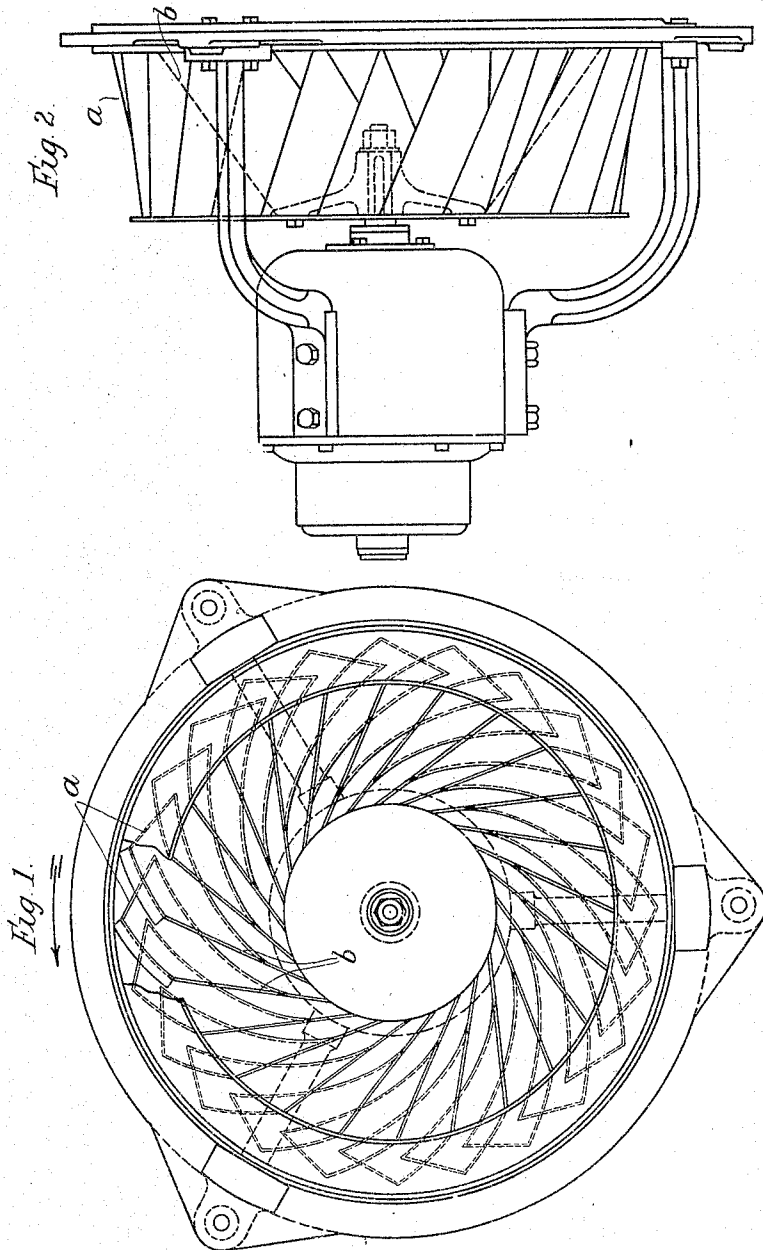


J. KEITH.
CENTRIFUGAL FAN.
APPLICATION FILED OCT. 21, 1910.

1,015,274.

Patented Jan. 16, 1912
3 SHEETS—SHEET 1.



WITNESSES:

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F. J. Hogan.

