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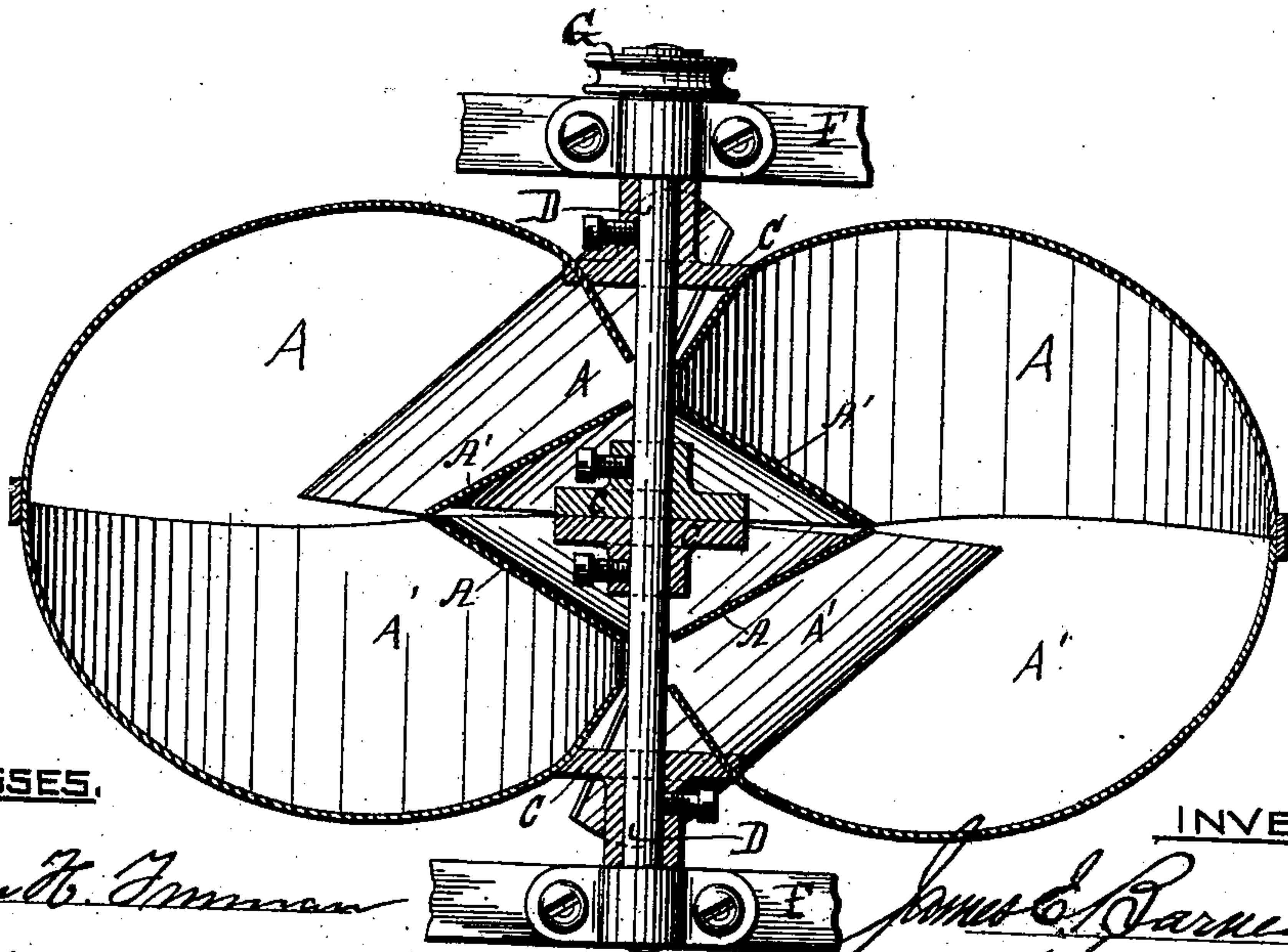
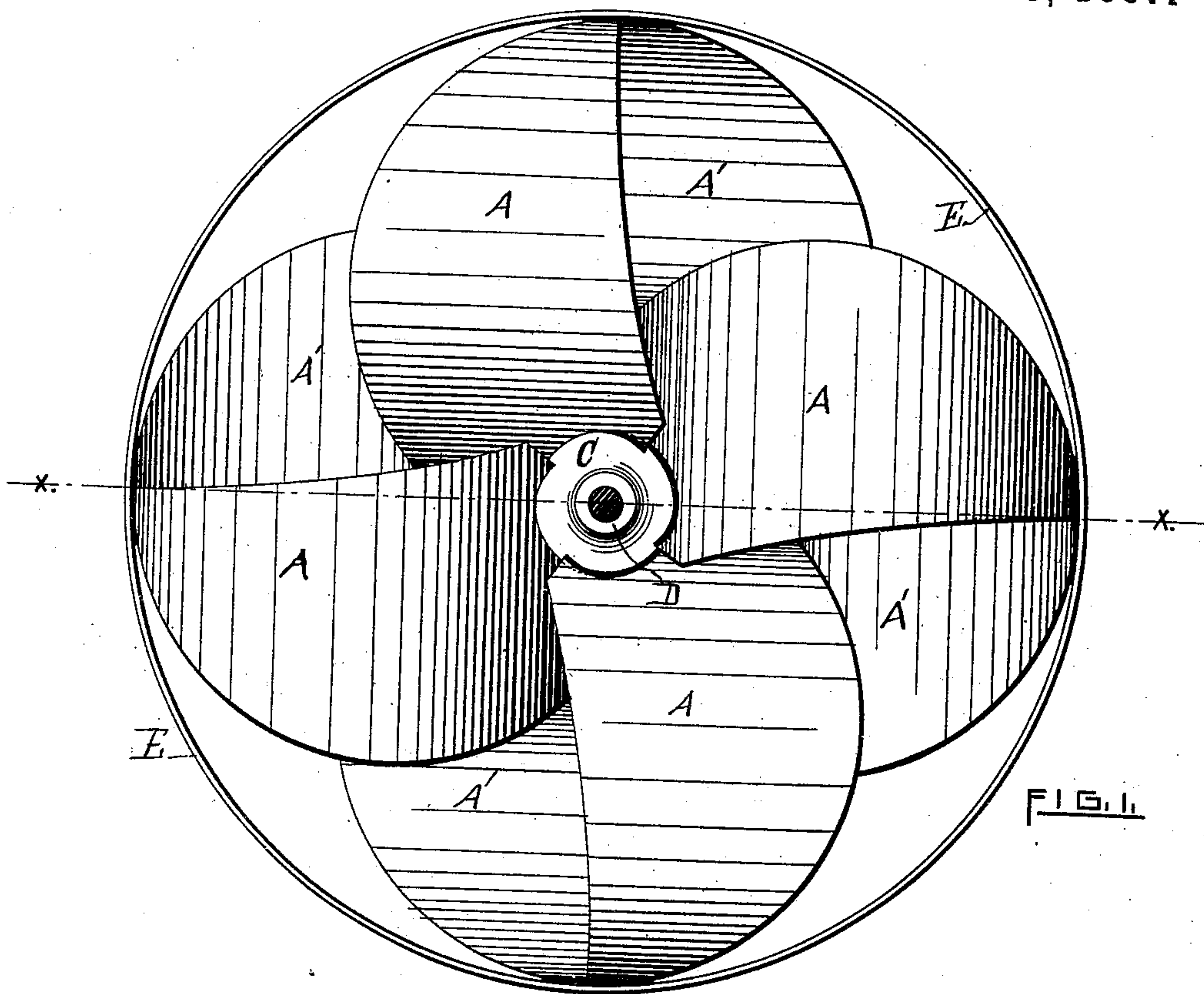
2 Sheets—Sheet 1.

