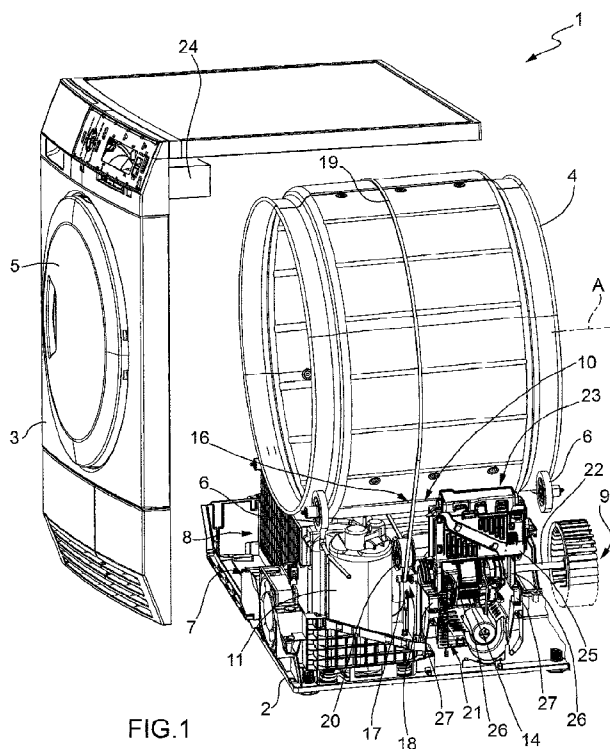




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- (71) Applicant (for all designated States except US): **ELECTROLUX HOME PRODUCTS CORPORATION N.V.** [BE/BE]; Raketsstraat 40, B-1130 Brussels (BE).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **LORENC, Marcin** [PL/IT]; Electrolux Italia S.p.A., Corso Lino Zanussi 30, I-33080 Porcia (PN) (IT). **ROS, Paolo** [IT/IT]; Electrolux Italia S.p.A., Corso Lino Zanussi 30, I-33080 Porcia (PN) (IT).
- (74) Agents: **NARDONI, Andrea** et al.; Electrolux Italia S.p.A., Corso Lino Zanussi 30, I-33080 Porcia (PN) (IT).
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[Continued on next page]

(54) Title: HOME LAUNDRY DRIER



(57) Abstract: A home laundry drier (1) comprising a laundry drum (4) which is located inside a casing (3) to rotate about an longitudinal axis (A), and a closed circuit hot-air generator (7) provided with: an air recirculating conduit (8) connected to laundry drum (4); a centrifugal fan (9) and heat-pump means (10) which comprises a first (12) and second air/refrigerant heat exchangers (13) located into the air recirculating conduit (8) to cool the airflow coming out from the laundry drum, and respectively, to heat the airflow returning back into laundry drum (4); the home laundry drier (1) further comprising an electric motor (14) designed to simultaneously rotate both centrifugal fan (9) and the laundry drum (4) through transmission system means (16); and inverter means (23) controlling the electric motor and configured to receive a predetermined speed which is associated to a nominal airflow rate within the air recirculating conduit (8) and to a nominal drum speed; and control the electric motor (14) so that the output motor speed is maintained substantially equal to predetermined speed, independently of decreasing of the airflow rate caused by clogging-up of particles within the first (12) and/or second air/refrigerant heat exchangers (13) of the heat-pump means (10).

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5

HOME LAUNDRY DRIER

The present invention relates to a home laundry
10 drier.

More specifically, the present invention relates to
a rotary-drum home laundry drier comprising: a
substantially parallelepiped-shaped outer box casing; a
cylindrical bell-shaped drum for housing the laundry to
15 be dried, and which is located in axially rotating manner
inside the casing to rotate about its horizontally
oriented longitudinal axis, directly facing a laundry
loading and unloading opening formed in the front face of
the casing; a door hinged to the front face of the casing
20 to rotate to and from a rest position closing the opening
in the front face of the casing to seal the casing and
the bell-shaped drum.

Further, rotary-drum laundry drier of the above type
comprises a closed-circuit, a hot-air generator designed
25 to circulate inside the revolving drum a stream of hot
air with a low moisture content, and which flows through
the revolving drum and over the laundry inside the drum
to rapidly dry the laundry.

In the rotary-drum laundry drier of the above type, the closed-circuit, hot-air generator comprise an air recirculating conduit having its two ends connected to the revolving drum, on opposite sides of the latter; a
5 centrifugal fan located along the recirculating conduit to produce, inside the latter, an airflow which flows through the revolving drum; and finally a heat-pump device having: a compressing device, which subjects a gaseous refrigerant to compression (e.g. adiabatic
10 compression) so that refrigerant pressure and temperature are much higher at the outlet than at the inlet of compressing device; and two heat exchangers, which are located one after the other, along the air recirculating conduit, and are designed to receive the refrigerant from
15 the compressing device so that to cool or heat the airflow.

