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Publication Classification(51) **Int. Cl.***F24F 13/14* (2006.01)*F24F 13/15* (2006.01)(57) **ABSTRACT**

A register has a narrow and long air outlet that is long in the longitudinal direction and short in the short-side direction, includes, but is not limited to a front movable louver that changes the wind direction in the short-side direction arranged inside the air outlet, and includes a rear movable louver that changes the wind direction in the longitudinal direction arranged upstream from the front movable louver. A back movable louver is arranged upstream from the rear movable louver in order to change the wind direction in the short-side direction. The back movable louver changes the wind direction by turning in a direction opposite to a direction in which the front movable louver is turned in the short-side direction.

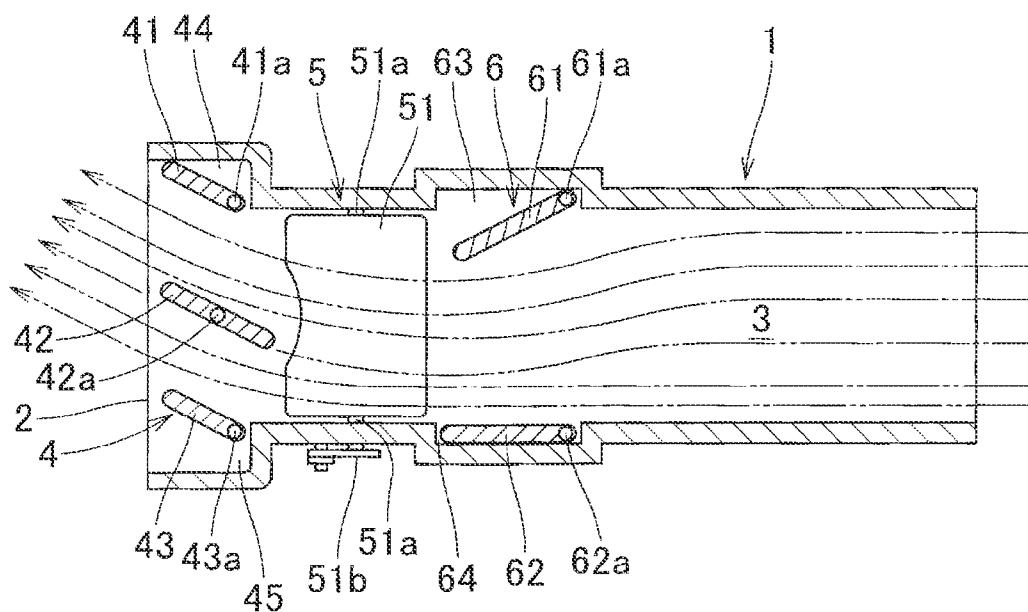


Fig. 1

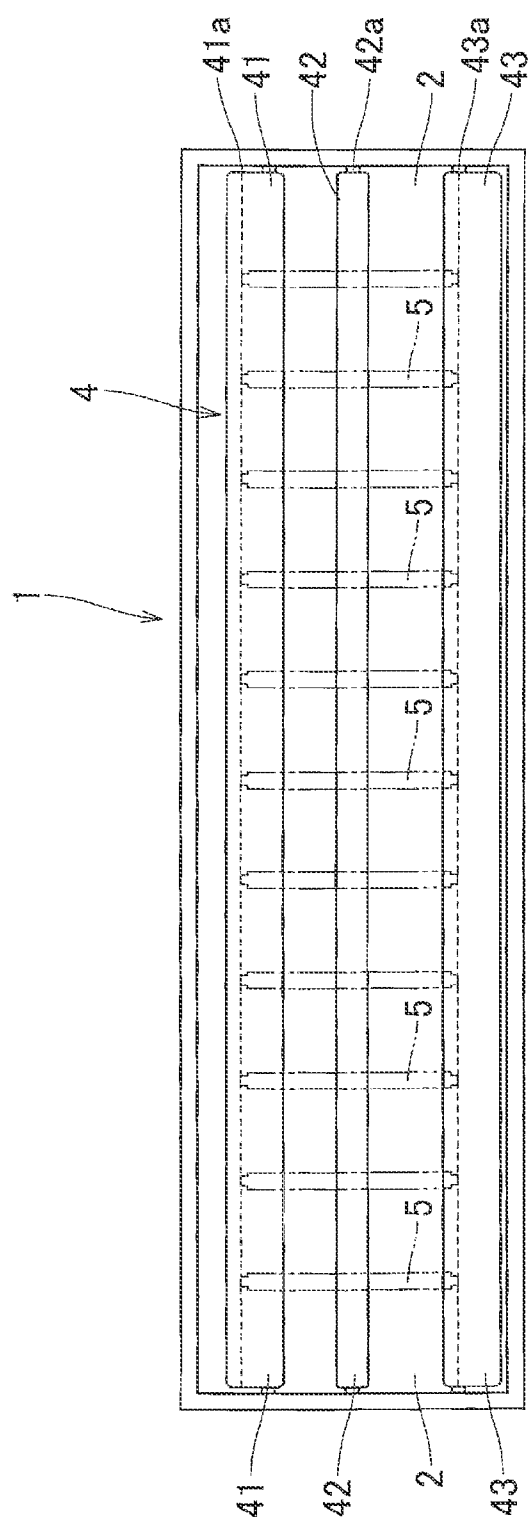


Fig. 2

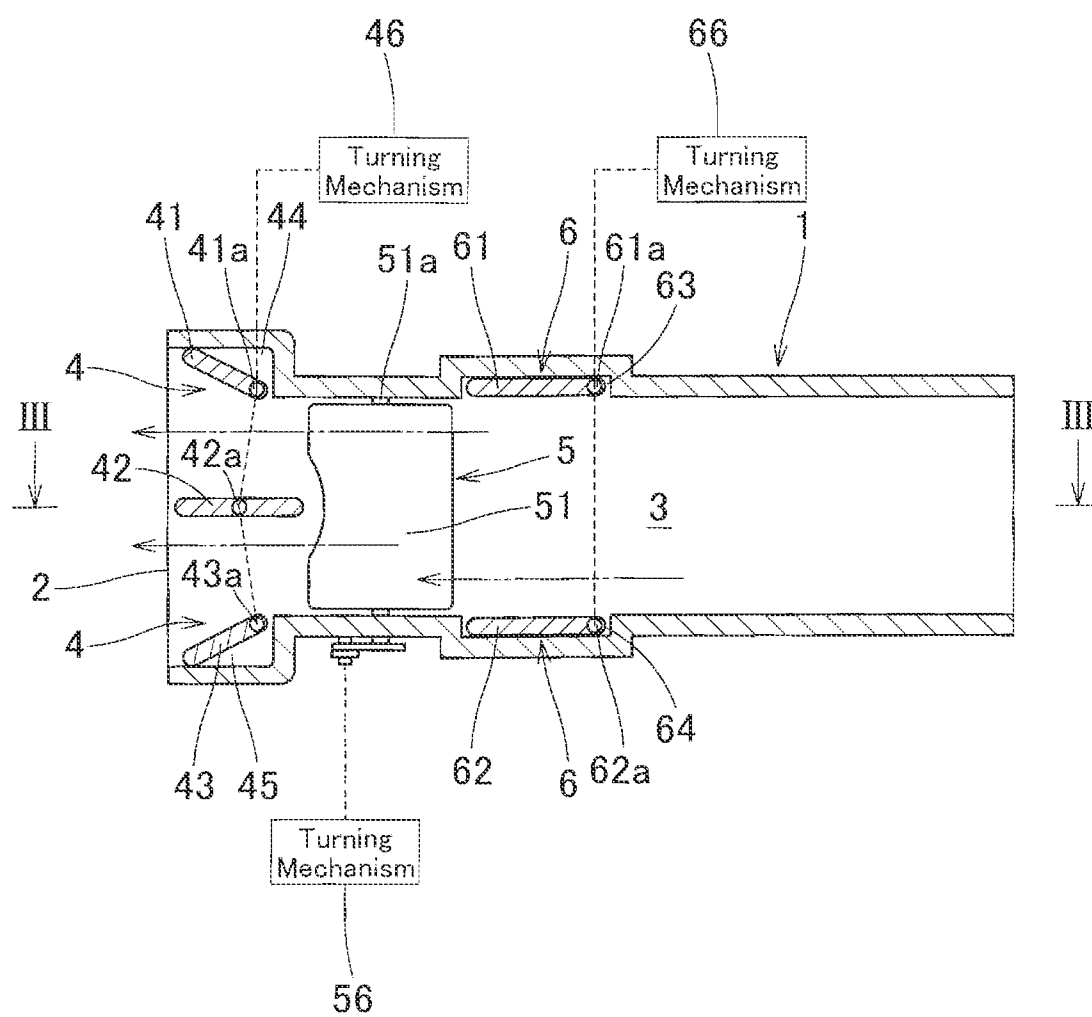
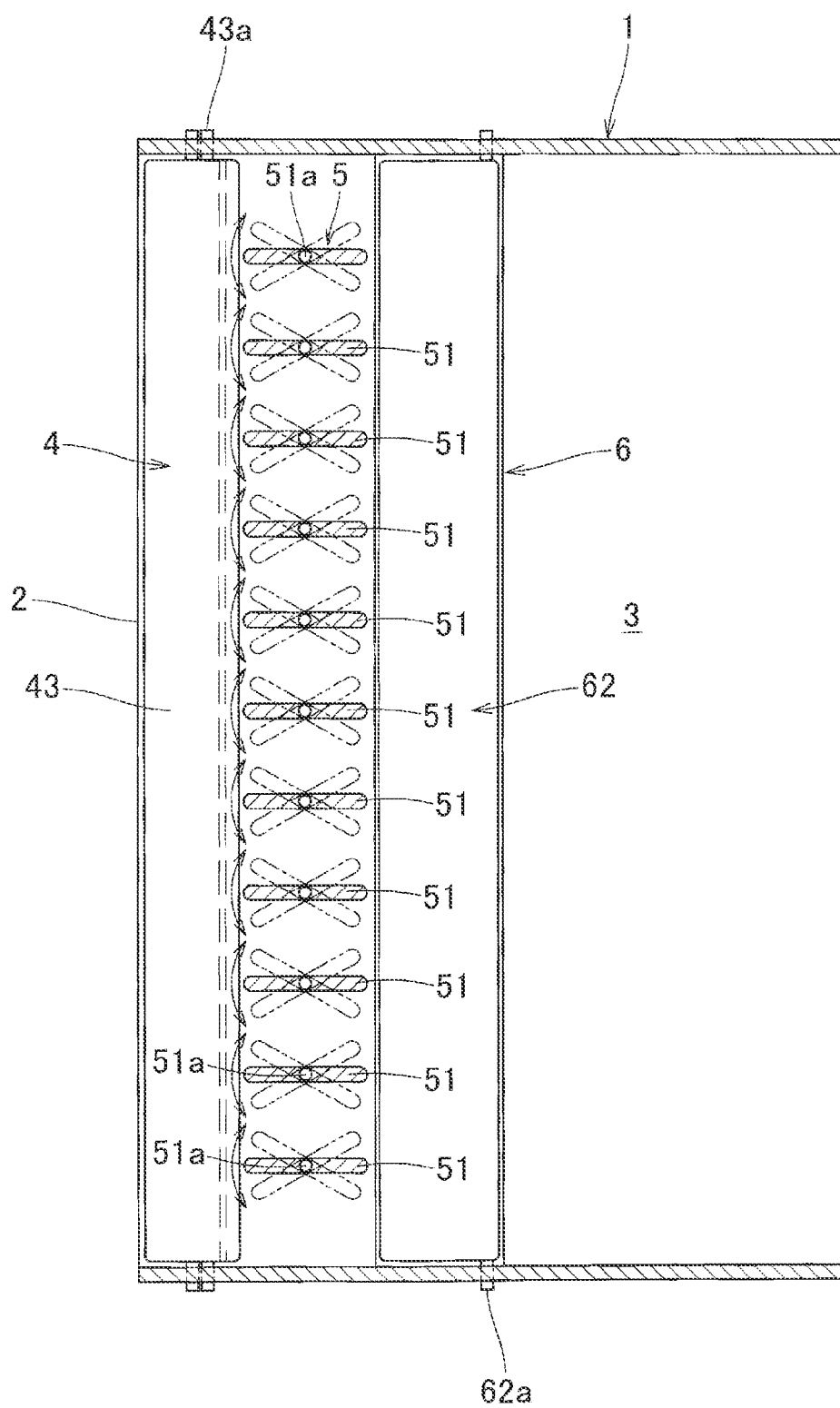


Fig. 3



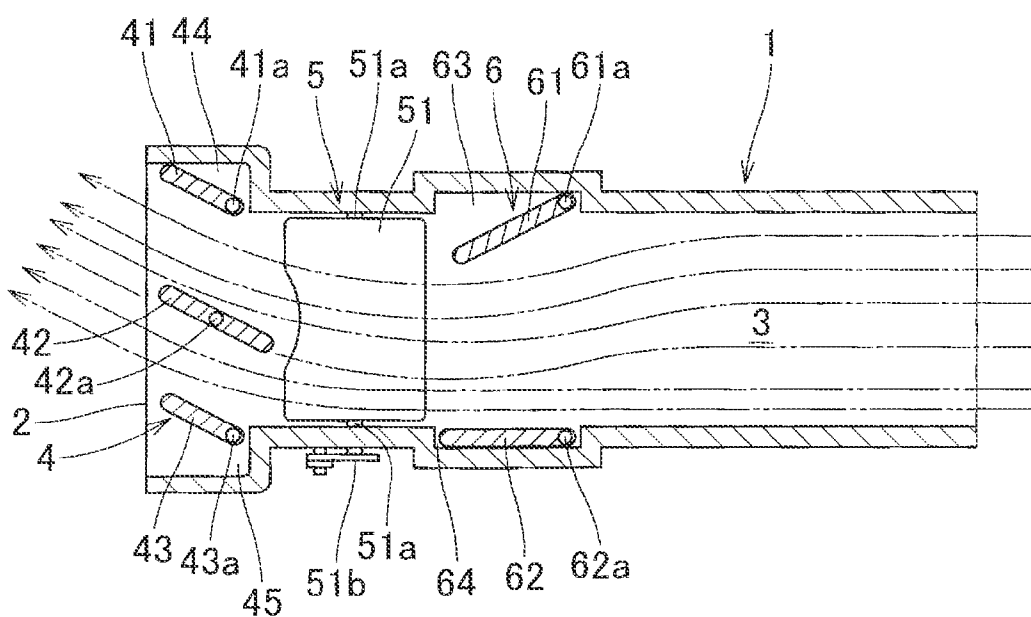


Fig. 6

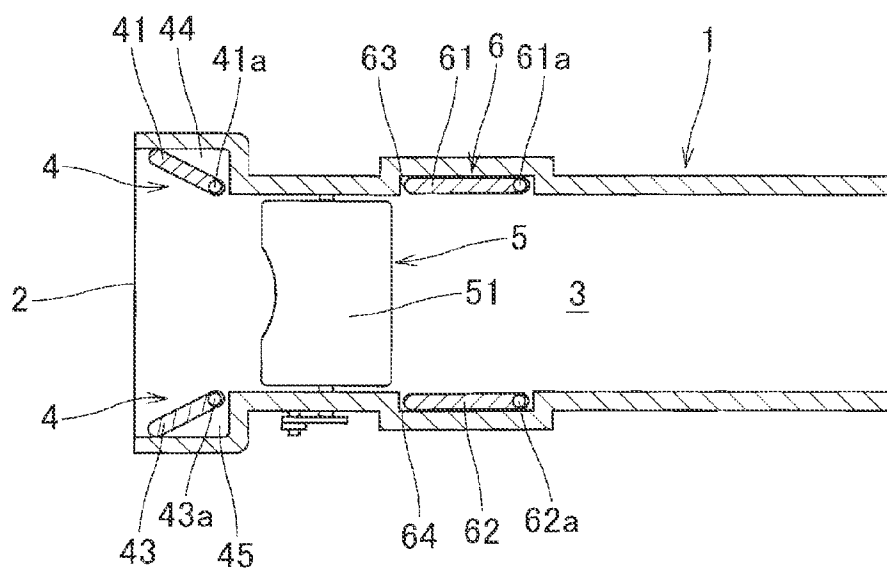
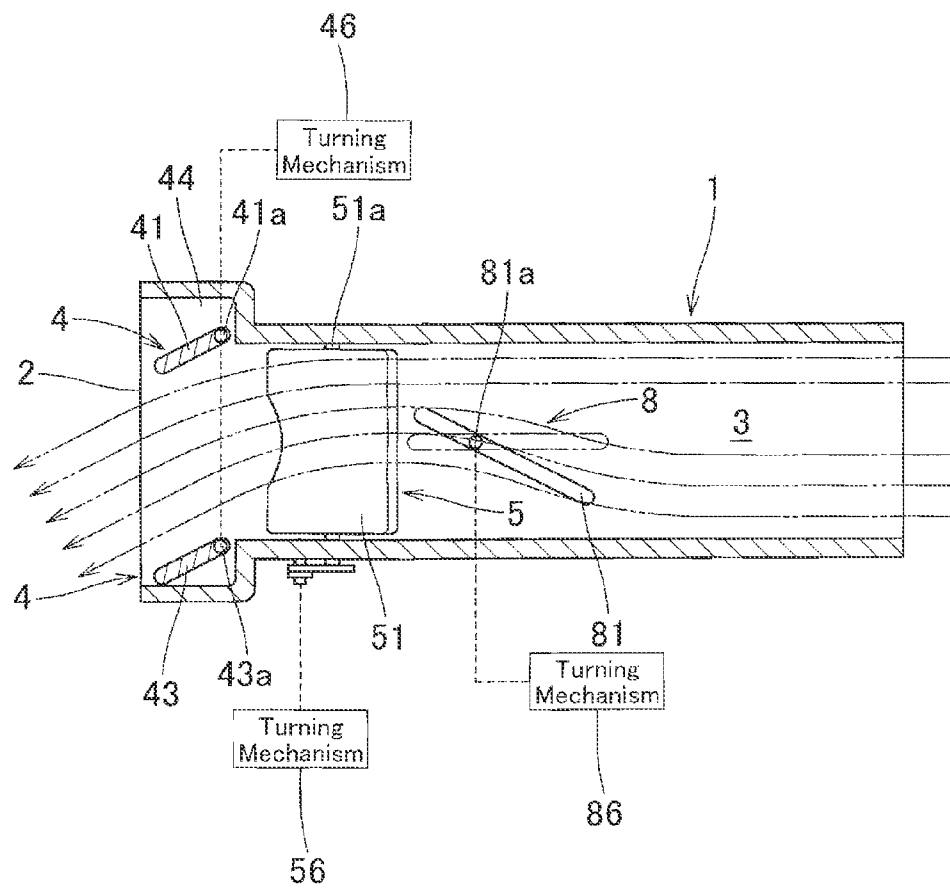


