Sheet 1 - 3 Sheets.

B. F. Sturtevant.

Rotary Blower.

No. 86470 Patented Feb. 2. 1869.

Fig. 1.

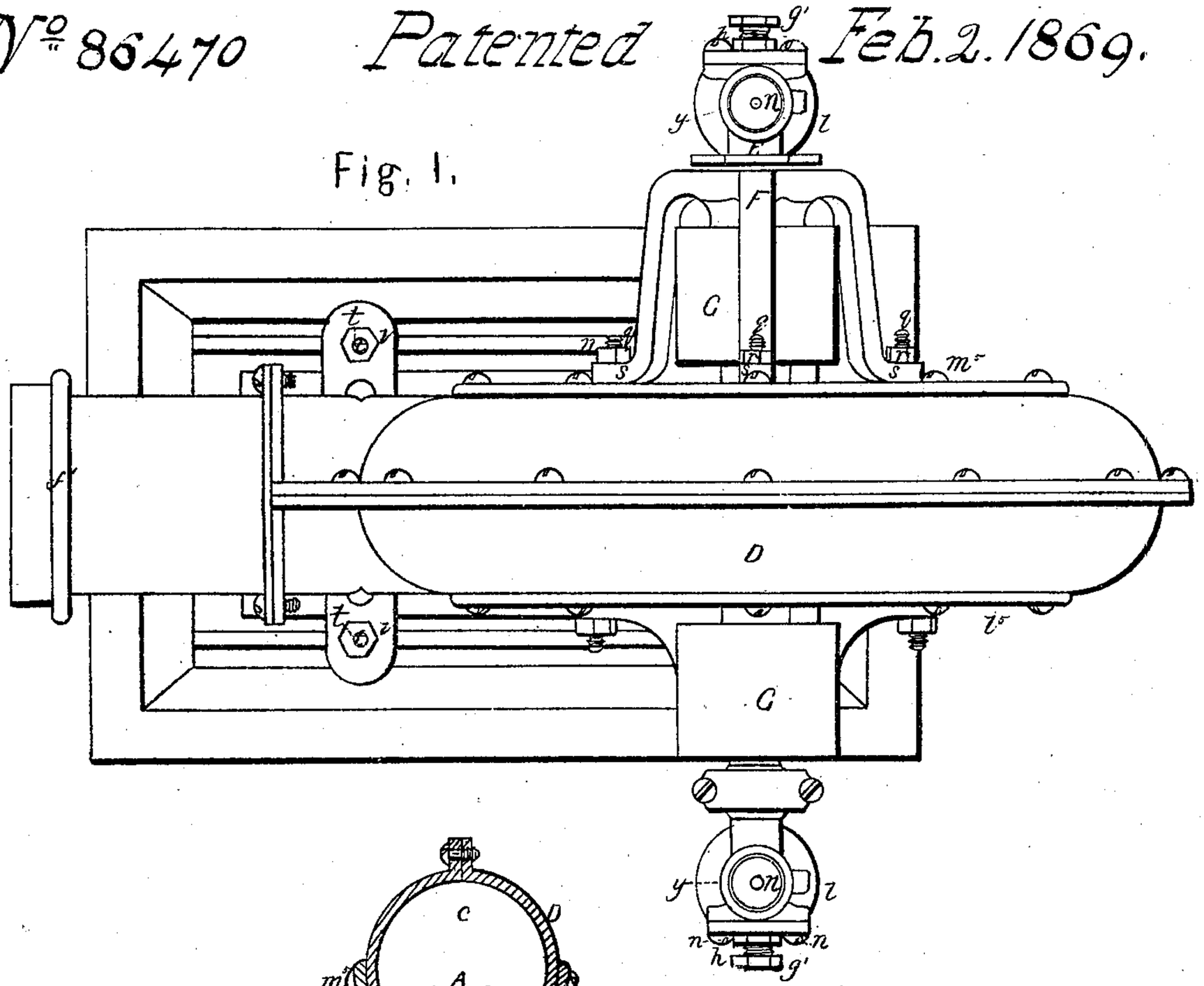
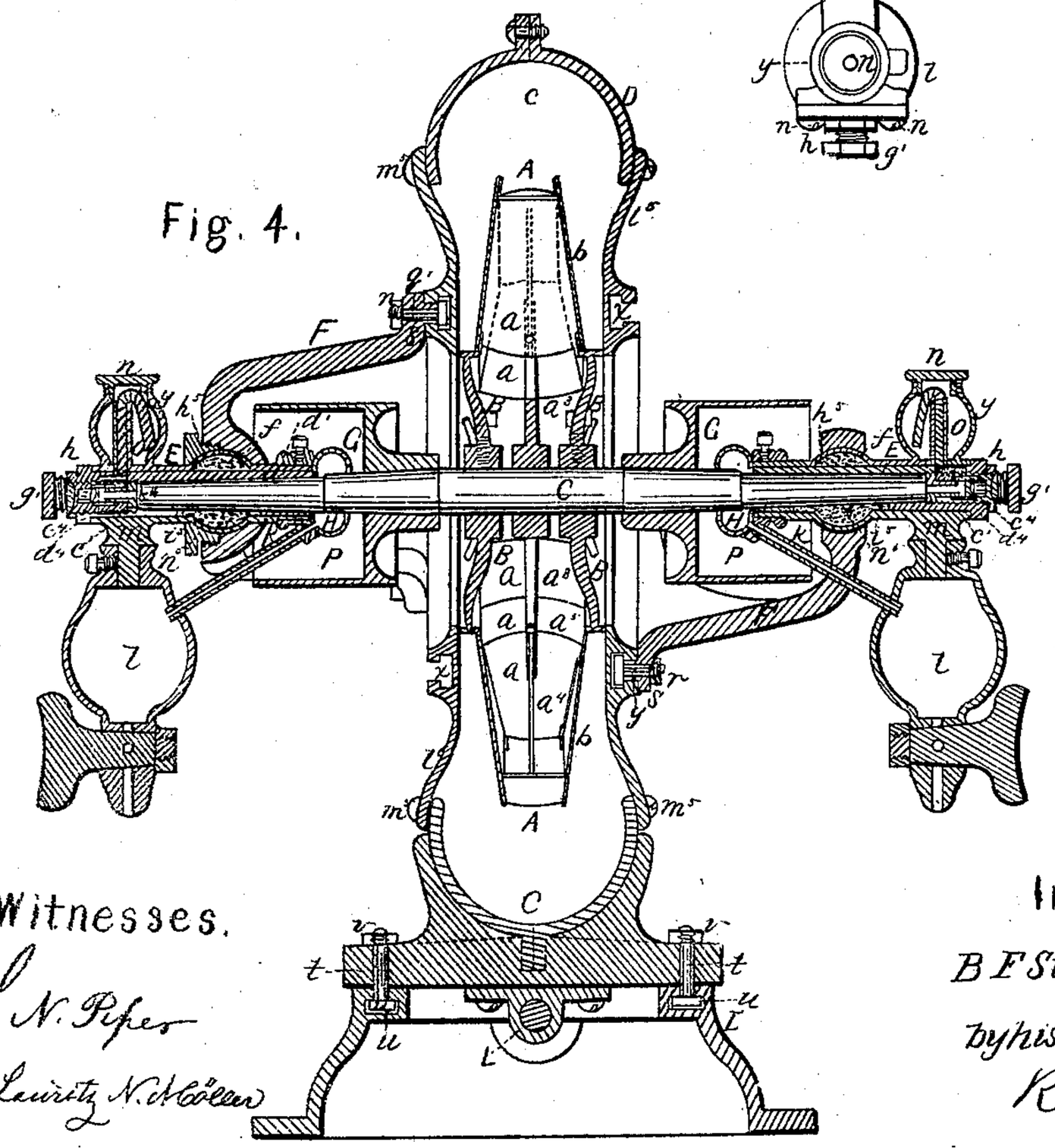


Fig. 4.



Witnesses.

