3 Sheets—Sheet 1.

J. DOUGHERTY.

BLOWING MACHINE.

No. 105,318. Patented July 12, 1870.

FIG. 1.

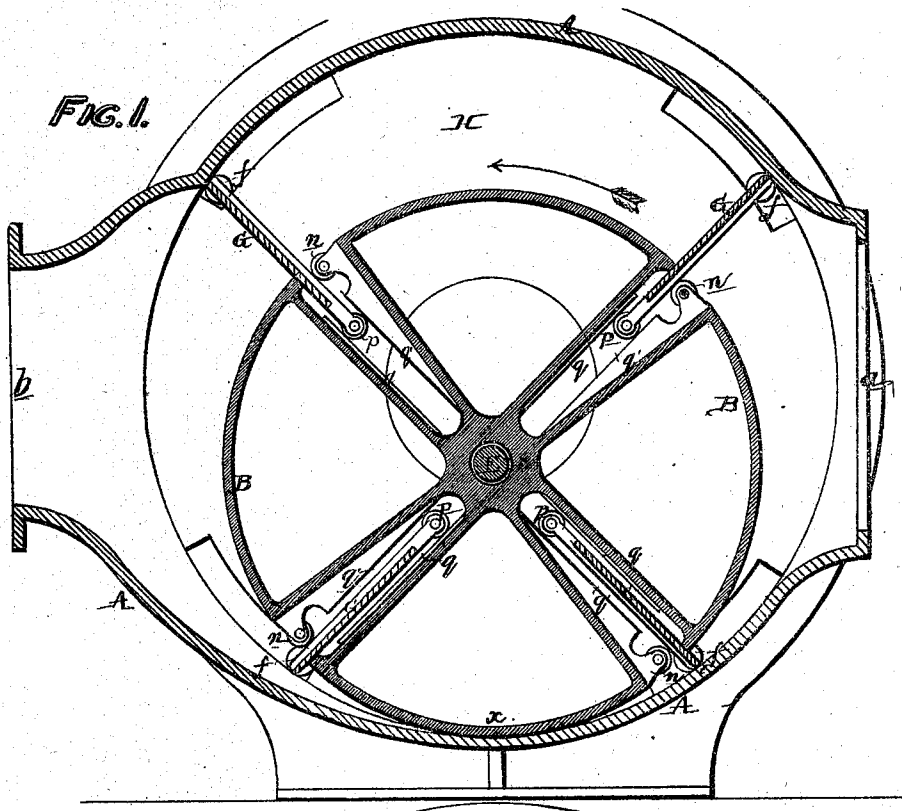
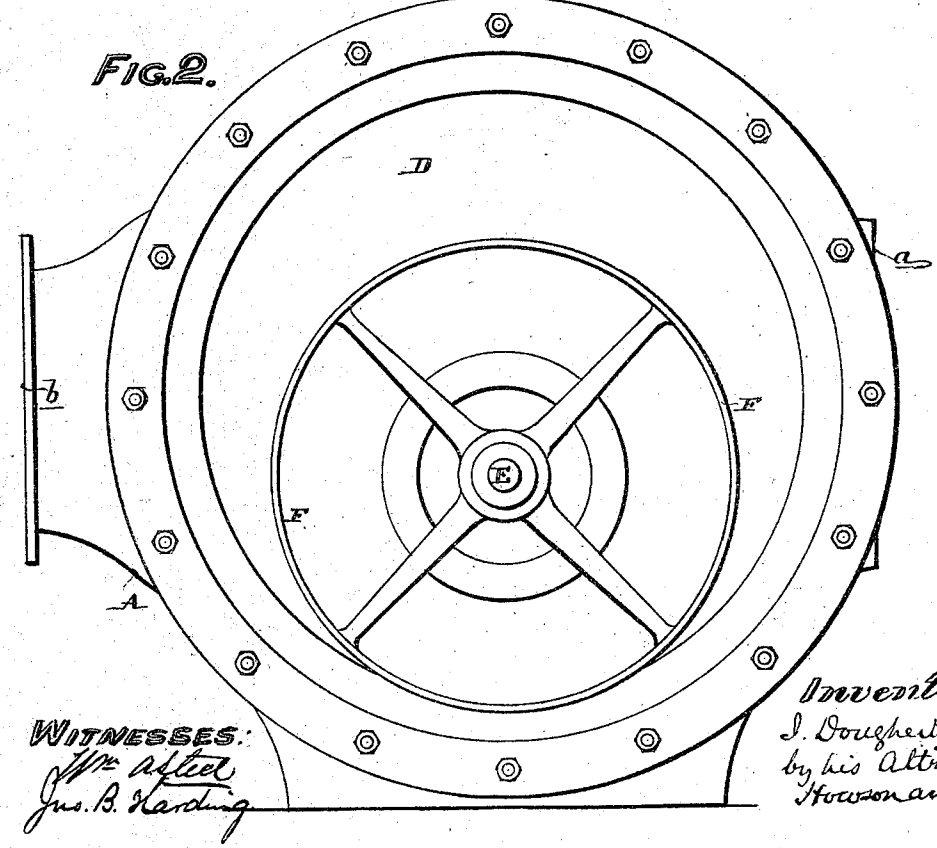


