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(56) Documents cited
GB 1508076 A GB 0783431 A GB 0715925 A
US 4900236 A US 4878806 A US 4729725 A
US 4518314 A US 4382400 A

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(54) Ceiling fan

(57) A unitary housing is provided, securable to the stationary member of the motor 16, for enclosing at least the lower and side surfaces of the motor 16 in a first compartment 36 thereof, and enclosing the electrical switch 24, 30 in a second compartment 38 thereof. The fan blades 20 are secured to the rotary part of the motor by means of wedge members 84.

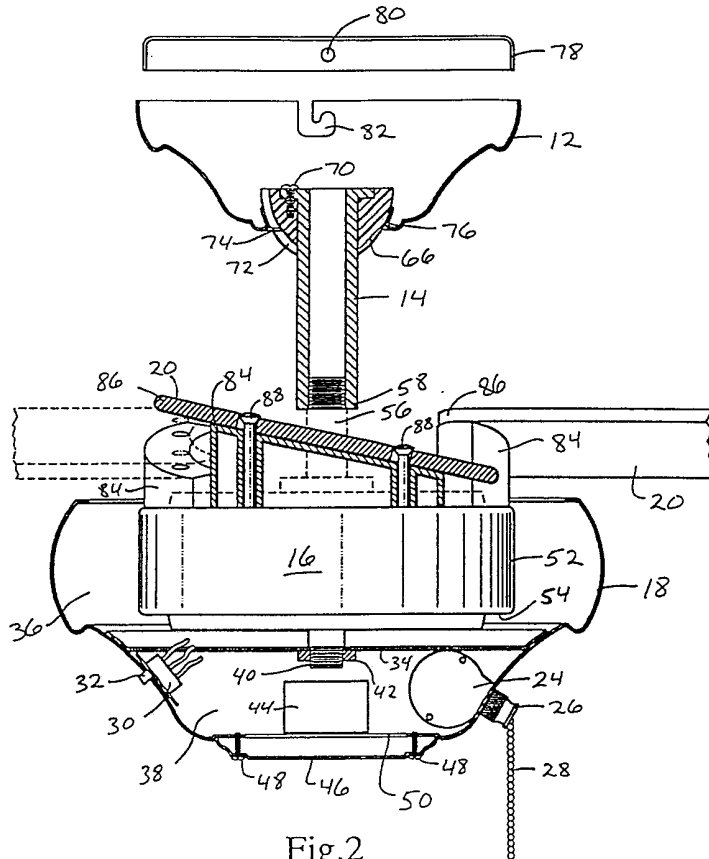


Fig.2

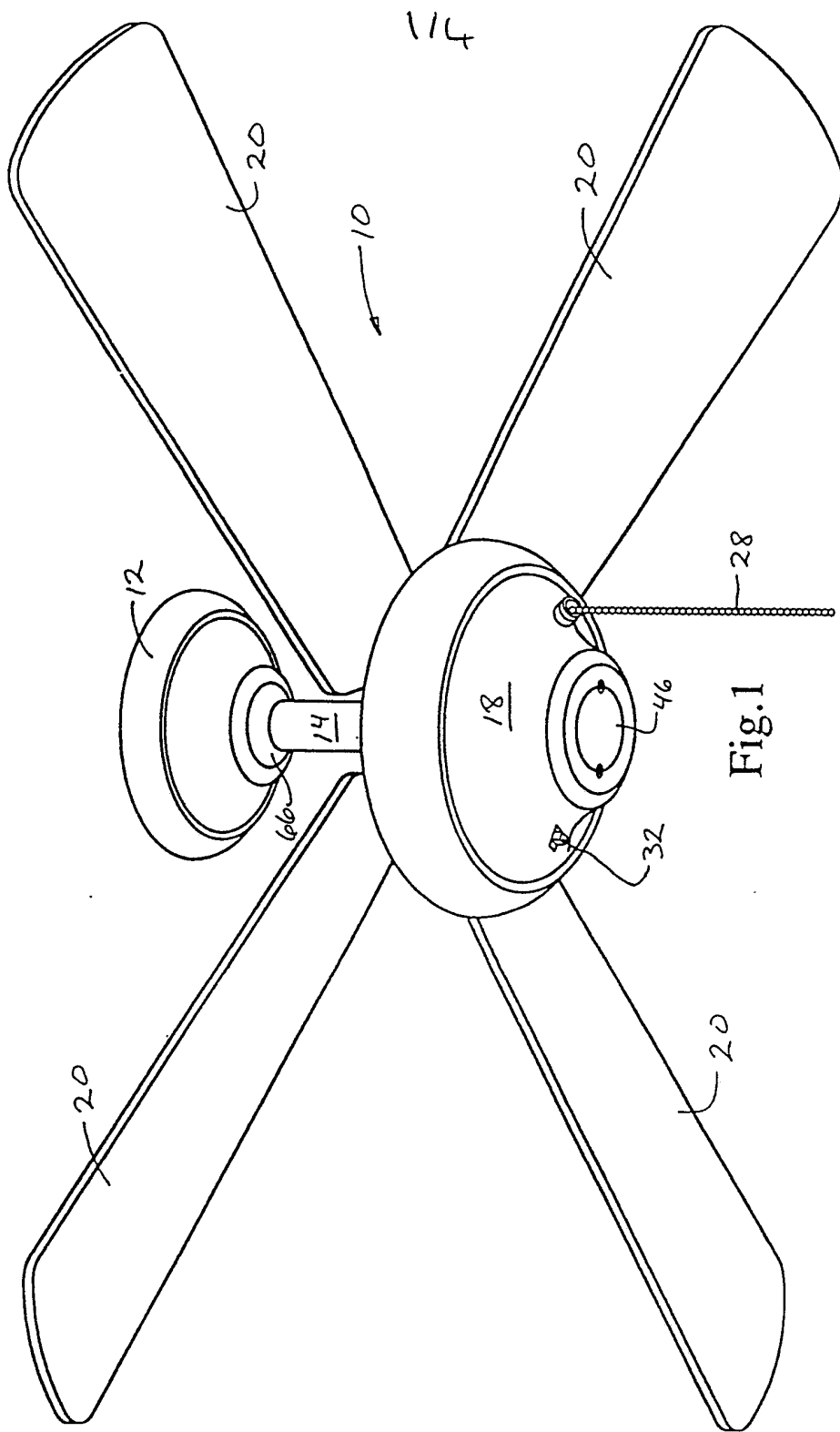


Fig. 1

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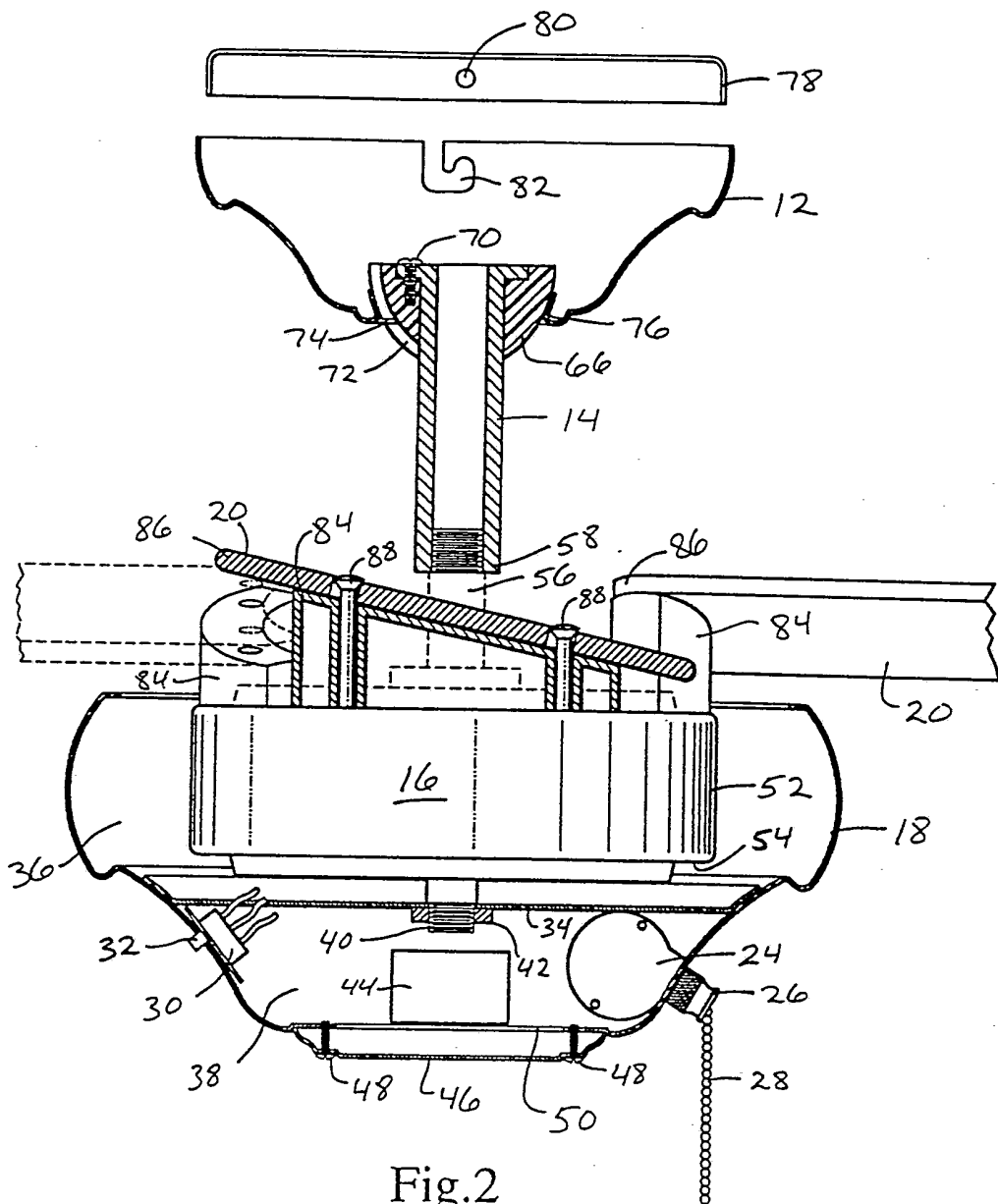