J. E. BARNEY.

COMPOUND VENTILATING WHEEL OR FAN.

No. 356,439.

Patented Jan. 25, 1887.



WITNESSES.

Nathan H. Freeman
D. L. Dabell

INVENTOR.

FIG. 2.

James E. Barney
By Henry H. H. H. H.
Attorney

(Model.)

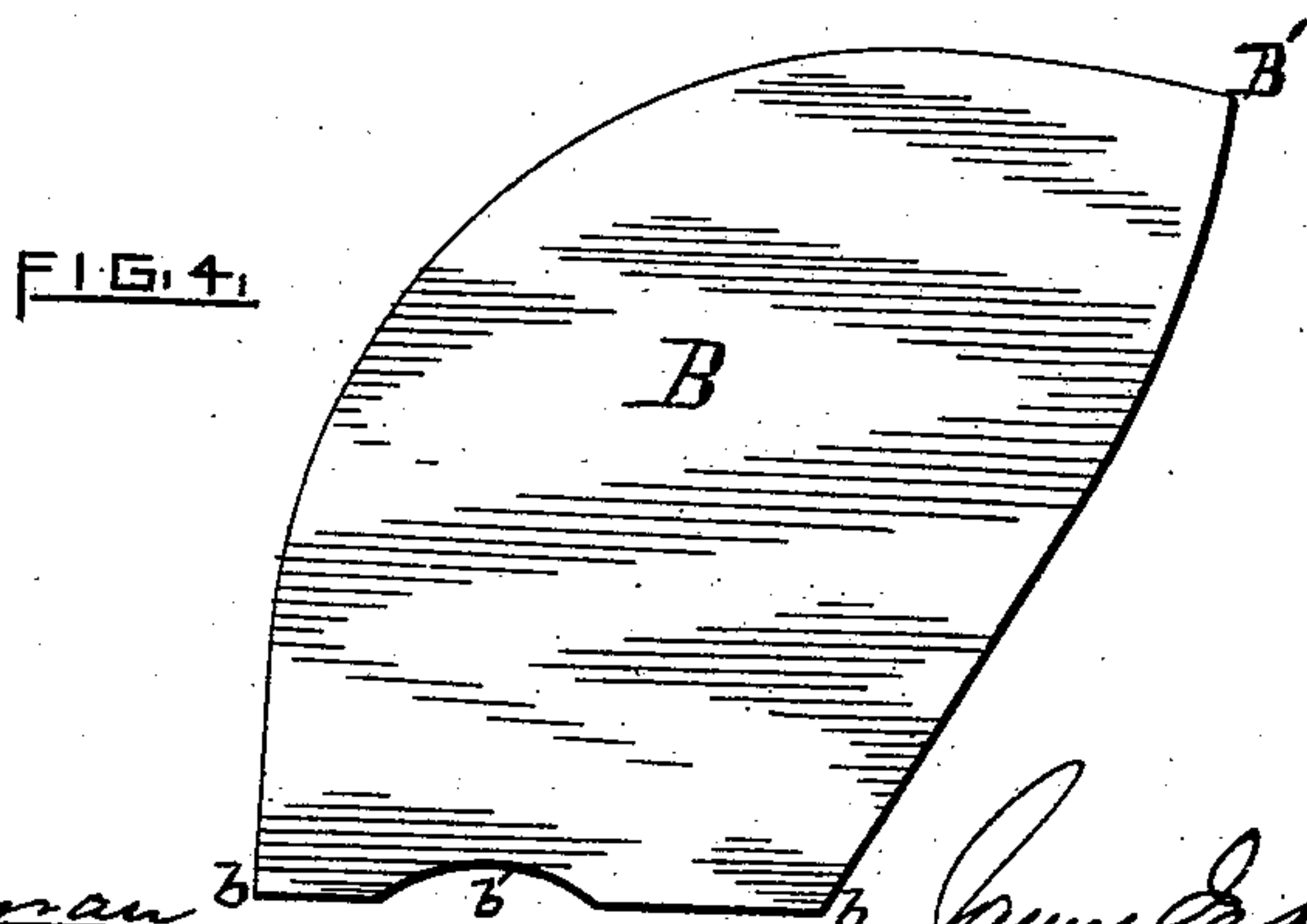
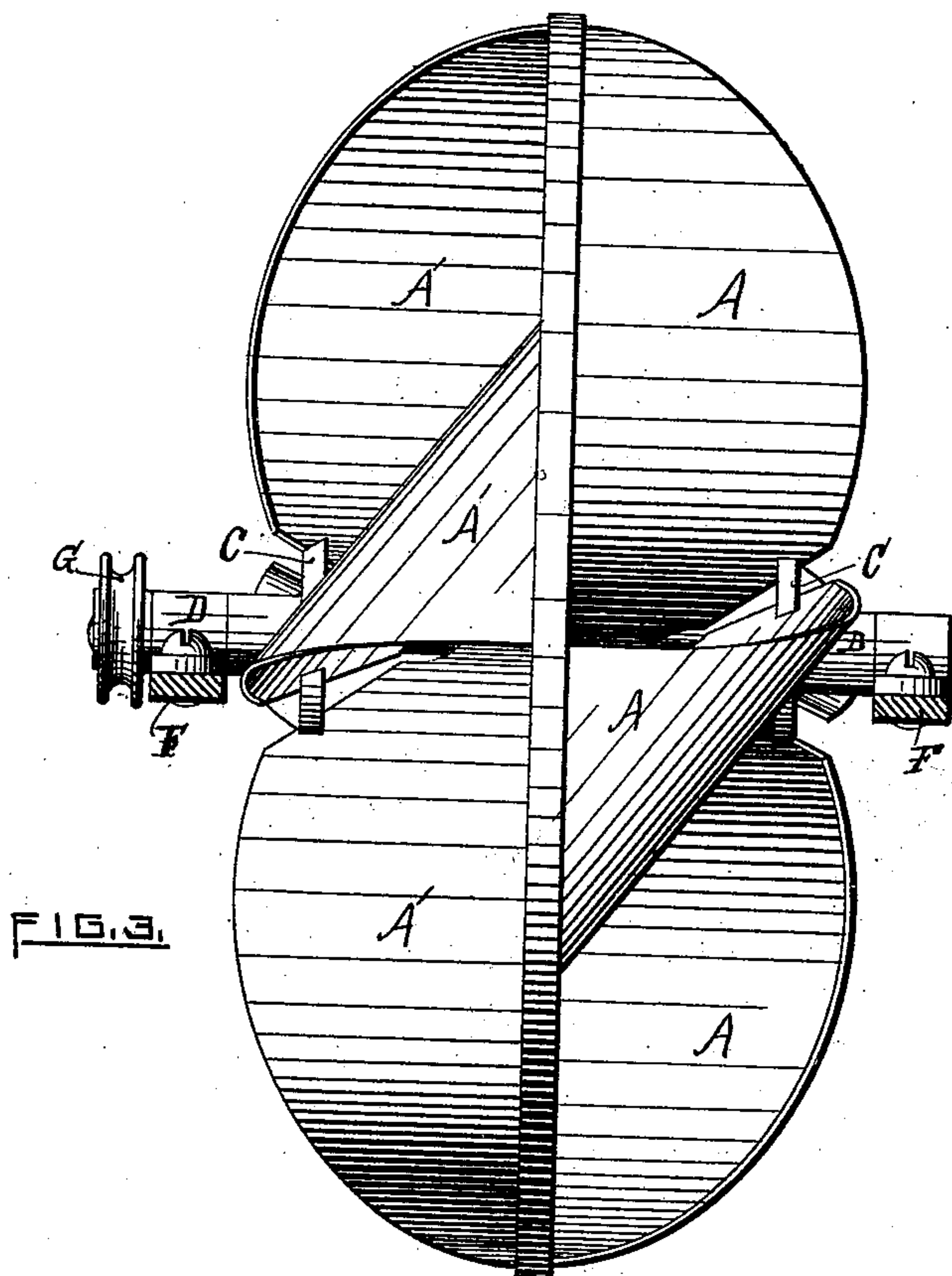
J. E. BARNEY.