Fig. 7



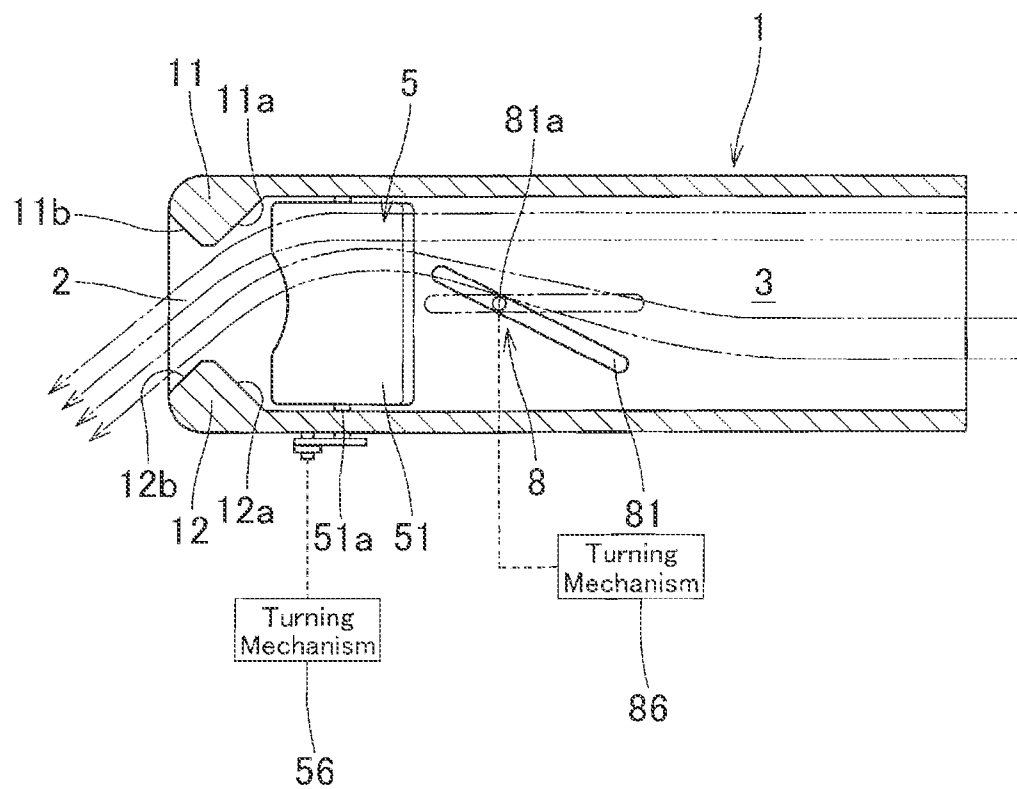


Fig. 10

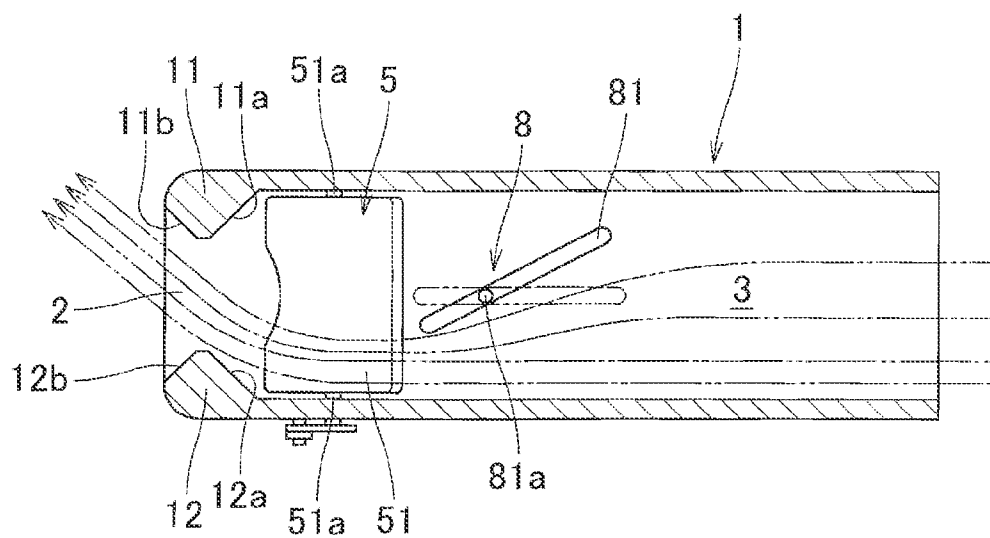
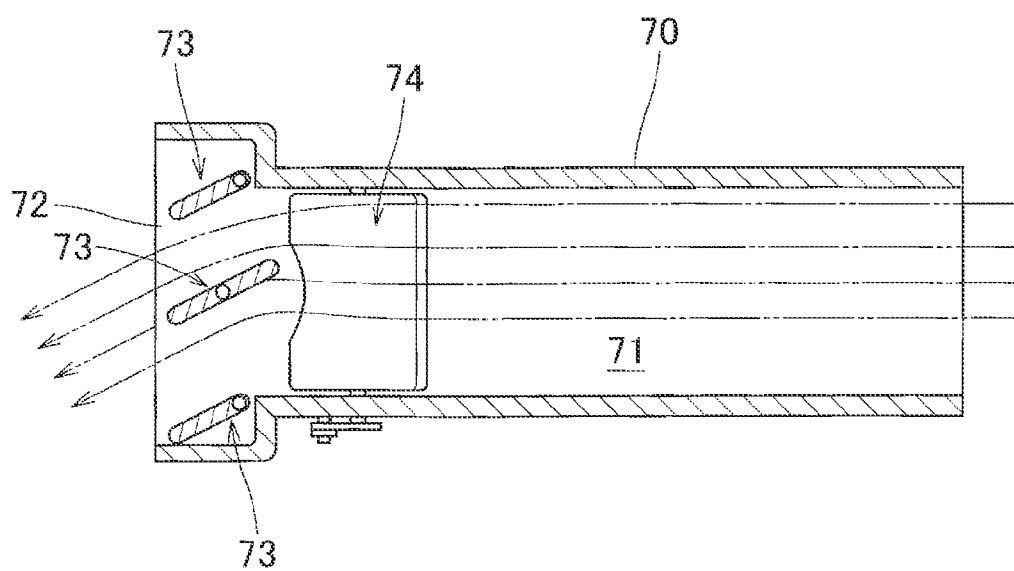


Fig. 11



REGISTER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a U.S. National-Stage entry under 35 U.S.C. §371 based on International Application No. PCT/JP2012/058905, filed Apr. 2, 2012, which claims priority to Japanese Patent Application No. 2011-237676, filed Oct. 28, 2011, which are all hereby incorporated in their entirety by reference.

TECHNICAL FIELD

[0002] This technical field relates to a register for air blow adjustment for an air outlet for air conditioning of an automobile, etc., and specifically, to a register that is suitable for a thin register having a narrow and long air outlet that is long in the longitudinal direction and short in the shorter-side direction and a small number of fins provided along the longitudinal direction inside the air outlet.

