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CEILING FAN**Introduction**

This invention relates to a ceiling fan and more
5 particularly relates to a ceiling fan with retractable
blades.

Background of the Invention

The problem with many ceiling fans is that the
10 radially projecting blades become unsightly dust
collectors when the fan is not in use. Ceiling fans that
often incorporate light fittings and it has been proposed
to incorporate retractable blades that retract within the
confines of the light fitting when not in use and expand
15 radially outwardly when in use to operate as conventional
fan blades.

Problems with fans of this kind concern ensuring a
balanced configuration especially as the blades move
20 between the retracted and operative positions. A further
problem with fans of this kind is the limit on the length
of the blades to enable them to retract within the
confines of the light fitting. This usually requires the
blades to nest with the tip of one blade above the root of
25 the adjacent blade, thus leading to an unsightly slack of
blades. If the blades are made shorter to reduce the need
for overlapping then the blades lack the aerodynamics to
move sufficient air to operate efficiently as a fan.

30 It is these issues that have brought about the
present invention.

Summary of the invention

According to one aspect of the present invention
35 there is provided a fan blade comprising a mount
supporting a plurality of superimposed fan blade segments
arranged to slide relative to one another from a retracted

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storage configuration to an extended operative configuration.

According to another aspect of the present invention
5 there is provided a ceiling fan comprising an electric motor adapted to drive a rotating plate that supports a plurality of equally spaced fan blades that extend radially of the plate, each fan blade comprising a root and a tip joined by leading and trailing edges, the root
10 being adapted to be secured to the plate, wherein each blade comprises a plurality of fan blade segments arranged to slide telescopically one within the other whereby the fan blade segments can be located substantially within the periphery of the plate in a retracted configuration and
15 can extend radially outwardly in an operative configuration.

Description of the Drawings

Embodiments of the present invention will now be
20 described by way of example only with reference to the accompanying drawings in which:

Figures 1a, 1b and 1c are respectively plan, side and perspective views of a fan in an expanded operative configuration,

25 Figures 2a, 2b, and 2c are respectively plan, side and perspective views of the fan in a retracted inoperative configuration,

Figures 3a and 3b are respectively plan and side elevational views of the fan in the retracted
30 configuration illustrating a drive assembly,

Figures 4a, 4b and 4c are respectively plan, side and perspective views of the fan in the expanded operative configuration with components omitted for clarity,

35 Figure 5 is a plan view of part of components for the fan in the expanded configuration,

Figure 6 is a plan view of one blade assembly in the expanded configuration,

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Figure 7 is a cross sectional view taken along the lines A-A of Figure 6,

Figure 8 is a cross sectional view taken along the lines B-B of Figure 6, and

5 Figure 9 is a cross sectional view taken along the lines C-C of Figure 6.

Description of the Preferred Embodiments

The ceiling fan 10 as illustrated in the accompanying
10 drawings comprises an electric motor 11 that is hung from the ceiling. The electric motor 11 is coupled to a circular plate 12 whereby the motor 11 rotates the plate 12 about a vertical axis. The plate 12 is adapted to support four equally spaced fan blade assemblies 20, 21,
15 22, 23. Each blade assembly 20 to 23 comprises three fan blade segments 30, 31, 32 that can slide relative to one another from a retracted position (Figure 2) where the fan blade segments are within the confines of the plate 12 to an outward operative position (Figure 1) in which the fan
20 blade segments 30-32 project radially outwardly of the plate 12 to facilitate movement of air as the plate 12 is rotated by the electric motor 11. It is understood that the electric motor 11 can be either on top of or below the plate 12.

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Each blade assembly 20- 23 is positioned on the periphery of the plate 12 via a mount 40 that is secured to the plate 12. As shown in Figure 2a the mounts 40 are
30 equally spaced around the periphery of the plate to be diametrically opposed to one another.

In this embodiment the blade comprises three blade segments, namely the first outer segment 30, an intermediate segment 31 that is telescopically mounted
35 within the outer segment 30, and an inner blade tip 32 that is again telescopically mounted within the intermediate section.

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Each mount 40 comprises a pair of support legs 41, 42 having outwardly extending flanges 43, 44 that enable the legs to be screwed to the surface of the plate 12. The support legs 41, 42 support a bridging member 45 that defines a slot 46 that accommodates a first outer blade segment 30. The slot defines a passageway that allows the blade segments 30 to be a smooth sliding fit within the slot 46. The legs 41, 42 of the mount assembly are also arranged so that the slot is on an incline of between 10 and 15 degrees (see Figure 2b). The angle on the slot gives the blade, which is otherwise flat, an angle of incidence to give the desired air movement when in the extended and operative position.

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The blade segments 30, 31, 32 all slide relative to one another so that in the retracted position (Figure 2) the tip 32 is wholly within the intermediate segment 31 which is wholly within the outer segment 30. In the extended position shown in Figure 2 the tip 32 projects radially outwardly of the intermediate segment 31 which is in turn radially outwardly of the outer segment 30. The telescopic arrangement of the three blade segments allows the segments to slide outwardly and the force to urge this outward movement is the centrifugal force generated by rotation of the plate 12 by the electric motor 11.

