

IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF ILLINOIS  
EASTERN DIVISION

DOCKETED  
OCT 12 2001

LAKEWOOD ENGINEERING AND  
MANUFACTURING COMPANY )

Plaintiff, )

vs. )

LASKO METAL PRODUCTS INC. )

Defendant. )

**01C 7867**

Civil Action No.

JUDGE RONALD GUZMAN

MAGISTRATE JUDGE KEYS  
Judge

**JURY DEMANDED**

FILED-ED4  
OCT 11 PM 4:08  
U.S. DISTRICT COURT

**COMPLAINT**

**NATURE AND STATUTORY BASIS OF ACTION**

1. This is an action for Patent Infringement of U.S. Patent No. 6,227,822 under the laws of the United States of Title 35, United States Code, Section 271.

**THE PARTIES**

2. Plaintiff, LAKEWOOD ENGINEERING AND MANUFACTURING COMPANY ("Lakewood"), is an Illinois corporation having its principal place of business at 501 North Sacramento Boulevard, Chicago, Illinois 60612.

3. On information and belief, Defendant, LASKO METAL PRODUCTS INC. ("Lasko"), is a Pennsylvania corporation having its principal place of business at 820 Lincoln Avenue, West Chester, PA 19380.

**JURISDICTION AND VENUE**

4. Jurisdiction over Count I is expressly conferred on this Court as an action under the Patent Act, Title 35 of the United States Code, and by 28 U.S.C. §§ 1331 and 1338.

5. Personal jurisdiction over defendant Lasko is proper as Lasko manufactures, imports, advertises and/or sells the accused products in United States commerce and within this State and District, and Lasko has committed one or more of the acts complained of herein within the United States and within this State and District.

6. Venue is proper in the United States District Court for the Northern District of Illinois pursuant to 28 U.S.C. § 1391 (b) and (c). At all times material to this Complaint, defendant Lasko has committed one or more of the acts complained of herein within the United States and within this State and District.

**COUNT I**

**PATENT INFRINGEMENT**

7. As a complete and first ground for relief, Lakewood hereby charges Lasko with infringement of U.S. Patent No. 6,227,822 (**EXHIBIT A**) under the patent laws of the United States and, in particular 35 U.S.C. §271, and re-alleges Paragraphs 1-6 of this Complaint.

8. U.S. Patent No. 6,227,822, entitled "Fan With Improved Electric Motor and Mounting," issued on May 8, 2001 to Mr. Yung Chen, is assigned to Lakewood, and in full force and effect for a term through October 20, 2018.

9. Lasko's Fan products, manufactured, imported, advertised and/or sold in the United States by Lasko, infringe Lakewood's Patent No. 6,227,822 (the "Accused Products"). The Accused Products include Lasko products sold under the product names/models: Wind-

Machine; Cyclone; Premium Box Fan; and, any other products having a similar electric motor configuration.

10. Such infringement by Lasko has caused, and will likely continue to cause, harm to Lakewood, for which Lakewood is entitled to recovery, including recovery under 35 U.S.C. §281 and 284.

11. Unless Lasko is preliminarily and permanently enjoined from infringement of Lakewood's patent, Lakewood is and will be irreparably harmed in a manner for which there is no adequate remedy at law.

12. On information and belief, Lasko has intentionally and willfully copied Lakewood's patented subject matter, and its infringement is willful.

13. Lakewood is entitled to award of reasonable attorney's fees, as this infringement action is an exceptional case under 35 U.S.C. §285.

**Prayer For Relief**

Plaintiff, Lakewood Engineering & Manufacturing Co., prays for the following relief of the Court:

14. A Judgment that Defendant, Lasko Metal Products, Inc., has infringed U.S. Patent No. 6,227,822 by the manufacture, importation, offer for sale, and/or sale of infringing products in the United States.

15. That Defendant, and its officers, agents, employees, and all others in active concert and/or participation with it, be preliminarily and permanently enjoined and restrained from: making, using, importing, offering for sale and/or selling in the United States any goods that would infringe U.S. Patent No. 6,227,822.

16. That Defendant be required to file in Court, and serve on Lakewood, within thirty (30) days after entry of the above injunction, a report in writing, under oath, setting forth in detail the manner and form in which it has complied with the injunction.
17. That Defendant be required to pay to Plaintiff recovery of damages, including actual damages, with calculation of lost profits and/or reasonable royalty.
18. A Judgment that Defendant's infringement was willful, and that Defendant be required to pay treble damages to plaintiff.
19. That this Court make an award of attorney's fees and taxable costs, and such other and further relief to Lakewood as the Court deems meet and just.

**JURY DEMAND**

20. Plaintiff demands trial of all infringement issues (Count I) by jury, pursuant to Rule 38 of the Federal Rules of Civil Procedure.

Respectfully submitted,  
LAKEWOOD ENGINEERING AND  
MANUFACTURING COMPANY

Dated: October 11, 2001

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# Exhibit A



US006227822B1

(12) **United States Patent**  
**Chen**

(10) Patent No.: **US 6,227,822 B1**  
(45) Date of Patent: **May 8, 2001**

(54) **FAN WITH IMPROVED ELECTRIC MOTOR AND MOUNTING**

(75) Inventor: **Yung Chen, Clarendon Hills, IL (US)**

(73) Assignee: **Lakewood Engineering and Manufacturing Co., Chicago, IL (US)**

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/175,635**

(22) Filed: **Oct. 20, 1998**

(51) Int. Cl.<sup>7</sup> ..... **F04B 17/00**

(52) U.S. Cl. .... **417/423.7; 417/360; 310/63**

(58) Field of Search ..... **417/423.15, 423.7, 417/360, 423.14; 310/89, 91, 258, 42, 63**

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Primary Examiner—Henry C. Yuen

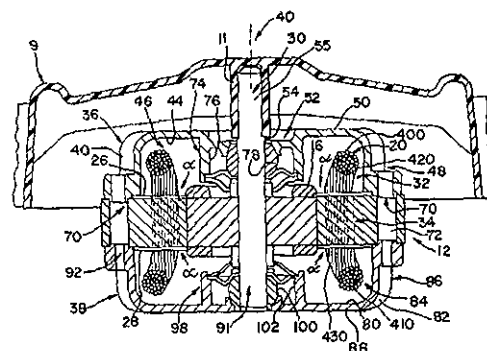
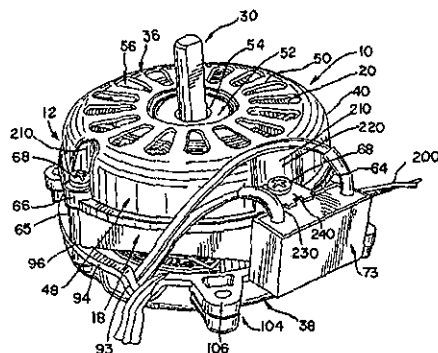
Assistant Examiner—Mahmoud M Gimie

(74) Attorney, Agent, or Firm—Wallenstein & Wagner

(57) **ABSTRACT**

A household fan with motor and motor housing for shielding the motor. The electric motor is preferably a four-pole permanent-split capacitor motor with a narrow profile enabling it to fit within a narrow box fan, the motor having a stator including a core of stacked laminations. A first outermost lamination defines a first supporting surface, and a second outermost lamination defines a second supporting surface on which the front and rear casings are supported. Copper windings are wound about the core. A rotor has an output shaft which passes through a central region of the core. The front and rear casings are generally dome-shaped. Each casing has a circumferential side wall and a vented end wall. The front casing has a recessed area around the opening for the output shaft such that a portion of the bladed propeller assembly protrudes within the recessed area, allowing for a narrow profile design. Radially extending legs allow for mounting on parallel brackets along a rear grill of the fan.

