over the laundry inside the drum (3); the lower supporting base (9) comprising a front chamber (93), that houses a cooling fan assembly (96), said front chamber (93) being closed by a first protection covering element (97); the rotary-drum laundry dryer (1) **being characterized in that** it comprises a second protection covering element (110) of said cooling fan assembly (96), said second protection covering element (110) being superposed to said first protection covering element (97) .
2. Rotary-drum laundry dryer, according to Claim 1, **characterized in that** the width of said second protection covering element (110) is substantially equal to the cabinet width.
3. Rotary-drum laundry dryer, according to anyone of the foregoing Claims, **characterized in that** said second protection covering element (110) is hinged

on an axis which, in particular, lies on a lower rim (91a) of a front cavity (91) forming said front chamber (93).

4. Rotary-drum laundry dryer, according to anyone of the foregoing Claims, **characterized in that** said second protection covering element (110) is hingedly fixed in a removable manner to the lower supporting base or socle 9.
5. Rotary-drum laundry dryer, according to anyone of the foregoing Claims, **characterized in that** said first protection covering element (97) is removably attached to said lower supporting base (9) through removable fastening devices.
6. Rotary-drum laundry dryer, according to anyone of the foregoing Claims, **characterized in that** the lower supporting base (9) comprises a front cavity (91) divided into a first front chamber (92) which provides access to the hot-air generator and a second front chamber (93), said first front chamber (92) being closed by means of a movable covering element (92a).
7. Rotary-drum laundry dryer, according to anyone of the foregoing Claims, **characterized in that** the outline of said first protection covering element (97) substantially follows the outline of said second protection covering element (110) of said cooling fan assembly (96).
8. Rotary-drum laundry dryer, according to Claim 7, **characterized in that** said first protection covering element (97) comprises a cup-shaped main body (97a) surrounded by an integral square-shaped flange 97b.
9. Rotary-drum laundry dryer, according to Claim 8, **characterized in that** said cup-shaped main body (97a) presents a semi-ovoid outline and the maximum width (W1) of the upper part (98a) of the lateral surface (98) is greater than the maximum width (W2) of the lower part (98b) of the lateral surface (98), so that the bottom surface (99) of the cup-shaped main body (97a) slopes downwardly.
10. Rotary-drum laundry dryer, according to Claim 9, **characterized in that** the maximum width (W3) of a first side part (98c) of the lateral surface (98) is greater than the maximum width (W4) of a second side part (98b) of the lateral surface (98), so that said bottom surface (99) slopes sideways.
11. Rotary-drum laundry dryer, according to any Claim 8 or to Claim 9, **characterized in that** said bottom surface (99) is slightly curved.

12. Rotary-drum laundry dryer, according to anyone of the foregoing Claims 8-11, **characterized in that** both the lateral surface (98) and the bottom surface (99) are provided with a number of slots (100).  
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13. Rotary-drum laundry dryer, according to Claim 12, **characterized in that** the length of a particular slot (100) in the lower part (98b) of the lateral surface (98) is substantially equal to the correspondent thickness of the lower part (98b).  
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14. Rotary-drum laundry dryer, according to anyone of the foregoing Claims, **characterized in that** said hot-air generator comprises a heat pump assembly.  
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15. Rotary-drum laundry dryer, according to Claim 14, **characterized in that** said cooling fan assembly (96) supplies a cooling airflow towards a portion of said heat pump assembly.  
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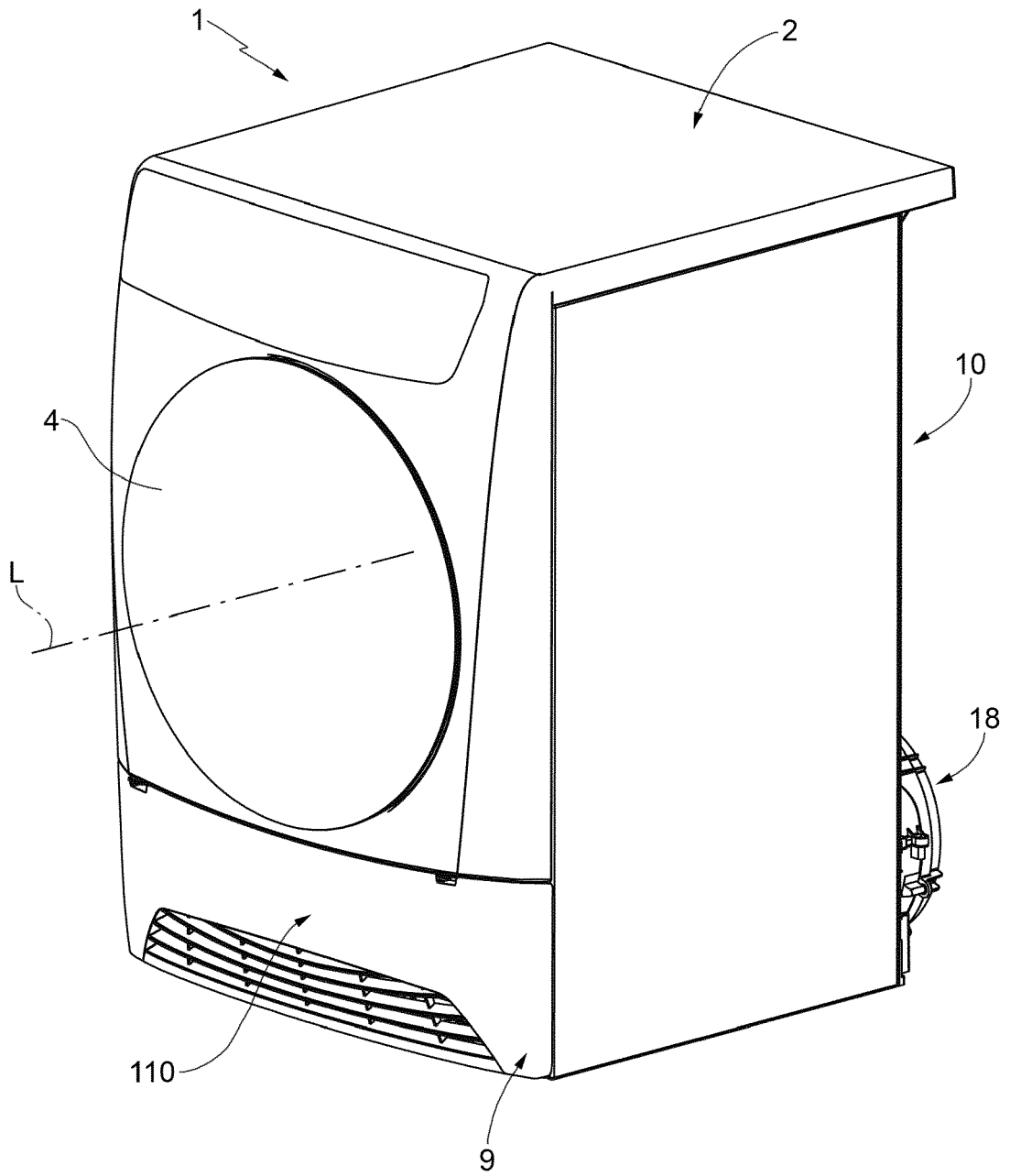