BACKGROUND

[0003] Registers for air blow adjustment have horizontally movable louvers and vertically movable louvers disposed orthogonal on the front and rear sides inside bezels or retainers forming air passages, which adjust an air blowing direction by changing angles of fins of the horizontally movable louvers and the vertically movable louvers when blowing out air from the air outlets provided on the bezels. The registers have been commonly used for air conditioning, etc., of automobiles.

[0004] Recently, among registers used for air conditioning of automobiles, a thin register having a narrow and long air outlet that is long in the longitudinal direction and short in the shorter-side direction and a small number of front movable fins, approximately 1-3, provided inside the air outlet have sometimes been used mainly because of design ability or design demands. Such a thin register is known in, for example, JP2002-103954 A.

[0005] For thin registers having narrow and long air outlets, forward movable fins, the number of which is approximately 1 to 3, are disposed along the longitudinal direction inside the air outlet that is long in the longitudinal direction and short in the short-side direction, and rear movable fins are disposed upstream from the front movable fins in the short-side direction orthogonal to the front movable fins. However, the thin registers, air outlets of which are in narrow and long shapes that are long in the longitudinal direction and short in the short-side direction, have suffered from a phenomenon that flow contraction easily occurs as a result of an air flow fed from the air passage toward the air outlet being contracted in the short-side direction, and particularly, because of the flow contraction, the directionality of wind when the rear movable fins are turned in the longitudinal direction easily deteriorates.

[0006] That is, the conventional thin registers usually have a structure for which, as shown in FIG. 11, includes an air outlet 72 having a narrow and long and rectangular shape that is long in the longitudinal direction and short in the short-side direction that is provided in a front portion of an air passage 71 formed in a case body 70 of the register, and inside of the air outlet 72. Front movable fins 73, the number of which is small, for example, three, are disposed along the longitudinal direction, and rear movable fins 74, the number of which is

large, are disposed upstream from the front movable fins 73 in a direction orthogonal to the front movable fins 73.

[0007] However, in such a thin register, as in FIG. 11, the air outlet 72, which is in a narrow and long shape that is long in the longitudinal direction and short in the short side-direction, easily has flow contraction as a result of an air flow fed from the air passage 71 toward the air outlet 72 contracted in the short-side direction, and particularly, easily has contraction of an air flow that is, an air flow contracted in the up-down short-side direction generated near the section between the rear movable fins 74 and the front movable fins 73 when the rear movable fins 74 are turned to the right or left, i.e., in the longitudinal direction.

[0008] Therefore, when the rear movable fins 74 are turned to the right or left, i.e., in the longitudinal direction with the front movable fins 73 turned up or down, wind is hard to bend because the direction of an air flow is returned by flow contraction, and there has been a problem that the directionality of wind when the direction of the rear movable fins 74 is changed easily deteriorates.

[0009] The present invention has been made in view of the problems described above, and at least one object thereof is to provide a register capable of increasing the directionality of wind even being a thin register having a narrow and long air outlet that is long in the longitudinal direction and short in the short-side direction and with movable louvers being provided inside the air outlet. Furthermore, other objects, desirable features and characteristics will become apparent from the subsequent summary and detailed description, and the appended claims, taken in conjunction with the accompanying drawings and this background.

SUMMARY

[0010] As a result of diligent research and development performed for registers having the above-described structure, a flow modulation of wind is identified that occurs when the movable louver on the downstream side is turned is composed of contraction and deflection of an air flow, and if the flow contraction on the downstream side is great, when the movable louver on the upstream side is turned to modulate wind, a phenomenon that the modulation is restored occurs, and the directionality of the wind direction by the movable louver on the upstream side is likely to drop.

[0011] That is, a register according to an embodiment of the present invention is a register having a narrow and long air outlet that is long in a longitudinal direction and short in a short-side direction, with a front movable louver that changes the wind direction in the short-side direction arranged in an air passage inside of the air outlet, and with a rear movable louver that changes the wind direction in the longitudinal direction arranged upstream of the rear movable louver. A back movable louver is disposed upstream of the rear movable louver in order to change the wind direction in said short-side direction. As the back movable louver, a first back fin and a second back fin are axially supported, along both inner surfaces in said air passage, so as to be turnable via pivots that are parallel to the longitudinal direction. When the wind direction is changed in a short-side direction, either one of the first back fin or the second back fin is turned in a short-side direction, while the other of the second back fin or the first back fin is kept parallel to the air passage, and the front movable louver is turned in a direction opposite to a

direction in which the back movable louver is turned in the short-side direction to change the wind direction in the short-side direction.

[0012] According to an embodiment, for example, when the front movable louver is oriented obliquely downward in the short-side direction, the back movable louver has an obliquely upward orientation opposite thereto, and thus an air flow flowing in the air passage is first bent by the back movable louver obliquely upward in the short-side direction to be contracted, passes through the rear movable louver in the contracted state, and changes there the wind direction in the longitudinal direction according to the direction of the rear movable louver, and in that state, the air flow next passes through the front movable louver to be deflected obliquely downward in the short-side direction so as to be bent, and is blown from the air outlet.

[0013] Therefore, a flow modulation section to change the wind direction in the short-side direction (for example, up and down) is created as a flow contraction section at the part of the back movable louver and created as a deflection portion at the part of the front movable louver, so that a modulating motion when bending the wind direction obliquely downward in the short-side direction is divided into flow contraction by the back movable louver and deflection by the front movable louver.

[0014] Therefore, when an air flow passes through the front movable louver from the rear movable louver, flow contraction (a flow of contracted air) is reduced, and accordingly, the phenomenon that the wind direction is returned by flow contraction is reduced when the rear movable louver is turned to change the wind direction in the longitudinal direction. Therefore, even in a thin register having the narrow and long air outlet that is long in the longitudinal direction and short in the shorter-side direction, when the direction of the rear movable louver is turned in the longitudinal direction with the direction of the front movable louver turned in the short-side direction, wind is never rectified by flow contraction, and the wind direction is satisfactorily changed according to the direction of the rear movable louver to increase the directionality of wind.

[0015] Here, in the above-described register, there may be a configuration that inner recesses are respectively formed on both inner surfaces in the air passage, and the first back fin and second back fin are arranged so as to be storable in said inner recesses. Accordingly, when the first back fin or the second back fin does not perform a flow contracting motion for an air flow, the first back fin or the second back fin can be stored in the inner recess to thereby reduce pressure loss during air blowing.

[0016] Moreover, another register is a register having a narrow and long air outlet that is long in a longitudinal direction and short in a short-side direction, with a front movable louver that changes the wind direction in said short-side direction being arranged in an air passage inside of the air outlet, and with a rear movable louver that changes the wind direction in the longitudinal direction being arranged upstream of the rear movable louver, in which a back movable louver is disposed upstream of the rear movable louver in order to change the wind direction in the short-side direction, as the back movable louver, one back fin is axially supported in the air passage so as to be turnable via pivots that are parallel to a longitudinal direction, when the wind direction is changed in a short-side direction, the one back fin is turned in a short-side direction, and the front movable louver is turned

in a direction opposite to a direction in which the back movable louver is turned in the short-side direction to change the wind direction in the short-side direction.

[0017] According to the register of an embodiment of the invention, similar to the above, a flow modulation section to change the wind direction in the short-side direction (for example, up and down) is created as a flow contraction section at the part of the back movable louver and created as a deflection portion at the part of the front movable louver, so that a modulating motion when bending the wind direction obliquely downward in the short-side direction is divided into flow contraction by the back movable louver and deflection by the front movable louver.

[0018] Therefore, similar to the above, when an air flow passes through the front movable louver from the rear movable louver, flow contraction (a flow of contracted air) is reduced, and accordingly, the phenomenon that the wind direction is returned by flow contraction is reduced when the rear movable louver is turned to change the wind direction in the longitudinal direction. Therefore, even in a thin register having the narrow and long air outlet that is long in the longitudinal direction and short in the shorter-side direction, when the direction of the rear movable louver is turned in the longitudinal direction with the direction of the front movable louver turned in the short-side direction, wind is never rectified by flow contraction, and the wind direction can be satisfactorily changed according to the direction of the rear movable louver to increase the directionality of wind.

[0019] Here, there may be a configuration such that, as the front movable louver, two or three front fins are axially supported so as to be turnable via pivots that are parallel to the longitudinal direction, all front fins turn in conjunction with each other so as to be oriented in the same direction to change the wind direction in a short-side direction.

[0020] Further, another register of an embodiment of the present invention is a register having a narrow and long air outlet that is long in a longitudinal direction and short in a short-side direction, with chevron projections having inclined surfaces at an upstream side formed along the longitudinal direction on both inner surfaces in an air passage along the longitudinal direction near the air outlet, and formed so as to bend an air flow of the air passage close to a center of the air outlet while being blown out with the direction of the inclined surfaces of the chevron projections being oriented upstream of the air passage, and with a rear movable louver being arranged upstream from the chevron projections so as to change the wind direction in said longitudinal direction, in which in the air passage and upstream from the rear movable louver, a back movable louver having one back fin is axially supported so as to be turnable via pivots along the longitudinal direction, and an air flow contracted by a turn of the back fin is bent by the chevron projections in a direction opposite to that of a bend in a short-side direction by the back fin to change the wind direction in the short-side direction.

