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(54) **INSULATED BOX FAN**

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Related U.S. Patent Documents

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F04B 17/00 (2006.01)

(52) **U.S. Cl.** ..... **417/423.14**; 416/244 R; 415/213.1; 417/423.8

(58) **Field of Classification Search** ..... 417/423.14, 417/423.8, 373, 244 R, 247 R, 423.15; 415/213.1; 310/89, 91
See application file for complete search history.

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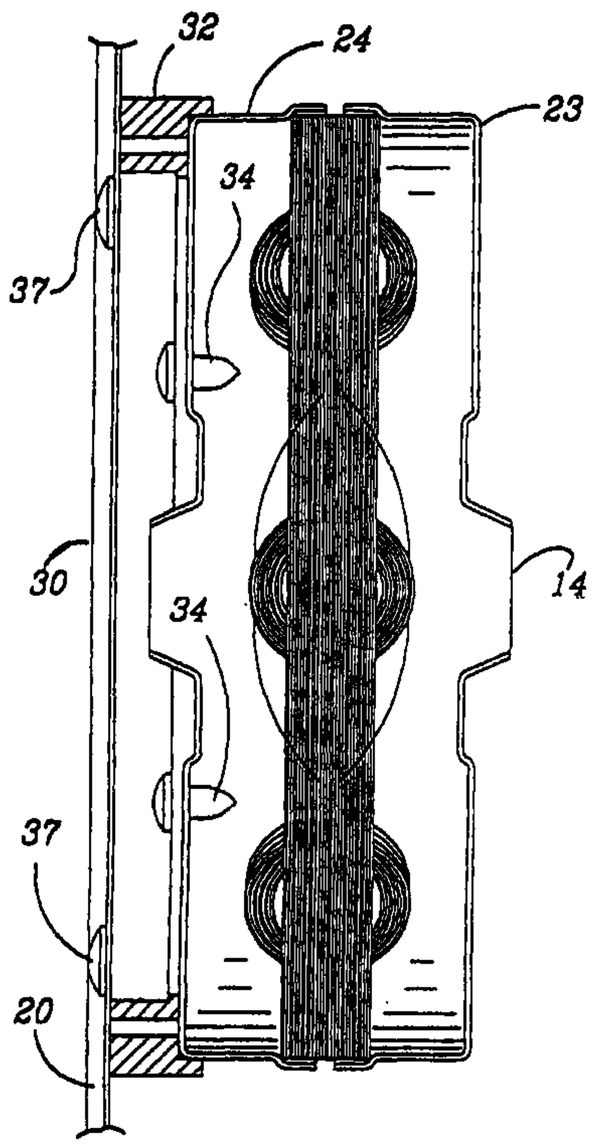
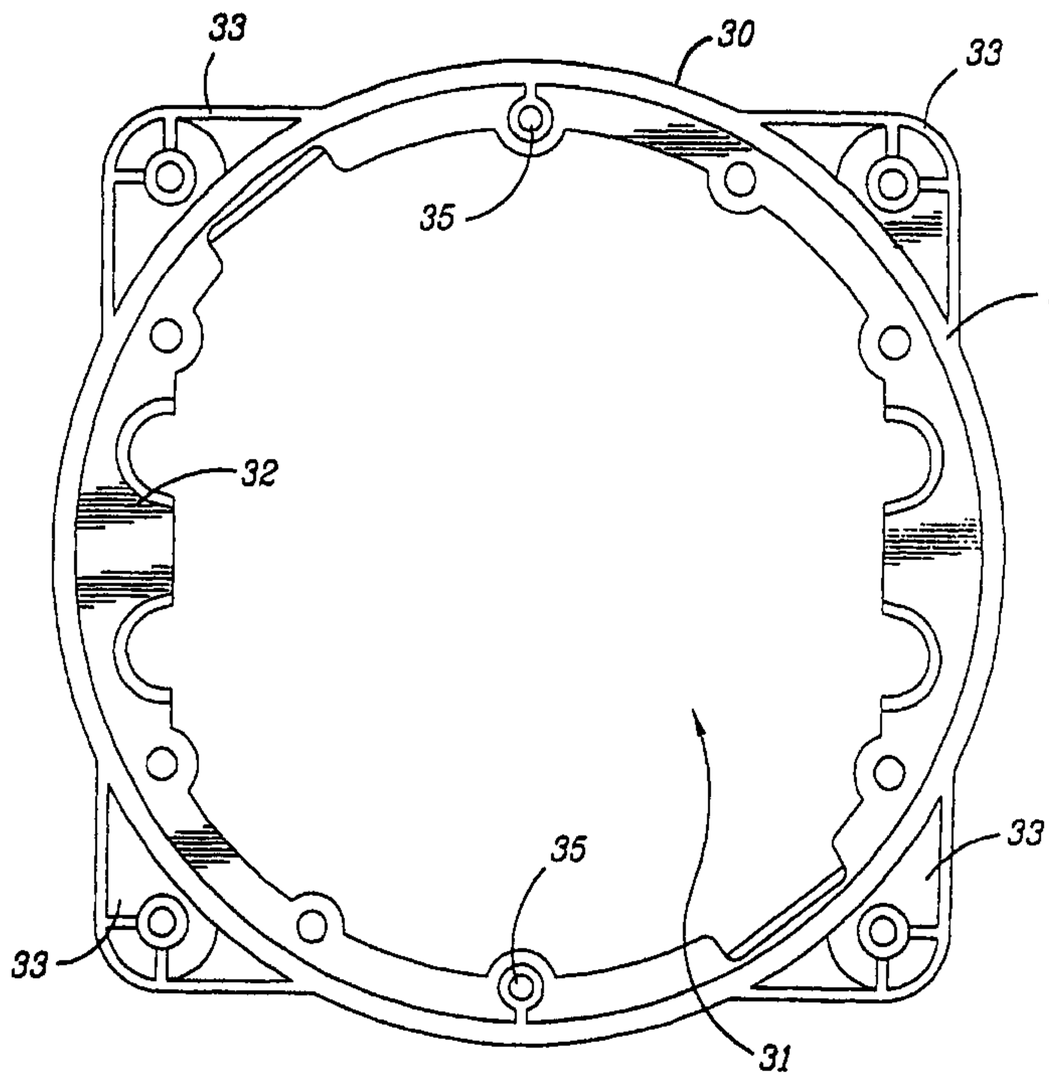
(57) **ABSTRACT**

