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WALL MOUNTED TYPE AIR CONDITIONER

HAVING FILTER MOVING MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a wall mounted type air conditioner having an air suction filter which is freely movable in upward and downward directions with respect to the air conditioner, and particularly to a wall mounted type air conditioner equipped with a mechanism for moving an air suction filter upwardly and downwardly.

2. Description of the Related Art

There is known a wall mounted type air conditioner having an air suction grille at the front side of the main body of the air conditioner. According to one of this type of air conditioners which have been proposed until now, an air suction filter which is freely movable upwardly and downwardly is held at the inside of an air suction grille, and when the air suction filter is required to be cleaned, the air suction filter is downwardly moved to a predetermined position to a filter element at the position for cleaning.

In the air conditioner thus constructed, a slender opening portion (slit) through which the air suction filter is downwardly moved is generally formed at the lower portion of the main body of the air conditioner, and the slit is covered by a flap-like lid member at a normal time.

However, the above type of air conditioner has a problem that the number of parts is increased and thus the manufacturing cost rises up because it needs the slender opening portion (slit) formed at the lower portion



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of the main body of the air conditioner and also the flap-like lid member for covering the slit.

SUMMARY OF THE INVENTION

Therefore, the present invention has been implemented in view of the foregoing description, and has an object to provide a wall mounted type air conditioner in which an air suction filter can be downwardly moved with respect to the air conditioner with no opening portion (slit).

According to the present invention, there is provided a wall mounted type air conditioner including an air suction grille disposed at the front face of the main body of the air conditioner, characterized in that the air suction grille has an air suction filter member disposed at the inside thereof so that the air suction filter member is freely movable upwardly and downwardly, and on the basis of an instruction from the external the air suction grille is released from the front face of the main body and the air suction filter member is passed through the gap formed between the air suction grille and the front face of the main body when the air suction grille is released from the front face of the main body.

The wall mounted type air conditioner described above further includes a mechanism for moving the air suction filter member downwardly and upwardly on the basis of the instruction from the external, and releasing and closing the air suction grille from and to the front face of the main body interlockingly with the downward and upward movements of the air suction filter member respectively, the air suction filter member being downwardly and upwardly moved through the gap between the air suction grille and the front face of the main body.

In the above wall mounted type air conditioner, the mechanism includes a cam member that is rotatably disposed in the neighborhood of an upward and downward movement path of the air suction filter member, and the cam member partially abuts against the air suction filter member and rotates when the air suction filter member is downwardly moved, and releases the air suction grille from the front face of the main body through the rotation of the cam member.

In the above wall mounted type air conditioner, the mechanism includes at least one rack fixed to the air suction filter member, at least one pinion fixed to the air suction grille and a DC stepping motor for driving the at least one pinion, the air suction filter member being upwardly and downwardly moved through the engagement between the rack and the pinion when the at least one pinion is rotated by the DC stepping motor.

The above wall mounted type air conditioner further includes a fixing member for forcedly keeping the attachment between the air suction grille and the front face of the main body when the air suction filter member is retracted inside the air suction grille.

In the above wall mounted type air conditioner, the air suction filter member comprises a guide member fixed to the inner surface of the air suction grille, a filter holder that is freely upwardly and downwardly movable while guided along the guide member, a take-off portion freely detachably inserted in the filter holder and a filter element mounted on the take-off portion.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-sectional view showing an embodiment of a wall

mounted type air conditioner according to the present invention;

Fig. 2 is a cross-sectional view showing a state that an air suction filter starts a downward movement;

Fig. 3 is cross-sectional diagram showing a state that the air suction filter has completed its downward movement;

Fig. 4 is a perspective view showing the state of Fig. 3;

Figs. 5A to 5C are longitudinally-sectional views showing the downward moving process of the air suction filter;

Fig. 6 is a cross-sectional view showing an initial state of a cam member;

Fig. 7 is a diagram showing a state that the cam member starts rotation;

Fig. 8 is a cross-sectional view showing the final state of the cam member; and

Fig. 9 is a diagram showing the final state of the cam member.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

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

Figs. 1 to are cross-sectional views showing the main body 1 of a wall mounted type air conditioner according to the present invention.