In detail, a first air/refrigerant heat exchanger, commonly referred to as the evaporator, provides for rapidly cooling the airflow arriving from the revolving
20 drum to condense the surplus moisture in the airflow; whereas a second air/refrigerant heat exchanger, commonly referred to as the condenser, provides for rapidly heating the airflow arriving from the first heat exchanger and directed back to the revolving drum, so
25 that the airflow re-entering into the revolving drum is heated rapidly to a temperature higher than or equal to that of the air flowing out of the revolving drum.

In the above domestic laundry driers, flowing of the

airflow through the revolving drum is accomplished by an electrical motor, i.e. a three-phase induction electric motors that drives both the centrifugal fan and a transmission system that rotates the revolving drum.

5 Unluckily, despite the fact that there are several removable air-filters located into the air recirculating conduit, during the flowing of the air through the revolving drum, particles of lint/fluff/dust build up inside of the first and second air/refrigerant heat
10 exchanger, causing a gradually clogging up of the closed-circuit which creates loss of pressure inside the air recirculating conduit.

 As a result of the loss of pressure inside the recirculating conduit, the rotation speed of the
15 centrifugal fan and the flow rate of the air flow tend to gradually decrease, causing the drawback that the drying time increases and, consequently, the drying process slows down.

 Due to the fact the rotation speed of the
20 centrifugal fan decreases, the electric motor is subjected to slow down and works under stress causing disadvantageous higher electricity power consumption.

 In addition, the air temperature inside the heat pump assembly tends to gradually increase, reaching a
25 high value which may both causes damaged the clothing and several heat dissipation problems at the compressing device of the heat-pump device.

 In detail, in that event, heat-pump device needs to

operate at full capacity, but compressing device could not be able to absorb by means of the evaporator a sufficient amount of heat from the airflow so as to maintain the air temperature into the air recirculating
5 conduit under a safety threshold over which the compressing device is automatically turned off by an auxiliary safety dryer device.

Finally, it should be understood that when the compressing device operates in the full capacity state,
10 it becomes quite noisy and unfortunately its operating life decreases.

It is the aim of the present invention to provide a rotary-drum home laundry drier designed to eliminate the aforementioned drawbacks.

15 According to the present invention, there is provided a home laundry drier as claimed in Claim 1 and preferably, though not necessarily, in any one of the Claims depending directly or indirectly on Claim 1.

According to a different aspect of the present
20 invention, there is provided a laundry drier comprising an outer box casing, a laundry drum which is located in axially rotating manner inside the casing to rotate about an longitudinal axis, and a closed circuit hot-air generator for circulating a stream of hot air inside said
25 laundry drum; said closed circuit hot-air generator comprising:

- an air recirculating conduit connected at both ends to laundry drum so that to form the closed circuit;

- a centrifugal fan located along said air recirculating conduit to produce, inside the latter, an airflow flowing through the laundry drum;
- heat-pump means comprising a first and second
5 air/refrigerant heat exchangers located into the air recirculating conduit to rapidly cool the airflow coming out from the laundry drum for condensing the surplus moisture in said airflow, and, respectively, to heat the airflow returning back into said laundry
10 drum;

the laundry drier further comprising:

- an electric motor which is designed to simultaneously rotate both said centrifugal fan and said laundry drum through transmission system means;
- 15 said laundry drier being characterized in comprising electronic control means controlling the speed of the electric motor and a base resting on the floor; said casing being fixed stably, but in easily removable manner, to the base; said heat-pump means being located
20 within said base and wherein the electronic control means comprises a protective outer container; said protective outer container (25) being fixed to the base (2).

Preferably, said protective outer container is fixed to the base by means of a number of supporting
25 brackets.

Preferably, the electronic control means are supported by at least two supporting brackets fixing the bottom side of the outer container to the upper ends of

two sidewalls of a motor compartment formed on the base and shaped to house said electric motor.

Preferably, the sidewalls of the motor compartment are faced one another and projects from the base in a direction substantially perpendicular to the lying plane of the base and orthogonal to the longitudinal axis; said supporting brackets being designed to support the outer container so that the later is placed astride the electric motor and beneath the drum.

10 Preferably, the first sidewall of the motor compartment projects from the base so that it separates the electric motor from the centrifugal fan.

Preferably, a second sidewall of the motor compartment is located on the base spaced-out from, and parallel with said first sidewall, and separates the electric motor from a compressor compartment, which is structured to house an electrically powered refrigerant compressing device.

Preferably, the outer container comprises one or more cooling slots adapted to cool the electronic control means.

Preferably, the electronic control means are coupled/connected with/to a heat sink adapted to cool the electronic components comprised in the electronic control means.

25 Preferably, the heat sink comprises a base plate of heat-conducting material having a first surface coupled/connected with/to the electronic components

comprised in the electronic control means and a number of dispersion plates/wings projecting from a second surface of base plate to outside of the outer container.

Preferably, the heat sink may be part of the outer
5 container.

Preferably, the electronic control means comprise inverter control means.

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

- Figure 1 shows a partly exploded view, with parts removed for clarity, of a home laundry drier in accordance with the teachings of the present invention;

- Figure 2 shows a perspective view, with parts
15 removed for clarity, of a lower part, i.e. a base, containing a hot-air generator of the home laundry drier shown in Figure 1;

- Figure 3 shows a perspective view, with parts removed for clarity, of a lower part, i.e. the base,
20 containing a hot-air generator of the home laundry drier according to a different embodiment of the present invention.