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COMPOUND VENTILATING WHEEL OR FAN.

No. 356,439.

Patented Jan. 25, 1887.



WITNESSES.

Nathan H. Timman
D. L. Daboll

INVENTOR.

James E. Barney
By Henry M. Smith
Attorney

UNITED STATES PATENT OFFICE.

JAMES E. BARNEY, OF HYDE PARK, MASSACHUSETTS.

COMPOUND VENTILATING WHEEL OR FAN.

SPECIFICATION forming part of Letters Patent No. 356,439, dated January 25, 1887.

Application filed April 23, 1886. Serial No. 199,916. (Model.)

To all whom it may concern:

Be it known that I, JAMES E. BARNEY, a citizen of the United States, residing at Hyde Park, in the county of Norfolk and State of Massachusetts, have invented a new and useful Compound Ventilator Wheel or Fan, of which the following is a specification.

The use of fans or wheels to induce the movement of currents of air is not novel. Various forms of fans have been constructed prior to my invention, consisting of a wheel having a single series of blades of different and varying curvatures, intended to facilitate the gathering of air, and with various devices employed to prevent back currents of air through the wheel.

In all prior constructions difficulty has been experienced not only from back currents within the wheel, but also from atmospheric pressure and resistance against the discharging-face of the wheel. In many instances, on occasions of wind-storms, the effect of pressure on the rear or discharging face of the wheel has been to very appreciably diminish the volume of discharged air. As the object of the wheel or fan is to circulate a volume of air in a given direction at a certain velocity, it is obvious that the above defect is a serious one. I have by practical tests demonstrated that such defect can be overcome by creating a vacuum at the rear of the wheel in advance of the discharged column of air. I accomplish this result by the unique construction shown in the accompanying drawings, and more fully explained hereinafter.

The purpose of my invention is to increase the volume and velocity of columns of air and to deliver them freely through the fan in such manner as to meet with a minimum of atmospheric resistance at the discharge-face of the fan.

I construct a wheel in two sections, each section consisting of a series of blades mounted upon hubs at an angle to the axis of the hub, with the inner straight edge of each blade lying in the plane of the rear face of the section and the outer curved edges forming the front face of the section. I unite these two sections upon a common shaft, with the planes of their inner faces abutting and the outer ends of each blade secured to a common peripheral central

ring, the concave inner surfaces of each two alternate opposite front and rear blades forming channels for the passage of air through the wheel at an angle to the axis of the wheel corresponding in degree with the angle at which the blades cross the shaft. The compound wheel in central cross-section presents an elliptical outline.

