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(54) Title: HEAT PUMP LAUNDRY TREATMENT APPARATUS

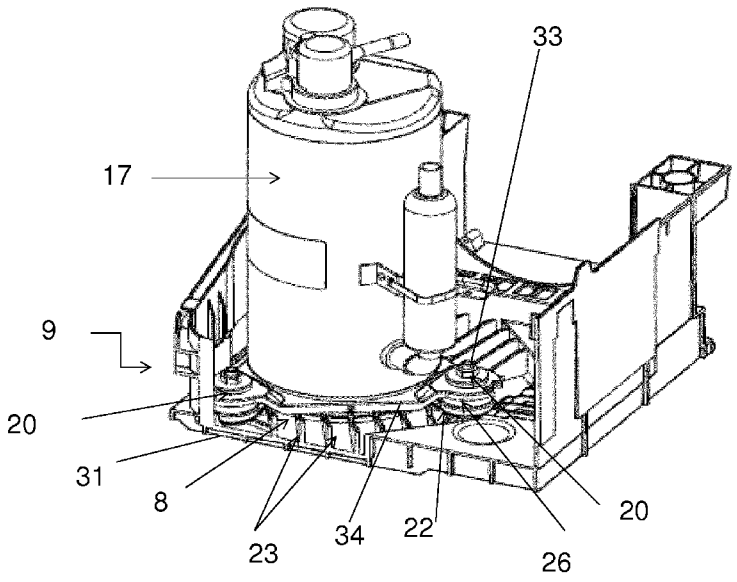

Figure 4

(57) Abstract: The present invention in fact relates to a heat pump laundry treatment apparatus (1), in particular a heat pump laundry dryer or a heat pump washing machine having drying function, comprising a cabinet (2) that houses a rotatable laundry drum (3) for treating laundry using process air, the drum (3) being accessible by a user through a door (4) of the apparatus (1). The laundry treatment apparatus (1) of the present invention further comprises: a basement (9) which constitutes a bottom portion of said cabinet (2) for supporting operational components for carrying out a drying process on laundry; a process air circuit (12) for circulating the process air through the drum (3); and a heat pump assembly (14) having a refrigerant loop, in which the refrigerant fluid is circulated through a first and a second heat exchanger (15,16), the heat pump assembly (14) comprising a compressing device (17) that is received in a seat (8) formed in the basement (9) and that is removably fixed thereon. The laundry treatment apparatus (1) of the present invention is further characterized by the fact that the compressing device (17) is fixed to a bottom wall (31) of said basement (9) by at least one pin (20) which comprises a counter-head (21) placed onto a lower surface (24) of said bottom wall (31) of said basement (9). By this way, the coupling between the compressing device (17) and the basement (9) is reliable and at the same time allows the reduction of the number of components involved and the number of possible noise sources, such as the metal sheet interface support between the compressing device (17) and the basement (9).

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HEAT PUMP LAUNDRY TREATMENT APPARATUS

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DESCRIPTION

The present invention relates to a heat pump laundry treatment apparatus, in particular a heat pump laundry dryer or a heat pump washing machine having drying function.

As it is known, a heat pump type laundry dryer generally comprises a casing enclosing a rotatable drum whose inner region defines a laundry treating chamber where a drying process is carried out. The machine casing is closed at the bottom thereof by a basement having a lower surface facing the floor where the machine is to be placed and an upper surface provided with seats for receiving operational components provided for carrying out a drying process on laundry. A heat pump assembly, an electric motor, a fan, a drying air circuit (process air circuit) and other devices provided for operating the laundry apparatus are operational components of the machine. A heat pump assembly includes a closed refrigerant loop, a first heat exchanger acting as evaporator for evaporating the refrigerant and cooling process air, a compressing device, a second heat exchanger acting as condenser for cooling the refrigerant and heating the process air, and an expansion device from where the refrigerant is returned to the first heat exchanger.

Today's heat pump type laundry dryers are notable for their high drying capability and effective energy saving. Typically, when drying laundry, the compressing device of the heat pump is activated while the drum is rotated by a drive unit, the refrigerant is compressed and drying air (process air) is re-circulated through the drum by means of a process air circuit and a blower installed in such circuit. Thus, the process air exhausted from the drum is cooled and dehumidified by heat exchange carried out by the evaporator of the heat pump assembly. The dehumidified air is heated by heat exchange carried out by the condenser of the heat pump assembly and, subsequently, the heated and dried air is supplied into the drum for performing the laundry drying process. As a result, dry warm air is repeatedly supplied into the drum, whereby laundry is dried.

One of the basic components of heat pump tumble dryer is the compressing device. There are various types of compressing devices used in tumble dryer, including different shapes. The compressing device is usually placed in the dryer basement near the heat exchangers.

In a known embodiment, the compressing device is fixed onto a basement through a special plate, generally made in metal sheet, which acts as an interface between the compressing device and the basement, allowing a solid fixation. In other words, the compressing device is fixed onto the plate which, in turn, is fixed onto the basement. The special plate interface is specifically designed for each compressing device model. However, this solution is not convenient for the fact that the interface represents an additional device which is counterproductive in terms of weight, cost, complexity, and assembling time. Such plate is often the cause of undesired noise due to vibrations generated by the compressing device operation. Rubber vibration absorbers are generally provided between the plate interface and the compressing device but their noise reduction effect is not completely satisfying.

In another known embodiment, the heat-pump assembly is provided within a housing body having a unit case and a related unit cover closing the unit case so as to form a box-like housing body. The heat pump assembly components, and in particular the compressing device, are fixed to a bottom wall of the housing body. In order to obtain a solid connection, the housing body carrying the heat pump therein has to be fixed onto the upper surface of the bottom portion of the dryer casing. This arrangement is particularly complex because requires first to install and fix the heat pump components in the housing body and then to fix the housing body onto the basement of the dryer casing. In addition, when needed, the removal of the housing body from the bottom portion of the tumble dryer outer casing and/or the removal of the heat pump components from the housing body are particularly difficult. Therefore, this solution is not advantageous.

In a further known embodiment, a support pin of the compressing device is screwed onto the basement by inserting it from the same side where the compressing device is located. However, this solution shows a poor mechanical resistance to the considerable vibrations generated by the compressing device. The problem is much

more relevant if the basement is made in polymeric material, because such vibrations may irreparably damage the basement.

Thus, there is still the need to have a reliable coupling between the compressing device and the basement, while reducing the number of components involved and the number of possible noise sources, such as the metal sheet interface support between the compressing device and the basement.

SUMMARY OF THE INVENTION

In compliance with the above aims, according to the present invention there is provided a heat pump laundry treatment apparatus, in particular a heat pump laundry dryer or a heat pump washing machine having drying function, comprising a cabinet that houses a rotatable laundry drum for treating laundry using process air, the drum being accessible by a user through a door of the apparatus. The laundry treatment apparatus of the present invention further comprises: - a basement which constitutes a bottom portion of said cabinet for supporting operational components for carrying out a drying process on laundry, - a process air circuit for circulating the process air through the drum, and - a heat pump assembly having a refrigerant loop, in which the refrigerant fluid is circulated through a first and a second heat exchanger, the heat pump comprising a compressing device that is received in a seat formed in the basement and is removably fixed thereon. The laundry treatment apparatus of the present invention is further characterized by the fact that the compressing device is fixed to a bottom wall of said basement by at least one pin which comprises a counter-head placed onto a lower surface of said basement bottom wall.