[0021] According to an embodiment of the invention, the wind direction can be changed in the short-side direction by a turn of the only one back fin, and for example, when the back fin is oriented obliquely upward in the short-side direction, an air flow flowing in the air passage is first bent by the back fin obliquely upward in the short-side direction to be contracted, passes through the movable louver in the contracted state, and changes there the wind direction in the longitudinal direction according to the direction of the movable louver, and in that state, the air flow next passes through the chevron projections

to be deflected obliquely downward in the short-side direction to be bent, and is blown from the air outlet.

[0022] Therefore, a flow modulation section to change the wind direction in the short-side direction (for example, up and down) is created as a flow contraction section at the part of the back fin and created as a deflection portion at the part of the chevron projections, so that a modulating motion when bending the wind direction in the short-side direction (for example, obliquely downward) is divided into flow contraction by the back fin and deflection by the chevron projections.

[0023] Therefore, when an air flow passes through the chevron projections from the movable louver, flow contraction (a flow of contracted air) is reduced, and accordingly, the phenomenon that the wind direction is returned by flow contraction is reduced when the rear movable louver is turned to change the wind direction in the longitudinal direction. Therefore, even in a thin register having the narrow and long air outlet that is long in the longitudinal direction and short in the shorter-side direction, when the direction of the rear movable louver is turned in the longitudinal direction with the back fin turned in the short-side direction, wind is never rectified by flow contraction, and the wind direction can be satisfactorily changed according to the direction of the rear movable louver to increase the directionality of wind.

[0024] Here, the chevron projections may be continuously formed with the same cross-sections in the longitudinal direction of the air outlet on both opposite sides of inner surfaces near the air outlet, and further, surfaces at a downstream side of the chevron projections may be formed in a shape opened so as to expand forward. Accordingly, the directionality of wind when the direction of the rear movable louver is changed the back fin turned in the short-side direction can be increased.

[0025] According to the register of embodiments of the present invention, when the direction of the rear movable louver is turned in the longitudinal direction with the direction of the front movable louver or the back movable louver turned in the short-side direction, wind is never rectified by flow contraction, and the wind direction can be satisfactorily changed according to the direction of the rear movable louver to increase the directionality of wind.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The present invention will hereinafter be described in conjunction with the following drawing figures, wherein like numeral denote like elements, and:

[0027] FIG. 1 is a front view of a register showing a first embodiment;

[0028] FIG. 2 is a longitudinal sectional view of the same register;

[0029] FIG. 3 is a sectional view along III-III of the same register;

[0030] FIG. 4 is a longitudinal sectional view when the wind direction is oriented downward in the short-side direction;

[0031] FIG. 5 is a longitudinal sectional view when the wind direction is oriented upward in the short-side direction;

[0032] FIG. 6 is a longitudinal sectional view of a second embodiment a front movable louver of which is composed of two front fins;

[0033] FIG. 7 is a longitudinal sectional view of a third embodiment a back movable louver of which is composed of one back fin;

[0034] FIG. 8 is a longitudinal sectional view of the same embodiment in a state where the wind direction is oriented upward in the short-side direction;

[0035] FIG. 9 is a longitudinal sectional view of a fourth embodiment using chevron projections in place of the front movable louver;

[0036] FIG. 10 is a longitudinal sectional view of the same embodiment in a state where the wind direction is oriented upward in the short-side direction; and

[0037] FIG. 11 is an explanatory sectional view of a conventional register.

DETAILED DESCRIPTION

[0038] The following detailed description is merely exemplary in nature and is not intended to limit application and uses. Furthermore, there is no intention to be bound by any theory presented in the preceding background or summary or the following detailed description.

[0039] FIG. 1 to FIG. 5 show a register of a first embodiment. A case body 1 of the register is formed into a thin box shape, and in its interior, an air passage 3 having a thin rectangular shape in cross-section is formed. An air inlet is formed at a terminal opening portion of the air passage 3, and at the front surface, an air outlet 2 in a horizontally narrow and long shape is formed to blow out air passing through the air passage 3, and a thin register is thus constructed.

[0040] That is, the air outlet 2 is, as shown in FIG. 1 and FIG. 2, formed in a flat and narrow and long slit shape, and formed in a horizontally long rectangular shape that is long in the longitudinal direction (right-left direction) and short in the short-side direction (up-down direction) Immediately inside of the air outlet 2 of the case body 1, a front movable louver 4 consisting of three horizontal fins 41, 42, and 43 is arranged turnably.

[0041] The front movable louver 4 is configured with the three horizontal fins 41, 42, and 43 being disposed, at predetermined clearances left vertically, along the longitudinal direction of the air outlet 2, and with pivots 41a, 42a, and 43a in the horizontal direction projecting from both sides of the respective horizontal fins 41, 42, and 43 being axially supported turnably on both side walls of the case body 1. The respective horizontal fins 41, 42, and 43 of the front movable louver 4 are turned, by a turning mechanism 46, in synchronization and conjunction with each other from the state in FIG. 2 to the state in FIGS. 4 and 5 where the wind direction is changed to upward or downward so as to change the wind direction in the up-down short-side direction in cooperation with a back movable louver 6 to be described later.

[0042] Moreover, as shown in FIG. 2, at an upper wall portion and lower wall portion in a front portion of the case body 1, inner recesses 44 and 45 are formed, respectively, and the horizontal fin 41 at the upper side is disposed so as to be storable in the upper inner recess 44 and the horizontal fin 43 at the lower side is disposed so as to be storable in the lower inner recess 45 to provide a configuration such as to, when turning the wind direction downward, make the upper horizontal fin 41 project from the inner recess 44 toward the inside to be oriented obliquely downward as in FIG. 4, and when turning the wind direction upward, make the lower horizontal fin 43 project from the inner recess 45 toward the inside to be oriented obliquely upward as in FIG. 5.

[0043] When air is blown straight ahead of the air outlet 2, as in FIG. 2, the upper and lower horizontal fins 41 and 43 are in a state stored in the inner recesses 44 and 45 to minimize

pressure loss during forward air blowing. The horizontal fin 42 at a middle position of the front movable louver 4 is arranged in the central longitudinal direction of the air outlet 2, and turned in the same direction in synchronization and conjunction with the upper and lower horizontal fins 41 and 43.

[0044] The turning mechanism 46 of the front movable louver 4 is composed of a linkage mechanism by manual operation, a gear mechanism, or a motor-driven mechanism, and is configured, when air is blown straight ahead of the air outlet 2, so as to make the middle horizontal fin 42 be horizontal and bring the upper and lower horizontal fins 41 and 43 into a state stored in the inner recesses 44 and 45, and when the wind direction is oriented downward, so as to turn the middle horizontal fin 42 downward as in FIG. 4 and make the upper horizontal fin 41 project from the inner recess 44 toward the inside to orient the same obliquely downward, and when the wind direction is oriented upward, so as to turn the middle horizontal fin 42 upward as in FIG. 5 and make the lower horizontal fin 43 project from the inner recess 45 toward the inside to orient the same obliquely upward.

[0045] In the air passage 3 and upstream from the front movable louver 4, that is, immediately upstream from the front movable louver 4, a rear movable louver 5 is arranged so as to change the wind direction in the longitudinal direction, i.e., the right-left direction of the air outlet 2. The rear movable louver 5 is formed, as shown in FIG. 2 and FIG. 3, by providing a large number of vertical fins 51 side by side at clearances left in the longitudinal direction, and the large number of vertical fins 51 are axially supported turnably by fitting pivots 51a provided in a vertically projecting manner with pivot holes provided on an upper wall and lower wall of the air passage 3.

[0046] For turning the large number of vertical fins 51 in synchronization and conjunction with each other, cranks 51b are attached to the pivots 51a provided at the lower side thereof, and a link bar 51d is joined to deviating joint shafts 51c of the cranks 51b. The rear movable louver 5 is a structure in which any pivot 51a is driven to rotate within a predetermined angular range by a turning mechanism 56, and the large number of vertical fins 51 are thereby turned in the same direction in synchronization and conjunction with each other to change the wind direction in the longitudinal direction, i.e., the right-left direction. The turning mechanism 56 of the rear movable louver 5 can have a structure such as to turn the pivot 51a of the vertical fin 51 by a turn of a cam or crank due to an operation of an operation knob or motor drive, and is configured such that the direction of the large number of vertical fins 51 is turned rightward or leftward by a turning operation of an operation knob or the like, and the wind direction in the longitudinal direction of the air outlet 2 is changed.