FIG. 1

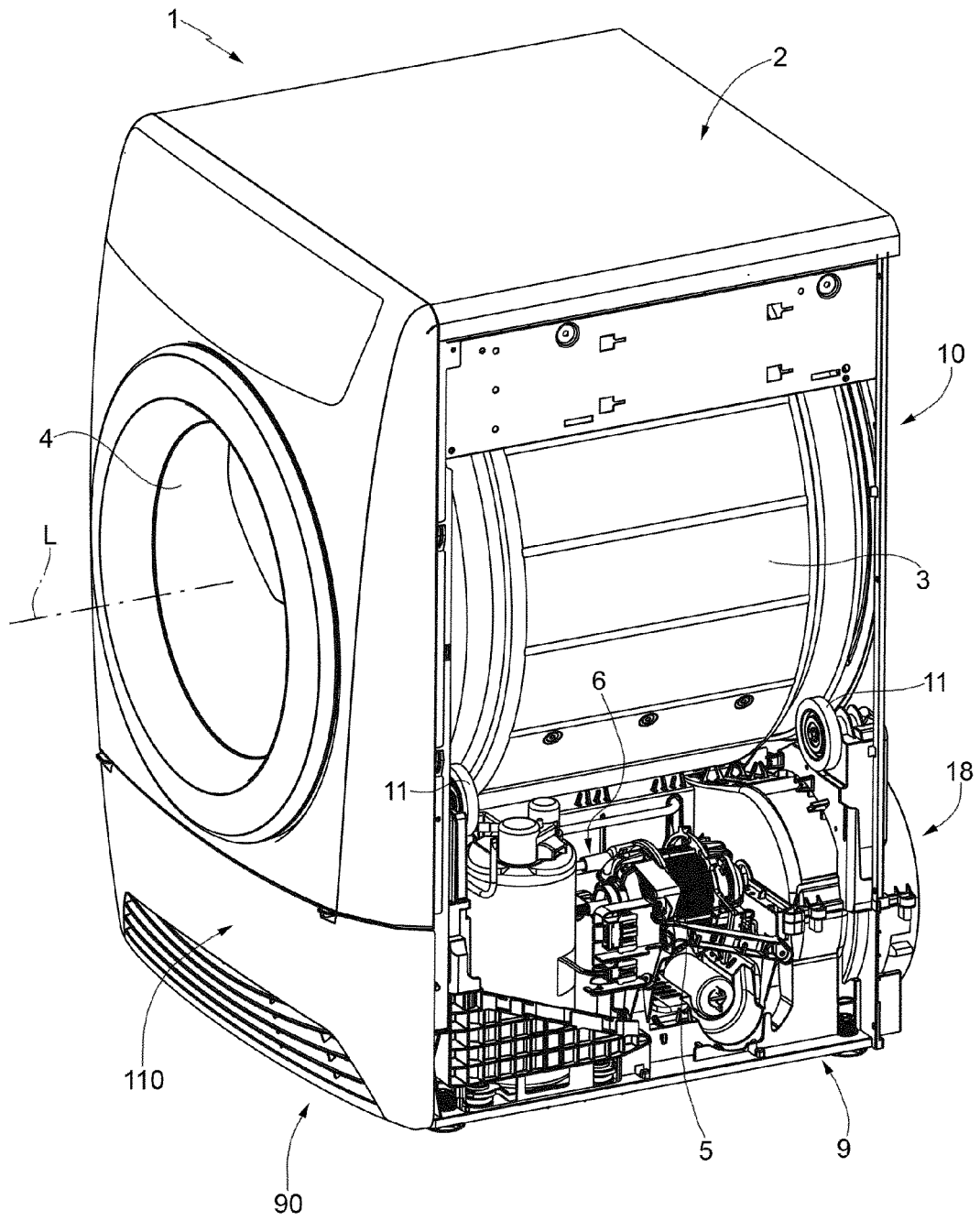


FIG. 2

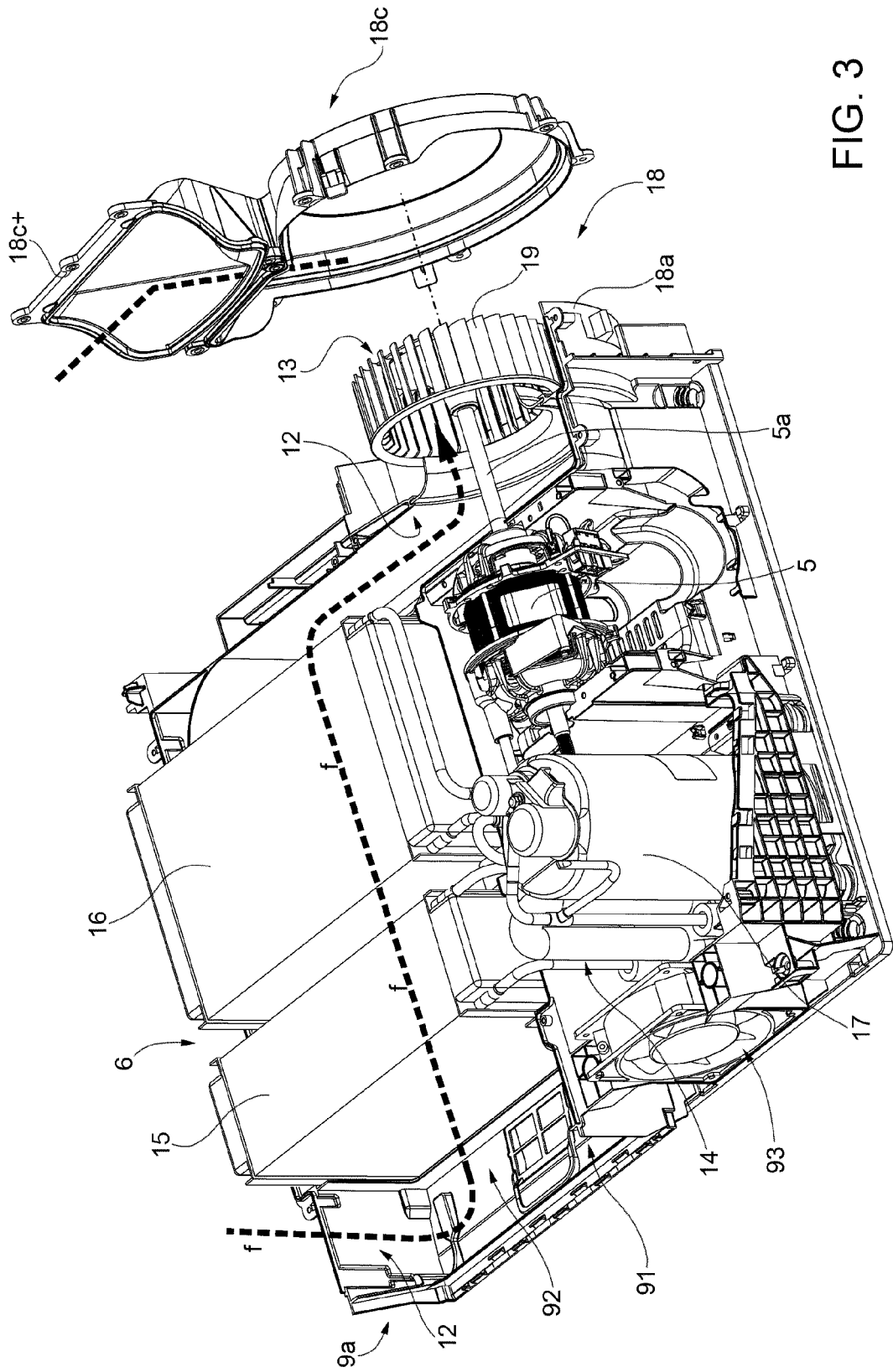


FIG. 3

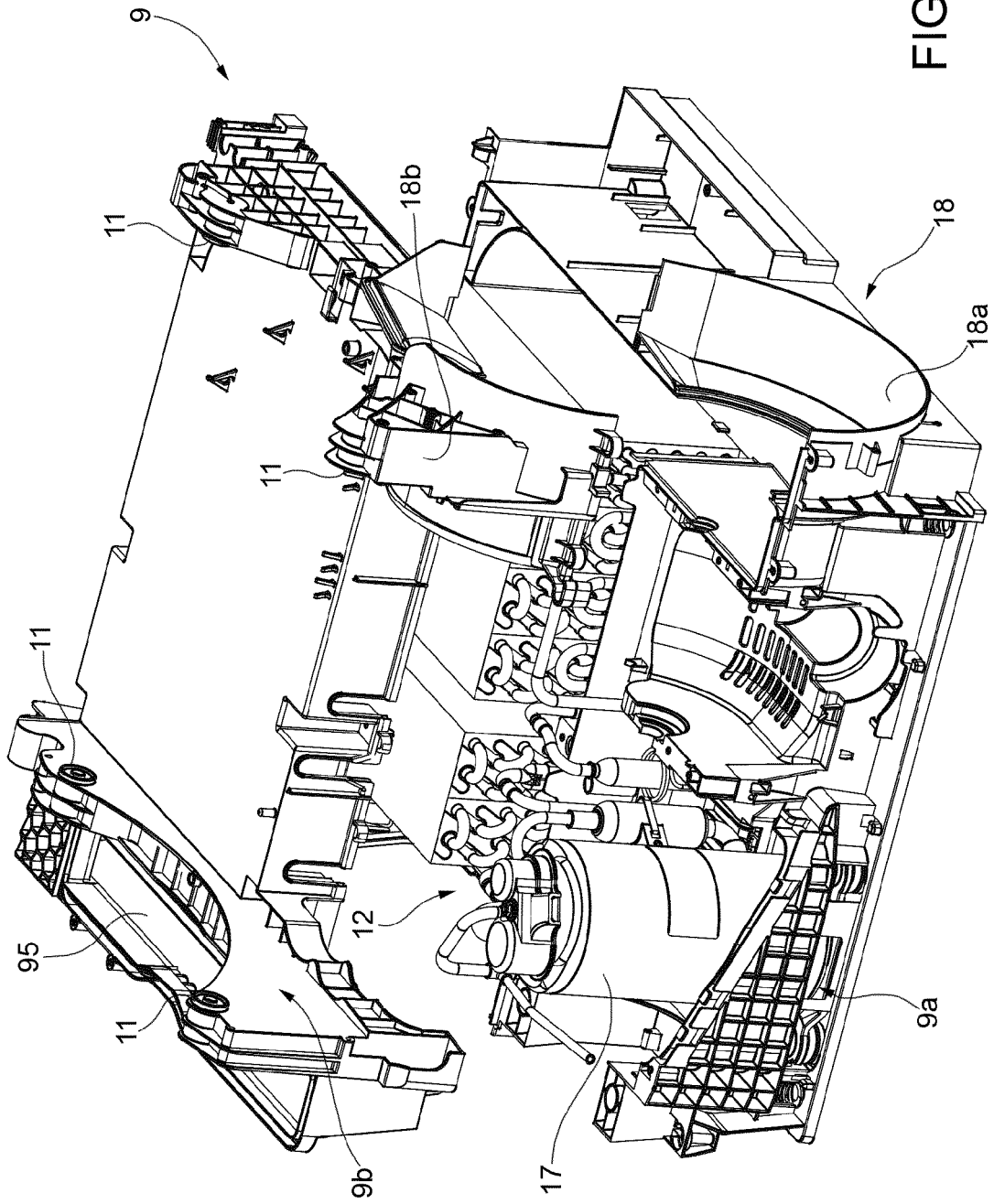


FIG. 4

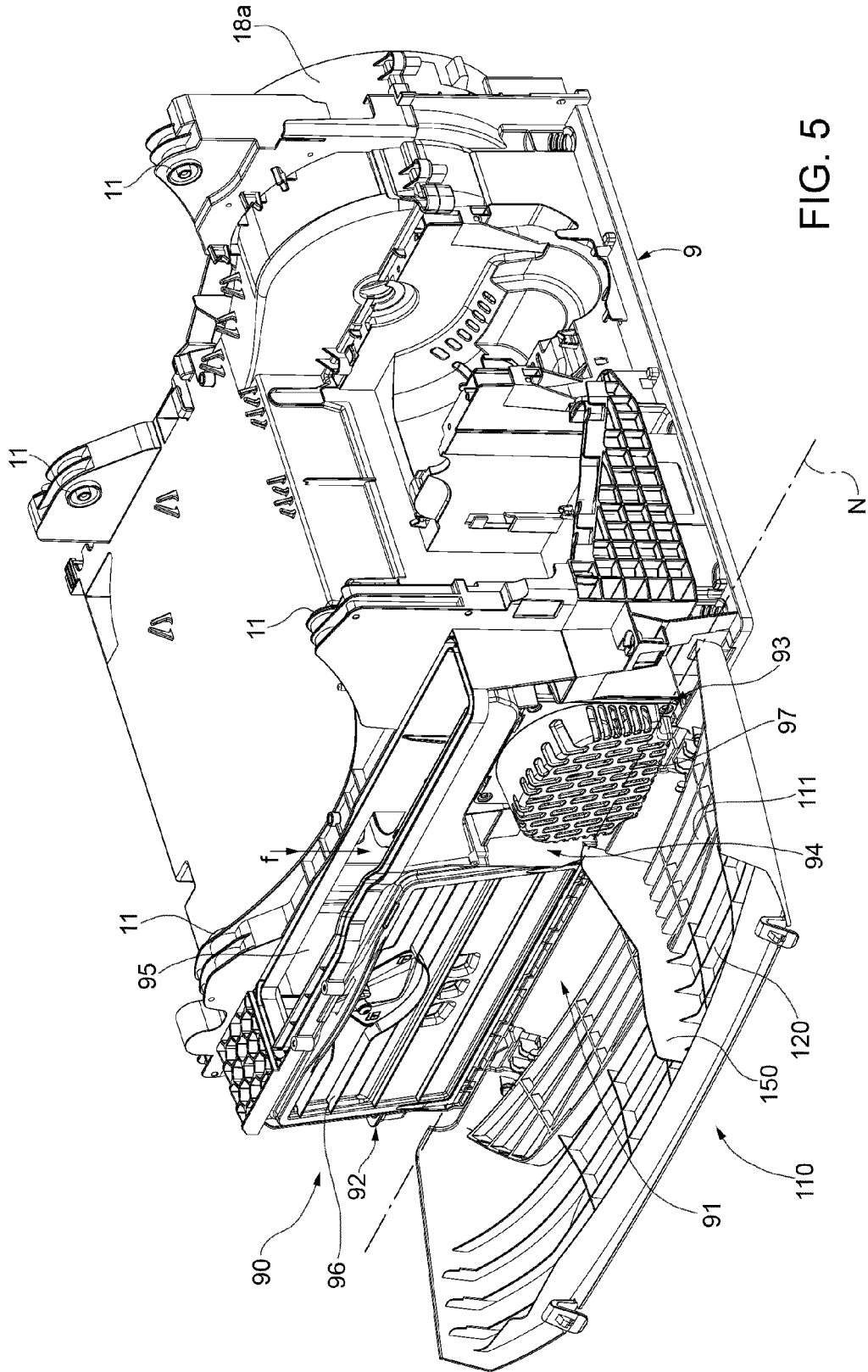


