

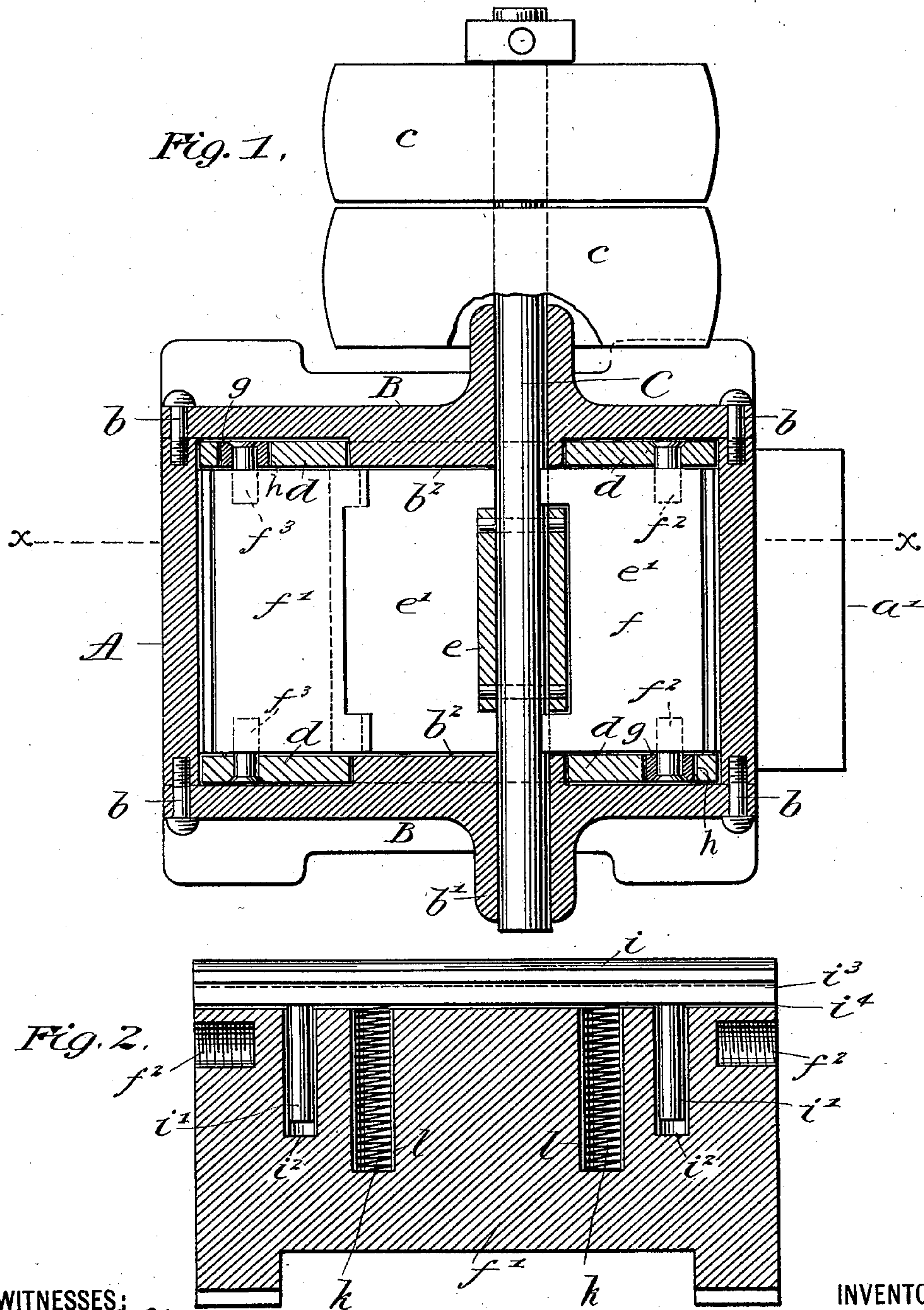
(No Model.)

2 Sheets—Sheet 1.

N. E. FUNK.  
BLOWER.

No. 599,778.

Patented Mar. 1, 1898.



