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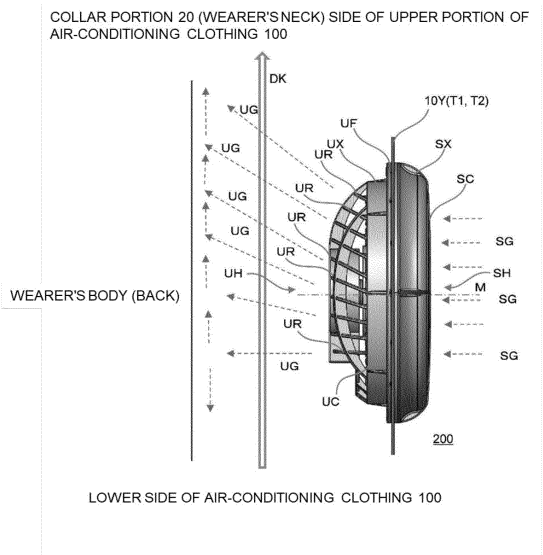
(54) AIR-CONDITIONING FAN UNIT AND AIR-CONDITIONING GARMENT

(57) The air-conditioning fan unit that is attached to and applied to an air-conditioning clothing in order to air-condition an inner space existing between a wearer and the air-conditioning clothing when worn by the wearer, comprises: an air-conditioning fan unit that has an air intake inlet portion for taking in outside air from outside the air-conditioning clothing, and has an exhaust outlet portion for exhausting airflow into an inside of the air-conditioning clothing; a first cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion; a second cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion; and a fan unit that is housed in a space surrounded by the first cylindrical portion and the second cylindrical portion, the fan unit having a plurality of fins provided to generate airflow from the air intake inlet portion toward the exhaust outlet portion by rotating around a rotation center line, wherein the exhaust outlet portion is provided with a plurality of ribs for adjusting the direction of the exhaust airflow to a preset setting direction from the direction of the airflow taken in from the air intake inlet portion.

[FIG. 8]



EP 4 454 506 A1

Description

[Technical field]

[0001] The present invention relates to an air-conditioning fan unit for air-conditioning an inner space existing between a wearer and air-conditioning clothing when the wearer is wearing the air-conditioning clothing, and to air-conditioning clothing that the air conditioning fan unit is installed.

[Background technology]

[0002] Conventionally, air-conditioning clothing equipped with an electric air-conditioning fan unit has been known. The air-conditioning fan unit is operated to draw outside air into the clothing body to cool the body. Such air-conditioning clothing can suppress the rise in body temperature of workers (wearers) who work indoors or outdoors in high-temperature environments, and is also effective as a measure against heatstroke in the summer.

[0003] Here, for example, when such a conventional air conditioning fan unit is attached to air conditioning clothing by rotating the mounting member multiple times relative to the unit body, the structure is such that the outlet side of the air conditioning fan unit protrudes inside the air conditioning garment.

[0004] For this reason, inside the conventional air-conditioning clothing, the exhaust port of the air-conditioned fan unit attached to the air-conditioning clothing is close to the wearer's body. Therefore, the flow of air output from the outlet of the air conditioning fan unit may be obstructed, resulting in a decrease in air conditioning efficiency.

[0005] In particular, many conventional air conditioning fan units draw in air from an intake port and exhaust it linearly from an exhaust port. If the exhaust port of the air conditioning fan unit is close to the wearer's body, the airflow discharged from the air conditioning fan unit will immediately collide with the wearer's body.

[0006] As a result, the flow resistance of the airflow for cooling inside air-conditioning clothing increases, whereby the volume and speed of the air that circulates into the air-conditioning clothing and exits through the vents of the air-conditioning clothing provided at the neck, sleeves, etc. become smaller.

[0007] As described above, the above conventional air conditioning fan unit has a problem in that it cannot improve air conditioning efficiency by reducing the flow path resistance of airflow for cooling inside air-conditioning clothing, when the air conditioning fan unit is attached to air conditioning clothing.

[Prior art]

[Patent document]

[0008] [Patent Document 1] JP 6473558 B

[Outline of the Invention]

[Problems to be solved by the invention]

[0009] Therefore, in view of the problems of the prior art, it is an object of the present invention to provide an air conditioning fan unit, that that can improve air-conditioning efficiency by reducing flow path resistance of airflow for cooling within the air-conditioning clothing when the air conditioning fan unit is attached to air conditioning clothing, and an air conditioning clothing to which the air conditioning fan unit is attached.

[Means for solving the problem]

[0010] An air-conditioning fan unit, according to an embodiment of the present invention, that is attached to and applied to an air-conditioning clothing in order to air-condition an inner space existing between a wearer and the air-conditioning clothing when worn by the wearer, comprising:

an air-conditioning fan unit that has an air intake inlet portion for taking in outside air from outside the air-conditioning clothing, and has an exhaust outlet portion for exhausting airflow into an inside of the air-conditioning clothing;
a first cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion;
a second cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion; and
a fan unit that is housed in a space surrounded by the first cylindrical portion and the second cylindrical portion, the fan unit having a plurality of fins provided to generate airflow from the air intake inlet portion toward the exhaust outlet portion by rotating around a rotation center line,
wherein the exhaust outlet portion is provided with a plurality of ribs for adjusting the direction of the exhaust airflow to a preset setting direction from the direction of the airflow taken in from the air intake inlet portion.

[0011] In the air conditioning fan unit, wherein each of the plurality of ribs has a plate-like shape.

[0012] In the air conditioning fan unit,
wherein at least some of the plurality of ribs are inclined with respect to the rotation center line so that the direction of airflow discharged from the exhaust port is adjusted to the setting direction.

[0013] In the air conditioning fan unit,
wherein at least some of the plurality of ribs are set to have different inclinations with respect to the rotation center line.

[0014] In the air conditioning fan unit,
wherein the plurality of ribs are set differently in stages so that the inclination with respect to the rotation center line is adjusted to a preset setting direction from the direction of the airflow taken in from the air intake inlet portion.

[0015] In the air conditioning fan unit,
wherein the setting direction is inclined in a direction from the rotation center line toward a collar provided at a top of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to the air-conditioning clothing.

[0016] In the air conditioning fan unit, wherein the setting direction is set in a plurality of directions.

[0017] In the air conditioning fan unit,
wherein the air conditioning fan unit exhausts airflow from the exhaust outlet portion into the interior of the air-conditioning clothing in the setting direction toward the collar provided on the upper part of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to an attachment portion located on the lower side of the air-conditioning clothing.

[0018] In the air-conditioning fan unit,

wherein the first cylindrical portion has a first fixing mechanism provided on a side surface of the first cylindrical portion,
wherein the second cylindrical portion includes: a flange provided to surround a side surface of the second cylindrical portion; and a second fixing mechanism provided on a side surface of the second cylindrical portion between the flange and the other end of the second cylindrical portion, and
wherein, in a state where the other end of the second cylindrical portion is inserted from the other end of the first cylindrical portion into the inside of the first cylindrical portion to a preset insertion position, the first fixing mechanism and the second fixing mechanism is fixed, whereby the first cylindrical portion and the second cylindrical portion are fixed, and the air-conditioning fan unit is attached to the attachment portion of the air-conditioning clothing by sandwiching the attachment portion of the air-conditioning clothing between the other end of the first cylindrical portion and the flange of the second cylindrical portion.

[0019] In the air-conditioning fan unit,
wherein the flange of the exhaust casing is provided with a direction indicator for the wearer to confirm the direction when attached to the attaching portion of the air-conditioning clothing.

[0020] In the air-conditioning fan unit,

wherein the first fixing mechanism is provided on the inner surface of the first cylindrical portion,
wherein the flange is provided so as to surround the outer surface of the second cylindrical portion, and
wherein the second fixing mechanism is provided on the outer surface of the second cylindrical portion so as to be located between the flange and the other end of the second cylindrical portion.

[0021] In the air-conditioning fan unit,

wherein the one end of the first cylindrical portion is connected to the air intake inlet portion, and the other end of the first cylindrical portion is open, and
wherein the one end of the second cylindrical portion is connected to the exhaust outlet portion, and the other end of the second cylindrical portion is open.

[0022] In the air-conditioning fan unit, further comprising;

an intake casing that includes the air intake inlet portion and the first cylindrical portion as an intake cylindrical portion and is attached to the outside of the air-conditioning clothing; and
an exhaust casing that includes the exhaust outlet portion and the second cylindrical portion as an exhaust cylindrical portion and is attached to the inside of the air-conditioning clothing.

[0023] In the air-conditioning fan unit,
wherein, the first fixing mechanism and the second fixing mechanism are fixed by rotating the intake casing relative to the exhaust casing, whereby the intake casing and the exhaust casing are fixed, and the fan unit is housed in a space surrounded by the intake casing and the exhaust casing.

[0024] In the air-conditioning fan unit,

wherein the first fixing mechanism is a first screw thread provided on the inner surface of the intake cylindrical portion, and
wherein the second fixing mechanism is a second screw thread provided on the outer surface of the exhaust cylindrical portion so as to be located between the flange and the other end of the exhaust cylindrical portion.

[0025] In the air-conditioning fan unit,
wherein, in a state where the intake casing and the exhaust casing are fixed, the intake cylindrical portion and the exhaust cylindrical portion are arranged to extend around the rotation center line.

[0026] In the air-conditioning fan unit,
wherein, in a state where the intake casing and the exhaust casing are fixed, the air-conditioning fan unit is attached to the attachment portion of the air-conditioning clothing, by sandwiching the attachment portion of the

air-conditioning clothing between the other end of the intake cylindrical portion of the intake casing and the flange of the exhaust cylindrical portion of the exhaust casing.

[0027] An air-conditioning clothing, according to an embodiment of the present invention, for air-conditioning an inner space that exists between a wearer and the air-conditioning clothing is worn by the wearer, comprising:

a clothing body that can be worn by the wearer;
an attaching portion provided on the clothing body and capable of attaching and detaching the air-conditioning fan unit; and
an air-conditioning fan unit having an air intake inlet portion for taking in outside air from the outside of the air-conditioning clothing and an exhaust outlet portion for exhausting airflow into the inside of the air-conditioning clothing,
wherein the air-conditioning fan unit comprises:

an air-conditioning fan unit that has an air intake inlet portion for taking in outside air from outside the air-conditioning clothing, and has an exhaust outlet portion for exhausting airflow into an inside of the air-conditioning clothing;
a first cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion;
a second cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion; and
a fan unit that is housed in a space surrounded by the first cylindrical portion and the second cylindrical portion, the fan unit having a plurality of fins provided to generate airflow from the air intake inlet portion toward the exhaust outlet portion by rotating around a rotation center line,
wherein the exhaust outlet portion is provided with a plurality of ribs for adjusting the direction of the exhaust airflow to a preset setting direction from the direction of the airflow taken in from the air intake inlet portion.

[0028] In the air-conditioning clothing,
wherein the setting direction is inclined in a direction from the rotation center line toward a collar provided at a top of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to the air-conditioning clothing.

[0029] In the air-conditioning clothing, wherein the setting direction is set in a plurality of directions.

[0030] In the air-conditioning clothing,
wherein the air conditioning fan unit exhausts airflow from the exhaust outlet portion into the interior of the air-conditioning clothing in the setting direction toward the collar provided on the upper part of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to an attachment portion located on the lower side of the air-conditioning clothing.

[Effect of the invention]

[0031] According to the air conditioning fan unit according to one aspect of the present invention, when the air-conditioning fan unit is attached to air-conditioned clothing, the air-conditioning efficiency can be improved by reducing the flow path resistance of airflow for cooling within the air-conditioned clothing.

[Brief explanation of the drawing]

[0032]

[FIG. 1A] FIG. 1A is a diagram illustrating an example of the appearance of air-conditioning clothing 100 according to an embodiment of the present invention as viewed from the front.
[FIG. 1B] FIG. 1B is a diagram illustrating an example of the appearance of the air-conditioned garment 100 according to the embodiment of the present invention as viewed from the rear.
[FIG. 2A] FIG. 2A is a diagram showing an example of a configuration of the outer surface 10Yin of the rear portion 10Y of the garment body 10 of the air-conditioning clothing 100, focusing on the area Q where the air-conditioning fan unit 200 is attached.
[FIG. 2B] FIG. 2B is a diagram showing an example of a configuration of the inner surface 10Yin of the rear portion 10Y of the clothing body 10 of the air-conditioning clothing 100, focusing on the area Q where the air-conditioning fan unit 200 is attached.
[FIG. 3A] FIG. 3A is a perspective view showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B.
[FIG. 3B] FIG. 3B is a diagram showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B, viewed from the exhaust port side.
[FIG. 3C] FIG. 3C is a diagram showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B, viewed from the intake port side.
[FIG. 3D] FIG. 3D is a side view showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B, viewed from the side along the rotation center line.
[FIG. 3E] FIG. 3E is a cross-sectional view showing an example of a cross section along the rotation center line of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B.
[FIG. 4A] FIG. 4A is a perspective view showing an example of the configuration of an intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E.
[FIG. 4B] FIG. 4B is a diagram showing an example of the configuration of the intake casing SC of the air

conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the exhaust port side.

[FIG. 4C] FIG. 4C is a diagram showing an example of the configuration of the intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the intake port side.

[FIG. 4D] FIG. 4D is a side view showing an example of the configuration of the intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the side along the rotation center line.