FIG. 5

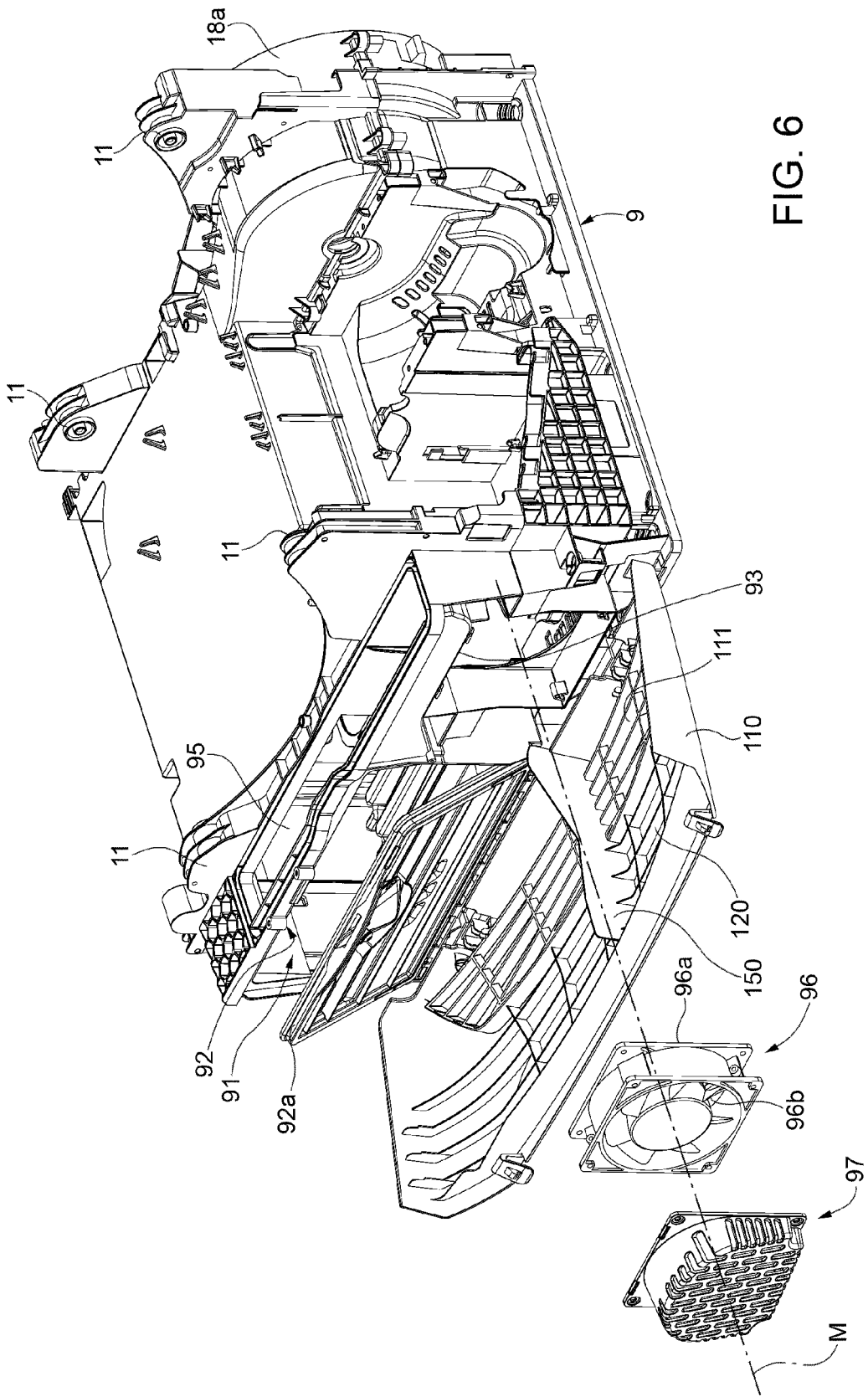


FIG. 6

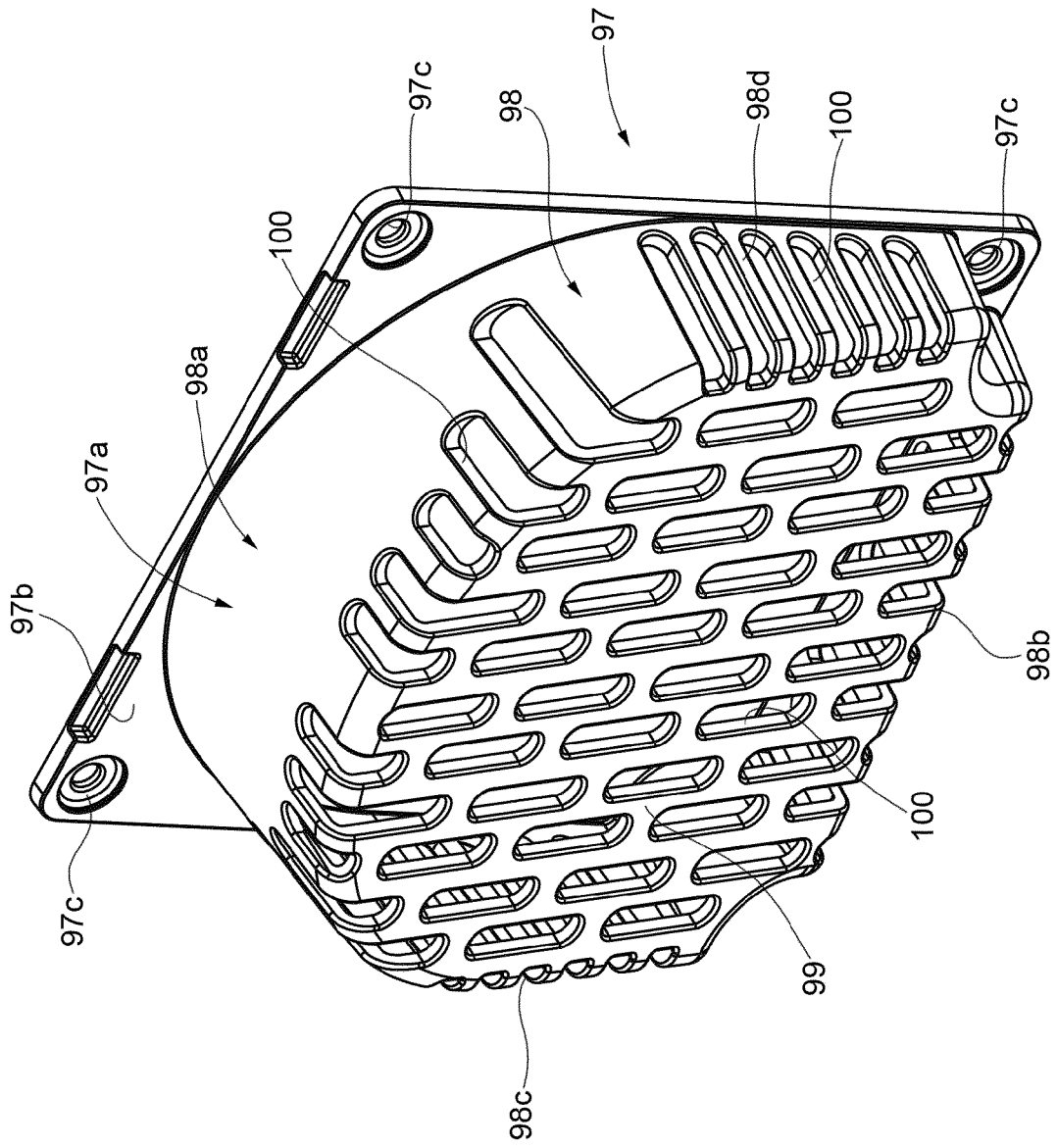


FIG. 7

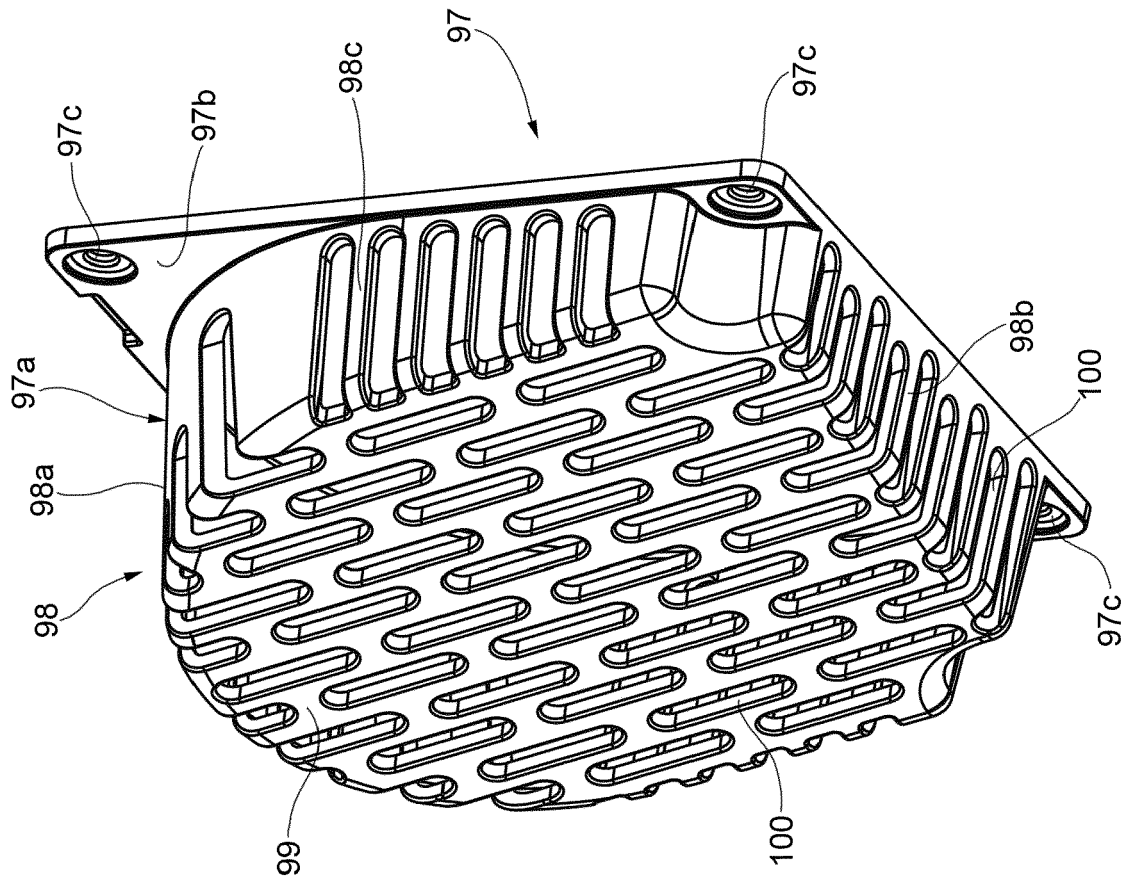


FIG. 8

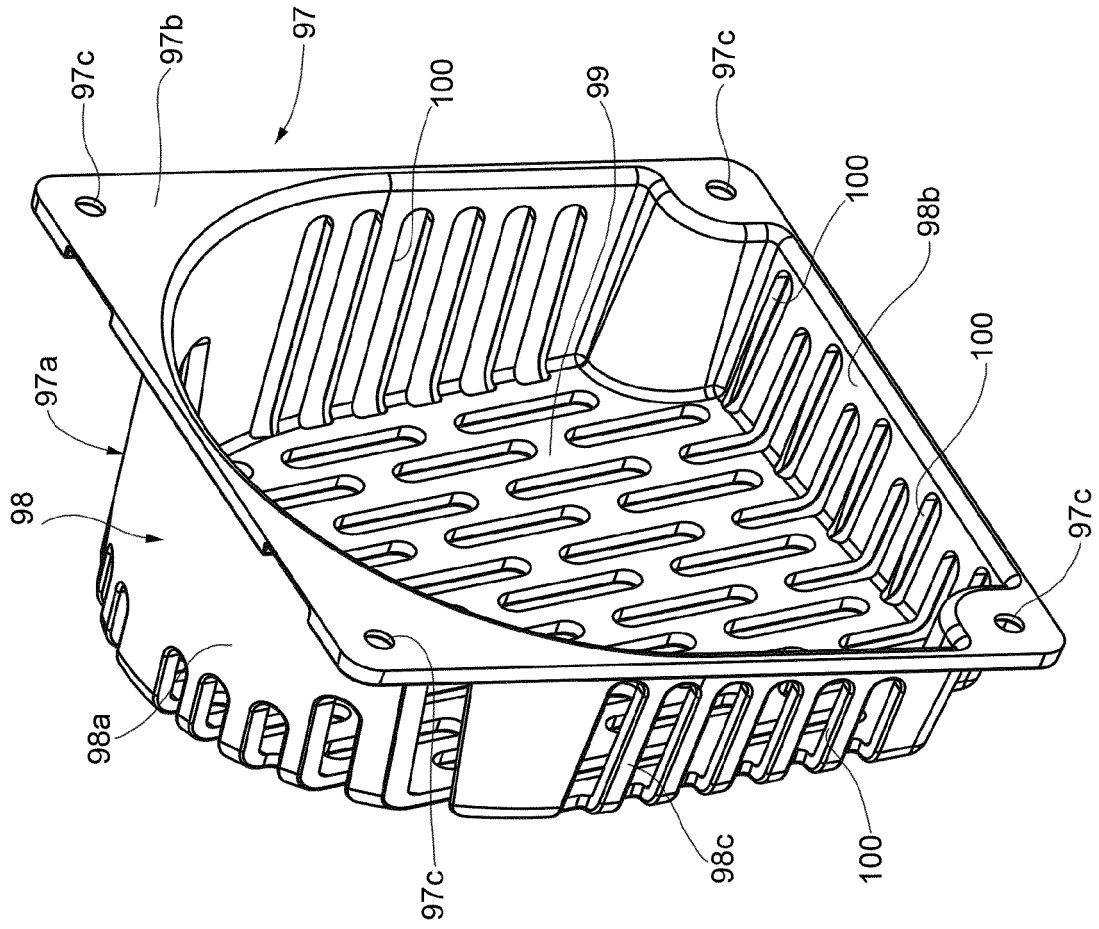