By this way, the coupling between the compressing device and the basement is reliable and at the same time allows the reduction of the number of components involved and the number of possible noise sources, such as the metal sheet interface support between the compressing device and the basement.

In the present invention, the term “bottom wall” of said basement refers to the basement wall which rests on the floor where the heat pump laundry treatment apparatus is to be placed, wherein said bottom wall has a lower surface facing the floor and an upper surface being in the inner part of the cabinet.

In the present invention, the term "operational components" refer to components which contribute to the good operation of the heat pump laundry treatment apparatus of the present invention and that are supported by the bottom portion of said cabinet. The operational components may include, for example, a process air fan; a portion of the process air circuit; a portion of the heat pump assembly; electric motors for rotating a laundry treatment chamber and/or a process air fan; a rotatable drum constituting the laundry treatment chamber, one or more control units or any other device, or portions thereof, operated for carrying out a drying treatment on laundry.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said pin counter-head provides a catch for the pin insertion from said lower surface of the bottom wall of the basement towards an upper surface thereof.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said pin counter-head is housed in a cavity provided in the lower surface of said basement bottom wall.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said pin protrudes into said compressing device seat passing through a pass-through opening formed in said basement bottom wall.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said pin comprises a portion dimensioned so as to interfere with said pass-through opening.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that pin comprises a threaded portion engaging with a correspondent thread formed within said pass-through opening.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said pin comprises a threaded end portion engaged or engageable by a correspondently threaded nut.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said pin is fixed onto said basement by over-injecting the material constituting said basement around at least a portion of said pin.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said pin is metallic or made in polymeric material.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said polymeric material is different from the material in which said basement is realized.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said lower surface of the basement bottom wall separates the cabinet from the ambient where the apparatus is placed.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that an air gap is formed between the lower surface of the basement bottom wall and surface on which the apparatus stands.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said compressing device seat, said basement comprises reinforcement ribs that are shaped to retain the base of said compressing device in a stable position.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said basement comprises seats for receiving a portion of the cabinet front wall.

Furthermore and preferably, though not necessarily, the heat pump laundry treatment apparatus is characterized in that said basement comprises a lower shell and an upper shell associated on each other, wherein said upper shell comprises housings for receiving drum supporting means.

A non-limiting embodiment of the present invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows in a perspective view a heat pump laundry treatment apparatus realized in accordance with the teachings of the present invention, with parts removed for clarity;

Figure 2 shows an enlarged view of a lower internal part of the heat pump laundry treatment apparatus of Figure 1;

Figure 3 shows in a perspective view an internal part of the front panel and the upper half-shell and the lower half-shell of the supporting basement of the heat pump laundry treatment of Figure 1, with parts removed for clarity;

Figure 4 shows in a perspective view the compressing device of the heat pump laundry treatment of Figure 1 fixed to the basement;

Figure 5 is a partly-exploded perspective view of the compressing device of Figure 4 and the related fixing element for fixing the compressing device to the basement.

Figure 6 is a partial section view of the compressing device of Figure 4 showing the fixing elements inserted in the basement for fixing the compressing device to the basement.

Figure 7 is a partly-exploded view of Figure 6 wherein the fixing elements are shown in a removed position from the basement.

Figure 8 shows in perspective view the lower supporting basement of the heat pump laundry treatment of Figure 1 including the compressing device seat for housing the compressing device of Figure 4;

Figure 9 shows a plan view of the lower supporting basement of the heat pump laundry treatment of Figure 1.

With reference to Figures 1 and 2, number 1 indicates as a whole a preferably household, heat pump laundry treatment apparatus 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 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 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.

Inside the 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 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.

With reference to Figures 1 and 2, the boxlike casing 2 preferably comprises a substantially parallelepiped-shaped lower supporting basement 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 basement 9 and it is structured so as to house the revolving drum 3.

In particular, the basement 9 has a bottom wall 31 which rests on the floor where the heat pump laundry treatment apparatus 1 of the present invention is to be placed; the bottom wall 31 has a lower surface 24 facing the floor and an upper surface 25 being in the inner part of the cabinet 10.

In addition, the lower surface 24 of the bottom wall 31 of the basement 9 separates the casing 2 from the ambient where the heat pump laundry treatment apparatus 1 of the present invention is placed. Furthermore, an air gap is formed between the lower surface 24 of the bottom wall 31 of the basement 9 and the surface on which the heat pump laundry treatment apparatus 1 stands. The basement 9 is preferably realized in polymeric material.

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.

With reference to Figures 2 and 3, the front and rear idle supporting rollers 11 are preferably fixed in free revolving manner directly on top of the lower supporting basement 9.

The laundry loading/unloading opening of casing 2 is therefore realized 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.

With reference to Figures 2 and 3, the hot-air generator 6 is a heat-pump type, wherein 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 cooling down the airflow arriving from revolving drum 3 to condense and restrain the surplus moisture in the airflow;

- 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 heating the airflow arriving from heat exchanger 15 and directed back to revolving drum 3, so that the airflow re-entering into revolving drum 3 is heated 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

- an expansion valve or similar passive/operated refrigerant expansion device 18 (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 an

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.

The heat-pump assembly 14 is further provided with a number of connecting pipes 19 which connect the two heat exchangers 15 and 16, the refrigerant compressing device 17 and the refrigerant expansion device 18 to one another, so as to allow the refrigerant to continuously flow in closed loop from the refrigerant compressing device 17 in sequence to the second air/refrigerant heat exchanger 16, to the refrigerant expansion device 18, to the first air/refrigerant heat exchanger 15, and finally return back to the refrigerant compressing device 17.

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 the airflow arriving from 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.

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, thus heating the airflow directed back into the revolving drum 3.

With reference to Figure 3, in the example shown, in particular, a central/intermediate segment 12c of the air recirculating conduit 12 extends in pass-through manner across the lower supporting basement 9, and the evaporator 15 and condenser 16 of the heat-pump assembly 14 are fitted/recessed, one downstream the other along the flowing direction of the airflow, into the central/intermediate segment 12c of the air recirculating conduit 12. The central/intermediate segment 12c is

therefore shaped/dimensioned so as to house both the evaporator 15 and the condenser 16 of the heat-pump assembly 14.

In the example shown, the central/ intermediate segment 12c of the air recirculating conduit 12 preferably extends inside the lower supporting basement 9 substantially horizontally.

Instead, the refrigerant compressing device 17 and the refrigerant expansion device 18 of the heat-pump assembly 14 are preferably fixed/recessed on the lower supporting basement, beside the central/intermediate segment 12c of the air recirculating conduit 12.

With reference to Figures 1, 2 and 3, a centrifugal fan 13 of hot-air generator 6, in turn, is preferably located outside of the lower supporting basement 9, preferably at one of the two end-openings of the central/ intermediate segment 12c of air recirculating conduit 12, so to directly communicate with, i.e. be flowingly/fluidly connected to, both the central segment 12c of the air recirculating conduit 12 and the inside of revolving drum 3.