S. N. Pipes

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by his attorney.

R H Eddy

Sheet 2-3 Sheets.

B. F. Sturtevant.

Rotary Blower.

No. 86470. Patented Feb. 2. 1869.

Fig: 2.

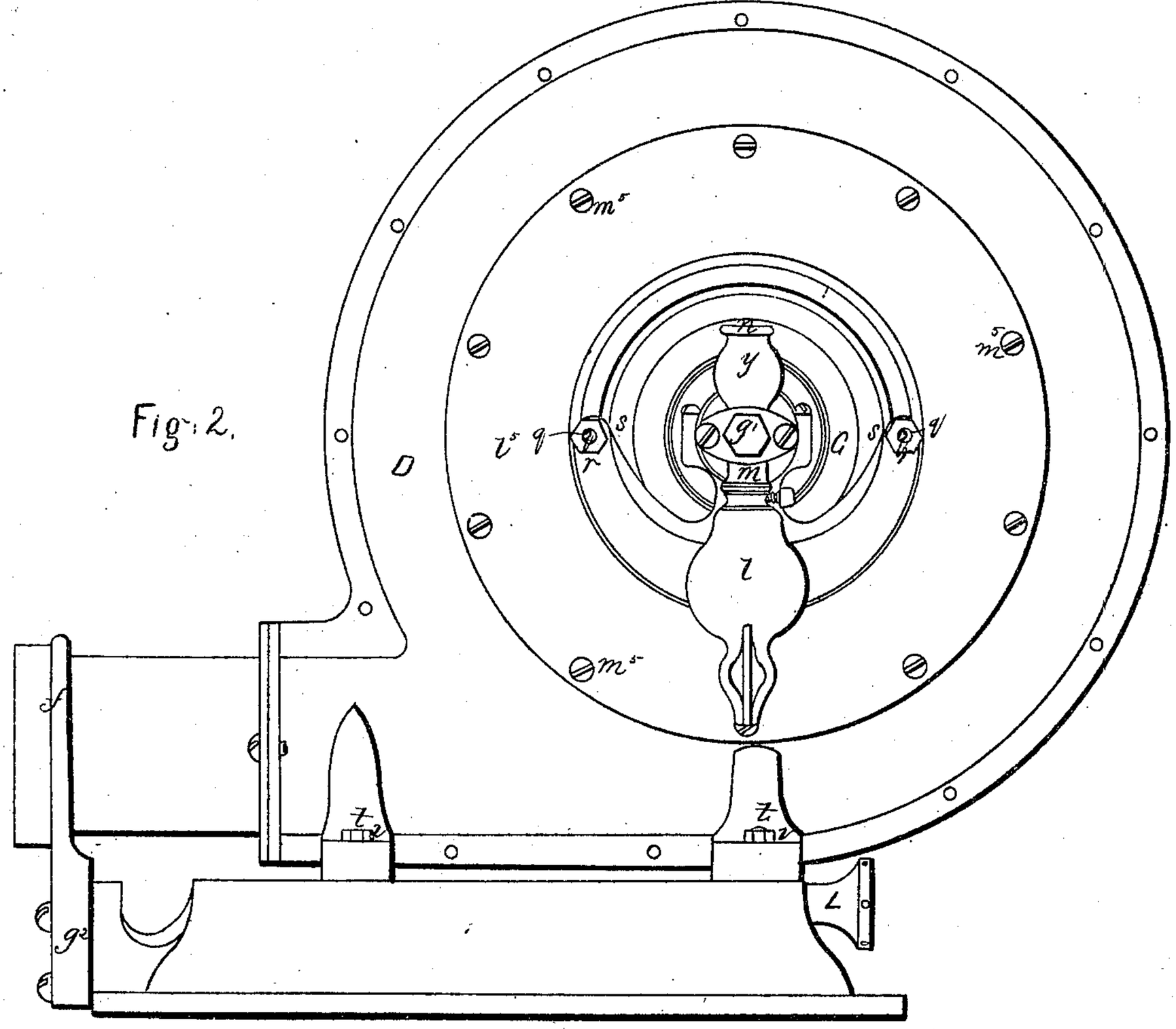
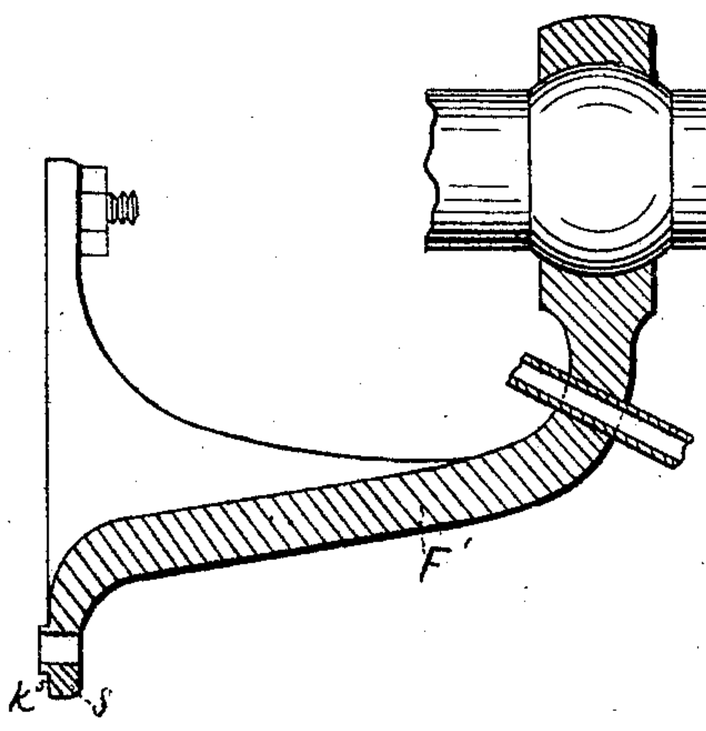