An insulated box fan, which includes an outer metal housing with two vertical metal brackets to which a plastic isolator ring is attached, and which ring is also attached to the fan motor, to electrically insulate it from the fan housing, and to direct additional cooling air to the fan motor.

26 Claims, 6 Drawing Sheets





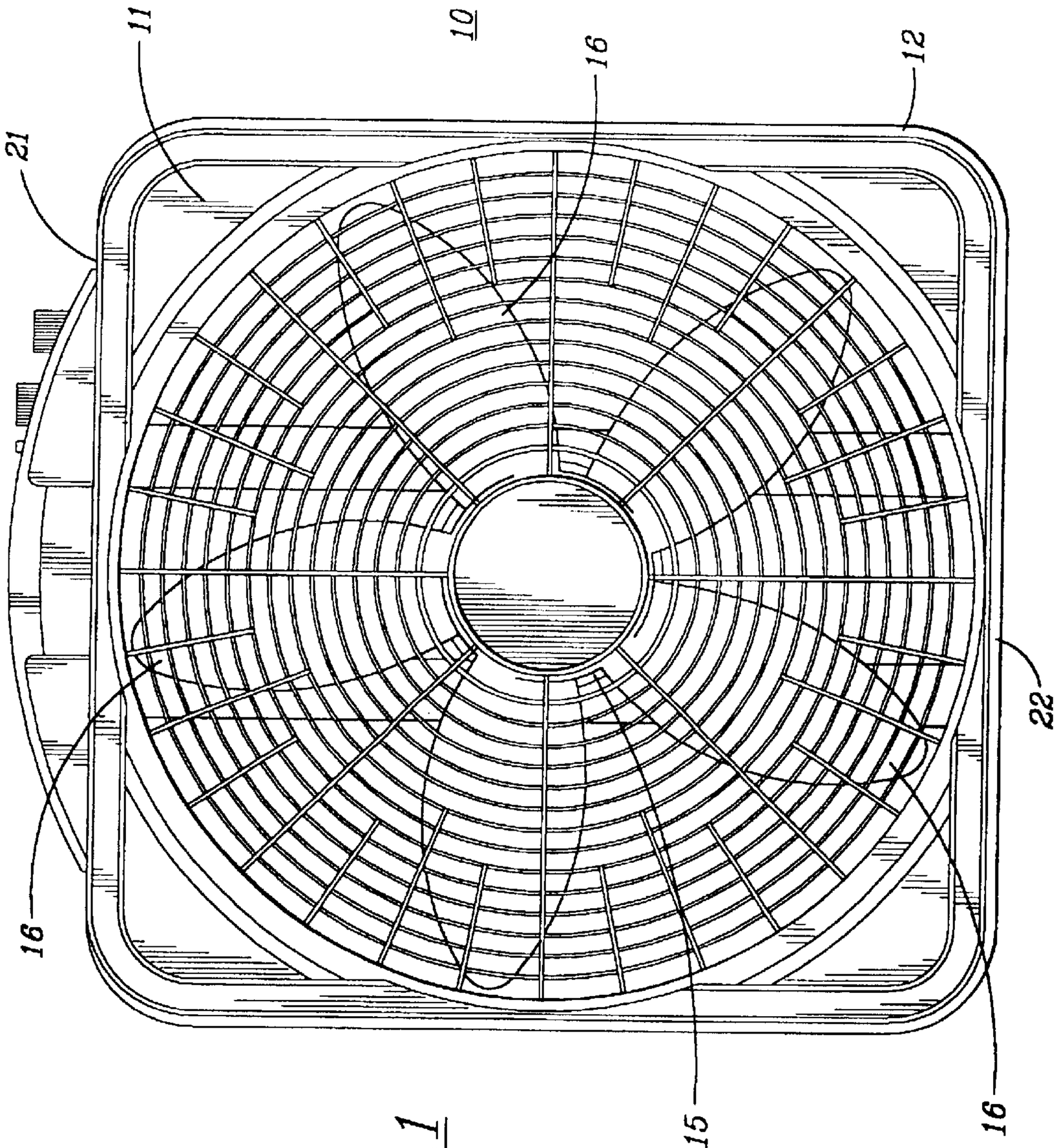