When my compound wheel is rotated, the blades on the front and rear faces of the wheel flaring in opposite directions, those on the front or feeding face will draw the air into the wheel, while the blades on the rear or discharging face will beat off the surrounding air and form a vacuum at the rear of the wheel and in advance of the discharged column of air. In other words, the concave inner face of the front blades, acting as suction, in unison with the convex outer face of the rear blades, acting as "plenum," produces a practical vacuum at the rear of the wheel and in advance of the discharged column of air, thereby increasing both the volume and velocity of the column of air moved through the wheel. This is a novel feature and an important element in my invention.

The shaft is mounted in framing corresponding in outline with the outline of the compound wheel. The whole is provided with suitable means for application of power, as is common in ventilator-wheels. Four hubs may be mounted on the shaft—two exterior and two intermediate; or one of the intermediate may be omitted and the two series of blades be secured to the three hubs retained. It may be desirable to divide the central hub into two segments to facilitate removal of one series of blades, should it become necessary to do so, without disturbing the other series.

The construction and arrangement of the blades relatively to each other and to the shaft prevent back flow or back currents of air in the wheel, which would diminish its effectiveness, as it does in all other constructions heretofore known.

I will now describe my invention with reference to the accompanying drawings, in which—

Figure 1 is a front elevation of my compound wheel. Fig. 2 is a sectional top plan on line *x x* of Fig. 1. Fig. 3 is a side eleva-

tion of the wheel. Fig. 4 is a plan of the templet of the blade.

A A A' A' represent, respectively, the front and rear blades, which are formed from a templet of the form shown in B, Fig. 4. Each blade has a straight base-line, *b b*, and an indentation, *b'*, a short distance from the center of the base-line. The blades are secured upon hubs C C at an angle to the axis of the shaft, the indentation *b'* receiving the shaft, and thereby permitting the base-line *b b* to fall into the plane of the axis of the shaft. The outer end of each blade in each series is secured to the peripheral ring E, with the convex face of each blade outward and the concave inner face inward, and the said concave inner faces of each two alternate opposite front and rear blades forming an air-channel across the axis of the wheel and at the same angle thereto as that made by their base-lines.

The shaft D is suitably mounted in a framing, F F, not necessary to be fully shown, but preferably of elliptical outline, to correspond with the outline of the horizontal cross-section of the wheel. Power is applied in the ordinary manner to a pulley, G.

It is obvious that my compound wheel structurally is adapted to work with equal effectiveness when rotated in either direction, the direct and reverse currents obtained being of equal volume and velocity.

I claim as my invention and desire to secure by Letters Patent—

1. A compound ventilating wheel or fan composed of a double series of blades, A A A' A', combined with a shaft, D, and hubs C C, each blade being secured upon its hubs at an angle to the axes thereof, and the outer ends of each blade secured to a common peripheral ring, E, and the concave inner faces of each two alternate front and rear blades arranged relatively as shown, to form an air-

channel through the wheel at an angle to the axis thereof, as described.

2. A compound ventilating wheel or fan composed of a double series of blades, each blade secured upon the hubs at an angle to the axis of the shaft, the outer edges of the blades united to a common peripheral ring, the convex surfaces of each series of blades forming the respective faces of the wheel, and the concave inner surfaces of each two opposite alternate blades forming an air-channel diagonally across the shaft, the whole combined with a shaft and rotated in the same direction, whereby the concave of the face-blades, acting as suction, in conjunction with the convex face of the rear blades, acting as plenum, produces a vacuum at the rear of the wheel and in advance of the discharged column of air.

3. In a compound ventilating wheel or fan, the templet B, provided with a straight base-line, *b b*, indented at one side of the center, as at *b'*, and with two sides of unequal convex curvature, as shown, converging to a point, B', when combined with the hubs and peripheral ring of a wheel to form a blade in which the base-line lying in the plane of the axis of the shaft is longer than the peripheral flange of the blade, as specified.

4. In a ventilating wheel or fan, the templet B, provided with a straight base-line, *b b*, and two sides of unequal convex curvature converging to a point, B', all as shown, when combined with hubs and peripheral ring of a wheel to form a fan-blade.

In testimony whereof I have hereunto set my hand, in presence of two witnesses, this 16th day of April, 1886.

JAMES E. BARNEY.

Witnesses:

HENRY MARSH, Jr.,
D. L. DUVALL.