FIG. 9

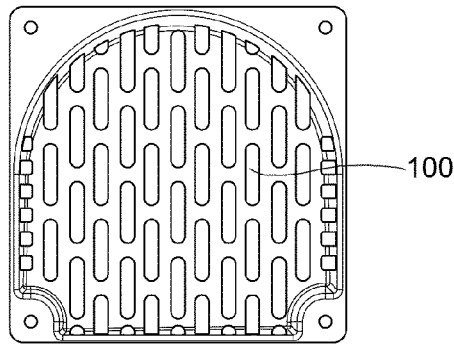


FIG. 11

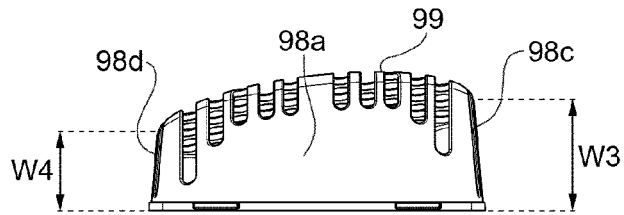


FIG. 13

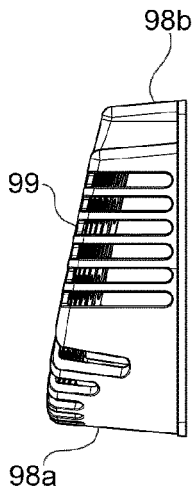


FIG. 14