**33 Claims, 5 Drawing Sheets**



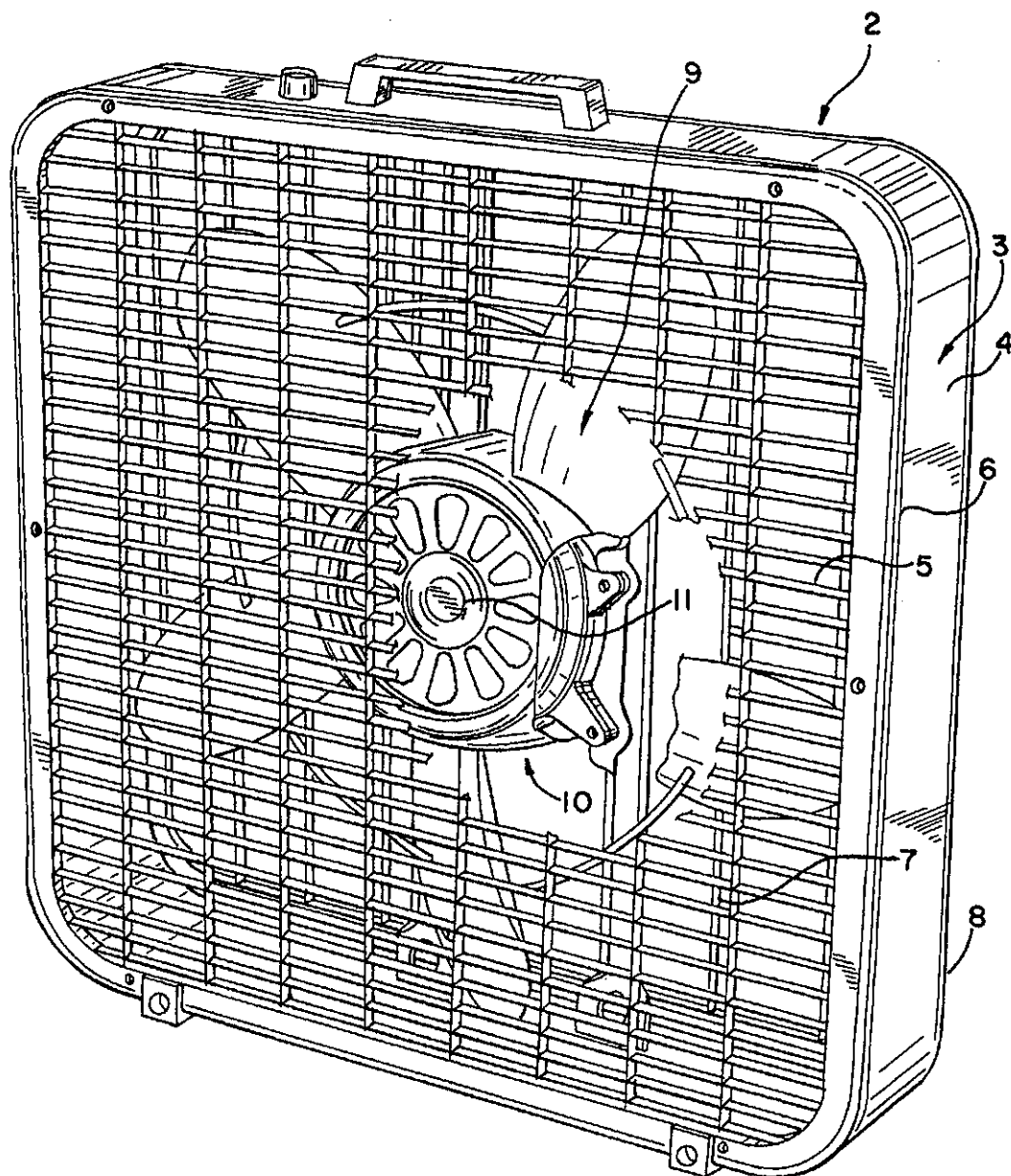
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FIG. 1



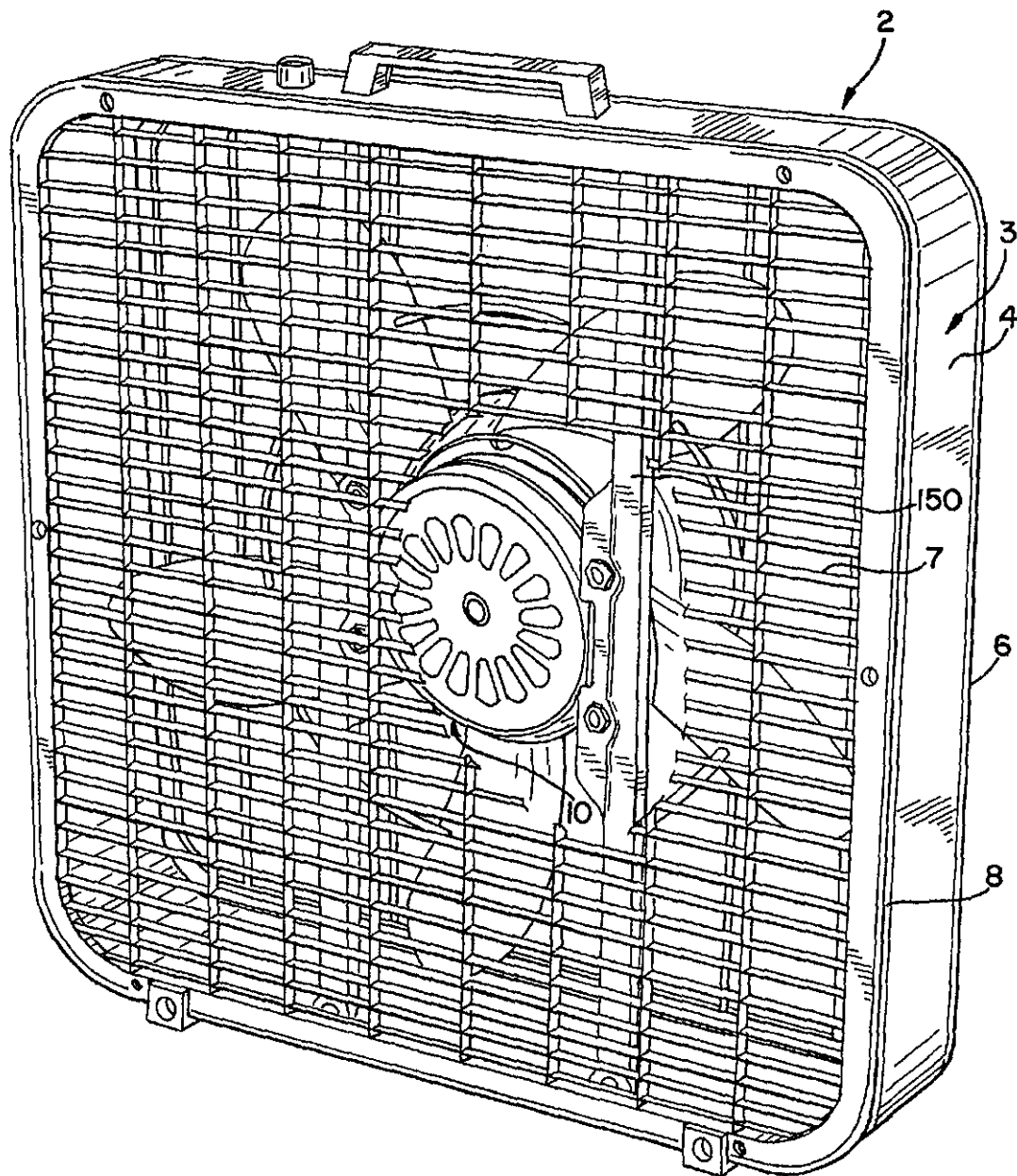
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FIG. 2