With reference to Figure 1, number 1 indicates as a whole a home laundry drier comprising a base 2 resting on
25 the floor; a casing 3 designed to be fixed stably, but in easily removable manner, to the base 2, by fixing means; a cylindrical revolving laundry drum 4 for housing the laundry to be dried, and which is fixed in axially

rotating manner inside casing 3 above the base 2, directly facing a laundry loading and unloading opening (non shown) formed in the front face of casing 3; and a door 5 hinged to the front face of casing 3 to rotate to
5 and from a rest position closing opening in the front face to seal revolving laundry drum 4.

Preferably, the revolving laundry drum 4 rests horizontally inside casing 3 on a number of horizontal supporting rollers 6 which are fitted to casing 3 to let
10 revolving drum 3 freely rotate about its longitudinal axis A.

Casing 3, revolving laundry drum 4, door 5 and supporting rollers 6 are commonly known parts in the industry, and therefore not described in detail.

15 With reference to Figure 1 and 2, laundry drier 1 comprises a closed-circuit, hot-air generator 7 housed inside the base 2 and at least partially in the casing 3, and designed to circulate through revolving laundry drum 4 a stream of hot air having a low moisture level, and
20 which flows over and rapidly dries the laundry inside revolving laundry drum 4.

Accordingly, closed-circuit, hot-air generator 7 provides for gradually drawing air from revolving laundry drum 4; extracting surplus moisture from the air drawn
25 from revolving laundry drum 4; heating the dehumidified air to a predetermined temperature, normally higher than the temperature of the air from revolving laundry drum 4; and feeding the heated, dehumidified air back into

revolving laundry drum 4, where it flows over, to rapidly dry, the laundry inside the drum.

Referring to Figure 2, hot-air generator 7 provides for continually dehumidifying and heating the air
5 circulating inside revolving drum 4 to rapidly dry the laundry inside the drum 4, and substantially comprises:

an air recirculating conduit 8 which has a air recirculating chamber 8a inside the base 2, presenting the two opposite ends connected to the revolving laundry
10 drum 4 on opposite sides of the latter;

an centrifugal fan 9 located along recirculating conduit 8 inside the base 2 to produce, inside recirculating conduit 8, an airflow f which flows into revolving drum 4 and over the laundry inside drum 4; and

15 a heat-pump device 10 which is located inside the base 2 and is able to rapidly cool the airflow F coming out from revolving laundry drum 4 for condensing the surplus moisture in the airflow F, and then to rapidly heat the airflow F returning back into revolving laundry
20 drum 4, so that the airflow entering into revolving drum 4 is heated rapidly to a temperature higher than or equal to that of the same air flowing out of the drum 4.

Referring to Figure 2, heat-pump device 10 is able to transfer heat from one fluid to another using an
25 intermediate gaseous refrigerant subjected to a closed thermodynamic cycle, the thermodynamic principles of which are widely known and therefore not described in detail.

Accordingly, heat-pump device 10 comprises an electrically powered refrigerant compressing device 11, which subjects a gaseous refrigerant to compression (e.g. adiabatic compression) so that refrigerant pressure and temperature are much higher at the outlet than at the inlet of compressing device 11.

Heat-pump device 10 further comprises a first air/refrigerant heat exchanger 12, i.e. an evaporator, which is located on the inside of the recirculating chamber 8a, and is designed so that the airflow F coming out from revolving drum 4 and the refrigerant flowing to the inlet of compressing device 11 flow through it simultaneously, allowing the refrigerant having a temperature lower than that of the airflow F, to absorb heat from the airflow f thus causing condensation of the surplus moisture in the airflow f.

Heat-pump device 10 further comprises a second air/refrigerant heat exchanger 13, i.e. condenser, which is located on the inside of the recirculating chamber 8a, downstream of the first air/refrigerant heat exchanger 12 and upstream of the centrifugal fan 9, and is designed so that the airflow f directed to revolving drum 4 and the refrigerant from the outlet of compressing device 11 flow through it simultaneously, allowing the refrigerant having a temperature greater than that of the airflow f to release heat to the airflow f, thus rapidly heating the airflow f to a temperature higher than of the airflow f coming out of the first air/refrigerant heat exchanger

12, and preferably, though not necessarily, also higher or equal to the temperature of the airflow *f* coming out of revolving drum 3.

Referring to Figure 2, heat-pump device 10 further
5 comprises a throttling valve or similar refrigerant expansion devices (not shown), which subjects the refrigerant flowing from the second air/refrigerant heat exchanger 13 to the first air/refrigerant heat exchanger 12 to a rapid expansion, so that pressure and temperature
10 of the refrigerant entering in the first air/refrigerant heat exchanger 12 are much lower than pressure and temperature of the refrigerant coming out from second air/refrigerant heat exchanger 13, thus completing the closed thermodynamic cycle in opposition to the
15 compressing device 11, which provides for rapidly compressing the refrigerant.

