July 23, 1940. J. I. BOWERS 2,208,890

BLOWER FAN

Filed Feb. 13, 1939

Fig. 1.

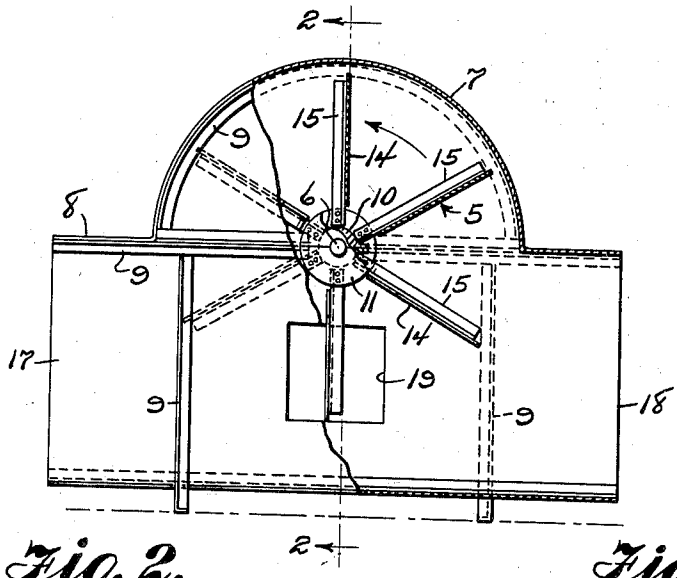


Fig. 2.

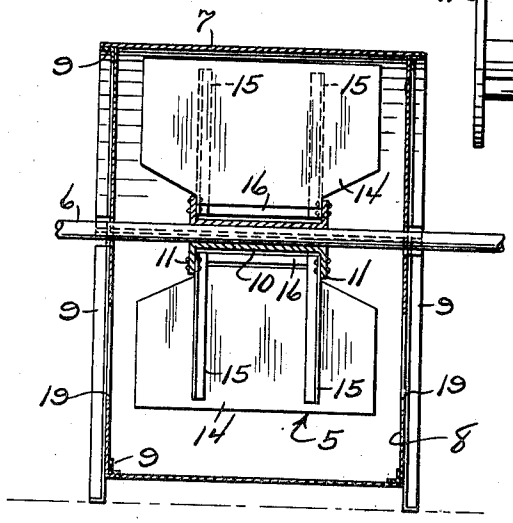


Fig. 3.

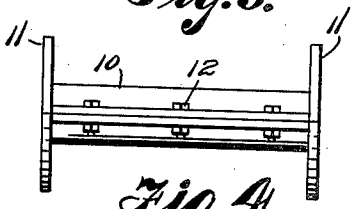
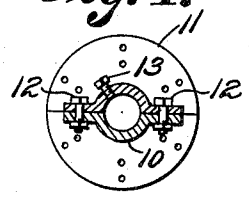


Fig. 4.



James I. Bowers
INVENTOR

BY Victor J. Evans & Co.
ATTORNEYS

Patented July 23, 1940

2,208,890

UNITED STATES PATENT OFFICE

2,208,890

BLOWER FAN

James I. Bowers, Burns, Oreg.

Application February 13, 1939, Serial No. 256,219

1 Claim. (Cl. 230—125)

The present invention relates to new and improved blower fans and more particularly to fans of the reversible type.

An important object of the present invention is to provide a blower fan so designed that it will rotate in either a clockwise or counter-clockwise direction and deliver the same amount of air per minute in either direction with no loss of efficiency.

In the discharge of air from a fan of the blower or pressure type, the factor of power is important in the production of any given amount of air, and where static pressures, frictions and eddies are set up by forcing the air through the fan itself, the power used and the size of the fan are accordingly raised. Where large volumes of air are required these factors are of importance and over a period of time the cost per cubic foot of air discharged increases considerably. Further, where an increase in the volume of air to be produced is desired, it becomes necessary to increase the diameter of the blades of the fans now in use, and where these fans are of a permanent nature, it requires considerable expense to allow for an increase in diameter and in some instances, is practically impossible.

Another object of the invention is, therefore, to construct a blower fan whereby all currents and eddies of air are eliminated.

According to the present invention there is provided a fan enclosed in a suitable housing and so designed as to allow the air to be set in motion by blades or vanes which will produce any given amount of air in cubic feet per minute for any work to be done. This fan is so constructed that a very low power factor is used to obtain large volumes of air at low pressure and low velocity, and an equally low power factor in proportion for high velocity and high pressure. As is to be understood, for low velocity and low pressures, the power is greatly reduced due to the vane or blade type fan area and the relatively large conduits for discharge. The herein described fan will operate under both low and high pressure and due to its construction is capable of being operated in either direction with the same factor of efficiency.

The invention will be fully and comprehensively understood from a consideration of the following detailed description when read in connection with the accompanying drawing which forms a part of the application.