[FIG. 4E] FIG. 4E is a sectional view showing an example of a cross section along the rotation center line of the configuration of the intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E.

[FIG. 5A] FIG. 5A is a perspective view showing an example of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E.

[FIG. 5B] FIG. 5B is a diagram showing an example of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the exhaust port side.

[FIG. 5C] FIG. 5C is a diagram showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the intake port side.

[FIG. 5D] FIG. 5D is a side view showing an example of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the side along the rotation center line.

[FIG. 5E] FIG. 5E is a sectional view showing an example of a cross section along the rotation center line of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E.

[FIG. 6A] FIG. 6A shows an example viewed from the side along the rotation center line with the air conditioning fan unit 200 attached, focusing on the region Q of the air conditioning clothing 100 shown in FIGS. 2A and 2B.

[FIG. 6B] FIG. 6B is a cross-sectional view showing an example of a cross section along the rotation center line with the air-conditioning fan unit 200 attached, focusing on region Q of the air-conditioning clothing 100 shown in FIGS. 2A and 2B.

[FIG. 7] FIG. 7 is a schematic diagram that extracts and schematically shows the configuration related to the intake cylindrical portion and the exhaust cylindrical portion from among the configurations shown in the cross-sectional view shown in FIG. 6B.

[FIG. 8] FIG. 8 is a side view showing an example of the air-conditioning fan unit 200 attached as viewed from the side along the rotation center line, focusing on the vicinity of region Q of air-conditioning clothing 100 shown in FIGS. 2A and 2B, in a state that the wearer is wearing air-conditioning clothing.

[FIG. 9] FIG. 9 is a diagram illustrating an example of the configuration of the clothing body 10 including wiring and a power source connected to the air conditioning fan unit 100 attached to the clothing body 10.

[Mode for carrying out the invention]

[0033] Hereinafter, embodiments according to the present invention will be described based on the drawings.

[0034] First, an air-conditioning clothing according to an embodiment and an air-conditioning fan unit attached to the air-conditioning clothing will be described with reference to the drawings. FIG. 1A is a diagram illustrating an example of the appearance of air-conditioning clothing 100 according to an embodiment of the present invention as viewed from the front. FIG. 1B is a diagram illustrating an example of the appearance of the air-conditioning clothing 100 according to the embodiment of the present invention as viewed from the rear. FIG. 2A is a diagram showing an example of a configuration of the outer surface 10Yin of the rear portion 10Y of the clothing body 10 of the air-conditioning clothing 100, focusing on the area Q where the air-conditioning fan unit 200 is attached. FIG. 2B is a diagram showing an example of a configuration of the inner surface 10Yin of the rear portion 10Y of the clothing body 10 of the air-conditioning clothing 100, focusing on the area Q where the air-conditioning fan unit 200 is attached.

[air-conditioning clothing]

[0035] The air-conditioning clothing 100 according to the embodiment shown in FIGS. 1A and 1B is, for example, work clothing for air-conditioning the inner space existing between the wearer (not shown) and the wearer when the wearer wears the clothing.

[0036] This air-conditioning clothing 100 is, for example, a vest (work clothes without sleeves), as shown in FIGS. 1A and 1B. However, the air-conditioning clothing 100 may be long-sleeved or short-sleeved work clothing.

[0037] For example, as shown in FIGS. 1A to 2B, this air-conditioning clothing 100 includes a clothing body 10, a first attaching portion T1, a second attaching portion T2, a first air-conditioning hole lid F1, and a second air-conditioning hole lid F2, a storage portion P2, a storage portion P1, and a collar portion 20. It is noted that in FIGS. 2A and 2B, for the sake of simplicity, a portion of the configuration of the air-conditioning clothing 100 shown in FIGS. 1A and 1B (in particular, the lids F1 and F2) may be omitted.

[0038] Hereinafter, each component of the air-conditioning clothing 100 will be explained in detail.

[Clothing body]

[0039] The clothing body 10 can be worn by the wearer.

In particular, this clothing body 10 can be worn on the wearer's upper body.

[0040] This clothing body 10 includes a front portion 10X (FIG. 1A) located in front of the air-conditioning clothing 100 and covering at least the vicinity of the wearer's chest; and a rear portion 10Y (FIG. 1B) located at the rear of the air-conditioning clothing 100 and covering at least the vicinity of the back of the wearer.

[0041] Furthermore, the front portion 10X of the clothing body 10 can be closed by closing the zipper G (FIG. 1A).

[0042] Additionally, this clothing body 10 includes openings 10L, 10R, 10U, and 10D corresponding to the wearer's shoulders, torso, and neck, respectively.

[0043] Furthermore, the front portion 10X of the clothing body 10 is provided with a storage portion (a storage portion for power supply) P2 and a storage portion P1, which are pockets, for example.

[First and second attaching portions]

[0044] For example, as shown in FIG. 1B, the first attaching portion T1 is provided at the rear portion 10Y of the clothing body 10, and the first attaching portion T1 has a first air conditioning hole T1A that penetrates between the inner surface 10Yin (FIG. 2B) and the outer surface 10Yout (FIG. 2A) of the rear portion 10Y of the clothing body 10.

[0045] This first attaching portion T1 is capable of attaching and detaching an air-conditioning fan unit 200, which is a temperature adjustment device that takes outside air into the air-conditioning clothing 100 through the first air-conditioning hole T1A. It is noted that the air-conditioning fan unit 200 is an electric fan.

[0046] In addition, the second attaching portion T2 is provided at the rear portion 10Y of the clothing body 10, for example, as shown in FIG. 1B, and the second attaching portion T2 has a second air conditioning hole T2A that penetrates between the inner surface 10Yin (FIG. 2B) and the outer surface 10Yout (FIG. 2A) of the rear portion 10Y of the clothing body 10.

[0047] This second attaching portion T2 is capable of attaching and detaching an air-conditioning fan unit 200, which is a temperature adjustment device that takes outside air into the air-conditioning clothing 100 through the second air-conditioning hole T2A. As mentioned above, the air-conditioning fan unit 200 is an electric fan.

[0048] In addition, in the embodiment, a case is described in which the temperature adjustment device is an electric fan. However, the temperature adjustment device may be a heat generating device that generates heat or other devices that can adjust the temperature.

[0049] In addition, in the examples of Figures 1B to 2B, the first attaching portion T1 and the second attaching portion T2 are arranged in the torso region of the rear portion 10Y of the clothing body 10 facing the back side of the wearer's torso when the air-conditioning clothing 100 is worn by the wearer. However, the first attaching portion T1 and the second attaching portion T2 may be arranged in other areas of the clothing body 10.

[First and second air-conditioning hole lids]

[0050] The first air-conditioning hole lid F1 and the second air-conditioning hole lid F2 are arranged on the inner surface 10Yin of the clothing body 10, for example, as shown in FIG. 1B.

[0051] This first air-conditioning hole lid F1 closes the first air-conditioning hole T1A in the closed state (FIG. 1B) when viewed from the outside of the clothing body 10, on the other hand, the first air-conditioning hole lid F1 does not close the first air-conditioning hole T1A in the open state.

[0052] Similarly, this second air-conditioning hole lid F2 closes the second air-conditioning hole T2A in the closed state (FIG. 1B) when viewed from the outside of the clothing body 10, on the other hand, the second air-conditioning hole lid F2 does not close the second air-conditioning hole T2A in the open state.

[0053] As mentioned above, in FIGS. 2A and 2B, for the sake of simplicity, a portion of the configuration of the air-conditioning clothing 100 shown in FIGS. 1A and 1B (in particular, the lids F1 and F2) may be omitted from the display.

[Collar portion]

[0054] For example, as shown in FIGS. 1A and 1B, the collar portion 20 is provided at the upper portion of the clothing body 10 and covers the area around the wearer's neck when worn by the wearer.

[0055] For example, the maximum height of this collar portion 20 from the connection portion with the clothing body 10 (lower end of the collar portion 20) to the upper end of the collar portion 20 is, for example, 8 cm or more.

[0056] In this way, by increasing the height of the collar portion 20 of the air-conditioning clothing 100, wind can be sent to the back of the wearer's neck and around the face.

[0057] In addition, wind can be sent into the helmet worn by the wearer from the clothing body 10 of the air-conditioning clothing 100 through the collar portion 20, reducing stuffiness on the wearer's head and increasing the cooling effect.

[0058] Furthermore, by increasing the height of the collar portion 20, the back of the wearer's neck is hidden, which provides a sunshade effect and can be expected to be highly effective in preventing heat stroke.

[0059] In addition, some work clothes, which are traditionally air-conditioning clothing, have hoods, but due to their casual appearance, they may not be able to be worn depending on the location or job. However, as in this embodiment, the air-conditioning clothing 100 is provided with a collar portion 20 instead of a hood, so that it can be worn regardless of location or work.

[0060] In particular, as in this embodiment, since the

air-conditioning clothing 100 includes a collar portion 20 instead of a hood, the wearer's ears are not covered and surrounding sounds can be easily heard, thereby reducing the risk of accidents during outdoor work.

[0061] In addition, in the example of FIGS. 1A and 1B, although the collar portion 20 is made up of one member, it may be made up of two or more members to make it easier to fold. Furthermore, this collar portion 20 may be provided with a storage portion (pocket), which is not shown.

[Air-conditioning fan unit]

[0062] For example, as shown in FIGS. 2A and 2B, the air-conditioning fan unit 200 according to this embodiment is applied by being attached to air-conditioning clothing 100, when worn by the wearer (not shown), for air-conditioning the inner space existing between the air-conditioning fan unit 200 and the wearer. The air-conditioning fan unit 200 has an intake port SH for taking in outside air from outside the air-conditioning clothing 100 and an exhaust port UH for discharging airflow into the inside of the air-conditioning clothing 100.

[0063] FIG. 3A is a perspective view showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B. FIG. 3B is a diagram showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B, viewed from the exhaust port side. FIG. 3C is a diagram showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B, viewed from the intake port side. FIG. 3D is a side view showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B, viewed from the side along the rotation center line. FIG. 3E is a cross-sectional view showing an example of a cross section along the rotation center line of the configuration of the air conditioning fan unit 200 shown in FIGS. 2A and 2B. It is noted that the configuration of the air-conditioning clothing 100 is not illustrated in FIGS. 3A to 3E.

[0064] The air-conditioning fan unit 200 according to the present embodiment includes, for example, an intake casing SC and an exhaust casing UC, as shown in FIGS. 3A to 3E.

[0065] The intake casing SC includes an intake port SH and a first cylindrical portion SX as an intake cylindrical portion SX, and the intake casing SC is adapted to be attached to the outside of the air-conditioning clothing 100.

[0066] Furthermore, the exhaust casing UC includes an exhaust port portion UH and a second cylindrical portion UX as the exhaust cylindrical portion UX, and the exhaust casing UC is configured to be attached inside the air-conditioning clothing 100.

[0067] For example, as shown in Figures 3D and 3E, in a state where the intake casing SC and the exhaust casing UC are fixed, the intake cylindrical portion SX and the exhaust cylindrical portion UX are arranged to extend around the rotation center line M.

[0068] In particular, for example, as shown in FIGS. 3A to 3E, the air-conditioning fan unit 200 according to the present embodiment includes an intake port SH, an exhaust port UH, a first cylindrical portion SX (hereinafter, may be referred to as an intake cylindrical portion SX), a second cylindrical portion UX. (hereinafter, may be referred to as an exhaust cylindrical portion UX), a fan unit UB, a drive portion UD, and a support portion UE.

[0069] It is noted that the configuration of the air-conditioning fan unit 200 is not limited to the configuration shown in FIGS. 3A to 3E, the arrangement of the first and second cylindrical portions SX and UX located between the intake port SH and the exhaust port UH may be changed.

[0070] Furthermore, in the examples shown in FIGS. 2A to 3E, the air-conditioning fan unit 200 is composed of two casings SC and UC. However, the air-conditioning fan unit 200 may also include a casing containing one of the first, second cylindrical portions SX and UX; and one mounting member including the other of the first, second cylindrical portions SX and UX for attaching the casing to the air-conditioning clothing 100.

[0071] In addition, the examples shown in Figures 2A to 3E explain the case that the first cylindrical portion SX is an intake cylindrical portion located on the intake side (i.e., outside the air-conditioning clothing 100), and the second cylindrical portion UX is an exhaust cylindrical portion located on the exhaust side (that is, inside the air-conditioning clothing 100). However, it is not limited to this, the second cylindrical portion UX is an intake cylindrical portion located on the intake side (i.e., outside the air-conditioning clothing 100), and the first cylindrical portion SX may be an exhaust cylindrical portion located on the exhaust side (that is, inside the air-conditioning clothing 100). In this case, one end SXa of the first cylindrical portion SX is connected to the exhaust port UH, and the other end SXb of the first cylindrical portion SX is open, and one end UXa of the second cylindrical portion UX is connected to the intake port SH, and the other end UXb of the second cylindrical portion UX is open.

[Intake casing]

[0072] Here, FIG. 4A is a perspective view showing an example of the configuration of an intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E. FIG. 4B is a diagram showing an example of the configuration of the intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the exhaust port side. FIG. 4C is a diagram showing an example of the configuration of the intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the intake port side. FIG. 4D is a side view showing an example of the configuration of the intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the side along the rotation center line. FIG. 4E is a sectional view showing an ex-

ample of a cross section along the rotation center line of the configuration of the intake casing SC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E.