INVENTOR

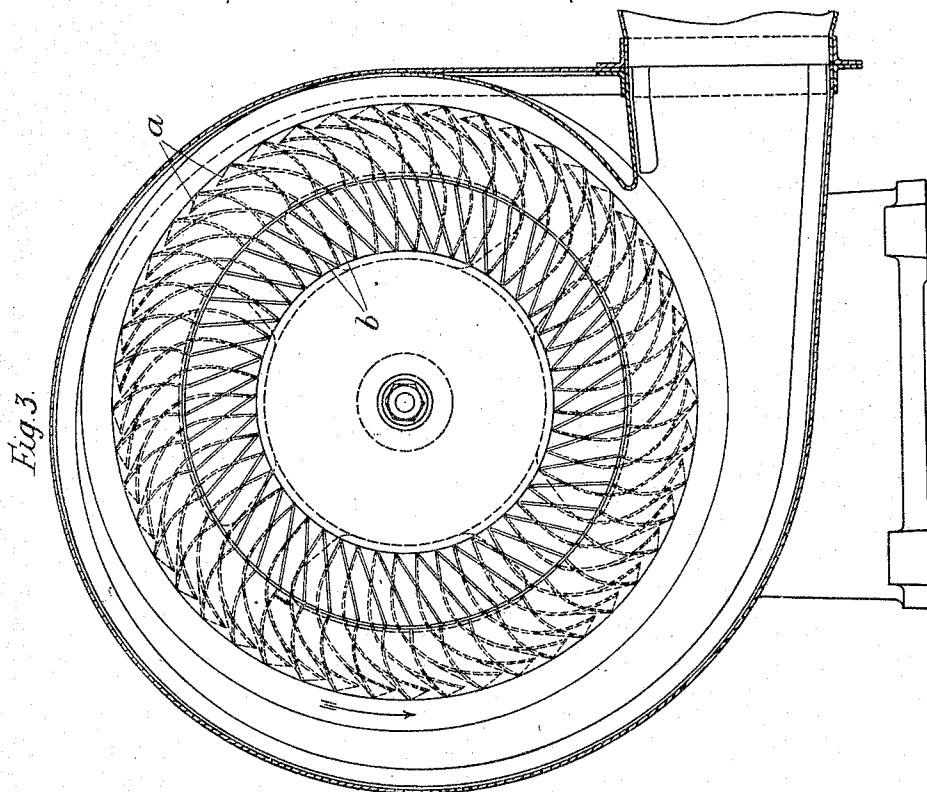
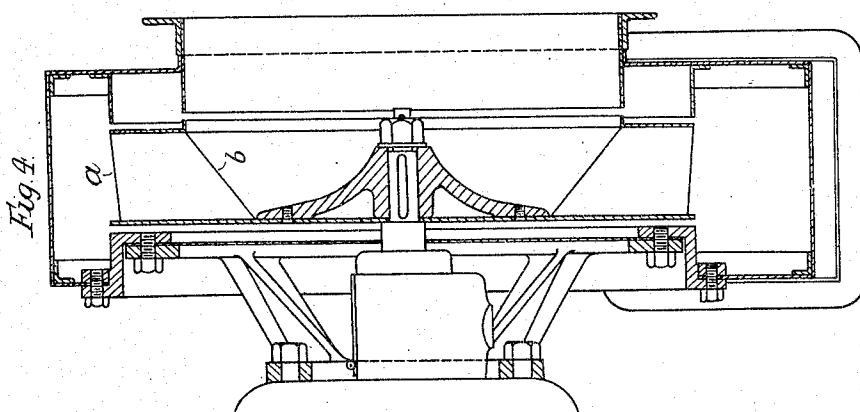
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3 SHEETS—SHEET 2.



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3 SHEETS-SHEET 3.

Fig. 5.

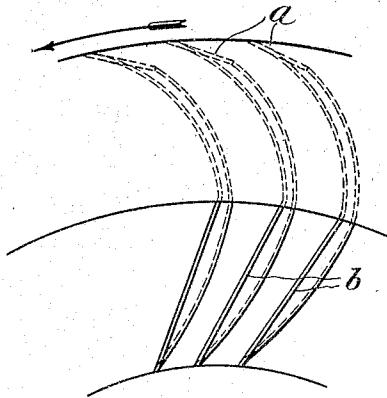


Fig. 6.