Fig.2

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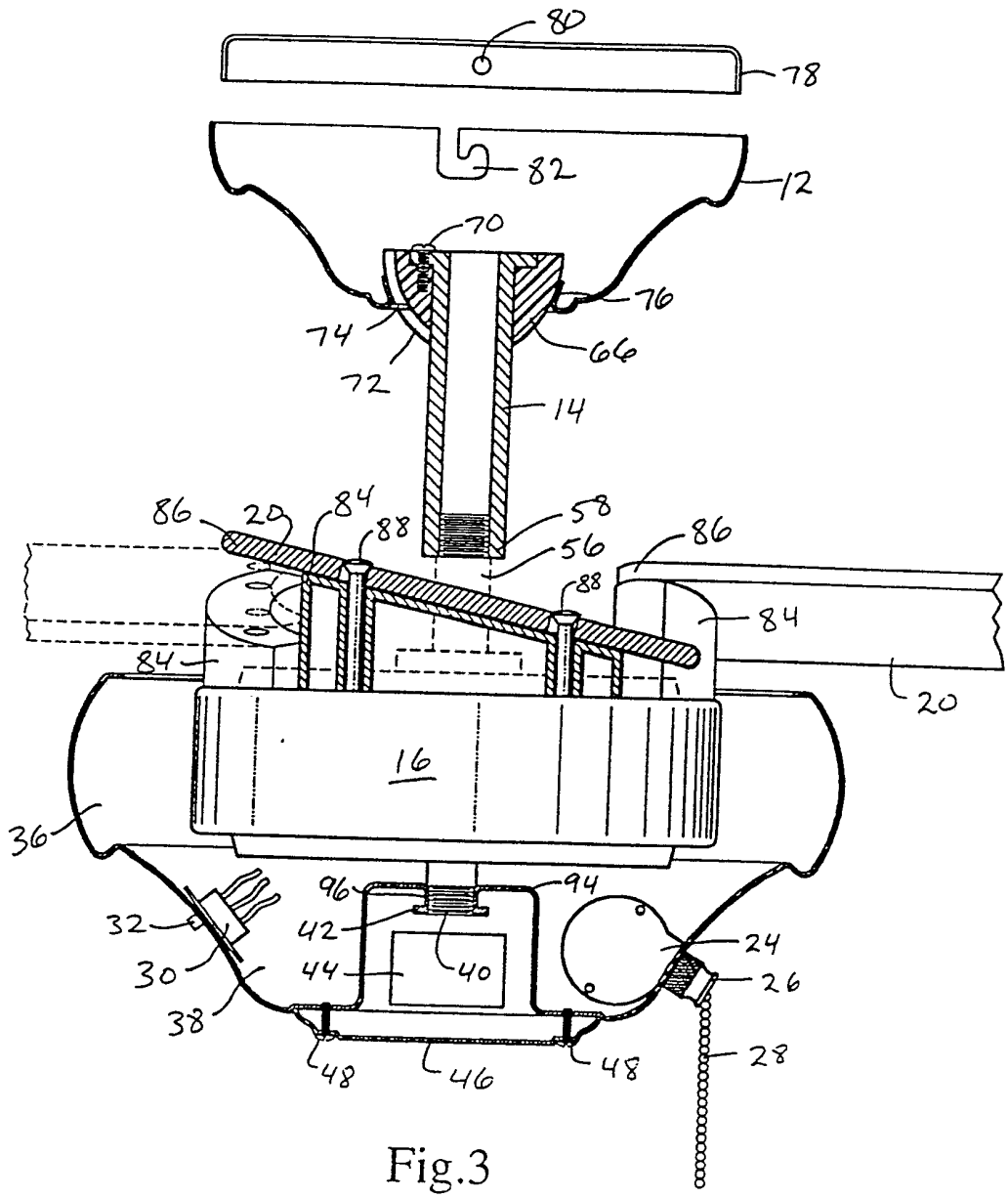