[0047] Further, in the air passage 3 and immediately upstream from the rear movable louver 5, a back movable louver 6 consisting of a first back fin 61 and a second back fin 62 is arranged so as to change the wind direction in the up-down short-side direction in cooperation with the front movable louver 4.

[0048] Generally, in a register for which a front movable louver and a rear movable louver are arranged in orthogonal directions to each other, a flow modulation of air that occurs when the front movable louver located downstream is turned is composed of contraction and deflection of an air flow, and if the flow contraction by the front movable louver is great, even when the rear movable louver is turned to modulate the

wind direction, a phenomenon that the modulation is restored by flow contraction occurs, and the directionality of the wind direction by the rear movable louver is likely to drop.

[0049] Accordingly, in the register, a flow contraction section to contract an air flow upward and downward in the short-side direction is created by the back movable louver 6 disposed upstream from the rear movable louver 5, and by contracting an air flow upward or downward by the back movable louver 6 and then causing deflection downward or upward by the front movable louver 4, a vertical flow modulation is divided into flow contraction by the back movable louver 6 and deflection by the upper movable louver 4. Thus, the phenomenon that modulation is restored between the rear movable louver 5 and the front movable louver 4 is suppressed so as to improve directionality when the rear movable louver 5 is turned to adjust the wind direction in the right-left direction.

[0050] The back movable louver 6 is configured with the first back fin 61 and the second back fin 62 being disposed, along the longitudinal direction of the air outlet 2, at an upper portion and lower portion in the air passage 3 and with pivots 61a and 62a in the horizontal direction provided so as to project at both side portions of the first back fin 61 and the second back fin 62 being axially supported turnably on both side walls of the case body 1. Moreover, the first back fin 61 and the second back fin 62 of the back movable louver 6 are arranged so as to be respectively stored, in a horizontal state, inside inner recesses 63 and 64 provided at an upper wall portion and lower wall portion in the air passage 3. Thus, when the first back fin 61 or the second back fin 62 does not perform a contracting motion for an air flow, the first back fin 61 can be stored inside the inner recess 63 or the second back fin 62 can be stored inside the inner recess 64, and pressure loss during air blowing is thus reduced.

[0051] Such a back movable louver 6 is structured such that, when the front movable louver 4 turns, for example, obliquely downward as in FIG. 4 to make the wind direction downward, the second back fin 62 turns obliquely upward in conjunction with that motion and when the front movable louver 4 turns obliquely upward as in FIG. 5 to make the wind direction upward conversely, the first back fin 61 turns obliquely downward in conjunction with that motion.

[0052] And therefore, the pivots 61a and 62a of the first back fin 61 and the second back fin 62 of the back movable louver 6 have a structure so as to be turned by an operation knob or a motor-driven turning mechanism 66, and the turning mechanism 66 is configured so as to, in the case of blowing air straight in the forward direction, keep the first back fin 61 and the second back fin 62 in a horizontal state and store the same inside the inner recesses 63 and 64 as in FIG. 2, and when the front movable louver 4 is turned to the wind direction upward, as in FIG. 5, turn the first back fin 61 downward, and when the front movable louver 4 is turned to turn the wind direction downward, as in FIG. 4, orient the second back fin 62 upward. In this manner, the back movable louver 6, in conjunction with a turn of the front movable louver 4, turns the first back fin 61 or the second back fin 62, and changes the wind direction in the up-down short-side direction in cooperation with the front movable louver 4.

[0053] That is, in the case of orienting the wind direction downward, as in FIG. 4, the back movable louver 6 operates so as to turn the second back fin 62 clockwise in FIG. 4 about the pivots 62a in a terminal end portion of the second back fin 62 in order to orient its tip end portion obliquely upward, and

so as to contract an air flow in the air passage 3 to the upside. At this time, the front movable louver 4, three horizontal fins 41, 42, and 43 of which are oriented obliquely downward, is structured such that modulation occurs at this time in a manner divided into flow contraction by the back movable louver 6 and deflection by the upper movable louver 4 to suppress the phenomenon that modulation by the rear movable louver 5 is restored between the rear movable louver 5 and the front movable louver 6.

[0054] On the other hand, in the case of orienting the wind direction upward, as in FIG. 5, the back movable louver 6 turns the first back fin 61 counterclockwise in FIG. 5 about the pivots 61a in a terminal end portion of the first back fin 61 in order to orient its tip end portion obliquely downward, and causes an air flow in the air passage 3 to contract to the downside. At this time, the front movable louver 4, three horizontal fins 41, 42, and 43 of which are oriented obliquely upward, is thus structured such that, similar to the above, modulation at this time is divided into flow contraction by the back movable louver 6 and deflection by the upper movable louver 4 to suppress the phenomenon that modulation by the rear movable louver 5 is restored between the rear movable louver 5 and the front movable louver 4.

[0055] The register configured as described above is fitted to the part of the instrument panel or dashboard inside the cabin of an automobile by connecting the terminal end of its case body 1 to an air duct (not shown). Air fed from the air duct is blown out from the air passage 3 of the case body 1 through the air outlet 2.

[0056] Where the air feeding direction is straight in front of the register, there is a state in which, as in FIG. 2, the horizontal fin 42 of the front movable louver 4 is set parallel to the air feeding direction of the air passage 3, the upper and lower horizontal fins 41 and 43 are stored in the inner recesses 44 and 45, and the first back fin 61 and the second back fin 62 of the back movable louver 6 are stored in the inner recesses 63 and 64. Thus, an air flow proceeds straight inside the air passage 3, passes through the sections between the vertical fins 51 of the rear movable fin 51, and is blown out straight ahead forward from the air outlet 2.

[0057] At this time, when the respective vertical fins 51 of the rear movable louver 5 are turned rightward or leftward, the wind direction changes into that direction, and because there is no modulation in the up-down short-side direction due to the front movable louver 4, no contraction of an air flow occurs, and air blowing can be performed with the wind direction satisfactorily changed in the right-left horizontal direction.

[0058] On the other hand, when changing the air blowing direction to downward, as in FIG. 4, the register turns the horizontal fins 41, 42, and 43 of the front movable louver 4 downward, and the back movable louver 6 turns the tip end portion of its second back fin 62 so as to be oriented upward.

[0059] Thus, an air flow flowing in the air passage 3 is, as in FIG. 4, bent by the second back fin 62 of the back movable louver 6 obliquely upward in the short-side direction to be contracted, passes through the sections between the vertical fins 51 of the rear movable louver 5 in the contracted state, and changes there the wind direction in the longitudinal direction (right-left direction) according to the direction of the rear movable louver 5, and in that state, the air flow next passes through the sections between the horizontal fins 41, 42, and 43, is deflected obliquely downward in the short-side direction to be bent, and is blown from the air outlet 2.

[0060] On the other hand, when changing the air blowing direction to upward, as in FIG. 5, the register turns the horizontal fins 41, 42, and 43 of the front movable louver 4 upward, and the back movable louver 6 turns the tip end portion of its first back fin 61 so as to be oriented downward.

[0061] Thus, an air flow flowing in the air passage 3 is, as in FIG. 5, bent by the first back fin 61 of the back movable louver 6 obliquely downward in the short-side direction to be contracted, passes through the sections between the vertical fins 51 of the rear movable louver 5 in the contracted state, and changes there the wind direction in the longitudinal direction (right-left direction) according to the direction of the rear movable louver 5, and in that state, the air flow next passes through the sections between the horizontal fins 41, 42, and 43 of the front movable louver 4, is deflected obliquely upward in the short-side direction to be bent, and is blown from the air outlet 2.

[0062] In this manner, a flow modulation section to change the wind direction in the short-side direction (up-down direction) is created as a flow contraction section at the part of the back movable louver 6 and created as a deflection portion at the part of the front movable louver 4, so that a modulating motion when bending the wind direction obliquely downward or upward in the short-side direction is divided into flow contraction by the back movable louver 6 and deflection by the front movable louver 4.

[0063] Therefore, when an air flow passes through the front movable louver 4 from the rear movable louver 5, flow contraction (a flow of contracted air) is reduced, and accordingly, the phenomenon that the wind direction is returned by contraction is reduced when the rear movable louver 5 is turned to change the wind direction in the right-left longitudinal direction. Therefore, even in a register having the narrow and long air outlet 2 that is long in the longitudinal direction and short in the shorter-side direction, when the direction of the rear movable louver 5 is turned in the longitudinal direction with the direction of the front movable louver 4 turned in the short-side direction, wind is never rectified by flow contraction, and the wind direction can be satisfactorily changed according to the direction of the rear movable louver 5 to increase the directionality of wind.

[0064] FIG. 6 shows a register of a second embodiment. As in FIG. 6, the number of front movable louvers may be two, and a front movable louver 4 consisting of only two upper and lower horizontal fins 41 and 43 can be axially supported via pivots 41a and 43a so as to be storable inside inner recesses 44 and 45 provided at an upper wall portion and lower wall portion in a front portion of a case body 1. The register in FIG. 6 is suitable for a thin register the case body 1 of which has an especially low height.

