

[54] **BLOWER ASSEMBLY**

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Related U.S. Application Data

[63] Continuation of Ser. No. 182,753, Sept. 22, 1971, abandoned.

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[51] Int. Cl. **F04b 17/00**

[58] Field of Search **417/424, 423 R; 415/219**

[56] **References Cited**

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[57]

ABSTRACT

A blower assembly comprising a housing with inlet and discharge openings in opposite sides. A backward curved blower wheel is mounted in the housing with a driving motor adjacent the circular inlet opening and provides a seal against reverse air flow with an annular ring on the wheel. The discharge opening is larger in area than the inlet and a resulting straight through flow occurs at a relatively low velocity and sound level but in an air stream of relatively broad cross section.

10 Claims, 4 Drawing Figures

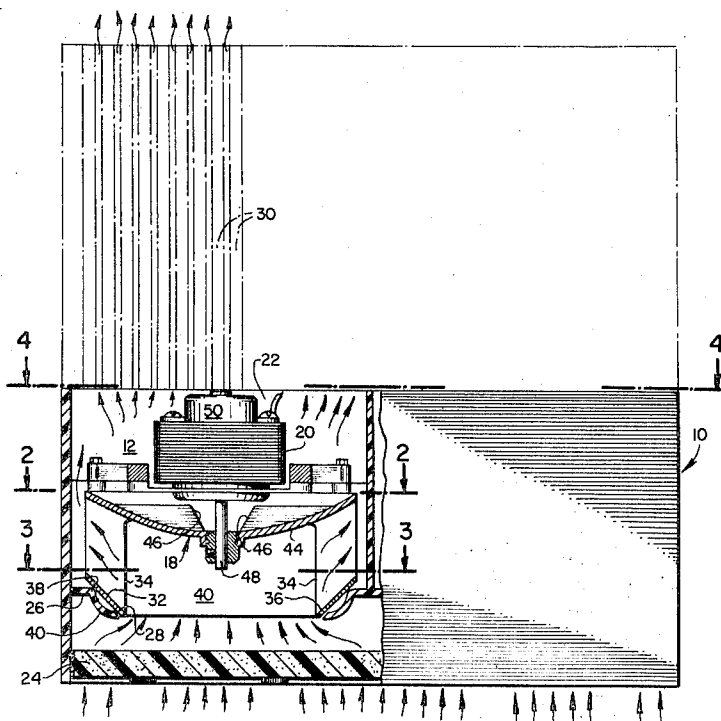


FIG. 1

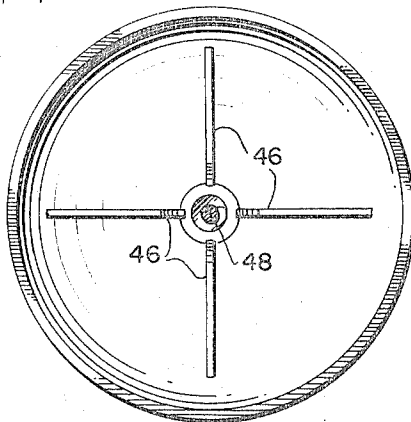
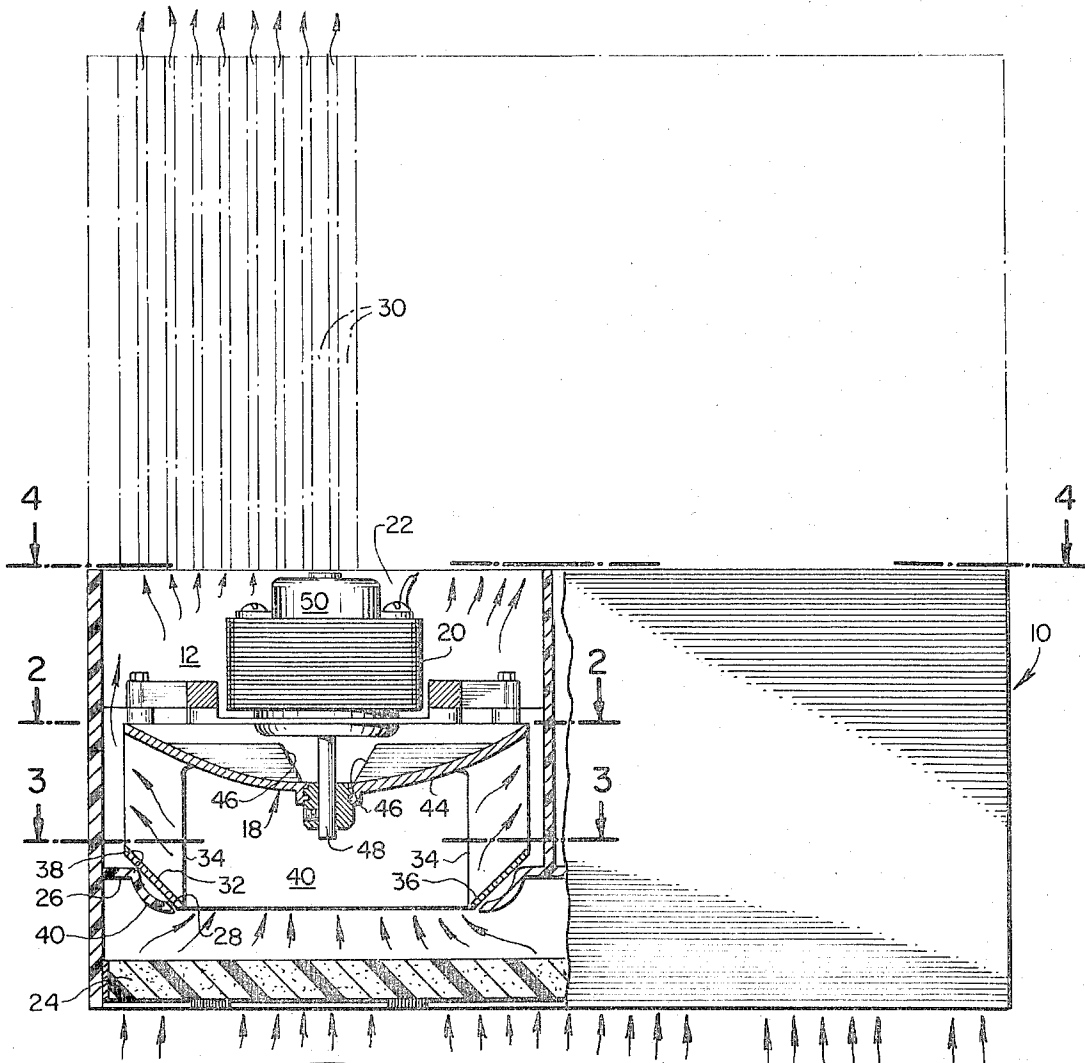