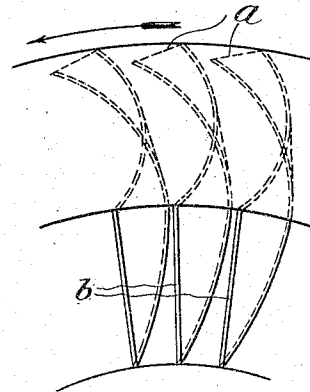


Fig. 7.

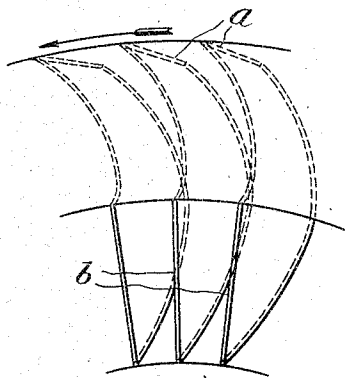


Fig. 8.

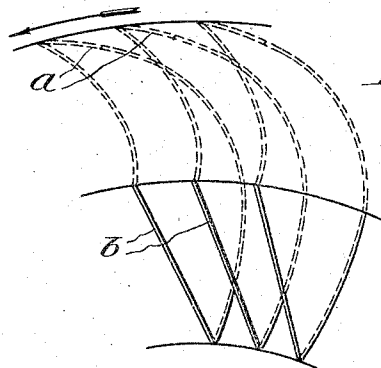
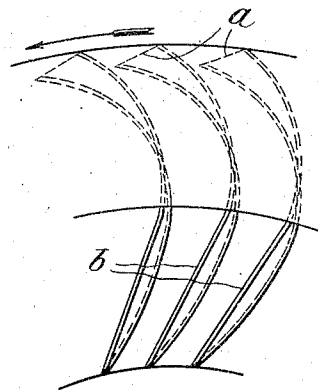


Fig. 9.

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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL FAN.

1,015,274.

Specification of Letters Patent.

Patented Jan. 16, 1912.

Application filed October 21, 1910. Serial No. 588,314.

To all whom it may concern:

Be it known that I, JAMES KEITH, a subject of the King of the United Kingdom of Great Britain and Ireland, and residing at London, England, have invented a certain new and useful Improvement in Centrifugal Fans, of which the following is a specification.

This invention contemplates certain improvements in centrifugal fans of the type described in the specification of Letters Patent No. 935,114 of 1908. In the said specification there is described a fan runner having a number of tapered blades (32 or thereabout) of which the outer and inner longitudinal edges lie on substantially conical surfaces differently inclined to the axis of the fan spindle; the inner cone being of shallower dimensions than the outer cone, so that the diameter of the runner is greatest where the blades are narrowest. With this fan, as the peripheral speed is greatest toward the inlet—where the external diameter is greatest—and the resistance offered by the blades is greatest at the back ends of the blades—where these are deepest—the tendency of the entering column of air to rush to the back of the fan, due to its momentum, is largely or wholly overcome, and the delivery of air is substantially equalized over the length of the outer longitudinal edges of the blades. In the fan described in the said specification I have described the blades as being so disposed that their outer longitudinal edges are practically co-planar with the axis and their inner longitudinal edges are inclined to a plane including the axis—that is, these edges of the blades are not only not parallel to each other but are not even co-planar.

Further experiments made particularly with fans having relatively short blades have led me to devise certain arrangements which may be considered as modifications of that described in the said specification, the efficiency of those fans fluctuating more or less according to the conditions of speed, volume and pressure; but each construction (some forms of which are also described and claimed in my co-pending application, Serial Number 602,885, filed January 16, 1911) may be regarded as in itself meritorious, and, within those limits where its efficiency reaches a maximum, as possessing certain advantages even over the original or standard "Keith" fan.

