Oct. 25, 1932. S. O. MELOS 1,884,067

FAN FOR PNEUMATIC BLOWERS AND THE LIKE

Filed June 8, 1931

Fig. 4

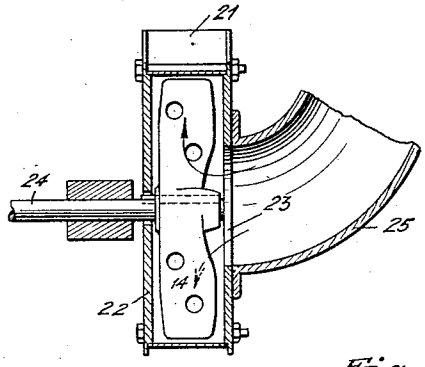


Fig. 3

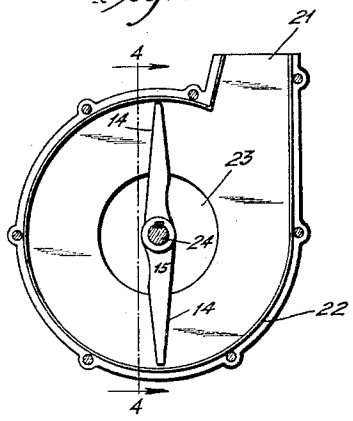


Fig. 1

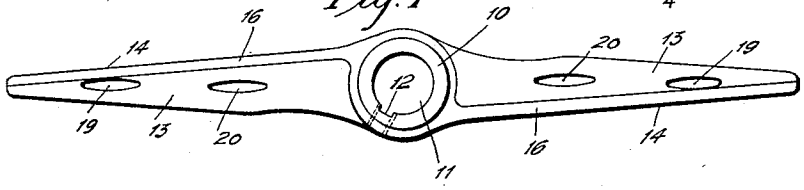


Fig. 9

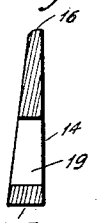


Fig. 2

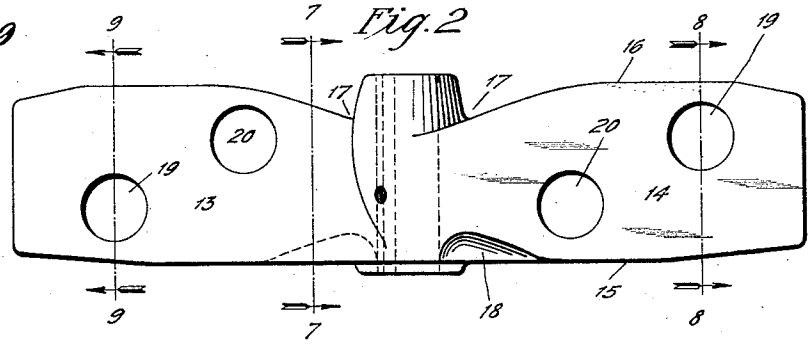


Fig. 8



Fig. 7

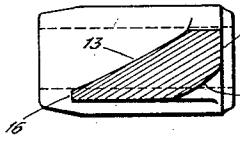
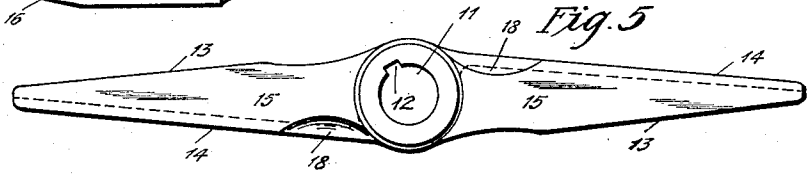


Fig. 5



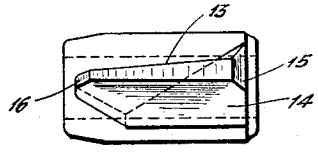


Fig. 6

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UNITED STATES PATENT OFFICE

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FAN FOR PNEUMATIC BLOWERS AND THE LIKE

Application filed June 8, 1931. Serial No. 542,889.

The object of my invention is to provide an improved fan designed to be rotatively mounted within a blower casing, and when so mounted will provide efficient means for delivering comparatively heavy material from a position within said casing outwardly through a vertically arranged discharge pipe, such as used in pneumatic conveyors, and so constructed that a maximum amount of material may be delivered with a minimum amount of air.

A further object is to provide a fan for blower casings which may be cast in a single piece of metal, and so shaped that the fan will operate comparatively close to the walls of the casing, in which it is mounted, and at the same time permit a comparatively large amount of material to be easily delivered to the same without clogging, through a comparatively small feed opening.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawing, in which:

Figure 1 illustrates the front edge of my improved fan blade.

Figure 2 is a side elevation of the same.

Figure 3 shows the manner in which the fan is mounted in a blower casing, said casing having one of its side members removed.

Figure 4 is a detail sectional view taken on the line 4—4 of Figure 3.

Figure 5 illustrates the back edge of the fan blade.

Figure 6 illustrates one end of the fan blade.

Figure 7 is a detail sectional view taken on the line 7—7 of Figure 2.

Figure 8 is a detail sectional view taken on the line 8—8 of Figure 2.

Figure 9 is a detail sectional view taken on the line 9—9 of Figure 2.

My improved fan blade comprises a hub 10 having an opening 11 for receiving a drive shaft, said opening having a key seat 12. The hub 10 is provided with laterally projecting blade members 13. The working face 14 of each blade is preferably supported tangentially with the hub portion 10. Said working faces connect the hub at diametrically opposite points.