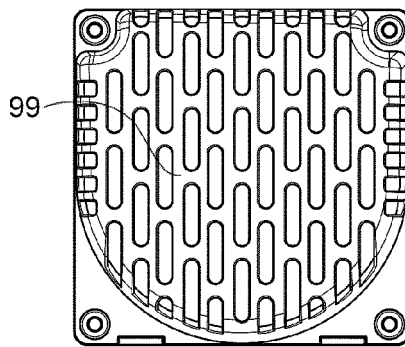


FIG. 10

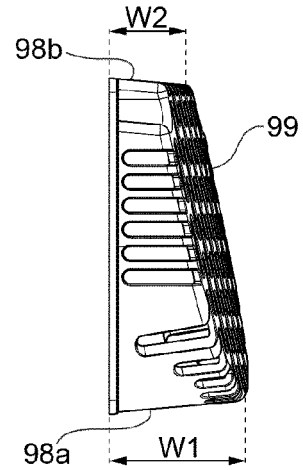


FIG. 15

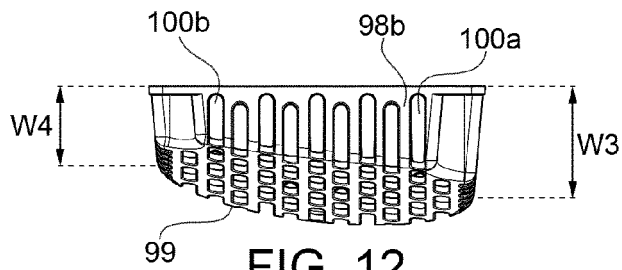
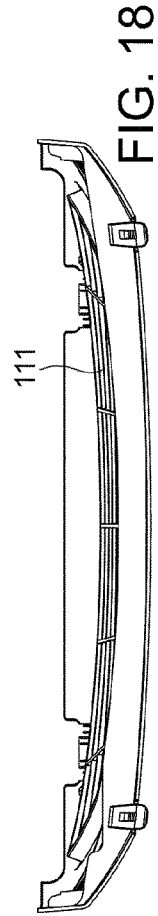
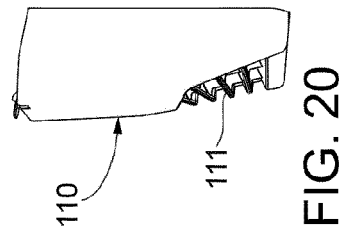
