

ELECTRIC FANS

5 This invention relates to electric fans.

Figure 1 is an exploded perspective view and Figure 2 a sectional view taken on a line II-II of Figure 1, showing parts of a conventional electric fan as described and publicly laid open under  
10 the Japanese Utility Model No. 52-103948.

In the drawings, the reference (a) indicates a support formed with a groove (b) to be fixed to a main body (not shown) comprising fan blades, an electric motor, guards, etc in the upper part. The  
15 reference (c) indicates a switch box disposed in the lower part of the support (a) and (d) indicates a base formed with a receptive groove (e) centrally thereof.

A conventional electric fan is constructed as referred to above, the  
20 switch box (c) being inserted into the receptive groove of the base (d) and the main body being fixed to the groove (b) of the support.

Usually there are various kinds of electric fans such as semi-floor type for Japanese room, desk set type and the height of  
25 support is different each dependent upon a purpose. Although there

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are some types of electric fans with the height adjustable for a kind of usage, their range of adjustments is limited in their extent and so it is known that each exclusive support (a) is necessary for the use of semi-floor type or desk set type.

5        In an electric fan explained above, it has been a problem that we have to select an electric fan with a size of support specifically for a kind of purpose, such as for semi-floor type or desk set type, and diversion of one type for another is not possible. Furthermore, it has been another problem that it is not  
10 possible to reduce production cost of various parts by standardizing their sizes and increase production efficiency.

A head part shown in vertical section in Figure 3 is already known in the laid open Japanese Patent No. 57-34477.

In Figure 3, (91) indicates a head part having a front cover  
15 (91a) and a back cover (91b), (92) indicates an electric motor for fan blades housed in the interior of the head cover (91), and fan blades (not shown) are connected to an axle (92a). (93) is a spindle fixed to the electric motor (92), extended downwards and received  
20 pivotally by way of a neckpiece (not shown), (94) is a plate fixed to the back portion of the electric motor (92) and the back cover (91b), (95) is an electric motor for head oscillation fixed to the plate (94) and an axle (95a) protrudes downwards from it. (96) is a crank fixed to the axle (95a) and (97) is a head oscillation rod rotatably held by the crank (96).

25        In a conventional electric fan constructed as above, an electric

motor for head oscillation is arranged behind an electric motor for driving fan blades and the known head oscillation device is made up of construction such that the rotational movement is transmitted to the axle (95a), the crank (96) and the head oscillation rod (97).

Consequently, in a conventional electric fan, due to the arrangement of an electric motor for head oscillation behind an electric motor for driving the fan blades, the shape of the head part of the electric fan protrudes backwards, which also requires larger packing form. It also makes it difficult to operate the fan near a wall surface. Furthermore, requiring a larger space has been a problem.

According to the invention, an electric fan comprises: a main body provided with a head part having a single set of fan blades, an electric motor for driving the fan blades, and a set of guards housing said blades, a neckpiece, an electric motor for head oscillation and a control box disposed below said head part; 5 a base detachably connectable directly to the lower part of the main body; and a support provided, when required, between said main body and said base with the upper part and the lower part each detachably connectable to said main body and said base respectively.

10 The support may comprise a tubular member, the upper part of the member being connected to the lower part of the control box of said main body by a screw and the lower part of the tubular member being connected to the base by a tube fixing screw.

Embodiment of the present invention will now be described with reference to Figures 4 to 17 of the accompanying drawings.

5 Referring to these drawings, Figure 4 is a front view of an electric fan for Japanese tatami room (semi-floor height); Figure 5 is a right side view of the fan; Figures 6 - 8 together illustrate a fully exploded perspective view showing each component; Figure 9 is an exploded perspective view of a head oscillation device and Figure 10 is a vertical section view of a part connecting a support. Figure 11 is a front view of a desk set type electric fan; Figure 12 is a right side view; Figure 13 and Figure 14 show perspective views indicating how parts are assembled; Figure 15 is a top view of packing form; Figure 16 is a vertical side view of Figure 15 and Figure 17 is a perspective view of that illustrated by Figure 15.

Firstly the overall structure of an electric fan will be explained referring to the example of Figures 4 to 10.

20 In Figure 4 and Figure 5, (1) is a front guard, (2) is a guard ring forming a periphery of the front guard (1), (3) is a rear guard matched to the front guard (1), (4) are fan blades housed in the inside of the front guard (1) and the rear guard (3), (5) is an electric motor for driving the fan blades (4), and thus a head part

