



WALL MOUNTED TYPE AIR CONDITIONER HAVING
AIR BLOW-OUT DIRECTION CHANGING PLATE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a wall mounted type air conditioner having an air blow-out direction changing plate at an air blow-out port of the main body of an air conditioner.

2. Description of the Related Art

There is known a wall mounted type air conditioner having an air blow-out direction changing plate in an air blow-out port surrounded by a scroll portion and a tongue portion of the main body of the air conditioner. In this type of air conditioner, the air blow-out direction changing plate comprises two horizontal plates and plural vertical plates, and the direction of the air stream blown out from the air blow-out port can be controlled by changing the posture (orientation) of the horizontal plates and the vertical plates.

For example, under cooling operation, the horizontal plates and the vertical plates are controlled so that the air stream is blown out substantially in the horizontal direction to increase the travel distance of the air stream. On the other hand, under heating operation, the horizontal and vertical plates are controlled so that the air stream is blown out substantially in the vertical direction to form the air stream flowing along the floor face.

However, it has been difficult for the conventional air blow-out direction changing plate comprising the two horizontal plates and the plural vertical plates as described above to uniformly circulate warm air /cool air all over the room under air-conditioning.



SUMMARY OF THE INVENTION

Therefore the present invention has been implemented in view of the foregoing situation, and has an object to provide a wall mounted type air conditioner which can uniformly circulate warm air/cool air all over the room under air-conditioning.

According to the present invention, there is provided a wall mounted type air conditioner having an air blow-out direction changing plate in an air blow-out port of the main body of the air conditioner, characterized in that said air blow-out direction changing plate comprises: a lower horizontal plate extending in the longitudinal direction of the lower side of said air blow-out port; an upper horizontal plate extending in the longitudinal direction of the upper side of said air blow-out port; and plural vertical plates extending in the short-side direction of said air blow-out port, wherein said upper horizontal plate is divided into at least two horizontal plates in the longitudinal direction of the upper side of said air blow-out port.

In the above wall mounted type air conditioner, the lower horizontal plate is designed to have a width smaller than said upper horizontal plate.

In the above wall mounted type air conditioner, dimples are formed on both sides of each of at least two vertical plates and on the upper surface of said lower horizontal plate to thereby increase a travel distance of air stream blown out from said air blow-out port.

In the above wall mounted type air conditioner, the at least two horizontal plates constituting said upper horizontal plate are designed to be swingable out of phase in the vertical direction.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-sectional view showing an embodiment of a wall mounted type air conditioner of the present invention;

Fig. 2 is a perspective view showing the wall mounted type air conditioner of the present invention;

Fig. 3 is a perspective view showing flat posture control;

Fig. 4 is a perspective view showing a state that the flap is exploded;

Fig. 5 is a perspective view showing vertical plates;

Fig. 6 is a perspective view showing vertical plates and a lower horizontal plate;

Figs. 7A to 7D show the directivity of air stream and temperature distribution when the main body of an air conditioner is mounted in a corner of a room under air-conditioning; and

Fig. 8 is a diagram showing flow of air stream under heating operation when the main body of an air conditioner is mounted in a corner of a room under air-conditioning.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment according to the present invention will be described hereunder with reference to the accompanying drawings.

Fig. 1 is a cross-sectional view showing a wall mounted type air conditioner of the present invention. Reference numeral 1 represents the main body of the air conditioner, and the main body 1 is fixed to the wall 3. In the main body 1 are disposed an indoor heat exchanger 5 and a cross-flow fan 7.

An upper air suction port 9 is integrally formed in the form of a grill on the upper portion 1A of the main body 1, and an air suction grille 11 is fixed to the front edge portion 1B of the upper portion 1A of the main body 1 so that

the lower end 11B of the air suction grille 11 is freely released from the front face of the main body 1 of the air conditioner under the state that the upper end 11A of the air suction grille 11 is linked to the front edge portion 1B of the upper portion 1A through a hinge so as to be rotatable around a fulcrum (not shown).

An air suction filter 13 having a filter element is mounted inside the air suction grille 11 so as to be freely movable in the upward and downward directions.

An air blow-out port 21 surrounded by a scroll portion 17 and a tongue portion 19 is formed at the lower portion of the main body of the air conditioner, and an air blow-out direction changing plate 23 is disposed in the air blow-out port 21. The air blow-out direction changing plate 23 comprises a small-width lower horizontal plate 24 extending in the longitudinal direction of the lower side of the air blow-out port 21, an upper horizontal plate 25 extending in the longitudinal direction of the upper side of the air blow-out port 21 and plural vertical plates 26 extending in the short-side direction of the air blow-out port 21. Further, an ion generating device 27 is disposed at the necked upstream side in the air blow-out port 21.

As shown in Fig. 2, the lower horizontal plate 24 comprises one small-width slender flap 24, and the upper horizontal plate 25 comprises two flaps 25A and 25B which are larger in width than the lower horizontal plate 24 and separated from each other in the longitudinal direction.

The flaps 24, 25A, 25B are independently connected to individual DC stepping motors respectively, and for example they are controlled to be independently swingable while the swinging motions thereof are displaced in

phase as shown in Fig. 3.

As shown in Figs. 4 and 5, the plural vertical plates 26 are freely rotatably fixed onto one slender plate 31, and the respective vertical plates 26 are mutually linked to one another by each bar 32. In the mutually-linked vertical plates 26, only the vertical plate 26A at the right end in Fig. 5 is directly supported on the scroll portion 17, and a DC stepping motor (not shown) is linked to one end of the bar 32 linked to the vertical plate 26A.