[0073] As mentioned above, the intake casing SC includes the intake port SH and the first cylindrical portion SX as the intake cylindrical portion SX, and the intake casing SC is attached to the outside of the air-conditioning clothing 100.

[0074] In particular, as shown in Figures 4A to 4E, the exhaust casing UC according to the present embodiment includes an air intake inlet portion SH and an intake cylindrical portion SX.

[Air intake inlet portion]

[0075] For example, as shown in Figure 2A, the air intake inlet portion SH is arranged outside the air-conditioning clothing 100 in a state where the air-conditioning fan unit 200 is attached to the air-conditioning clothing 100. The air-conditioning fan unit 200 is configured to take in outside air SG (FIG. 3D) from outside the air-conditioning clothing 100 via this air intake inlet portion SH.

[0076] It is noted that, for example, as shown in FIGS. 3A and 4A, the air intake inlet portion SH is provided with a rib UR.

[Intake cylindrical portion (first cylindrical portion)]

[0077] The intake cylindrical portion SX has one end SXa and the other end SXb, which are located between the air intake inlet portion SH and the exhaust outlet portion UH, for example, as shown in FIGS. 3A to 3E.

[0078] For example, as shown in Figures 4A to 4E, one end SXa of the intake cylindrical portion SX is connected to an air intake inlet portion SH, and the other end SXb of the intake cylindrical portion SX is open.

[0079] For example, as shown in FIGS. 4A to 4E, the intake cylindrical portion SX includes a first fixing mechanism SN and a protrusion ST.

[0080] The first fixing mechanism SN is provided on the side surface (particularly the inner surface SXc) of the first cylindrical portion SX.

[0081] This first fixing mechanism SN is a first screw thread SN provided on the inner surface SXc of the intake cylindrical portion SX, as shown in FIGS. 4A to 4E.

[0082] For example, as shown in Figures 4A to 4E, the first thread SN is provided on the inner surface SXc of the intake cylindrical portion SX so as to spirally extend from the other end SXb of the intake cylindrical portion SX toward one end SXa.

[0083] Furthermore, for example, in the example shown in FIGS. 4A to 4E, two first threads SN are provided on the inner surface SXc of the intake cylindrical portion SX.

[0084] One of the two first threads SN is arranged at a position opposite to the other of the two first threads SN, on the inner surface SXc of the intake cylindrical portion SX, centering on the rotation center line M.

[0085] It is noted that, for example, the first thread SN may be inclined so as to bend toward the other end SXb side of the intake cylindrical portion SX. In the vicinity of the other end SXb of the inner surface SXc of the intake cylindrical portion SX.

[0086] Furthermore, the outer surface SXd of the intake cylindrical portion SX of the intake casing SC is provided with a protrusion ST for hooking the wearer's finger, for example, as shown in FIGS. 4A to 4E.

[0087] This protrusion ST is, for example, a linear protrusion extending from one end SXa of the intake cylindrical portion SX toward the other end SXb, as shown in FIGS. 4A to 4E.

[0088] It is noted that instead of the protrusion ST, a member on which the wearer's fingers are likely to get caught or friction may be applied may be used.

[0089] Furthermore, for example, as shown in FIGS. 4A to 4E, the outer surface SXd of the intake cylindrical portion SX of the intake casing SC is inclined, from the other end SXb of the intake cylindrical portion SX to one end SXa (toward the tip), so that the outer shape of the intake cylindrical portion SX becomes thin.

[0090] In this way, the outer diameter of one end SXa of the intake cylindrical portion SX of the intake casing SC is set to be smaller than the outer diameter of the other end SXb of the intake cylindrical portion SX.

[0091] As a result, for example, when the air-conditioning fan unit 200 is attached to the air-conditioning clothing 100, the appearance of the intake casing SC that protrudes outside is improved, and it is possible to reduce the possibility that the intake casing SC gets caught on external members or mechanisms.

[Exhaust casing]

[0092] Here, FIG. 5A is a perspective view showing an example of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E. FIG. 5B is a diagram showing an example of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the exhaust port side. FIG. 5C is a diagram showing an example of the configuration of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the intake port side. FIG. 5D is a side view showing an example of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E, viewed from the side along the rotation center line. FIG. 5E is a sectional view showing an example of a cross section along the rotation center line of the configuration of the exhaust casing UC of the air conditioning fan unit 200 shown in FIGS. 3A to 3E.

[0093] As mentioned above, the exhaust casing UC includes an exhaust outlet portion UH and a second cylindrical portion UX as the exhaust cylindrical portion UX, the exhaust casing UC is adapted to be attached inside the air-conditioning clothing 100.

[0094] In particular, as shown in Figures 5A to 5E, the exhaust casing UC according to the present embodiment includes an exhaust port side UH, an exhaust cylindrical portion UX, a fan unit UB, a drive portion UD, a support portion UE, and a connection portion UA.

[Exhaust outlet portion]

[0095] Here, the exhaust outlet portion UH is arranged inside the air-conditioning clothing 100 in a state where the air-conditioning fan unit 200 is attached to the air-conditioning clothing 100, for example, as shown in FIG. 2B. The air-conditioning fan unit 200 is configured to output airflow UG (FIG. 3D) into the air-conditioning clothing 100 via this exhaust outlet portion UH.

[0096] Furthermore, for example, as shown in FIGS. 3D and 5D, the exhaust outlet portion UH is provided with a plurality of ribs UR that adjusts the direction of the exhaust airflow UG.

[0097] In particular, each of the plurality of ribs UR has a plate-like shape (a so-called baffle plate), as shown in FIGS. 3D and 5D, for example. At least some of the plurality of ribs UR are inclined with respect to the rotation center line M so that the direction of the airflow discharged from the exhaust port UH is adjusted to the setting direction.

[0098] Furthermore, at least some of the plurality of ribs UR are set to have different inclinations with respect to the rotation center line M. More specifically, the plurality of ribs UR are set to have different inclinations with respect to the rotation center line M in a stepwise manner, so that the direction of the airflow taken in from the intake port SH is adjusted to a preset setting direction.

[0099] For example, some of the plurality of ribs UR are arranged so that the direction of the plate-like shape thereof is substantially parallel to the inclination with respect to the rotation center line M. On the other hand, some of the plurality of ribs UR are arranged so that the direction of the plate-like shape is inclined with respect to the rotation center line M.

[Exhaust cylindrical portion (second cylindrical portion)]

[0100] The exhaust cylindrical portion UX has one end UXa and the other end UXb, which are located between the air intake inlet portion SH and the exhaust outlet portion UH, for example, as shown in FIGS. 3A to 3E.

[0101] For example, as shown in FIGS. 5A to 5E, one end UXa of the second cylindrical portion UX is connected to the exhaust outlet portion UH, and the other end UXb of the second cylindrical portion UX is open.

[0102] Here, as shown in FIGS. 5A to 5E, the exhaust cylindrical portion UX according to the present embodiment includes a flange UF, a second fixing mechanism UN, and a protrusion UT.

[0103] As shown in FIGS. 5A to 5E, the flange UF is provided so as to surround the side surface (particularly the outer surface UXd) of the exhaust cylindrical portion UX.

[0104] For example, as shown in FIGS. 3B and 5B, a direction display section UZ is provided on the exhaust outlet portion UH side of the flange UF of the exhaust casing UC for the wearer to confirm the direction when attached to the first attaching portion T1 (and/or second attaching portion T2) of the air-conditioning clothing 100.

[0105] Furthermore, as shown in Figures 5A to 5E, the second fixing mechanism UN is provided on the side surface (particularly the outer surface UXd) of the exhaust cylindrical portion UX so as to be located between the flange UF and the other end UXb of the exhaust cylindrical portion UX.

[0106] Then, as shown in Figs 5A to 5E, the second fixing mechanism SN is a second screw thread UN located between the flange UF and the other end UXb of the exhaust cylindrical portion UX, on the outer surface UXd of the exhaust cylindrical portion UX.

[0107] For example, as shown in Figures 5A to 5E, this second thread SN (from the tip SNa to the rear end SNb) is provided on the outer surface UXd of the exhaust cylindrical portion UX, so as to spirally extend from the other end SXb of the exhaust cylindrical portion UX toward the flange UF.

[0108] Also, for example, as shown in Figure 5D, in the vicinity of the other end UXb of the outer surface UXd of the exhaust cylindrical portion UX, the one end UNa of the second thread UN is inclined so as to bend toward the other end UXb side of the exhaust cylindrical portion UX.

[0109] As a result, with the other end UXb of the exhaust cylindrical portion UX inserted from the other end SXb of the intake cylindrical portion SX to the inside of the intake cylindrical portion SX to the previously described insertion position, when rotating the intake casing SC relative to the exhaust casing UC around the rotation center line M, the first thread SN and the second thread UN can be made to mesh more reliably. That is, the intake casing SC and the exhaust casing UC can be screwed together more reliably.

[0110] In addition, for example, in the example shown in FIGS. 5A to 5E, two second screw threads UN are provided on the outer surface UXd of the exhaust cylindrical portion UX.

[0111] One of the two second threaded threads UN is arranged at a position opposite to the other of the two second threaded threads UN. on the outer surface UXd of the exhaust cylindrical portion UX, centering on the rotation center line M.

[0112] In particular, for example, as shown in FIGS. 3E, 4E, and 5E, the inner diameter of the region (inner surface SXc), where the first thread SN of the intake cylindrical portion SX is provided, is set to be larger than the outer diameter of the region (outer surface UXd) where the second screw thread UN of the exhaust cylindrical portion UX is provided.

[0113] For example, when inserting the other end UXb of the exhaust cylindrical portion UX from the other end

SXb of the intake cylindrical portion SX to the inside of the intake cylindrical portion SX to the previously described insertion position, it is configured that, the first thread SN passes through a region of the outer surface UXd of the exhaust cylindrical portion UX where the second thread SN is not formed, and the second thread UN passes through a region of the inner surface SXc of the intake cylindrical portion SX where the first thread SN is not formed.

[0114] As a result, in the state that the second thread UN located on the air intake inlet portion SH side and the first thread UN located on the exhaust outlet portion UH side, the first thread SN and the second thread UN engage with each other. That is, when the intake casing SC and the exhaust casing UC are screwed together, the first thread SN is located between the flange UF and the second thread SN, and the first thread SN and the second thread UN are in contact with each other, so that the first thread SN and the second thread UN engage with each other.

[0115] As a result, as described below, the air-conditioning fan unit 200 can be made removable from the air-conditioning clothing 100, by rotating the intake cylindrical portion SX relative to the exhaust cylindrical portion UX around the rotation center line M, with a rotation angle for screwing within one rotation (360 degrees) (more preferably about 60 degrees).

[0116] Furthermore, for example, as shown in FIGS. 5A to 5E, the protrusion UT is provided to hook the wearer's finger on the outer surface UXd of the exhaust cylindrical portion UX of the exhaust casing UC.

[0117] This protrusion UT is a linear protrusion extending from one end UXa of the exhaust cylindrical portion UX toward the other end UXb.

[Fan unit]

[0118] Furthermore, for example, as shown in FIGS. 3A to 3E, the fan unit UB is housed in a space surrounded by the first cylindrical portion SX and the second cylindrical portion UX. For example, as shown in FIGS. 5A to 5E, this fan unit UB has a plurality of fins UF provided so as to generate airflow from the air intake inlet portion SH toward the exhaust outlet portion UH by rotating the fins UF around the rotation center line M.

[Drive unit]

[0119] Furthermore, for example, as shown in FIGS. 5A to 5E, the drive unit UD is housed in the exhaust casing UC, and the drive unit UD drives the fan unit UB to rotate the fins UF of the fan unit UB about the rotation center line M. This drive unit UD is, for example, a motor.

[Support portion]

[0120] Furthermore, the support portion UE is provided at the exhaust outlet portion UH, for example, as shown in FIGS. 5A to 5E, and is configured to support the drive unit UD.

[0121] For example, as shown in FIGS. 5A to 5E, the connection unit UA is provided on the support unit UE and is configured to connect wiring (wiring L shown in FIG. 9 in the example described later) for supplying power from a power source to the drive unit UD.

[Air-conditioning fan unit installation]

[0122] Here, an example of mounting the air-conditioning fan unit 200 of this embodiment having the above configuration will be described.

[0123] FIG. 6A shows an example viewed from the side along the rotation center line with the air conditioning fan unit 200 attached, focusing on the region Q of the air conditioning clothing 100 shown in FIGS. 2A and 2B. FIG. 6B is a cross-sectional view showing an example of a cross section along the rotation center line with the air-conditioning fan unit 200 attached, focusing on region Q of the air-conditioning clothing 100 shown in FIGS. 2A and 2B. FIG. 7 is a schematic diagram that extracts and schematically shows the configuration related to the intake cylindrical portion and the exhaust cylindrical portion from among the configurations shown in the cross-sectional view shown in FIG. 6B. In addition, in FIG. 7, the structure related to the intake cylindrical portion SX is shown by a solid line, and the structure related to the exhaust cylindrical portion UX is shown by a dotted line.

[0124] For example, as shown in FIGS. 6A to 7, in a state that the other end UXb of the exhaust cylindrical portion UX inserted into the intake cylindrical portion SX from the other end SXb of the first cylindrical portion SX to the preset insertion position, the air-conditioning fan unit 200 is attached to the first attaching portion T1 (or second attaching portion T2) of the air-conditioning clothing 100 by fixing the first fixing mechanism (first thread) SN and the second fixing mechanism (second thread) UN, the first cylindrical portion SX and second cylindrical portion UX are fixed, and sandwiching the first attaching portion T1 (and/or second attaching portion T2) of the air-conditioning clothing 100 between the other end SXb of the intake cylindrical portion SX and the flange UF of the exhaust cylindrical portion UX.

