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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a fan that can be used in closed places, domestic or public, to create a stream of ventilation or conditioning air for the surrounding environment.

[0002] Hereafter, the term fan will mean, in a broader sense, any apparatus whatsoever able to provide ventilation, conditioning, cooling, heating, thermoventilation, dehumidification, or purification of the air.

BACKGROUND OF THE INVENTION

[0003] Fans for rooms are known, substantially configured in a column, having a containing structure which houses the mechanical components that generate the stream of air for ventilation or conditioning, and a zone for the emission of the stream of air comprising one or more outlet apertures through which the stream is emitted toward the room.

[0004] In the most typical and widespread solutions, the outlet aperture is generally located visible on the front part of the structure of the fan, often making the technical components partly visible, for example the ventilation blades and/or the possible heating means.

[0005] This can determine an unpleasant aesthetic impact of the fan, preventing the creation of a visible profile that is clean and unobstructed, and subtracting quality from the fan itself.

[0006] Portable fans are also known, which do not have their internal components visible, or partly visible, or which do not have ventilation blades, and which exploit the Coanda effect to direct a conditioned stream toward a user.

[0007] One disadvantage of known fans is that the stream of air that reaches the user generally has a different temperature than the one desired, and in particular it is generally warmer in the case of a cooling action, and colder in the case of a heating function, resulting in an uncomfortable feeling for the user.

[0008] In particular, one disadvantage of known fans is that, in order to supply the user with the stream of air at the desired temperature, it is necessary to heat it or cool it to a respectively higher or lower temperature, with consequent increase in energy consumption.

[0009] Another disadvantage of fans of the prior art is that the air entering the fan is sucked in from a lower zone, where the motor is present, in substantial correspondence or proximity with the base of the fan itself.

[0010] In this way, in addition to sucking up the air present in the room, the fan also sucks up the dust that is present in greater quantities on the base surface where the fan also rests.

[0011] Moreover, in the event that a room or space is to be heated, this is disadvantageous because the air taken in near the ground is generally at a lower temperature than the average temperature of the room itself, so more energy is needed to heat up the stream of air to guarantee the thermal well-being of the user.

[0012] Examples of known fans are described, for example, in documents KR-A-2012/0066834, WO-A-2013/185387, AU-A-2012 200 112.

[0013] KR-A-2012/0066834 describes a fan comprising a base portion, a main body comprising an impeller, and a blowing device with an annular shape, disposed above the main body, and provided on its internal periphery with an annular nozzle for the air to exit, and defined by a first and a second plate. The air is sucked into the main body below the blowing device, it is heated by means of heating planes disposed in the blowing device, and finally it is emitted through the annular outlet nozzle, in contact with an annular surface of the blowing device, located inside the ring, in the direction facing the front of the fan. In the solution described in KR-A-2012/0066834, the stream of air in contact with the annular surface outside the blowing device has substantially the same temperature as the stream of air inside it.

[0014] In the solution described in KR-A-2012/0066834, the heating planes are located directly in contact with the first and second plate and comprise a heating layer suitable to convert electrical energy into thermal energy, possibly a protective layer against heat radiations located on an internal side, and an insulating layer located on the side in contact with one or the other plate, which has only the function of preventing the heating layer from heating the plate with which it is associated excessively, preventing possible damage to it and safety problems for a user, who could get burned due to the high temperature. In the solution provided in KR-A-2012/0066834, in fact, the stream of air emitted remains adjacent to the annular surface of the blowing device only in correspondence with a short initial segment downstream of the outlet nozzle, in which neither the heating elements nor the insulating material are provided, then separates from the annular surface and is conveyed substantially toward a central common zone.

[0015] Document WO-A-2013/185387 describes a fan comprising a base and an air outlet device, connected to an upper portion of the base, and having an annular shape, inside which heating elements are disposed. The stream of air exiting from the air outlet device has substantially the same temperature as the stream of air inside it. The solution described in WO-A-2013/185387 provides to insert reflecting plates inside the outlet device in correspondence with the heating elements, on the one hand to heat the stream of air in the outlet device more quickly, and on the other hand to prevent the outlet device from being damaged due to high temperatures.

[0016] Document AU-A-20122200112 describes a fan comprising a base and a nozzle having an annular shape, mounted on the base, in which the internal periphery of the ring comprises a Coanda surface located in correspondence with a mouth for the emission of air, onto which the exiting stream of air is directed. In the solution described, the Coanda surface is defined by plates having a high thermal conductivity, so that the exiting stream of air has substantially the same temperature as the stream of air inside the annular nozzle.

[0017] The solutions described above do not allow either to obtain a stream of air with a single compact and uniform front, or to improve the energy efficiency of the fan to provide a stream of air at the desired temperature. Moreover, in these solutions, since the heating elements are located directly in contact with or in proximity to the external surfaces of the fan, they can present safety problems for the users.

[0018] One purpose of the present invention is to provide an improved fan compared with fans known in the art.

[0019] Another purpose of the present invention is to provide a fan having a high energy efficiency.

[0020] One purpose of the present invention is to provide a fan which returns a distributed stream of air and at a uniform temperature, able to guarantee maximum comfort to the people present in the room in which it is positioned.

[0021] Another purpose is to provide a fan which requires minimal maintenance interventions and with reduced frequency.

[0022] Another purpose of the present invention is to provide a fan with a high aesthetic value, having a front surface without discontinuities and defining a closed profile without apertures to access the internal zone where the functional components of the fan are present.

[0023] Another purpose of the present invention is to provide a fan which allows to condition the zone where the user is positioned in the best possible way.

[0024] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0025] The present invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0026] In accordance with the above purposes, the present invention concerns a fan configured to condition a room by emitting a stream of air at a defined temperature and speed.

[0027] In accordance with the embodiments, the fan is the column type, and comprises a main body with a vertical development with respect to a support base on which it is located in a condition of use, said main body defining an internal housing compartment.

[0028] In accordance with the embodiments, the fan comprises an air suction and distribution unit, disposed inside the main body, which cooperates with apertures made on the main body in order to take in and emit air from/to the outside of the main body itself.

[0029] The fan has at least one longitudinal aperture, having a vertical development during use, for the emission of the stream of air toward the outside, and comprises a channeling element positioned in proximity to the at least one longitudinal aperture and cooperating with it to direct the stream of air exiting from the longitudinal aperture toward the room or zone to be conditioned.

[0030] According to the embodiments, the longitudinal aperture is positioned in the rear part, during use, of the fan, opposite a front part of the fan positioned, during use, toward the zone to be conditioned, and the channeling element is configured to divert the stream of air so that it adheres to the external surface of the main body and is conveyed toward the front of the fan.