In the example shown, the centrifugal fan 13 is preferably located on the back of the lower supporting basement 9, at the exit end-opening or outlet of the central/intermediate segment 12c of the air recirculating conduit 12, i.e. downstream of both evaporator 15 and condenser 16 of the heat-pump assembly 14.

In addition to the above, with reference to Figure 3, the lower supporting basement 9 of outer casing 2 is preferably formed/composed by a lower half-shell 9a which is structured for resting on the floor, and by an upper half-shell 9b which in turn is structured for being stacked up on top of, and rigidly coupled to, the lower half-shell 9a, so to preferably directly support the upper boxlike cabinet 10 and preferably also the front and rear idle rollers 11 that support in free revolving manner the revolving drum 3.

The lower half-shell 9a and the upper half-shell 9b are furthermore shaped so as to form, when coupled to one another, substantially the whole central/intermediate segment 12c of the air recirculating conduit 12 which houses, one downstream the

other along the flowing direction of the airflow, both the evaporator 15 and the condenser 16 of the heat-pump assembly 14.

In the example shown, the lower half-shell 9a and the upper half-shell 9b are preferably structured/shaped so as to firmly and unremovably jam/block in between themselves the evaporator 15 and the condenser 16 of the heat-pump assembly 14 when coupled to one another to form/compose the lower supporting basement 9 of outer casing 2.

In other words, the lower half-shell 9a and upper half-shell 9b are shaped so as to form the two halves of the central segment 12c of the air recirculating conduit 12, and are structured for being substantially airtight coupled to one another, so as to compose/form the whole central segment 12c of the air recirculating conduit 12, and contemporaneously directly lock/trap in between themselves the evaporator 15 and the condenser 16.

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

In addition to the above, the lower supporting basement 9 is also preferably structured so to directly support the electric motor 5.

In addition, with reference to Figures 4 to 7, the refrigerant compressing device 17 has a base 34 that is received in a proper seat 8 formed in the basement 9 and is removably fixed thereon. In particular, the compressing device 17 is fixed to the bottom wall 31 of said basement 9 by interposing only anti-vibration devices 26 to reduce vibrations due to operation of the compression device 17. The assembly comprising the anti-vibration devices 26, pins 20, and fastening devices 33 forms a 'direct' connection between the compressing device 17 and the bottom wall 31 of said basement 9. The anti-vibration device 26 is provided to reduce vibrations and noise when the apparatus is working. Preferably the anti-vibration device 26 is made of rubber. There are no special devices interposed between the compressing device 17 and the basement 9 which act as an interface as in the prior art. Thus, the number of components constituting the heat pump laundry treatment apparatus 1 is reduced.

With reference to Figures 4 to 7, the refrigerant compressing device 17 is directly fixed to the bottom wall 31 of the basement 9 by at least one pin 20; in the example of Figure 5 three pins 20 are shown for a better fixation of the compressing device 17 to the basement 9.

Each of the pins 20 comprises a counter-head 21 placed onto the lower surface 24 of the bottom wall 31 of the basement 9. Each pin counter-head 21 provides a catch for the pin 20 insertion from the lower surface 24 of the bottom wall 31 of the basement 9 towards the upper surface 25 thereof. Furthermore, each pin counter-head 21 is housed in a cavity 27 provided in the lower surface 24 of the bottom wall 31 of the basement 9.

Each of the pins 20 protrudes into a seat 8 for the compressing device 17 passing through a pass-through opening 22 formed in the bottom wall 31 of the basement 9. Furthermore, each of the pins 20 comprises a portion 28 dimensioned so as to interfere with the pass-through openings 22 in order to fixedly receive the pin 20. In an alternative embodiment, the pin portion 28 may comprise a thread which engages a corresponding threaded part formed in the pass-through opening 22, in this manner the fixation of the pins 20 into the correspondent pass-through openings 22 is simplified.

On an end region opposite to the counter-head 21, each pin 20 may comprise a threaded portion 29 engaging with a correspondingly threaded nut 33 (Figure 5) that locks the base 34 of the compressing device 17 on the seat 8 formed on the bottom wall 31 of the basement 9.

In addition, each of the pins 20 may be fixed, or further fixed, onto the basement 9 by over-injecting the material constituting the basement 9 around at least a portion of the pin 20. In such a way, each of the pins 20 may be partially covered, by over-injecting the material constituting the basement 9 only around that portion of the pin 20 which is placed close to the pin counter-head 21 or, in alternative, each of the pins 20 may be totally covered by such a over-injection of the material constituting the basement 9.

Once the pins 20 are fixed to the basement 9 of the apparatus of the present invention, the anti-vibration device 26 may be inserted around the pin 20 to reduce the vibrations between the compressing device 17 and the basement 9 when the apparatus 1 is working.

In the example shown, each of the pins 20 is metallic or made in polymeric material. In case the pins 20 are made in polymeric material, such a polymeric material is different from the material in which the basement 9 is realized.

With reference to Figures 4, 8 and 9, in the seat 8 for the compressing device 17, the basement 9 comprises reinforcement ribs 23 that are shaped to retain the base 34 of the compressing device 17 in a stable position.

In addition, the basement 9 comprises seats 35 for receiving a portion of the front wall of the cabinet 2.

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

Clearly, changes may be made to the rotary-drum laundry drier 1 as described herein without, however, departing from the scope of the present invention.

CLAIMS

1. Heat pump laundry treatment apparatus (1), in particular a heat pump laundry dryer or a heat pump washing machine having drying function, comprising a cabinet (2) that houses a rotatable laundry drum (3) for treating laundry using process air, the drum (3) being accessible by a user through a door (4) of the apparatus (1), wherein the laundry treatment apparatus (1) comprises:

a basement (9) which constitutes a bottom portion of said cabinet (2) for supporting operational components for carrying out a drying process on laundry,

a process air circuit (12) for circulating the process air through the drum (3),

a heat pump assembly (14) having a refrigerant loop, in which the refrigerant fluid is circulated through a first and a second heat exchanger (15,16), the heat pump assembly (14) comprising a compressing device (17) that is received in a seat (8) formed in the basement (9) and that is removably fixed thereon,

characterized in that the compressing device (17) is fixed to a bottom wall (31) of said basement (9) by at least one pin (20) which comprises a counter-head (21) placed onto a lower surface (24) of said bottom wall (31) of said basement (9).

2. Heat pump laundry treatment apparatus according to claim 1, wherein said pin counter-head (21) provides a catch for the pin (20) insertion from said lower surface (24) of said bottom wall (31) of said basement (9) towards an upper surface (25) thereof.

3. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein said pin counter-head (21) is housed in a cavity (27) provided in the lower surface (24) of said bottom wall (31) of said basement (9).

4. Heat pump laundry treatment apparatus according to any preceding claim, wherein said pin (20) protrudes into said compressing device seat (8) passing through a pass-through opening (22) formed in said bottom wall (31) of said basement (9).

5. Heat pump laundry treatment apparatus according to claim 4, wherein said pin (20) comprises a portion (28) dimensioned so as to interfere with said pass-through opening (22).

6. Heat pump laundry treatment apparatus according to claim 4, wherein said pin (20) comprises a threaded portion (29) engaging with a correspondent thread formed within said pass-through opening (22).