FIG. 2

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FIG. 3

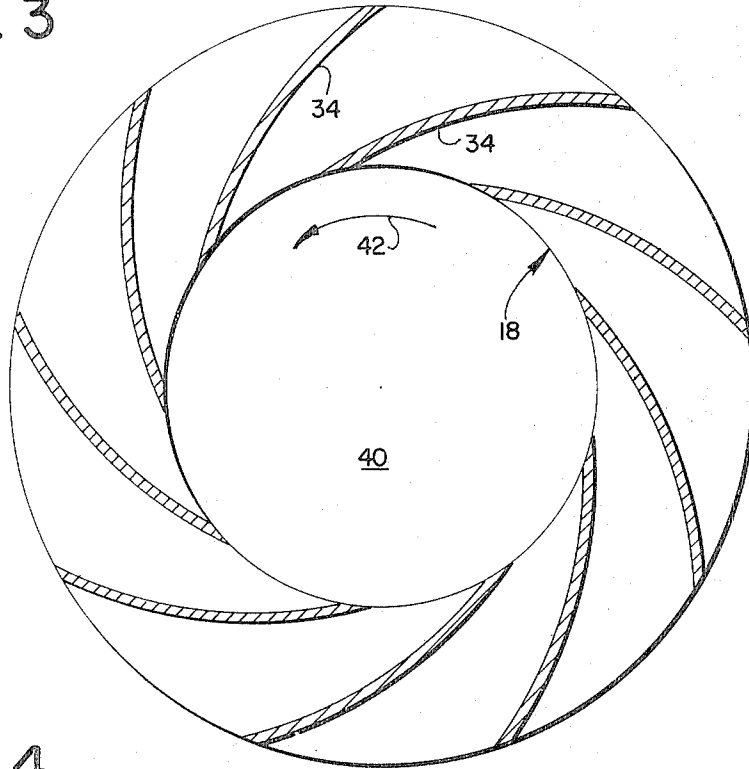
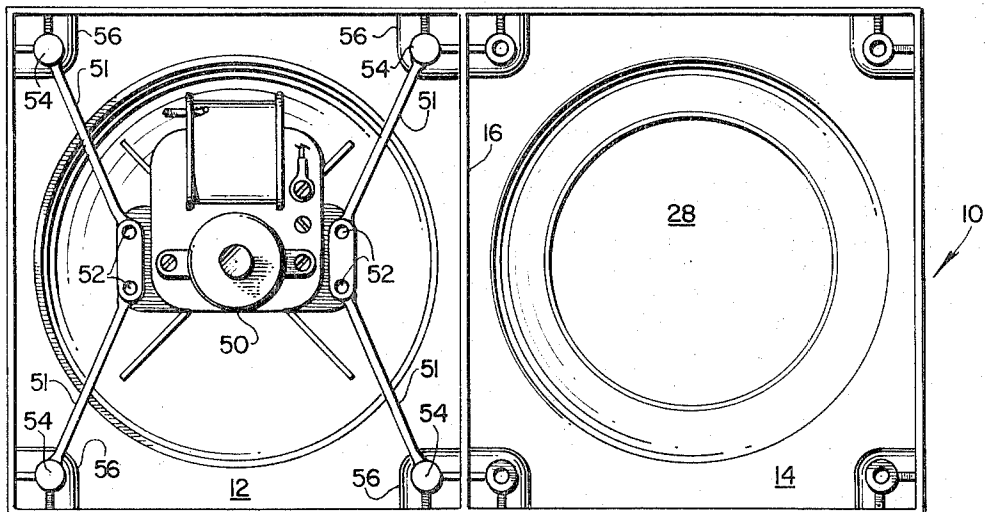


FIG. 4



BLOWER ASSEMBLY

This is a continuation of application Ser. No. 182,753, filed Sept. 22, 1971, now abandoned.

BACKGROUND OF THE INVENTION

Straight through or in line air flow can of course be conveniently provided with devices such as axial fans and transverse flow blowers but various disadvantages such as high sound levels are encountered.

SUMMARY OF THE INVENTION

It is the general object of the present invention to provide an improved straight through or in line blower assembly capable of discharging a stream of air for cooling or other purposes at relatively low velocity and low sound level but generally broad cross section.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a blower assembly constructed in accordance with the present invention with a portion thereof broken away for clarity of illustration.

FIG. 2 is a transverse sectional view taken generally as indicated at 2—2 in FIG. 1 and showing an upper or rear portion of a blower wheel forming a part of the assembly.

FIG. 3 is a transverse section taken generally as indicated at 3—3 in FIG. 1 and illustrating blower wheel blade form.

FIG. 4 is a transverse section taken generally at 4—4 in FIG. 1 and illustrating a blower wheel drive motor, motor mounts, etc.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring particularly to FIGS. 1 and 4, it will be observed that the blower assembly of the present invention comprises a housing indicated generally at 10 and which, in the presently preferred form shown, takes a rectangular configuration. While the invention is not so limited, the housing may be provided with first and second chambers 12, 14, separated by a partition 16, FIG. 4, and which may be identical in substantially all respects. That is, each of the chambers 12 and 14 may receive blower wheel and motor assemblies with individual inlet and discharge openings as indicated generally in FIG. 4 where the righthand blower and motor assembly is omitted for clarity of illustration. The blower wheel and motor assemblies may be identical although different pressure and flow characteristics may be provided for. Accordingly, a single left hand chamber 12 will be described hereinbelow in association with its blower wheel and drive motor 18, 20 but it will be understood that such description applies equally to a blower wheel and motor assembly for the chamber 14.