[0031] Thanks to the column shape of the main body, having a substantially circular section, or in any case curvilinear, and thanks to the cooperation between the longitudinal aperture and the channeling element, the conditioned stream of air flows substantially in contact with the external surface of the main body for a segment that extends for most of its perimeter extension.

[0032] The conditioned stream of air exiting from the longitudinal aperture, on both sides thereof, remains in fact adherent to the external surface of the main body from a respective lead-in edge, substantially defined by the position of the longitudinal extension itself, to a respective separation edge located in correspondence with a front part of the fan, so that the two streams of air exiting in opposite directions from the longitudinal aperture join together in a common and uniform front directed toward the room to be conditioned.

[0033] According to possible variant embodiments, two longitudinal apertures can be provided disposed on opposite sides of the main body, each cooperating with a respective channeling element configured to convey the stream of air adhering to a portion of the external surface of the main body toward the front of the fan.

[0034] In accordance with the embodiments, the fan also comprises a conditioning device, configured to modify the condition of the stream of air distributed by the air suction and distribution unit, so as to confer characteristics of temperature and/or humidity so as to define a determinate effect in the zone to be conditioned.

[0035] The conditioning device is disposed inside the main body, between the air suction and distribution unit and the at least one longitudinal aperture, so that a conditioned stream of air is emitted to the outside of the main body.

[0036] According to some embodiments, the conditioning device is positioned in a substantially central zone of the main body, distanced from the internal surfaces of the latter.

[0037] According to some embodiments, the conditioning device is connected to the longitudinal aperture by means of a channel configured to separate the stream of sucked-in air from the conditioned stream of air.

[0038] According to one aspect of the present invention, the fan is provided with heat insulation means associated at least with an internal surface of the main body, opposite the external surface in contact with the conditioned stream of air, and configured to prevent, or at least limit, the onset of a heat exchange between the conditioned stream exiting from the main body through the at least one longitudinal aperture, and adhering to said external surface, and the inside of the main body itself.

[0039] According to the embodiments, the heat insulation means extend from the lead-in edge toward the front part of the fan.

[0040] According to some embodiments, the heat insulation means extend for most of the segment comprised between the lead-in edge and the separation edge.

[0041] In this way it prevents the air sucked in by the suction and distribution unit inside the internal cavity of the main body, not yet conditioned by the conditioning device, from in any way adding to or respectively removing heat from the conditioned stream of air that flows adherent to the external surface of the main body (depending on whether the conditioned stream has a lower or higher temperature than the room temperature).

[0042] In particular, in the fan according to the invention, the heat insulation means advantageously prevent a heat exchange occurring from the outside toward the inside of the main body, or vice versa, so that the conditioned stream emitted by the fan keeps the desired temperature in its path toward the front part of the fan and therefore toward the user, in this way increasing the overall efficiency of the fan.

[0043] In accordance with some embodiments, the heat insulation means can comprise a layer or panel of insulating material disposed in contact with the internal surface of the main body.

[0044] According to other embodiments, the insulation material covers the internal surface of the main body at least in a zone having a longitudinal extension corresponding with that of the one or more longitudinal apertures.

[0045] According to other embodiments, the heat insulation means can also comprise a layer or panel of reflecting material, so as to minimize the absorption of heat radiation of the conditioned stream.

[0046] According to some embodiments, the heat insulation means can be applied to the main body or to the channeling element, by means of mechanical attachment, structural integration, the application of surface finishings, or similar or comparable techniques.

BRIEF DESCRIPTION OF THE DRAWINGS

[0047] These and other characteristics of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a view in front elevation of a fan according to one embodiment of the present invention;
- fig. 2 is a longitudinal section view along the line II-II of fig. 1;
- fig. 3 is a cross section of the fan taken along the section line III-III of fig. 1;
- fig. 4 is a cross section of a fan according to a variant embodiment of the present invention, taken along the section line III-III of fig. 1.

[0048] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one embodiment can conveniently be incorporated into other embodiments without further clarifications.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

[0049] With reference to figs. 1-4, the embodiments described here concern a fan 10 that can be used in particular in closed rooms in order to condition a room, that is, for the ventilation of air at ambient temperature, for cooling, heating, thermoventilation, dehumidification, or purification of the air.

[0050] The fan 10 comprises a main body 12, having a preferably vertical development with respect to a support base 18 on which it can be put in a condition of use.

[0051] According to some embodiments, the main body 12 substantially has a column shape, preferably with a cylindrical or curvilinear section, which can be substantially constant, or also variable, along its longitudinal development.

[0052] According to some embodiments, the main body 12 has a substantially hollow column shape.

[0053] The main body 12 defines inside it a housing compartment 13 for the functional components of the fan 10.

[0054] According to some embodiments, the main body 12 has a tubular shape, and is provided with an external surface 22 and with an internal surface 23, opposite the external surface 22, which defines the compartment 13.

[0055] According to some embodiments, the main body 12 is provided with inlet/outlet apertures for the air 16, 27.

[0056] In accordance with some embodiments, the fan 10 comprises a suction and distribution unit 14 disposed in the compartment 13 inside the main body 12 and cooperating with the inlet/outlet apertures for the air 16, 27 in order to suck up and emit air from/to the outside of the main body 12 itself.

[0057] In accordance with some embodiments, the fan 10 also comprises a conditioning device 28, configured to modify the state of the stream of air Wi sucked in by the suction and distribution unit 14, so as to give it the characteristics of temperature and/or humidity such as to define a determinate effect in the zone to be conditioned.

[0058] The conditioning device 28 is disposed inside the main body 12, between the suction and distribution unit 14 and at least one longitudinal aperture 16, so that a stream of air Wo is emitted outside the main body, in particular a conditioned stream of air.

[0059] In general, therefore, with the air conditioning device 28 functioning, the stream of suctioned air Wi inside the main body 12 will have a different temperature from that of the exiting stream of air Wo, for example greater if the fan 10 is used for heating, or less if the fan is used for cooling.

[0060] According to some embodiments, the conditioning device 28 can comprise one or more of either a heating device, a cooling device or a dehumidification device.

[0061] Here and hereafter in the description, the term "conditioned" generally means a stream of air which has a temperature, humidity, or speed different from those of the ambient air, for example a heated or cooled stream of air, a dehumidified stream of air, or even a stream of air to which a certain speed has been imparted.

[0062] According to some embodiments of the present invention, the fan 10 comprises a longitudinal aperture 16, with a vertical development, for the emission of a conditioned stream Wo toward the outside, and a channeling element 20 cooperating with the at least one longitudinal aperture 16 to divert the conditioned stream Wo exiting from the main body 12 toward the front part of the fan 10.