Heat-pump device 10 finally comprises a number of suitable connecting pipes which connect refrigerant compressing device 11, first heat exchanger 12, second
20 heat exchanger 13 and refrigerant expansion device one to the other, so as to form a closed circuit allowing the refrigerant coming out from the outlet of compressing device 11 to flow, in sequence, through second heat exchanger 13, refrigerant expansion device and first heat
25 exchanger 12, before returning to the inlet of compressing device 11.

Referring to Figure 1 and 2, home laundry drier also comprises an electric motor 14, which drives both the

centrifugal fan 9 and a transmission system 16 that rotates the revolving laundry drum 4 around the longitudinal axis A.

Accordingly, the electric motor 14 has a first shaft
5 17 whose distal end 18 is pulley-shaped and forms part of the transmission system 16 for rotating the revolving laundry drum 4.

The transmission system 16 further comprises an endless belt 19 which passes around the outer periphery
10 of revolving laundry drum 4 and around the distal end of the first shaft 17. The distal end is designed to drive the belt 19 around the drum 4. In order to maintain the belt 19 in tension or friction against the outer surface periphery of drum 4, an idler pulley 20 is held in
15 tension against the belt 19 by means of a cantilevered spring device 21.

Referring to Figures 1 and 2, the electric motor 14 also comprises a second shaft 22 which extend from the frame of the electric motor 14 to the opposite side of
20 the first shaft 17 and is directly connected to a center hub of the centrifugal fan 9 so as to rotate the latter around a rotational axis, together with the rotation of endless belt 19 of the revolving drum 4.

Preferably, the electric motor 14 comprises a three-
25 phase electric motor, i.e. an induction or permanent-magnet electric motor, such as brushless AC motor.

The rotation speed of the electric motor 14 which rotates both the drum 4 and the centrifugal fan 9 is

controlled by an electronic control apparatus such as an inverter control device 23, which, preferably, receives an input reference speed from a main electronic control unit 24 on the basis of the drying cycle selected by the user.

Accordingly, any drying cycle selectable by the user may comprise one or more reference speeds, each of which is associated with a nominal airflow rate within the air recirculating conduit 8 and to a nominal revolving drum speed.

In a preferred embodiment of the present invention, inverter control device 23 is configured to:

- receive a reference speed from the main electronic control unit 24 associated with the nominal airflow rate and the nominal revolving drum speed which the drying program provides for, and

- control the electric motor 14 so that the output motor speed is maintained substantially equal to the reference speed, independently of decreasing of the airflow rate F inside the air recirculating conduit 8 compared to the nominal airflow rate, and caused by clogging-up of particles within the first air/refrigerant heat exchanger 12 and/or the second air/refrigerant heat exchanger 13.

In a preferred embodiment, the electrical architecture of inverter control device 23 may comprise an interface circuit (not shown) for receiving, filtering, and conditioning reference speed from the main

electronic control unit 24; a control circuit connected to interface circuit to receive reference speed and generate control signals accordingly; and a power circuit, which receives the control signals and
5 accordingly regulates current/voltage supply to electric motor 14 so that the output speed of the electric motor 14 is substantially equal to the received reference speed.

Preferably, inverter control device 23 may comprise,
10 for example, a first and a second power line (not shown) at a substantially continuous supply voltage; the electric power circuit (not shown) may comprise a number of transistors, i.e. six transistors located in pairs along three control circuit branches connected to the
15 first and second power line, and each having, between the relative pair of transistors, a node connected to a input terminal of the electric motor 14; current-measuring modules (not shown) able to instantaneously measure the supply current along a power line or circuit branches;
20 and an open-loop module (not shown) which is configured to receive the supply voltage and the reference speed associated to a selected drying program, and supply control signals for controlling transistors and each comprising a given duty cycle enabling/disabling a
25 respective transistor of the power circuit so that the output motor speed is maintained substantially equal to the reference speed.

It should be pointed out that controlling the

electric motor 14 by the inverter control device 23 based on the reference speed (associated with the nominal airflow rate and the nominal revolving drum speed), allows to obtain an output motor speed which is
5 substantially stable and constant, substantially equal, or nearly equal, to the reference speed, and eliminates (or at least greatly reduces) drying time/temperature increase caused by clogging-up of particles within the first/second air/refrigerant heat exchanger 12, 13.

10 In a preferred embodiment shown in Figure 2, inverter control device 23 substantially comprises a protective outer container 25; and an inverter electronic circuit (not shown), which is conveniently defined by a electronic board housed inside the container 25 and
15 electrically connected to both main electronic control unit 24, to receive reference speed, and to the input terminals of the electric motor 14 so that to supply to the latter the controlled current/voltage.

Preferably, protective outer container 25 comprises
20 a box made in plastic or any other kind of similar material, has a parallelepiped external shape and is permanently fixed to the base 2 by means of a number of supporting brackets 26.

In a preferred embodiment, outer container 25 of the
25 inverter control device 23 is supported by at least two supporting brackets 26 fixing the bottom side of the outer container 25 to the upper ends of two sidewalls 27 of a compartment 28 formed on the base 2 and shaped to

house the electric motor 14.

In a preferred embodiment, the box of the outer container 25 may present one or more cooling slots (not shown) designed to cool the inner electronic circuit.

