

DESCRIPTION

ELECTRIC FAN

5 TECHNICAL FIELD

The present invention relates to an electric fan.

BACKGROUND ART

An electric fan of the related art is configured of a U-shaped base
10 portion made of metal, two support portions that are able to be fixed to the base
portion so as to oppose each other, two lower support posts that are able to be
respectively fixed to the support portions, and a fan unit fixed to upper ends of
the lower support posts. The support portions are fixed to the base portion by
first fixing portions. Lower ends of the lower support posts are fixed to the
15 support portions by second fixing portions (for example, see PTL 1).

Citation List

Patent Literature

PTL 1: Japanese Patent Unexamined Publication No. 63-138196

20

SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

The electric fan of the related art has a problem that it takes time to
mount and assemble the lower support posts on the base portion.

25

An object of the present invention is to facilitate mounting of the lower
support posts on a base portion and to further improve an assembling property.

SOLUTIONS TO PROBLEM

In order to achieve the object, an electric fan of the invention includes a base portion; two support portions that are provided in the base portion to oppose each other; and fixing portions that are provided in each of the support portions. In addition, the electric fan includes two lower support posts which
5 have the lower ends fixed by the fixing portions; and a fan unit that is fixed to the upper ends of the lower support posts. The base portion is formed integrally with the support portions with resin.

According to the invention, if the lower support posts are fixed to the base portion, it is possible to fix the lower support posts by the fixing portions.
10 Therefore, mounting of the lower support posts on the base portion is facilitated and it is possible to further improve the assembling property.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view illustrating an appearance of an electric fan
15 of an embodiment of the invention.

FIG. 2 is an exploded view of the electric fan of the embodiment of the invention.

FIG. 3 is a perspective view of a base portion of the electric fan of the embodiment of the invention which is viewed from a bottom surface.

20 FIG. 4 is an enlarged perspective view of a support portion of the base portion of the electric fan of the embodiment of the invention which is viewed from the bottom surface.

FIG. 5 is an enlarged perspective view illustrating the support portion of the base portion of the electric fan of the embodiment of the invention.

25 FIG. 6 is an enlarged perspective view illustrating a connecting portion of the electric fan of the embodiment of the invention.

FIG. 7 is a schematic view of the base portion of the electric fan of the

embodiment of the invention which is viewed from the bottom surface.

DESCRIPTION OF EMBODIMENT

Hereinafter, an embodiment of the invention will be described with
5 reference to the drawings. The invention is not limited to the embodiment.

FIG. 1 is a perspective view illustrating an appearance of an electric fan
of an embodiment of the invention. FIG. 2 is an exploded view of the electric
fan. The electric fan of the embodiment includes base portion 1, support
portions 2, fixing portions 3, lower support posts 4, and fan unit 5.

10 FIG. 3 is a perspective view of base portion 1 of the electric fan of the
embodiment of the invention which is viewed from a bottom surface. As
illustrated in FIGS. 1 and 3, base portion 1 is symmetrical from back and front,
and is symmetrical from right and left. Base portion 1 has an elongated
rectangular shape that is long in a rightward and leftward direction. A
15 vertical cross-section of base portion 1 has a recessed shape that is opened
downward. Base portion 1 is configured of inner peripheral surface 6, top
surface 7, and outer peripheral surface 8. Base portion 1 includes a plurality
of planar base reinforcing ribs 9 on a lower surface connecting inner peripheral
surface 6, top surface 7, and outer peripheral surface 8. Base portion 1
20 includes two support portions 2 facing each other on right and left short sides.

FIG. 4 is an enlarged perspective view of support portion 2 of base
portion 1 of the electric fan of the embodiment of the invention which is viewed
from the bottom surface. FIG. 5 is an enlarged perspective view illustrating
support portion 2 of base portion 1 of the electric fan. As illustrated in FIGS. 3
25 to 5, support portion 2 is configured of cylindrical upper support portion 10
extending upward from an upper surface of base portion 1 and cylindrical lower
support portion 11 extending downward from a lower surface of base portion 1.

Upper support portion 10 and lower support portion 11 communicate with each other.

As illustrated in FIGS. 1, 4, and 5, right and left support portions 2 of base portion 1 include fixing portions 3. Lower ends of two lower support posts 4 are fixed to support portions 2 by fixing portions 3. Lower support portion 11 is formed integrally with inner peripheral surface 6 of base portion 1. Planar support reinforcing ribs 12 that are a plurality of reinforcing portions extend from a peripheral surface of lower support portion 11 to the lower surface of base portion 1 and to base reinforcing ribs 9.