Fig. 1

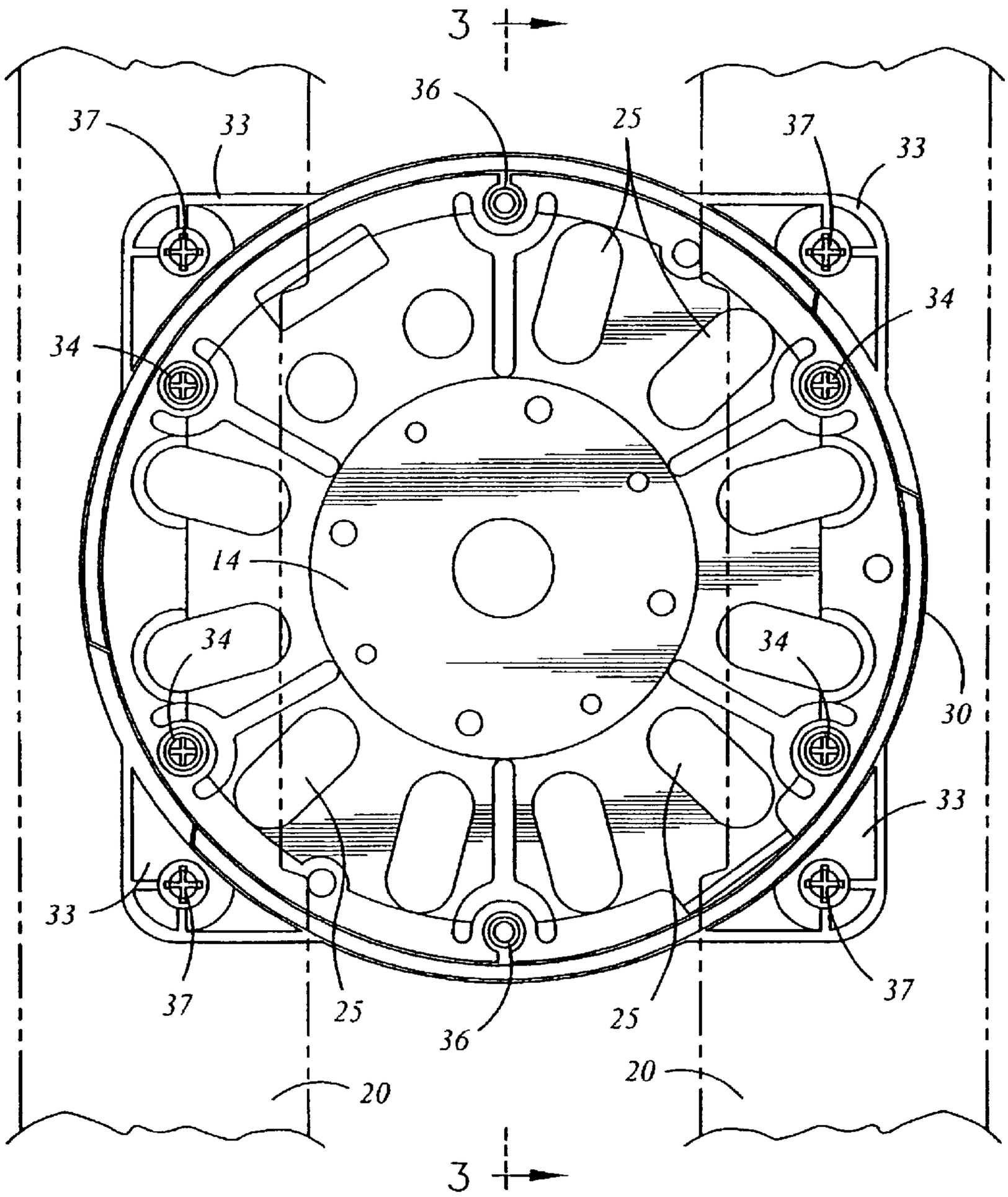


Fig. 2

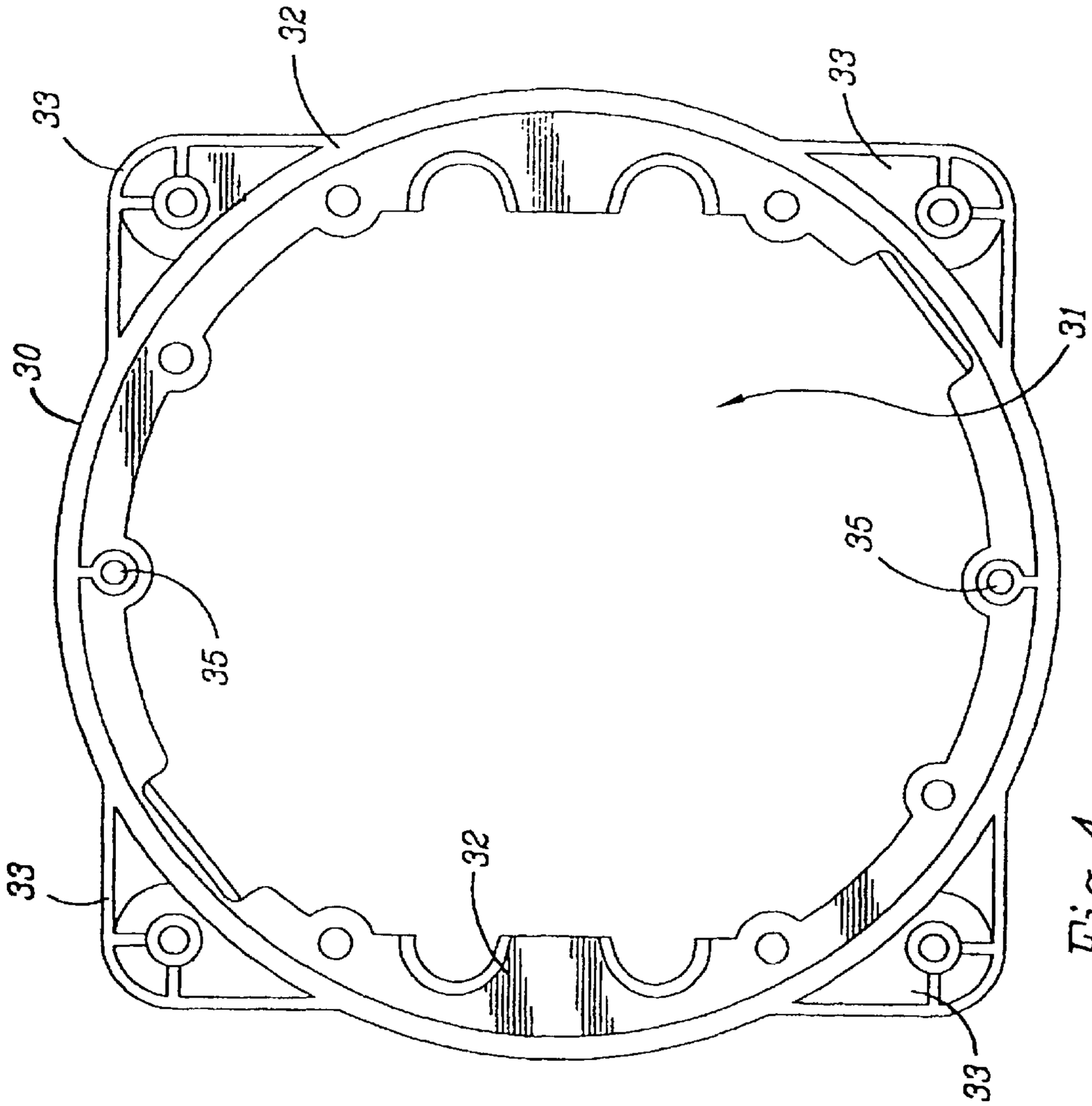


Fig. 4

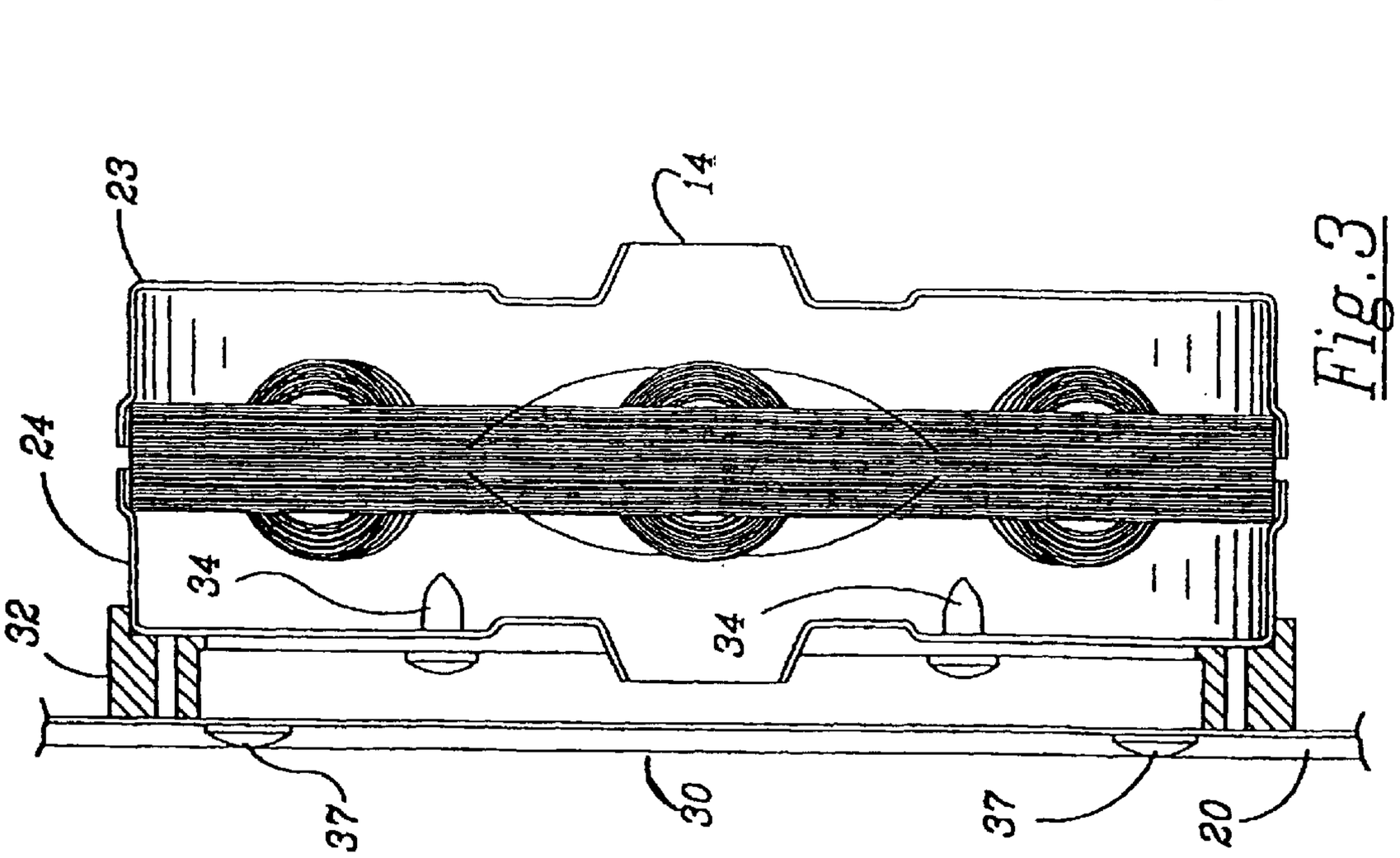