FIG. 2.



WITNESSES:
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Jno. B. Harding

Inventor's:
J. Dougherty
by his Attys
Howson and Sons

3 Sheets—Sheet 2.

J. DOUGHERTY.

BLOWING MACHINE.

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FIG. 3.

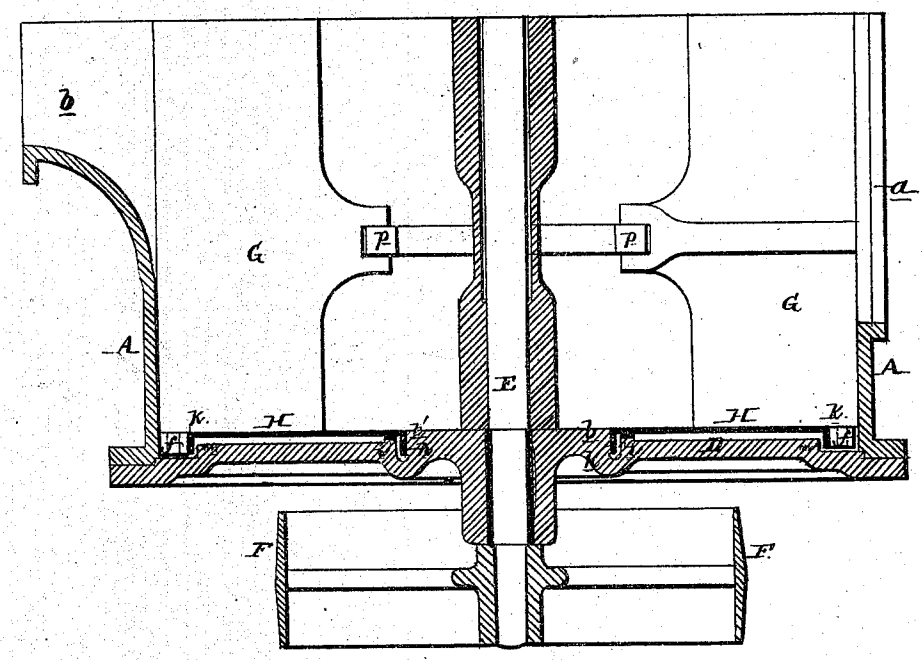


FIG. 4.

