March 1, 1960 P. H. HUTT 2,926,839

BLOWERS

Filed Feb. 27, 1957

2 Sheets-Sheet 1

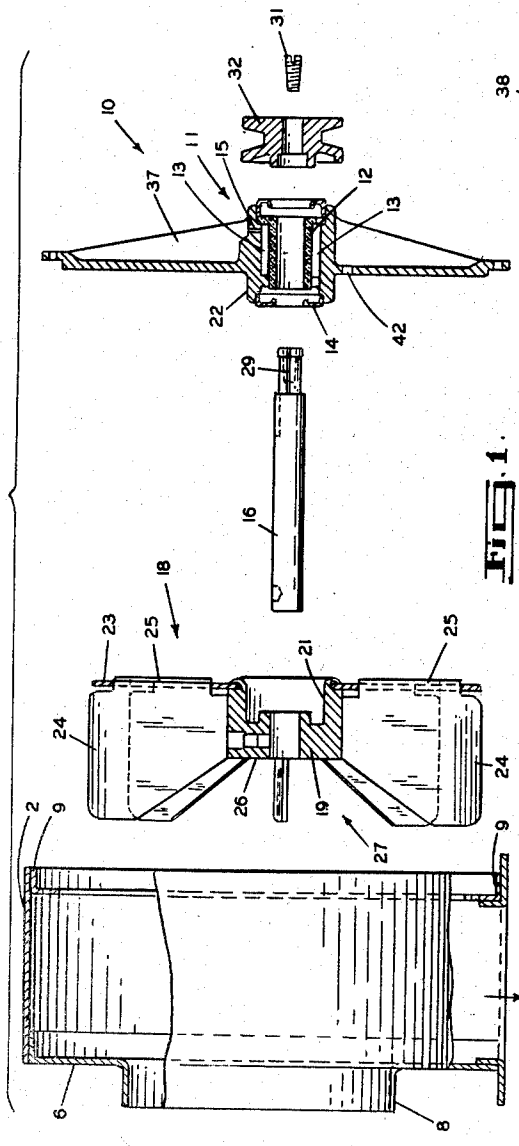


Fig. 1.

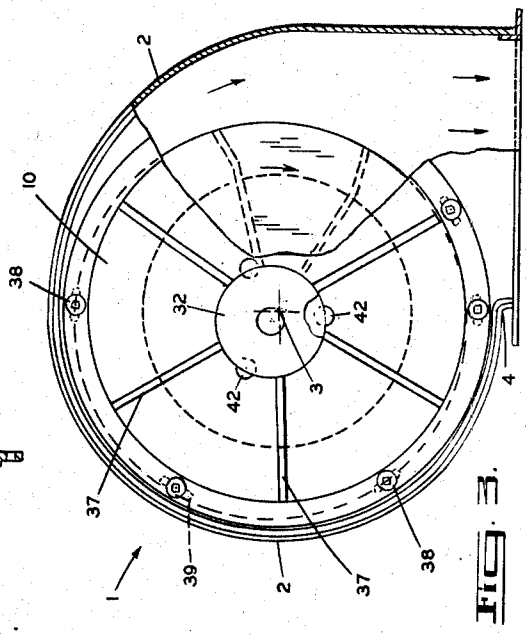


Fig. 3.

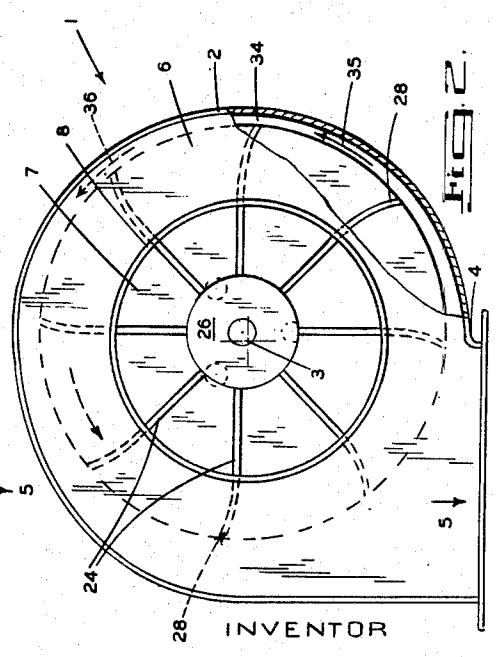


Fig. 2.