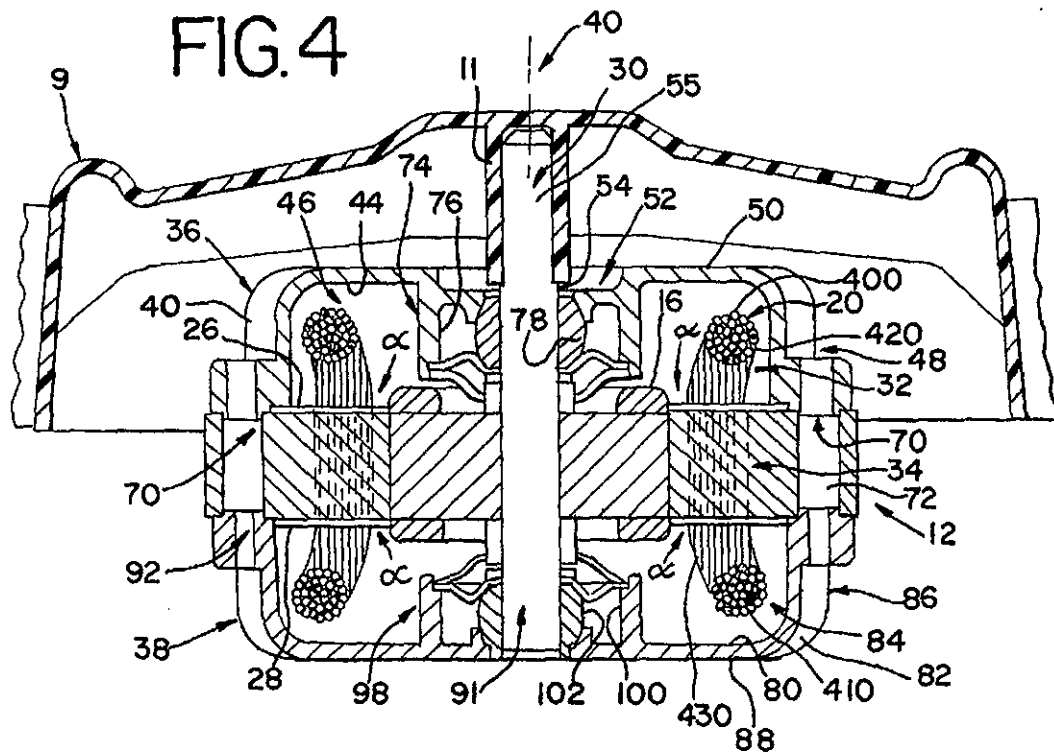
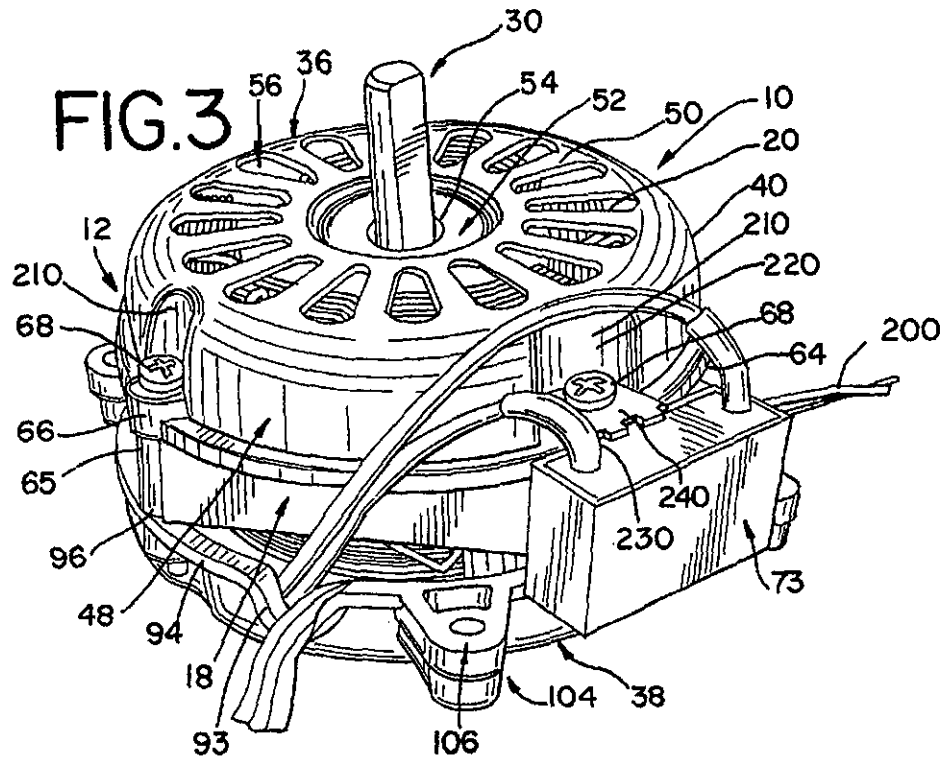


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FIG. 6

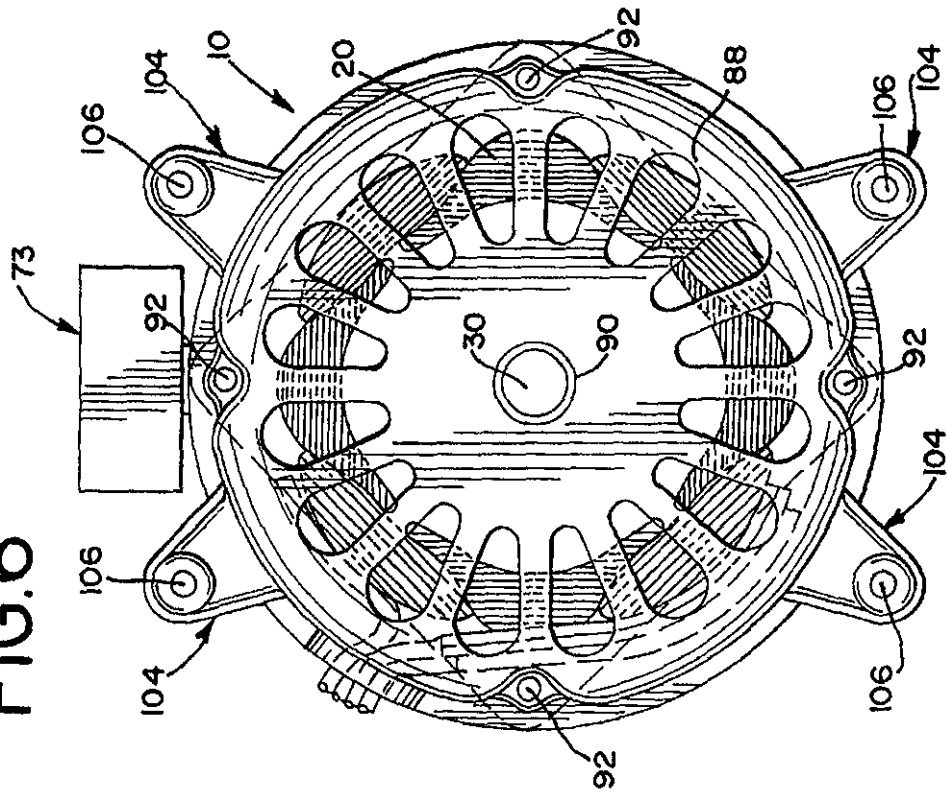
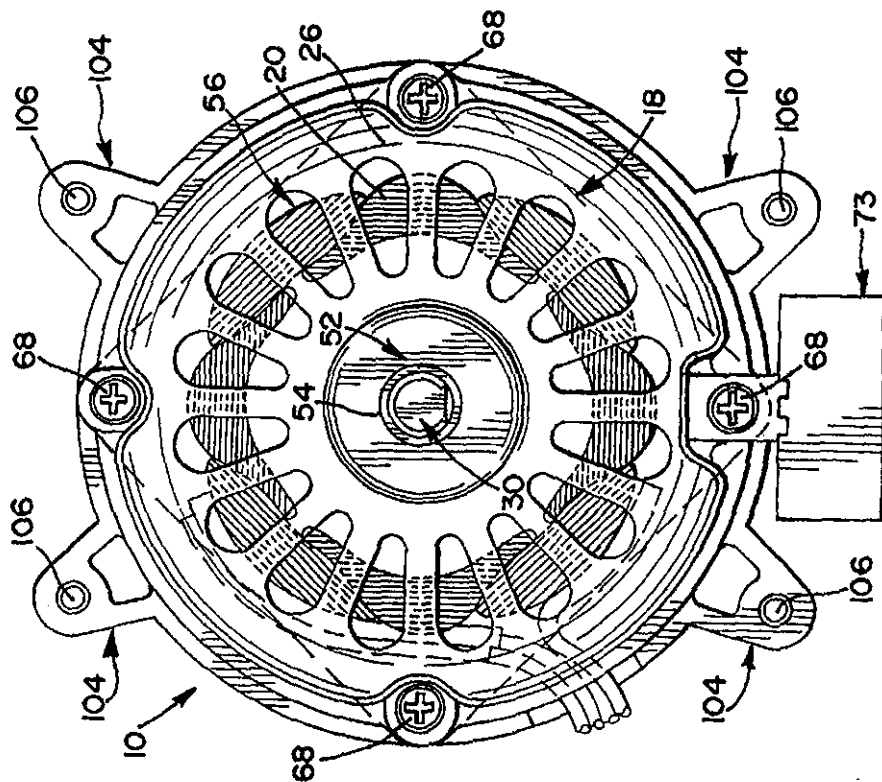