[0063] According to some embodiments, the at least one aperture 16 is disposed, in the condition of use of the fan, in the rear part of the main body 12, that is, on the opposite side with respect to the room to be conditioned.

[0064] In general, the terms "rear part" and "front zone" are intended only to define a functional relationship between these two parts, which are substantially opposite one another, in which the front part is generally facing the user during use.

[0065] According to possible variant embodiments, two longitudinal apertures 16 can be provided, made on opposite sides of the main body 12, each cooperating with a respective channeling element 20 to convey the conditioned stream Wo toward the front part.

[0066] According to some embodiments, the channeling element 20 is configured in such a way as to allow the conditioned stream of air Wo to adhere to the external surface 22 of the main body 12. In other words, the channeling element 20 is able to divert the conditioned stream of air Wo, exiting from the longitudinal aperture 16, so that, thanks to the Coanda effect, it follows at least for a certain segment the profile of the external surface 22 of the main body 12 before it reaches the zone to be conditioned.

[0067] According to some embodiments, the conditioned stream of air Wo remains substantially adherent to the external surface 22 of the main body 12 for most of its perimeter extension.

[0068] In particular, the conditioned stream of air Wo, exiting from opposite sides of the longitudinal aperture 16, remains adherent to the opposite walls of the external surface 22 of the main body 12 starting from a lead-in edge B1, substantially defined by the position of the longitudinal aperture 16, until it reaches a separation edge B2 located in correspondence with a front part of the fan. Downstream of the separation edge B2 the two streams of air, on one side and the other of the main body 12, come together to form a common and uniform air front.

[0069] According to some embodiments, for example described with reference to figs. 3 and 4, the channeling element 20 comprises an active surface 20a which during use is hit by the conditioned stream Wo exiting from the longitudinal aperture 16 and a non-active surface 20b facing toward the outside of the fan 10.

[0070] According to other embodiments, in cooperation with the external surface 22, the channeling element 20 is configured to determine a minimum passage section 21 of the conditioned stream of air Wo exiting from the compartment 13.

[0071] According to some embodiments, the longitudinal aperture or apertures 16 can extend only for a portion of the main body 12, for example in a central zone along the longitudinal extension thereof.

[0072] According to some embodiments, the air enters inside the main body 12 through through inlet holes 27.

[0073] According to some embodiments, the through inlet holes 27 can be made at least partly above the longitudinal aperture 16, in the top part and/or on the upper lateral wall of the main body 12.

[0074] According to possible embodiments, the suction and distribution unit 14 can advantageously be located above the longitudinal aperture 16.

[0075] According to other embodiments, the suction and distribution unit 14 can comprise an impeller 15 provided with suitably directed blades in order to determine the intake of the air from outside and its entrance into the main body 12, and a drive member 17 connected to the impeller 15.

[0076] According to some embodiments, the suction and distribution unit 14 can be oriented in such a way that the axis of rotation of the impeller 15 is substantially parallel to the axis of development of the longitudinal aperture 16.

[0077] According to possible solutions, the main body 12 can have a continuous surface in correspondence with the front part of the fan 10.

[0078] In this way, the main body 12 has a cross section with a curvilinear profile, that is, without sharp edges and it is advantageously possible to make the stream of air W transit in adherence to the external surface 22 exiting the longitudinal aperture 16, exploiting the principle of the Coanda effect.

[0079] According to a preferred embodiment, the main body 12 can be configured to have a substantially cylindrical shape for the whole of its height.

[0080] According to one embodiment, shown by way of example in fig. 1, the main body 12 can have a tapered shape in at least part of its vertical development.

[0081] In particular, according to an advantageous formulation, the main body 12 has, on its height, a narrowing of the section substantially in correspondence with the longitudinal aperture 16.

[0082] In one formulation of the invention, the external surface 22 has a rounded geometry substantially free of discontinuities, so that the conditioned stream Wo, exiting from the main body 12, is conveyed toward the front part and then toward the room to be ventilated or conditioned, remaining substantially adherent to the external surface 22 at least as far as the separation edge B2.

[0083] Within the field of the present invention, the rounded geometry can be defined by a substantially circular, regular oval, drop-shaped or flattened section, or such as to obtain a profile of the main body 12 suitable to convey the stream of air W at least for a segment in adherence to the external surface 22 without creating significant variations in the development of the stream, or disturbances, turbulence, discontinuities or other factor that could disturb the development of the stream.

[0084] According to some embodiments, the one or more longitudinal apertures 16 in the main body 12 can be defined by respective edges 25a, 25b of the main body 12 bent toward the inside of the compartment 13.

[0085] According to some embodiments, the edges 25a, 25b extend at least for a segment substantially parallel to each other toward the inside of the compartment 13, defining between them an outlet channel 29 for the conditioned stream Wo toward the longitudinal aperture 16.

[0086] According to some embodiments, the conditioning device 28 is positioned in a central zone of the main body 12, distanced from the internal surfaces 23 of the latter, and is connected to the longitudinal aperture 16 by means of the outlet channel 29, which therefore functions as an element of separation between the stream of suctioned air Wi and the conditioned stream Wo.

[0087] The compartment 13 allows to channel inside the fan 10 the stream of air Wi sucked in by the suction and distribution unit 14 from the inlet holes 27 to the conditioning device 28 and then to emit the conditioned stream Wo through the longitudinal aperture 16.

[0088] According to one aspect of the present invention, the fan 10 is provided with heat insulation means 40 associated with the main body 12, and configured to prevent, or at least to limit, the onset of a heat exchange between the conditioned stream Wo which transits adjacent to the channeling element 20 and the external surface 22 of the main body 12 and the inside of the main body 12 itself.

[0089] In particular, the heat insulation means 40 have the function of preventing the stream of suctioned air Wi inside the main body 12 from influencing the temperature of the conditioned stream Wo in transit toward the front part of the fan 10.

[0090] By way of example, the main body 12 can be made of plastic material, for example having a thermal conductivity of about 0.15 W/mK and, during use, it can be positioned inside a room to be conditioned having an average temperature Ta.

[0091] Inside the compartment 13, the inlet stream of air Wi upstream of the conditioning device 28 is characterized by a first temperature T1 and the conditioned stream Wo downstream of the conditioning device 28 is characterized by a second temperature T2.

[0092] Outside the main body 12, in the front part of the fan 10, the conditioned stream Wo maintained in adherence with the external surface 22 has a third temperature T3.

[0093] In particular, in correspondence with the lead-in edge B1 the conditioned stream Wo has the second temperature T2, while downstream of the separation edge B2 it has the third temperature T3.

[0094] If the conditioning device 28 is not active or is absent, and the fan 10 is in the ventilation operating mode, in general the first temperature T1, the second temperature T2 and the third temperature T3 are substantially equal to the ambient temperature Ta:

- $T1 \simeq Ta$;
- $T2 \simeq T1$;
- $T2 \simeq T3$.

