An air circulation fan used in a light steel frame includes a top base, a circuit assembly, a shroud, a driving source, and a blade set. A pivoting portion of the shroud is pivotally connected to a combining portion of the top base, so that the shroud can pivotally hang on the top base. When the shroud is combined with the top base, the two connecting portions of the shroud are inserted into two through-holes of an accommodating casing with a second elastic piece of each through-hole abutting against a first elastic piece of each combining portion, thereby electrically connecting the circuit assembly to the driving source. When the shroud is separated from the top base, the connecting portions are removed from the through-holes with the second elastic piece being separated from the first elastic piece, thereby shutting off the electrical connection between the circuit assembly and the driving source.
FIG. 2
AIR CIRCULATION FAN USED IN LIGHT STEEL FRAME

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The embodiment of the invention relates to an air circulation fan used in a light steel frame, and in particular to an air circulation fan used in a light steel frame, which can be assembled and disassembled easily.

[0003] 2. Description of Prior Art

[0004] In general, the air circulation fan used in a light steel frame is referred as an air circulation fan mounted in a ceiling plate of the light steel frame, which is used for keeping the circulation of air.

[0005] As shown in FIG. 1, the conventional air circulation fan 1 used in a light steel frame includes a top base 2 positioned in the light steel frame, a shroud 3 mounted below the top base 2, a blade set 4 disposed in the top base 1, and a rotating disk 5 assembled with the shroud 3. The top base 1 and the shroud 3 are assembled together by screws.

[0006] When the interior of the conventional air circulation fan 1 used in a light steel frame is to be cleaned or repaired, or its components are to be replaced, the screws fixed between the top base 2 and the shroud 3 have to be loosened first. Then, an operator needs to hold the shroud 3 by his one hand to prevent the shroud 3 from falling to the ground while cleaning, repairing or replacing the components of the air circulation fan by the other hand. As a result, it is very inconvenient for the operator to detach the shroud 3 from the top base 2 or mount the shroud 3 back to the top base 2.

[0007] Further, when the shroud 3 is to be assembled with the top base 2, the operator has to stand below the top base 2 and holds the shroud 3 to face upward so as to mount the upward-facing shroud 3 to the top base 2. Thus, the shroud 3 often blocks the operator’s sight, which makes the operator more difficult to align the shroud 3 with the top base 2 for fixation. As a result, it takes a lot of time to assemble or disassemble the conventional air circulation fan. Especially, it takes more working hours and has greater difficulty in carrying out such an assembling or disassembling process by only one operator.

[0008] Further, the top base 2 of the conventional air circulation fan 1 is provided with a fan motor 6 for driving the blade set 4 to rotate. The shroud 4 is provided with a synchronous motor 7 for driving the rotatable disk 5 to rotate. The fan motor 6 and the synchronous motor 7 are electrically connected to a circuit assembly 8 on the top base 2 via electric wires. After the circuit assembly 8 is electrically connected to an external power source 9, the external power source 9 can provide the necessary electricity for the operation of the fan motor 6 and the synchronous motor 7.

[0009] However, when the shroud 3 is to be assembled with the top base 2, the electrical connection between the circuit assembly 8 and the fan motor 6 as well as the electrical connection between the synchronous motor 7 and the external power source 9 have to be established before the assembly of the shroud 3 with the top base 2. Similarly, when the shroud 3 is to be detached from the top base 2, the electrical connection between the circuit assembly 8 and the fan motor 6 as well as the electrical connection between the synchronous motor 7 and the external power source 9 have to be shut off to thereby detach the circuit assembly 8, the fan motor 6, the synchronous motor 7 and the external power source 9 from each other. Thereafter, the shroud 3 can be detached from the top base 2. Therefore, such a procedure makes the assembly/detachment of the conventional air circulation fan too complicated, which increases the working hours and reduces the efficiency in operation.

SUMMARY OF THE INVENTION

[0010] In order to solve the above problems, an objective of the embodiment of the invention is to provide an air circulation fan used in a light steel frame, which can be assembled or disassembled easily with improved efficiency and reduced working hours even by one operator.

[0011] Another objective of the embodiment of the invention is to provide an air circulation fan used in a light steel frame, in which the electrical connection between a driving source and a circuit assembly can be shut off once a shroud is detached from a top base.

