

(No Model.)

R. H. THURSTON.
CENTRIFUGAL BLOWER.

No. 257,412.

Patented May 2, 1882.

Fig. 1.

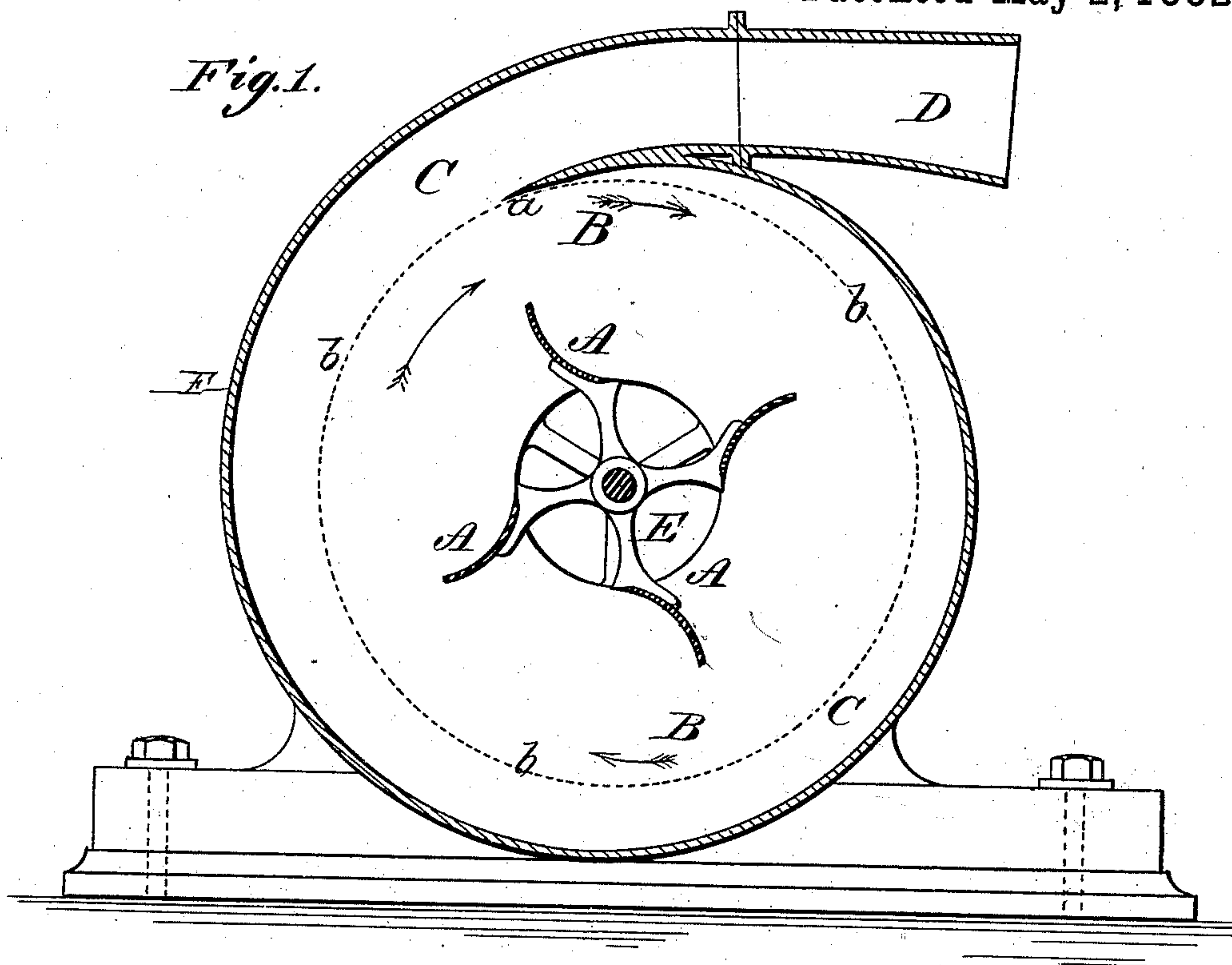
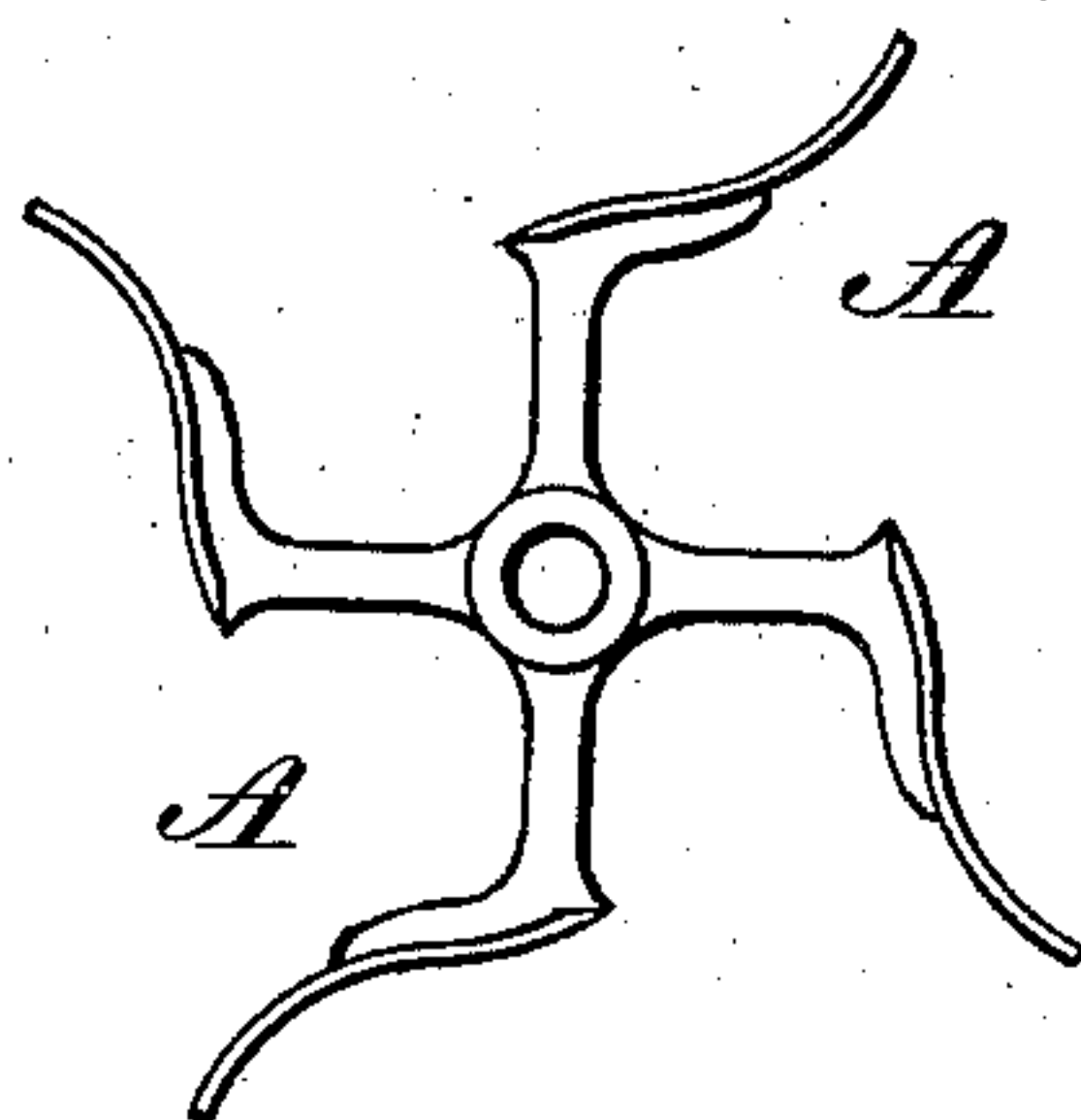