5 Preferably, the inner electronic circuit may be coupled/connected with/to a heat sink (not shown) designed to cool the electronic components comprised in the electronic circuit.

In a preferred embodiment, heat sink comprises a
10 base plate (not shown) of heat-conducting material, e.g. aluminium, presenting a first surface coupled/connected with/to the inner electronic circuit and a number of dispersion plates/wings projecting from the second surface of base plate to outside of the box.

15 In a preferred embodiment, heat sink may be part of the outer container 25. For example, heat sink may be integrated into a wall of the box so that the dispersion plates/wings project to the out side of the box.

In a possible embodiment box of the outer container 25
20 have a slot which is closed by the base plate of the heat sink.

In a different embodiment, inverter control device
23 above disclosed is replaced by a electronic control unit (not shown) which is configured to regulate the
25 speed of the electric motor based on the input reference speed from a main electronic control unit 24. It should be pointed out that in this case electronic control unit is housed inside the protective container 25 and

electrically connected to both main electronic control unit 24, to receive reference speed, and to the input terminals of the electric motor 14 so that to supply to the latter the controlled current/voltage on the basis of
5 a specific speed control algorithm. For example specific speed control algorithm, when implemented by the electronic control unit may control the motor to vary the output motor speed.

Referring to Figure 2, sidewalls 27 of the
10 compartment 28 are faced one another and projects from the base 2 in a direction substantially perpendicular to the lying plane of the base 2 and orthogonal to the longitudinal axis A; whereas two supporting brackets 26 supports the outer container 25 so that the later is
15 placed astride the electric motor 14 and beneath the drum 4.

Accordingly, a first sidewall 27 projects from the base 2 so that it separates the electric motor 14 from the centrifugal fan 9 and present its upper end shaped to
20 house an intermediate portion of the second shaft 22; whereas the second sidewall 27 is located on the base 2 spaced-out from, and parallel with, the first sidewall 27, and is shaped to house an intermediate portion of the first shaft 17.

25 According to a preferred embodiment second sidewall 27 separates the electric motor 14 from a compressor compartment 29, which is structured to house the electrically powered refrigerant compressing device 11.

It should be pointed out that according to another embodiment the inverter control device 23 may be supported by means of supporting brackets 26 fixing the bottom side of the outer container 25 with two sidewalls 27 of a motor compartment 28 formed into a base designed to contains an air/air heat exchanger 30 as shown in Figure 3.

Referring to Figure 3, hot-air generator essentially comprises a cool condenser module 31 located on the inside of the recirculating chamber 8a; a cooling open circuit 32 which has a portion that cross through the cool condenser module 31, and a cooling fan 33 located along the cooling open circuit 32 to cool condenser module 31 so that condense the moisture in the hot air flowing through it.

Accordingly the process fan 9 is located into a fan compartment 34 formed on the base 2 and is shrunk-on the end of the first shaft 17.

The electric motor 14 drives both the process fan 9 and the cooling fan 33

The advantages of drier 1 as described above are obvious: controlling the electric motor by the inverter control circuit, rotation speed of the centrifugal fan and the flow rate of the air flow are maintained stable during the drying cycle. Therefore drying time does not increase and the electric motor does not work under stress.

In addition, clothing is not subjected to be damaged

because air temperature inside the heat pump assembly does not increase over a critical threshold.

CLAIMS

1) A laundry drier (1) comprising an outer box casing (3), a laundry drum (4) which is located in axially rotating manner inside the casing (3) to rotate
5 about an longitudinal axis (A), and a closed circuit hot-air generator (7) for circulating a stream of hot air inside said laundry drum (4); said closed circuit hot-air generator (7) comprising:

- 10 - an air recirculating conduit (8) connected at both ends to laundry drum (4) so that to form the closed circuit;
- a centrifugal fan (9) located along said air recirculating conduit (8) to produce, inside the latter, an airflow flowing through the laundry drum
15 (4);
- heat-pump means (10) comprising a first (12) and second air/refrigerant heat exchangers (13) located into the air recirculating conduit (8) to rapidly cool the airflow coming out from the laundry drum
20 for condensing the surplus moisture in said airflow, and, respectively, to heat the airflow returning back into said laundry drum (4);

the laundry drier (1) further comprising:

- 25 - an electric motor (14) which is designed to simultaneously rotate both said centrifugal fan (9) and said laundry drum (4) through transmission system means (16);

said laundry drier (1) being characterized in comprising

electronic control means (23) controlling the speed of the electric motor and configured to:

- receive a predetermined speed which is associated to a nominal airflow rate within the air recirculating conduit (8) and to a nominal drum speed; said nominal
5 airflow rate and nominal drum speed being both related to a drying program selected by a user; and
- control the electric motor (14) so that the output motor speed is maintained substantially equal to said
10 predetermined speed, independently of decreasing of the airflow rate caused by clogging-up of particles within said first (12) and/or second air/refrigerant heat exchangers (13) of the said heat-pump means (10).

2. Laundry drier according to Claim 1, comprising a
15 base (2) resting on the floor; said casing (3) being fixed stably, but in easily removable manner, to the base 2; said heat-pump means (10) being located within said base (2).