Lower support post 4, of which an axial direction is the upward and downward direction, has a cylindrical shape. A material of lower support post 4 is metal. Fan unit 5 is fixed to upper ends of lower support posts 4.

Fan unit 5 is configured of connecting portion 13 that is fixed to the upper ends of lower support posts 4, two upper support posts 14 which have lower ends fixed to the upper portions of connecting portion 13, and fan portion 15 that is rotatably provided in upper support posts 14.

Upper support post 14, of which an axial direction is an upward and downward direction, has a cylindrical shape. A material of upper support post 14 is metal. Fan portion 15 is rotatably mounted on upper support posts 14.

Connecting portion 13 is configured of two connection support portions 16, connection fixing portion 17, and elongated rectangular plate-shaped connection plate portion 18. The upper ends of lower support posts 4 and the lower ends of upper support posts 14 are inserted into two connection support portions 16. Connection fixing portions 17 are provided on an upper side and a lower side of connection support portions 16. Connection plate portion 18 connects two connection support portions 16.

FIG. 6 is an enlarged perspective view illustrating the connecting

portion 13 of the electric fan of the embodiment of the invention. As illustrated in FIG. 6, connection support portion 16, of which an axial direction is the upward and downward direction, has a cylindrical shape. A material of connection support portion 16 is resin. Connection fixing portion 17 is
5 configured of lower connection fixing portion 19 that connects connection support portion 16 and the upper end of lower support post 4, and upper connection fixing portion 20 that connects connection support portion 16 and the lower end of upper support post 14.

Lower connection fixing portion 19 is configured of lower hole 21, upper
10 screw hole 22, and upper screw 23. Lower hole 21 is included on the outside below connection support portion 16. Upper screw hole 22 opposes lower hole 21 and is provided in an upper portion of lower support post 4. Upper screw 23 is screwed into upper screw hole 22 via lower hole 21. Upper connection fixing
15 portion 20 is configured of upper hole 24, lower screw hole 25, and lower screw 26 that is screwed into lower screw hole 25 via upper hole 24. Upper hole 24 is included on the outside above connection support portion 16. Lower screw hole 25 opposes upper hole 24 and is provided in a lower portion of upper support post 14. Lower screw 26 is screwed into lower screw hole 25 via upper
20 hole 24. Two connection support portions 16 oppose each other in the rightward and leftward direction in base portion 1. An axial direction of lower hole 21 and upper hole 24 is the rightward and leftward direction in base portion 1. Two connection support portions 16 are formed integrally with both ends of connection plate portion 18 and are formed of resin.

As illustrated in FIG. 2, the electric fan of the embodiment is assembled
25 by fixing fan unit 5, connecting portion 13, two lower support posts 4, and base portion 1 with screws. That is, in a packing state, fan unit 5, connecting portion 13, two lower support posts 4, and base portion 1 are separately

accommodated in one packing case.

The embodiment is characterized in that base portion 1 is formed integrally with support portion 2 and is formed of resin. Therefore, if lower support posts 4 are fixed to base portion 1, it is possible to fix lower support posts 4 to support portions 2 of base portion 1 by fixing portions 3. Therefore, mounting of lower support posts 4 on base portion 1 is facilitated and it is possible to further improve the assembling property.

Specifically, as illustrated in FIGS. 3 to 5, support portion 2 includes cylindrical upper support portion 10 extending upward from the upper surface of base portion 1 and cylindrical lower support portion 11 extending downward from the lower surface of base portion 1. Upper support portion 10 and lower support portion 11 communicate with each other and it is possible to insert the lower end of lower support post 4 into upper support portion 10 and lower support portion 11. Upper support portion 10 includes fixing portion 3 that fixes lower support post 4 to support portion 2. A reinforcing portion connected to base portion 1 is provided in lower support portion 11. The reinforcing portions are a plurality of reinforcing portions extending a peripheral surface of lower support portion 11 to the lower surface of base portion 1 and to base reinforcing ribs 9, and are planar support reinforcing ribs 12 having vertical surfaces.

Therefore, if lower support posts 4 are fixed to base portion 1, first, the lower ends of lower support posts 4 are inserted from openings of the upper ends of upper support portions 10 that are in support portions 2 of base portion 1. Next, the lower ends of lower support posts 4 are further inserted into the lower ends of lower support portions 11. Finally, lower support posts 4 are fixed to support portions 2 by fixing portions 3 of upper support portions 10. As described above, lower support posts 4 are inserted into support portions 2

of base portion 1 and it is possible to fix lower support posts 4 to support portions 2 by fixing portions 3. Therefore, it is possible to facilitate mounting of lower support posts 4 on base portion 1. The reinforcing portion connected to base portion 1 is provided in lower support portion 11. Therefore, even if a force is applied to lower support portion 11 in a direction in which lower support post 4 falls down, it is possible to receive the force applied from lower support post 4 to support portion 2 in base portion 1 via the reinforcing portion. Therefore, the strength of support portion 2 is improved and it is possible to support fan unit 5.