Fig. 3

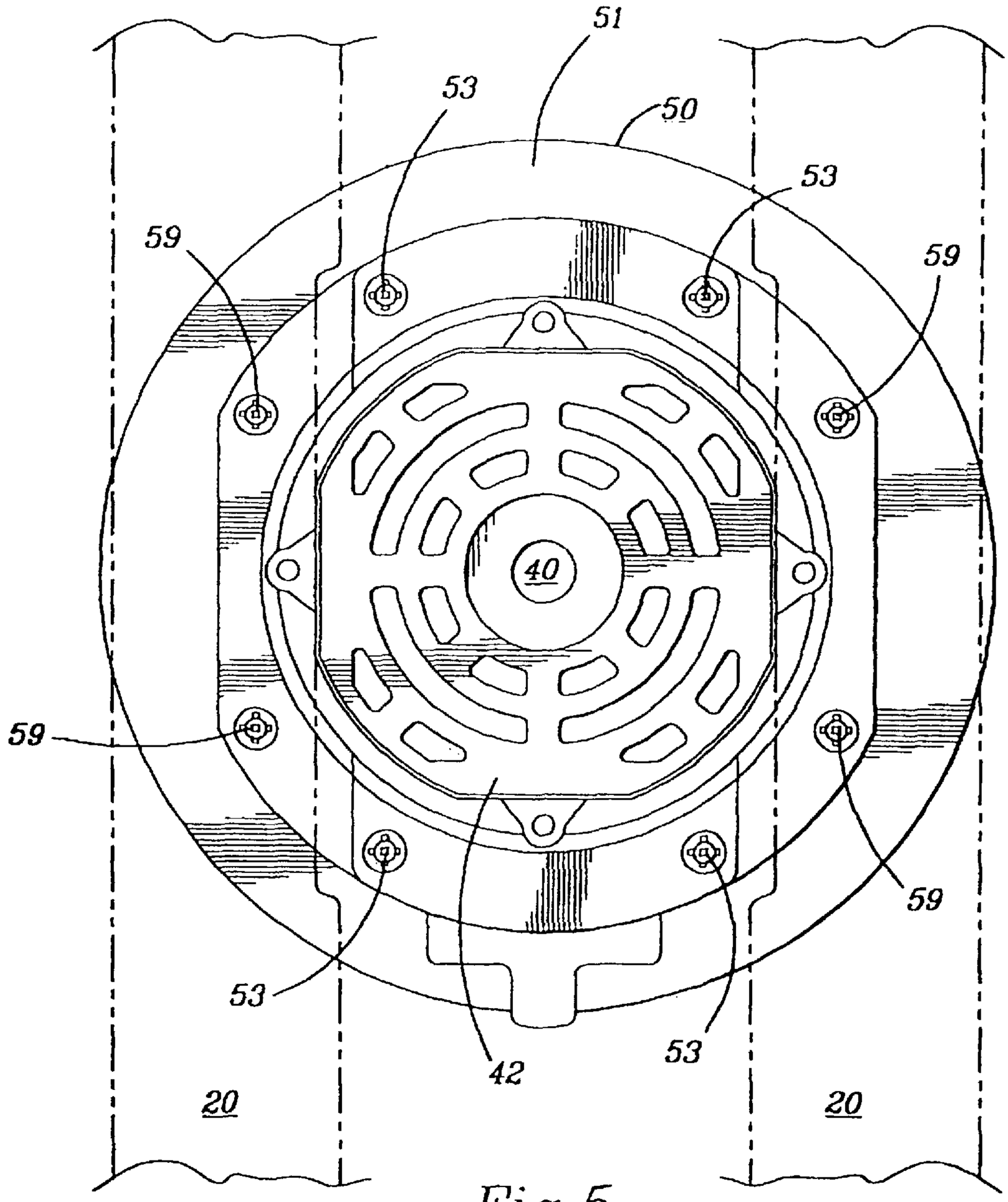


Fig.5

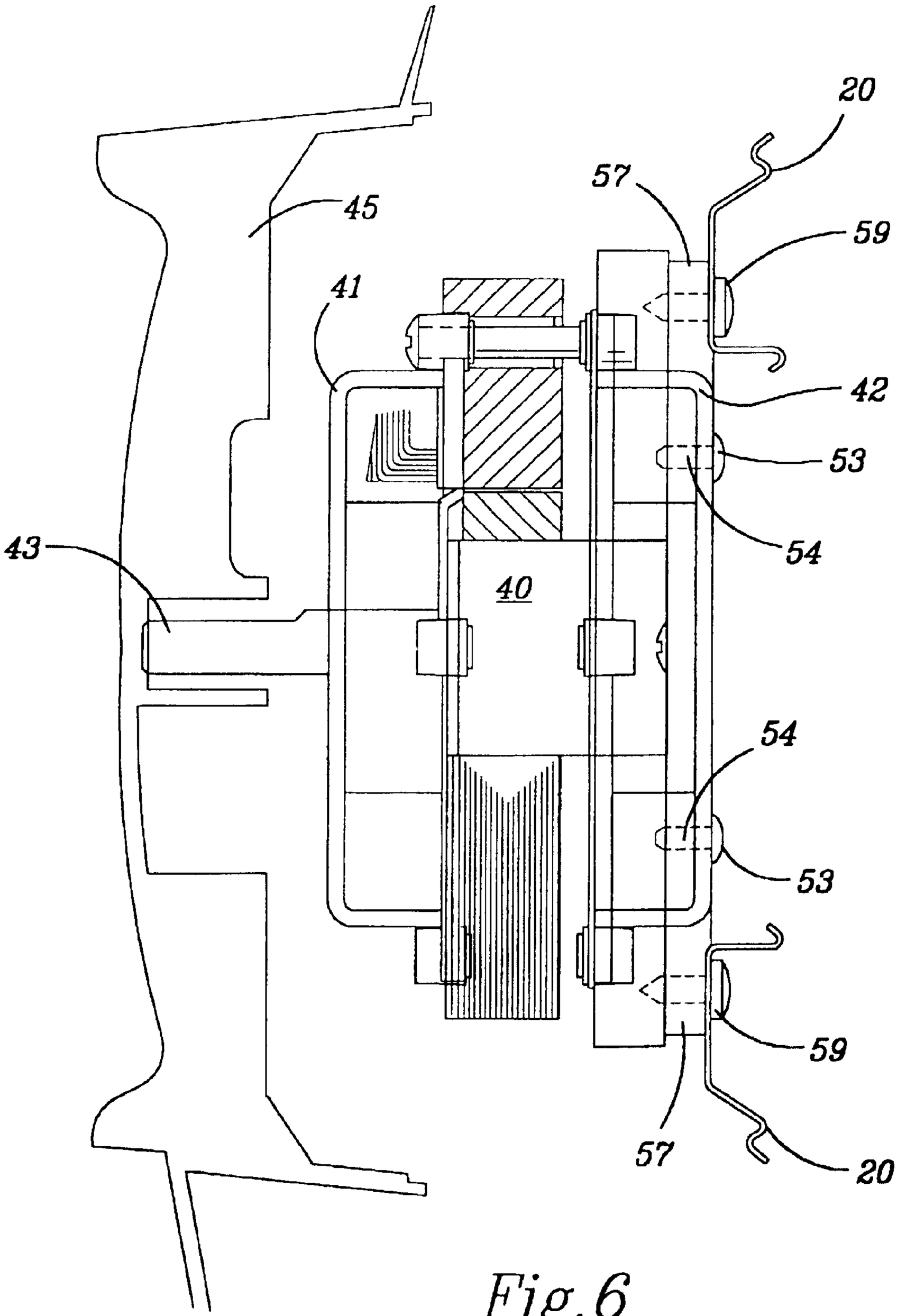


Fig.6

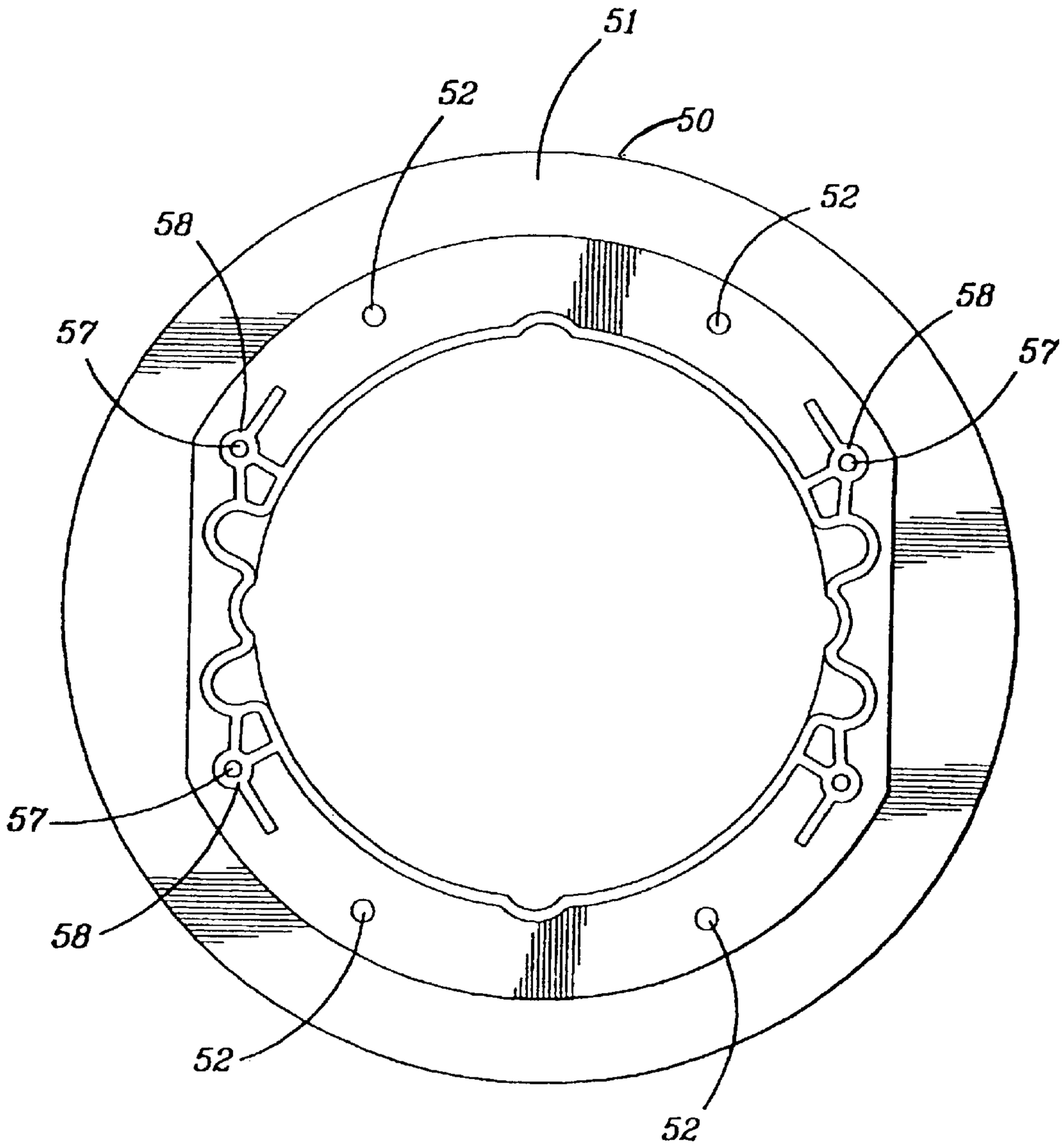


Fig. 7

INSULATED BOX FAN

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an insulated box fan of the type wherein the motor is electrically insulated from the rest of the fan by an isolator ring.