FIG. 5



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FIG. 7

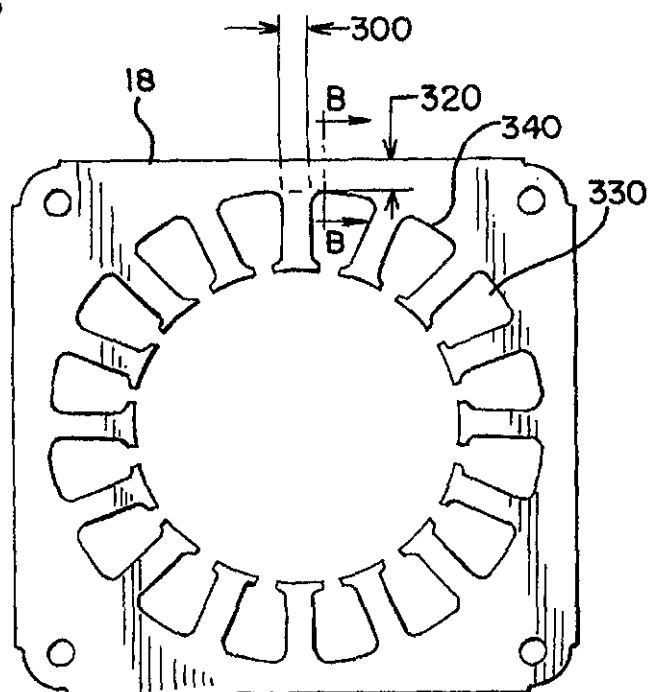
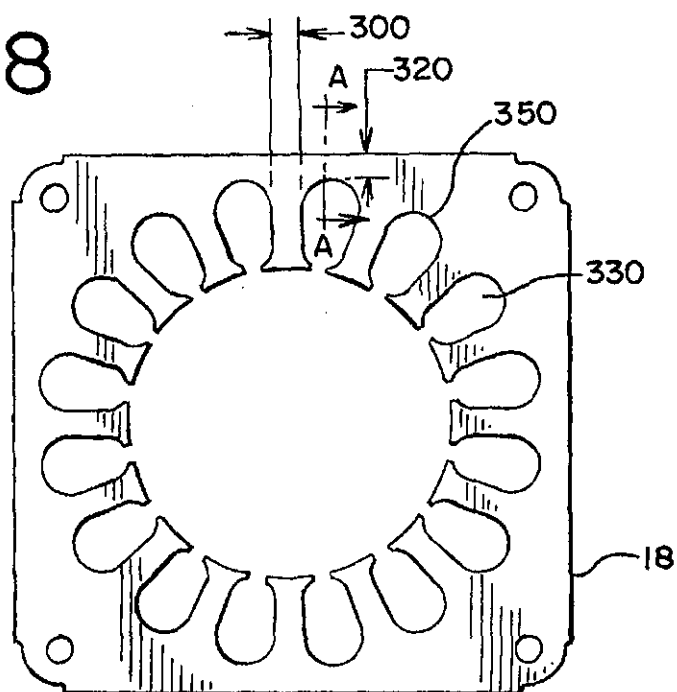


FIG. 8



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## FAN WITH IMPROVED ELECTRIC MOTOR AND MOUNTING

### TECHNICAL FIELD

The present invention relates to the construction of a household fan. More particularly, the present invention relates to a household box fan having an industrial-standard narrow width provided with an improved motor, motor housing and mounting assembly.

### BACKGROUND

Various types of household fans are currently used for cooling and ventilation. Such fans are available in a variety of shapes and sizes. Household fans typically used by consumers have an electric motor used to drive propeller-type blade assemblies. Such fans commonly employ electric motors of the type known as shaded pole motors. One common type of household fan is the "box fan" which generally includes an electric motor and fan blade assembly mounted in a casing that has an overall generally square configuration. Typical box fans usually have a metal frame having front and rear grills, fan control switches and/or knobs, and an exposed handle disposed on the outer surface of the casing. The electric motor is typically mounted in the center of the casing between the two grills. The motor is often mounted to some internal strut members, typically appearing as an elongated metal member that spans from one side of the casing to an opposed side of the casing.

One common type of box fan, often referred to as a "narrow body" box fan, has a casing width of approximately 3.75 inches. The narrow thickness of this type of box fan is advantageous for numerous reasons, including low cost of casing materials, narrow width for fitting into window openings, lighter weight, and possible reduction in the overall packaging size. Because of the narrow width of this type of box fan, however, manufacturers are limited as to the space allowed for mounting a motor and fan assembly. Therefore, the electric motor used in these types of box fans is a shaded pole motor, which is compatible with 3/4 inch box fans because they provide the necessary power to drive the blade assembly, and yet have a narrow profile capable of fitting within the permitted mounting area within the narrow casing.

However, shaded pole motors tend to be in limited supply since they require large casings which are formed by a punch press with an expensive progressing die, or with multiple punch press operations. Such casings also require an expensive painting step. Such casings are not easily die cast due to their large diameters. In addition, shaded pole motors require laminations which use low carbon steel and must pass through an expensive heat treating step. Supply of these high quality laminations is presently limited. Furthermore, shaded pole motors are inefficient, much of their input energy being lost to undesirable heat generation. In addition to the expense of the laminations, shaded pole motors require epoxy to insulate the stator, the stator is large, the windings require expensive machinery to create, and a punch press with a long feeder is required to create the large diameter casings.

Electric motors are categorized by Underwriters' Laboratory (UL) according to the difference between their operating temperatures and the ambient temperature. Motors having operating temperatures from 75° C. to 95° C. above ambient temperature are categorized as Class B, and require special insulation materials. Those motors which operate at temperatures not more than 75° C. above ambient tempera-

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ture are categorized as Class A, and have less stringent requirements for insulation materials. The operating temperatures of many motors are typically more than 75° C. above ambient temperature, and therefore, require expensive Class B insulation materials.