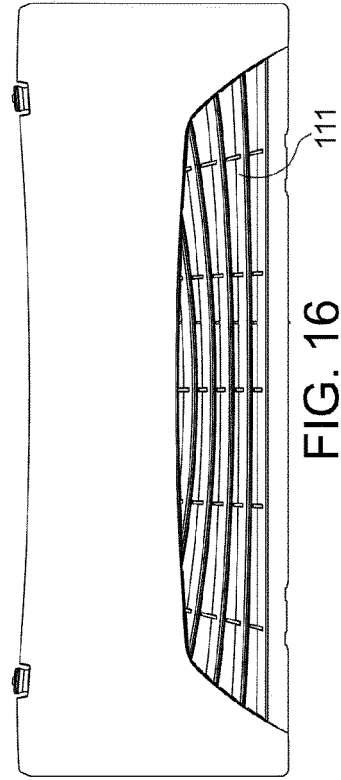
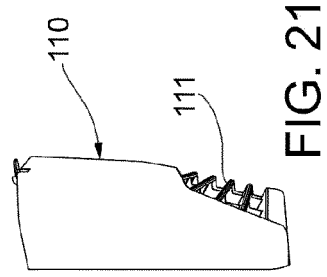
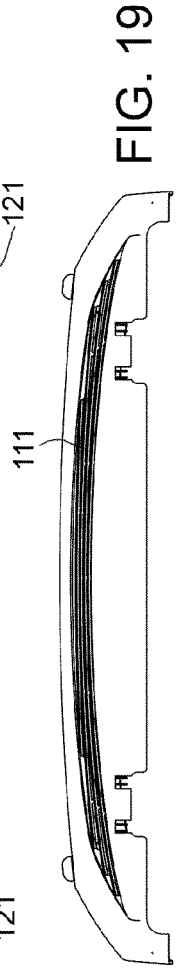
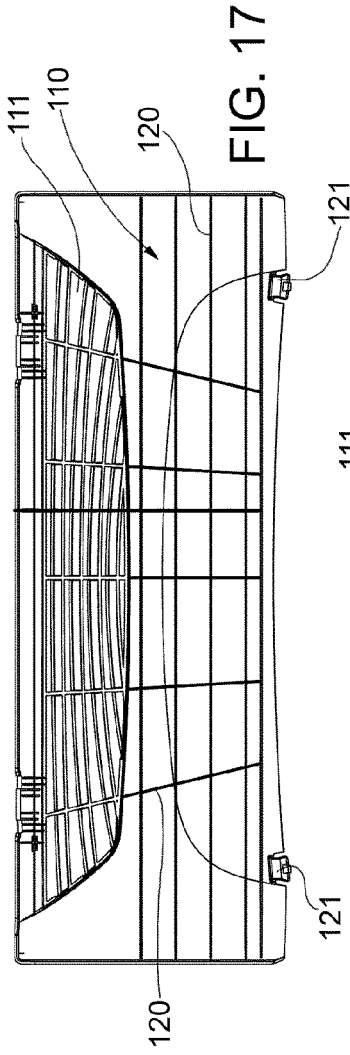


FIG. 12