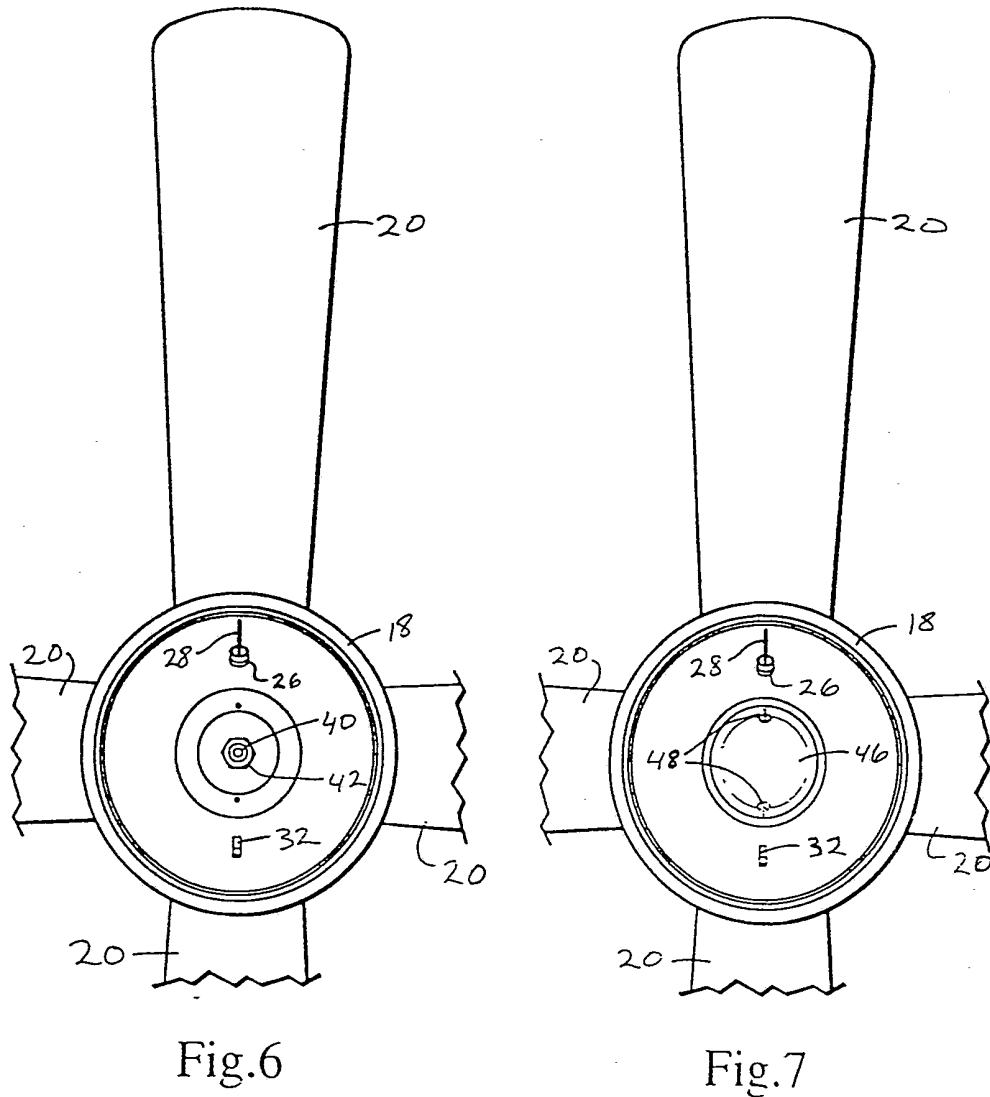
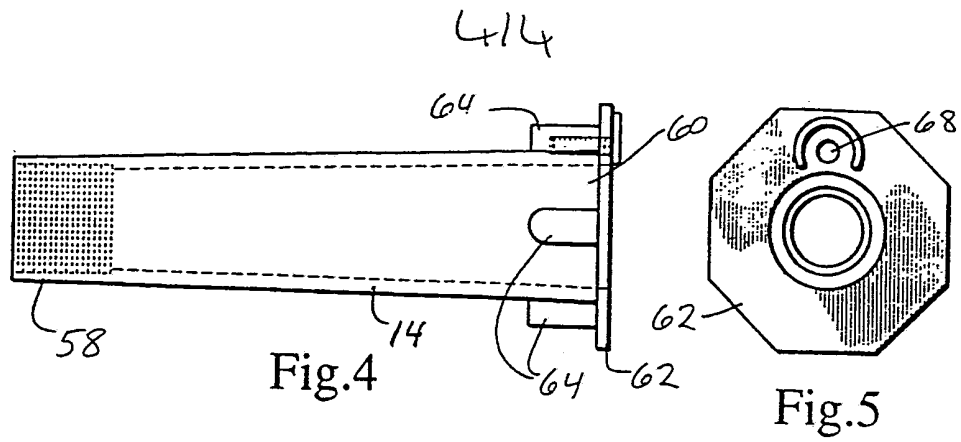