Fig. 2.



WITNESSES:

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CENTRIFUGAL BLOWER.

SPECIFICATION forming part of Letters Patent No. 257,412, dated May 2, 1882.

Application filed October 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. THURSTON, of Hoboken, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Centrifugal Blowers or Fans, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in both figures.

Figure 1 is a sectional side view of a blower embodying my invention, and Fig. 2 is a side view of the fans in a modified form.

In the construction of centrifugal blowers the object to be attained is maximum velocity of the air-current with maximum economy of power. To this end the air must enter and be discharged from the blower with minimum resistance, and also take the most direct course through it. The inner surface of the blower should likewise be as smooth and the changes of channel-section made as gradual as practicable. It is further necessary that the vanes of the wheel rotating within the blower-case should cleave the passing air-current without impact, in order to avoid eddies and friction in the vanes.

In carrying out my invention the chamber of the blower is made of so much greater diameter than the wheel that a space for what is termed a "vortex" or "whirlpool" is left around the periphery of the wheel, in which vortex the velocity of the current decreases from the inner to the outer periphery, being at each point inversely as the radius at that point. Outside this vortex is a spiral delivery-channel whose cross-sectional area gradually enlarges from its point of inception to where it merges in the delivery-pipes. In constructing a blower I make the inner edges of the vanes on an angle with tangents to the circumference of the case. In other words, the inner edge of each vane is nearly perpendicular to a radius of the wheel. From such inner edge the vanes describe a gentle curve toward the periphery of the case, so that their outer edges are radial, or nearly so, to the axis. In consequence of this construction the air or other fluid entering the blower is cleft without impact, and

its direction of motion gradually changed until it leaves the vanes radially.

The shape of vane may be that shown in Fig. 1 of the drawings for moderate speeds, while for considerable speeds the inner portion may be more or less nearly an involute to the smaller circle, gradually altering the outer extremity, as shown in Fig. 2, bringing it radially at the periphery, as in the first case. The two forms of vane are geometrically related in this way, and may be considered as practically one form. The path in each case for the fluid, as determined by the vanes, is one in which it is compelled to change its direction and velocity with a nearly-uniform acceleration, and the vane would be laid out by first constructing the desired line of movement of a particle of air and tracing the line of the vane by reference to it.

To take the fluid from the vortex I construct a spiral channel surrounding the vortex or whirlpool above described, in which the cross-sections exterior to the vortex are made gradually to increase from a certain point at the periphery of the vortex throughout the whole circumference until opposite this initial point the cross-section is equal to that of the delivery-pipe.

Referring to Fig. 1, the letters A indicate the vanes of the wheel; B, the vortex-space surrounding the latter, and C the spiral delivery-channel. The air is taken in at side openings, E, around the axis of the wheel, and delivered from the blower by pipe D, whose diameter is gradually decreased from its mouth inward. The vanes A are attached to radial arms of a hub keyed on a rotating shaft. The vanes are curved lengthwise and placed with their concave sides in the direction of rotation of the wheel, which is to the right, as indicated by the arrow. The inner ends of the vanes A are nearly tangential to radii of the wheel, while their outer ends are on lines which are as nearly parallel to said radii as practicable.

The axis of the wheel is located eccentrically to the periphery of the case F, it being nearest the point *a* where the delivery-pipe D joins the case of the blower—that is to say, the distance of the axis of the wheel from the inner periphery of the case is gradually increased from the

point *a* in the direction of the arrow, around to the same point. Now, taking the distance between points *a* and the axis as a radius and striking a circle from the latter, we indicate, 5 as by the dotted line *b*, both the outer lines of the vortex-space B and the inner boundary of the spiral delivery-channel C. Said vortex-space is therefore an annular space surrounding the wheel, and of a uniform diameter 10 greater than the greatest diameter of the delivery-channel C, which is contiguous to point *a*. Within this vortex-space the fluid acquires the rotary motion essential to the greatest effectiveness, as explained in the preceding portion of this specification, and its centrifugal tendency is allowed gradual scope by the graduated spiral delivery-channel C, so that it enters the delivery-pipe D at a maximum velocity relative to the force applied to the wheel.

20 I do not claim a channel surrounding the fan-disk constructed for the simple purpose of conveying away the issuing fluid. Fans have been made in which the central revolving portion is fitted to a larger casing, but which is

not of such a form as makes it an efficient 25 vortex; nor do I claim curved vanes in connection with a case having a gradually enlarged delivery-channel, since such have been used, although in an arrangement essentially 30 different from mine.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

A blower formed by the combination of a wheel having longitudinally-curved vanes whose outer extremities are parallel to radii 35 of the wheel, and a case in which said wheel is located eccentrically, it being nearest the point *a* of inception of the delivery-pipes with the body of the case, but at a greater distance therefrom than the diameter of the spiral delivery-channel C, which is gradually increased 40 from the point *a* until merged in said delivery-pipe, all as shown and described.

ROBERT HENRY THURSTON.

Witnesses:

EDW. E. MACGOVERN,
H. F. MANN.