[0125] In this way, by rotating the intake casing SC relative to the exhaust casing UC around the rotation center line M, the first fixing mechanism SN and the second fixing mechanism UN are fixed, whereby the intake casing SC and the exhaust casing UC are fixed, and the fan unit UB is housed in a space surrounded by the intake casing SC and the exhaust casing UC.

[0126] In other words, in a state where the intake casing SC and the exhaust casing UC are fixed, the first attaching portion T1 (or second attaching portion T2) of the air-conditioning clothing 100 is attached to the other end of the intake cylindrical portion SX of the intake casing SC, by sandwiching the SXb and the flange UF of the exhaust cylindrical portion UX of the exhaust casing UC,

whereby the air-conditioning fan unit 200 is attached to the first attaching portion T1 (or second attaching portion T2) of the air-conditioning clothing 100.

[0127] In this embodiment, for example, as shown in FIGS. 3E, 6B, and 7, in the state the other end UXb of the exhaust cylindrical portion UX inserted from the other end SXb of the intake cylindrical portion SX to the inside of the intake cylindrical portion SX to the previously described insertion position, the intake casing SC is rotated relative to the exhaust casing UC around a rotation center line M, so that the first thread SN and the second thread UN engage with each other, thereby screwing the intake casing SC and the exhaust casing UC together.

[0128] Then, preferably, for example, with the other end UXb of the exhaust cylindrical portion UX inserted from the other end SXb of the intake cylindrical portion SX to the inside of the intake cylindrical portion SX to the insertion position, the first thread SN and the second thread UN engage with each other by rotating the intake casing SC relative to the exhaust casing UC around the rotation center line M at a screwing rotation angle of less than one rotation (360 degrees), whereby the intake casing SC and the exhaust casing UC are screwed together. More preferably, for example, this screw rotation angle is about 60 degrees.

[0129] That is, the air-conditioning fan unit 200 becomes removable to the air-conditioning clothing 100, by rotating the intake casing SC relative to the exhaust casing UC around the rotation center line M at a screwing rotation angle of less than one rotation (360 degrees), (more preferably about 60 degrees).

[0130] Thereby, the wearer can more easily and reliably remove the air-conditioning fan unit 200 from the air-conditioning clothing 100 compared to the prior art described above.

[0131] Furthermore, as mentioned above, the first thread SN passes through a region of the outer surface UXd of the exhaust cylindrical portion UX where the second thread SN is not formed, and the second thread UN passes through a region of the inner surface SXc of the intake cylindrical portion SX where the first thread SN is not formed, when inserting the other end UXb of the exhaust cylindrical portion UX from the other end SXb of the intake cylindrical portion SX to the inside of the intake cylindrical portion SX to the previously described insertion position.

[0132] As a result, for example, as shown in FIG. 7, in a state where the second thread UN is located on the air intake inlet portion SH side and the first thread UN is located on the exhaust outlet portion UH side, the first thread SN and the second thread UN will mesh with each other. That is, in a state where the intake casing SC and the exhaust casing UC are screwed together, by positioning the first thread SN between the flange UF and the second thread SN and abutting the first thread SN and the second thread UN.

[0133] In addition, in this embodiment, the first screw thread SN, which is the first fixing mechanism UN, and the second thread UN, which is the second fixing mechanism SN, mesh with each other, so that the first cylindrical portion SX and second cylindrical portion UX are screwed together. However, the first cylindrical portion SX and the second cylindrical portion UX may be fixed by fitting the first fixing mechanism UN and the second fixing mechanism SN. Furthermore, the first cylindrical portion SX and the second cylindrical portion UX may be fixed by fitting the first fixing mechanism UN and the second fixing mechanism SN. In addition, the first cylindrical portion SX and the second cylindrical portion UX may be fixed by fixing the first fixing mechanism UN and the second fixing mechanism SN.

[0134] As a result, in the air-conditioning fan unit 200 according to this embodiment, the wearer can easily attach and detach the air-conditioning fan unit 200 without removing the wiring (cable) or battery (Wiring L and battery B shown in FIG.9 in the example described later) connected to the air-conditioning fan unit 200.

[0135] For example, in the prior art air-conditioning fan unit described above, the ring-shaped portion cannot avoid the cable or battery, or the portion inside the air-conditioning clothing to which the cable is connected needs to be rotated to remove the air-conditioning fan unit from air-conditioning clothing. Therefore, when removing the air-conditioning fan unit from the air-conditioning clothing, the cable must also be removed from the air-conditioning fan unit.

[0136] On the other hand, in the air-conditioning fan unit 200 according to the present embodiment, the wearer can attach and fix the air-conditioning fan unit 200 to the air-conditioning clothing 100 while fixing the exhaust casing UC by hand. Furthermore, if the wind exiting the exhaust outlet portion UH can be given directionality by ribs on the exhaust outlet portion UH side, the wearer can adjust the wind to flow in any direction.

[0137] As mentioned above, the air-conditioning fan unit 200 in this embodiment is arranged so that the intake casing SC protrudes outside the air-conditioning clothing 100, and the thickness of the exhaust casing UC of the air-conditioning fan unit 200 inside the air-conditioning clothing 100 becomes thinner, whereby the exhaust port UH of the air-conditioning fan unit 200 is separated from the wearer's body.

[0138] Thereby, inside the air-conditioning clothing 100, the outlet UH side of the air-conditioning fan unit 200 can be prevented from coming into contact with the body of the wearer, making it difficult to cause discomfort to the wearer. Furthermore, the flow of air output from the outlet of the air-conditioning fan unit is less likely to be obstructed by the wearer's body, making it easier for the airflow to flow into the air-conditioning clothing 100, thereby improving air conditioning efficiency.

[0139] Here, FIG. 8 is a side view showing an example of the air-conditioning fan unit 200 attached as viewed from the side along the rotation center line, focusing on the vicinity of region Q of air-conditioning clothing 100 shown in FIGS. 2A and 2B, in a state that the wearer is

wearing air-conditioning clothing.

[0140] As shown in FIG. 8, as described above, the exhaust port UH of the air conditioning fan unit 200 is provided with the plurality of ribs UR that are for adjusting the direction of the exhaust airflow to a preset setting direction from the direction of the airflow taken in from the intake port SH. Furthermore, as described above, each of the ribs UR has a plate-like shape, for example.

[0141] At least some of the plurality of ribs UR are inclined with respect to the rotation center line M so that the direction of the airflow discharged from the exhaust port UH is adjusted to the setting direction. At least some of the plurality of ribs UR are set to have different inclinations with respect to the rotation center line M.

[0142] In particular, the plurality of ribs UR are set to have different inclinations with respect to the rotation center line M in stages, so that the direction of the airflow taken in from the intake port SH is adjusted to a preset setting direction. In this case, the setting direction is set in a plurality of directions.

[0143] The plurality of setting directions are inclined in a direction DK from the rotation center line M toward the collar part 20 provided on the upper part of the air-conditioning clothing 100. In a state where the air conditioning fan unit 200 is attached to the air-conditioning clothing 100.

[0144] For example, in the example of Figure 8, among the plurality of ribs UR, the ribs UR on the lower side of the air-conditioning clothing 100 are arranged. The direction of the plate-like shape of the rib UR is approximately parallel to the inclination with respect to the rotation center line M. On the other hand, among the plurality of ribs UR, the ribs UR on the collar portion (wearer's neck) side of the upper portion of the air-conditioning clothing 100 are arranged, so that the direction of the plate-like shape (air guide plate) of the rib UR is tilted upward with respect to the rotation center line M.

[0145] In this way, in a state where the air conditioning fan unit 200 is attached to the first and second attachment portions T1 and T2 on the lower side of the air-conditioning clothing 100, the air-conditioning fan unit 200 exhausts the airflow into the air-conditioning clothing 100 from the exhaust port UH in the setting direction toward the collar part 20 provided on the upper part of the air-conditioning clothing 100.

[0146] Therefore, inside the air-conditioning clothing 100, even if the exhaust port of the air conditioning fan unit 200 attached to the air-conditioning clothing 100 is close to the wearer's body, the flow of air output from the exhaust port UH of the air conditioning fan unit 200 is less likely to be obstructed, and a decrease in air conditioning efficiency can be suppressed.

[0147] Furthermore, as mentioned above, A direction display section UZ is provided for the wearer to confirm the direction when attached to the first attachment portion T1 (and/or the second attachment portion T2) of the air-conditioning clothing 100, on the exhaust port UH side of the flange UF of the exhaust casing UC.

[0148] Thereby, when the wearer attaches the air conditioning fan unit 200 to the air-conditioning clothing 100 while checking the direction indicator UZ, the wearer can easily set the airflow exhausted from the exhaust port UH of the air-conditioning fan unit 200 to be directed toward the collar section 20 provided at the upper part of the air-conditioning clothing 100.

[0149] As described above, the present embodiment provides an air conditioning fan unit that can improve air conditioning efficiency by reducing the flow path resistance of airflow for cooling inside air-conditioning clothing when the air conditioning fan unit is attached to air-conditioning clothing, and air-conditioning clothing to which the air-conditioning fan unit is attached.

(Example)

[0150] Here, FIG. 9 is a diagram illustrating an example of the configuration of the clothing body 10 including wiring and a power source connected to the air conditioning fan unit 100 attached to the clothing body 10. It is noted that in FIG. 9, for the sake of simplicity, the structure on the right side of the front portion 10X of the clothing body 10 is omitted, and the structures such as the first and second air-conditioning hole lids F1 and F2 are omitted.

[Power supply]

[0151] Here, for example, as shown in FIG. 9, one power supply B is provided in common to the two air-conditioning fan units 200. This power source B is connected to each air-conditioning fan unit 200 via wiring L, respectively. It is noted that this power source B is, for example, a portable battery placed in the air-conditioning clothing 100, and is configured to supply the power necessary for driving the air-conditioning fan unit 200.

[0152] In the example of FIG. 9, the branched wiring L connects the power supply B and each air-conditioning fan unit 200, respectively. However, one linear wiring L may connect the power source B and each air-conditioning fan unit 200, respectively.

[0153] Although not shown, a plurality of (for example, two) power supplies B may be provided corresponding to each air-conditioning fan unit 200. In this case, the two power supplies B are connected to the two air-conditioning fan units 200 via the wiring L, respectively.

[Storage portion for power supply]

[0154] Furthermore, a power supply storage portion P2 is provided at the front portion 10X of the clothing body 10, and is configured to house the power supply B. For example, as shown in FIG. 9, this power supply storage portion P2 is a hem pocket provided on the front left side of the clothing body 10.

[0155] For example, as shown in FIG.9, in this power storage portion P2, a wiring hole P2H for passing the wiring L between the inside and outside of the power

storage portion P2 is formed near the center of the power storage portion P2.

[0156] In addition, in the example of FIG. 9 already mentioned, the power supply B is stored in the power supply storage portion P2 provided on the left side of the front portion 10X of the clothing body 10. However, the power source B may be stored in the storage portion P1 provided on the right side of the front portion 10X of the clothing body 10.

[0157] It is noted that the other configurations of the air-conditioning clothing and air-conditioning fan unit according to this example are the same as those of the previously described embodiments.

[0158] That is, according to the air conditioning fan unit of this embodiment, it is possible to reduce the flow path resistance of the airflow for cooling inside the air-conditioning clothing and improve the air conditioning efficiency, when the air conditioning fan unit is attached to air-conditioning clothing.

[0159] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the methods and systems described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

[Explanation of symbols]

[0160]

100	air-conditioning clothing
10	clothing body
20	collar portion
200	air-conditioning fan unit

Claims

1. An air-conditioning fan unit that is attached to and applied to an air-conditioning clothing in order to air-condition an inner space existing between a wearer and the air-conditioning clothing when worn by the wearer, comprising:

an air-conditioning fan unit that has an air intake inlet portion for taking in outside air from outside the air-conditioning clothing, and has an exhaust outlet portion for exhausting airflow into an inside of the air-conditioning clothing;
a first cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion;
a second cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion; and
a fan unit that is housed in a space surrounded by the first cylindrical portion and the second cylindrical portion, the fan unit having a plurality of fins provided to generate airflow from the air intake inlet portion toward the exhaust outlet portion by rotating around a rotation center line,
wherein the exhaust outlet portion is provided with a plurality of ribs for adjusting the direction of the exhaust airflow to a preset setting direction from the direction of the airflow taken in from the air intake inlet portion.

2. The air conditioning fan unit according to claim 1, wherein each of the plurality of ribs has a plate-like shape.

3. The air conditioning fan unit according to claim 2, wherein at least some of the plurality of ribs are inclined with respect to the rotation center line so that the direction of airflow discharged from the exhaust port is adjusted to the setting direction.

4. The air conditioning fan unit according to claim 2, wherein at least some of the plurality of ribs are set to have different inclinations with respect to the rotation center line.

5. The air conditioning fan unit according to claim 4, wherein the plurality of ribs are set differently in stages so that the inclination with respect to the rotation center line is adjusted to a preset setting direction from the direction of the airflow taken in from the air intake inlet portion.

