T. J. RITTER.

BLOWER.

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1,131,555.

Patented Mar. 9, 1915.

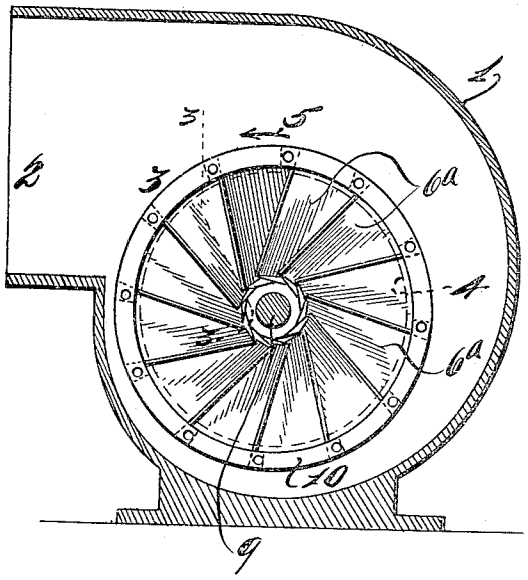


Fig. 1.

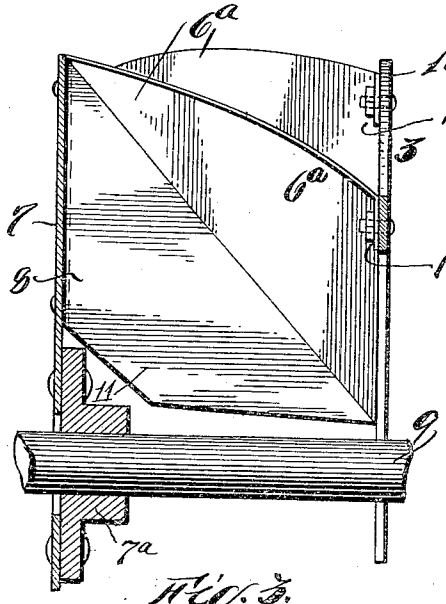


Fig. 3.

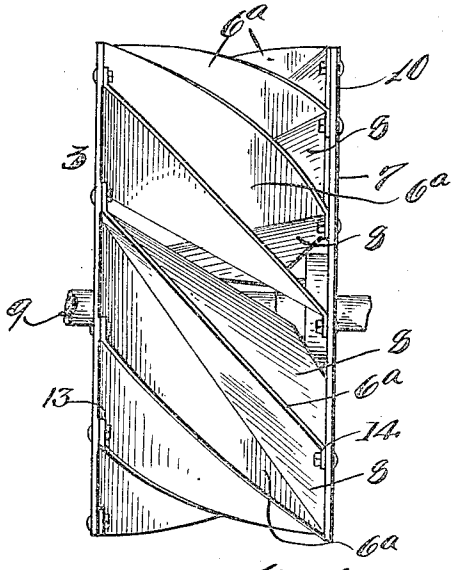


Fig. 2.

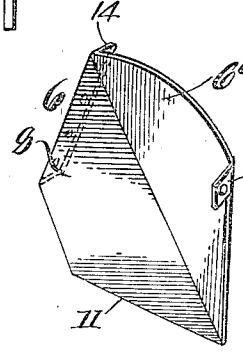


Fig. 4.

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UNITED STATES PATENT OFFICE.

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BLOWER.

1,131,555. Specification of Letters Patent. Patented Mar. 9, 1915.

Original application filed September 10, 1913, Serial No. 789,035. Divided and this application filed March 27, 1914. Serial No. 827,561.

To all whom it may concern:

Be it known that I, THEODORE JONATHAN RITTER, a citizen of the United States, residing at New York city, in the county of Kings, State of New York, have invented certain new and useful Improvements in Blowers, of which the following is a clear, full, and exact description.

This invention relates to an improvement in centrifugal fans, that is to say fans which take the air in at one side and discharge it circumferentially, and more particularly to the rotary members thereof.

The object of this invention is to provide a centrifugal fan constructed so as to draw in air and to force the same through the outlet without losses, due to back pressure particularly at high speed, and for this reason and by the general construction and arrangement of the vanes to secure a high degree of efficiency.

The features of the improvement will be pointed out in the following specification and claims.