By forwardly/reversely rotating the motor, each bar 32 is reciprocally moved in the direction of an arrow A, and the posture of each vertical plate is controlled.

A hook 31A is formed at one end of the slender plate 31, and the hook 31A is engaged with a fixing portion (not shown) of the scroll portion 17 to thereby fix the plate 31 to the scroll portion 17.

In this construction, the engagement between the hook 31A and the fixing portion is released and the plate 31 is drawn out, the plate 31 is rotated around the support point of the vertical plate 26A which is directly supported on the scroll portion 17, and all the vertical plates 26 are integrally drawn out from the air blow-out port 21 together with the plate 31. Further, in this construction, when the plate 31 is rotated to integrally drawn out all the vertical plates 26 from the air blow-out port 21 together with the plate 31 after the respective flaps 24, 25A and 25B are detached, the inside of the air blow-out port 21 is empty and this makes it remarkably easy to clean the scroll portion 17 and the tongue portion 19 and further the cross-flow fan 7, etc.

Fig. 6 is an enlarged perspective view showing the lower horizontal

plate 24 and the vertical plates 26.

In this embodiment, for example, many dimples (recesses) 33 which are substantially similar to dimples formed on the outer periphery of a well known golf ball are formed on both sides of each of plural (two or more) vertical plates 26 and on the upper surface of the lower horizontal plate 24 to increase the travel (flow) distance of air stream blown out from the air blow-out port as shown in Fig. 6. The formation location of these dimples is not limited to the above positions, and they may be formed on the other flaps.

According to this embodiment, under cooling operation, the posture of each of the two flaps 25A and 25B is independently controlled as shown in Fig. 3 while the lower horizontal plate 24 is controlled to be kept in the substantially horizontal position as indicated by a solid line of Fig. 1 to blow out the air stream substantially horizontally and increase the travel (flow) distance of the air stream by action of the many dimples 33.

Accordingly, not only the travel distance of the air stream is increased, but also cool air can be uniformly blown all over the room under air-conditioning by the action of the two flaps 25A, 25B. Further, when minus ions are generated from the ion generating device 27, the minus ions can be uniformly blown all over the room while riding on the air stream.

Under heating operation, the posture of each of the two flaps 25A, 25B is independently controlled as shown in Fig. 3 while the lower horizontal plate 24 is controlled to be kept in the substantially vertical position as indicated by a broken line of Fig. 1 to form air stream along the floor face.

Accordingly, not only the air stream along the floor face is formed, but also warm air can uniformly blown all over the room under air-conditioning by

the action of the two flaps 25A, 25B. Further, when minus ions are generated from the ion generating device 27, the minus ions can be uniformly blown all over the room while riding on the air stream.

Figs. 7A to 7D show the directivity of air stream and temperature distribution when the main body 1 of the air conditioner is mounted in a corner of a room 41 under air-conditioning, wherein Figs. 7A and 7C correspond to the conventional air conditioner, and Figs. 7B and 7D corresponds to the air conditioner of the present invention.

As is apparent from Figs. 7A and 7B, when the respective flaps are controlled as described above, the center X of the air stream is shifted to substantially the center of the room 41 under air-conditioning. Further, as is apparent from Figs. 7C and 7D, when the respective flaps are controlled, the temperature gradient is small, and warm air or cool air can be uniformly blown all over the room 41 under the air-conditioning.

Fig. 8 shows flow of air stream under heating operation when the main body 1 of the air conditioner is mounted in a corner of the room 41 under air-conditioning.

As described above, when the flaps 24, 25A, 25B are controlled as described above, the air stream blown out from the air blow-out port 21 can be uniformly circulated all over the room 41 as indicated by Y.

The present invention is not limited to the above-described embodiment, and various modifications may be made without departing from the subject matter of the present invention.

The control of the posture of each flap is not limited to the above-described control mode, and another control mode may be used. Further, the

upper horizontal plate 25 is divided into the two flaps in the longitudinal direction. However, the division number is not limited to two, and it may be three or more.

As described above, according to the present invention, warm air or cool air can be uniformly blown (circulated) all over the room under air-conditioning.

WHAT IS CLAIMED IS

1. A wall mounted type air conditioner having an air blow-out direction changing plate in an air blow-out port of the main body of the air conditioner, characterized in that said air blow-out direction changing plate comprises:

 a lower horizontal plate extending in the longitudinal direction of the lower side of said air blow-out port;

 an upper horizontal plate extending in the longitudinal direction of the upper side of said air blow-out port; and

 plural vertical plates extending in the short-side direction of said air blow-out port, wherein said upper horizontal plate is divided into at least two horizontal plates in the longitudinal direction of the upper side of said air blow-out port.

2. The wall mounted type air conditioner as claimed in claim 1, wherein said lower horizontal plate is designed to have a width smaller than said upper horizontal plate.

3. The wall mounted type air conditioner as claimed in claim 1, wherein dimples are formed on both sides of each of at least two vertical plates and on the upper surface of said lower horizontal plate to thereby increase a travel distance of air stream blown out from said air blow-out port.

4. The wall mounted type air conditioner as claimed in claim 1, wherein said at least two horizontal plates constituting said upper horizontal plate are designed to be swingable out of phase in the vertical direction.