No. 660,582. Patented Oct. 30, 1900.

# A. W. METCALFE.

## FAN OR BLOWER FOR VENTILATING PURPOSES.

(Application filed June 14, 1897.)

(Model.) 2 Sheets—Sheet 1.

Fig. 1.

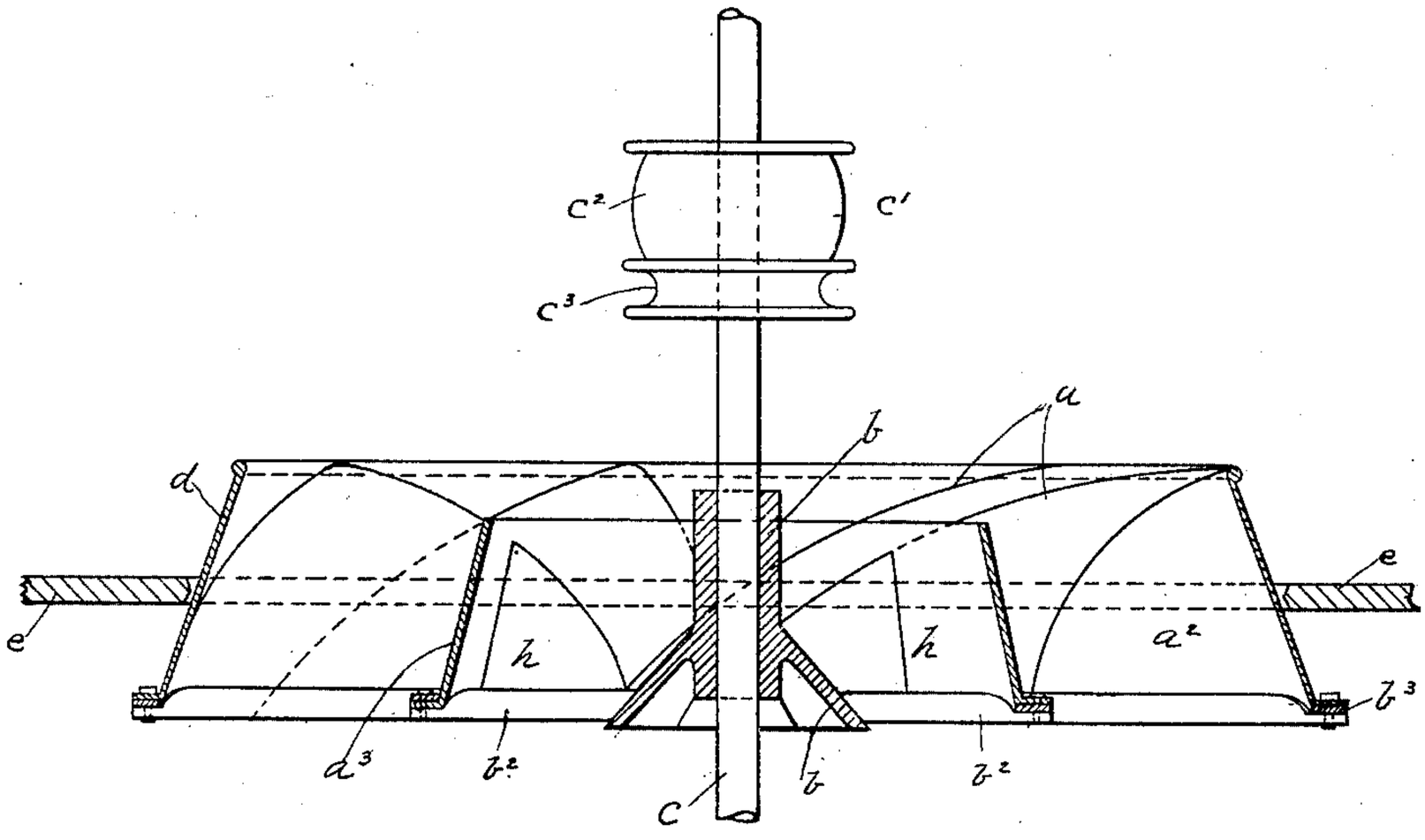



Fig. 2.