7. Heat pump laundry treatment apparatus according to any preceding claim, wherein said pin (20) comprises a threaded end portion (29) engaged or engageable by a correspondently threaded nut (33).

8. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein said pin (20) is fixed onto said basement (9) by over-injecting the material constituting said basement (9) around at least a portion of said pin (20).

9. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein said pin (20) is metallic or made in polymeric material.

10. Heat pump laundry treatment apparatus according to claim 9, wherein said polymeric material is different from the material in which said basement (9) is realized.

11. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein said lower surface (24) of the bottom wall (31) of said basement (9) separates the cabinet (2) from the ambient where the apparatus (1) is placed.

12. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein an air gap is formed between the lower surface (24) of the bottom wall (31) of said basement (9) and the surface on which the apparatus (1) stands.

13. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein in said compressing device seat (8), said basement (9) comprises reinforcement ribs (23) that are shaped to retain a base (34) of said compressing device (17) in a stable position.

14. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein said basement (9) comprises seats (35) for receiving a portion of the cabinet (2) front wall.

15. Heat pump laundry treatment apparatus according to one or more of the previous claims, wherein said basement (9) comprises a lower shell (9a) and an upper shell

(9b) associated on each other, wherein said upper shell comprises housings for receiving drum supporting means.