WITNESSES:

Frank S. Ober

G. M. Trean

INVENTOR

Nelson E. Funk,

BY

Lawyer, Edwards & Ryan,

ATTORNEYS

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

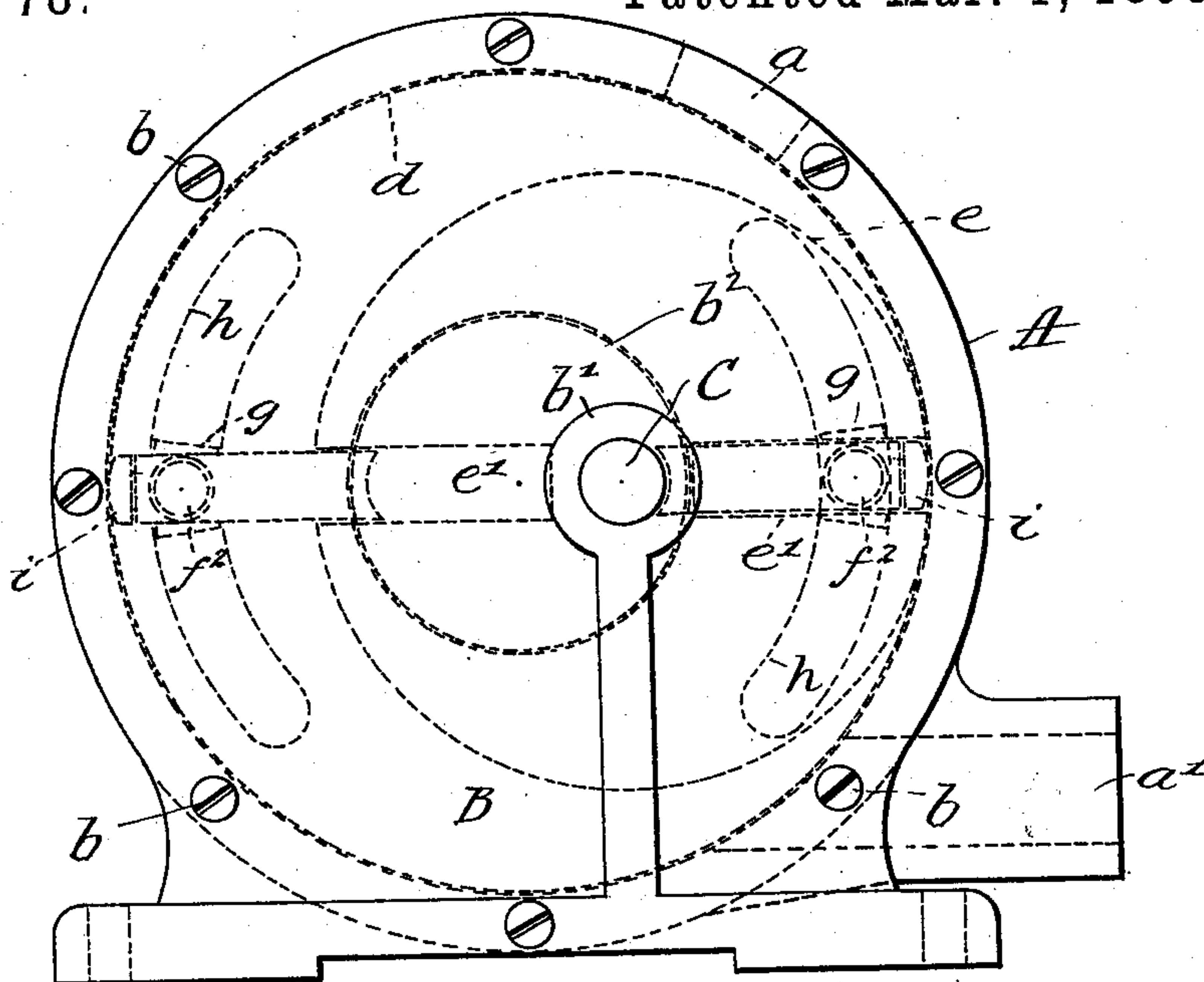
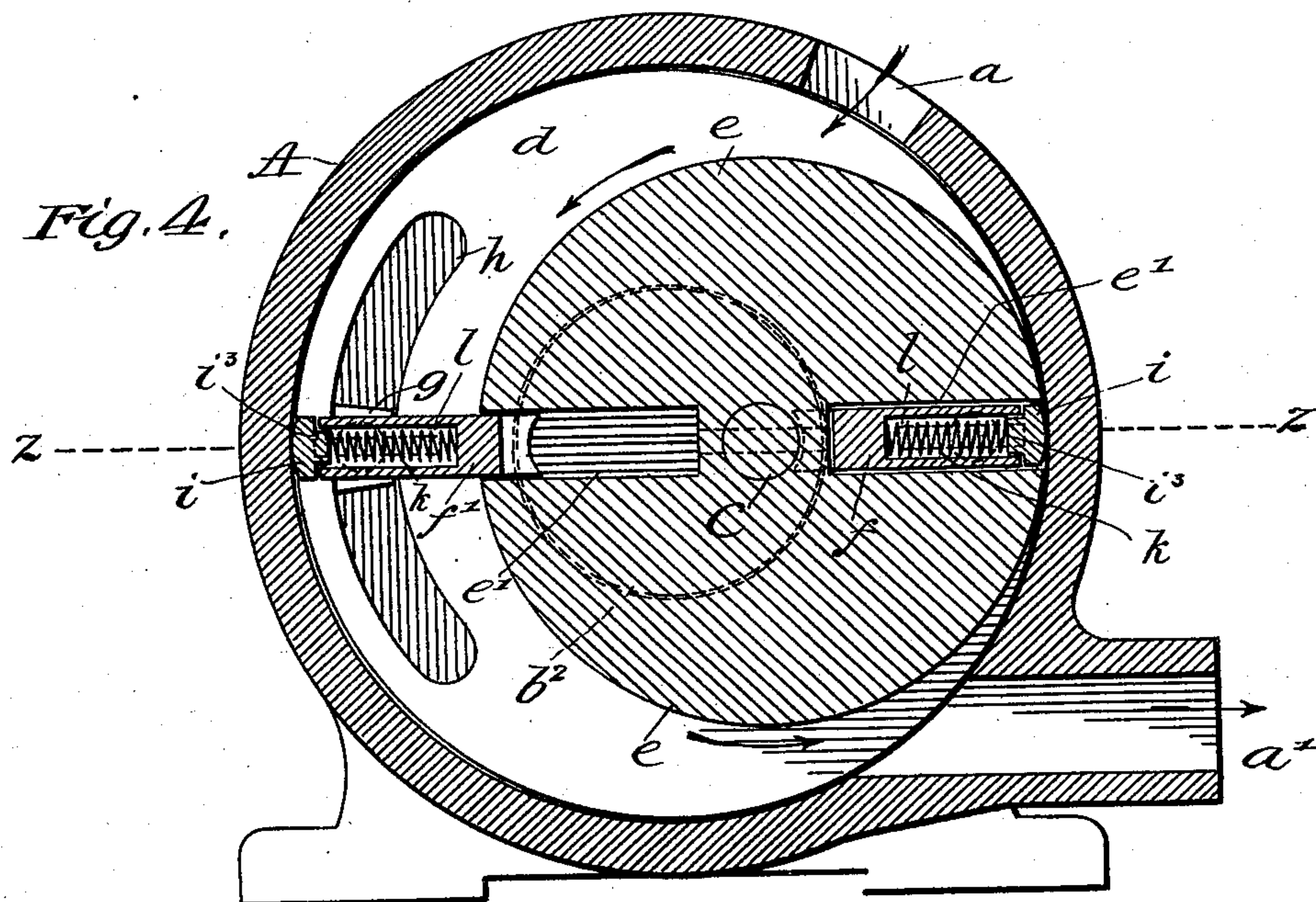