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of an electric fan comprises said (1) - (5). (7) is a rear cover covering a substantially L-shaped support (35) not shown supporting an electric motor (5) for fan blades in its upper part, (8) is a handle fixed to the upper part of the support (35), (9) is a neck-  
5 piece held rotatably in the lower part of the support (35), (10) is a holding piece detachably mounted and movable upwards or downwards to the neckpiece (9) and prevents the lower part of guarding (2) from moving outwards, (11) is a neckpiece cover housing the neck-  
10 piece (9), (12) is a control box arranged below the neckpiece cover (11), (13) indicates its case, (14) indicates a cover covering the case (13), (15) indicates an ornamental panel arranged in front of the control box (12) and on which a push button switch (16) is disposed, (17) indicates a knob for controlling a time switch (61) as explained later. Thus, the main body (18) of an electric fan is  
15 constructed of the head part (6) and said (7) - (17) above. (19) indicates a support, (20) indicates a tube forming a major part of the support and the upper part being connected to the lower part of the control box (12) by a screw (21), and its lower part is connected to a base (23) by a fixing screw (22). (26) indicates an electric  
20 cable which passes through a bottom plate (24) and the tube (20) supplying electric power to an electric motor (47) for head oscillation and the electric motor for fan blades (5).

In Figure 6 - Figure 10, (31) is a guard mark, which is fastened to the central area of the front guard (1) by a screw (32). (33) is  
25 a nut to fix the fan blades (4) to the electric motor (5). (34)

is a plate for fixing the electric motor, by which plate (34) the electric motor (5) is fastened to the rear guard (3) by screws (5A). (35) is a substantially L-shaped support to which upper part the back side of the rear guard (3) is fixed, the lower part of the support being fixed to the neckpiece (9) by a screw (36) and covered by being fastened with the rear cover (7) by screws (37). (38) indicates a depression and elevation angle adjustment plate and is fixed rotatably to the lower part of the neckpiece (9) by a bolt (39) and nut (40). (41) and (42) indicate respectively a helical spring and a spring holding plate disposed in the neckpiece (9) giving recovering forces to the neckpiece (9) connected to the depression and elevation angle adjustment plate, (43) and (44) are respectively a pressure spring and balls disposed in the lower part of the neckpiece (9) selecting a position which determines a depression and elevation angle of the neckpiece (9) by working with the depression and elevation angle adjustment plate (38), (45) indicates a spindle fixed to the depression and elevation angle adjustment plate (38) and extends downwards, (46) indicates a locking screw fixing the neckpiece (9) to the neckpiece cover (11), (47) indicates an electric motor for head oscillation fixed inside the case (13) via supporting plate (48) by screws (49), a crank (50) is fixed to the motor spindle by a pin (50a), a rod (51) is pivotally mounted to the tip of the crank (50) by a screw (53) through a washer (52). (54) indicates a spindle tube supporting the spindle (45) inserted in the case (13), (55) indicates an arm with one end inserted by the spindle and the other

end rotatably mounted to the end of the rod (51), (56) indicates a clutch fixed to the lower area of the depression and elevation angle adjustment plate (38), housing a pressure spring (57) and a ball (58) inside, and housed in the inside of a cavity of the arm  
5 (55) connected frictionally to the arm (55) by the pressure spring (57). (59) indicates a condensor fixed by a locking screw (60), (61) indicates a time switch controlled by the knob (17), and thus (47) - (61) are housed in the inside of the case (13). (62) indicates a locking E-ring for location to the tip of the  
10 spindle (45). (63) indicates a screw fixing the push button switch (16) to the ornamental panel (15). (64) indicates, as shown in Figure 10, a tubular holder formed with a conical concaved surface (64a) mating a conical convexed surface (13a) formed in the lower part of the case (13) in its upper area and having a female thread  
15 (64b) in its lower area, and having an uneven surface (64c) and a groove (64d) in the upper peripheral surface and having a hole (64e) in the lower edge area. (65) indicates a spring pressure plate fixed in the lower part of the case (13) by a screw (66). (67) indicates a pressure spring held in by the pressure plate (65) and pressing a  
20 ball (68) placed in front of the edge of the spring to an uneven upper peripheral surface (64c) of the tubular holder (64), and thus a duplicate head oscillation device is constructed by said (64c) and (65) - (68). (69) indicates a cover arranged in the upper inside of the tube (20), (70) indicates a guide piece connecting the cover (69)  
25 and the tube (20), (71) indicates a fixing plate guided by the guide

plate (70) and with the tip of the screw (21) screwed into, (72) indicates an E-ring inserted to the tip of the screw (21), (73) indicates a pressure spring provided with the screw (21) and arranged between the tube (20) and the fixing plate (71). (74) 5 indicates a tube holder fixed in the lower inside of the tube (20) as shown in Figure 8 and having in the inside the female thread same as that of the tube holder (64), and (75) indicates a cable case cover provided on the lower surface of the bottom plate (24).

In an electric fan constructed as above, on electricity being 10 supplied to the electric motor (5), the fan blades (4) start rotating and push air through the front guard (1).