3. Laundry drier according to Claims 2 or 3,
20 wherein electronic control means (23) comprises a protective outer container (25); said protective outer container (25) being fixed to the base (2).

4. Laundry drier according to Claim 3, wherein said protective outer container (25) is fixed to the base (2)
25 by means of a number of supporting brackets (26).

5. Laundry drier according to Claim 4, wherein electronic control means (23) are supported by at least two supporting brackets (26) fixing the bottom side of

the outer container (25) to the upper ends of two sidewalls (27) of a motor compartment (28) formed on the base (2) and shaped to house said electric motor (14).

6. Laundry drier according to Claim 5, wherein
5 sidewalls (27) of the motor compartment (28) are faced one another and projects from the base (2) in a direction substantially perpendicular to the lying plane of the base (2) and orthogonal to the longitudinal axis (A); said supporting brackets (26) being designed to support
10 the outer container (25) so that the later is placed astride the electric motor (14) and beneath the drum (4).

7. Laundry drier according to Claim 6, wherein a first sidewall (27) of the motor compartment (28) projects from the base (2) so that it separates the
15 electric motor (14) from the centrifugal fan (9).

8. Laundry drier according to Claims 6 or 7, wherein a second sidewall (27) of the motor compartment (28) is located on the base (2) spaced-out from, and parallel with said first sidewall (27), and separates the
20 electric motor (14) from a compressor compartment (29), which is structured to house an electrically powered refrigerant compressing device (11).

9. Laundry drier according to any of the foregoing Claims, wherein the outer container (25) comprises one or
25 more cooling slots adapted to cool the electronic control means (23).

10. Laundry drier according to any of the foregoing Claims, wherein the electronic control means (23) are

coupled/connected with/to a heat sink adapted to cool the electronic components comprised in the electronic control means (23).

11. Laundry drier according to claim 10, wherein the
5 heat sink comprises a base plate of heat-conducting material having a first surface coupled/connected with/to the electronic components comprised in the electronic control means (23) and a number of dispersion plates/wings projecting from a second surface of base
10 plate to outside of the outer container (25).

12. Laundry drier according to claim 10 or 11, wherein the heat sink may be part of the outer container (25).

13. Laundry drier according to any of the foregoing
15 Claims, wherein electronic control means (23) comprise inverter control means (23).