In the accompanying drawings Figures 1 and 2 are elevations at right angles to each other of a centrifugal fan of the open type. Figs. 3 and 4 are like views of a case fan having blades of different form. Figs. 5 to 9 show modified constructions of blades.

The new fan runner comprises as heretofore a number of tapered and scooped blades of which the outer and inner longitudinal edges lie on substantially conical surfaces differently inclined to the axis of the fan runner, the outer cone being less inclined than the inner cone, and both cones being truncated, the narrow ends of the blades being held by a ring which constitutes the end of the runner of maximum diameter and the deeper ends being fitted to a disk constituting that part of the runner of least diameter.

In the open fan runner shown in Figs. 1 and 2, the blades are so set that both the outer and inner longitudinal edges *a* and *b*, respectively, are oblique to a plane including the axis of the fan runner, the outer longitudinal edge *a* of any given blade sloping rearwardly from an imaginary plane including the axis and the inner longitudinal edge *b* sloping forwardly from the said plane, *i. e.* in the opposite direction; that is, assuming that said plane be rotated around the axis of the runner, both longitudinal edges of each blade will deviate from the same plane and in opposite directions. In both these cases the runner is intended to rotate with the convex surfaces of the blades presented to the air.

In the construction of runner shown in Figs. 3 and 4 the outer longitudinal edges *a* of the blades slope forwardly in the direction of rotation and the inner longitudinal edges *b* slope rearwardly from said plane.

In the construction shown in Fig. 5 the outer longitudinal edges *a* of the blades slope rearwardly and the inner longitudinal edges *b* slope forwardly. It will be understood that in this case the runner is rotated so that the concave surfaces of the plates are presented to the air.

I may so far vary these constructions as to decrease the obliquity of the inner longitudinal edges *b* so as to make them co-planar with the axis, Figs. 6 and 7. Or I may vary the form or curvature of the blades so that the inner longitudinal edges *b* shall be oblique to a plane including the axis of the runner, the inner and outer lon-

gitudinal edges of the same blade sloping away in the same direction whether forwardly or rearwardly from an imaginary plane which includes the axis; in the construction shown in Fig. 8 the outer and inner longitudinal edges *a* and *b* respectively slope forwardly in the direction of rotation, while in the construction shown in Fig. 9 the outer and inner longitudinal edges *a* and *b* slope rearwardly.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. A fan runner comprising a plurality of scooped blades the outer and inner longitudinal edges of which lie on substantially conical surfaces differently inclined to the axis of the runner, the outer cone being less inclined than the inner cone, and both cones being truncated, and each blade being so set that both its outer and inner longitudinal edges deviate from a plane rotating on the axis of the fan runner; means joining the inner ends of the blades, and means joining the outer ends of the blades.

2. A fan runner comprising a plurality of blades the outer and inner longitudinal edges of which lie on substantially conical surfaces differently inclined to the axis of the runner, the outer cone being less inclined than the inner cone, and both cones being truncated, and each blade being so set that both its outer and inner longitudinal edges

deviate from a plane rotating on the axis of the fan runner; and means joining the ends of the blades.

3. A fan runner comprising a plurality of scooped blades the outer and inner longitudinal edges of which lie on substantially conical surfaces differently inclined to the axis of the runner, the outer cone being less inclined than the inner cone, and both cones being truncated, and each blade being so set that both its outer and inner longitudinal edges deviate from a plane rotating on the axis of the fan runner.

4. A fan runner comprising a plurality of tapered and scooped blades, the outer and inner longitudinal edges of which lie on substantially conical surfaces differently inclined to the axis of the runner, the outer cone being less inclined than the inner cone, and both cones being truncated, and each blade being so set that both its outer and inner longitudinal edges deviate from a plane rotating on the axis of the fan runner; a disk joining the inner edges of said blades, and a ring joining the outer edges of said blades.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES KEITH.

Witnesses:

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JOHN MCCLEARY, Jr.