One type of electric motor which can be manufactured at lower cost is a four-pole permanent-split capacitor (PSC) motor. PSC motors incorporate a capacitor in series with an auxiliary coil, the auxiliary coil being connected in parallel with a main coil. PSC motors can incorporate a less expensive type of laminations since a lower grade steel may be used with a silicon content. Such laminations do not require heat treatment. However, there are many problems associated with providing a four-pole PSC motor in a narrow frame of a box fan. The primary problem is that the profile of the typical four-pole PSC motor is too thick to fit within the narrow box fan, due to the construction of the motor, the internal motor windings, and the casings used for such motors. Another main problem preventing manufacturers from placing a four-pole PSC motor in a narrow box fan is the difficulty of mounting the motor in the confined mounting space. Furthermore, the operating temperature of typical four-pole PSC motors places them in the UL Class B category.

Typical mounting of motors includes attaching a mounting plate to the back of the motor casing, and fastening the mounting plate to the internal mounting, such as the strut within the box fan. This type of mounting requires use of additional space in the fan housing, also making it impossible to mount a four-pole PSC motor in a narrow housing to provide necessary clearance between the bladed propeller and the front grill of the fan. Further, this type of mounting, with a separate mounting plate, requires additional manufacturing cost and time, and risks mis-alignment of the motor in the fan housing.

One attempt at mounting a motor without a mounting plate was contemplated in U.S. Pat. No. 5,430,338 issued to McMillan et al. ("McMillan"). McMillan teaches sandwiching the stator core within upper and lower housing casings to facilitate construction of the electric motor. Sandwiching the stator core within the housings alleviates manufacturing problems associated with aligning and configuring the stator and rotor within the electric motor housing. However, the sandwiching technique taught in McMillan fails to resolve other problems as it only makes the motor's profile wider.

Furthermore, the profile of a motor must not only be narrow enough to fit within the narrow box fan, but once the motor is mounted within the narrow box and equipped with a blade assembly and the protective grills, the product must pass the "Probe Test" to gain UL approval. The "Probe Test" by UL is a test that determines if the fan product possesses the necessary clearance between the front of the bladed propeller and the front grill of the fan housing. If the blade rotates in a position that is too close to the front grill, it is determined to be potentially dangerous for consumers, and will not obtain UL approval. Generally, this test includes operating the fan while pushing a probe against the front grill with a given amount of force (one pound of force). Therefore, the fan motor must be mounted in a position that permits secure attachment of the blade assembly, without the blade assembly advancing too close to the front grill. It would be advantageous, therefore, to devise a structure for such a box fan with a four-pole PSC motor that may be mounted in a relatively narrow space, while keeping the bladed propeller away from the front grill.

Another problem with using a four-pole PSC motor in a narrow space within a fan is the relatively large thickness of

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such motors. The typical four-pole PSC motor has the bulk of its copper windings positioned on either of the sides of the laminations, thereby requiring additional thickness to them as compared to shaded pole motors. Further, by current UL standards, a clearance space of at least 2.4 millimeters (mm) is required between the copper windings and the cast metal outer casing of the motor. It would be advantageous, therefore, to develop a four-pole PSC motor that has a relatively reduced thickness, without compromising the volume of space required for the copper windings or violating the UL standards of required clearance between the windings and the metal motor casing.

Yet another problem with attempting to make a box fan with a four-pole PSC motor is the fact that most four-pole motors operate at a higher peak torque than what is desirable for such a product. The peak torque of such motors typically resides at about 1200 revolutions per minute (RPM), whereas the peak torque output optimal for a box fan product is approximately 1000 RPM.

Therefore, there is a need for a fan with a four-pole PSC electric motor that has a narrow profile and runs at a lower temperature and peak torque output.

#### SUMMARY OF THE INVENTION

It is an object of the present invention to provide a narrow box fan with a four-pole PSC electric motor in which the four-pole PSC motor is narrow enough to fit within the narrow box fan.

It is another object of the present invention to provide a narrow box fan having a four-pole PSC motor in which a portion of the casing of the motor is recessed in order to elongate the exposed portion of the output shaft to reduce the width of the motor and blade assembly.

It is a further object of the present invention to provide a narrow box fan in which the motor has legs which extend off the sides of the rear casing for securely mounting to parallel brackets on the rear grill of the fan.

It is still a further object of the present invention to provide a box fan with a four-pole PSC motor in which the laminations are sandwiched by the casings, and the inner dimensions of the casings are wider than the windings so that wiring may pass through the casings through the side of the motor rather than the rear of the motor, thereby reducing the overall width of the motor, and wires may pass along the side of the copper windings.

It is another object of the present invention to provide a narrow box fan having a four-pole PSC motor in which the windings of the motor are spread out in the radial direction and reduced in the axial dimension, thereby reducing the overall width of the profile of the motor.

It is another object of the present invention to provide a narrow box fan having a four-pole PSC motor in which the outer diameter of the windings of the motor extends beyond the outer diameter of the stator slots, whereby efficiency is enhanced and the width of the motor profile is reduced.

It is yet another object of the present invention to provide a narrow box fan in which the vented casings may be placed close to the windings, and in particular, in which the casings are made of plastic, and thus may even be in close proximity or in direct contact with the windings, thereby reducing the width of the motor and improving ventilation for greater efficiency.

It is another object of the present invention to provide a narrow box fan with a four-pole PSC motor in which a portion of the stator slots is flattened, whereby efficiency is improved.

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It is a further object of the present invention to provide a narrow box fan with a four-pole PSC motor in which the peak torque of the motor is approximately 1000 rpm.

The present invention is directed to a fan having a four-pole PSC electric motor and a housing for shielding the electric motor. The electric motor comprises a rotor and a stator. The stator includes a core of stacked laminations having a first supporting surface defined by a first outermost lamination and a second supporting surface defined by a second outermost lamination. Copper windings are wound about the stator. The rotor includes an output shaft.

The housing comprises front and rear casings. The casings are generally dome-shaped and centered about a longitudinal axis. The first casing has an interior surface and an exterior surface. The interior surface defines a first chamber. The exterior surface comprises a circumferential side wall connected to a first vented end wall. The first vented end wall has a recessed central area which extends inwardly toward the stacked lamination. The recessed central portion defines a central opening through which the output shaft of the electric motor passes.

The rear casing also has an interior surface and an exterior surface. The interior surface defines a second chamber. The exterior surface comprises a second circumferential side wall connected to a second vented end wall.

The casings are wider in diameter than the stator coils to allow for ventilation, and side entry and passage of lead wires, yet narrow enough in diameter such that aluminum die casting of the casings is feasible.

Other features and advantages of the invention will be apparent from the following specification taken in conjunction with the following drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially cut away front perspective view of the fan assembly of the present invention;

FIG. 2 is a partially cut away rear perspective view of the fan assembly of the present invention;

FIG. 3 is a perspective view of the fan motor;

FIG. 4 is a cut away side view of the fan motor of the present invention;

FIG. 5 is top view of the fan motor of the present invention;

FIG. 6 is a bottom view of the fan motor of the present invention;

FIG. 7 is a cross-sectional view of one embodiment of the stator having flattened stator slots; and

FIG. 8 is a cross-sectional view of another embodiment of the stator having rounded stator slots.

#### DETAILED DESCRIPTION

While this invention is susceptible of embodiments in many different forms, there is shown in the drawings and will herein be described in detail preferred embodiments of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the broad aspect of the invention to the embodiments illustrated.