The housing 10 may vary widely in form and may be a fabricated metal, molded plastic construction, etc. As shown, the housing is of molded construction and is rectangular as aforesaid with each of the chambers 12 and 14 of rectangular configuration and open at the top to form a discharge opening 22. At a lower marginal portion, the housing 10 supports a filter 24 which may be of conventional construction and serve for both chambers 12, 14. Spaced upwardly from the filter 24 a transverse partition 26 forms inlet openings 28, 28 for the chambers 12, 14 one shown in FIG. 1. Thus, air flow through the chambers 12 and 14 commences generally

upwardly through the filter 24, passes through the inlet openings 28, 28 and a relatively broad cross sectional stream of air is discharged through the discharge openings 22, 22. In FIG. 1, broken lines 30, 30 represent electronic circuit boards in a computer and air discharged from the blower is employed in cooling the same. The invention, however, is not so limited and other uses may be made of a stream of air discharged from the blower assembly.

Each inlet opening 28 is of circular configuration as best illustrated in FIG. 4 in the right-hand chamber 14 and, in accordance with the invention, the blower wheel 18 and the housing adjacent said inlet opening are disposed in at least one annular sealing zone in closely spaced relationship to prevent air flow in a reverse direction downwardly through said opening. As shown, the blower wheel 18 includes an annular member 32 interconnecting air moving blades 34, 34 adjacent the inlet opening 28 and which is inclined outwardly from a radial inner edge 46 between axial and radial planes and in a direction away from the inlet opening. More particularly, the member 32 is inclined outwardly with respect to the opening 28 in FIG. 1 and has its radial inner or lower edge 36 disposed adjacent the inlet opening 28 in a first annular sealing zone. Optionally, and in the form shown the housing 26 provides for a second annular sealing zone at 38 between said housing and member 32. An annular arcuate section 40 of the housing curves radially outwardly and upwardly from the opening 28 away from and thence in a return direction into close proximity with the member 32 at the zone 38. Thus, air within the chamber 12 is effectively prevented from flowing in a reverse direction downwardly through the inlet opening 28.

The discharge opening 22, in accordance with the invention, is at least one half the area of the inlet opening 28 and, as shown, the said opening is substantially larger than the opening 28. Restriction on the free upward flow of discharge air is of course provided by the electronic circuit boards 30, 30 in the cooling installation shown.

While there may be substantial variation in the construction of the blower wheel 18, the said wheel in accordance with one important aspect of the present invention is of the type having blades 34, 34 which are inclined rearwardly with respect to the direction of blower wheel rotation. More specifically, and as best illustrated in FIG. 3, the blower wheel 18 comprises a plurality of axially extending and circumaxially spaced air moving blades disposed about an open central area 40 for receiving air introduced through the inlet opening 28. The blades 34, 34 shown as nine in number, are inclined rearwardly with respect to the counter rotating wheel (arrow 42) and are preferably slightly arcuate in a trailing configuration as shown.

A radial blade supporting member or end plate 44 is formed integrally with the blades 34, 34 and is preferably concave viewed from above, FIG. 1. Within the concavity of the end plate 44, there is preferably provided a plurality of air circulating and motor cooling fins 46, 46. Four equally circumaxially spaced fins are shown and each such fin terminates radially outwardly from the axis of the wheel spaced from a motor shaft 48.

A small electric motor 50 carrying the shaft 48 is located axially adjacent and above a blower wheel for cooling by the air circulating fins 46, 46 and is sup-

ported by a mounting means minimizing vibration and sound generation.