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Each diametrically opposed pair of blade assemblies 21, 22 or 23, 24 are interconnected by a chain 50 that rotates about a sprocket 51 located on the underside of each mount 40. The chain is also coupled to a centrally located sprocket 52 that is in turn coupled to a coil spring 53 located within a housing 54. The chain 50 is attached to an elongate rod 60 via an adjustable linkage.

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As shown in Figure 6 the rod 60 extends parallel to the chain 50 and is coupled to an inner end of the outer

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blade segment 32. Movement of the chain 50 pulls the rod 60 radially inwards to pull the outer blade segment 32 into the intermediate segment 31 until the inner end of the blade segment 32 abuts stop 63 on the inner end of the intermediate segment 31. Further movement of the rod 60 causes inward displacement of the intermediate segment 31 until it engages stops 64 on the inner end of the first blade segment 30. All these segments 30, 31, 32 are then pulled by the rod 60 under the mount 40 to assume the fully retracted position shown in Figure 2.

As the centrifugal force of the fan 10 forces the blade 30-32 segments outwardly the movement of the segments causes rotation of the sprocket 51 under the mount 40 to drive the chain 50 to in turn rotate the central sprocket 52 against the spring 53. As the fan 10 slows down the coil spring 53 urges the central sprocket 52 to rotate the chain 50 and pull back the fan segments 30-32 to the retracted position. In this manner, the sprocket and chain drive not only controls the outward movement of the fan segments but through the spring 53 brings the segments back into the retracted position when not in use. To avoid collision of the chains 50 two central sprockets 52 are provided in different vertical planes with the upper sprocket driving the fan blade assemblies 20 and 21 and the lower sprocket driving the other pair of fan blade assemblies 22 and 23.

The fan blade segments 30-32 are moulded in plastics to define leading and trailing edges. The blade segments 30-32 are substantially flat and the tip segment 32 has a curved end.

The fan described above has a number of advantages over conventional fans with retractable blades. Because the blades do not pivot from the operative to the retracted positions there is no danger of collision

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between the blades during the retraction process.
Furthermore, the fact that the blade segments expand radially or in a longitudinal sense means that the blades can be designed to have increased length to thereby
5 increase the airflow. Furthermore, the telescopic location of the blade segments allows the fan to assume a compact and comparatively thin configuration in the retracted position which makes the fan, especially when it incorporates a light fitting, much more attractive in the
10 retracted position than is the case with other fans with retractable blades where the blades form an unsightly nest above the light fitting.

In the claims which follow and in the preceding
15 description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but
20 not to preclude the presence or addition of further features in various embodiments of the invention.

CLAIMS:

1. A ceiling fan comprising an electric motor
5 adapted to drive a rotating plate that supports a
plurality of equally spaced fan blades that extend
radially of the plate, the fan having a lower
periphery above which the fan blades are located,
each fan blade comprising a root and a tip joined by
10 leading and trailing edges, the root being adapted to
be secured to the plate, wherein each blade comprises
a plurality of fan blade segments arranged to slide
telescopically one within the other whereby the fan
blade segments are located wholly within the lower
15 periphery in a retracted configuration and extend
radially outwardly of the lower periphery in an
operative configuration.
2. The ceiling fan according to claim 1, wherein the
20 lower periphery is defined by the rotating plate.
3. The ceiling fan according to claims 1 or 2,
wherein as the fan rotates the fan blade segments
slide outwardly due to centrifugal forces.
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4. The ceiling fan according to claim 3 wherein
biasing means pulls the fan blade segments back into
the retracted configuration against the centrifugal
force as the fan slows down to a stop.
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5. The ceiling fan according to any one of claims 1
to 4, wherein opposed blades are interconnected by a
chain driven by a sprocket including biasing means
which rotates the chain to pull back the blade
35 segments as the fan slows to a stop.
6. The ceiling fan according to any one of the

preceding claims, wherein each blade has an angle of incidence to the horizontal, preferably between 10 and 15 degrees.

5 7. The ceiling fan according to any one of the preceding claims, wherein the rotating plate supports four equally spaced radially extending blades.

10 8. The ceiling fan according to any one of the preceding claims, wherein each blade is secured to the plate by a mount.

15 9. The ceiling fan according to claim 8 wherein the mount includes a slot through which the blade slides.

20 10. The ceiling fan according to any one of the preceding claims wherein the mount supports three fan blade segments: an outer segment, an inner segment and an intermediate segment.

25 11. The ceiling fan according to claim 10 wherein the outer blade segment defines a tip of the blade.

30 12. The ceiling fan according to claim 11 wherein in the wholly retracted storage configuration, the tip of the blade is wholly within the intermediate segment, and an intermediate segment is wholly within the outer segment.

35 13. The ceiling fan according to any one of the preceding claims wherein the fan blade segments are substantially flat.

40 14. A ceiling fan substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.