In the drawing:

Figure 1 is a side elevational view with parts thereof shown in section of the new and improved blower fan;

Figure 2 is a vertical sectional view taken substantially on line 2—2 of Figure 1;

Figure 3 is an elevational view of the hub structure employed for associating the blades of the fan with the drive shaft; and

Figure 4 is a vertical sectional view through the hub illustrated in Figure 3.

Referring to the drawing for a more detailed description thereof, the fan indicated generally by the reference numeral 5 is rotatably supported on a shaft 6 extending through the housing 7. It will be noted that the housing 7 projects beyond the frame 8 which frame forms a conduit to provide an inlet and outlet for air discharged by the fan. The shaft 6 is supported within the housing 7 in a manner whereby substantially one-half of the fan is disposed within the housing, the other half extending within the conduit in the path of incoming air. The housing 7 and conduit 8 may be formed of any desired material such as sheet metal or the like and in the assembly thereof, there are provided angle irons 9 disposed on both sides of the construction for bracing and supporting the structure.

The fan 5 is supported on the shaft 6 by means of the split hub 10, better illustrated in Figures 3 and 4 of the drawing. The hub 10 is formed with flanges 11 on each end thereof and the split sections, in assembly, are secured to the shaft 6 by means of bolts or the like 12. If desired a locking screw 13 may be employed and carried by one of the sections for engagement with the shaft 6 to positively assure the hub 10 rotating with said shaft.

The fan 5 includes a plurality of vanes or blades 14 which are preferably of a flat surface, each of the blades being connected to the flanges 11 by means of angle iron braces 15, which braces extend substantially the entire width of the blade or vane for materially strengthening the fan. The braces 15 are arranged in spaced relation on each blade 14, and are suitably connected by means of a transverse brace 16 disposed between the flanges 11 as clearly shown in Figure 2 of the drawing.

Additional air inlets are also provided which are in the form of openings positioned within the conduit 8. It is preferred, however, that the inlets be diametrically opposed and positioned substantially as illustrated at 19 in Figures 1 and 2, the purpose of which will hereinafter appear.

An important feature of the present invention resides in the manner of positioning the fan

within the housing and the respective sides of the fan blades and housing. Referring particularly to Figure 2 of the drawing it will be noted that a space is provided between each end of the blade and each side wall of the housing and that there is also provided a relatively large space between the fan blade and the bottom of the conduit. In operation one end of the conduit 8 is the suction side and the other end the discharge side, or the condition may be reversed, depending upon the direction of the rotation of the fan 5. For purposes of description let it be assumed that the fan is rotating in the direction of the arrow in which case air is admitted through the end 17 of the conduit 8 and discharged through the end 18. The motion set up by the rotating blades 15 will create a vacuum along the sides of the housing and in addition to air being drawn in the end 17, air will also be admitted through the openings 19 which will be discharged by action of the fan through the end 18. Due to the close proximity of the fan blades with the top of the housing 7 very little air will be carried therein, thus only a part of the air is contacted by the blades. Thus it can be understood that use is made of the air currents to help draw in the air and to expel it from the fan. By this method, power is reduced to a low point while volume is increased. The hub 10 is so designed as to prevent any air suction in the center of the wheel.

It has been found that the herein described blower fan will operate at a lower power rate and deliver a larger volume of air, primarily due to its construction which includes the space between the side of the housing and the edge of the fan blade, and the space allowed at the bottom of the housing or where the conduit 8 is located. The housing allows the air to pass by and be set in motion by the blades of the fan. The fan may be of any size desired, for example, the blade may be increased in width with no increase in diameter, with a corresponding increase in the width of the housing. Also, the diameter of the fan may be reduced if desired, and by these means the volume of output may be increased by a slight change.

It is also to be understood that the shaft 6 is to be driven by any appropriate means and preferably by a reversible type motor whereby the rotation of the shaft can be reversed to permit reversed motion of the fan 5.

A blower fan of the type herein illustrated and described is capable of various uses and the conduit 8 can be attached to appropriate inlets and outlets where its use is deemed necessary. In some instances it may be found desirable to directly admit atmospheric air through the openings 19 in which case they would be connected to appropriate inlet connections.

Also, it will be understood, of course, by those skilled in the art that variations in the herein-above described device involving the substitution of substantial equivalents for the devices described are intended to be comprehended within the spirit of the present invention and that the invention is capable of extended application and is not confined to the exact showing of the drawing nor to the precise construction described and, therefore, such changes and modifications may be made therein as do not affect the spirit of the invention nor exceed the scope thereof as expressed in the appended claim.

What is claimed is:

A blower fan comprising, in combination, a housing, a conduit having communication with said housing, said conduit being formed with diametrically opposed openings in the side walls thereof, a shaft extending through said housing, a hub mounted on said shaft, said hub being formed with flanges on each end thereof, means for rotatably mounting a fan on said hub, said means comprising angle iron braces extending from said flanges, said fan including a series of relatively flat-surfaced blades extending partially within said conduit, the edges of said blades being arranged in spaced relation relative to the side walls of said housing whereby rotation of said fan creates a vacuum in said space to aid in drawing and expelling air through said conduit.

JAMES I. BOWERS.