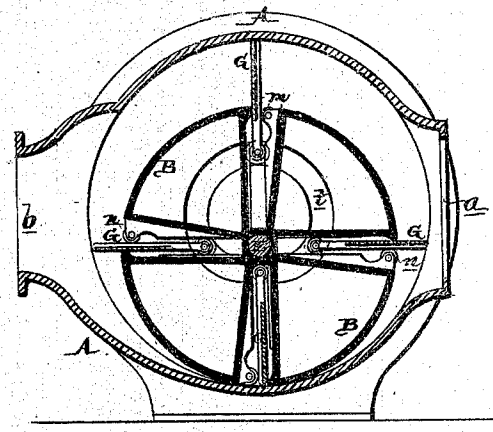
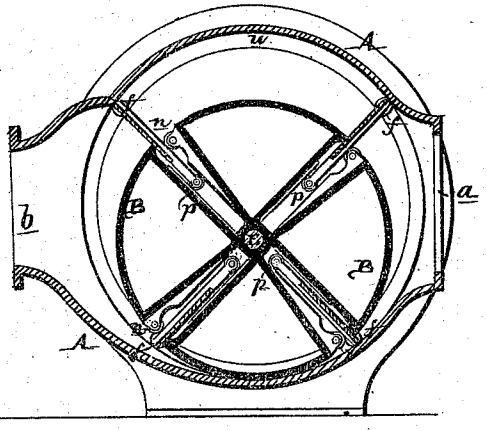


FIG. 5.



WITNESSES: Wm. A. Steel. Jno. B. Harding.

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3 Sheets—Sheet 3.

J. DOUGHERTY.

BLOWING MACHINE.

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FIG. 6.

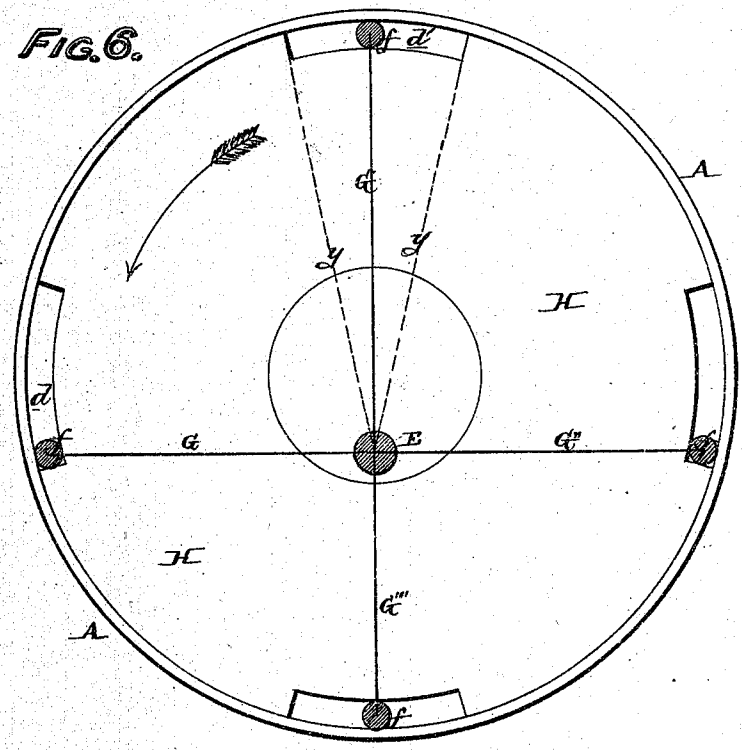
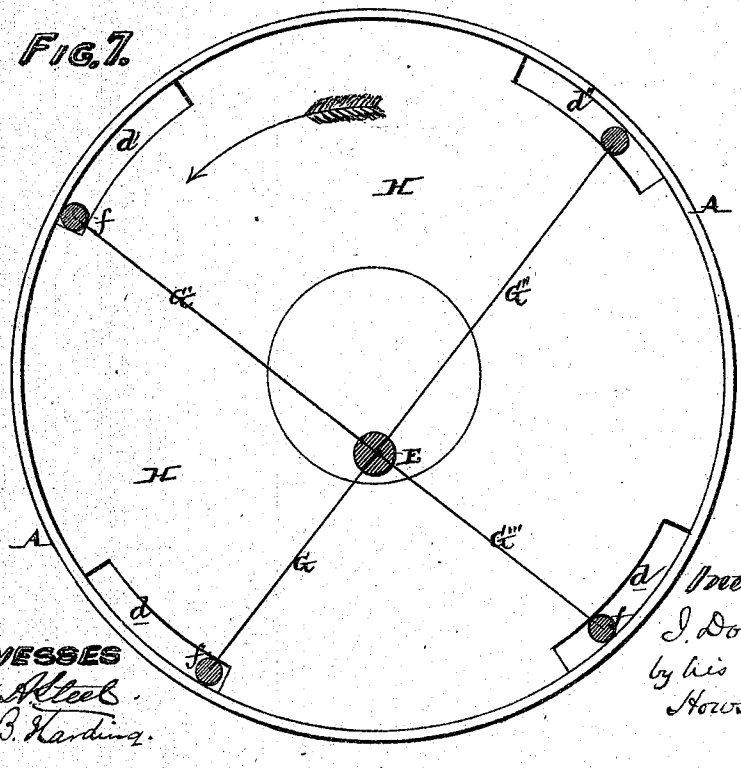