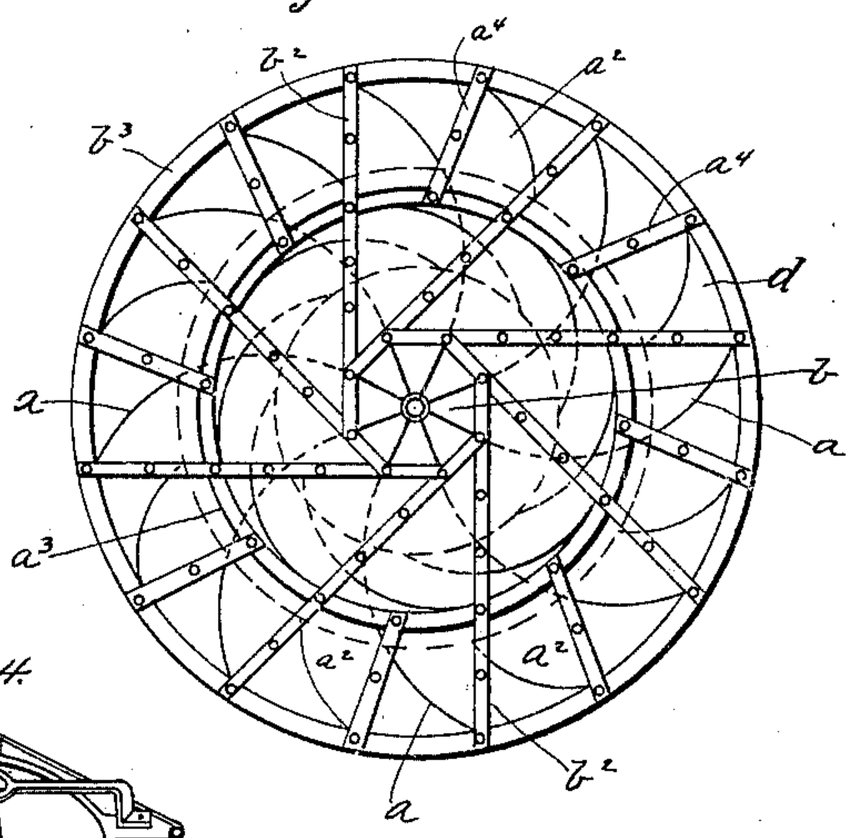



Fig. 3.

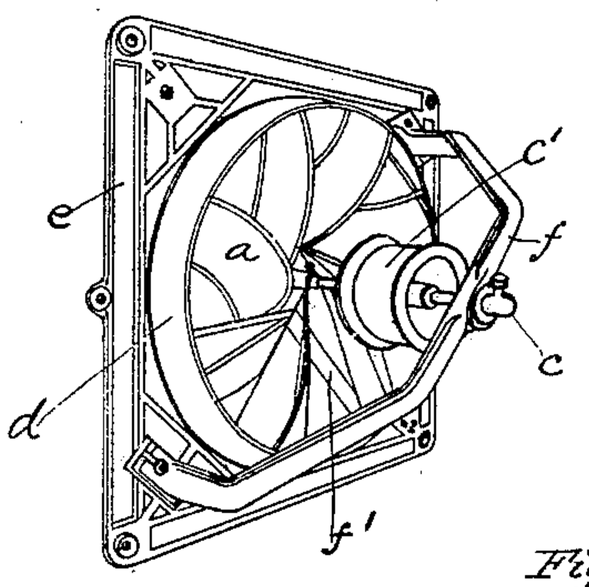
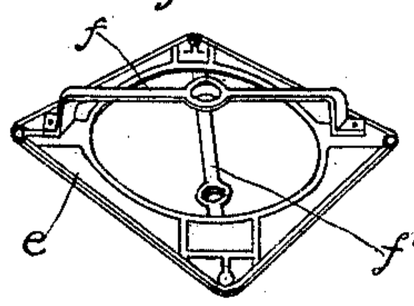



Fig. 4.

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## FAN OR BLOWER FOR VENTILATING PURPOSES.

(Application filed June 14, 1897.)

(Model.) 2 Sheets—Sheet 2.

Fig. 5.