[0095] If the conditioning device 28 is a heating element and the fan 10 is therefore a fan heater in heating mode, the relationship between the temperatures changes as follows:

- $T1 \geq Ta$;
- $T2 > T1$;
- $T2 \geq T3$.

[0096] Since the second temperature T2 is higher than the ambient temperature Ta, a first thermal stream Qc is established from the channelizer toward the outside of the main body 12, in particular through the channeling element 20.

[0097] The entity of the first thermal stream Qc can vary as a function of the physical properties of the channeling element 20 itself, as well as its geometrical characteristics and the difference between the second temperature T2 of the conditioned stream Wo at exit and the ambient temperature Ta.

[0098] Similarly, since T2 > T1, the conditioned stream Wo in the outlet channel 29 will exchange a second thermal stream of the edges Qb toward the internal compartment 13, that is through the edges 25a, 25b, whose characteristics depend on the physical properties of the material of which the outlet channel 29 itself is made, in this case the material of the main body 12.

[0099] In the same way, the conditioned stream Wo in adherence to the external surface 22 will exchange a third wall thermal stream Qp with the internal compartment 13 through the wall of the main body 12, depending on the physical properties of the material of the main body 12.

[0100] In short, the three thermal streams Qc, Qb, Qp can be understood as heat loss, since they contribute to removing heat from the conditioned stream Wo toward the area to be conditioned, thus reducing the temperature T3 of the latter in proximity to the front part of the fan 10.

[0101] The fan 10 according to the present invention, thanks to the presence of the heat insulation means 40, allows to minimize, if not eliminate, the thermal streams Qc, Qb, Qp, so as to obtain the following relation between the temperatures:

- $T1 \simeq Ta$;
- $T2 >> T1$;
- $T2 \simeq T3$.

[0102] It is understood that, even if the example has been made considering a heating conditioning device 28, it is clear that in the case of a cooling conditioning device 28 the relationship between the temperatures Ta, T1, T2, T3 and the direction of the thermal streams Qc, Qb, Qp will be substantially specular.

[0103] According to some embodiments, the heat insulation means 40 comprise at least one layer, or a panel, or a film, of insulating material 41, 42, 43 associated with the main body 12 and/or with the channeling element 20 in correspondence with the transit zones of the conditioned stream Wo.

[0104] According to possible solutions, a first layer or panel of insulating material 41 can be disposed inside the compartment 13, in contact with the internal surface 23 of the main body 12.

[0105] According to some embodiments, the first layer or panel of insulating material 41 can extend at least for a portion having a longitudinal extension corresponding to that of one or more longitudinal apertures 16.

[0106] According to other embodiments, the first layer or panel of insulating material 41 can extend at least from the lead-in edge B1 toward the front of the fan 10.

[0107] According to other variant embodiments, the first layer or panel of insulating material 41 can extend at least in part from the lead-in edge B1.

[0108] According to other variants, the first layer or panel of insulating material 41 can extend at least for most of the segment comprised between the lead-in edge B1 and the separation edge B2.

[0109] According to variant embodiments, the first layer or panel of insulating material 41 extends for at least the entire segment comprised between the lead-in edge B1 and the separation edge B2 on each side of the main body 12.

[0110] According to other embodiments, the first layer or panel of insulating material 41 can extend for the entire internal surface 23 of the main body 12.

[0111] In this way, the aesthetic value of the fan 10 itself is maintained and at the same time the onset of the wall thermal stream Qp is prevented, or at least limited, or vice versa, so that the conditioned stream Wo emitted by the fan 10 maintains the desired temperature in its path toward the front part of the fan 10 and hence toward the user.

[0112] The first layer or panel of insulating material 41 allows to maintain $T3 \simeq T2$, that is, the temperature of the conditioned stream Wo downstream of the separation point B2 is approximately equal to the temperature of the conditioned stream Wo in correspondence with the longitudinal aperture 16 and the lead-in edge B1.

[0113] According to some embodiments, the insulating material 41 of the first layer or panel can have a low thermal conductivity, for example lower than 0.15 W/mK.

[0114] According to possible solutions, the insulating material 41 of the first layer or panel can have a thermal conductivity lower than 0.10 W/mK.

[0115] According to other embodiments, the insulating material 41 of the first layer or panel can have a thermal conductivity lower than 0.05 W/mK.

[0116] According to other embodiments, a second layer or panel of insulating material 42 can be applied to the non-active surface 20b of the channeling element 20, so as to prevent the channelizer thermal stream Qc from being generated through the latter.

[0117] In this way the conditioned stream of air Wo inside the main body 12 is not influenced by the ambient temperature.

[0118] According to other embodiments, a third layer or panel of insulating material 43 can be applied on the edges 25a, 25b which define the outlet channel 29, so as to prevent an edge thermal stream Qb from generating through them.

[0119] According to some embodiments, the third layer or panel of insulating material 43 can be disposed on the edges 25a, 25b of the outlet channel 29 facing toward the inside of the outlet channel 29 itself, so as to prevent possible heat exchanges between the conditioned stream of air Wo and the stream of air sucked in Wi.

[0120] According to some embodiments, the second 42 and/or the third layer or panel of insulating material 43 can have characteristics of thermal conductivity similar to those of the first layer or panel of insulating material 41.

[0121] According to other embodiments, the heat insulation means 40 can also comprise at least one layer or panel of reflecting material 45, disposed along the passage of the conditioned stream Wo and configured to minimize the absorption of heat radiation emitted by the latter.

[0122] According to possible solutions, a layer or panel of reflecting material 45 applied on the active surface 20a of the channeling element 20 can be provided, so as to reflect the heat radiation of the conditioned stream Wo exiting from the longitudinal aperture 16. In this way, in the case of heating, the layer or panel of reflecting material 45 contributes to increasing the temperature T2 of the conditioned stream Wo, and hence the efficiency of the fan 10.

[0123] According to possible embodiments, the layer or panel of reflecting material 45 has a thermal reflection coefficient greater than 0.7.

[0124] According to possible variant embodiments, the layer or panel of reflecting material 45 has a coefficient of thermal reflection higher than 0.8.

[0125] According to other variant embodiments, the layer or panel of reflecting material 45 has a coefficient of thermal reflection higher than 0.95, or possibly close to 1, that is, it almost completely reflects the incident heat radiation of the conditioned stream Wo that flows on the external surface 22 of the main body 12.

[0126] By reflection coefficient we mean the dimensionless index which indicates the ratio between the intensity of the radiation reflected by a surface and the intensity of the radiation incident on the same surface.