FIG. 1 is a perspective view of the front of the fan assembly 2. A frame 3 comprises a substantially continuous side wall 4, a front grill 5 attached to the front edge 6 of side wall 4, and a rear grill 7 attached to the rear edge 8 of the side wall 4. A bladed propeller assembly 9 and a motor 10 are housed within the frame 3.

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FIG. 3 is a perspective view of a four-pole PSC electric motor 10 of the present invention. The motor 10 includes a motor housing 12 for shielding the electric motor 10. The electric motor 10 includes a stator 14 and a rotor 16. The stator 14 comprises a core of stacked laminations 18 around which copper wires 20 are wound. As shown in FIG. 2, a first outermost lamination 22 in the stack defines a first supporting surface or front surface 24, and a second outermost lamination 26 defines a second supporting surface or rear surface 28. An output shaft 30 is connected to the rotor 16.

The output torque of typical four-pole PSC motors is around 1200 RPM. Since the output torque suitable for a fan is generally 1000 RPM, the torque output of the motor 10 is reduced to approximately 1000 RPM by applying a matrix of material on an outer portion of rotor 16 in order to change its resistance.

The electric motor 10 is generally used to drive a cooling or air circulating household fan assembly 2. In the preferred embodiment, the electric motor 10 is a four-pole PSC motor. The motor 10 and housing 12 combination is particularly useful in the manufacture of a 3¼ inch box fan. Four-pole PSC electric motors have a substantially greater stack height than the shaded-pole motors which are normally used in the manufacture of 3¼ inch box fans. Therefore, conventional four-pole PSC motor/housing combinations are not compatible with 3¼ inch box fans. The present motor/housing combination can be utilized within a 3¼ inch box fan. The following features of the motor 10 and the motor housing 12 allow it to be fit within a 3¼ inch box fan.

Referring to FIG. 4, the motor's windings 20 have first and second parts 32, 34. The first parts 32 extend outwardly from the first and second outermost laminations 22, 26. The second parts 34 pass through the interior of the core 18. The first parts 32 bend as they emerge from the core of stacked laminations 18. The bend of the first and second parts 32, 34 forms a slot exit angle  $\alpha$  between the first parts 32 and the first and second supporting surfaces 24 and 28, defined by the angle between the inner (closest to rotor) portion of the respective supporting surfaces 24 and 28, and the inner surface of first parts 32 as it leaves the slots 330. The slot exit angle  $\alpha$  is generally greater than 90°. This bending of the first parts 32 allows the windings 20 to be maintained closer to the surface of the core 18, thus the overall thickness of the motor 10 is reduced. The dimensions of the outer circumference 420 and inner diameter 430 of the windings 20 are increased such that the height of the windings 20 between the front surface 24 of the laminations 18 and the front surface 400 of the windings 20, as well as the height of the windings between the rear surface 28 of laminations 18 and the rear surface 410 of the windings is about ⅝ inch or less. Thus, the motor has a narrower profile than typical PSC motors which have winding heights over ¾ inch. The outer circumference 420 of the windings 20 extends at least 2.0 mm, and preferably about 3.0 mm to an area radially beyond the outer edge of the stator slots 330.

In a preferred embodiment, stator slots 330 have a flattened edge portion 340. This flattened edge portion 340 increases the minimum distance 320 between the edge of the slots 330 and the outer edge of laminations 18 to about 0.174 inch (4.41 mm), compared to about 0.141 inch (3.58 mm) for the stator slots with rounded edge portions 350. The distance 300 between stator slots 330 remains around 0.150 (3.81 mm) in both embodiments. The embodiment having flattened edge portions 340 has an increased efficiency over the rounded edge portion embodiment due to a decrease in bottle-necking of magnetic flux between the edge portion 320 and the edge of the laminations 18 for a given lamination thickness.

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In a preferred embodiment, the outer circumference 420 of the windings 20 within at least the rear casing 38 extends radially beyond the laminations 18. The rear casing 38 is preferably wider in at least its inner diameter than the front casing 36, thereby accommodating the wider portion of the windings 20, lead wires 200 adjacent the windings 20, and allowing for more efficient cooling of motor 10. The windings 20 may not extend radially in the front portion of the motor as far as in the rear portion of the motor so that the front casing 36 may be dimensioned to allow for indented portions 210 and apertures 106 to properly align with the laminations 18. The smaller diameter front casing 36 allows for a reduction in materials and facilitates molding.

The motor housing 12 comprises generally dome-shaped first (front) and second (rear) casings 36, 38. The first casing 36 is centered about a longitudinal axis 40 and has a first interior surface 42 and a first exterior surface 44. The first interior surface 42 defines a first chamber 46. The first exterior surface 44 includes a circumferential side wall 48 connected to a first (front) vented end wall 50. The first vented end wall 50 has a recessed central area 52 extending inwardly toward the stacked laminations 18.

The recessed central area 52 defines an opening 54 through which a proximal end 55 of the motor's output shaft 30 passes. The recessed central area 52 is adapted to receive a female connector located on an inner surface of a central hub 11 of the fan blade assembly 9. The female connector is press fit around the output shaft 30 and extends into the recessed central area 52. This recessed central area 52 allows the central hub to function closer to the motor housing 12, thus saving space and producing a narrower profile for placement within a narrow box fan.

Casings 36 and 38 can be formed of aluminum and die-cast, due to their narrower diameter than the casings of typical shaded pole motors. The die-casting of casings 36 and 38 enables production with a high degree of accuracy and consistency. Alternatively, the casings 36 and 38 can be formed of plastic, and placed closer or adjacent to the windings of copper wires 20. The motor construction according to the invention is up to 1.75 lbs. or more lighter than a typical shaded pole motor.

The first vented end wall 50 also includes a plurality of vents 56 (See FIGS. 3 and 5). The vents 56 are tear-shaped and are positioned between the recessed central area 52 and the first circumferential side wall 48. The vents 56 allow air to circulate through the motor housing 12, and the electric motor's 10 operating temperature is lowered by as much as 42° F. (6° C.). The resulting operating temperature of the motor 10 is approximately 65° C. above ambient temperature, thus placing it in the Class A category and allowing for less expensive insulation materials to be used. The motor 10 operates much more efficiently than a typical shaded pole motor, which would require 180–200 Watts of input power to produce the same output power as the motor 10 of the present invention having only about 120 Watts of input power.

At one end, the first circumferential side wall 48 is connected to a first lip portion 64. The first lip portion 64 engages the first supporting portion 22 of the stacked laminations 18. The first lip portion 64 has a plurality of pads or lands 65 which engage the first supporting surface 24. The first lip portion 64 also includes a plurality of bolt holes 66 adapted for receiving bolts or fasteners 68 or other connection means. The bolts 68 are long enough to pass from the first casing 36 through the stacked laminations 18 to the second casing 36. Indented portions 210 protrude into casing 36 and are adapted to make space for bolts 68.

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At least one of the indented portions 210 comprises a receiving surface 220 which is geometrically adapted to receive a cooperatively dimensioned edge 230 of a mounting plate 240 attached to capacitor 73. The receiving surface 220 and edge 230 are preferably flat, such that the capacitor 73 can be mounted using a single bolt 68, the cooperating surfaces preventing twisting of the capacitor 73. Other cooperating geometries may optionally be employed. Capacitor 73 is mounted such that it is below the end wall 50 along the side of the motor 10 and clear of any moving parts of the bladed propeller assembly 9.

A boss 70 surrounds each bolt hole 66. The bosses 70 are adapted fit within a portion of lengthwise apertures 72 in the interior of the stacked laminations 18. The bosses 70 act as guides to facilitate assembly of the motors 10.