The mounting means preferably comprises similar motor mounts, FIG. 4, on opposite sides of the motor 50 and each comprising elongated members 51, 51 extending generally diagonally outwardly from interconnections 52, 52 with the motor to outer connections 54, 54 at corners of the chambers 12, 14. More particularly, the outer connections 54, 54 are made with bosses 56, 56 formed at the corners of the chambers 12 and 14.

In operation the motor 50 drives the blower wheel whereby to provide an interblade air flow in a generally radial direction and to pressurize the chamber 12. As mentioned above a broad discharge plow is thus obtainable at a relatively low velocity and at a desirably low sound level.

I claim:

1. A blower assembly for providing a stream of air at a relatively low velocity and low sound level but of broad cross section, said assembly comprising a housing having spaced air inlet and discharge openings, said inlet opening being of substantially circular configuration and said discharge opening having a cross sectional area at least equal to one half the area of said inlet opening, a rotary blower wheel supported in said housing adjacent and in coaxial relationship with said inlet opening, said blower wheel having at least one radial blade supporting member and a plurality of axially extending and circumaxially spaced air moving blades disposed about an axially open central area for receiving air introduced through said inlet opening, said blower wheel and housing adjacent said inlet opening being disposed at least in one annular sealing zone in closely spaced relationship to prevent air flow in a reverse direction through said inlet opening, said air moving blades being inclined rearwardly with respect to the direction of blower wheel rotation and operable at low sound level to induce a flow of air therebetween and in a generally radial outward direction with respect to said wheel and inlet opening, and said housing extending continuously about and in spaced relationship with the circumference of said wheel to arrest said radial outward air flow, and to provide a substantially unobstructed annular plenum zone extending about said blades and to said discharge opening, and an electric motor connected in driving relationship with said blower wheel, said motor being operable to rotate said blower wheel whereby to induce interblade air flow as aforesaid and to pressurize said housing interior with resulting air flow through said discharge opening in a desired stream of relatively low velocity and sound level but broad and uniform cross section.

2. A blower assembly as set forth in claim 1 wherein

said discharge opening has a cross sectional area at least equal to that of said inlet opening.

3. A blower assembly as set forth in claim 2 wherein said discharge opening is arranged opposite and in approximate axial alignment with said inlet opening and is substantially larger in cross sectional area than said opening.

4. A blower assembly as set forth in claim 1 wherein said blower wheel has an annular member interconnecting its said air moving blades adjacent said inlet opening and cooperatively forming said annular sealing zone with said housing adjacent said opening.

5. A blower assembly as set forth in claim 4 wherein said annular member is inclined outwardly from its radial inner edge between axial and radial planes and in a direction away from said inlet opening, and wherein said housing adjacent said inlet opening has a generally flat configuration blending into an annular arcuate section projecting away from said blower wheel and terminating at a free circular edge adjacent said annular member on said wheel.

6. A blower assembly as set forth in claim 4 wherein said blower wheel has its said radial blade supporting member arranged axially opposite said inlet opening, wherein said motor is disposed outwardly and axially adjacent said member, and wherein said member carries a plurality of radially extending cooling fins for circulating air over said motor.

7. A blower assembly as set forth in claim 4 wherein said housing extends beyond said inlet opening in a direction away from said blower wheel, and wherein a filter member is provided across said projecting housing portion for the passage of air therethrough prior to entry through said inlet opening.

8. A blower assembly as set forth in claim 4 wherein said housing is of generally rectangular configuration with a central partition and first and second blower wheel chambers on opposite sides thereof, each of said chambers having opposite inlet and discharge openings as aforesaid, and each of said chambers having a blower wheel and motor assembly mounted therein as aforesaid.

9. A blower assembly as set forth in claim 8 wherein each of said motors has an associated motor mount, said motor mounts comprising elongated members extending generally diagonally outwardly from inner connections with their respective motors and having outer connections with the housings at corners of their respective chambers.

10. A blower assembly as set forth in claim 8 wherein said blower wheel and motor assemblies have differing pressure and flow characteristics.

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