6. The air conditioning fan unit according to claim 5, wherein the setting direction is inclined in a direction from the rotation center line toward a collar provided at a top of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to the air-conditioning clothing.

7. The air conditioning fan unit according to claim 4, wherein the setting direction is set in a plurality of directions.

8. The air conditioning fan unit according to claim 6, wherein the air conditioning fan unit exhausts airflow from the exhaust outlet portion into the interior of the air-conditioning clothing in the setting direction toward the collar provided on the upper part of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to an attachment portion located on the lower side of the air-conditioning clothing.

9. The air-conditioning fan unit according to claim 8,

wherein the first cylindrical portion has a first fixing mechanism provided on a side surface of the first cylindrical portion,
wherein the second cylindrical portion includes: a flange provided to surround a side surface of the second cylindrical portion; and a second fixing mechanism provided on a side surface of the second cylindrical portion between the flange and the other end of the second cylindrical portion, and
wherein, in a state where the other end of the second cylindrical portion is inserted from the other end of the first cylindrical portion into the inside of the first cylindrical portion to a preset insertion position, the first fixing mechanism and the second fixing mechanism is fixed, whereby the first cylindrical portion and the second cylindrical portion are fixed, and the air-conditioning fan unit is attached to the attachment portion of the air-conditioning clothing by sandwiching the attachment portion of the air-conditioning clothing between the other end of the first cylindrical portion and the flange of the second cylindrical portion.

10. The air-conditioning fan unit according to claim 9, wherein the flange of the exhaust casing is provided with a direction indicator for the wearer to confirm the direction when attached to the attaching portion of the air-conditioning clothing.

11. The air-conditioning fan unit according to claim 9,

wherein the first fixing mechanism is provided on the inner surface of the first cylindrical portion,
wherein the flange is provided so as to surround the outer surface of the second cylindrical portion, and
wherein the second fixing mechanism is provided on the outer surface of the second cylindrical portion so as to be located between the flange and the other end of the second cylindrical portion.

12. The air-conditioning fan unit according to claim 11,

wherein the one end of the first cylindrical portion is connected to the air intake inlet portion, and the other end of the first cylindrical portion is open, and
wherein the one end of the second cylindrical portion is connected to the exhaust outlet portion, and the other end of the second cylindrical portion is open.

13. The air-conditioning fan unit according to claim 12, further comprising;

an intake casing that includes the air intake inlet portion and the first cylindrical portion as an intake cylindrical portion and is attached to the outside of the air-conditioning clothing; and
an exhaust casing that includes the exhaust outlet portion and the second cylindrical portion as an exhaust cylindrical portion and is attached to the inside of the air-conditioning clothing.

14. The air-conditioning fan unit according to claim 13, wherein, the first fixing mechanism and the second fixing mechanism are fixed by rotating the intake casing relative to the exhaust casing, whereby the intake casing and the exhaust casing are fixed, and the fan unit is housed in a space surrounded by the intake casing and the exhaust casing.

15. The air-conditioning fan unit according to claim 14,

wherein the first fixing mechanism is a first screw thread provided on the inner surface of the intake cylindrical portion, and
wherein the second fixing mechanism is a second screw thread provided on the outer surface of the exhaust cylindrical portion so as to be located between the flange and the other end of the exhaust cylindrical portion.

16. The air-conditioning fan unit according to claim 15, wherein, in a state where the intake casing and the exhaust casing are fixed, the intake cylindrical portion and the exhaust cylindrical portion are arranged to extend around the rotation center line.

17. The air-conditioning fan unit according to claim 15, wherein, in a state where the intake casing and the exhaust casing are fixed, the air-conditioning fan unit is attached to the attachment portion of the air-conditioning clothing, by sandwiching the attachment portion of the air-conditioning clothing between the other end of the intake cylindrical portion of the intake casing and the flange of the exhaust cylindrical portion of the exhaust casing.

18. An air-conditioning clothing for air-conditioning an inner space that exists between a wearer and the air-conditioning clothing is worn by the wearer, comprising:

a clothing body that can be worn by the wearer;
an attaching portion provided on the clothing body and capable of attaching and detaching the air-conditioning fan unit; and
an air-conditioning fan unit having an air intake inlet portion for taking in outside air from the out-

side of the air-conditioning clothing and an exhaust outlet portion for exhausting airflow into the inside of the air-conditioning clothing,
wherein the air-conditioning fan unit comprises:

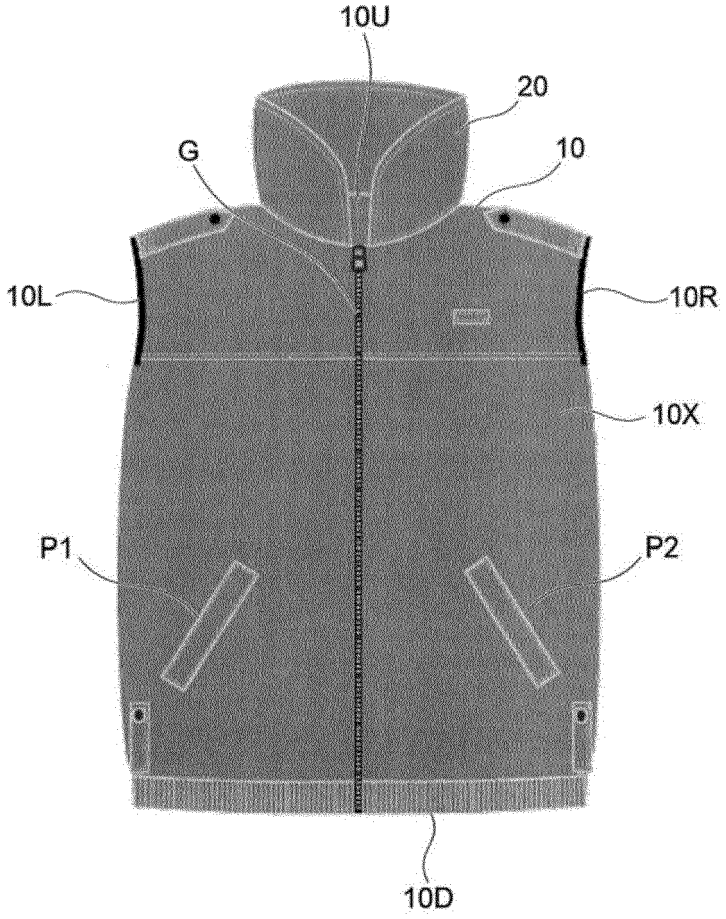
an air-conditioning fan unit that has an air intake inlet portion for taking in outside air from outside the air-conditioning clothing, and has an exhaust outlet portion for exhausting airflow into an inside of the air-conditioning clothing;
a first cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion;
a second cylindrical portion that has one end and the other end located between the air intake inlet portion and the exhaust outlet portion; and
a fan unit that is housed in a space surrounded by the first cylindrical portion and the second cylindrical portion, the fan unit having a plurality of fins provided to generate airflow from the air intake inlet portion toward the exhaust outlet portion by rotating around a rotation center line,
wherein the exhaust outlet portion is provided with a plurality of ribs for adjusting the direction of the exhaust airflow to a preset setting direction from the direction of the airflow taken in from the air intake inlet portion.

19. The air-conditioning clothing according to claim 18, wherein the setting direction is inclined in a direction from the rotation center line toward a collar provided at a top of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to the air-conditioning clothing.

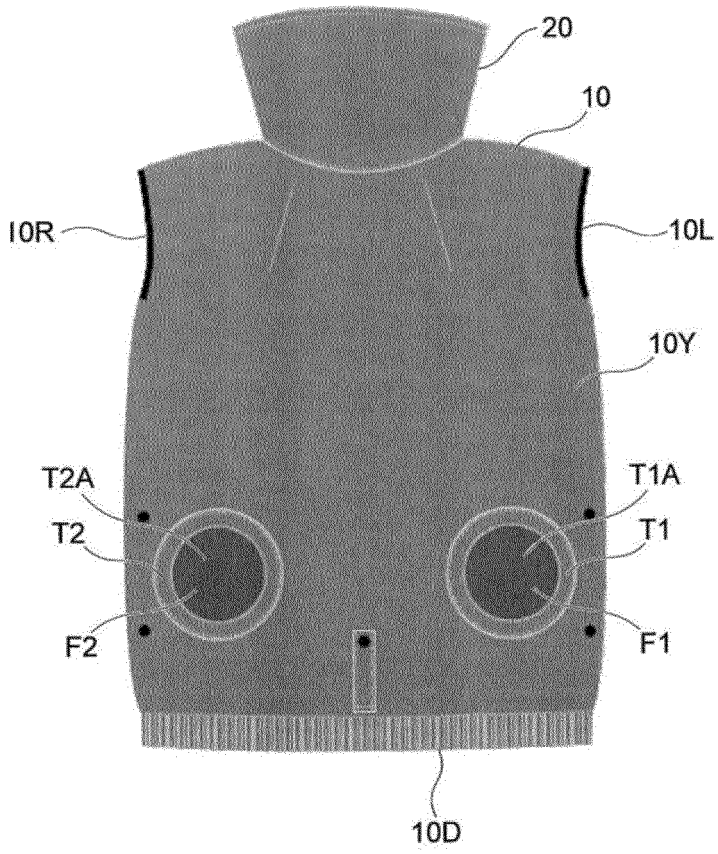
20. The air-conditioning clothing according to claim 19, wherein the setting direction is set in a plurality of directions.

21. The air-conditioning clothing according to claim 19, wherein the air conditioning fan unit exhausts airflow from the exhaust outlet portion into the interior of the air-conditioning clothing in the setting direction toward the collar provided on the upper part of the air-conditioning clothing, in a state where the air conditioning fan unit is attached to an attachment portion located on the lower side of the air-conditioning clothing.

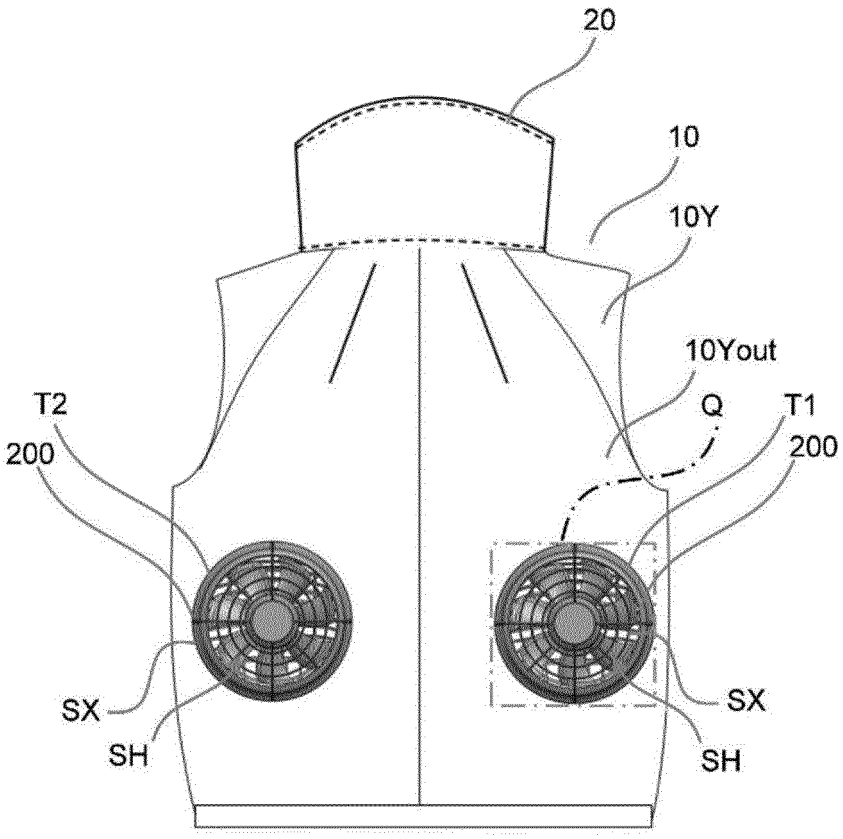
[FIG. 1 A]



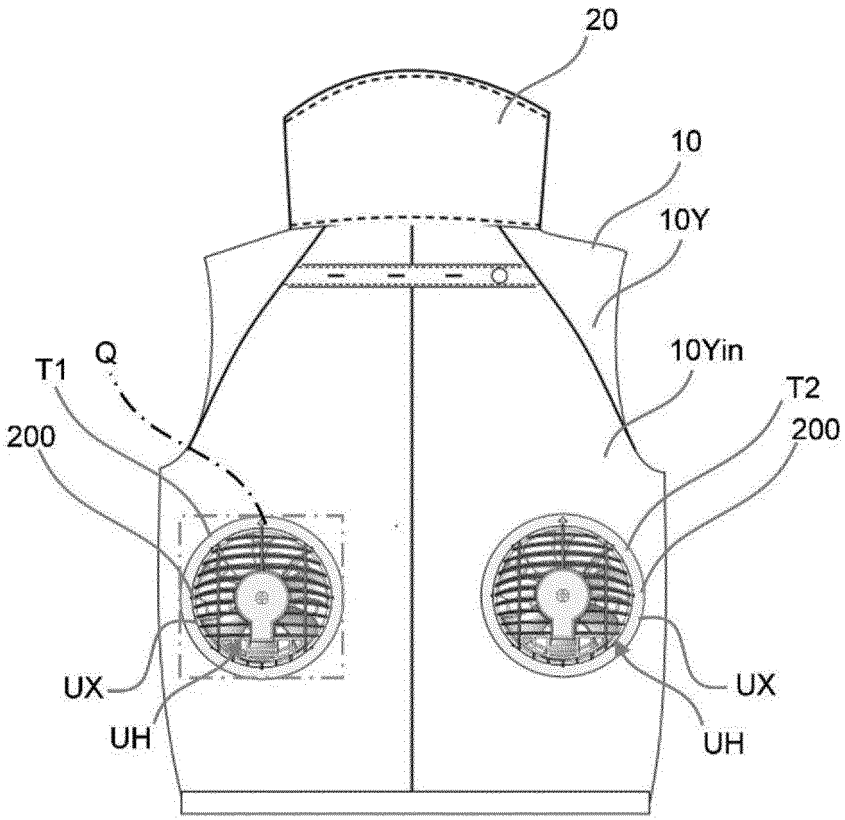
[FIG. 1 B]