A first hub 74 is positioned within the first chamber 46 on the first interior surface 42 of the first casing 36. The first hub 74 stabilizes the output shaft 30 within the motor housing 12. The first hub 74 is centered about the longitudinal axis 40. The first hub 74 has a cylindrical side wall 76 that extends from the first interior surface 42 downwardly toward the stacked laminations 18. A sleeve 78 is fitted within the first hub 74 to further stabilize the output shaft 30.

The second (rear) casing 38 also has a second interior surface 80 and a second exterior surface 82. The second interior surface 80 defines a second chamber 84. The second exterior surface 82 comprises a second circumferential side wall 86 connected to a second vented end wall 88. The second (rear) vented end wall 88 is similar to the first vented end wall 50. However, the second vented end wall 88 does not have a central recessed portion 52. The second vented end wall 88 includes an opening 90 through which a distal end 91 of the output shaft 30 passes. (See FIG. 4). The second vented end wall 88 also has a plurality of vents 89. The vents 89 are tear-shaped and surround the opening 90. The vents 89 are positioned between the opening 90 and the second circumferential side wall 86. The vents 89 aid in reducing the operating temperature of the electric motor 10.

The second circumferential side wall 86 has plurality of threaded bolt holes 92 adapted to receive the bolts 68 used to join the first and second casings 36, 38 with the core of stacked laminations 18. The second circumferential side wall 86 also has a U-shaped access 93. Lead wires 200 pass adjacent the windings 20 between the windings 20 and the interior of rear casing 38. A thermal fuse is positioned along the lead wires 200. The lead wires 200 extend from the electric motor 10 through the U-shaped access 93 to a power source.

The second circumferential side wall 86 further includes a second lip portion 94 for engaging the second supporting surface 28. The second lip portion 94 has a plurality of pads or lands 96 which engage the second supporting surface 28. The second lip portion 94 also has a plurality of bosses 70 surrounding each threaded bolt hole 92. The bosses 70 fit within the apertures 72 which pass through the core of stacked laminations 18. The pads or lands 65, 96 of the first and second lip portions 64, 94 cooperate to sandwich the stacked laminations 18 between the first and second casings 36, 38 in such a way that the two outermost laminations 22, 26 are not positioned within the first and second chambers 46, 84.

A second hub 98 is positioned within the second chamber 84 on the second interior surface 80 of the second casing 38. The second hub 98 stabilizes the output shaft 30 within the motor housing 12. The second hub 98 is also centered about the longitudinal axis 40. The second hub 98 has a second

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cylindrical side wall 100 that extends from the second interior surface 80 upwardly toward the stacked laminations 18. A sleeve 102 is fitted within the second hub 98 to further stabilize the output shaft 30.

The second circumferential side wall 86 further comprises an extended body portion for attachment to mounting surfaces of the fan, the extended body portion extending radially outward of the side wall of the rear casing and preferably comprised of a plurality of mounting brackets or legs 104. The mounting brackets 104 are integral with the second circumferential side wall 86 and spaced a distance from the second vented end wall 88. The spacing or offset helps allow the motor 10 to be used in a narrow box fan. Each mounting bracket or leg 104 has an opening or aperture 106 for receiving a fastening device. In one preferred embodiment, the extending body portion includes a rear surface which surrounds the apertures 106 and is aligned with the end wall of the rear casing 38. The fastening device attaches the motor 10 to a support bracket 150 within the fan frame 3. Normally, the space between the support brackets is lost because the motor housing lies completely in front of the support bracket. However, by offsetting the mounting brackets 104 the motor housing 12 extends between the support brackets and the motor housing 12 can be accommodated within a narrow box fan, such as a 3¼ inch box fan. The mounting brackets or legs 104 are preferably positioned in pairs in such a way that a first line defined by and extending through the centers of the rear sides of the openings 106 of each of two primary legs or brackets 104 is parallel to a second line defined by and extending through the centers of the rear side of the openings 106 of the other two secondary legs or brackets 104, and the lines are adjacent and clear of the casing 38.

A method for producing a narrow household box fan is also disclosed. The method includes the steps of providing a fan housing having a motor support within an interior cabinet. The above-described four-pole PSC electric motor with motor housing is attached to the motor support. A blade assembly is then press fit onto the proximal end of the output shaft.

While specific embodiments have been illustrated and described, numerous modifications are possible without departing from the spirit of the invention, and the scope of protection is only limited by the scope of the accompanying claims.

What is claimed is:

1. A fan assembly comprising:

- a frame having a substantially continuous outer side wall and front grill proximal to a front edge of the side wall and a rear grill proximal to a rear edge of the side wall;
- a motorized blade assembly having a four-pole permanent-split capacitor electric motor and an integrally attached bladed propeller with a central hub, said motor having a rotor with a rotatable output shaft extending from a front side of said motor secured to said bladed propeller, and having a front casing with a front end wall and a side wall and an interior portion, the front end wall having a central opening through which a proximal end portion of the output shaft passes, a rear casing having an end wall and a side wall and an interior portion, the motor further comprising a stator having copper windings and a core of stacked laminations, the front casing being disposed on a front surface of the laminations, and the rear casing being disposed on a rear surface of the laminations, said windings extending through a plurality of slots in said

UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF ILLINOIS

Lakewood Engineering and Manufacturing Company v. Lasko Metal Products Inc.

JUDGE RONALD GUZMAN

Case Number:

MAGISTRATE JUDGE KEYS

DOCKETED

OCT 12 2001

01C 7867

APPEARANCES ARE HEREBY FILED BY THE UNDERSIGNED AS ATTORNEY(S) FOR

Plaintiff

(A)		(B)	
SIGNATURE	<i>Bradley F. Rademaker</i>	SIGNATURE	<i>Judie D. Dziezak</i>
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CITY/STATE/ZIP	Chicago, IL 60606	CITY/STATE/ZIP	Chicago, IL 60606
TELEPHONE NUMBER	(312) 554-3300	TELEPHONE NUMBER	(312) 554-3300
IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE)	6,208,189	IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE)	6,224,852
MEMBER OF TRIAL BAR?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	MEMBER OF TRIAL BAR?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
TRIAL ATTORNEY?	YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>	TRIAL ATTORNEY?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
		DESIGNATED AS LOCAL COUNSEL?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
(C)		(D)	
SIGNATURE		SIGNATURE	
NAME		NAME	
FIRM		FIRM	
STREET ADDRESS		STREET ADDRESS	
CITY/STATE/ZIP		CITY/STATE/ZIP	
TELEPHONE NUMBER		TELEPHONE NUMBER	
IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE)		IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE)	
MEMBER OF TRIAL BAR?	YES <input type="checkbox"/> NO <input type="checkbox"/>	MEMBER OF TRIAL BAR?	YES <input type="checkbox"/> NO <input type="checkbox"/>
TRIAL ATTORNEY?	YES <input type="checkbox"/> NO <input type="checkbox"/>	TRIAL ATTORNEY?	YES <input type="checkbox"/> NO <input type="checkbox"/>
DESIGNATED AS LOCAL COUNSEL?	YES <input type="checkbox"/> NO <input type="checkbox"/>	DESIGNATED AS LOCAL COUNSEL?	YES <input type="checkbox"/> NO <input type="checkbox"/>



JS 44 (Rev. 3/99)

## VIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

## I. (a) PLAINTIFFS

Lakewood Engineering and Manufacturing Company  
501 North Sacramento Boulevard  
Chicago, Illinois 60612

JUDGE RONALD GUZMAN

## DEFENDANTS

Lasko Metal Products, Inc.  
820 Lincoln Avenue  
West Chester, Pennsylvania 19380

DOCKETED  
OCT 12 2001

(b) County of Residence of First Cook  
(EXCEPT IN U.S. PLAINTIFF CASES)

County of Residence of First Listed Chester  
(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE  
LAND INVOLVED.