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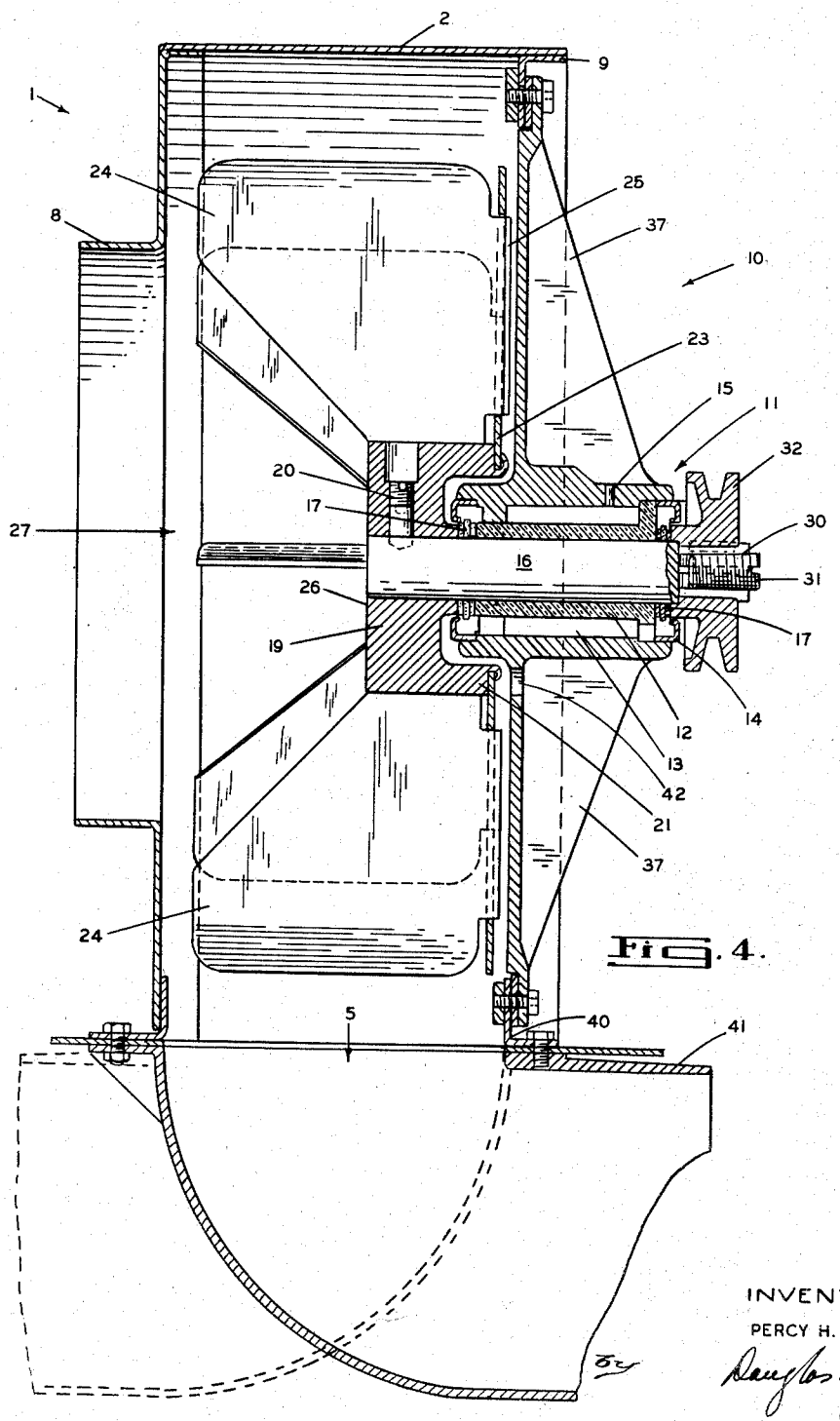


Fig. 4.

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BLOWERS

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Application February 27, 1957, Serial No. 642,776

7 Claims. (Cl. 230—127)

This invention relates to improvements in blowers and more especially to blowers such as are used in clothes drying machines and the like.

The principal object of the invention is to provide a blower of economical construction which will operate with extreme quietness at high capacity.

