J. E. FOSTER.

BLOWER FAN.

APPLICATION FILED MAR. 28, 1914.

1,149,904. Patented Aug. 10, 1915.

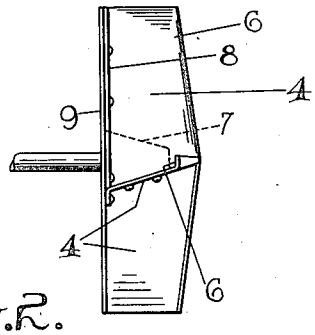


Fig. 2.

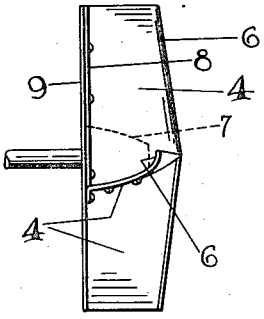


Fig. 3.

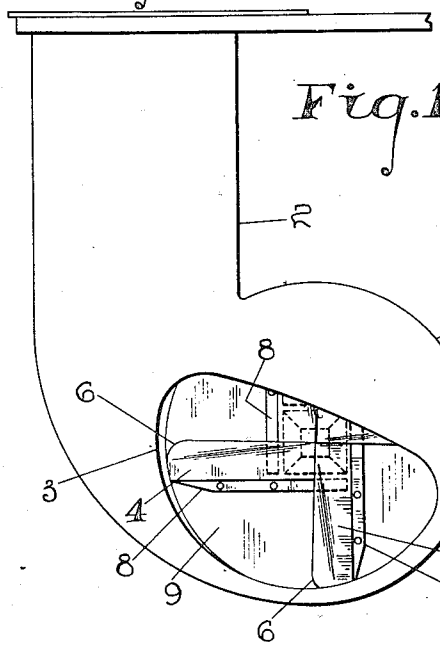


Fig. 1.

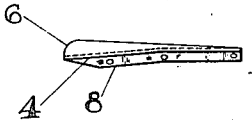
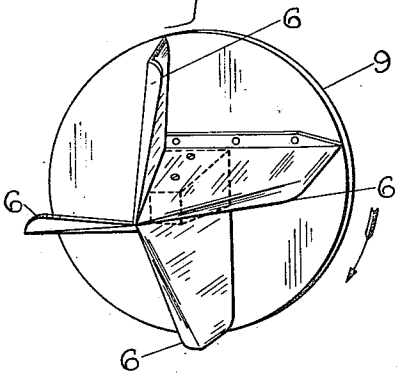


Fig. 7.

Fig. 4.



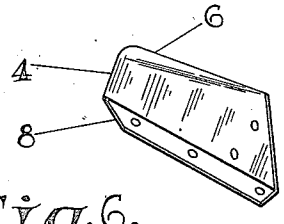


Fig. 6.

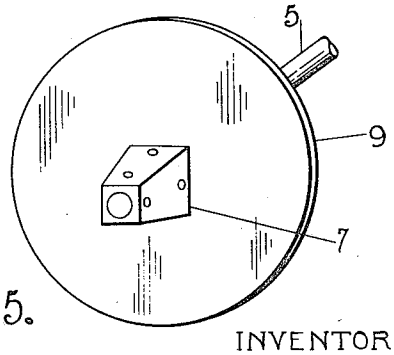


Fig. 5.

WITNESSES.

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UNITED STATES PATENT OFFICE.

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BLOWER-FAN.

1,149,904. Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed March 28, 1914. Serial No. 828,005.

To all whom it may concern:

Be it known that I, JAMES EMANUEL FOSTER, of the village of Clarksburg, in the county of Grey, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Blower-Fans, of which the following is a specification.

This invention relates to blower fans of the type which take in air at the side of the fan casing and discharge it tangentially, and my object is to devise a fan of this type particularly adapted to handle solid matter intermingled with the air, such for example as straw, grain, small paper or metal cartons and the like.

I attain my object by means of a construction which may be briefly described as follows: Each blade of the fan is given a pitch which gives it a screw action tending to draw in air at the side of the casing. The construction also is such that the forward face of each blade is not radial to the axis of the fan, but for substantially its entire width is set forward of a radial plane parallel to its rear edge. The whole is constructed in detail substantially as hereinafter described.

Figure 1 is a side elevation of my improved fan. Fig. 2 is an end elevation of the fan without its housing or casing. Fig. 3 is a similar view showing a modification. Fig. 4 is a perspective view of the fan. Fig. 5 is a similar view of the disk and hub which carry the fan blades. Fig. 6 is a perspective view of one of the blades. Fig. 7 is a side elevation of a modification of one of the blades.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

1 is the fan casing, which is of ordinary type, being provided with the tangential outlet 2 and the inlet opening 3 on its side. As this fan is intended to receive the air and solids to be discharged toward the periphery rather than adjacent the axis of the fan, the inlet opening 3 is eccentric to the fan casing, being preferably located toward the lower side of the same.

The fan itself is formed of a series of blades 4 suitably connected to the shaft 5 in any suitable manner, but preferably in a manner hereinafter to be described. The blades 4 are preferably straight in the direction of their length, that is, the longitudinal sections will show straight lines. They are also preferably straight transversely as shown in Figs. 2 and 6, but may also be curved as indicated more particularly in Fig. 3. In the form shown in all the drawings excepting Fig. 3, each blade may be formed of a flat piece of sheet metal. Each blade, it will be seen, is so set relative to the axis of the fan that its forward face lies at an acute angle to the back of the frame casing, so that the blades have a pitch which gives them a screw action tending to draw air in through the opening in the side of the fan. Particularly if the blades be straight in transverse section as shown in Fig. 2, I prefer to form a lip 6 at the outer side of each blade, which lip is highest at the outer part of the fan blade and dies out to nothing at its base.