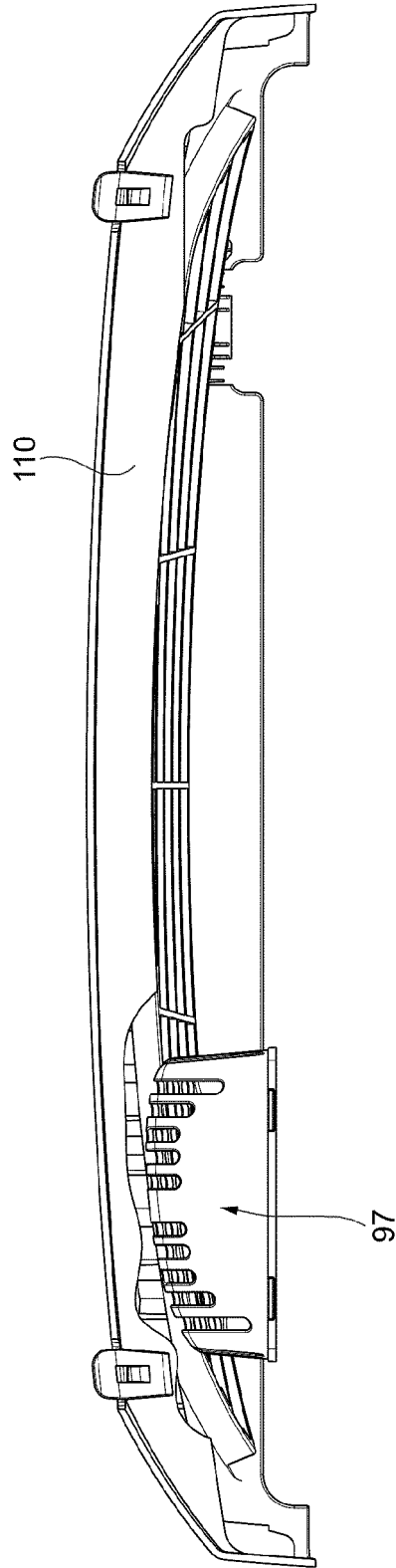


FIG. 22



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Application Number  
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
Place of search		Date of completion of the search	Examiner
Munich		21 February 2014	Diaz y Diaz-Caneja
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	
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