Fig. 3



CEILING FAN

Background of the InventionField

5 The present invention relates to ceiling fans and, more particularly, to ceiling fans having a unitary motor and switch housing.

Description of the Prior Art

10 Electric ceiling fans are commonly utilized to assist heating and air conditioning systems by providing an additional degree of air circulation within the confines of a room. A typical ceiling fan comprises a motor suspendable from a ceiling, a housing surrounding such motor, a switch (or switches) for allowing selective control of the motor, a separate housing for the switch, and a plurality of blades
15 attached to the motor. Generally speaking, modern ceiling fans can be broadly categorized into two groups: those having blades attached to the bottom surface of the motor, and those having blades attached to the top surface of the motor. An example of the former category is shown in U.S. Pat. No.
20 4,729,725, issued March 8, 1988, entitled "Mounting System for Selectively Mounting Ceiling Fans", while an example of the second category is shown in U.S. Pat. No. 4, 518,314, issued May 21, 1985, entitled "Decorative Fan Motor Cover and Mounting Structure Therefore".

25 As exemplified in the above referenced U.S. patents, ceiling fans typically include a multicomponent housing, comprising an upper housing member for encasing at least the exposed side and lower surfaces of the motor, and a second housing member for encasing the switches employed to control
30 the operation of the fan motor. The '314 patent illustrates a typical assembly for a fan having top mounted blades, which includes a plurality of housing members secured by a collection of plates, panels, brackets, screws, and other miscellaneous hardware.

35 As illustrated in the above referenced '725 patent, modern ceiling fans are typically suspended by means of a ball and socket arrangement, wherein a ball, or at least a portion thereof, is secured to the upper end of a rod and is seated in

a socket, or hole, formed in a canopy secured to the ceiling. The lower end of the rod is secured to the fan motor, typically by means of a pin and retaining clip or a screw and a nut. Such arrangements generally require an additional adaptor component for providing a method of attachment between the lower end of the hanger rod and the fan motor.

The above-referenced patents also illustrate the well-known construction technique for ceiling fans of virtually all types, wherein the blades are attached to the motor by means of individual brackets commonly referred to as blade irons. Such blade irons typically comprise a functional and decorative component of the fan, having one end secured to the blade by two or three screws, with the other end being similarly attached to the motor by two additional screws. Blade irons serve not only as attachment means for securing the blades to the motor, but also as mechanisms for establishing a desired angle of attack for the blades in order to provide the necessary degree of air displacement. Conventional blade irons add to the cost of ceiling fans and occasionally break, thereby resulting in a potentially hazardous situation.

There is a need in the art for a simplified ceiling fan construction, so that the number of components necessary to comprise an attractive and functional housing is minimized. There is a similar need in the art for a simplified hanging system, and for a simplified and less hazardous blade attachment method.

Brief Summary of the Invention

This invention provides a unique ceiling fan assembly having a unitary housing structure for enclosing both the motor and switching mechanisms, wherein the ceiling blades are attached to the top surface of the motor. This invention also provides a simplified hanging structure for ceiling fans, having a hanging rod with an upper end pivotally mounted within a canopy, and a lower end attached directly to the fan motor without necessitating additional adapters or connecting devices. The unitary housing provided by this invention

includes a removable bottom cover for allowing access to the interior of the housing from below. The blades in this invention are mounted directly to the motor without blade irons, and are maintained at a desired angle by wedge shaped members disposed between the blades and the motor.