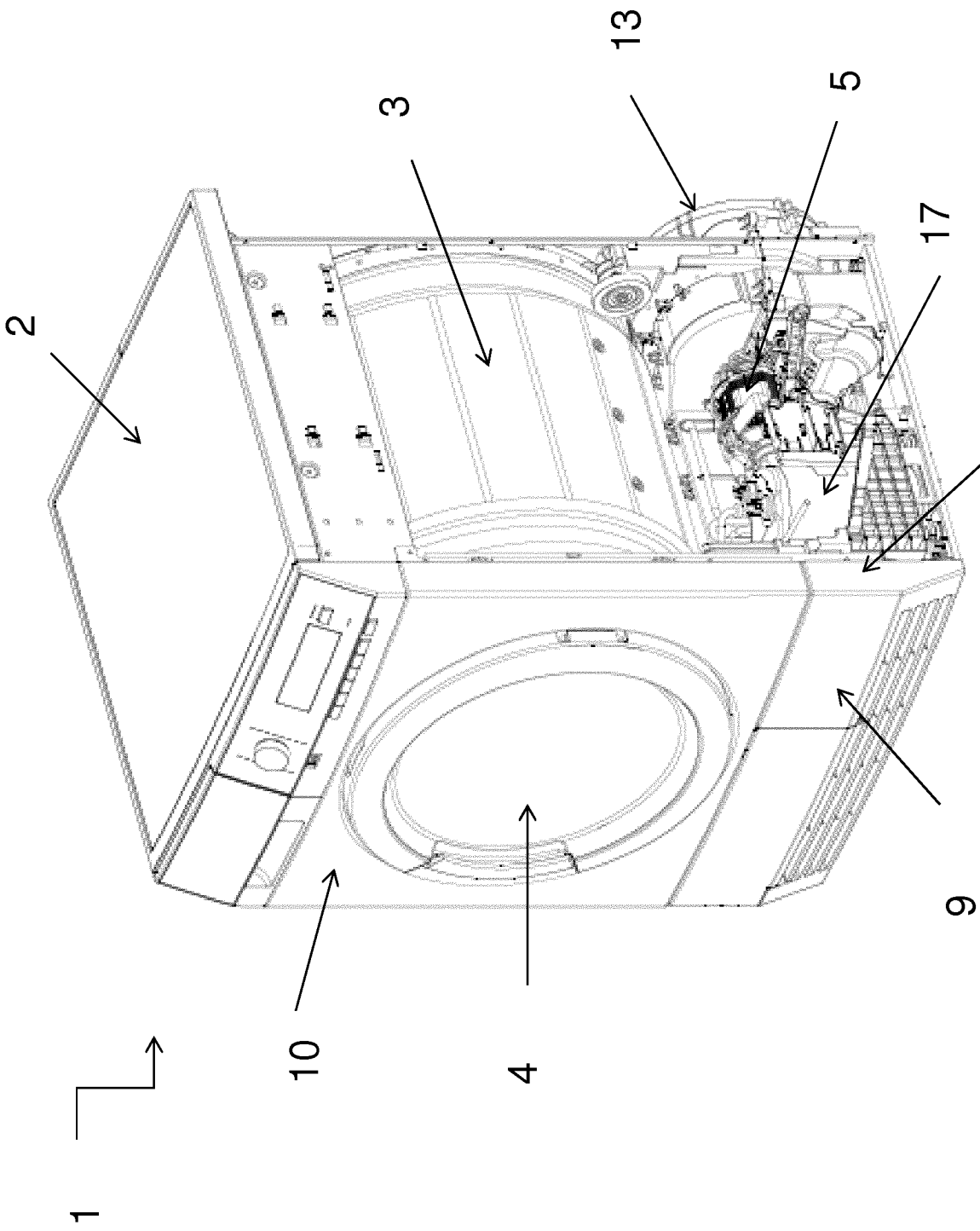

Figure 1

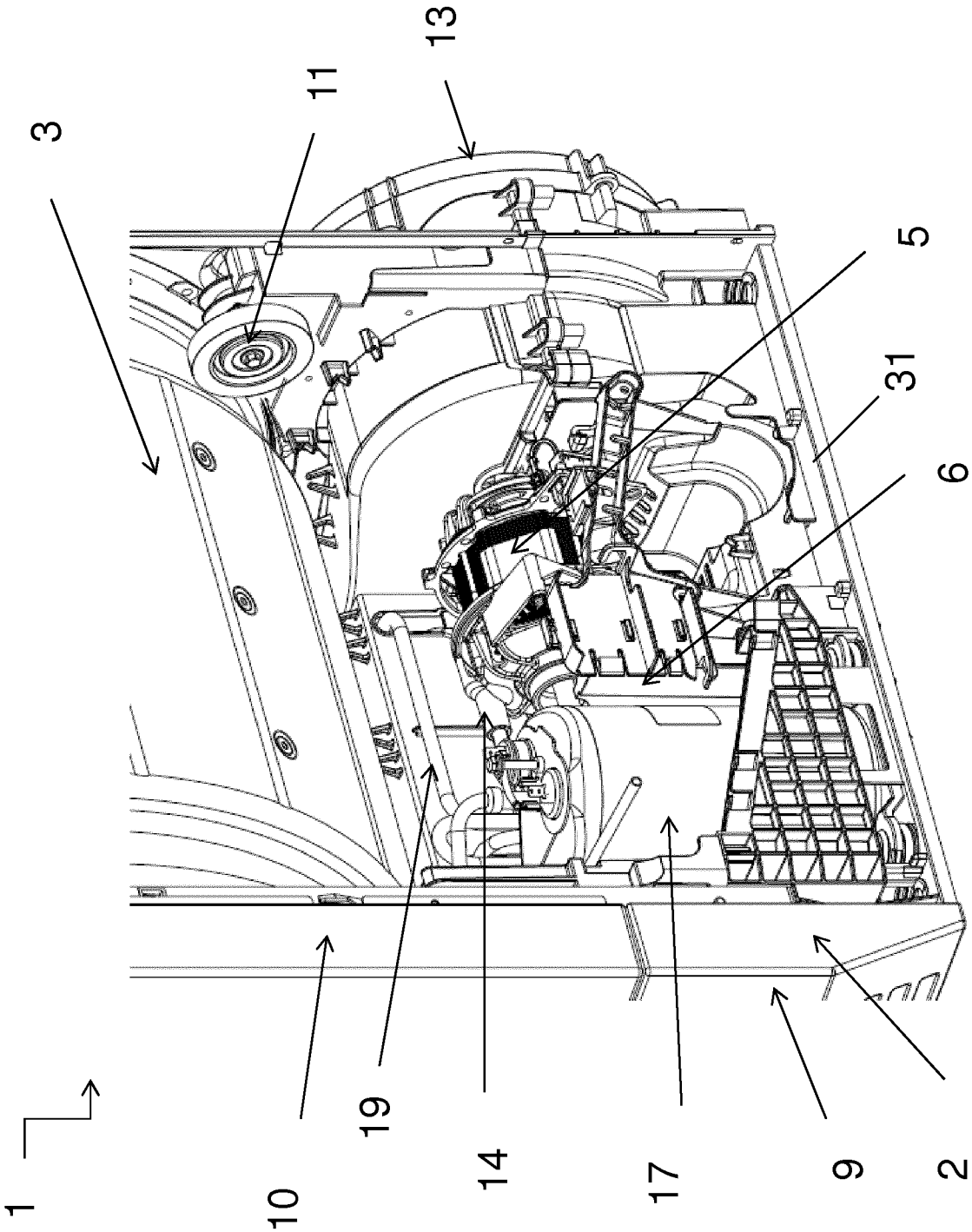

Figure 2

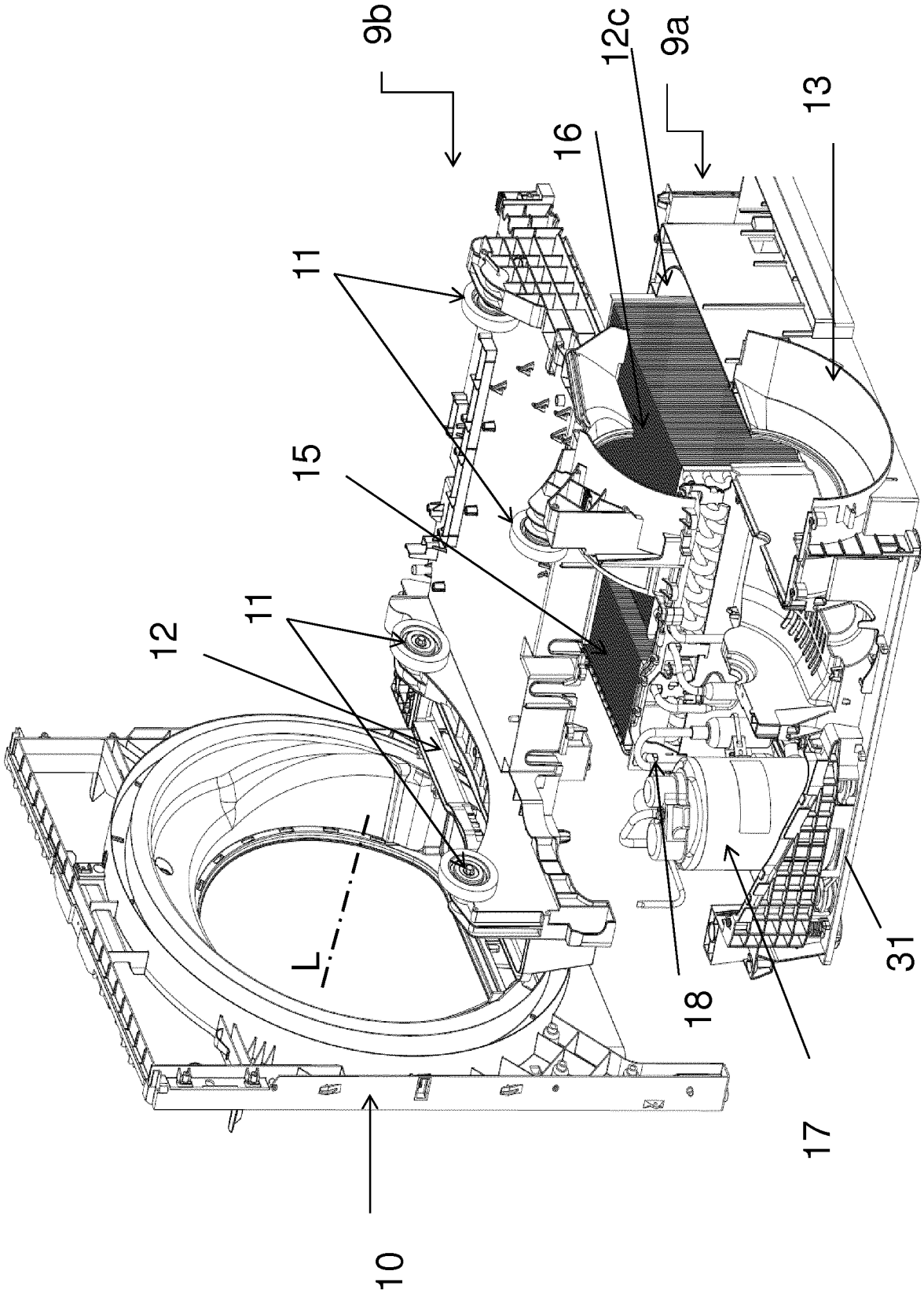

Figure 3

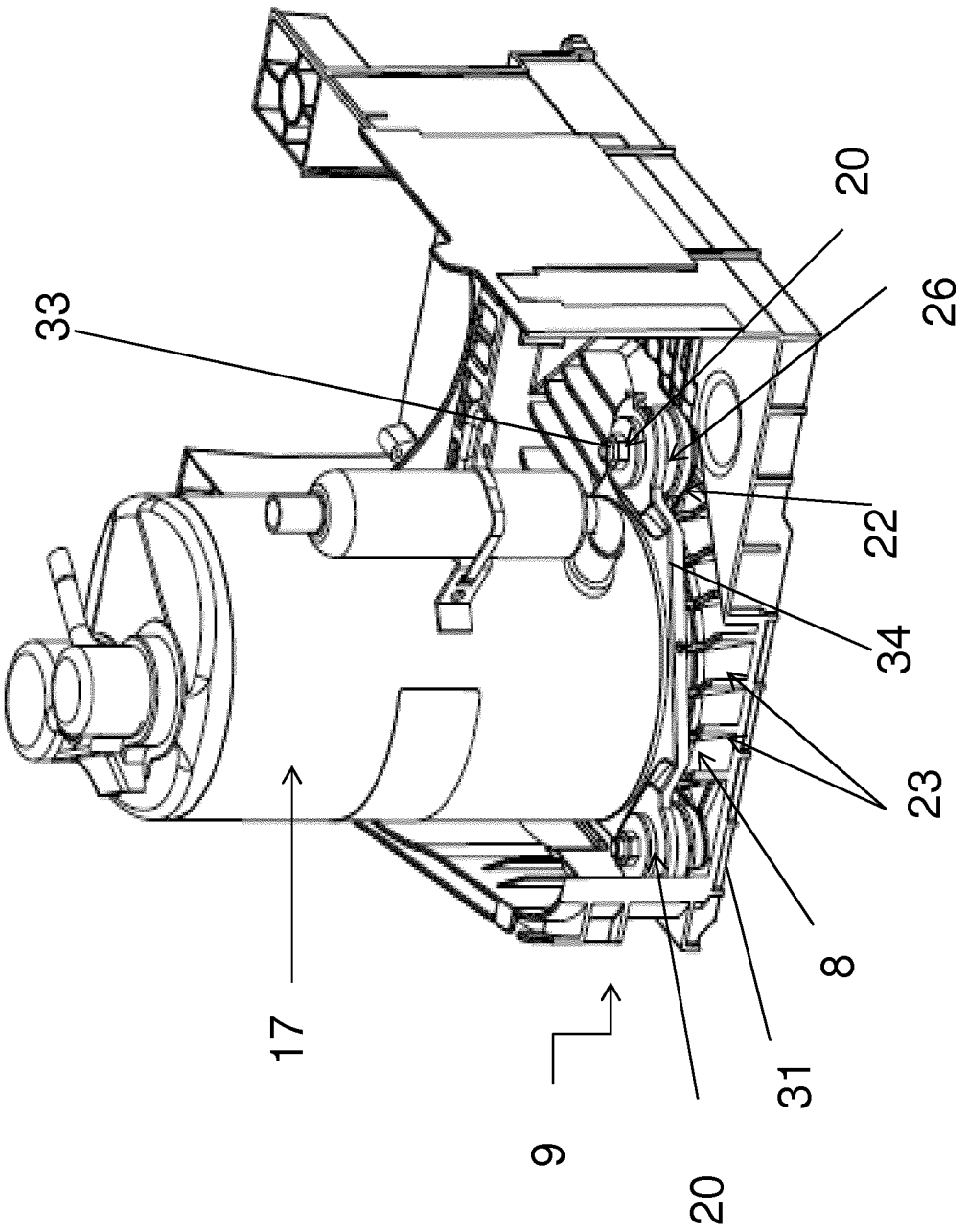

Figure 4

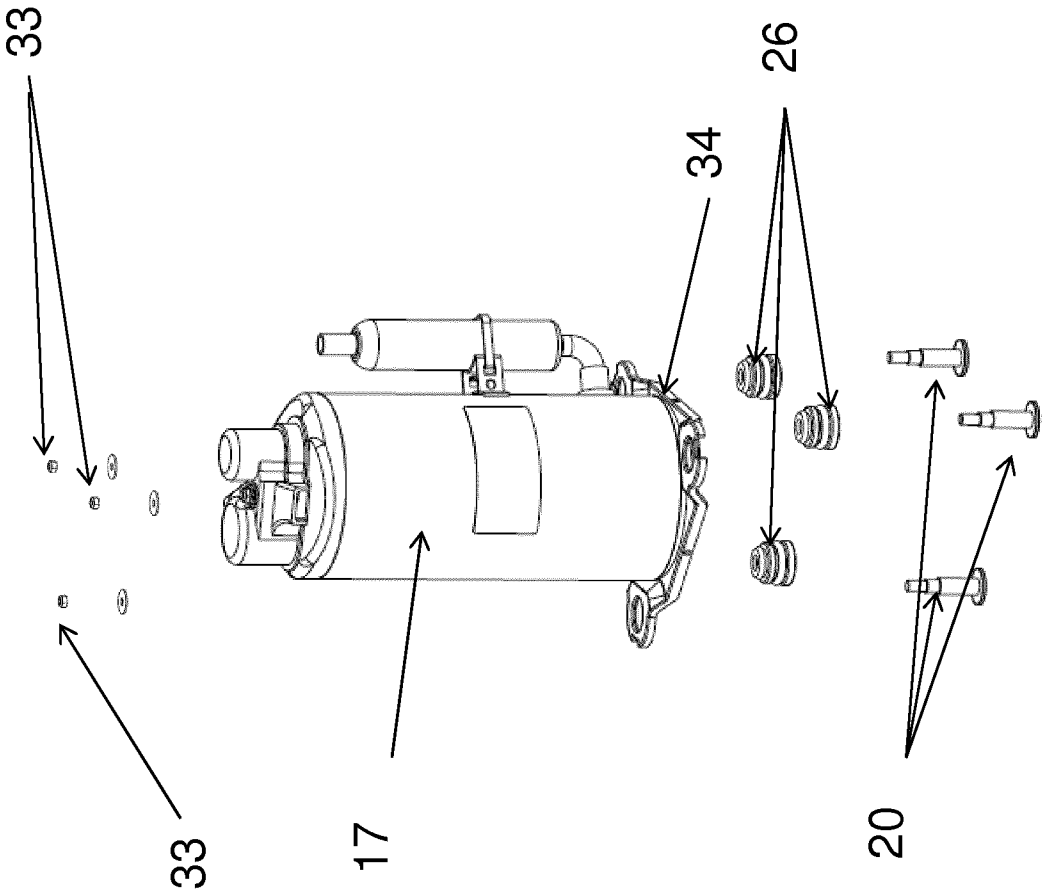

Figure 5

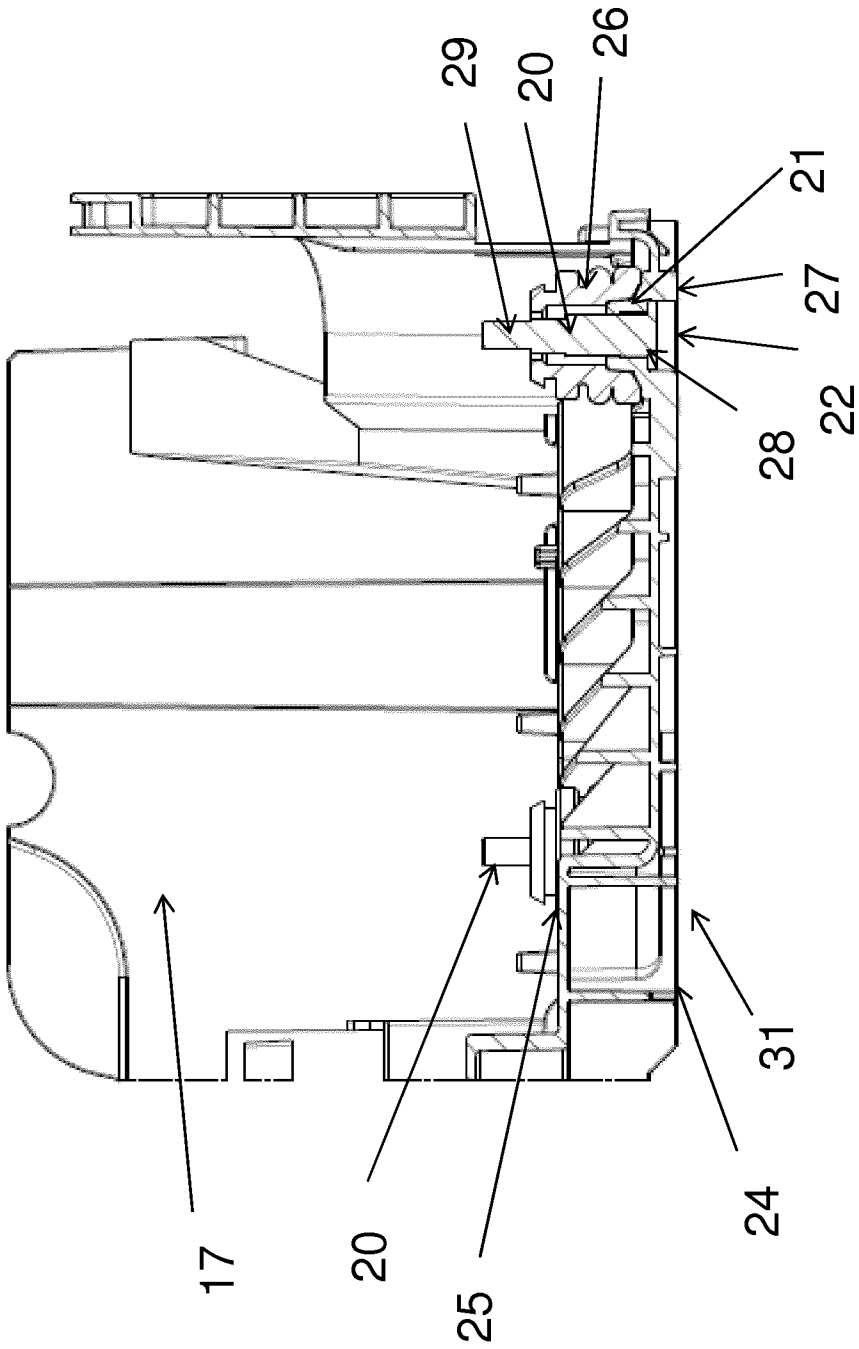

Figure 6

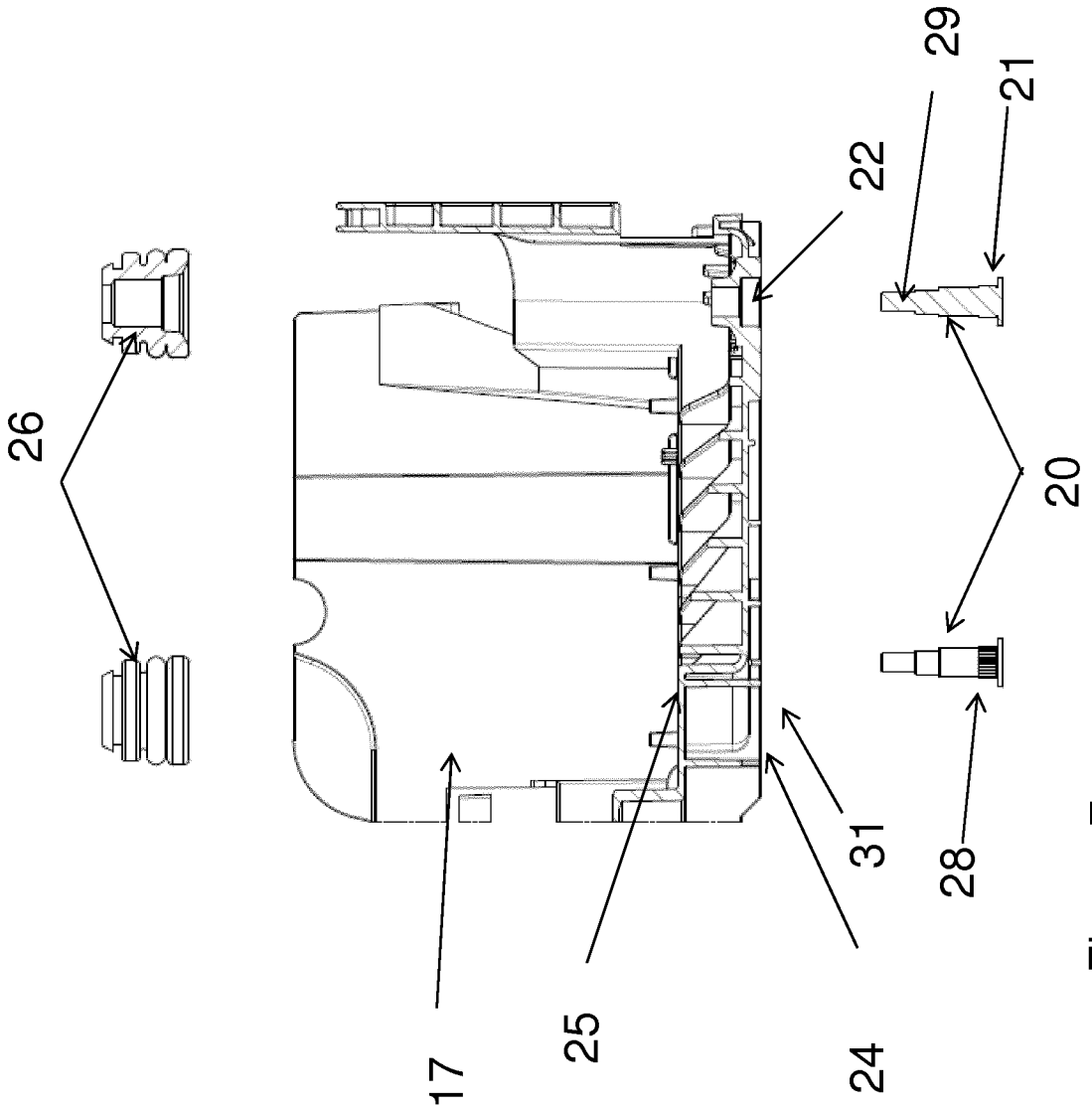

Figure 7