[0127] Possible non-limiting examples of insulating materials 41, 42, 43 can be, for example, foamed plastics, air gel, and suchlike.

[0128] As is known from the state of the art, air gel is a mixture similar to a gel, consisting of a solid-state substance and a gas, which result in a solid foam having particular properties, including high insulating capacities. In addition, air gel is a very resistant material, and can be easily produced in the form of thin and flexible films.

[0129] Possible non-limiting examples of reflecting materials 45 can be, for example, metal materials, such as aluminum, or steel, or their alloys.

[0130] According to other embodiments, thanks to the characteristics of conductivity and reflection of these materials, it is possible to make very thin layers or panels, which can be easily inserted into the compartment 13 without interfering with the components of the fan 10.

[0131] According to some embodiments, for example, the overall thickness of the insulating materials 41, 42, 43 can be comprised between about 1 and 10 mm for foamed plastics or air gels.

[0132] According to possible variants, the overall thickness of the reflecting materials 45 can be comprised between about 0.1 and 1 mm, in the case of metal materials.

[0133] These thicknesses are negligible with respect to the thickness of the wall of the main body 12 and the channeling element 20, so that the heat insulation means 40 can be easily applied to one or the other without affecting the geometry and structural resistance of the fan 10.

[0134] Moreover, since the heat insulation means 40 can be applied only in the zones affected by the flow and transit of the conditioned stream Wo, and with extremely reduced thicknesses, the increase in the cost of production of the fan 10 is negligible.

[0135] According to some embodiments, the layers or panels of insulating material 41, 42, 43, or reflecting material 45 can be applied by mechanical attachment, for example using grids, glues, adhesives, or other attachment elements, such as screws or pins.

[0136] According to other embodiments, the layers or panels of insulating material 41, 42, 43, or of reflecting material 45 can be applied by structural integration, for example during the production step of the fan 10.

[0137] According to other embodiments, the layers or panels of insulating material 41, 42, 43, or of reflecting material 45 can be applied by applying surface finishes, such as sprays, varnishes or paints.

[0138] It is clear that modifications and/or additions of parts can be made to the fan 10 as described heretofore, without departing from the field and scope of the present invention.

[0139] For example, the layers or panels of insulating material 41, 42, 43 can be applied on one or more of either the main body 12, the channeling element 20 or the outlet channel 29, with thicknesses and materials equal to or different from one another, combining them in the most appropriate way according to specific requirements and the overall shape of the fan 10 itself.

[0140] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of fan 10.

Claims

1. Fan, comprising a main body (12) having a hollow column shape with a vertical development with respect to a support base (18) on which it is positioned in a condition of use, and defining an internal housing compartment (13), said fan comprising an air suction and distribution unit (14), disposed inside said compartment (13), cooperating with apertures (27) made on the main body (12) in order to remove the air from outside the main body (12), a conditioning device (28) configured to thermally modify the condition of the stream of air distributed by said suction and distribution unit (14), **characterized in that** it comprises at least one longitudinal aperture (16), with a vertical development, for the emission of a conditioned stream of air (Wo) toward the outside, disposed in a rear zone, during use, of the hollow column-type_main body (12), and a channeling element (20) positioned in proximity to the at least one longitudinal aperture (16) and cooperating with it to determine the exit of said conditioned stream of air (Wo) through said at least one longitudinal aperture (16), and divert the conditioned stream of air (Wo) exiting from the main body (12)_so that said conditioned stream of air (Wo) adheres to an external surface (22) of said main body (12) and is conveyed toward the front of the fan, remaining substantially in contact with said external surface (22) between a lead-in edge (B1),_where the conditioned stream of air (Wo) adheres to the external surface (22), defined by the position of said longitudinal aperture (16) and a separation edge (B2) disposed in a front zone of the fan, opposite the rear zone, said fan being provided with heat insulation means (40) configured to prevent, or at least limit, the onset of a heat exchange between

said conditioned stream of air (Wo) exiting from said main body (12) through said at least one longitudinal aperture (16), and the stream of suctioned air (Wi) inside said main body (12), said heat insulation means (40) being associated at least with an internal surface (23) of said main body (12), opposite said external surface (22) in contact with said stream (Wo), and extending from said lead-in edge (B1) toward the front part of the fan.

2. Fan as in claim 1, **characterized in that** said heat insulation means (40) extend at least for most of the area comprised between said lead-in edge (B1) and said separation edge (B2).

3. Fan as in claim 1 or 2, **characterized in that** said heat insulation means (40) extend for a zone having a longitudinal extension substantially corresponding with that of said longitudinal aperture (16).

4. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) comprise a layer or a panel of insulating material (41) disposed in contact with said internal surface (23) of said main body (12).

5. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) comprise a layer or a panel of insulating material (42) disposed in contact with an inactive surface (20b) of said channeling element (20) facing toward the outside of the fan, and opposite an active surface (20a) in contact with said stream of air (Wo).

6. Fan as in any claim hereinbefore, **characterized in that** said conditioning device (28) is positioned in a substantially central zone of said main body (12) and is connected to said longitudinal aperture (16) by means of an exit channel (29), **and in that** said heat insulation means (40) comprise a layer or a panel of insulating material (43) disposed along the edges (25a, 25b) of said exit channel (29) of said conditioned stream of air (Wo) between said conditioning device (28) and said longitudinal aperture (16).

7. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) also comprise a layer or panel of reflecting material (45), configured to minimize the absorption of the heat radiation of said conditioned stream (Wo).

8. Fan as in claim 7, **characterized in that** said layer or panel of reflecting material (45) is disposed on an active surface (20a) of said channeling element (20) facing toward said longitudinal aperture (16).

9. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) comprise layers or panels of insulating material (41, 42, 43) with thermal conductivity less than 0.10 W/mK.

10. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) comprise layers or panels of insulating material (41, 42, 43) with thermal conductivity less than 0.5 W/mK.

11. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) comprise layers or panels of reflecting material (45) with a reflection coefficient higher than 0.8.

12. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) comprise layers or panels of reflecting material (45) with a reflection coefficient higher than 0.95.

13. Fan as in any claim hereinbefore, **characterized in that** said heat insulation means (40) can be applied by means of mechanical attachment, structural integration, or application of surface finishings.