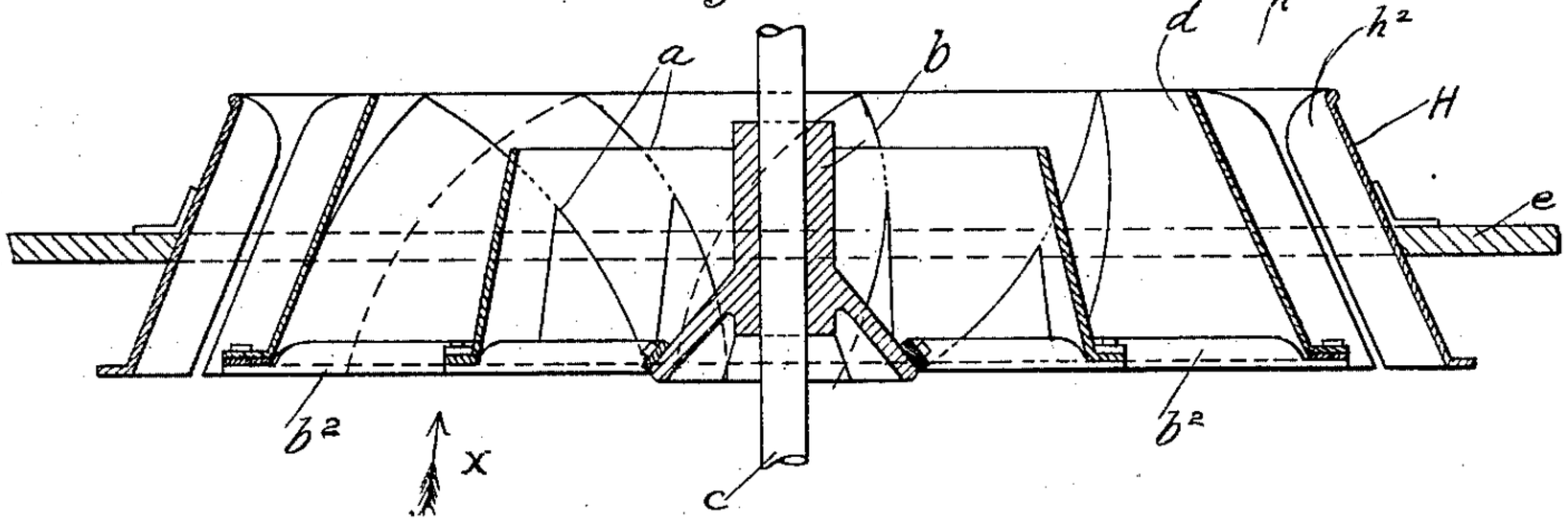
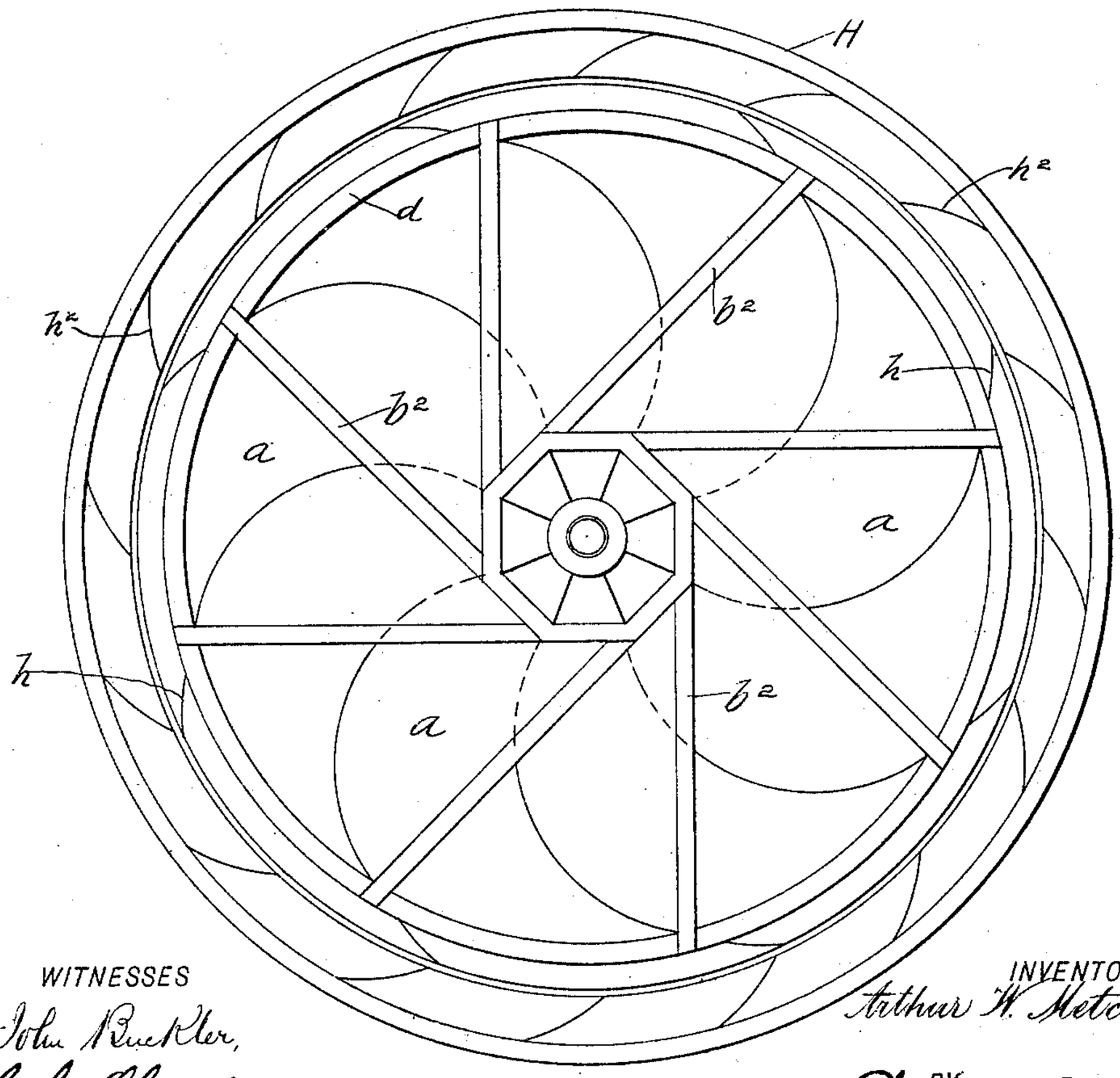