The main body 1 of the air conditioner is fixed on the wall 3. The main body 1 is equipped with an indoor heat exchanger 5 and a cross-flow fan disposed inside the main body 1. Further, an upper air suction port 9 is formed in the form of a grille at the upper portion 1A of the main body 1, and an air suction grille 11 is secured to the front edge portion 1B of the upper

portion 1A so that the lower end 11B of the air suction grille 11 is freely released from the front face of the main body 1 under the state that the upper end 11A of the air suction grille 11 is linked to the front edge portion 1B through a hinge so as to be rotatable around a fulcrum 12.

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

Fig. 4 is a perspective view showing the outlook of the main body 1 of the air conditioner when the air suction filter 13 having the filter element 14 is downwardly moved, and it corresponds to Fig. 3.

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 1 of the air conditioner, and a blow-direction changing plate 23 is disposed in the air blow-out port 21. The blow-direction changing plate 23 comprises a small-width lower horizontal plate 23A extending in the longitudinal direction of the lower side of the air blow-out port 21, an upper horizontal plate 23B extending in the longitudinal direction of the upper side of the air blow-out port 21 and plural vertical plates 23C extending in the short-side direction of the upper side of the air blow-out port 21.

Figs. 5A to 5C show an elevating mechanism of the air suction filter 13.

According to this embodiment, the elevating mechanism comprises guides 41 fixed on the inner surface of the air suction grille 11, a filter holder 43 which is freely movable upwardly/downwardly while guided along the guides 41, a take-off portion 45 which is freely insertable/detachable into/from

the filter holder 43, and a filter element 14 mounted on the take-off portion 45. The guides 41 are disposed at both the sides of the air suction grille 11, and serve to guide both the sides of the filter holder 43.

Reference numeral 47 represents an upper guide, and it guides only the upper end portion 14A of the filter element 14. As shown in Fig. 1, the upper guide 47 is disposed so as to extend along the gap between the upper portion 1A of the main body 1 and the upper portion of the indoor heat exchanger 5 while curved.

Next, a driving system for the air suction filter 13 will be described.

The air suction filter 13 is fixed to the inner surface of the air suction grille 11 through the pair of right and left guides 41, and a fixing portion 51 is disposed at the lower end of each of the pair of guides 41. A pinion 52 is equipped to each fixing portion 51, and the pinions 52 are linked to each other through a link shaft 53 to make the pinions 52 rotate in synchronism with each other. Any one of the pinions 52 is linked to a DC stepping motor which is rotatable forwardly and reversely.

Each pinion 52 is engaged with a rack 43A fixed to the outer wall of the filter holder 43. When the DC stepping motor is driven, the pinions 52 are rotated in synchronism with each other, and the filter holder 43 is moved upwardly or downwardly in conformity with the rotational direction of the pinions 52.

A belt 54 is fixed to the upper end portion of the fixing portion 51 at one end thereof and turned around an upper roller 56 fixed to the upper end of the filter holder 43. The belt 54 extends downwardly, is fixed to the upper end of the take-off portion 45 at the substantially intermediate portion 54C

thereof and further extends downwardly. Thereafter, the belt 54 is turned around a lower roller 57 fixed to the lower end of the filter holder 43, extends upwardly and then is fixed to the lower end portion of the fixing portion 51. Accordingly, when the DC stepping motor is forwardly rotated, the filter holder 43 is downwardly moved through the engagement between the rack 43A and the pinion 52. At this time, since the substantially intermediate portion 54C of the belt 54 is fixed to the upper end of the take-off portion 45, the filter holder 43 is downwardly moved to the lowest point thereof, and at the same time the take-off portion 45 is downwardly moved to the lowest point thereof which is located at a lower position than the lowest point of the filter holder 43 as shown in Fig. 5C.

On the other hand, when the DC stepping motor is reversely rotated, the filter holder 43 is upwardly moved through the engagement between the rack 43A and the pinion 52, and also the take-off portion 45 is drawn up into the filter holder 43 by the belt 54 and retracted at a predetermined position.