Another important object is to provide a blower which will be self-cooling.

A further important object is to provide a blower which will handle particle laden air such as a clothes drier discharge without fouling.

Again it is an object to provide a blower as aforesaid of sturdy and economical construction which can be easily and quickly assembled and adjusted for proper operation.

The principal feature of the invention resides in mounting a bladed rotor in a scroll housing in which the scroll has an inlet at one side centered on its axis of generation and an outlet in its periphery, the scroll increasing in radius from a minimum at one side of the outlet to a maximum at the other side of the outlet, the rotor being mounted so that its center of rotation is eccentric to the axis of generation of the scroll so that the point at which the rotor blade reaches its closest proximity to the housing periphery is displaced from the edge of the outlet at the minimum scroll radius, whereby a sharp air cut-off at this edge is eliminated and a vibration dampening air wedge is provided between such edge and such point.

A further important feature resides in journalling the rotor in a journal block carried by a backing plate separate from and closing the side of the blower housing opposite to the inlet, the plate being adjustably mounted on the blower housing to provide a control of the dampening air wedge.

Still a further feature resides in forming the rotor journal housing as a rearward projection of the backing plate to dispose the rotor bearings essentially externally of the housing and providing outlet passages in the backing plate adjacent to the central zone of the rotor to direct air against the journal and cool the bearings. In this connection, it is a feature to provide the rotor with a backing disc to which the rotor blades are secured, the plates having portions projecting through the disc to serve as a means for locking the blades in position in the disc and to also serve as air circulating means to direct air rearwardly through the backing plate openings into the rotor journal housing.

Another feature of the invention resides in providing a novel means adjustable locking the rotor driving pulley on the rotor shaft without scoring of the rotor shaft.

Other features of the invention reside in the arrangement and construction of the parts, and these and other objects and features will be appreciated from the following detailed description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a part elevational, part sectional view showing the components of a blower constructed in accordance with the invention in separated relation ready for assembly;

Figures 2 is a front elevational view, partly broken away, of the assembled blower;

Figure 3 is a rear elevational view, partly broken away, of the blower; and,

Figure 4 is an enlarged mid-vertical sectional view of the blower.

With reference to the drawings, the blower comprises a housing 1 of scroll formation, having a spiral peripheral wall 2 receding from an axis of generation indicated at 3 around the housing from a point 4 at one side of an outlet 5 formed in the peripheral wall to a point adjacent to the opposite side of the outlet 5. The front wall 6 of the housing is provided with a circular opening 7 centered on the housing axis 3, the wall being provided with an annular flange 8 around opening 7 to define an inlet passage.

The housing is provided at the rear with an annular internal ring or flange 9 forming a mounting for a circular backing plate 10. The backing plate 10 is formed with an eccentric journal or bearing block 11 which projects for a major portion of its extent rearwardly of the plate 10, and consequently, outside of the housing 1 as seen in Figure 4.

The bearing block or boss 11 is formed with a bore therethrough receiving a bushing 12, the boss and bushing being formed to define on assembly an annular chamber 13 to receive lubricant. Arranged at each end of the boss are annular lubricant deflecting rings 14, and the boss 11 may be provided with a suitable radial passage 15 through which the lubricant 13 may be replaced.

Mounted within the bushing 12 is a shaft 16 provided with lubricant throw washers 17 at each end of the bearing boss to cooperate with the deflector rings 14 to maintain the bearings against lubricant leakage. Mounted on the inner end of the shaft 16 within the housing 1 is a rotor, generally designated at 18, which comprises an annular cup-shaped hub 19 secured to the shaft by means of a set screw 20 and having an annular wall 21 surrounding the inner end 22 of the bearing boss 11 which projects inwardly of the plate 10.

Secured to the wall 21 of the hub 19 is a disc 23 and extending outwardly from the hub 19 are radial blades 24 which have projections 25 at the rearward edges thereof projecting through corresponding slots in the disc 23, and these projections are turned angularly against the rear face of the disc 23 as best seen in Figure 2. The blades 24 at their inner end are flush with the front face 26 of the hub 19, and progressively widen outwardly of the hub to a maximum width adjacent to the periphery of the inlet 7 to define a frustro-conical formation therebetween, designated at 27. The outer tips 28 of the blades are turned laterally to impart rigidity to the blades.