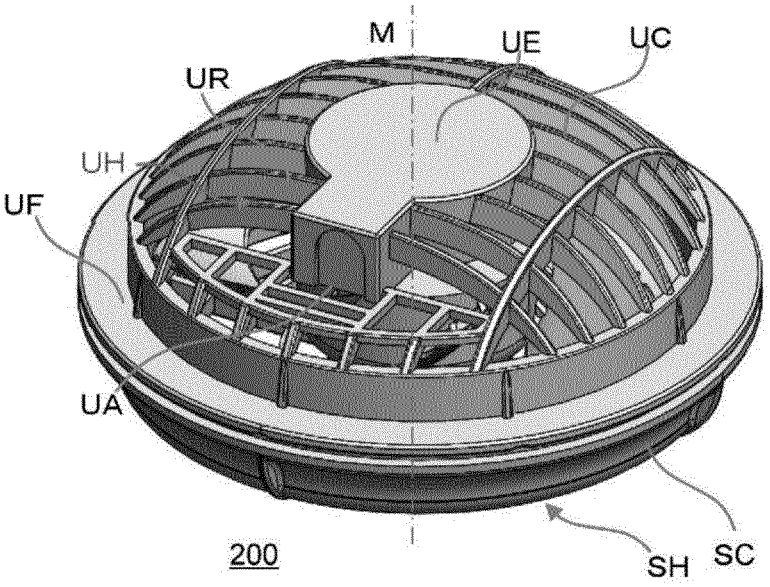
[FIG. 2 A]



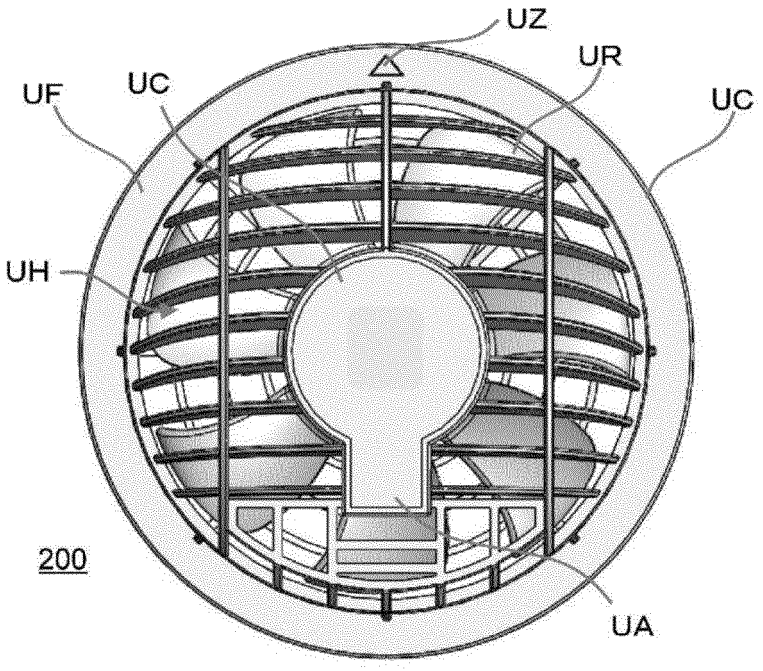
[FIG. 2 B]



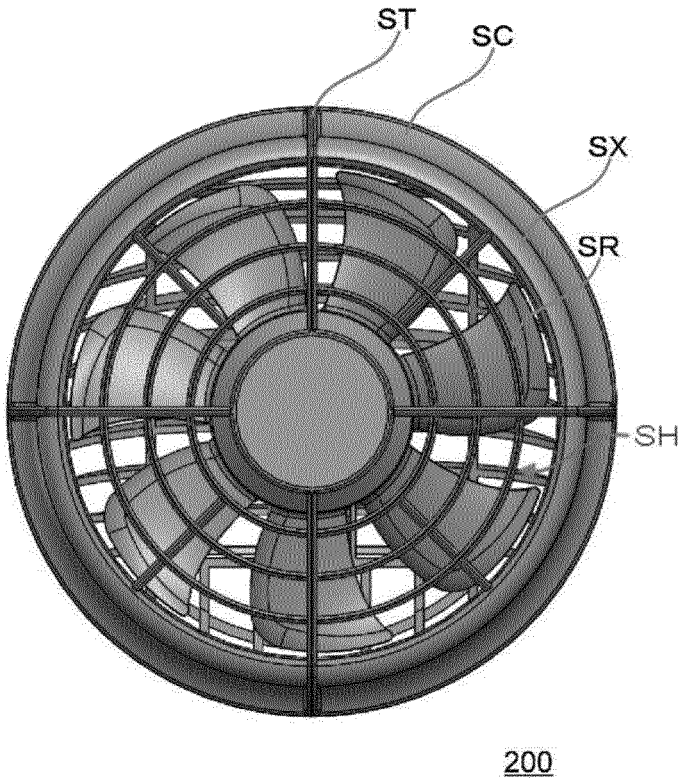
[FIG. 3A]



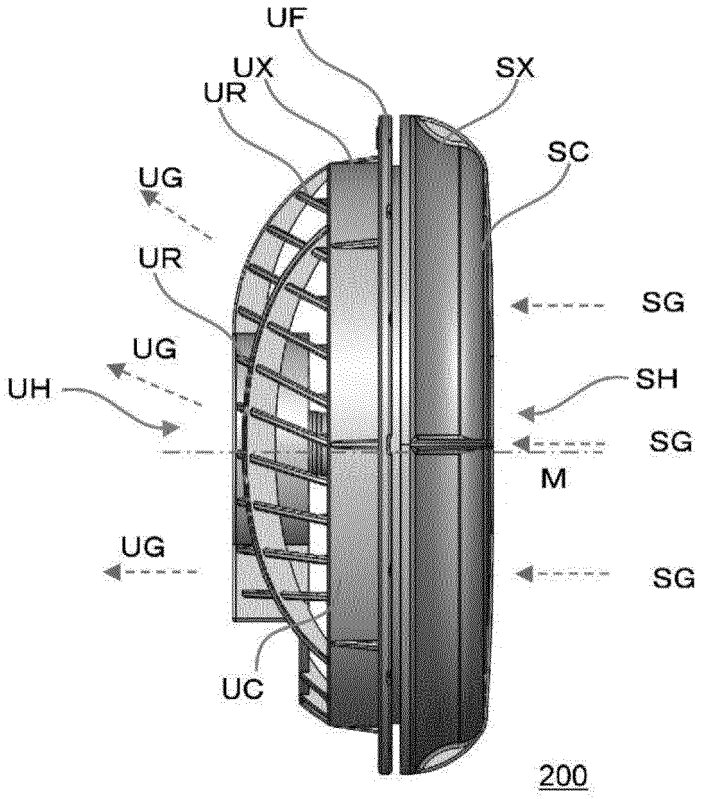
[FIG. 3 B]



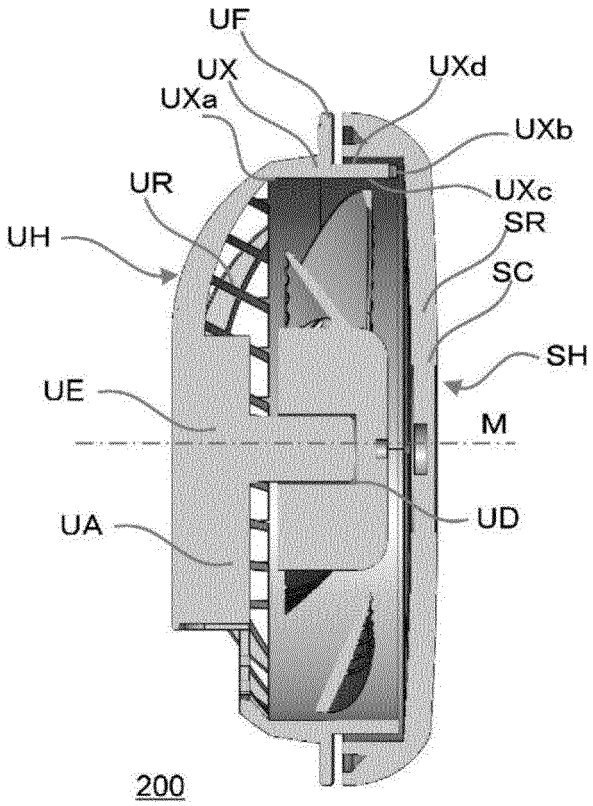
[FIG. 3C]



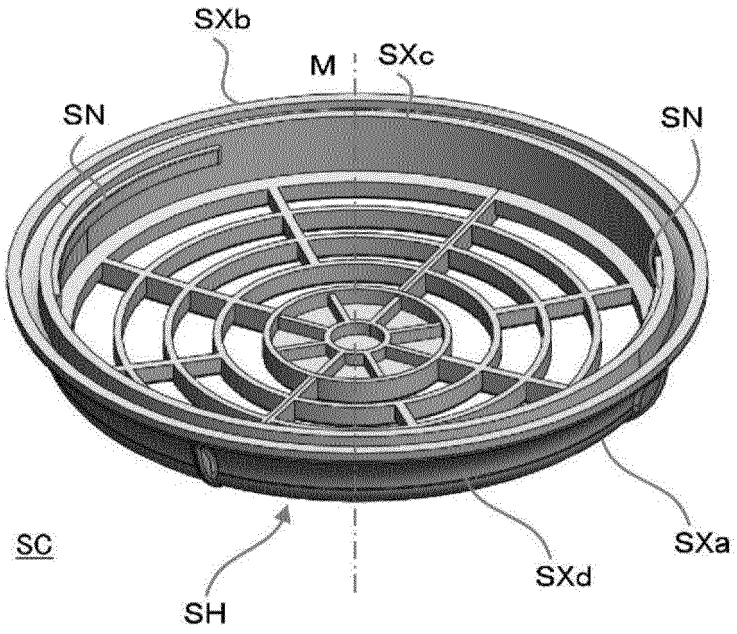
[FIG. 3D]



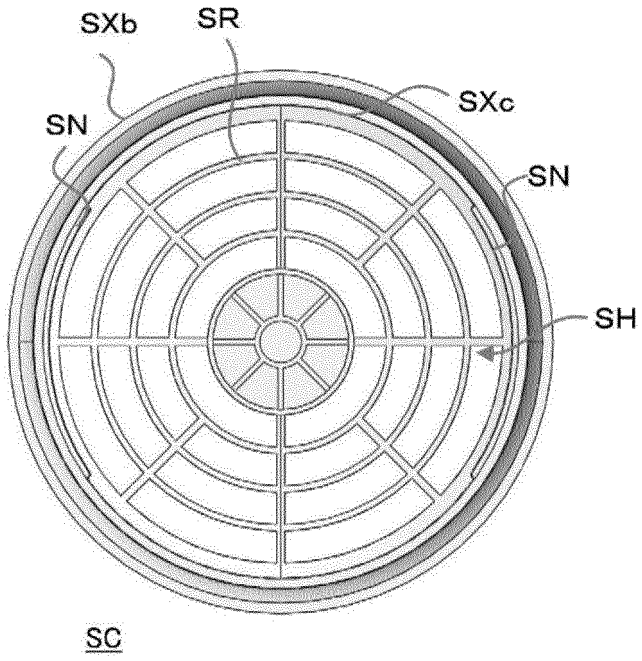
[FIG. 3 E]



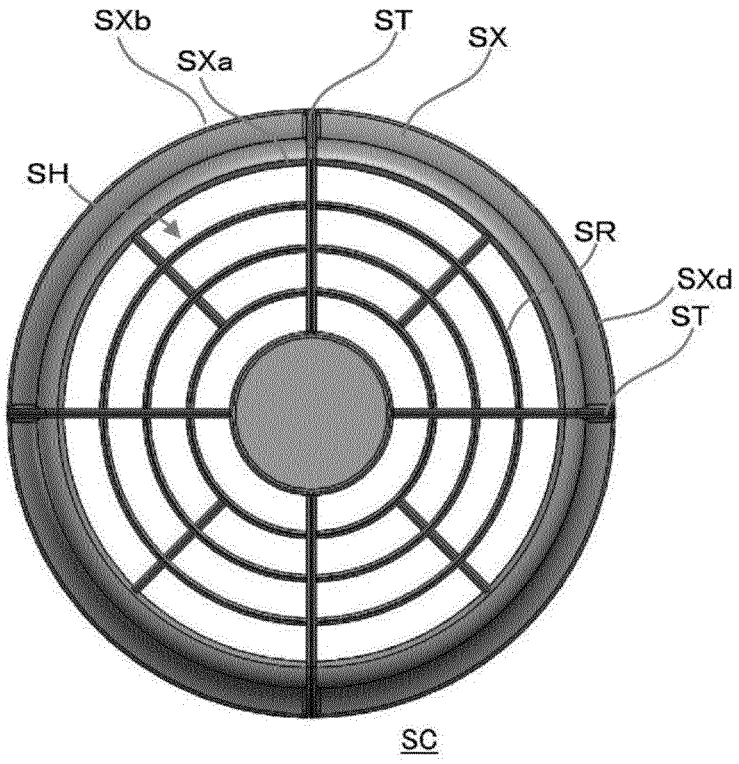
[FIG. 4 A]