As illustrated in FIG. 5, distance X1 between the axial center of fixing portion 3 and the lower end of lower support post 4 and distance X1' between the axial center of fixing portion 3 and the lower end of lower support portion 11 are longer than distance X2 between the axial center of fixing portion 3 and the upper end of upper support portion 10.

Therefore, even if a force applied to lower support post 4 in a direction in which lower support post 4 falls down, lower support post 4 is inclined so as to be rotated around the axial center of fixing portion 3. Therefore, a moving distance of lower support post 4 in the upper end of upper support portion 10 is smaller than a moving distance of lower support post 4 in the lower end of lower support portion 11. Therefore, a force applied to the upper end of upper support portion 10 is smaller than the force applied to the lower end of lower support portion 11 and it is possible to suppress damage to the upper end of upper support portion 10. It is possible to receive the force applied from lower support post 4 to lower support portion 11 in base portion 1 via the reinforcing portion. Therefore, the strength of support portion 2 is improved and it is possible to support fan unit 5.

As illustrated in FIG. 5, fixing portion 3 is configured of hole 27 that is

included in upper support portion 10 inwardly, screw hole 28 that is provided in the lower portion of lower support post 4 to oppose hole 27, and screw 29 that is screwed into screw hole 28 via hole 27. Two support portions 2 oppose each other in base portion 1 in the rightward and leftward direction, and an axial direction of hole 27 is the rightward and leftward direction in base portion 1. Therefore, screw 29 is positioned in upper support portion 10 inwardly. Therefore, screw 29 is unlikely to be seen from the outside of base portion 1 and the design thereof is improved.

As illustrated in FIG. 4, an opening of the lower end of lower support portion 11 is closed by lower cover 30. Therefore, the strength of lower support portion 11 is improved. If the lower end of lower support post 4 is inserted and the lower end of lower support post 4 comes into contact with lower cover 30 which is provided in the lower end of lower support portion 11, hole 27 included in upper support portion 10 inwardly and screw hole 28 provided in the lower portion of lower support post 4 communicate with each other. Therefore, assembly workability by screw 29 is improved.

FIG. 7 is a schematic view of the base portion of the electric fan of the embodiment of the invention which is viewed from the bottom surface. An axis passing through point T is the center axis of upper support portion 10 and lower support portion 11. Line segment UV is a line segment passing through point T and is perpendicular to inner peripheral surface 6 and outer peripheral surface 8. Point S is a midpoint in line segment UV. As illustrated in FIG. 7, point T is provided near inner peripheral surface 6 from point S in line segment UV. That is, the center axis of upper support portion 10 and lower support portion 11 that serve as support portion 2 is provided near inner peripheral surface 6 from the midpoint of the line segment perpendicular to inner peripheral surface 6 and outer peripheral surface 8. Specifically, distance TV

between the center axis of upper support portion 10 and lower support portion 11 that serve as support portion 2, and inner peripheral surface 6 in base portion 1 is smaller than distance UT between the center axis of upper support portion 10 and lower support portion 11 that serve as support portion 2, and outer peripheral surface 8 in base portion 1. Therefore, stability of the electric fan is improved.

As described above, the electric fan of the embodiment includes base portion 1, two support portions 2 that are provided in base portion 1 to oppose each other, and fixing portions 3 that are provided respectively in support portions 2. The electric fan includes two lower support posts 4 which have the lower ends fixed by fixing portions 3 and fan unit 5 that is fixed to the upper ends of lower support posts 4. Base portion 1 is formed integrally with support portions 2 and is formed of resin. Therefore, mounting of lower support posts 4 on base portion 1 is facilitated and it is possible to further improve the assembling property.

Support portion 2 has a recessed shape of which a vertical cross-section is opened downward and is configured of cylindrical upper support portion 10 extending upward from the upper surface of base portion 1 and cylindrical lower support portion 11 extending downward from the lower surface of base portion 1. Upper support portion 10 and lower support portion 11 communicate with each other. The lower end of lower support post 4 is inserted into upper support portion 10 and lower support portion 11. Upper support portion 10 includes fixing portion 3. Reinforcing portion 12 connected to base portion 1 is provided in lower support portion 11. Therefore, it is possible to facilitate mounting of lower support post 4 on base portion 1. Even if the force is applied to lower support portion 11 in the direction in which lower support post 4 falls down, the force applied from lower support post 4 to support

portion 2 can be received by base portion 1 via reinforcing portion 12. Therefore, the strength of support portion 2 is improved and it is possible to support fan unit 5.