The back edge 15 of each blade tapers inwardly and outwardly from the hub portion in the manner clearly illustrated in Figure 5, with one of its edges in alinement with the adjacent working face. The front edge 16 of each of the blades is comparatively thin and of substantially uniform thickness and parallel with the working face.

The back face of each blade connects the back edges of the face members 15 and 16, assuming a warped and somewhat helical surface. This construction leaves the back edges of the blades wider than the front edges, as shown in Figures 8 and 9.

The inner ends of the front edges 16 are curved inwardly to form recesses 17, and thus provide means whereby the material may be more easily fed into the fan casing The inner ends of the back edges 15 are also provided with recesses 18 which lighten the construction. The entire fan blade is formed of a single piece of cast metal.

Each of the blades has openings 19 and 20, the openings 19 being near the outer ends of the blades, and one near the front edge and the other near the back edge. The openings 20 are intermediate the openings 19 with one of the openings near the front edge and the other opening near the back edge. The openings of one blade are in staggered relation with those of the other blade, in such manner that as the blade is rotated any particles of material passing through one of the openings would not also pass through the next following opening.

Said openings 20 permit a certain amount of air to pass backwardly through the openings to decrease the amount of vacuum back of the blade, and to decrease the amount of air discharged through the outlet opening 21 of the fan casing 22. The front end of the casing 22 is provided with an inlet opening 23, while the blade is supported on a suitable shaft 24, one end of which projects into the casing. The fan is designed to rotate in a

counterclockwise direction, as illustrated in Figure 3.

The outlet 21 is provided in the periphery of the fan casing, so that material may be discharged from the fan blade tangentially. A suitable feed spout 25 may be provided.

Assuming that the shaft 24 and the fan blade are being rotated quite rapidly, and that material, such as ground feed, is being fed through the opening 23, it will be seen that the rotation of the fan will create a considerable amount of suction through the opening 23, causing the material to enter the casing back of the blades 14, where it will be delivered outwardly toward the outer ends of the blades by centrifugal force, and delivered upwardly through the discharge opening 21.

I have found by actual practice that a considerable advantage is gained by placing the openings 19 and 20 in the fan blades, and that a considerable amount of power is saved, due to the fact that considerably less air is delivered through the discharge opening 21 which is usually connected with a long discharge pipe. The ground feed is delivered to a chamber where it is separated from the air.

By cutting down the amount of air delivered through the discharge pipe, the necessity of a large air separator is eliminated. This is of particular advantage when the blower is used in connection with the small portable mills which are now in extensive use throughout the country, in which it is desirable to eliminate from the structure as much weight and bulk as possible.

By providing the openings 19 and 20 in the fan blades, the volume of air delivered by the fan may be materially decreased without decreasing the volume of material delivered by the fan.

By forming the working face of the blades comparatively flat and tangentially with the hub, the tendency of the material to slip or to be delivered over the end of the fan blade is increased, thereby decreasing the loss of power due to the friction of the material passing outwardly over the front face of the blade, and thereby resulting in considerable saving in power.

By forming the front edge of the blades comparatively thin and providing the cut away portions 17 it will be seen that a comparatively small amount of blade area is adjacent to the inlet opening 23, and thus providing a space of comparatively large area through which the material may easily enter the fan casing and between the rotating blades.

The blade is formed of cast metal, such as cast iron, and naturally has a considerable amount of weight which is of particular advantage when the feed is delivered to the mill in irregular quantities or bunches, as the weight of the rotating blade acts as a balance wheel, serving to store up energy when the casing is being fed lightly, which may be utilized when irregular feeding takes place, thereby eliminating a considerable amount of strain on the driving elements of the shaft 24, the driving elements usually being in the form of a multiple rope belt. A great deal of difficulty has been experienced in obtaining a suitable flexible transmission means between the power device and the fan shaft.

Thus it will be seen that I have provided a fan blade of comparatively simple construction, which may be cast of a single piece of metal, in which the actual manufacturing cost is reduced to a minimum, and at the same time I have provided a fan blade in which the amount of power for its operation is reduced and in which the volume of air delivered by the fan is also reduced, and which is highly efficient when used in pneumatic blowers for the purpose of delivering the material to suitable conveyors.

I claim as my invention:

1. The combination of a cylindrical casing having central opening at one end and a tangentially arranged discharge opening in its periphery, a shaft extending into said casing, a fan blade on the inner end of the said shaft, said blade comprising a hub having oppositely projecting blades, the front face of each blade being tangent to said hub, the back edge of each blade tapering inwardly toward its outer end, the front edge of each blade being comparatively thin and parallel with said face, the central portion of each of said blades having openings connecting its front and back faces.

2. A fan comprising a hub having oppositely projecting blades, the front face of each blade being tangent to said hub, the back edge of each blade tapering inwardly toward its outer end, the front edge of each blade being comparatively thin and parallel with said face, each of said blades having openings connecting its front and back faces, the openings of one blade being in staggered relation with those of the other blade.

3. The combination of a fan casing having inlet and outlet openings, a shaft having one end projecting into said casing, a fan carried by the inner end of said shaft comprising a hub portion, a laterally projecting blade, and an opening in the central portion of said blade connecting its front and back faces.

4. A fan comprising a hub having laterally and oppositely projecting blades, the front face of each blade being tangent to said hub, the front edge of each blade being comparatively thin and the back edge comparatively thick, each blade having an opening connecting its front and back faces.

5. A fan comprising a hub having laterally and oppositely projecting blades, the front

face of each blade being tangent to said hub, the front edges of the back and front faces being parallel, the back edges of the back and front faces being substantially tangent to opposite sides of said hub and converging near their outer ends.

Des Moines, Iowa, June 5, 1931.

SAMUEL O. MELOS.