[0012] In order to achieve the above objectives, the embodiment of the invention provides an air circulation fan used in a light steel frame, including:

[0013] a top base having a main body, a combining portion provided on one side of the main body, a hooking piece provided on the other side of the main body opposite to the combining portion, and an accommodating casing provided inside the main body, the accommodating casing being provided with two through-holes each having a first elastic piece of electrical conductivity;

[0014] a circuit assembly provided in the accommodating casing of the top base for electrically connecting an external power source to the first elastic piece of the top base;

[0015] a shroud having a covering body, a pivoting portion provided on one side of the covering body, an insertion trough provided on the other side of the covering body opposite to the pivoting portion, and two connecting portions provided in the covering body each having a second elastic piece of electrical conductivity;

[0016] a driving source provided between the top base and the shroud and electrically connected to the second elastic piece of the shroud;

[0017] a blade set provided inside the main body of the top base and coupled to the driving source, the blade set being driven by the driving source to rotate in situ;

[0018] wherein the pivoting portion of the shroud is pivotally connected to the combining portion of the top base, so that the shroud can be pivotally hung on the top base;

[0019] when the shroud is combined with the top base, the connecting portion of the shroud is inserted into the through-hole of the accommodating casing with the second elastic piece abutting against the first elastic piece, thereby electrically connecting the circuit assembly to the driving source;

[0020] when the shroud is separated from the top base, the connecting portion is removed from the through-hole with the second elastic piece being separated from the first elastic piece, thereby shutting off the electrical connection between the circuit assembly and the driving source.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. 1 is an exploded perspective view showing a conventional air circulation fan used in a light steel frame;

[0022] FIG. 2 is an exploded perspective view showing a preferred embodiment of the invention;

[0023] FIG. 3 is a partially enlarged exploded view showing the preferred embodiment of FIG. 2;
FIG. 4 is a partially enlarged cross-sectional view showing the preferred embodiment of FIG. 2;

FIG. 5 is a partially enlarged assembled view showing the preferred embodiment of FIG. 2;

FIG. 6 is an assembled perspective view showing the preferred embodiment of FIG. 2;

FIG. 7 is a partially cross-sectional assembled view showing the preferred embodiment of FIG. 2; and

FIG. 8 is a partially cross-sectional exploded view showing the preferred embodiment of FIG. 2.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 2 to 4. The top base 10 has a main body 11, a combining portion 12 provided on one side of the main body 11, a hooking piece 13 provided on the other side of the main body 11 opposite to the combining portion 12, and an accommodating casing 14 provided inside the main body 10. The combining portion 12 is integrally formed on a side edge of the main body 11. The interior of the combining portion 12 has a pivoting space 121. The top of the combining portion 12 has an inlet 122 in communication with the pivoting space 121 and the outside. One side of the combining portion 12 has a hinging port 123 in communication with the pivoting space 121 and the inlet 122. The size of the hinging port 123 is smaller than the size of the inlet 122.

A free end of the accommodating casing 14 is provided with two through-holes 141. The inner wall of each through-hole 141 is provided with a first elastic piece 142 of electrical conductivity. An end of each first elastic piece 142 adjacent to the through-hole 141 is bent to form an inclined surface 143.

As shown in FIGS. 2 and 4, the circuit assembly 20 is provided in the accommodating casing 14 of the top base 10 and electrically connected to the first elastic piece 141. The circuit assembly 20 is electrically connected to an external power source, thereby electrically conducting the electricity of the external power source into the circuit assembly 20.

Please refer to FIGS. 2 to 4. The shroud 30 has a covering body 31, a pivoting portion 32 provided on one side of the covering body 31, an insertion trough 33 provided on the other side of the covering body 31 opposite to the pivoting portion 32, and two connecting portions 34 provided in the covering body 31. The pivoting portion 32 is integrally formed on a side edge of the covering body 31. The pivoting portion 32 has a supporting arm 321 and a pivotal shaft 322. The pivotal shaft 322 is positioned on a side edge of the supporting arm 321. The pivotal shaft 322 is provided with an electrical conductivity. The top end of the second elastic piece 341 is bent to cover the top of the connecting portion 34.

As shown in FIG. 2, the driving source 40 is referred to a source which is rotatable after being energized by electricity. The driving source 40 has a fan motor 41 and a synchronous motor 42. The fan motor 41 is provided at a central position in the main body 11 of the top base 10. The synchronous motor 42 is provided in a central position in the covering body 31 of the shroud 30. The driving source 40 is electrically connected to the second elastic piece 341 of the shroud 30, that is, the fan motor 41 and the synchronous motor 42 are both electrically connected to the second elastic piece 341.

As shown in FIG. 2, the blade set 50 is combined with the fan motor 41 of the driving source 40 and located in a central position in the main body 11 of the top base 10. The blade set 50 is driven by the fan motor 41 of the driving source 40 to rotate in situ.

As shown in FIG. 2, the rotating disk 60 is combined with the synchronous motor 42 of the driving source 40 and located in a central position in the covering body 31 of the shroud 30. The rotating disk 60 is driven by the synchronous motor 42 of the driving source 40 to rotate in situ.