5 The distance between the axial center of fixing portion 3 and the lower end of lower support post 4, and the distance between the axial center of fixing portion 3 and the lower end of lower support portion 11 are longer than the distance between the axial center of fixing portion 3 and the upper end of upper support portion 10. Therefore, a moving distance of lower support post 4 in the upper end of upper support portion 10 is shorter than a moving distance of
10 lower support post 4 in the lower end of lower support portion 11. Therefore, the force applied to the upper end of upper support portion 10 is smaller than the force applied to the lower end of lower support portion 11 and it is possible to suppress damage to the upper end of upper support portion 10.

Fixing portion 3 is configured of hole 27 that is provided in upper
15 support portion 2 inwardly, screw hole 28 that is provided in the lower portion of lower support post 4 to oppose hole 27, and screw 29 that is screwed into screw hole 28 via hole 27. Two support portions 2 oppose each other in base portion 1 in the rightward and leftward direction and the axial direction of the hole is the rightward and leftward direction in base portion 1. Therefore,
20 screw 29 is positioned in upper support portion 10 inwardly. Therefore, screw 29 is unlikely to be seen from the outside of base portion 1 and the design thereof is improved.

The center axis of upper support portion 10 and lower support portion 11 is provided near inner peripheral surface 6 from the midpoint of the line
25 segment perpendicular to inner peripheral surface 6 and outer peripheral surface 8 of base portion 1. Therefore, stability of the electric fan is improved.

INDUSTRIAL APPLICABILITY

According to the invention, mounting of the lower support post on the base portion is facilitated, it is possible to further improve the assembling property, and thereby it is useful in the electric fan.

5

REFERENCE MARKS IN THE DRAWINGS

	1	base portion
	2	support portion
	3	fixing portion
10	4	lower support post
	5	fan unit
	6	inner peripheral surface
	7	top surface
	8	outer peripheral surface
15	9	base reinforcing rib
	10	upper support portion
	11	lower support portion
	12	support reinforcing rib
	13	connecting portion
20	14	upper support post
	15	fan portion
	16	connection support portion
	17	connection fixing portion
	18	connection plate portion
25	19	lower connection fixing portion
	20	upper connection fixing portion
	21	lower hole

	22	upper screw hole
	23	upper screw
	24	upper hole
	25	lower screw hole
5	26	lower screw
	27	hole
	28	screw hole
	29	screw
	30	lower cover

CLAIMS

1. An electric fan comprising:
a base portion;
two support portions that are provided in the base portion to oppose each other;
a fixing portion that is provided in each of the support portions;
two lower support posts which have lower ends fixed by the fixing portions;
and
a fan unit that is fixed to upper ends of the lower support posts,
wherein the base portion is formed integrally with the support portions with resin.

2. The electric fan of Claim 1,
wherein each of the support portions has a recessed shape in which a vertical cross-section is opened downward, and is configured of a cylindrical upper support portion extending upward from an upper surface of the base portion and a cylindrical lower support portion extending downward from a lower surface of the base portion,
wherein the upper support portion and the lower support portion communicate with each other,
wherein a lower end of each of the lower support posts is inserted into the upper support portion and the lower support portion,
wherein the upper support portion includes the fixing portion; and
a reinforcing portion connected to the base portion is provided in the lower

support portion.

3. The electric fan of Claim 2,

wherein a distance between an axial center of the fixing portion and the lower end of the lower support post, and a distance between the axial center of the fixing portion and the lower end of the lower support portion are longer than a distance between the axial center of the fixing portion and an upper end of the upper support portion.

4. The electric fan of Claim 2 or 3,

wherein the fixing portion is configured of a hole that is provided inwardly in the upper support portion, a screw hole that is provided in a lower portion of the lower support post to oppose the hole, and a screw that is screwed into the screw hole via the hole,

wherein the two support portions oppose each other in a rightward and leftward direction in the base portion, and

wherein an axial direction of the hole is the rightward and leftward direction in the base portion.

5. The electric fan of any one of claims 2 to 4,

wherein center axes of the upper support portion and the lower support portion are closer to an inner peripheral surface of the base portion than to a midpoint of a line segment perpendicular to the inner peripheral surface and an outer peripheral surface of the base portion.