This embodiment is equipped with a mechanism for performing the following operation. For example when the air suction filter 13 starts the downward movement as described above on the basis of a signal input from a remote controller (not shown), as shown in Fig. 2, the air suction grille 11 is released from the front face of the main body 1 of the air conditioner interlockingly with the downward movement of the air suction filter 13, a gap 100 having a fixed interval is formed between the lower end of the air suction grille 11 and the main body 1 of the air conditioner, and the air suction filter 11 is downwardly moved to the predetermined position through the gap 100.

That is, a cam member 61 is provided in the neighborhood of the

upward/downward movement path of the filter holder 43 (air suction filter) as shown in Fig. 6, and one end 61A of the cam member 61 is linked to the fixed portion of the air suction grille 11 through a hinge so as to be rotatable around a fulcrum 62.

An abutting portion 63 is integrally formed on the other end 61B of the cam member 61 so as to project into the movement path of the filter holder 43. When the filter holder 43 is downwardly moved and the lower end 43A of the filter holder 43 abuts against the abutting portion 63, the abutting portion 63 is pushed aside and the cam member 61 is rotated in the direction of an arrow A around the fulcrum 62. When the filter holder 43 is further downwardly moved, the abutting portion 63 is detached from the lower end 43A of the filter holder 43, the cam member 61 is further rotated in the direction of the arrow A around the fulcrum 62, and then the press portion 61C of the cam member 61 abuts against the fixed portion 65 of the main body 1 of the air conditioner as shown in Figs. 8 and 9.

In this embodiment, the main body 1 of the air conditioner is designed so that the dimension between the fixed portion 65 of the main body 1 of the air conditioner and the filter holder 43 is smaller as the filter holder 43 is downwardly moved. Accordingly, when the filter holder 43 is downwardly moved to the predetermined position, the filter holder 43 is pushed aside by the cam member 61 located between the fixed portion 65 and the filter holder 43 because the fixed portion of the main body 1 is unmovable, and thus the air suction grille 11 is released from the front face of the main body 1 of the air conditioner, so that a gap 100 enough to pass the air suction filter 11 downwardly therethrough can be formed between the lower end of the air

suction grille 11 and the main body 1 of the air conditioner.

The above construction is equipped with the mechanism for releasing the air suction grille 11 from the front face of the main body 1 interlockingly with the downward movement of the air suction filter 11 when the air suction filter 11 starts its downward motion in response to the signal input from a remote controller or the like, and downwardly moving the air suction filter 11 to the predetermined position through the gap 100 thus formed. Therefore, it is unnecessary to provide a slender opening portion (slit) for the downward movement of an air suction filter at the lower portion of the main body 1 of the air conditioner and a lid member for covering the opening portion. Therefore, the structure can be simplified, and the number of parts can be reduced, so that the manufacturing cost of the air conditioner can be reduced. Further, the lid member, etc. do not appear, and thus the present invention makes the outlook of the air conditioner more excellent in beauty.

In the above-described embodiment, when the air suction filter is upwardly moved to the initial retract position thereof and the contact between the cam member 61 and the filter holder 43 is released, the air suction grille 11 is rotated around the fulcrum 12 in the opposite direction to that of the downward movement of the filter holder 43 and returned to the close position thereof due to its own weight. In this case, as shown in Figs. 1 to 3, a fit pin 58 is equipped to the tip portion 58B of the take-off portion 45 and a fit piece 58A is equipped at the front face of the main body 1 of the air conditioner. The fit pin 58 and the fit piece 58A are designed to be engaged with each other under the state that the filter holder 43 is located at the retract position between the air suction grille 11 and the front face of the

main body 1.

As shown in Fig. 2, the tip portion 57B of the take-off portion 45 is designed to have a slope surface as shown in Fig. 2. When the filter holder 43 is upwardly moved to the retract position, the slope surface of the tip portion 58B of the take-off portion 45 abuts against the tip of the fit piece 58A, and the air suction grille 11 is moved to the close position thereof due to its weight with keeping the contact between the slope surface and the fit piece 58A. When the filter holder 43 is further upwardly moved, the fit pin 58 abuts against the lower surface of the fit piece 58A. In this case, the fit piece 58A is designed to be bent (i.e., the fit piece 58A has a slope portion), and the fit pin 58 is slid along the lower surface of the slope portion of the fit piece 58A. Through this sliding motion of the fit pin 58 in the upward and inward direction, the air suction grille 11 is further moved to the close position. Accordingly, when the filter holder 43 is located at the retract position, the pin 58 is surely fitted to the fit piece 58A, so that the attachment between the air suction grille 11 and the front face of the main body 1 is made sure.