When the shroud 30 is to be assembled with the top base 10, the pivotal shaft 322 of the pivoting portion 32 of the shroud 30 has to be disposed in the pivoting space 121 via the inlet 122 of the top base 10 in such a manner that the supporting arm 321 of the pivoting portion 32 can penetrate and protrude from the hinging port 123 as shown in FIG. 5. In this way, the pivotal shaft 322 can pivotally rotate in the pivoting space 121 to allow the shroud 30 to pivotally rotate relative to the top base 10 within a predetermined range of degrees. Then, the hooking piece 13 is inserted into the insertion trough 33 provided on the other side of the shroud 30, thereby assembling the shroud 30 with the top base 10.

When the shroud 30 is to be detached from the top base 10, the hooking piece 13 of the top base 10 is removed from the insertion trough 33 of the shroud 30, so that the pivotal shaft 322 of the shroud 30 can be hung on a side edge of the top base 10 as shown in FIG. 6. In this way, the shroud 30 can be prevented from being completely separated from the top base 10. Thus, an operator needs not to hold the shroud 30 by his/her hand while cleaning, repairing or replacing components in the top base 10.

Therefore, the pivotal connection between the combining portion 12 of the top base 10 and the pivoting portion 32 of the shroud 30 can increase the efficiency in assembling/dismantling the air circulation fan with reduced working hours. Even only one operator can do this job easily.

On the other hand, when the shroud 30 is to be assembled with the top base 10, the connecting portion 34 of the shroud 30 is inserted into the through-hole 141 of the top base 10 in such a manner that the second elastic piece 341 can be guided in the through-hole 141 along the inclined surface 143 of the first elastic piece 142 until the first elastic piece 142 abuts against the second elastic piece 341 in proper position as shown in FIG. 7. The contact between the first elastic piece 142 and the second elastic piece 341 can establish the electrical connection between the driving source 40 and the circuit assembly 20. When the shroud 30 is to be separated from the top base 10, the second elastic piece 341 of the shroud 30 is removed from the through-hole 141 of the accommodating casing 14. In this way, as shown in FIG. 8, the first elastic piece 142 does not contact the second elastic piece 341 any more, thereby shutting off the electrical connection between the driving source 40 and the circuit assembly 20.
According to the above, by means of the construction of the embodiment of the invention, the electrical connection between the driving source and the circuit assembly can be established or shut off quickly, easily and more safely.

What is claimed is:

1. An air circulation fan used in a light steel frame, including:
   a top base having a main body, a combining portion provided on one side of the main body, a hooking piece provided on the other side of the main body opposite to the combining portion, and an accommodating casing provided inside the main body, the accommodating casing being provided with two through-holes each having a first elastic piece of electrical conductivity;
   a circuit assembly provided in the accommodating casing of the top base for electrically connecting an external power source to the first elastic piece;
   a shroud having a covering body, a pivoting portion provided on one side of the covering body, an insertion trough provided on the other side of the covering body opposite to the pivoting portion, and two connecting portions provided in the covering body each having a second elastic piece of electrical conductivity;
   a driving source provided between the top base and the shroud and electrically connected to the second elastic piece of the shroud;
   and
   a blade set provided inside the main body of the top base and coupled to the driving source, the blade set being driven by the driving source to rotate in situ;

2. The air circulation fan used in a light steel frame according to claim 1, wherein the combining portion is integrally formed on a side edge of the main body, the interior of the combining portion has a pivoting space, the top of the combining portion has an inlet in communication with the pivoting space and the outside, one side of the combining portion has a hanging port in communication with the pivoting space and the inlet, the size of the hanging port is smaller than the size of the inlet, the pivoting portion of the shroud is integrally formed on a side edge of the covering body, the pivoting portion has a supporting arm and a pivotal shaft connected to a distal end of the supporting arm, the pivotal shaft is vertically connected to the supporting arm, both ends of the pivotal shaft protrude from two opposite sides of the supporting arm, the pivotal shaft of the pivoting portion is disposed into the pivoting space and the inlet to thereby pivotally rotate in the pivoting space, the supporting arm protrudes out of the hanging port.

3. The air circulation fan used in a light steel frame according to claim 2, wherein the axial length of the pivotal shaft is smaller than the size of the inlet but larger than the size of the hanging port.

4. The air circulation fan used in a light steel frame according to claim 1, wherein an end of each first elastic piece adjacent to the through-hole is bent to form an inclined surface.

5. The air circulation fan used in a light steel frame according to claim 1, wherein an end of each second elastic piece is bent to cover the top of the connecting portion.

6. The air circulation fan used in a light steel frame according to claim 1, wherein the driving source has a fan motor and a synchronous motor, the fan motor is provided at a central position in the main body to be connected to the blade set, the synchronous motor is provided in a central position in the covering body, both the fan motor and the synchronous motor are electrically connected to the second elastic piece.

7. The air circulation fan used in a light steel frame according to claim 6, further including a rotating disk combined with the synchronous motor and located in a central position in the covering body, the rotating disk being driven by the synchronous motor to rotate in situ.

8. The air circulation fan used in a light steel frame according to claim 1, wherein the insertion trough is configured to allow the hooking piece to be inserted therein.