2. Description of the Prior Art

Box fans are perhaps the most common fan in the industry. Historically, box fans are constructed of metal and plastic and are one of the least expensive fans, they provide a high volume of air, are of relatively light weight, are sturdy and long lasting, are versatile in that they can be placed on virtually any flat surface, and are stable and resist toppling.

With the use in fans of six pole motors and the increasing use of four pole motors, which use capacitors and consequent higher operating voltages, problems can arise if the fan is placed into a window, and the air being moved by the fan becomes moisture laden air, or if water comes directly onto the fan.

One of the problems from moisture laden air is that the water may provide a current leakage path to parts of the fan that come into contact with the user.

Box fans typically mount the motor, which has a metal outer casing, directly to vertical metal brackets in the fan, so that if the motor casing is electrically charged, the fan housing will also become charged, and present a hazard to the user.

The fan of the invention is designed to isolate the motor housing from the fan mounting brackets to prevent the fan housing from becoming electrically charged, and provides other positive advantages.

SUMMARY OF THE INVENTION

It has now been found that an insulated box fan is available, wherein the fan motor is electrically insulated from the fan housing by an isolator ring.

The principal object of the invention is to provide a box fan that has a fan motor that is electrically insulated from the fan housing.

A further object of the invention is to provide a box fan that is simple and inexpensive to construct.

A further object of the invention is to provide a box fan which maintains the mechanical and structural integrity of the metal bracket portion of the fan.

A further object of the invention is to provide a box fan wherein the basic fan housing structure is not modified, and which provides a slim streamlined box fan.

A further object of the invention is to provide a box fan that can be safely placed in a window.

A further object of the invention is to provide a box fan with improved air flow to the fan motor for better cooling.

Other objects and advantageous features of the invention will be apparent from the description and claims.

DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description

taken in connection with the accompanying drawings forming part hereof in which:

FIG. **1** is a front view of a box fan which incorporates the invention;

FIG. **2** is a fragmentary rear view of one embodiment of a portion of the box fan of FIG. **1**;

FIG. **3** is a vertical sectional view, taken approximately on the line **3-3** of FIG. **2**;

FIG. **4** is a front view of an isolator ring of the fan of FIG. **3**;

FIG. **5** is a view similar to FIG. **2**, illustrating another embodiment of a portion of a box fan;

FIG. **6** is a horizontal sectional view, taken approximately on the line **6-6** of FIG. **5**; and

FIG. **7** is a front elevational view of an isolator ring used in the fan illustrated in FIG. **5**.

It should, of course, be understood that the description and drawings herein are merely illustrative and that various modifications and changes can be made in the structures disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

When referring to the preferred embodiments, certain terminology will be utilized for the sake of clarity. Use of such terminology is intended to encompass not only the described embodiment, but also technical equivalents which operate and function in substantially the same way to bring about the same result.

Referring now more particularly to FIGS. **1-4**, inclusive, a box fan **10** is illustrated which has a front grill **11**, an outer rectangular fan housing **12**, a fan motor **14**, with a fan hub **15**, and a plurality of fan blades **16** extending therefrom.

The front grill **11** is preferably of molded synthetic plastic and the fan housing **12** is preferably of stamped metal.

A rear grill (not shown) would also be provided, which could having a design similar to front grill **11**.

The fan housing **12** has a pair of spaced vertical brackets **20** extending from the top **21** of the housing **12** to the bottom **22**, which brackets **20** are preferably of metal, to add strength and rigidity to the fan housing **12**.

The embodiment of fan motor **14** illustrated in detail in FIGS. **2** and **3** is a six (6) pole motor, which has a front casing **23** and a rear casing **24**.

The rear casing **24** is of dish shape with a plurality of radial cutouts **25**.

An isolator ring **30** is provided, which is of molded plastic, with polypropylene plastic being the preferred material.

The isolator ring **30** is of dish shape, open in the center **31**, and includes a rim **32** with projections **33**, four being shown, and spaced with two at the top and two at the bottom.

The motor casing **24** is attached to rim **32** by four screws **34**, which extend through rim **32** into threaded openings (not shown) in casing **24**.

The rim **32** has openings **35** at the top and bottom with locating pins **36** therein, which extend from motor casing **24**.

The projections **33** have screws **37** engaged therein, four being illustrated, which screws extend through openings (not shown) in brackets **20**, retaining ring **30** thereto.

Referring now more specifically to FIGS. **5-7** inclusive, another embodiment of the invention is illustrated, with a

four (4) pole motor **40**, which includes a front dish shaped casing **41**, and a rear dish shaped casing **42**.

The motor **40** has an output shaft **43** with a blade hub **45** thereon.

An isolator ring **50** is provided, which is of molded plastic with polypropylene plastic being preferred.

The ring **50** has a wide rim **51**, with spaced openings **52**, which have screws **53** therein, four being illustrated, which extend therethrough into threaded openings **54** in casing **42** to retain motor **40** thereon.

The configuration of the rim **51** has been found to better direct the air to cool the motor than with previous structures, and it has been found that the operating temperature of the fan motor may be lowered by as much as 2.5 degrees centigrade by use of the ring **50**.

The rim **51** has four spaced **57** bosses thereon, which have openings **58** therein, and as shown in FIGS. **5**,**6**, have screws **59** therein, which screws **59** extend through openings (not shown) in the brackets **20** of a fan housing (not shown) similar to that described above, to retain the motor **40** thereon. While at least two screws are shown in each bracket **20**, variations can be used where the bracket could have an opening (not shown), which would have a tab (not shown) from the ring **50** engaged therein, and one screw **59**.