The outer end of the shaft 16 is slotted longitudinally to provide a plurality of slots 29 which will allow spreading of the shaft end. This slotted shaft end is formed with an inwardly threaded bore 30 and a threaded tapered plug 31 threading into the bore 30 effects a spreading of the slotted shaft end to expand the shaft outwardly and lock a pulley 32 mounted on the shaft end. With this arrangement, the pulley may be adjusted to different positions on the shaft, and locked in position without scoring the outer surface of the shaft. If desired, an additional key between the shaft and pulley may be employed, and as shown in Figure 4, the shaft may be provided with a small flange 32 at its outer extremity, which flange will block removal of the pulley upon outward expansion of the shaft end.

In operation, the rotor 18 is driven through a suitable drive, not shown, driving pulley 32. As seen from Figure 2, the rotor is rotated anti-clockwise, the blades drawing in air through inlet 7 into the conical formation 27, and then throwing the air outwardly and ejecting it

through the outlet 5. Following the ejection of the air the blades cut past the point 4 at one side of the outlet, where the radial distance of the housing wall 2 from the axis of generation 3 is a minimum. However, by having the bearing boss 11 arranged eccentrically of the plate 10 and hence displaced from the housing axis 3, the point at which the blades 24 reach their closest proximity to the housing wall 2 is displaced anti-clockwise, as seen from Figure 2, from the point 4 to the point 34. Thus, there is provided between the outlet cut-off point 4 and the point of closest proximity of the blades to the housing periphery 34 an air wedge or tapering air column indicated at 35.

It has been found that by disposing the rotor in the housing to provide this tapering air column 35, a silencing of the pipe organ effect, which occurs when the blades cut past the edge of the outlet, is effected. The diverging air passage 36 occuring after the point 34 is passed, and increasing until the opposite side of the outlet 5 is reached, provides ample passage expansion around the housing to provide an effective high capacity discharge out the outlet. Thus, the silencing of the blower is achieved without adversely affecting the blower capacity.

To insure rigidity of the plate 10 and its bearing boss 11, the plate is formed with a plurality of ribs 37 on its rear face, the ribs extending from adjacent to the periphery of the plate to the boss 11, increasing in depth from the plate periphery to the boss. The plate is secured to the housing flange 9 by means of suitable bolts 38 fitting in peripherally extending slots 39 which allow rotational adjustment of the plate to alter the eccentricity of the bearing boss and hence shaft 16 relative to the housing axis 3. By this adjustment the location of the point 34 where the blades reach closest proximity to the housing peripheral wall 2 can be adjusted to vary the air wedge 35 to produce optimum silencing of the blower for the discharge conditions to which the blower may be subjected.

In this connection, it will be seen from Figure 4 particularly that the housing outlet 5 is provided with a flanged adapter 40 to which may be bolted a reversible elbow 41 which may be arranged to discharge air delivered through the outlet 5 in a direction parallel to the housing axis 3 either to the rear of the blower as shown in solid line in Figure 4, or to the front of the blower, as illustrated in dotted line.

In the operation of the rotor 18, a pressure will be built up within the housing 1, forcing air behind the rotor disc 23 and the projections at the rear of this disc as formed by the blade projections 25 will cause a circulation of such air, and this air is delivered through suitable openings 42 in the backing plate 10 surrounding the bearing boss 11, whereby such air is directed onto the bearing boss to effect a cooling thereof.

It will be noted that the inner ends of the rotor blades 24, being flush with the front face 26 of the hub 19, will eliminate any trapping of lint or other particles entrained in the air drawn in through the housing inlet 7. Such particles will therefore be centrifuged outwardly by the blades to be discharged through the outlet 5. Should any such particles find their way to the rear of the rotor disc 23, they will be prevented from accumulating on the front face of the backing plate 10 by the blade projections 25 projecting on the rear of the rotor disc.

It will be understood that variations in detail and arrangement of the parts may be made without departing from the spirit of the invention and scope of the appended claims.