A primary objective of this invention is to provide a ceiling fan having a combined motor and switch housing composed of a minimum number of components in order to simplify assembly and lower the cost of the unit. It is a further object of this invention to provide a ceiling fan having a housing which is sufficiently inexpensive and easily replaceable, thereby making feasible the use of multiple interchangeable housings having a variety of external configurations and/or colors. A still further object of this invention is to provide a ceiling fan having simplified means for attaching a plurality of blades to the top surface of the motor thereof. These and other objects of the present invention will become apparent from the reading of the following specification, taken in conjunction with the enclosed drawings.

Brief Description of the Drawings

FIGURE 1 is a perspective view of a representative ceiling fan of the present invention;

FIGURE 2 is a side elevational view, partially in section, of the preferred embodiment of the present invention;

FIGURE 3 is a side sectional view similar to Figure 2 of an alternative embodiment of the present invention;

FIGURE 4 is a side elevational view of the hanging tube of the present invention;

FIGURE 5 is an end elevational view of the hanging tube shown in FIGURE 4;

FIGURE 6 is a bottom plan view of a representative ceiling fan housing of the present invention, with the bottom cover member removed; and

FIGURE 7 is a bottom plan view similar to Figure 6, but with the bottom cover member installed.

Detailed Description of the Preferred Embodiment

Referring initially to Figures 1 and 2, ceiling fan 10 of the present invention comprises canopy 12 having tube 14 (commonly referred to as a down rod or hangar rod) pivotally suspended therefrom, electric motor 16 secured to tube 14, housing 18, and a plurality of blades 20 secured to the upper surface 22 of motor 16. In the preferred embodiment shown, ceiling fan 10 includes a speed control switch 24 secured to housing 18 by nut 26 and selectively operable by pulling chain 28, and directional control switch 30 selectively operable by button 32 for controlling the rotational direction of motor 16. It will be well understood by those skilled in the art upon reading this disclosure that the advantages of the present invention may be realized regardless of the number or configuration of switching mechanisms employed, and that conventional switches 24 and 30 are displayed primarily by way of example and should not constitute a limitation on the scope of this invention.

The preferred embodiment of ceiling fan 10 is illustrated in Figure 2, wherein housing 18 includes an internal panel 34 which effectively divides housing 18 into an upper compartment 36 and a lower compartment 38. Panel 34 has a generally centrally located hole formed therethrough for receiving externally threaded member 40, a stationary component of motor 16. Nut 42 is threaded onto member 40, thereby removably securing housing 18 to motor 16. Panel 34 is preferably welded to housing 18, but may be secured by any suitable means. Upper compartment 36 effectively encloses the side and lower surfaces of motor 16, while lower compartment 38 encloses switches 24 and 30 and any other necessary components (such as a capacitor) illustrated generally at 44. Plate 46 is removably secured to the lower portion of housing 18 by means of screws 48 to cover access opening 50. Opening 50 is provided to allow ready access to nut 42 so that housing 18 may be easily installed, and conveniently removed and replaced when desired by the user.

Electric motor 16 is substantially conventional, comprising a generally round outer side surface 52, and

generally flat upper surface 22 and lower surface 54. Motor 16 further comprises a stationary member which includes threaded member 40 as mentioned above, as well as externally threaded member 56. Upon operation of motor 16, the outer
5 portion defined by side surface 52, upper surface 22, and lower surface 54 rotates about the central stationary portion which includes threaded members 40 and 56. The electrical aspects of motor 16 are conventional, and will be well understood by those skilled in the art.

10 By providing external threads on member 56, motor 16 may be secured directly to the internal threaded lower end 58 of tube 14 without necessitating the use of any additional fastening devices. Upper end 60 of tube 14 has flange 62 and at least one finger 64 integrally formed therewith, for
15 engaging the suitably formed opening through ball member 66. Flange 62 serves to support tube 14, thereby preventing tube 14 from passing completely through the centrally located hole in ball member 66, while fingers 64 prevent tube 14 from rotating relative to ball member 66. Preferably, flange 62 is
20 hexagonally shaped as shown in Figure 5, and rod 14 includes at least four fingers 64. One of such fingers 64 includes a threaded hole 68 formed therein, for engaging screw 70 which may be employed as a ground element for motor 16. Ball member 66 has slot 72 formed therein for receiving prong 74 formed in
25 canopy 12, thereby preventing relative rotation between ball member 66 and canopy 12.