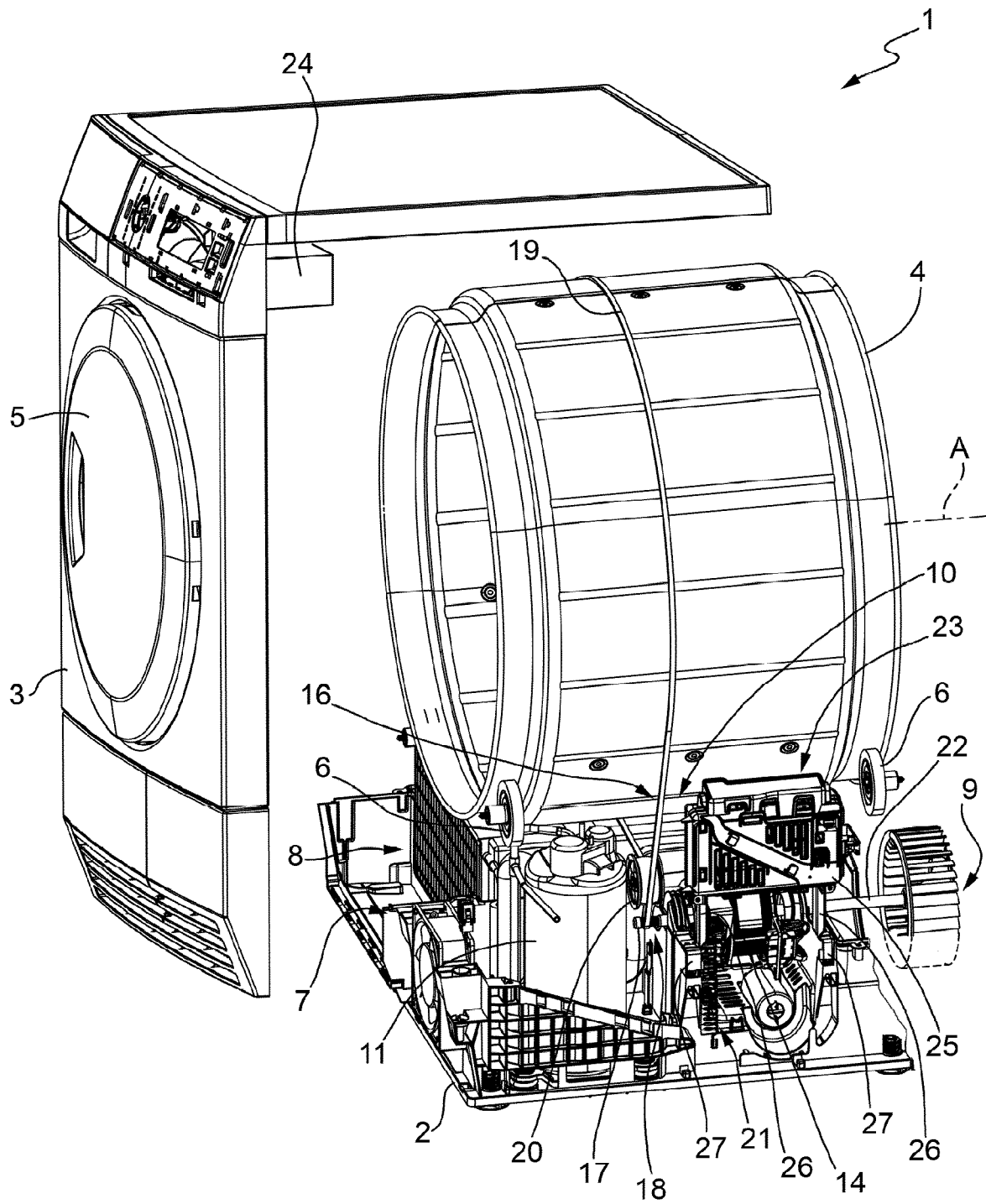


FIG.1

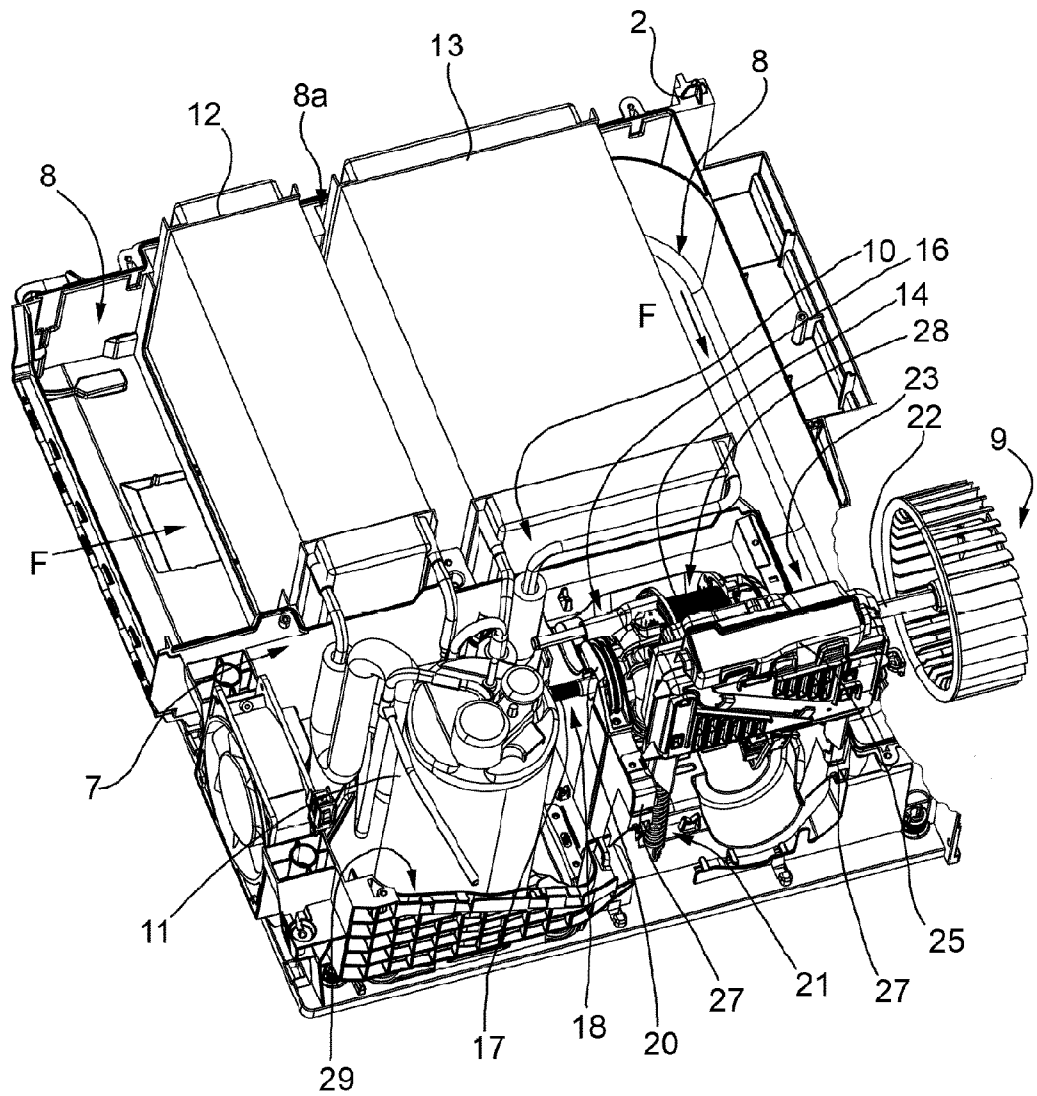


FIG.2

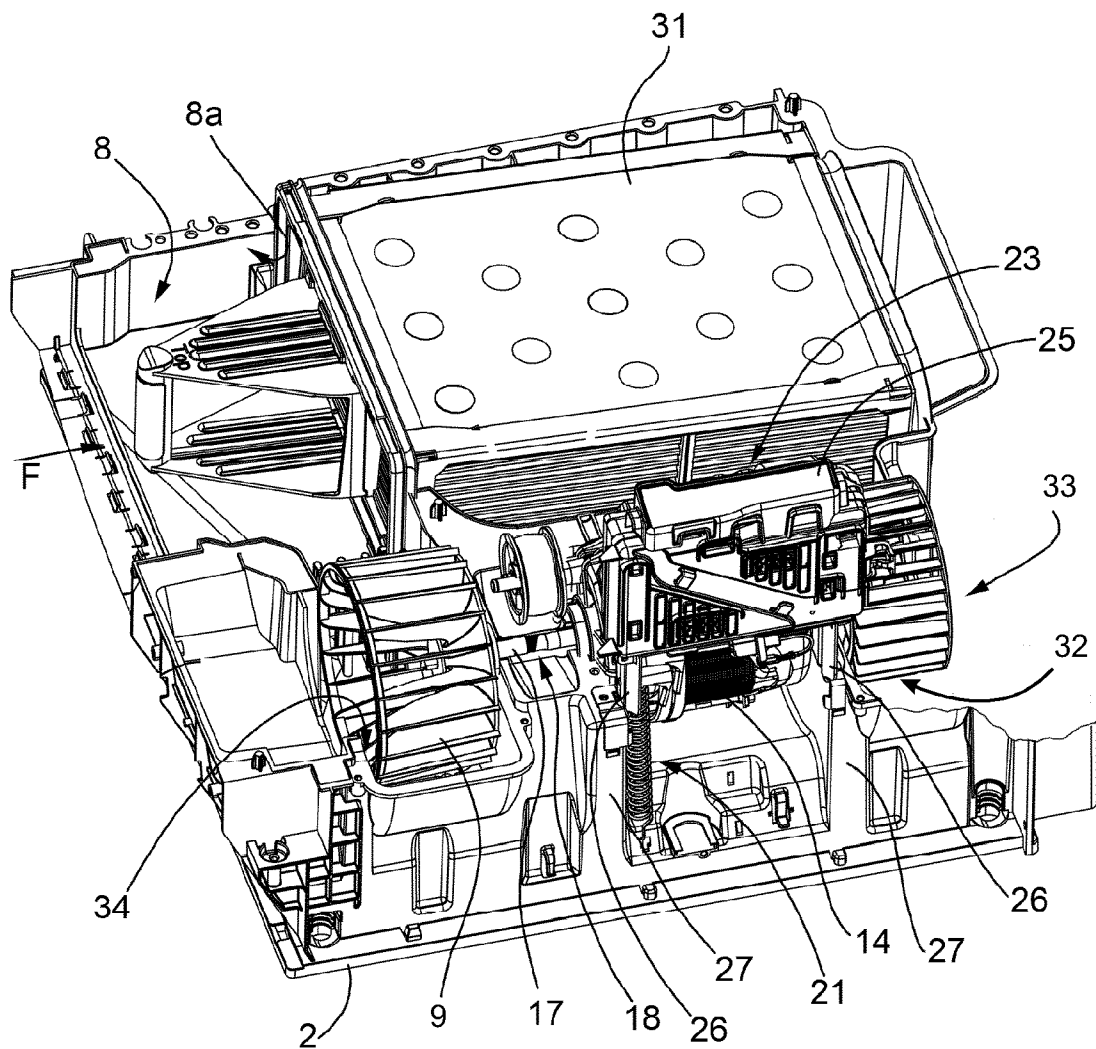


FIG.3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/051780

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F58/28 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.
A	EP 1 209 277 A2 (ELECTROLUX ZANUSSI ELETTRODOME [IT]) 29 May 2002 (2002-05-29) paragraph [0008] - paragraph [0011]; figures 1,2	1-13
A,P	----- EP 2 336 419 A1 (PANASONIC CORP [JP]) 22 June 2011 (2011-06-22) paragraph [0012] - paragraph [0021]; figures 4,5	1-13
A	----- EP 2 063 011 A1 (ELECTROLUX HOME PROD CORP [BE]) 27 May 2009 (2009-05-27) paragraph [0016] paragraph [0029] -----	13



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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

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"&" document member of the same patent family

Date of the actual completion of the international search

11 July 2012

Date of mailing of the international search report

30/07/2012

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Spitzer, Bettina

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/051780

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1209277	A2	29-05-2002	AT 256214 T 15-12-2003
		DE 60101445 D1 22-01-2004	
		DE 60101445 T2 14-10-2004	
		EP 1209277 A2 29-05-2002	
		ES 2211711 T3 16-07-2004	

EP 2336419	A1	22-06-2011	CN 102061598 A 18-05-2011
		EP 2336419 A1 22-06-2011	

EP 2063011	A1	27-05-2009	EP 2063011 A1 27-05-2009
		EP 2319975 A1 11-05-2011	
		ES 2359891 T3 27-05-2011	
		RU 2008146190 A 27-05-2010	