In the drawings: Figure 1 is a sectional side elevation of my improvement, looking at the inlet side of the rotary member. Fig. 2 is an enlarged end view of the blower fan. Fig. 3 is an enlarged fragmentary sectional view of the fan, the section being taken on a line 3—3 in Fig. 1. Fig. 4 is a perspective detail view of one of the fan blades.

In the drawing a blower casing is indicated by 1 having an outlet 2 through which air is forced by the rapid revolution of the blower fan 3. The intake opening in the casing is indicated by dotted lines 4, Fig. 1. The direction of revolution of the fan 3 is indicated by the arrow 5.

The rotary member 3 or fan proper comprises a plurality of vanes 6, the construction and arrangement of which constitutes the essence of the invention. Before describing the vanes, it may be explained that they are carried by a shaft 9, to which power is applied, the vanes being supported at one side by a disk 7 fixed to the shaft by a hub 7^a and at the other side united by a ring 10. The latter forms the inlet side of the fan rotor, and is adjacent the side of the casing having the intake opening 4, the inner circle of the ring and the said opening being preferably approximately of the same diameter. The disk 7 forms the back or closed side of the fan. These principles of construction are familiar in connection with centrifugal fans, and, as is well known, such an assemblage may be doubled, the disk then being central instead of at one side.

The vanes are bent or troughed, being composed, either actually or in effect, of two parts or planes 6^a and 8 disposed in angular relation to each other. The part 8, which may be distinguished as the inner part since as a whole it is nearer the axis of the fan, is preferably arranged in general tangential relation to the shaft or to a circle described about the axis, being thus inclined rearward from its inner edge with respect to the direction of movement (which is the same as saying that from its outer portion inwardly it inclines in the direction of movement.) The outer part 6^a is bent forward with respect to the lower part and is disposed obliquely between the sides 10 and 7, extending rearwardly with respect to the direction of movement from the inlet side to the back side, as clearly shown in Fig. 2. The vane as a whole partakes of this crosswise bias; the outer or peripheral edge of the part 6^a rakes sharply rearward; and the inner edge of the part 8 (the edge nearest the shaft) is also diagonaled in the same direction, though to a less extent. As is apparent from Fig. 2, the bias arrangement of the vanes is such that they overlap each other, the forward portion of each vane (at the inlet side) being in advance of the rear portion of the vane next in front and substantially as far advanced as the rear portion of the second vane in front. It is to be noted that the valley or angle between the parts 6^a and 8, at the forward face of the vane, extends in a diagonal direction from the inner portion of the vane, at or adjacent the inlet side, outward toward the periphery and toward the back or disk side 7, and also rearwardly with respect to the direction of movement. In its preferred form the vane is composed of two substantially triangular planes. The parts 8 are widest near their inner portions and narrow outwardly, whereas the parts 6^a are widest at the periphery and narrow inwardly. Two sides of the triangle 6^a form the outer edge and the inlet edge of the vane, while two sides of the truncated triangle 8 form

the inner edge and the back edge of the vane. The inlet edges of the vanes extend across the intake and all lie in a substantially vertical plane perpendicular to the axis of the rotor. At their outer ends these edges bear lugs 13 by which the vanes are bolted to the ring 10, while the back side edges have flanges 14 bolted or riveted to the disk 7. Between these side members 7 and 10 both parts of the vanes are included.

The vanes extend into the central part of the fan, with their inner edges comparatively close to the shaft, and are of substantially full width at this region, thus securing a gain in efficiency, owing to their special construction. In this connection, it may be noted that the inner corner of the plane 8, adjacent the disk 7, is cut away as indicated at 11, but this is merely to clear the hub 7^a and to enable the vane to be brought closer to the shaft.

In operation the two parts of the vanes coöperate in an effective manner to force the air from the central region of the fan outward to the periphery, where it flows through the outlets of the passages between the vanes into the casing 1, being finally driven out through the discharge 2. By reason of the formations and general rearward rake of the vanes, transversely of the fan, escape of air through the inlet and the production of back draft or eddy currents are avoided or minimized, and the vane action as a whole is rendered more effective. The formation and arrangement of the vanes and of their parts, and the direction of the valleys formed thereby, are all of importance and contribute to the improved result secured, though it is to be understood that I am not limited to the precise form shown, since a certain degree of variation is permissible.