[0065] Similar to the above, the register shown in FIG. 6, when turning the wind direction downward, also makes the upper horizontal fin 41 of the front movable louver 4 project at a tip end portion from an inner recess 44 toward the central side to orient the same obliquely downward, and the tip end of a second back fin 62 of a back movable louver 6 is oriented obliquely upward to blow air. On the other hand, when turning the wind direction upward, similar to the case in FIG. 5, the register makes the lower horizontal fin 43 of the front movable louver 4 project at a tip end portion from an inner recess 45 toward the central side to orient the same obliquely upward, and the tip end of a first back fin 61 of the back movable louver 6 is oriented obliquely downward to blow air. In this manner, a front movable louver 4 composed of only

two horizontal fins **41** and **43** allows forming a slit-like air outlet **2** in a narrow and long shape that is shorter in the short-side direction.

[0066] FIG. 7 and FIG. 8 show a register of a third embodiment. In this example, a back movable louver **8** consisting of one back fin **81** is arranged upstream of an air passage **3** in a case body **1** in place of the back movable louver **6** described above. For the same parts as those described above, the same reference signs as above will be used in FIG. 7 and FIG. 8 and description thereof will be omitted.

[0067] As shown in FIG. 7 and FIG. 8, a front movable louver **4** arranged immediately inside of an air outlet **2** is configured with two horizontal fins **41** and **43** being disposed, at predetermined clearances left vertically, along the longitudinal direction of the air outlet **2**, and with pivots **41a** and **43a** in the horizontal direction projecting from both sides of the respective horizontal fins **41** and **43** being axially supported turnably on both side walls of the case body **1**. The respective horizontal fins **41** and **43** of the front movable louver **4** are turned up and down by a turning mechanism **46** so as to change the wind direction in the up-down short-side direction in cooperation with the back movable louver **8**.

[0068] The turning mechanism **46** of the front movable louver **4** is composed of a linkage mechanism by manual operation, a gear mechanism, or a motor-driven mechanism, and is configured, similar to the above, when air is blown straight ahead of the air outlet **2**, so as to bring the upper and lower horizontal fins **41** and **43** into a state stored in inner recesses **44** and **45**, and when the wind direction is oriented downward, so as to make the upper horizontal fin **41** project from the inner recess **44** toward the inside to orient the same obliquely downward as in FIG. 7, and when the wind direction is oriented upward, so as to make the lower horizontal fin **43** project from the inner recess **45** toward the inside to orient the same obliquely upward.

[0069] A rear movable louver **5** arranged upstream from the front movable louver **4** is formed by providing a large number of vertical fins **51** side by side at clearances left in the longitudinal direction, and the large number of vertical fins **51** are axially supported turnably by fitting pivots **51a** provided in a vertically projecting manner with pivot holes provided on the upper wall and lower wall of the air passage **3**. Similar to the above, the rear movable louver **5** operates so as to turn the vertical fins **51** rightward or leftward to turn the wind direction rightward or leftward by a turning mechanism **56**.

[0070] Further, in the air passage **3** and immediately upstream from the rear movable louver **5**, a back movable louver **8** consisting of only one back fin **81** is arranged so as to change the wind direction in the up-down short-side direction in cooperation with the front movable louver **4**. The back fin **81** of the back movable louver **8** is formed in a horizontally long shape that is long along the longitudinal direction (horizontal direction) of the air outlet **2**, and is axially supported so as to turn up and down in the air passage **3** in a mode such that pivots **81a** are provided so as to project at both end portions thereof and the pivots **81a** are fitted with pivot holes provided on both side wall portions of the case body **1**.

[0071] A turning mechanism **86** of the back movable louver **8** is composed of a linkage mechanism that turns the back fin **81** according to an operation of an operation knob or a motor-driven mechanism, and is configured, when changing the air feeding direction to downward, so as to turn a downstream-side tip end portion of the back fin **81** so as to be oriented obliquely upward, which is opposite to the air feeding direc-

tion, and when changing the air feeding direction to upward, so as to turn the downstream-side tip end portion of the back fin **81** so as to be oriented obliquely downward.

[0072] The register configured as described above, when changing the air feeding direction downward, as in FIG. 7, turns the horizontal fins **41** and **43** of the front movable louver **4** downward, and turns the downstream-side tip end portion of the back fin **81** of the back movable louver **8** so as to be oriented obliquely upward.

[0073] Thus, an air flow flowing in the air passage **3** is, as in FIG. 7, bent by the back fin **81** of the back movable louver **8** obliquely upward in the short-side direction to be contracted, passes through the sections between the vertical fins **51** of the rear movable louver **5** in the contracted state, and changes there the wind direction in the longitudinal direction (right-left direction) according to the direction of the rear movable louver **5**, and in that state, the air flow next passes through the sections between the horizontal fins **41** and **43** of the front movable louver **4**, is deflected obliquely downward in the short-side direction to be bent, and is blown from the air outlet **2**.

[0074] On the other hand, when changing the air feeding direction to upward, as in FIG. 8, the register turns the horizontal fins **41** and **43** of the front movable louver **4** upward, and the back movable louver **8** turns the downstream-side tip end portion of its first back fin **81** so as to be oriented downward.

[0075] Thus, an air flow flowing in the air passage **3** is, as in FIG. 8, bent by the back fin **81** of the back movable louver **8** obliquely downward in the short-side direction to be contracted, passes through the sections between the vertical fins **51** of the rear movable louver **5** in the contracted state, and changes there the wind direction in the longitudinal direction (right-left direction) according to the direction of the rear movable louver **5**, and in that state, the air flow next passes through the sections between the horizontal fins **41** and **43** of the front movable louver **4**, is deflected obliquely upward in the short-side direction to be bent, and is blown from the air outlet **2**.

[0076] In this manner, similar to the above, a flow modulation section to change the wind direction in the short-side direction (up-down direction) is created as a flow contraction section at the part of the back movable louver **8** and created as a deflection portion at the part of the front movable louver **4**, so that a modulating motion when bending the wind direction obliquely downward or upward in the short-side direction is divided into flow contraction by the back movable louver **8** and deflection by the front movable louver **4**. Therefore, when an air flow passes through the front movable louver **4** from the rear movable louver **5**, flow contraction (a flow of contracted air) is reduced, and accordingly, the phenomenon that the wind direction is returned by flow contraction is reduced when the rear movable louver **5** is turned to change the wind direction in the right-left longitudinal direction.

[0077] FIG. 9 and FIG. 10 show a register of a fourth embodiment, and in this example, chevron projections **11** and **12** are provided along the longitudinal direction of an air outlet **2** at upper and lower portions immediately inside the air outlet **2** in place of the front movable louver **4** described above.

[0078] The air outlet **2** of the resistor is formed as an air outlet of a thin register that is horizontally long and has a short vertical width, the chevron projections **11** and **12** provided at the upper and lower portions are formed along the longitudi-

nal direction on both upper and lower inner surfaces of the air outlet **2**, the height of the respective chevron projections **11** and **12** is provided, in the embodiment in the drawings, as approximately 9% of the height (length of the short side in the vertical direction) of the air outlet **2**, and depending on the height of the air outlet **2**, it can be provided as approximately 7 to 12% of that height.

[0079] Moreover, in the chevron projections **11** and **12** provided at the upper and lower portions, inclined surfaces **11a** and **12a** are formed at their upstream side. The inclined surfaces **11a** and **12a** at the upstream side of the chevron projections **11** and **12** are formed respectively with their inclination directions oriented to vertical fins **51** of a rear movable louver **5**, and the inclination angle with respect to a horizontal line of the inclined surfaces **11a** and **12a** of the present embodiment is set here to approximately 45°, but can be set to approximately 35° to 55° depending on the height (length in the short-side direction) of the air outlet **2**.

[0080] The chevron projection **11** and the chevron projection **12** are, as shown in FIGS. **9** and **10**, formed at opposite upper and lower portions of immediately inside surfaces of the air outlet **2**, in a symmetric form with respect to a horizontal center line of the air outlet **2**. Further, the chevron projection **11** and the chevron projection **12** are formed continuously in their longitudinal direction with the same cross-sections.

[0081] On the other hand, surfaces at the downstream side of the chevron projections **11** and **12**, that is, surfaces at the front side of the register are opened so as to expand forward and obliquely upward, that is, so as to expand obliquely downward to the front and obliquely downward to the front, and formed as forward inclined surfaces **11b** and **12b** provided at the upper and lower portions. The chevron projection **11** and the chevron projection **12**, as shown in FIGS. **9** and **10**, act so as to bend downward or upward the direction of an air flow to be blown out from the air outlet **2** when the downstream-side tip end of a back fin **81** of a back movable louver **8** is oriented upward or downward.