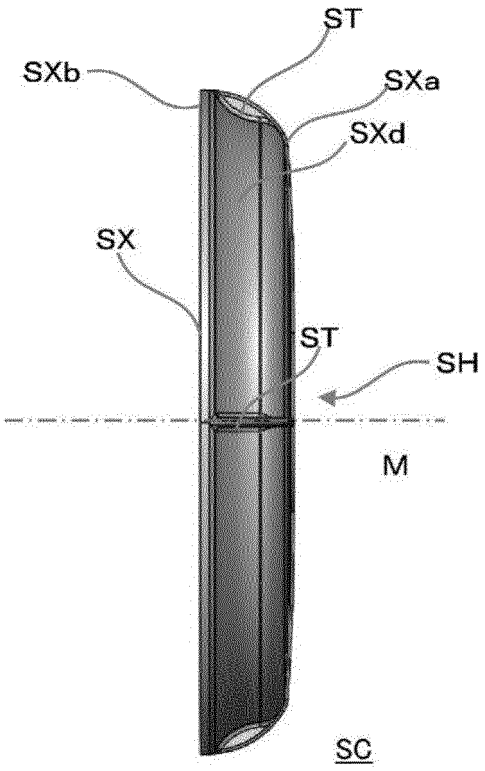
[FIG. 4 B]



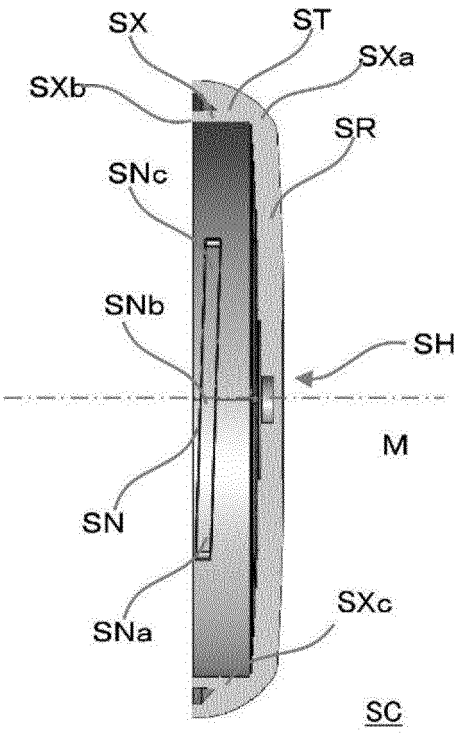
[FIG. 4 C]



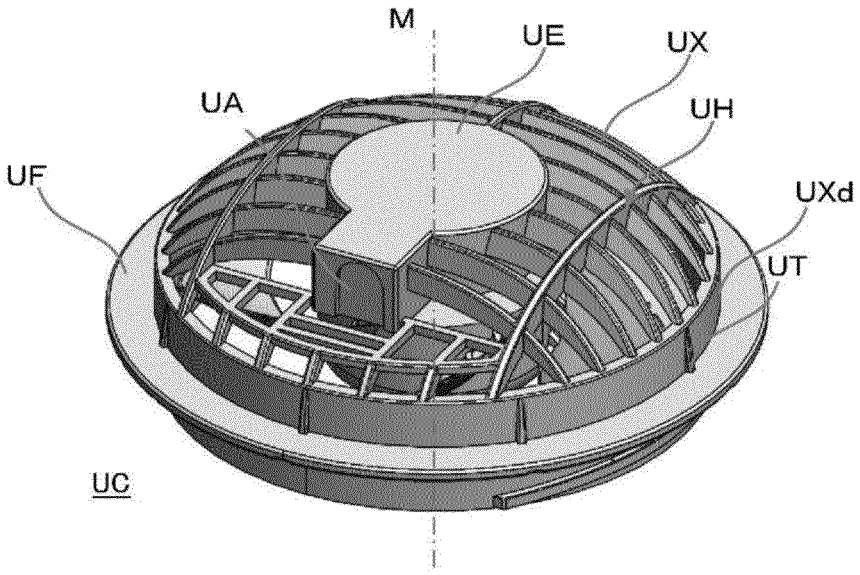
[FIG. 4 D]



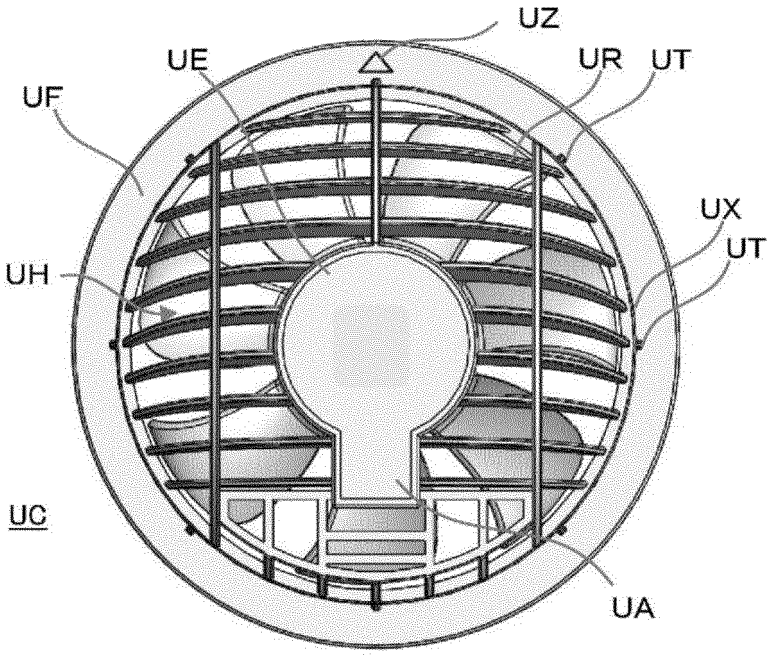
[FIG. 4 E]



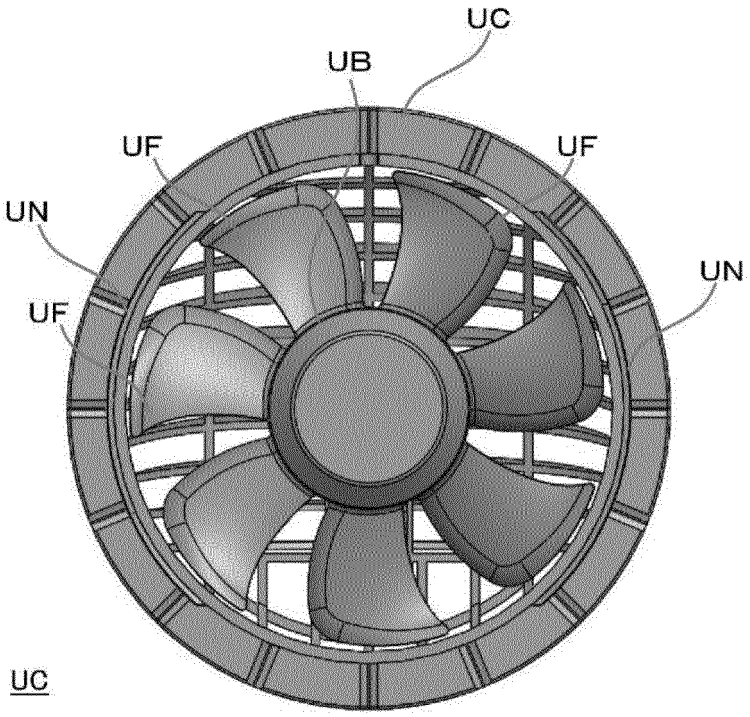
[FIG. 5 A]



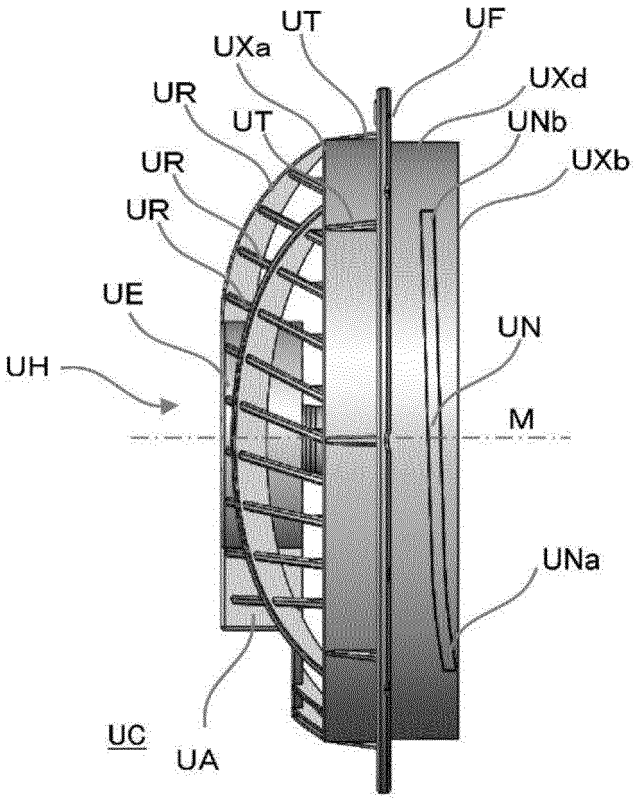
[FIG. 5 B]



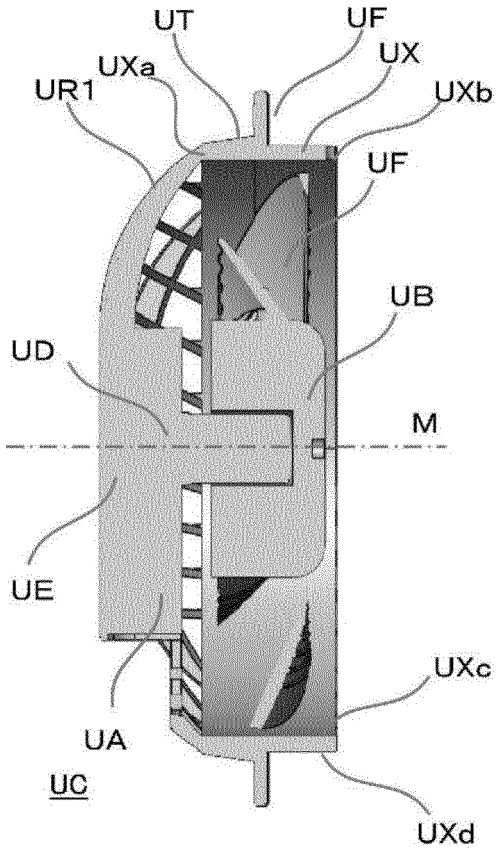
[FIG. 5C]



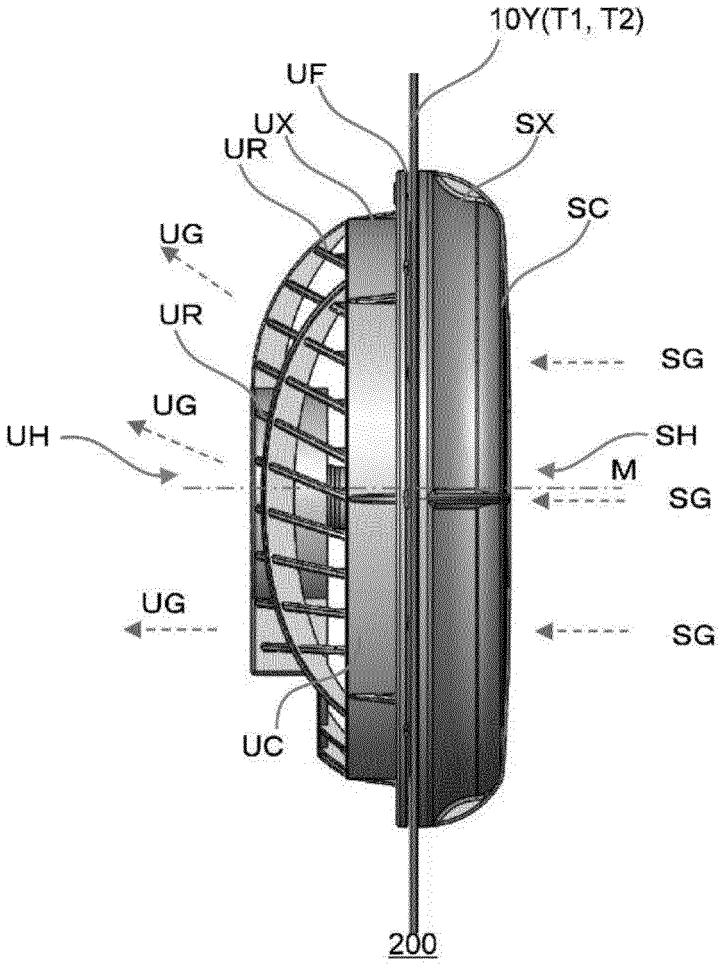
[FIG. 5 D]