Fig. 6.

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# UNITED STATES PATENT OFFICE.

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## FAN OR BLOWER FOR VENTILATING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 660,582, dated October 30, 1900.

Application filed June 14, 1897. Serial No. 640,755. (Model.)

*To all whom it may concern:*

Be it known that I, ARTHUR WILSON METCALFE, a subject of the Queen of Great Britain, residing at Belfast, in the county of Antrim, Ireland, have invented certain new and useful Improvements in Fans or Blowers for Ventilating Purposes, of which the following is a full and complete specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to ventilating devices, and particularly to propellers or blowers for use in ventilating buildings or compartments therein; and the object thereof is to provide devices of this class of improved construction, the improvement consisting in the shape or form and construction of the propellers or blowers and the separate parts thereof and the method of connecting the blades of the propellers or blowers with the operative or moving parts of the apparatus; and with these and other objects in view the invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

The invention is the same as that for which Letters Patent were granted in Great Britain February 28, 1896, No. 4,474, and is fully disclosed in the following specification, of which the accompanying drawings form a part, in which—

Figure 1 is a transverse sectional view of my improved propeller or blower; Fig. 2, a bottom plan view thereof; Fig. 3, a perspective view of a frame in which the propeller or blower is mounted; Fig. 4, a similar view showing said frame with the propeller or blower and its shaft disconnected therefrom; Fig. 5, a view similar to Fig. 1, showing a modified form of construction; and Fig. 6 a plan view looking in the direction of the arrow X. Figs. 2, 3, and 4 are on a reduced scale, Fig. 3 is on a scale smaller than Fig. 2, and Fig. 4 is on a still smaller scale.