It will thus be seen structure has been provided with which the objects of the invention are achieved.

I claim:

1. In combination with a box fan which includes a rectangular metal outer housing, at least one grill on said housing, a pair of spaced vertical metal brackets connected to said housing, a fan motor having a front casing and a rear casing, the improvement which comprises

an electrically insulating ring,

said ring is connected to said fan motor rear casing by at least one screw, which passes through said ring into said rear casing, and

said ring is connected to said brackets by at least two screws, which pass through said brackets and are engaged in said ring.

2. A box fan as defined in claim **1** in which said ring is of molded plastic.

3. A box fan as defined in claim **1** in which said ring is of circular configuration.

4. A box fan as defined in claim **1** in which said ring has rim means to direct cooling air to said fan motor to reduce its operating temperature.

5. An electrically insulated box fan comprising:

a substantially rectangular metal outer housing;

at least one grill on said housing;

at least two metal brackets connected to said housing;

a fan motor comprising:

a front casing, and

a rear casing;

at least one substantially rigid electrical insulator;

said at least one substantially rigid electrical insulator directly coupled to at least one of said fan motor casings; and

said at least one substantially rigid electrical insulator coupled to at least one metal brackets by at least one attaching member, which passes through said at least one of said metal brackets and engages said at least one substantially rigid electrical insulator,

wherein said motor is electrically insulated from said metal outer housing.

6. The electrically insulated box fan according to claim 5, wherein said at least one attaching member is a screw.

7. The electrically insulated box fan according to claim 5, wherein said at least one insulator is coupled to a rear portion of said fan motor casing.

8. The electrically insulated box fan according to claim 5, wherein said at least one insulator is formed from a polymer.

9. The electrically insulated box fan according to claim 5, wherein said box fan is also a window fan.

10. The electrically insulated box fan according to claim 5, wherein said front and/or rear casing further comprises at least one extension and said at least one electrical insulator is connected to said at least one extension.

11. An electrically insulated motor mount and fan combination comprising:

a fan comprising:

a metal outer housing,

at least one grill on said housing,

at least two metal brackets connected to said housing, and

a fan motor having a front casing and a rear casing; and

at least one substantially rigid electrically insulated motor mount comprising:

a first portion coupled directly to said fan motor; and

a second portion coupled to at least one of said at least two metal brackets of said fan,

wherein said substantially rigid electrically insulated motor mount insulated said fan motor from said metal outer housing of said fan.

12. The combination according to claim 11, wherein said first portion includes a locator for positioning said electrical insulator relative to at least a portion of said fan motor.

13. The combination according to claim 11, wherein said second portion is coupled to said at least one of said brackets with at least one coupling device.

14. The combination according to claim 13, wherein said coupling device is a screw.

15. The combination according to claim 11, wherein said fan is one of a box fan and/or a window fan.

16. An improvement in combination with a fan which includes a metal outer housing, at least one grill on said housing, at least a pair of metal brackets connected to said housing, a fan motor having a front casing and a rear casing, the improvement comprising:

at least one substantially rigid electrical insulator;

said at least one substantially rigid electrical insulator being coupled to only one of said front or rear casing of said fan motor; and

said at least one substantially rigid electrical insulator being coupled to at least one of said metal brackets by at least one attaching member which passes through at least one of said metal brackets and engages said at least one electrical insulator,

wherein said at least one substantially rigid electrical insulator entirely supports said fan motor relative to said metal brackets and said metal outer housing.

17. The improvement according to claim 16, wherein said at least one attaching member is a screw.

18. The improvement according to claim 16, wherein said fan is one of a box fan and/or a window fan.

19. The improvement according to claim 16, wherein said at least one electrical insulator is formed from a polymer.

20. The improvement according to claim 16, wherein said electrical insulator separates said fan motor casing from said metal brackets.

21. The improvement according to claim 16, wherein said at least one electrical insulator completely insulates said fan motor electrically from said metal outer housing.

22. The improvement according to claim 16, wherein said rear casing further comprises at least one orifice to locate and position said at least one electrical insulator relative to said fan motor.

23. The improvement according to claim 22, wherein said at least one attaching member passes through and/or into said orifice.

24. The improvement according to claim 16, wherein said at least one electrical insulator is coupled to said rear casing with at least one coupling device distinct from said attaching member.

25. In combination with a box fan which includes a rectangular metal outer housing, at least one grill on said housing, at least a pair of spaced metal brackets connected to said housing, a fan motor having a front casing and a rear casing, the improvement comprising:

at least one substantially rigid electrically insulating member,

said at least one substantially rigid electrically insulating member directly coupled to said fan casing by at least one respective attaching member; and

said at least one respective attaching member passing through one of said metal brackets and into said at least one substantially rigid electrically insulating member.

26. An electrically insulated box fan comprising:

a substantially rectangular metal outer housing;

at least one grill on said housing;

at least two metal brackets connected to said housing;

a fan motor comprising:

a front casing, and

a rear casing;

at least one electrical insulator for substantially rigidly supporting said fan motor;

said at least one electrical insulator directly coupled to at least one of said fan motor casings; and

said at least one electrical insulator coupled to said at least one of said metal brackets by at least one attaching member, which passes through said at least one metal bracket and engages said at least one rigid electrical insulator,

wherein said motor is electrically insulated from said metal outer housing.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : RE 40,298 E
APPLICATION NO. : 10/425274
DATED : May 6, 2008
INVENTOR(S) : Charles Litvin

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

At Column 3, line 62, should read:

coupled to at least one of said metal brackets by at least one

Signed and Sealed this

Twenty-ninth Day of July, 2008

JON W. DUDAS
Director of the United States Patent and Trademark Office