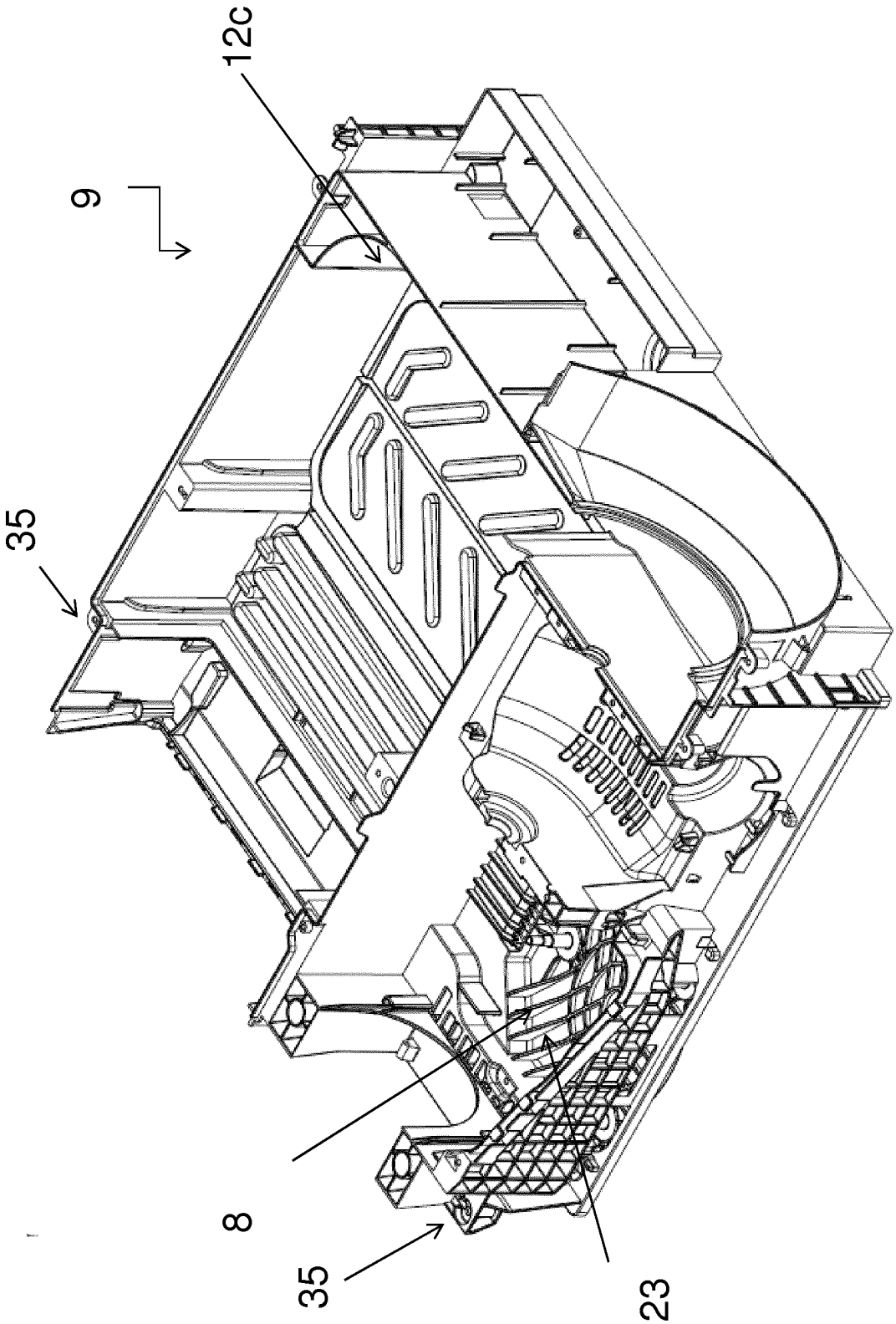

Figure 8

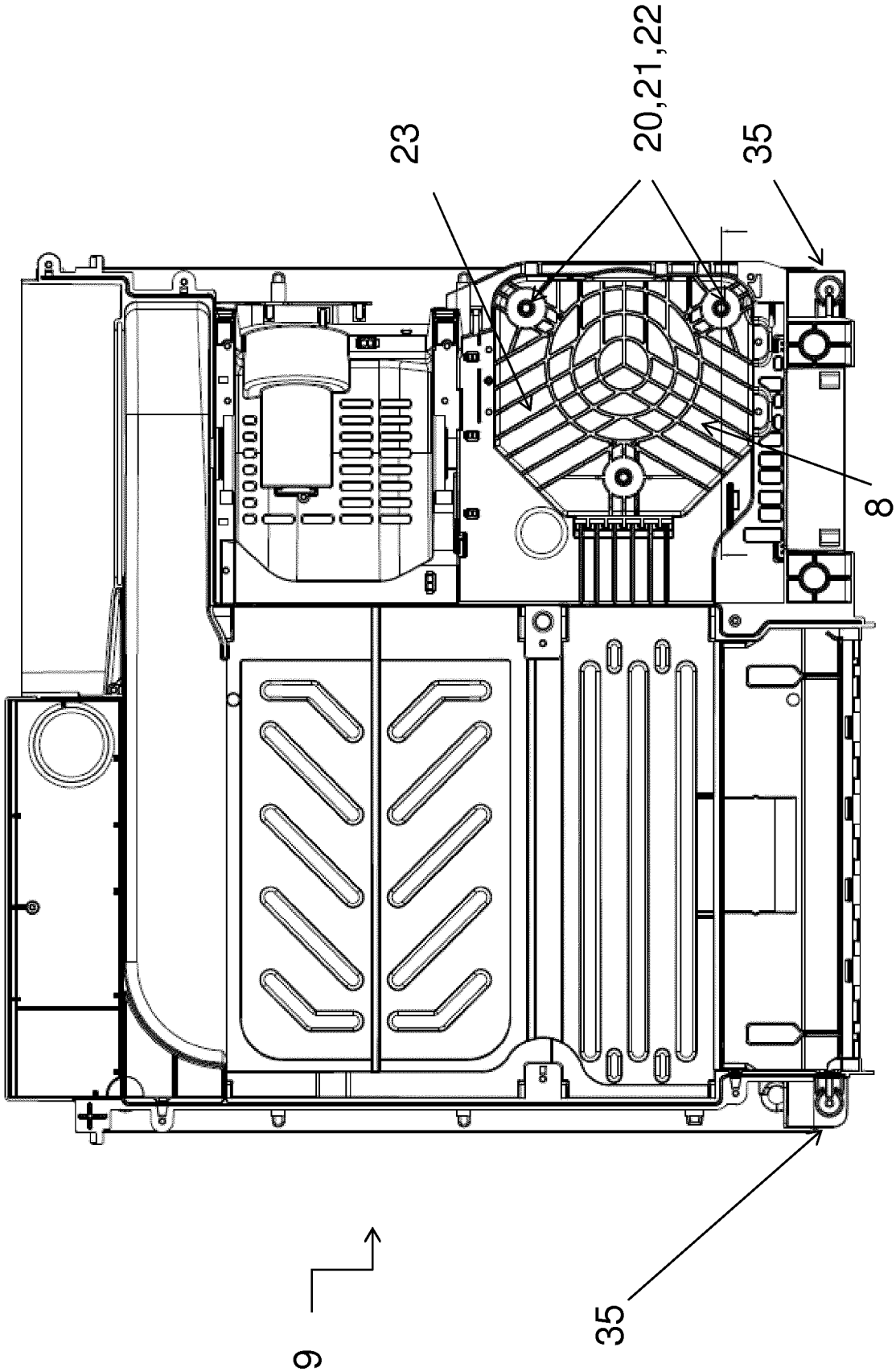

Figure 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/076036

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F58/20
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 341 179 A1 (ELECTROLUX HOME PROD CORP [BE]) 6 July 2011 (2011-07-06) paragraphs [0011] - [0015] paragraphs [0018] - [0020] paragraphs [0024], [0029] - [0033] paragraphs [0039] - [0055] figures 1-3	1-15
X	JP 2010 057545 A (TOSHIBA CORP; TOSHIBA CONSUMER ELECT HOLDING; TOSHIBA HOME APPLIANCES) 18 March 2010 (2010-03-18) paragraphs [0001] - [0010] paragraphs [0015] - [0018] paragraphs [0021] - [0026] claims 1-6; figures 1-14	1,2,4, 11,12

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 February 2014	17/02/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Weinberg, Ekkehard

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/076036

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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International application No
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