As clearly shown in Figures 2 and 3, ball member 66 seats within socket 76 formed in canopy 12, thereby enabling ceiling fan 10 to pivot slightly relative to canopy 12 as necessary.
30 Mounting plate 78 is rigidly securable to a ceiling by conventional means (not shown), with canopy 12 being removably secured thereto by suitable means. Preferably, mounting plate 78 includes a plurality of pins 80 extending therefrom for operatively engaging receptacles 82 formed in the upper
35 perimeter of canopy 12. Prong 74 preferably comprises a small segment of socket 76 formed in a generally horizontal position.

Blades 20 comprise substantially planar sections of wood or other suitable material. As is well known in the art,

blades 20 must be maintained at an angle other than 90° relative to the axis of rotation for motor 16 in order to effect adequate air movement. Accordingly, generally wedge shaped members 84 are operatively disposed between the proximate ends 86 of blades 20 and the upper surface 22 of motor 16. As illustrated in Figures 2 and 3, each of ends 86 has a pair of holes formed therethrough for receiving screws 88 which engage suitable threaded holes (not shown) formed in upper surface 22 of motor 16, thereby securing blades 20 and members 84 to motor 16. Members 84 are preferably formed of a suitably rigid and light plastic material, having a substantially hollow interior with cylindrical channels 90 formed therein for receiving screws 88. Members 84 eliminate the need for conventional blade irons, which are considerably more costly and prone to breakage.

Figure 3 illustrates an alternative embodiment of the present invention, wherein housing 92 includes a cup-like compartment 94 integrally formed therewith, thereby eliminating the need for a separate panel 34. Nut 42 is similarly employed to secure housing 92 onto threaded member 40 by supporting the edges of hole 96 formed in compartment 94. All other aspects of the alternative embodiment are identical to the preferred embodiment discussed in detail above.

Those skilled in the art will fully appreciate the fact that housings 18 and 92 and plate 46 may be formed from a number of suitable metal or plastics materials, and may be provided in a wide variety of colors. It will also be understood that plate 46 may be removed and replaced with any number of different lighting kits suitable for the purpose. The foregoing detailed description of a preferred and alternative embodiment is to be clearly understood as being given by way of illustration and example only, the spirit and scope of the present invention being limited solely by the appended claims.

Claims

1. A ceiling fan, comprising;
an electric motor having upper, lower, and side
surfaces, said motor comprising a stationary member and a
rotating member, said rotating member being selectively
rotatable upon operation of said motor;

means for suspending said motor from a ceiling,
securable to said stationary member;

switch means for selectively controlling the
operation of said motor;

a plurality of radially extending blades, removably
secured to said rotating member adjacent said upper surface of
said motor; and

a unitary housing removably securable to said
stationary member of said motor, for enclosing at least said
lower and side surfaces of said motor, said housing being
internally configured to provide at least two compartments,
the first of said compartments being suitable for at least
substantially encasing said motor and the second of said
compartments being suitable for at least substantially
encasing said switch means.

2. A ceiling fan as set forth in claim 1, wherein said
suspending means comprise:

a plate member fixedly securable to a ceiling;

a canopy removably securable to said plate member,
having a centrally located hole formed therethrough;

a rod having longitudinally opposed first and second
ends, said first end having a contiguous annular flange
extending radially therefrom, said second end having
attachment means associated therewith for attaching said rod
to said motor;

a ball member, comprising a generally flat upper
surface and a spherical lower surface, having a centrally
located, vertically disposed hole formed therethrough for
receiving said rod, said generally flat upper surface being
adapted to engage said flange thereby preventing said rod from

falling downwardly through said hole in said ball member,
wherein

5 said spherical lower surface of said ball
member is adapted to pivotally engage said hole in said canopy
such that a portion of said ball member protrudes from said
canopy, with said first end of said rod being retained within
said canopy and said second end of said rod extending
therebelow; and

10 means for preventing rotation of said ball member
within said hole in said canopy about a vertical axis.

3. A ceiling fan as set forth in claim 2, wherein said
means for preventing rotation of said ball member comprise:

 a vertical slot formed in the surface of said ball
member; and

15 a tab formed in the rim of said hole in said canopy,
said tab being adapted to engage said slot in said ball
member, thereby preventing rotation of said ball member about
a vertical axis yet allowing pivotal movement of said ball
within said hole in said canopy.

20 4. A ceiling fan as set forth in claim 2, wherein:
 said attachment means associated with said second
end of said rod comprise screw threads.

25 5. A ceiling fan as set forth in claim 2, wherein said
rod and said annular flange are die cast together as a single
component.