Patentansprüche

1. Lüfter umfassend ein Hauptgehäuse (12), das eine Hohlsäulenform mit vertikaler Ausdehnung in Bezug auf einen Grundträger (18), auf dem er im Gebrauchszustand positioniert ist, aufweist und eine innere Aufnahmekammer (13) definiert, wobei der Lüfter umfasst: eine Luftansaug- und -verteilungseinheit (14), die im Inneren der Kammer (13) angeordnet ist und mit Öffnungen (27) kooperiert, die auf dem Hauptgehäuse (12) ausgebildet sind, um die Luft von außerhalb des Hauptgehäuses (12) zu entnehmen, und eine Konditionierungsvorrichtung (28), die so konfiguriert ist, dass sie den Zustand des von der Ansaug- und Verteilungseinheit (14) verteilten Luftstroms thermisch modifiziert, **dadurch gekennzeichnet, dass** er umfasst: mindestens eine bei Gebrauch in einem rückseitigen Bereich angeordnete Längsöffnung (16) mit vertikaler Ausdehnung für die Emission eines konditionierten Luftstroms (Wo) zur Außenseite des Hauptgehäuses (12) mit Hohlsäulenform, und ein Kanalisierungselement (20), das in der Nähe der mindestens einen Längsöffnung (16) angeordnet ist und mit dieser kooperiert, um den Austritt des konditionierten Luftstroms (Wo) durch die mindestens eine Längsöffnung (16) zu bestimmen und den aus dem Hauptgehäuse (12) austretenden konditionierten Luftstrom (Wo) so abzulenken, dass der konditionierte Luftstrom (Wo) an einer Außenfläche (22) des Hauptgehäuses (12) anhaftet und zur Vorderseite des Lüfters befördert wird, wobei er im Wesentlichen zwischen einer durch die Position der Längsöffnung (16) definierten Einführkante (B1), wo der konditionierte Luftstrom (Wo) an der

Außenfläche (22) anhaftet, und einer in einem dem rückseitigen Bereich gegenüberliegenden vorderen Bereich des Lüfters angeordneten Trennungskante (B2) mit der Außenfläche (22) in Kontakt bleibt, wobei der Lüfter mit Wärmeisolationsmitteln (40) ausgestattet ist, die so konfiguriert sind, dass sie das Einsetzen eines Wärmeaustausches zwischen dem konditionierten Luftstrom (Wo), der aus dem Hauptgehäuse (12) durch die mindestens eine Längsöffnung (16) austritt, und dem eingesaugten Luftstrom (Wi) im Inneren des Hauptgehäuses (12) verhindert oder zumindest begrenzt, wobei die Wärmeisolationsmittel (40) zumindest mit einer Innenfläche (23) des Hauptgehäuses (12), die der Außenfläche (22) in Kontakt mit dem Strom (Wo) gegenüberliegt, verbunden sind und sich von der Einführkante (B1) zum vorderen Teil des Lüfters erstrecken.

2. Lüfter gemäß Anspruch 1, **dadurch gekennzeichnet, dass** sich die Wärmeisolationsmittel (40) zumindest über den größten Teil des zwischen der Einführkante (B1) und der Trennungskante (B2) gelegenen Bereichs erstrecken.

3. Lüfter gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sich die Wärmeisolationsmittel (40) über einen Bereich mit länglicher Ausdehnung, der im Wesentlichen der der Längsöffnung (16) entspricht, erstrecken.

4. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) eine Schicht oder eine Platte aus einem isolierenden Material (41) umfassen, die in Kontakt mit der Innenfläche (23) des Hauptgehäuses (12) angeordnet ist.

5. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) eine Schicht oder eine Platte aus einem isolierenden Material (42) umfassen, die in Kontakt mit einer inaktiven Oberfläche (20b) des Kanalisierungselements (20) angeordnet ist, die der Außenseite des Lüfters zugewandt ist und einer aktiven Oberfläche (20a) in Kontakt mit dem Luftstrom (Wo) gegenüberliegt.

6. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Konditionierungsvorrichtung (28) in einem im Wesentlichen zentralen Bereich des Hauptgehäuses (12) positioniert und mit der Längsöffnung (16) durch einen Austrittskanal (29) verbunden ist, und dass die Wärmeisolationsmittel (40) eine Schicht oder eine Platte aus einem isolierenden Material (43) umfassen, die entlang der Kanten (25a, 25b) des Austrittskanals (29) des konditionierten Luftstroms (Wo) zwischen der Konditionierungsvorrichtung (28) und der Längsöffnung (16) angeordnet ist.

7. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) außerdem eine Schicht oder eine Platte aus einem reflektierenden Material (45) umfassen, die so konfiguriert ist, dass sie die Absorption der Wärmestrahlung des konditionierten Stroms (Wo) minimiert.

8. Lüfter gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Schicht oder die Platte aus reflektierendem Material (45) auf einer aktiven Oberfläche (20a) des Kanalisierungselements (20) der Längsöffnung (16) zugewandt angeordnet ist.

9. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) Schichten oder Platten aus einem isolierenden Material (41, 42, 43) mit einer Wärmeleitfähigkeit von weniger als 0,10 W/mK umfassen.

10. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) Schichten oder Platten aus einem isolierenden Material (41, 42, 43) mit einer Wärmeleitfähigkeit von weniger als 0,5 W/mK umfassen.

11. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) Schichten oder Platten aus einem reflektierenden Material (45) mit einem Reflexionskoeffizienten von über 0,8 umfassen.

12. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) Schichten oder Platten aus einem reflektierenden Material (45) mit einem Reflexionskoeffizienten von über 0,95 umfassen.

13. Lüfter gemäß irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Wärmeisolationsmittel (40) durch mechanische Befestigung, strukturelle Integration oder Anwendung von Oberflächenbehandlungen aufgebracht werden.

Revendications

1. Ventilateur, comprenant un corps principal (12) ayant une forme de colonne creuse avec un développement vertical par rapport à une base de support (18) sur laquelle il est positionné dans un état d’utilisation, et définissant un compartiment de logement interne (13), ledit ventilateur comprenant une unité d’aspiration et de distribution d’air (14), disposée à