## MAGISTRATE JUDGE KEYS

(c) Attorney's (Firm Name, Address, and Telephone Number)

Bradley F. Rademaker  
Wallenstein & Wagner, Ltd.  
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(312) 554-3300

(SEE ATTACHMENT I.(c))

Attorneys (If Known)

01C 7867

## II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff  
☐ 2 U.S. Government Defendant  
☒ 3 Federal Question (U.S. Government Not a Party)  
☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

## III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)

- Citizen of This State ☐ 1 ☐ 1 DEF Incorporated or Principal Place of Business In This State ☐ 4 ☐ 4 DEF  
Citizen of Another State ☐ 2 ☐ 2 DEF Incorporated and Principal Place of Business In Another State ☐ 5 ☐ 5 DEF  
Citizen or Subject of a Foreign Country ☐ 3 ☐ 3 DEF Foreign Nation ☐ 6 ☐ 6 DEF

## IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT	TORTS		FORFEITURE/PENALTY	BANKRUPTCY	OTHER STATUTES
<input type="checkbox"/> 110 Insurance <input type="checkbox"/> 120 Marine <input type="checkbox"/> 130 Miller Act <input type="checkbox"/> 140 Negotiable Instrument <input type="checkbox"/> 150 Recovery of Overpayment & Enforcement of <input type="checkbox"/> Judgment/Health Care Act <input type="checkbox"/> 152 Recovery of Defaulted Student Loans (Excl. Veterans) <input type="checkbox"/> 153 Recovery of Overpayment's Benefits <input type="checkbox"/> 160 Stockholders' Suits <input type="checkbox"/> 190 Other Contract <input type="checkbox"/> 195 Contract Product Liability	<b>PERSONAL INJURY</b> <input type="checkbox"/> 310 Airplane <input type="checkbox"/> 315 Airplane Product Liability <input type="checkbox"/> 320 Assault, Libel & Slander <input type="checkbox"/> 330 Federal Employers' Liability <input type="checkbox"/> 340 Marine <input type="checkbox"/> 345 Marine Product Liability <input type="checkbox"/> 350 Motor Vehicle <input type="checkbox"/> 355 Motor Vehicle Product Liability <input type="checkbox"/> 360 Other Personal Injury	<b>PERSONAL INJURY</b> <input type="checkbox"/> 362 Personal Injury—Med. Malpractice <input type="checkbox"/> 365 Personal Injury—Product Liability <input type="checkbox"/> 368 Asbestos Personal Injury Product Liability <b>PERSONAL PROPERTY</b> <input type="checkbox"/> 370 Other Fraud <input type="checkbox"/> 371 Truth in Lending <input type="checkbox"/> 380 Other Personal Property Damage <input type="checkbox"/> 385 Property Damage Product Liability	<input type="checkbox"/> 610 Agriculture <input type="checkbox"/> 620 Other Food & Drug <input type="checkbox"/> 625 Drug Related Seizure of Property 21 USC <input type="checkbox"/> 630 Liquor Laws <input type="checkbox"/> 640 R.R. & Truck <input type="checkbox"/> 650 Airline Regs. <input type="checkbox"/> 660 Occupational Safety/Health <input type="checkbox"/> 690 Other	<input type="checkbox"/> 422 Appeal 28 USC 158 <input type="checkbox"/> 423 Withdrawal 28 USC 157 <b>PROPERTY RIGHTS</b> <input type="checkbox"/> 820 Copyrights <input checked="" type="checkbox"/> 830 Patent <input type="checkbox"/> 840 Trademark	<input type="checkbox"/> 400 State Reapportionment <input type="checkbox"/> 410 Antitrust <input type="checkbox"/> 430 Banks and Banking <input type="checkbox"/> 450 Commerce/ICC Rates/etc. <input type="checkbox"/> 460 Deportation <input type="checkbox"/> 470 Racketeer Influenced and Corrupt Organizations <input type="checkbox"/> 810 Selective Service <input type="checkbox"/> 850 Securities/Commodities/Exchange <input type="checkbox"/> 875 Customer Challenge 12 USC 3410 <input type="checkbox"/> 891 Agricultural Acts <input type="checkbox"/> 892 Economic Stabilization Act <input type="checkbox"/> 893 Environmental Matters <input type="checkbox"/> 894 Energy Allocation Act <input type="checkbox"/> 895 Freedom of Information Act <input type="checkbox"/> 900 Appeal of Fee Determination Under Equal Access to Justice <input type="checkbox"/> 950 Constitutionality of State Statutes <input type="checkbox"/> 890 Other Statutory Actions
<b>REAL PROPERTY</b> <input type="checkbox"/> 210 Land Condemnation <input type="checkbox"/> 220 Foreclosure <input type="checkbox"/> 230 Rent Lease & Ejectment <input type="checkbox"/> 240 Torts to Land <input type="checkbox"/> 245 Tort Product Liability <input type="checkbox"/> 290 All Other Real Property	<b>CIVIL RIGHTS</b> <input type="checkbox"/> 441 Voting <input type="checkbox"/> 442 Employment <input type="checkbox"/> 443 Housing/Accommodations <input type="checkbox"/> 444 Welfare <input type="checkbox"/> 440 Other Civil Rights	<b>PRISONER PETITIONS</b> <input type="checkbox"/> 510 Motions to Vacate Sentence <input type="checkbox"/> Habeas Corpus: <input type="checkbox"/> 530 General <input type="checkbox"/> 535 Death Penalty <input type="checkbox"/> 540 Mandamus & Other <input type="checkbox"/> 550 Civil Rights <input type="checkbox"/> 555 Prison Condition	<b>LABOR</b> <input type="checkbox"/> 710 Fair Labor Standards Act <input type="checkbox"/> 720 Labor/Mgmt. Relations <input type="checkbox"/> 730 Labor/Mgmt. Reporting & Disclosure Act <input type="checkbox"/> 740 Railway Labor Act <input type="checkbox"/> 790 Other Labor Litigation <input type="checkbox"/> 791 Empl. Ret. Inc. Security Act	<b>SOCIAL SECURITY</b> <input type="checkbox"/> 861 HIA (1395ff) <input type="checkbox"/> 862 Black Lung (923) <input type="checkbox"/> 863 DIWC/DIWW (405(g)) <input type="checkbox"/> 864 SSID Title XVI <input type="checkbox"/> 865 RSI (405(g)) <b>FEDERAL TAX SUITS</b> <input type="checkbox"/> 870 Taxes (U.S. Plaintiff or Defendant) <input type="checkbox"/> 871 IRS—Third Party 26 USC 7609	

## V. ORIGIN

(PLACE AN "X" IN ONE BOX ONLY)

- ☒ 1 Original Proceeding  
☐ 2 Removed from State Court  
☐ 3 Remanded from Appellate Court  
☐ 4 Reinstated or Reopened  
☐ 5 Transferred from another district (specify)  
☐ 6 Multidistrict Litigation  
☐ 7 Appeal to District Judge from Magistrate Judgment

## VI. CAUSE OF ACTION

(Cite the U.S. Civil Statute under which you are filing and write brief statement of cause. Do not cite jurisdictional statutes unless diversity.)

35 U.S.C. §§ 271 et seq.

## VII. REQUESTED IN COMPLAINT:

☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23

DEMAND \$

CHECK YES only if demanded in complaint:

JURY DEMAND: ☒ Yes ☐ No

## VIII. RELATED CASE(S) IF ANY

(See instructions):

JUDGE

DOCKET NUMBER

DATE

SIGNATURE OF ATTORNEY OF RECORD

October 11, 2001

Bradley F. Rademaker

ADDITIONAL PLAINTIFFS' ATTORNEYS  
(Civil Cover Sheet Attachment)

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