FIG. 7.



WITNESSES

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United States Patent Office.

JAMES DOUGHERTY, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 105,318, *dated July* 12, 1870.

IMPROVEMENT IN BLOWING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

I, JAMES DOUGHERTY, of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented a Blowing-Machine, of which the following is a specification.

Nature and Object of the Invention.

My invention consists of a hollow stationary cylinder, having inlet and outlet openings and end cover-plates, in combination with an inner and smaller revolving cylinder, situated eccentrically as regards the outer cylinder, and carrying vanes caused to reciprocate radially by annular recesses, or by cam-like grooves in the cover-plates, all substantially as described hereafter.

My invention further consists in the combination of the said inner revolving cylinder and its radially reciprocating vanes with certain anti-friction disks, caused by the vanes to revolve eccentrically as regards the said inner cylinder.

My invention also consists of further improvements, which, together with the above, are fully described hereafter, and which tend to the reduction of friction and the production of a most effective blowing-machine.

Description of the Accompanying Drawing.

Figure 1 (drawing No. 1) represents a vertical section of my improved blowing-machine;

Figure 2, an end view of the same;

Figure 3, (drawing No. 2,) a sectional plan of part of the machine;

Figures 4 and 5, vertical sections illustrating modifications of my invention; and

Figures 6 and 7, diagrams illustrating the action of the machine, illustrated by figs. 1, 2, and 3.

General Description.

In figs. 1, 2, and 3, A represents a hollow cylinder, within which revolves a cylinder, B, of smaller diameter, the axis of one cylinder being arranged at a distance from but parallel to that of the other, and the circumference of the inner cylinder revolving in close proximity to the interior of the larger cylinder at *x*, fig. 1, without being in absolute contact therewith.

The outer cylinder has on one side a hollow projection, *a*, forming an inlet for the air, and on the opposite side a hollow projection, *b*, through which the compressed air is forced to the distributing-pipes.

The outer cylinder is closed at each end by a cover-plate, D, in which the shaft E, carrying the inner cylinder, has its bearings, as shown in fig. 3, the shaft being furnished, on the outside of the cover-plates, with suitable pulleys, F, for receiving driving-belts.

The inner cylinder B has radial recesses, four in the present instance, each receiving a vane, G, which, as the cylinder revolves in the direction of the arrow, fig. 1, reciprocate radially from and toward the shaft D, as explained hereafter, the outer edges being thereby caused to traverse in a circle, and in close proximity to, but without being in absolute contact with, the interior of the outer cylinder.

On the inside of each cover-plate is formed a circular hub, *b'*, concentric with the outer cylinder, and on the hub of each plate revolves a disk, H, fig. 3, which intervenes between the ends of the vanes G and the inside of the cover-plate.

Each disk, as will be observed on reference to fig. 1, and to the diagram, figs. 6 and 7, has in the edge segmental recesses, corresponding in number to the vanes, and each recess forms, with the cylinder, a segmented space, *d*, which is concentric with the cylinder A.

On each end of each vane G, at the corners of the same, is hung a roller, *f*, one roller fitting freely in one of the segmental recesses *d*, at one end of the cylinder, and the other roller in one of the similar recesses at the opposite end of the cylinder, so that, as the inner cylinder revolves with its vanes, the latter must slide in and out radially from the center of the shaft E, owing to the eccentricity of the latter as regards the disks and segmental spaces.