In this case, an urging member such as a spring or the like may be provided between the air suction grille 11 and the main body 1 to forcibly urging the air suction grille 1 to the main body 1, so that the air suction grille 11 can be quickly and surely returned to the initial close position thereof interlockingly with the upward movement of the filter holder 43 to the initial retract position thereof. In this case, the attachment force between the air suction grille 1 and the front face of the main body 1 is set to such level that the air suction grille 1 is easily released from the front face of the main body 1 when the filter holder 43 is pushed aside by the cam member 61.

Further, the fixing member is not limited to a combination of the fit pin 58 and the fit piece 58A, and it may be magnet, a combination of a projecting and a recess in which the projecting can be fitted or the like.

In the above-described embodiment, the cam member 61 has a substantially triangular shape in which one apex thereof abuts against the fixed portion of the main body 1, another apex thereof abuts against the filter holder 43 and the other apex thereof serves as a fulcrum around which the cam member 61 is rotatable. However, the cam member 61 is not limited to the triangular member, and any kind of cam member having any shape may be used insofar as it pushes aside the filter holder 43 (air suction grille 11) interlockingly with the downward movement of the filter holder 43.

The present invention is not limited to the above-described embodiment, and various modifications may be made to the embodiment.

For example, in the above embodiment, the air suction grille is released from the front face of the main body in response to an input signal from a remote controller or the like, and the air suction filter is passed (downwardly moved) to the predetermined position through the gap formed between the lower end of the air suction grille and the main body. Therefore, the air suction filter can be downwardly moved to the predetermined position without any complicated structure like the prior art.

WHAT IS CLAIMED IS

1. A wall mounted type air conditioner including an air suction grille disposed at the front face of the main body of the air conditioner, characterized in that said air suction grille has an air suction filter member disposed at the inside thereof so that said air suction filter member is freely movable upwardly and downwardly, and on the basis of an instruction from the external said air suction grille is released from the front face of the main body and said air suction filter member is passed through the gap formed between said air suction grille and the front face of the main body when said air suction grille is released from the front face of the main body.
2. The wall mounted type air conditioner as claimed in claim 1, further including a mechanism for moving said air suction filter member downwardly and upwardly on the basis of the instruction from the external, and releasing and closing said air suction grille from and to the front face of the main body interlockingly with the downward and upward movements of said air suction filter member respectively, said air suction filter member being downwardly and upwardly moved through the gap between said air suction grille and the front face of the main body.
3. The wall mounted type air conditioner as claimed in claim 2, wherein said mechanism includes a cam member that is rotatably disposed in the neighborhood of an upward and downward movement path of said air suction filter member, and said cam member partially abuts against said air suction filter member and rotates when said air suction filter member is downwardly moved, and releases said air suction grille from the front face of the main body through the rotation of said cam member.

4. The wall mounted type air conditioner as claimed in claim 2, wherein said mechanism includes at least one rack fixed to said air suction filter member, at least one pinion fixed to said air suction grille and a DC stepping motor for driving said at least one pinion, said air suction filter member being upwardly and downwardly moved through the engagement between said rack and said pinion when said at least one pinion is rotated by said DC stepping motor.

5. The wall mounted type air conditioner as claimed in claim 1, further comprising a fixing member for forcedly keeping the attachment between said air suction grille and the front face of the main body when said air suction filter member is retracted inside said air suction grille.

6. The wall mounted type air conditioner as claimed in claim 1, wherein said air suction filter member comprises a guide member fixed to the inner surface of said air suction grille, a filter holder that is freely upwardly and downwardly movable while guided along said guide member, a take-off portion freely detachably inserted in said filter holder and a filter element mounted on said take-off portion.