Fig. 4.



WITNESSES:

Frank S. Ober.

C. M. Ireland

INVENTOR

Nelson E. Funk

BY

Lawyer, Edwards & Ryan

ATTORNEYS



# UNITED STATES PATENT OFFICE.

NELSON E. FUNK, OF NEW YORK, N. Y.

## BLOWER.

SPECIFICATION forming part of Letters Patent No. 599,778, dated March 1, 1898.

Application filed November 30, 1896. Serial No. 614,027. (No model.)

*To all whom it may concern:*

Be it known that I, NELSON E. FUNK, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Blowers, of which the following is a full, clear, and exact specification.

This invention relates to rotary blowers, and particularly to that class of rotary blowers known as "positive" blowers.

The object of the invention is to construct a blower of high efficiency and simple and economical construction.

In blowers heretofore constructed, and especially in those of the positive type, much difficulty has been experienced by reason of the large leakage of the air or fluid past the fan-blades during the operation of the blower. I propose to construct a blower in which this objectionable feature shall not be present and which shall also possess other features of advantage which will more clearly appear hereinafter.

The invention will be described more in detail, with reference to the forms thereof illustrated in the accompanying drawings, in which—

Figure 1 is a horizontal section taken on the line  $z z$  of Fig. 4. Fig. 2 is a detailed sectional view of the fan-blade. Fig. 3 is a side elevation, and Fig. 4 is a vertical section taken on line  $x x$  of Fig. 1.

Referring more particularly to the drawings, A represents the usual cylindrical casing of the blower,  $a$  the inlet thereto, and  $a'$  the outlet therefrom. For convenience of manufacture the ends B B of the casing may be cast separately and fixed to the shell by screws  $b b$  or other suitable means. Suitable bearings  $b' b'$  are provided in the ends B B, and the power-shaft C, carrying the driving-pulleys  $c c$ , is mounted therein. Upon the inner faces of the ends B B, cast integrally therewith or otherwise formed thereon, are two circular projections or holes  $b^2 b^2$ , concentric with the ends B B, but eccentric with regard to shaft C. A circular disk or plate  $d$ , the periphery of which coincides with the inner side of the casing, is mounted at each end of the casing on the hubs  $b^2 b^2$  and is adapted to rotate thereon. The plates are preferably of the same thickness as the thickness of the

hubs in order to properly fill in the space between the hubs and casing. A suitable drum  $e$ , of sufficient length to occupy the space between the plates  $d d$  and hubs  $b^2 b^2$  at each end and of sufficient diameter to occupy the space between shaft C and the side of the casing nearest said shaft, is mounted on shaft C concentric therewith, and is adapted to rotate with said shaft independent of the plates  $d d$ . A plurality of slots  $e'$ , suitable to the number of fans to be employed, are formed in drum  $e$  in a plane coincident with the axis thereof. In the drawings I have illustrated a blower having but two fan-blades, but it is obvious that any desired number may be employed and the blower adapted thereto by purely mechanical changes. In the drawings two slots are illustrated, both being in the same plane, and in the slots the fan-blades  $f$  and  $f'$  are adapted to operate. These fan-blades are adapted to slide in and out in the slots and are of substantially the same width as the radius of the drum, so that when the blades are resting in their innermost position their outer edges will be even with the periphery of the drum. Each of the fans  $f f'$ , &c., is pivotally connected at one end thereof with a plate  $d$  by a pin  $f^2$  or other suitable connection, and the other end of each of said fans is pivoted to a block  $g$ , sliding in a segmental slot  $h$  in plate  $d$ , by a pin  $f^3$  similar to  $f^2$ , whereby each fan is stationarily pivoted to a plate  $d$  at one side and movably pivoted to the opposite plate  $d$  at the other side. The object of the above arrangement is that in all positions the fan-blade will be subject to a forward pull from at least one end and also to reduce to a minimum the tendency of the fans to vibrate from their proper position.

In order to preserve a constant contact at all times between the edge of the fan-blades and the sides of the casing, I make use of a construction substantially similar to that illustrated in detail in Fig. 2, wherein  $i$  represents a strip of fiber or other suitable material carried by the fan-blade and adapted to rest at all times against the sides of the casing.  $i' i'$  are dowels projecting from strip  $i$  into dowel holes or sockets  $i^2 i^2$  in the fan-blade and arranged to slide easily therein, thereby permitting the strip to slide toward and away from the fan-blade. A projecting



lip  $i^3$  is formed on the inner side of the strip and arranged to slide into and out of a longitudinal groove  $i^4$  in the fan-blade. The purpose of this strip is to prevent the passage of air or fluid between the strip and the fan-blade. Springs  $k$   $k$ , located in suitable recesses  $l$   $l$  in the fan-blade, serve to press the strip out from the blade and hold it normally against the side of the casing.

10 In the operation of the above-described apparatus power is applied to the driving-pulleys  $c$   $c$  to rotate shaft  $C$ , which in turn rotates drum  $e$ . As drum  $e$  revolves the connections between the fan blades and plates  $d$   $d$  cause the latter to revolve also. By reason of the difference in centers between plates  $d$   $d$  and drum  $e$  the fan-blades will be drawn out and returned successively as the drum revolves, the fan-blades, however, at all times being closely in contact with the side of the casing, because of the fact that the distance between the side of the casing and the connecting-pins  $f^2$   $f^3$  is always constant, and also because of the constant spring-pressure of strip  $i$  against the side of the casing. As blade  $f'$  revolves its connection with plates  $d$   $d$  must necessarily shift. Therefore I have provided the slots  $h$   $h$  in said plates and the sliding blocks in said slots to permit of lateral shifting of the points of connection sufficient to compensate for the lost motion. In order that the plates  $d$   $d$  shall at all times exert a continual pull upon the fan-blade, it is well to locate the slots  $h$   $h$  on opposite sides of the plate, whereby the pivotal connection between one end of the blade will be constant with respect to the plate and the connection at the other end of the blade will be movable, as is illustrated in the drawings.