When electricity is supplied to the electric motor for head oscillation, the crank (50) rotates and the rod (51) makes reciprocating movement, and this movement is transmitted to the arm 15 (55). Thus, the arm (55) makes a titubating movement at the centre of the axis, and makes the spindle (45), connected to the arm (55) by way of the clutch (56) and the support (35) by way of the neck-piece (9), titubate also. The head part (6), thus, oscillates this way. Furthermore, when the main body (18) is horizontally moved, 20 since the ball (68) rolls on the uneven surface (64c) of the tubular holder (64) and stops at the place desired, oscillatory movement starts at this point making so-called duplicate head oscillation. Furthermore, when the head part (6) is tilted forward or backward, the neckpiece (9) may be held at any desired position by the 25 appropriate recovering forces of the helical spring and the depression

and elevation angle adjustment plate and the function of the pressure spring and balls.

Although the above is a construction of semi-floor type, this may be used for desk set type by taking the main body (18) off the tube (20), and connecting the main body (18) to the base (23) directly. The attaching and detaching process of this tube (20) is explained in the following.

Firstly, as shown in full section in Figure 10, after the fixing plate (71) is placed apart from the inside wall of the tube (20), the lower end of the tubular holder (64) is held to the main body (18) by the screw (66) engaging with the groove (64d) at the upper portion of the tube (20). As the screw (21) is rotated, the fixing plate (71) moves to the right side being guided by the guide piece and the end of the fixing plate (71) engages the hole (64e) of the tubular holder (64) as shown chain dotted. In this way, with the tubular holder (64) being fixed to the tube (20), upward removal of the electric fan will be prevented. The handling procedure for taking off the main body will be in the reverse manner. After taking off the tube (20), by inserting the tube holder to the hole of the base directly and screwing the tube fixing screw to the female thread (64b) of the tube holder (64), the electric fan may be used for desk set type as shown in Figure 11 and Figure 12.

Furthermore, the cable (26) may be taken outside of the tube holder (64) through the support (19) and the base (23).

Considering now the packing of the parts before assembly is

completed as shown in Figure 15 - Figure 17. That is, the main body (18), the support (19) and the base (23) separated from a whole unit will be stored in an outer case (81) together with packing materials.

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With this invention it is possible to use a smaller outer case (81) by packing the parts closely since the shape of the main body is different from a conventional shape and no part is protruding backward from the head part (6).

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In addition to the example that one product could be used for two type purposes such as semi-floor type and desk set type by the use or non-use of the support (19), the product could be further used for floor type purpose and for other various usages.

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In Figures 18 - 20 an electric fan is shown which is not in accordance with the present invention. Figure 18 is a side section view, Figure 19 is a back view, and Figure 20 is an exploded perspective view of the major parts of the fan.

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The fan of Figures 18-20 has a different type of head oscillating device, comprising an electric motor for head oscillation (47a) provided in the inside of a support (35a), not in the inside of a control box (13). Figure 18 is a side sectional view, Figure 19 is a rear view, and Figure 20 is an exploded perspective view. The upper part of a support (35a) is fastened to a rear guard (3) by screws (76) and in the lower part a spindle (45a) is attached thereto and extends downwards and a screw (77) prevents the support (35a) from lifting off. The neckpiece (9a) is inserted into a slot (79) of the upper part of a base (78) and pivotally held by a pin (80). (81) indicates a screw to select a position for depression and elevation angle of the neckpiece (9a) by locking the inserted part of the neckpiece (9a) in the slot (79) of the base (78).

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An electric motor for head oscillation (47a) is fixed in the interior of the support (35a) and one of the ends of a crank (50a) is fixed to the motor spindle. The other end of the crank (50a) is connected rotatably to one end of a link (51a) by a pin (83) and an E-shaped ring inserted into the end thereof. The other end of the link (51a) is connected rotatably to an arm (86) projecting sideways from the neckpiece by a screw (85). The head oscillating device comprising an electric motor for head oscillation (47a), a crank (50a), a link (51a) etc, is housed in the inside of the support (35a) and in the rear of the support (35a) a cover (89) is fastened by a screw (90) and a cover (89b) covers the front area.

The head oscillating device is similar to the previous embodiment in that the crank (50a) rotates by the electric motor for head oscillation (47a), and by the reciprocating movement of the link (51a) the support (35a) makes oscillating movement at the centre of the spindle (45a). Thus it is possible to have a function same as the previous embodiment.

Reference is made to co-pending Application Nos. 89.02683 and 89.02684 which claim subject matter disclosed herein.

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CLAIMS

1. An electric fan comprising: a main body provided with a head part having a single set of fan blades, an electric motor for driving the fan blades, and a set of guards housing said blades, a neckpiece, an electric motor for head oscillation and a control box disposed below said head part; a base detachably connectable directly to the lower part of the main body; and a support provided, when required, between said main body and said base with the upper part and the lower part each detachably connectable to said main body and said base respectively.

2. An electric fan as claimed in Claim 1, in which the support is made of a tubular member, the upper part of the member being connected to the lower part of the control box of said main body by a screw and the lower part of the tubular member being connected to the base by a tube fixing screw.

3. An electric fan as claimed in Claim 1, substantially as hereinbefore described with reference to Figures 4 to 17 of the accompanying drawings.