l'intérieur dudit compartiment (13), coopérant avec des ouvertures (27) réalisées sur le corps principal (12) afin d'éliminer l'air de l'extérieur du corps principal (12), un dispositif de conditionnement (28) configuré pour modifier thermiquement l'état du flux d'air distribué par ladite unité d'aspiration et de distribution (14), **caractérisé en ce qu'**il comprend au moins une ouverture longitudinale (16), avec un développement vertical, pour l'émission d'un flux d'air conditionné (Wo) vers l'extérieur, disposée dans une zone arrière, pendant l'utilisation, du corps principal de type colonne creuse (12), et un élément de canalisation (20) positionné à proximité de l'au moins une ouverture longitudinale (16) et coopérant avec elle pour déterminer la sortie dudit flux d'air conditionné (Wo) à travers ladite au moins une ouverture longitudinale (16), et dévier le flux d'air conditionné (Wo) sortant du corps principal (12) de sorte que ledit flux d'air conditionné (Wo) adhère à une surface externe (22) dudit corps principal (12) et est transporté vers l'avant du ventilateur, restant sensiblement en contact avec ladite surface externe (22) entre un bord d'entrée (B1), où le flux d'air conditionné (Wo) adhère à la surface externe (22), défini par la position de ladite ouverture longitudinale (16) et un bord de séparation (B2) disposé dans une zone avant du ventilateur, opposée à la zone arrière, ledit ventilateur étant pourvu de moyens d'isolation thermique (40) configurés pour empêcher, ou au moins limiter, l'apparition d'un échange thermique entre ledit flux d'air conditionné (Wo) sortant dudit corps principal (12) à travers ladite au moins une ouverture longitudinale (16), et le flux d'air aspiré (Wi) à l'intérieur dudit corps principal (12), lesdits moyens d'isolation thermique (40) étant associés à au moins une surface interne (23) dudit corps principal (12), opposée à ladite surface externe (22) en contact avec ledit flux (Wo), et s'étendant depuis ledit bord d'entrée (B1) vers la partie avant du ventilateur.

2. Ventilateur selon la revendication 1, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) s'étendent au moins sur la majeure partie de la zone comprise entre ledit bord d'entrée (B1) et ledit bord de séparation (B2).

3. Ventilateur selon la revendication 1 ou 2, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) s'étendent sur une zone ayant une extension longitudinale correspondant sensiblement à celle de ladite ouverture longitudinale (16).

4. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) comprennent une couche ou un panneau de matériau isolant (41) disposé en contact avec ladite surface interne (23) dudit corps principal (12).

5. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) comprennent une couche ou un panneau de matériau isolant (42) disposé en contact avec une surface inactive (20b) dudit élément de canalisation (20) faisant face vers l'extérieur du ventilateur, et opposé à une surface active (20a) en contact avec ledit flux d'air (Wo).

6. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit dispositif de conditionnement (28) est positionné dans une zone sensiblement centrale dudit corps principal (12) et est relié à ladite ouverture longitudinale (16) au moyen d'un canal de sortie (29), **et en ce que** lesdits moyens d'isolation thermique (40) comprennent une couche ou un panneau de matériau isolant (43) disposé le long des bords (25a, 25b) dudit canal de sortie (29) dudit flux d'air conditionné (Wo) entre ledit dispositif de conditionnement (28) et ladite ouverture longitudinale (16).

7. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) comprennent également une couche ou un panneau de matériau réfléchissant (45), configuré pour minimiser l'absorption du rayonnement thermique dudit flux conditionné (Wo).

8. Ventilateur selon la revendication 7, **caractérisé en ce que** ladite couche ou ledit panneau de matériau réfléchissant (45) est disposé sur une surface active (20a) dudit élément de canalisation (20) faisant face à ladite ouverture longitudinale (16).

9. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) comprennent des couches ou des panneaux de matériau isolant (41, 42, 43) ayant une conductivité thermique inférieure à 0,10 W/mK.

10. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) comprennent des couches ou des panneaux de matériau isolant (41, 42, 43) ayant une conductivité thermique inférieure à 0,5 W/mK.

11. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) comprennent des couches ou des panneaux de matériau réfléchissant (45) avec un coefficient de réflexion supérieur à 0,8.

12. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) comprennent des couches ou des panneaux de matériau réfléchissant (45) avec un coefficient de réflexion supérieur à 0,95.

13. Ventilateur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'isolation thermique (40) peuvent être appliqués au moyen d'une fixation mécanique, d'une intégration structurelle ou d'une application de finitions de surface.