As the inner cylinder revolves, it carries with it the two disks H H, for the rollers *f* of one of the vanes are always in contact with the ends of one of each of the segmental spaces *d*.

This will be best understood by reference to the diagrams in drawing No. 3, which I will now proceed to explain.

In fig. 6, the shaft E, carrying the inner cylinder, is supposed to be revolving in the direction of the arrow.

The roller *f* of the vane G is in contact with the end of the segmental space *d*, and therefore the said vane is in the act of carrying the disk round, while the rollers of the other vanes, being free from contact with the ends of their respective segmental spaces, do not contribute to the movement of the disk.

When the vane G has reached the position shown in fig. 7, however, the vane G' has become the acting medium through which the inner cylinder is caused to carry round the disk, for its roller is bearing on the end of its recess, *d'*, while the end of the segmental space *d*, moved faster than the roller of the vane G by the action of the vane G', leaves the roller of the said vane G behind; in the mean time, the roller of the vane G'' is gradually approaching the end of its segmental space, fig. 7, and preparing to serve as a medium for moving the disk round when the roller of the vane G' ceases to perform this duty.

It will be seen, therefore, that one vane after the

other serves to carry the disk round with the inner cylinder.

It will be understood that the object of the disks H, interposed between the ends of the vanes and the permanent cover-plates, is to prevent excessive friction, which would take place if the vanes revolved directly in contact with the said plates.

The extent of the diminution of the friction effected by the disks will be understood when we consider the extent of surface over which the end of a vane will be in moving frictional contact with the disk during one revolution; this surface is represented by the narrow space between the dotted lines *y y*, fig. 6.

It should be understood that the entire surface of the disk does not revolve in close frictional contact with the inside of the cover-plate; the flange *h* of the disk revolves on the above-mentioned internal hub of the plate, as seen in fig. 3, and the disk bears against the annular rib *i*, on the plate, and these are the only two points where the disk is in contact with the cover-plate.

The annular flange *k*, at the outer edge of the disk, against which the flange bears, revolves in close proximity to, but not in absolute contact with, a shoulder, *m*, formed near the outer edge of the said plate.

In order to prevent excessive friction of the vanes against the inner cylinder, as the former reciprocate radially in the latter, I employ rollers *n*, hung to projections on one side of and near the entrance to each recess, the ribs at the back of each vane bearing against these rollers, while the inner edge of each vane itself is provided with rollers *p p*, between ribs *q* and *q'*, on opposite sides of the recess.

As the vanes revolve in the direction of the arrow, fig. 1, they are, of necessity, subjected to a great strain in a contrary direction, but this strain is transmitted to the inner cylinder through the rollers *n p*, the former revolving in contact with the ribs at the back of each vane, and the latter in contact with ribs *q'*, on the inner cylinder, so that the vanes reciprocate radially and with comparatively little friction, therein, and force the air which enters the outer cylinder through the inlet-opening *a* from the outlet *b*, in a compressed state.

In the modification shown in fig. 4, the anti-friction disks H are dispensed with, and the vanes are caused to reciprocate radially in the inner cylinder, as the latter revolves, by a cam-like recess, *t*, in each cover-plate, rollers hung to the opposite inner corners of each vane projecting into the said recesses *t*.

In the modification illustrated in fig. 5, the anti-friction disks are also dispensed with, and rollers, hung to the opposite outer corners of each vane, project into an annular recess, *w*, on each cover-plate, so that the vanes must reciprocate as they revolve.

Claims.

1. A hollow stationary cylinder, having inlet and outlet openings and cover-plates, in combination with an inner and smaller revolving cylinder, situated eccentrically as regards the outer cylinder, and carrying vanes caused to reciprocate radially by the action of plates or disks turning within the outer cylinder or casing eccentrically to the inner cylinder, substantially as described.

2. The combination of the said inner cylinder and its vanes with anti-friction disks H H, recessed to receive rollers or projections on the said vanes.

3. The vanes G, reciprocating in recesses in the inner cylinder B, and bearing against the latter through the medium of rollers *n p*, as specified.

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

JAMES DOUGHERTY.

Witnesses:
H. HOWSON,
JOHN WHITE.