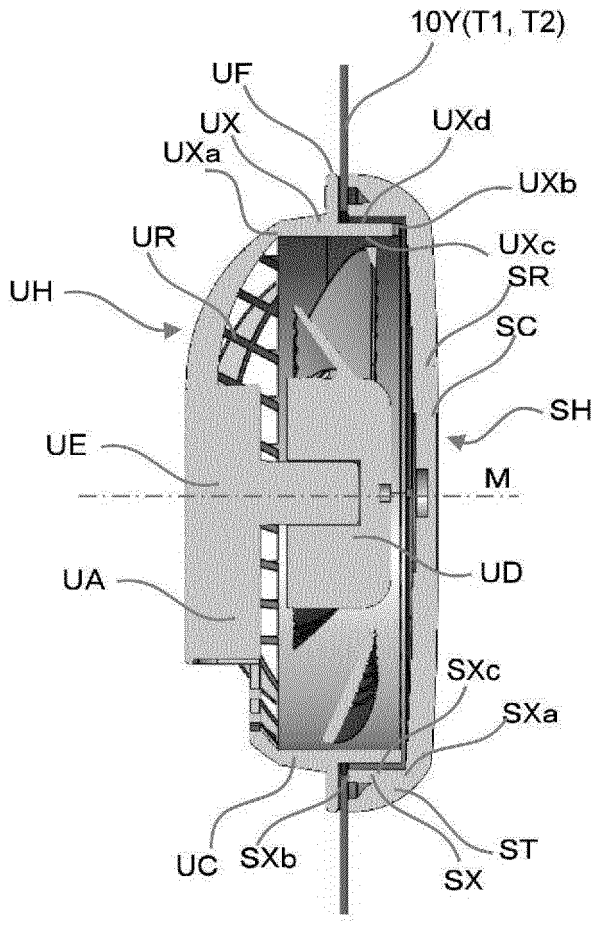
[FIG. 5 E]



[FIG. 6 A]



[FIG. 6 B]


10Y(T1, T2)
UF
UX
UXa
UXd
UXb
UR
UXc
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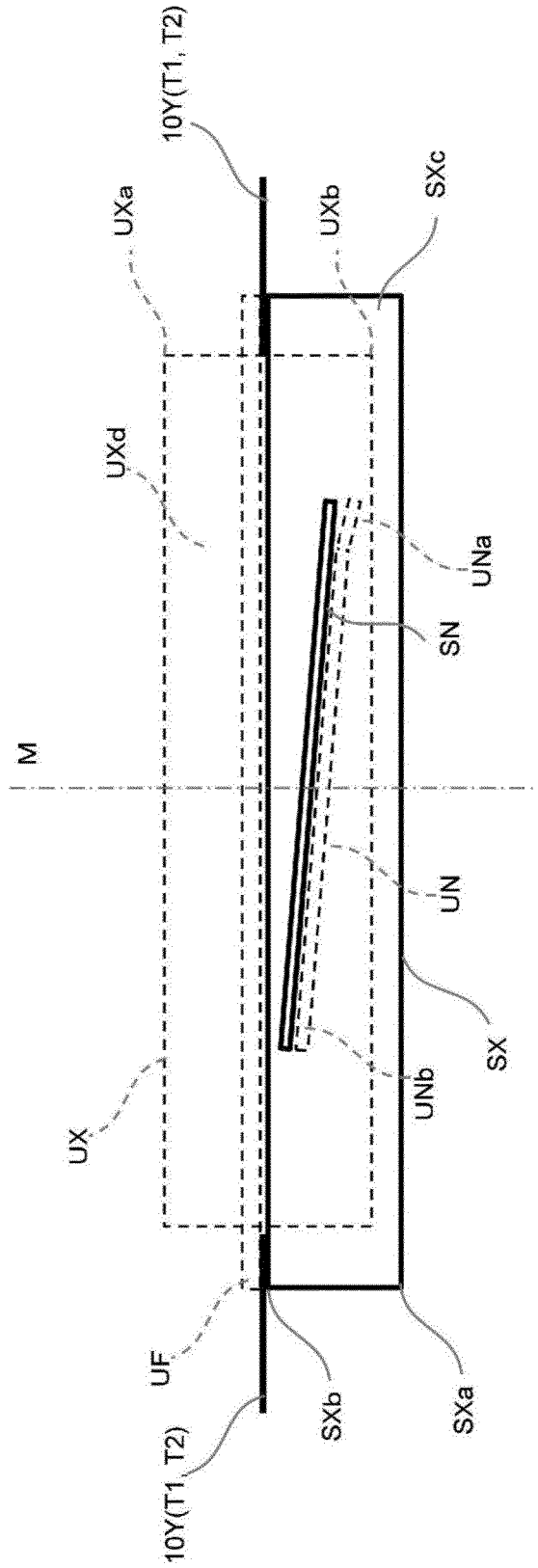
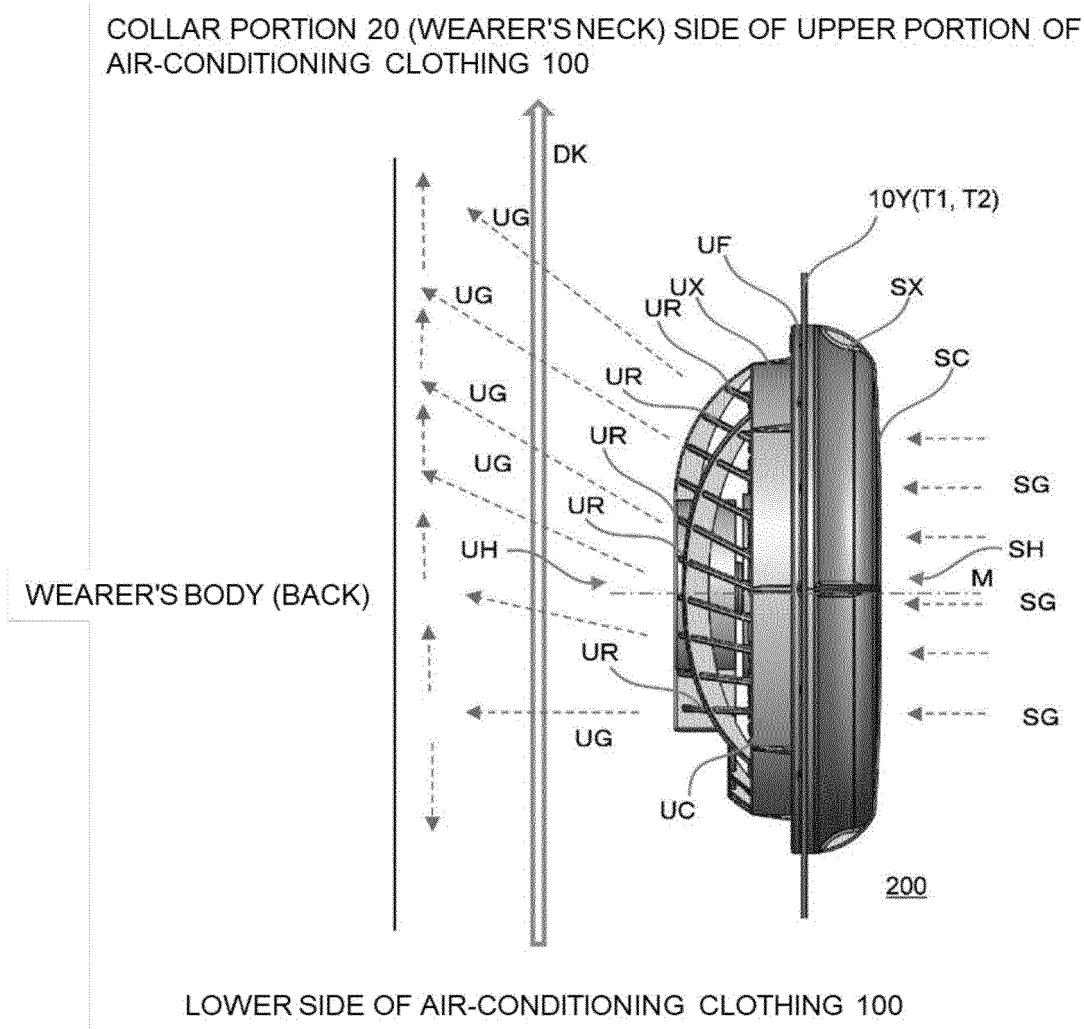
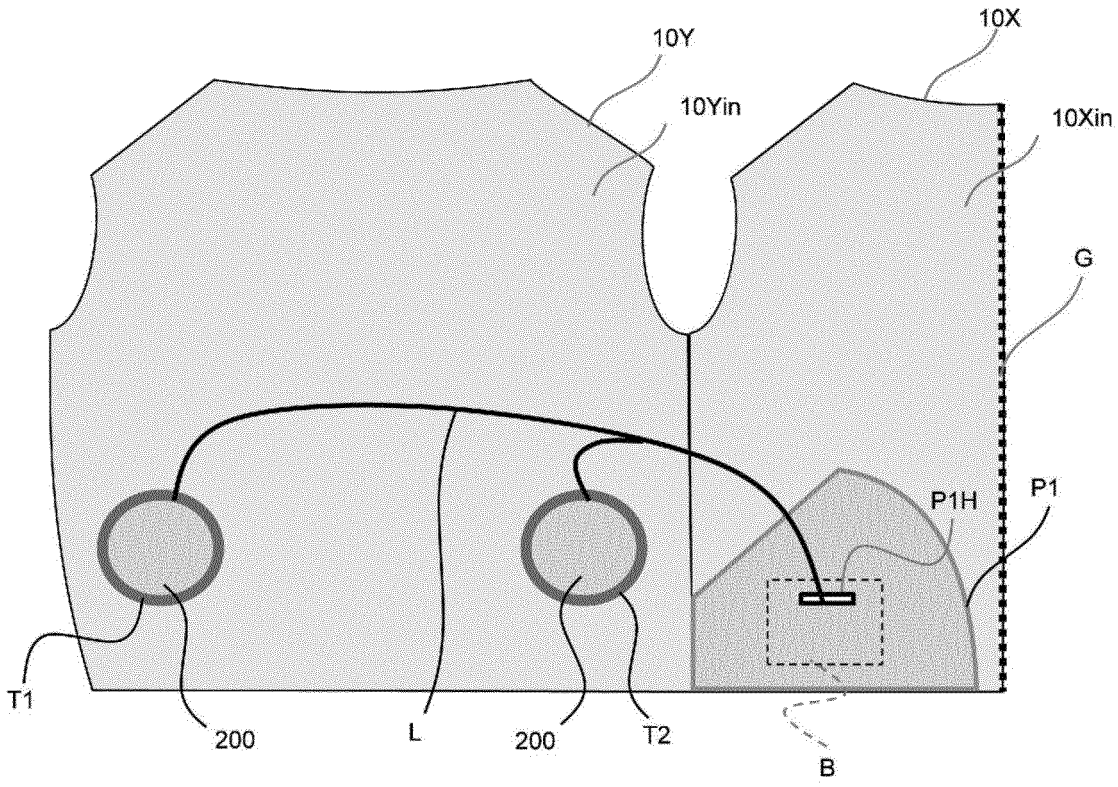
[FIG. 7]



[FIG. 8]


COLLAR PORTION 20 (WEARER'S NECK) SIDE OF UPPER PORTION OF AIR-CONDITIONING CLOTHING 100
DK
10Y(T1, T2)
UG
UF
UX
UR
SX
SC
SG
SH
M
UH
UC
200
WEARER'S BODY (BACK)
LOWER SIDE OF AIR-CONDITIONING CLOTHING 100

[FIG. 9]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2023/037401

A. CLASSIFICATION OF SUBJECT MATTER

A41D 13/002(2006.01)i; ***F04D 29/54***(2006.01)i; ***F04D 25/08***(2006.01)i
FI: A41D13/002 105; F04D25/08 301Z; F04D29/54 D

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)

A41D13/002; F04D25/08; F04D29/54

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

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2023
Registered utility model specifications of Japan 1996-2023
Published registered utility model applications of Japan 1994-2023

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2186471 B1 (BSG CO., LTD.) 03 December 2020 (2020-12-03) paragraphs [0026]-[0052], fig. 1, 4-8	1-2, 18
A		3-17, 19-21
A	JP 2022-76529 A (TOYOTA JIDOSHA KABUSHIKI KAISHA) 20 May 2022 (2022-05-20) entire text, all drawings	1-21
A	JP 2020-33671 A (SANESU KK) 05 March 2020 (2020-03-05) entire text, all drawings	1-21
A	CN 103994103 A (FOSHAN SHUNDE JILING ELECTRIC APPLIANCE CO., LTD.) 20 August 2014 (2014-08-20) entire text, all drawings	3-4, 19

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 November 2023	**14 November 2023**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2023/037401

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
KR 10-2186471 B1	03 December 2020	(Family: none)	
JP 2022-76529 A	20 May 2022	US 2022/0142278 A1 CN 114451601 A	
JP 2020-33671 A	05 March 2020	(Family: none)	
CN 103994103 A	20 August 2014	(Family: none)	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 6473558 B **[0008]**