What I claim as my invention is:

1. A blower comprising a housing of scroll formation having a spiral peripheral wall formed with an outlet therein, said spiral wall receding from its axis of generation from one side of said outlet to the other, said housing having an inlet therein at one side thereof and being open at the other side, a substantially circular plate provided with an eccentric bearing boss closing said open housing side, said plate being centered on and being adjustably displaceable about the housing axis, means for securing said plate in adjusted position, a shaft journalled in said bearing boss and a rotor comprising a hub and a plurality of radially extending vanes mounted on said shaft, said plate being adjusted whereby said blades on rotation reach their point of closest proximity to the housing peripheral wall at a selected point spaced in the direction of rotation from the side of said outlet where said housing wall is at its minimum distance from said housing axis to provide an air wedge tapering from latter outlet side to said point.

2. A device as claimed in claim 1 in which said bearing boss projects rearwardly of said plate to lie substantially outside said housing and means are provided to direct air drawn into said housing through said inlet onto said bearing boss.

3. A blower comprising a housing having an inlet in one side thereof and being open at the opposite side and having an outlet in the periphery thereof, a removable plate closing said open housing side and formed with a bearing boss adjacent to the center thereof, said bearing boss extending for a major portion of its length outside of said housing, a shaft journalled in and extending through said bearing boss, a rotor rotatably arranged within said housing and comprising a hub mounted on one end of said shaft, a disc having a plurality of radial slots therein and secured to said hub at one side thereof adjacent to but spaced from said plate and having its periphery spaced from the periphery of said housing, and a plurality of blades extending radially from said hub to adjacent to the periphery of said housing and provided with projections extending through said slots and turned against and secured to the face of said disc facing said backing plate to define blade projections for the circulation of air, said plate having a plurality of openings therethrough surrounding said bearing boss, the space between said disc and housing peripheries and between said disc and plate defining a restricted passage means providing communication between said inlet and said latter openings to direct a minor portion of inlet air onto said bearing boss.

4. A blower as claimed in claim 3 in which the end of said shaft opposite to said rotor hub projects outwardly of said bearing boss outside of said casing and is slotted longitudinally and is formed with an inwardly tapering threaded bore, and a threaded tapered plug is threaded into said tapered shaft bore to expand said shaft and anchor same from without said housing against removal from said bearing boss.

5. A blower as claimed in claim 3 in which said housing is of scroll formation and said peripheral wall recedes outwardly from the housing axis of generation from a minimum radial displacement at a point adjacent to one side of said outlet to a maximum radial displacement at a point adjacent to the other side of said outlet, and said plate is adjustable about said housing axis and means are provided for clamping said plate in adjusted positions, and said bearing boss formed on said plate is arranged eccentric to said housing axis whereby said rotor blades on rotor rotation may be arranged to reach their point of closest proximity to said peripheral housing wall at a selected point displaced from the point where said peripheral wall has its said minimum radial displacement from said axis of generation.

6. A blower comprising a housing scroll formed with an inlet opening in the periphery and an inlet opening in one side thereof and being open at the other side, a plate closing said open other side and being provided adjacent to the center thereof with a bearing boss extending rearwardly from said housing, said plate having a plurality of openings surrounding said bearing boss,

a shaft mounted for rotation in said bearing boss, a hub mounted on said shaft within said housing and carrying a disc at one side in spaced relation to said plate to define therewith a restricted passage means communicating with the openings in said plates, and a plurality of vanes mounted radially of said hub and provided with anchorage means extending through said disc and projecting into said restricted passage means whereby a minor portion of air drawn in through said inlet opening is directed along said restricted passage means and through the openings in said plate.

7. A blower comprising a housing having an inlet in one side thereof and being open at the opposite side and having an outlet in the periphery thereof, a removable plate closing said open housing side and formed with a bearing boss adjacent to the center thereof, said bearing boss extending for a major portion of its length outside of said housing, a shaft journalled in and extending through said bearing boss, a rotor rotatably arranged within said housing and comprising a hub mounted on one end of said shaft, a disc secured to said hub at one side thereof adjacent to but spaced from said plate and having its periphery spaced from the periphery of said housing, and a plurality of blades extending radially from said hub to adjacent to the periphery of said housing and secured to said disc to present air impelling projections on the side thereof facing said plate for the circulation of air, said plate having a plurality of openings therethrough surrounding said bearing boss, the space between said disc and housing peripheries and between said disc and plate defining a restricted passage means providing communication between said inlet opening and said latter openings to direct a minor portion of inlet air onto said bearing boss.

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