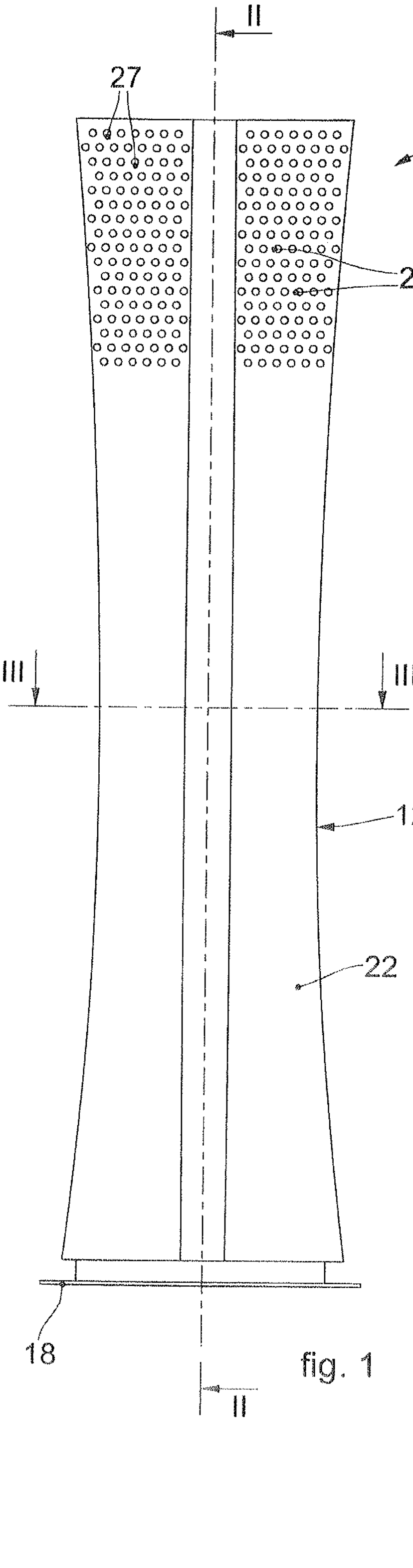

II
27
10
27
III
III
12
22
18
II

fig. 1

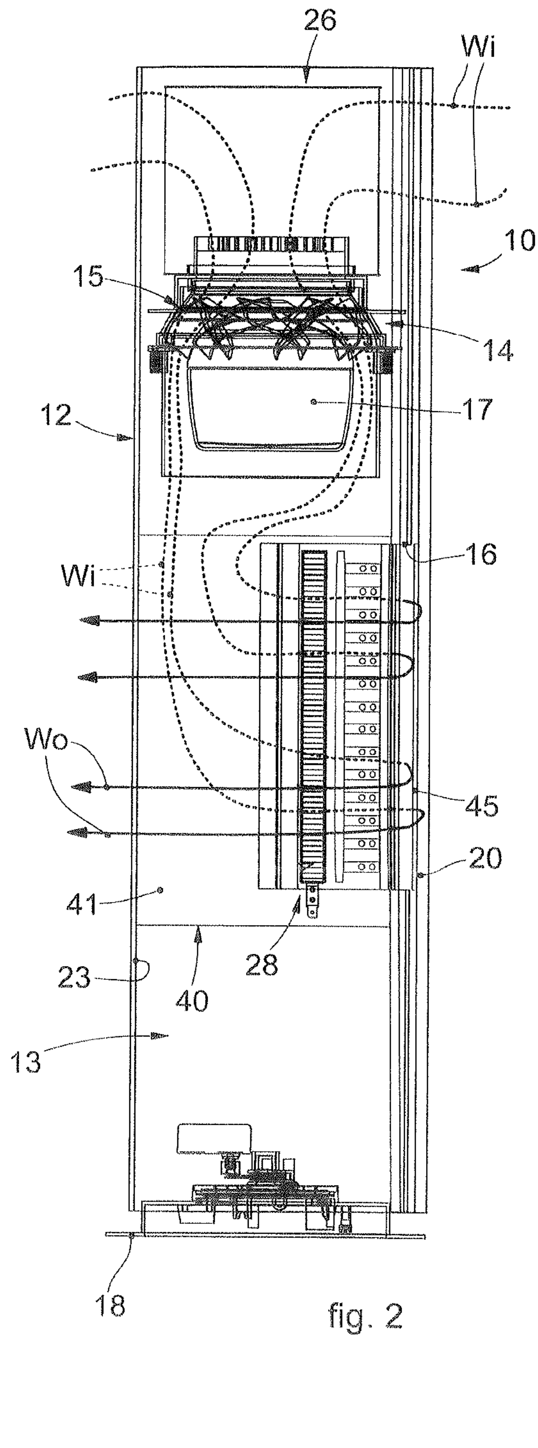
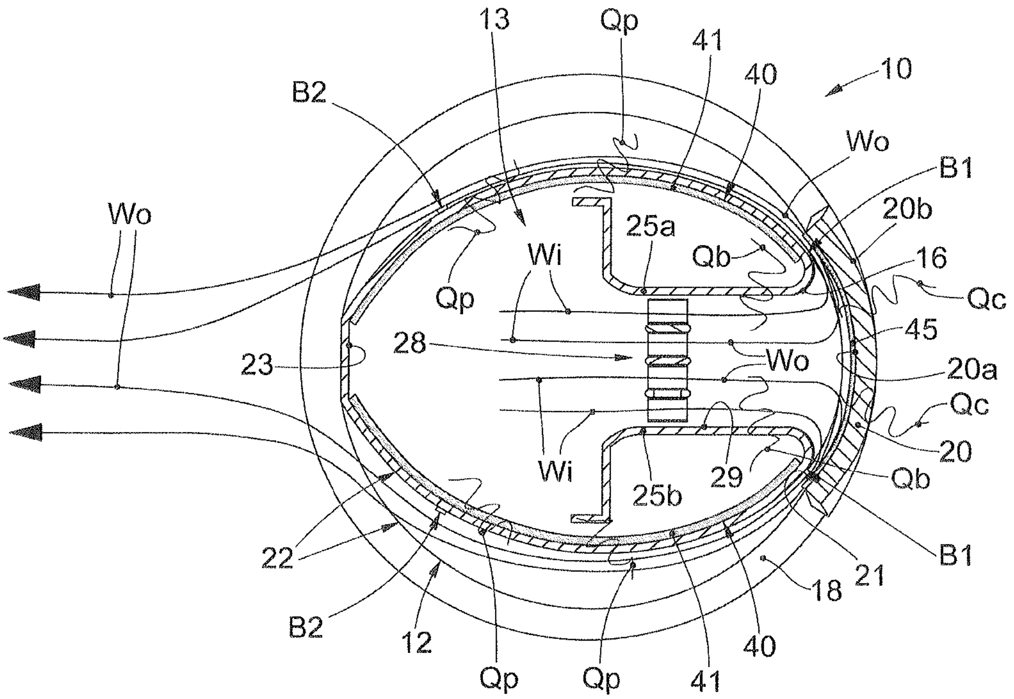

26
Wi
10
15
14
17
12
16
Wi
Wo
45
20
41
28
23
40
13
18

fig. 2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Qp
41
40
10
B2
Wo
B1
20b
Wo
25a
Wi
Qb
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45
28
Wo
23
20a
Qc
Wi
20
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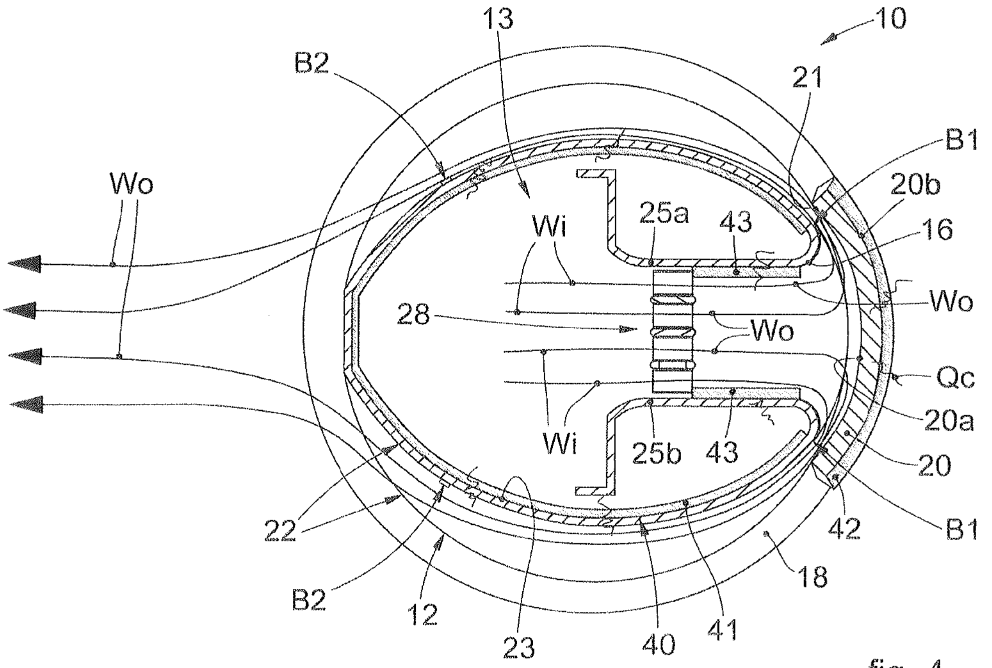
25b
Qb
22
B1
21
18
B2
12
Qp
Qp
41
40

fig. 3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10
21
B2
B1
Wo
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25a
43
20b
16
Wo
28
Wo
Qc
20a
Wi
25b
43
20
22
42
B1
18
B2
12
23
40
41

fig. 4

REFERENCES CITED IN THE DESCRIPTION

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