6. A ceiling fan as set forth in claim 2, wherein said
flange includes grounding means associated therewith for
providing an electrical ground for said motor.

30 7. A ceiling fan as set forth in claim 6, wherein said
grounding means comprise a threaded hole formed in said
flange, and a suitable screw for threadingly engaging said
hole, thereby securing a grounding wire to said flange.

8. A ceiling fan as set forth in claim 2, wherein said rod further includes means associated therewith for preventing rotation of said rod within said hole in said ball member.

5 9. A ceiling fan as set forth in claim 1, further comprising a plurality of wedge shaped members equal in number to said plurality of blades, each of said wedge shaped members being disposed between a different one of said blades and said rotating member of said motor and being operative to maintain said blade at a specified angle relative to said top surface
10 of said motor.

10. A ceiling fan as set forth in claim 9, wherein each of said wedge shaped members comprises:

15 a substantially flat bottom surface adapted to fit against said upper surface of said rotating member of said motor;

a substantially flat top surface adapted to fit against a portion of the proximate end of one of said blades; and

20 curved front and back surfaces, wherein the curvature of said front surface generally corresponds to the shape of said side portion of said motor.

25 11. A ceiling fan as set forth in claim 10, wherein each of said wedge shaped members includes a plurality of vertical holes formed therethrough at substantially 90° angles to said bottom surface thereof,

said holes being adapted to admit mounting screws utilized to secure said blades to said rotating member of said motor.

30 12. A ceiling fan as set forth in claim 1, wherein the number of said blades is four.

13. A ceiling fan as set forth in claim 8, wherein said means for preventing rotation of said rod within said hole in said ball member comprise at least one lug member integrally formed on said rod adjacent said first end thereof,

5 said at least one lug member being configured to engage said ball member, thereby preventing relative rotational movement between said rod and said ball member.

14. A ceiling fan as set forth in claim 13, wherein said ball member is at least one receptacle formed therein, the number of said receptacles being equal to the number of said lug members,

10 said at least one receptacle being adapted to receive said at least one lug member, thereby providing a more positive engagement between said ball member and said rod.

15 15. A ceiling fan as set forth in claim 13, wherein the number of said lug members is four.

16. A ceiling fan as set forth in claim 15, wherein said lugs are evenly spaced at substantially 90° intervals around said first end of said rod.

20 17. A ceiling fan as set forth in claim 1, wherein:
 said stationary member of said motor comprises a centrally disposed, vertically oriented shaft having longitudinally opposed upper and lower ends; and

25 said housing is removably secured to said lower end of said shaft.

18. A ceiling fan as set forth in claim 17, wherein:
 said lower end of said shaft has male screw threads formed thereon;

30 said housing includes a horizontally disposed panel having a hole formed therein, said lower end of said shaft extending through said hole when said housing is secured thereto; and

 said housing is secured to said lower end of said

shaft by a nut threaded onto said lower end of said shaft.

19. A ceiling fan as set forth in claim 17, wherein:

said upper end of said shaft has male screw threads formed thereon;

5 said suspending means comprise a canopy securable to a ceiling and having a rod depending therefrom, said rod having longitudinally opposed first and second ends, said first end being pivotally retained within said canopy and said second end having female screw threads formed therein, wherein

10 said motor is suspended by operatively engaging said male screw threads on said shaft and said female screw threads in said rod.

20. A ceiling fan constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

GB 9215459.0

Relevant Technical fields

(i) UK CI (Edition K) F1C (CE, CFAA, CFE, CFGB)
(ii) Int CI (Edition 5) F04D 25/00, 25/02, 25/06,
25/08, 29/26, 29/32, 29/34,
29/36, 29/40, 29/60

Search Examiner

M D WALKER

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

23 SEPTEMBER 1992

Documents considered relevant following a search in respect of claims 1-4, 8, 12-19

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 1508076 (SANYO) eg Figures 10, 13	1, 4 at least
Y	GB 783431 (GENERAL ELECTRIC) page 1 line 46 to page 2 line 40	1, 12 at least
Y	GB 715925 (REVO ELECTRIC) whole document	1
Y	US 4900236 (KAPAAN) Figures 1, 2	1,17,18
Y	US 4878806 (MARKWARDT) Figures 1, 2, column 3 line 47 to column 4 line 45	1,2,8,12, 13 at least
Y	US 4729725 (MARKWARDT) Figure 2	1-3,12,17
Y	US 4518314 (SCHULTZ) Figures 1, 2, 3 column 2 lines 24-66	1,12,17
Y	US 4382400 (STUTZMAN) column 2 line 55 to column 3 line 28	1



Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art.

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