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ELECTRIC FANS

5 This invention relates to electric fans, and is concerned with electric fans with oscillating head parts.

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

15 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 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.

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The electric fan is constructed by inserting the switch box (c) into the receptive groove of the base (d), the main body being fixed to the groove (b) of the support.

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5 A head part of an electric fan is shown in vertical section in
Figure 3, which head part is known prior art from the laid
open Japanese Patent No. 57-34477.

10 In Figure 3, (91) indicates a head part having a front cover
(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 pivotally by way of a neckpiece (not
shown), (94) is a plate fixed to the back portion of the
15 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).

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5 In a conventional electric fan as shown in Figure 3, the electric motor (95) for head oscillation is arranged behind the electric motor (92) used to drive the fan blades and the head part (91) oscillates by movement transmitted to the axle (95a), the crank (96) and the head oscillation rod (97) by the motor (95).

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Due to the disposition of the electric motor (95) behind the electric motor (92), the shape of the head part (91) protrudes backwards. This arrangement results in large packaging of an electric fan. It also makes it difficult to operate the fan near a wall surface.

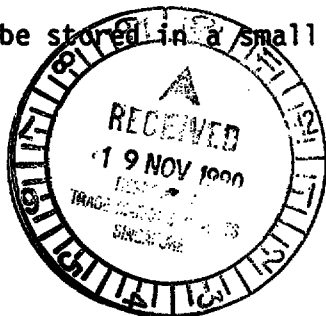
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The present invention solves these problems and a primary object of the invention is to provide an improved, multi-purpose electric fan, whereby production efficiency may be increased by standardising various parts.

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Another object of the present invention is to provide an electric fan without a head part protruding backwards, of small packing size, usable near a wall surface and which can be stored in a small space.

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According to the invention, an electric fan comprises: a main body and a base, the main body being provided with a head part comprising a plurality of fan blades, an electric motor for driving the fan blades, and a set of guards housing the electric motor and the fan blades, the head part being mounted on the base so as to allow oscillation of the head part relative to the base, a control box disposed below the head part and an electric motor disposed within the control box and operable to transmit oscillation movement to the head part, the main body being detachably connected to the base by way of an 'L'-shaped support.

Referring to Figures 4 to 16 of the drawings:

Figure 4 is a front view of a room electric fan,

Figure 5 is a side view of the fan,

Figures 6 to 9 are exploded views which illustrate various components of the fan,

Figure 10 is a fragmentary side view, in section, of a support part of the fan,

Figure 11 is a front view of a desk-set type electric fan,

Figure 12 is a right-hand side view of this fan,

Figures 13 and 14 are views in perspective indicating how parts of the fan are assembled,

5 Figure 15 is a plan view of the fan when packed,

Figure 16 is a vertical side view of the package of Figure 15, and

Figure 17 is a view in perspective of the fan and package of Figure 15.

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

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In Figures 4 and 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

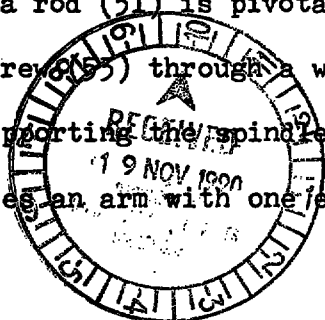
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of an electric fan comprises said (1) - (5). (7) is a rear cover covering a substantially L-shaped support (35) not shown supporting an electric motor (5) for fan blades in its upper part, (8) is a handle fixed to the upper part of the support (35), (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-
piece (9), (12) is a control box arranged below the neckpiece cover
10 (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

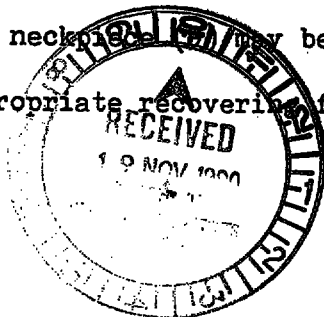
20 ball (68) placed in front of the edge of the spring to an uneven upper peripheral surface (64c) of the tubular holder (64), and thus a duplicate head oscillation device is constructed by said (64c) and (65) - (68). (69) indicates a cover arranged in the upper inside of the tube (20), (70) indicates 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 neck-piece (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).

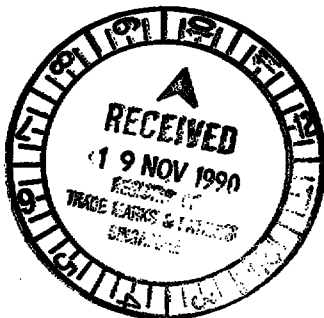
Considering now the packing of the parts before assembly is

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.

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).

As explained above, this invention has such advantages that one type of electric fan may be used for different purposes, ie semi-floor type, desk-set type, floor type, etc.

Reference is directed to the claims of co-pending applications no. 2,213,528 (87.00283) and 2,213,204 (89.02684) which have disclosures in common with those of the present application.



CLAIMS

1. An electric fan comprising: a main body and a base, the main body being provided with a head part comprising a plurality of fan blades, an electric motor for driving the fan blades, and a set of guards housing the electric motor and the fan blades, the head part being mounted on the base so as to allow oscillation of the head part relative to the base, a control box disposed below the head part and an electric motor disposed within the control box and operable to transmit oscillation movement to the head part, the main body being detachably connected to the base by way of an 'L'-shaped support.