[0082] That is, when the downstream-side tip end of the back fin **81** of the back movable louver **8** is oriented to the upside (obliquely upward), as in FIG. **9**, an air flow flowing in the air passage **3** flows along the vicinity of its upper wall surface, and contacts the inclined surface **11a** of the upper chevron projection **11** to be bent downward, and is blown obliquely downward. On the other hand, when the downstream-side tip end of the back fin **81** is oriented to the downside (obliquely downward), as in FIG. **10**, an air flow flowing in the air passage **3** flows along the vicinity of its lower wall surface, and contacts the inclined surface **12a** of the lower chevron projection **12** to be bent upward, and is blown obliquely upward. Moreover, during obliquely downward or obliquely upward air blowing, wind is satisfactorily guided by the forward inclined surfaces **11b** and **12b** opened so as to expand forward, and blown without being disturbed in the directionality of wind by the edge of the opening portion.

[0083] Similar to the above, a turning mechanism **86** of the back movable louver **8** is composed of a linkage mechanism that turns the back fin **81** according to an operation of an operation knob or a motor-driven mechanism, and is configured, when changing the air feeding direction to downward, so as to turn a downstream-side tip end portion of the back fin **81** so as to be oriented obliquely upward, which is opposite to the air feeding direction, and when changing the air feeding

direction to upward, so as to turn the downstream-side tip end portion of the back fin **81** so as to be oriented obliquely downward.

[0084] The register configured as described above, when changing the air feeding direction downward, as in FIG. **9**, similar to the above, turns the downward-side tip end portion of the back fin **81** of the back movable louver **8** so as to be oriented obliquely upward, which is opposite to the air feeding direction.

[0085] Thus, an air flow flowing in the air passage **3** is, as in FIG. **9**, bent by the back fin **81** of the back movable louver **8** obliquely upward in the short-side direction to be contracted, passes through the sections between the vertical fins **51** of the rear movable louver **5** in the contracted state, and changes there the wind direction in the longitudinal direction (right-left direction) according to the direction of the rear movable louver **5**, and in that state, the air flow flowing in the air passage **3** flows along the vicinity of its upper wall surface, and contacts the inclined surface **11a** of the upper chevron projection **11** to be bent downward, and is blown obliquely downward from the air outlet **2**.

[0086] On the other hand, when changing the air feeding direction to upward, as in FIG. **10**, the register turns the back fin **81** of the back movable louver **8** downward so that its downstream-side tip end portion is oriented downward.

[0087] Thus, an air flow flowing in the air passage **3** is, as in FIG. **10**, bent by the back fin **81** of the back movable louver **8** obliquely downward in the short-side direction to be contracted, passes through the sections between the vertical fins **51** of the rear movable louver **5** in the contracted state, and changes there the wind direction in the longitudinal direction (right-left direction) according to the direction of the rear movable louver **5**, and in that state, the air flow flowing in the air passage **3** flows along the vicinity of its lower wall surface, and contacts the inclined surface **12a** of the lower chevron projection **12** to be bent upward, and is blown obliquely upward from the air outlet **2**.

[0088] In this manner, similar to the above, a flow modulation section to change the wind direction in the short-side direction (up-down direction) is created as a flow contraction section at the part of the back movable louver **8** and created as a deflection portion at the part of the chevron projections **11** and **12**, so that a modulating motion when bending the wind direction obliquely downward or upward in the short-side direction is divided into flow contraction by the back movable louver **8** and deflection by the chevron projections **11** and **12**. Therefore, when an air flow passes through the chevron projections **11** and **12** from the rear movable louver **5**, flow contraction (a flow of contracted air) is reduced, and accordingly, the phenomenon that the wind direction is returned by flow contraction is reduced when the rear movable louver **5** is turned to change the wind direction in the right-left longitudinal direction.

[0089] Therefore, even in a register having the narrow and long air outlet **2** that is long in the longitudinal direction and short in the shorter-side direction, when the direction of the rear movable louver **5** is turned in the longitudinal direction with the direction of the back movable louver **8** turned in the short-side direction, wind is never rectified by flow contraction, and the wind direction can be satisfactorily changed according to the direction of the rear movable louver **5** to increase the directionality of wind.

[0090] In the above-described embodiment, a register having a horizontally long air outlet **2** is configured by the process

such as providing horizontal fins **41**, **42**, and **43** for a front movable louver **4** and providing vertical fins **51** for a rear movable louver **5**, however, those components may also be applied to a vertically long thin-register in a state rotated by 90 degrees, and in the case of a vertically long thin-register, there may be a configuration so as to provide an air outlet having a vertically narrow and long shape, and provide vertical fins for a front movable louver and provide horizontal fins side by side for a rear movable louver, or alternatively provide chevron projections at both right and left sides inside of the vertically long air outlet in place of the front movable louver. In this case, a back fins) of a back movable louver is in the vertical direction the same as that of the vertical fins of the front movable louver or the chevron projections.

[0091] While at least one exemplary embodiment has been presented in the foregoing summary and detailed description, it should be appreciated that a vast number of variations exist. It should also be appreciated that the exemplary embodiment or exemplary embodiments are only examples and are not intended to limit the scope, applicability, or configuration in any way. Rather, the foregoing summary and detailed description will provide those skilled in the art with a convenient road map for implementing an exemplary embodiment, it being understood that various changes may be made in the function and arrangement of elements described in an exemplary embodiment without departing from the scope as set forth in the appended claims and their legal equivalents.

1. A register, comprising:

- a narrow and long air outlet that is long in a longitudinal direction and short in a short-side direction;
- a front movable louver that changes a wind direction in said short-side direction arranged in an air passage inside of said narrow and long air outlet;
- a rear movable louver that changes the wind direction in said longitudinal direction arranged upstream of said rear movable louver;
- a back movable louver disposed upstream of said rear movable louver in order to change the wind direction in said short-side direction; and
- a first back fin and a second back fin axially supported along both inner surfaces in said air passage, so as to be turnable via pivots that are parallel to the longitudinal direction,

wherein when the wind direction is changed in a short-side direction, said first back fin is turned in a short-side direction while the other of said second back fin is kept parallel to said air passage, and

wherein the front movable louver is turned in a direction opposite to a direction in which said back movable louver is turned in the short-side direction to change the wind direction in the short-side direction.

2. The register according to claim **1**, wherein inner recesses are formed on both inner surfaces in the air passage, and the first back fin and the second back fin are arranged so as to be storable in said inner recesses.

3. A register, comprising:

- a narrow and long air outlet that is long in a longitudinal direction and short in a short-side direction;

- a front movable louver that changes the wind direction in said short-side direction arranged in an air passage inside of said narrow and long air outlet;

- a rear movable louver that changes the wind direction in said longitudinal direction arranged upstream of said rear movable louver,

- a back movable louver disposed upstream of said rear movable louver in order to change the wind direction in said short-side direction; and

- a back fin is axially supported in said air passage so as to be turnable via pivots that are parallel to a longitudinal direction,

wherein when the wind direction is changed in a short-side direction, said one back fin is turned in a short-side direction, and the front movable louver is turned in a direction opposite to a direction in which said back movable louver is turned in the short-side direction to change the wind direction in the short-side direction.

4. The register according to claim **1**, further comprising at least two front fins of the front movable louver are axially supported so as to be turnable via pivots that are parallel to the longitudinal direction, all of said front fins turn in conjunction are oriented in a direction to change the wind direction in a short-side direction.

5. A register, comprising:

- a narrow and long air outlet that is long in a longitudinal direction and short in a short-side direction;

- chevron projections having inclined surfaces at an upstream side formed along the longitudinal direction on both inner surfaces in an air passage along the longitudinal direction near said narrow and long air outlet, and formed so as to bend an air flow of said air passage close to a center of the air outlet while blown out with the direction of said inclined surfaces of the chevron projections oriented upstream of said air passage, and

- a rear movable louver arranged upstream from said chevron projections so as to change the wind direction in said longitudinal direction and

- a back movable louver in said air passage and upstream from the rear movable louver having one back fin axially supported so as to be turnable via pivots along the longitudinal direction,

wherein an air flow contracted by a turn of said back fin is bent by said chevron projections in a direction opposite to that of a bend in a short-side direction by said back fin to change the wind direction in a short-side direction.

6. The register according to claim **5**, wherein the chevron projections are continuously formed with substantially the same cross-sections in the longitudinal direction of said narrow and long air outlet on both opposite inner surfaces in the air passage along the longitudinal direction near the air outlet, and surfaces at a downstream side of said chevron projections are formed in a shape opened so as to expand forward.

7. The register according to claim **1**, further comprising at least two front fins of the front movable louver axially supported so as to be turnable via pivots that are parallel to the longitudinal direction, all of said front fins turn in conjunction are oriented in a direction to change the wind direction in a short-side direction.

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