This application is in substance a division of my prior application filed September 10, 1913, Serial Number 789,035. The latter application discloses a number of angular vanes, on the order of the vanes of which the present fan is composed, in combination with a multi-blade series of peripheral vanes. The claims of the original application are restricted to the combination of the two sets of vanes, while the present case is directed broadly to the construction and arrangement of the angular vanes.

I claim as my invention:

1. A centrifugal fan comprising vanes disposed diagonally crosswise of the fan from the inlet side thereof rearwardly of the direction of movement to the back side of the fan, the vanes being composed each of two parts in angular relation, the valley between said parts being at the forward face of the vane and extending diagonally from the inner and forward portion of the vane to the outer and rearward portion thereof.

2. A centrifugal fan comprising vanes disposed diagonally crosswise of the fan from the inlet side thereof rearwardly of the direction of movement to the back side of the fan, the vanes overlapping each other and being composed each of two parts in angular relation, the valley between said parts being at the forward face of the vane and extending diagonally from the inner and forward portion of the vane to the outer and rearward portion thereof.

3. A centrifugal fan comprising vanes composed of two parts arranged to form a valley extending diagonally from the inner portion of the vane approximately at the inlet side outward toward the periphery and toward the back of the fan, and also rearwardly with respect to the direction of movement.

4. A centrifugal fan comprising vanes the inner parts of which are pitched from their inner edges rearwardly of the direction of movement while the outer parts are pitched forward with respect to the lower parts and also diagonally rearward, with respect to the direction of movement, from the inlet side of the fan toward the back side thereof, the valleys formed by the said parts extending diagonally from approximately the inner corners at the inlet side to approximately the outer corners at the back side of the fan.

5. A centrifugal fan having an open inlet side and a closed back side and comprising vanes extending from near the axis to the outer portion of the fan, the vanes comprising two planes set at an angle to each other and the junction of the planes extending diagonally approximately from the inlet and inner portion of the vane to the outer and back portion thereof and also pitched rearward with respect to the direction of movement, the inner plane being approximately the width of the fan at its inner portion and tapering toward its outer portion and the outer plane being widest at its outer portion and tapering toward its inner portion.

6. A centrifugal fan having an open inlet side and a closed back side and comprising vanes extending approximately the full width of the fan from the central portion thereof to the outer portion, the vanes comprising two planes set at an angle to each other and the junction of the planes extending diagonally approximately from the inlet and inner portion of the vane to the outer and back portion thereof and also pitched rearward with respect to the direction of movement, the inner plane being approximately the width of the fan at its inner portion and tapering toward its outer portion and the outer plane being widest at its outer portion and tapering toward its inner portion.

7. A centrifugal fan having an open inlet side formed by a ring and a closed back side formed by a disk and comprising vanes having front edges attached to the ring and extending across the inlet in a plane substantially perpendicular to the axis and approaching close to the center, the outer edges of the vanes extending obliquely sharply rearward, with respect to the direction of movement, from the inlet side toward the back side, the back edges being applied to the disk, and the inner edges also extending obliquely rearward from the inlet side but less sharply than the outer edges, the vanes being angled or troughed with the valleys running diagonally from the front and inner regions of the vanes outward and rearward toward the back and outer regions thereof.

8. In a centrifugal fan, a vane comprising two substantially triangular planes in angular relation to each other, two sides of one triangle forming the outer edge and the inlet edge of the vane and two sides of the other triangle forming the back edge and the inner edge thereof, the remaining common sides of the triangles extending diagonally from the inner and inlet portion of the vane to the outer and back portion thereof and rearwardly with respect to the direction of movement.

9. A fan comprising a casing and a rotary member therein having an intake at the side, said rotary member comprising a plurality of vanes of angular or trough formation, the valley of each vane extending diagonally from the inner portion of the vane adjacent the intake to the outer portion of the vane adjacent the back or closed side of the fan, the outer portion of each vane being disposed diagonally, and in coöperation with the inner portion of the vane serving to trap the air taken in laterally and to deliver the same circumferentially.

Signed at Washington in the District of Columbia this 25th day of March, 1914.

THEODORE JONATHAN RITTER.

Witnesses:
PAUL F. GROVE,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."