40 Inasmuch as drum  $e$  always occupies the same space the passage open to the air through the blower is always constant; but this passage, it will be observed, is larger about midway between the inlet and the outlet than at either of said points. This permits the full force of the blade to be exerted against the air at that point and crowds the air forward into the outlet with great force.

A further feature of advantage in my improved blower resides in the formation of the edge of the blade or the strip in contact with the casing, the edge of the blade being rounded to form a segment of a circle having as its center the point where the blade is pivoted to the sliding block. With this construction, no matter what is the position of the blades, their edges will always be in constant contact with the casing, for the reason that each pivotal point is always a constant distance from the casing, and therefore whatever angle the blade assumes one point in the periphery of its segmental edge must touch the casing.

It will be seen that should the inner surface of the casing be rough or should dust or foreign matter collect in the blower the contact of the fan-blades with the casing will not

be interfered with, for the reason that the strip would simply be pressed in by said roughness or foreign matter until the same has been passed, when the strip would resume its normal position by the force of the springs.

It is obvious that the apparatus above described is capable of modification, and I do not, therefore, limit myself to the precise construction herein shown and described. The various parts may be reversed, or some of them omitted, or well-known equivalents substituted therefor without departing from the spirit or terms of my invention.

Having thus described my invention, I claim—

1. In a blower, the combination with the cylindrical casing, of a revolving slotted drum mounted therein eccentrically with respect to the axis of said casing, fan-blades adapted to slide in the slots of said drum, and revolving plates mounted in said casing concentric thereto and eccentric to said drum, one side of said fan-blades being stationarily pivoted to one of said plates and the other side of said blades being movably pivoted to the other of said plates, substantially as described.

2. In a blower, the combination with the cylindrical casing, of a revolving slotted drum mounted therein eccentrically with respect to the axis of said casing, fan-blades adapted to slide in the slots of said drum, revolving plates mounted in said casing concentric thereto and eccentric to said drum, one side of said fan-blades being stationarily pivoted to one of said plates, and the other side of said blades being movably pivoted to the other of said plates, strips carried by and forming part of said blades, and springs interposed between said strips and the blades, substantially as described.

3. In a blower, the combination with the casing, of a plate and fan-blade revolving therein upon centers eccentric to each other, said blade being pivoted to said plate by a pivot movable in said plate in a line concentric to its axis, and the plane of the outer edge of said blade being segmental to a circle having said movable pivot for its center, substantially as described.

4. In a blower, the combination with the casing, of a plate and fan-blade revolving therein upon centers eccentric to each other, said blade being pivoted to said plate by a pivot movable in said plate in a line concentric to its axis, a strip carried by and forming the outer edge of said blade, said strip having its outer edge formed into a plane segmental to a circle having said movable pivot for its center, and means whereby said strip is normally held in constant contact with said casing, substantially as described.

5. In a blower, the combination with the cylindrical casing, of a plate or plates and fan-blades revolving therein upon centers eccentric to each other, the plates being concentric with the casing, a segmental slot or slots in said plates, a block or blocks sliding



in said slots, said blades being pivoted to one of said plates and to one of said blocks, and a strip carried by and forming part of said blades, the surface of the outer edge of said blocks being segmental to the point of pivot of said blades to said blocks, substantially as described.

6. In a blower, the combination with the cylindrical casing, of a plate or plates and fan-blades revolving therein upon centers eccentric to each other, the plates being concentric with the casing, a segmental slot or slots in said plates, a block or blocks sliding in said slots, said blades being pivoted to one

of said plates and to one of said blocks, a strip carried by and forming part of said blades, and a spring or springs interposed between said strip and the blade to normally hold the strip in constant contact with the casing, the surface of the outer edge of said blades being segmental to the point of pivot of said blades to said blocks, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

NELSON E. FUNK.

Witnesses:

C. V. EDWARDS,  
M. A. RYAN.