Each blade is preferably set so that its base extends substantially to the face of the next following blade. When so arranged the forward face of each blade is not radial to the axis of the fan, but for substantially its entire width is set forward of a radial plane parallel to its rear edge. The blades, however, are preferably of a sufficient width so that their outer edges and their bases meet at a common point in the axis of the fan. By this arrangement each blade presents a short forward face and a relatively long rearward face, and the air space in a plane taken parallel to the back of a blade is much deeper adjacent the back of the casing than at its inlet side.

From my construction it follows that I obtain a screw action of the fan which materially facilitates the entrance of air and straw or other solids into the casing and overcomes any tendency of the said air or solids to spill outwardly at the periphery of the fan.

The free discharge of material entering the side of the fan casing through the tangential outlet is materially facilitated by the arrangement of the blades described with the forward surface of the blade set forward of a radial plane and by the substantially straight lines longitudinal of the blade surface along which the air and straw or other material moves to the exit.

The arrangement of the blades, it will be noted, is such that there is practically no dead space at the center of the fan and no arms or projections of any kind against which straw or other material may lodge or with which it may become entangled.

To facilitate the entrance of the straw or solids, the blades are preferably somewhat tapered as shown, their outer edge being inclined inwardly from the center to a small extent as indicated more particularly in Fig. 2.

As a preferable construction the shaft 5 has a hub 7 secured to its end of pyramidal form, though the pyramid may be somewhat truncated if desired as shown particularly in Fig. 5. The hub is preferably square in cross section as four blades will usually be employed. To this hub the inner ends of the blades are secured by bolts or rivets. Each blade is also preferably provided with a flange 8 by means of which it is secured to a disk 9, though this disk may be omitted entirely, the blades simply rotating close to the back of the fan casing. I prefer, however, to employ the disk as it strengthens the fan and has a tendency to reduce friction since the straw or other material would otherwise rub over the back of the fan casing.

I have stated that the blades are substantially straight in the direction of their length. This does not mean that they are necessarily straight from end to end as the outer portions may be bent so that their surfaces do not lie in the same planes as the surfaces of the inner portions, (see Fig. 7), or the absolutely straight configuration may be otherwise departed from as long as the departure is not marked and does not interfere with the free discharge of solids from the fan.

What I claim as my invention is:—

1. The combination of a fan casing provided with a side inlet opening and a tangential discharge opening; and a fan comprising a plurality of blades set with their rear edges dropped back having reference to the direction of rotation of the fan and relative to the outer edges and to planes parallel to said edges intersecting in the axis of the fan, to give pitch to the blades, the pitch being substantially the same at all points in the length of each blade.

2. The combination of a fan casing provided with a side inlet opening and a tangential discharge opening; and a fan comprising a plurality of blades set with their rear edges dropped back having reference to the direction of rotation of the fan and relative to the outer edges and to planes parallel to said edges intersecting in the axis of the fan, to give pitch to the blades, the pitch being substantially the same at all points in the length of each blade, and the base of each blade extending substantially to the face of the next following blade.

3. The combination of a fan casing provided with a side inlet opening and a tangential discharge opening; and a fan comprising a plurality of blades set with their rear edges dropped back having reference to the direction of rotation of the fan and relative to planes parallel to said edges intersecting in the axis of the fan, to give pitch to the blades, the pitch being substantially the same at all points in the length of each blade, the base of each blade extending substantially to the face of the next following blade, and the bases and outer edges of the blades substantially meeting at a point in the axis of the fan.

4. The combination of a fan casing provided with a side inlet opening and a tangential discharge opening; and a fan comprising a plurality of substantially flat blades each having its forward face inclined at an acute angle to the back of the fan casing, the base of each blade extending substantially to the face of the next following blade and the outer edges and the bases of the blades substantially meeting at a point in the axis of the fan.

5. The combination of a fan casing provided with a side inlet opening and a tangential discharge opening; and a fan comprising a plurality of blades set with their outer edges and their bases substantially meeting at a point in the axis of the fan, the base of each blade extending substantially to the face of the next following blade, and the rear edges of the blades dropped backward relative to their outer edges, having reference to the direction of rotation of the fan to give pitch to the blades.

6. The combination of a fan casing provided with a tangential discharge opening and a side inlet opening eccentric to the fan and located toward the discharge side thereof; and a fan comprising a plurality of blades set with their rear edges dropped backward relative to their outer edges, having reference to the direction of rotation of the fan and relative to planes parallel to said edges intersecting the axis of the fan, to give pitch to the blades, the base of each blade extending substantially to the face of the next following blade whereby each blade has a short driving or front face and a long rear face.

7. In a blower, the combination of a hub and a plurality of substantially flat blades each having its forward face inclined at an acute angle to the back of the fan casing, and the outer edges and the bases of the blades substantially meeting at a point in the axis of the fan.

8. In a blower the combination of a hub of pyramidal shape; and a fan blade secured to each face of the hub, the base of each blade extending substantially to the face of the next following blade, the blades having their bases and outer edges substantially meeting at a point in the axis of the fan.

9. In a blower the combination of a hub;

a disk secured thereto; a plurality of substantially flat blades, each secured to the hub and the disks and each having its forward face inclined at an acute angle to the back of the fan casing, and the outer edges and the bases of the blades substantially meeting at a point in the axis of the fan.

Signed at Toronto this 20th day of March 1914, in the presence of the two undersigned witnesses.

JAMES E. FOSTER.

Witnesses:
J. EDW. MAYBEE,
E. P. HALL.