In the drawings forming part of this specification the separate parts of my improvement are designated by the same letters of reference in each of the views, and in the practice of my invention I provide a propeller or blower which comprises curved blades $a$, which are attached to a central nave or boss $b$, which is secured to a driving-shaft $c$ and to a conical rim $d$, the connection between the conical rim $d$ and the base of the boss $b$ being made by means of strips $b^2$, any desired number of which may be employed, and the inner ends of said strips $b^2$ are secured to the boss $b$ and the outer ends thereof to a ring $b^3$, which is secured to or formed integrally with the larger perimeter of the conical rim $d$. My improved propeller or blower is also preferably provided with a series of supplemental blades $a^2$, which are about half the length of the blades $a$ and which are secured to the rim $d$ and extend inwardly to an inner supplemental conical rim $a^3$, which is preferably secured midway between the boss $b$ and the outer conical rim $d$. The supplemental blades $a^2$ are secured in place between the blades $a$ and are arranged in the same manner, and the outer edges of all of said blades are convex and curved inwardly from the smaller diameter of the conical rim $d$ in the direction of the base of the boss $b$, and the supplemental conical rim $a^3$ is connected with the larger perimeter of the outer conical rim $d$ by strips $a^4$. The shapes of the blades $a$ and $a^2$ are clearly shown in Fig. 1, and the strips $b^2$ and $a^4$ are secured to the edges thereof, so as to give strength and stability to the propeller or blower. The base of the boss $b$ is conical in form, as shown in Fig. 1, and the inner ends of the blades $a$ are connected with the conical portion of said boss.

The propeller or blower revolves freely in a plate $e$, which is secured to or forms a part of a wall in which the propeller or blower is mounted in the usual manner, or said plate $e$ may form a part of a frame, (shown in Figs. 3 and 4,) in which the propeller may be mounted, said frame being adapted to be secured to or in a wall, as will be readily understood.

The spindle or shaft $c$ is provided with a driving-pulley $c'$, as shown in Fig. 1, and said driving-pulley is what is known as a "double" pulley, the part $c^2$ being used when the power is transmitted by a belt and the part $c^3$ when a cord is used for this purpose.

The spindle or shaft $c$ may be supported in any suitable manner, and in Fig. 3 I have shown the frame consisting of the plate $e$ and yokes $f$ and $f'$, secured to the opposite sides thereof, in which the said shaft is mounted, and said plate is provided with a central cir-

cular opening, in which the propeller or blower revolves. The object of Fig. 3 is to show simply one method of mounting the propeller or blower, and in Fig. 4 the frame, consisting of the plate *e* and the yokes *f* and *f'*, is shown separately.

The blades *a* are fixed tangentially around the conical base of the boss *b*, and the wider ends are fixed to the conical rim *d*, which is smaller at the admission than at the delivery side, and said blades are slightly spiral in form, and the object of this construction is to take advantage of the tangential tendency of the revolving air in the fan or blower in order to produce greater draft in passing through the fan or blower.

In the modification shown in Figs. 5 and 6 the fan or blower revolves in a stationary rim H, secured to the plate *e* and of similar form to the rim *d* of the fan or blower, and the outer surface of the rim *d* of the fan or blower is provided with blades *h*, arranged spirally or at an inclination thereon, and the inner surface of the stationary rim H is provided with corresponding blades $h^2$, which are arranged at an inclination opposite to that of the blades *h* of the rim *d* of the blower or propeller, and by reason of this construction it will be apparent that the capacity of the propeller or blower is increased.

My invention is not limited to the form in cross-section of the rims *d* and H, and it will be apparent that changes in and modifications of the construction described may be made without departing from the spirit of my invention or sacrificing its advantages.

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

1. A fan or blower, comprising a central boss, a plurality of spirally-arranged blades, the inner ends of which are narrower than the outer ends, and secured to said boss, and the outer ends of which are secured to a conical outer rim, said boss and said rim being also connected on the delivery side of the propeller or blower by strips to which said blades are also secured, said propeller or blower being also provided with an inner supplemental conical rim placed centrally between the boss and the outer rim, and with supplemental blades arranged between the first-named blades and secured to the outer rim and extending inwardly to the supplemental rim, substantially as shown and described.

2. A propeller or blower, comprising a shaft, a central boss rigidly secured to said shaft which is conical in form at the delivery side of the propeller or blower, spirally-arranged blades, the inner ends of which are narrower than the outer ends and connected with said conical portion of said boss, and the outer ends of which are connected with a conical rim, said conical portion of the boss and the outer rim being also connected by strips to which said blades are secured, and an intermediate supplemental rim secured centrally between the boss and the outer rim, and supplemental blades arranged between the outer and supplemental rims, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 10th day of May, 1897.

ARTHUR WILSON METCALFE.

Witnesses:
JAMES B. TANEY,
R. B. MCCLELLAND.