Fig: 6.



Witnesses.

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Sheet 3 - 3 Sheets.

B. F. Sturtevant.

Rotary Blower.

No. 86470. Patented Feb. 2. 1869.

Fig. 5

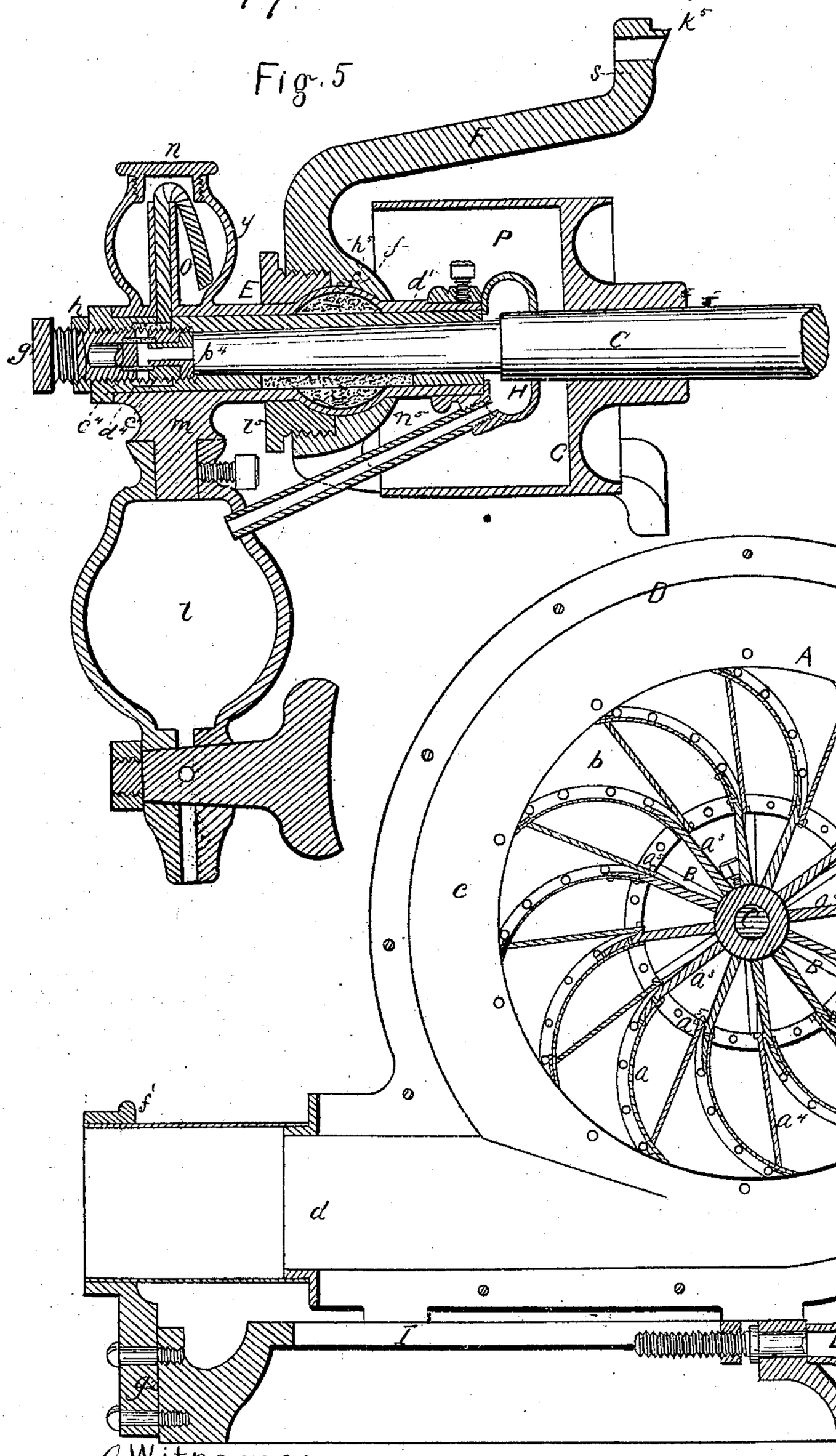

Fig. 3

Witnesses.
S. N. Pieper
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UNITED STATES PATENT OFFICE.

BENJAMIN FRANKLIN STURTEVANT, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ROTARY BLOWERS.

Specification forming part of Letters Patent No. **86,470**, dated February 2, 1869.

To all persons to whom these presents shall come:

Be it known that I, BENJAMIN FRANKLIN STURTEVANT, of Boston, in the county of Suffolk and State of Massachusetts, of the United States of America, have made a new and useful invention having reference to Blowers for Furnaces, &c.; and I do hereby declare the nature of the same and the manner in which it is to be performed to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a side elevation, Fig. 3 a longitudinal and vertical section, and Fig. 4 a transverse and vertical section, of one of my improved blowers.

The difficulty heretofore experienced in fan-blowers has been the great friction generated between the wheel and the case by the rapid motion of the wheel and the air within the case, and the only way of obviating this is to make a large air-space between the wheel-floats and surrounding case.

In making my invention I have sought to construct the wheel and case comprising the blower in such a manner as to enable the air to be received into it and discharged from the wheel and its case to the best practical advantage, and also enable the wheel to run in the case with as little friction from the air between it and the case as possible. Therefore, in carrying out my invention, I not only make the wheel with curved floats and two conical or frusto-conical annuli or plates to support such floats, (they and the floats being formed and the plates being fixed to two spoked wheels, substantially as represented in the accompanying drawings,) but I make the case containing the wheel with air-spaces on the sides of the wheel and around its periphery sufficient to enable the air to flow freely from the wheel, and on its sides generate little or no friction to serve as an obstruction to it while in revolution.

The conical disks to the wheel are indispensable, as they act in partitions between the air in the case and that in the wheel, and serve to direct the air properly out of the periphery of the wheel.

The large air-space about the periphery of the wheel is to afford room for free discharge of air from all parts of such periphery at the same time. This air-space also operates to prevent noise, which is generally produced in fan-blowers by the wheel running in too close proximity with the case, and by the uneven discharge of air resulting therefrom.

In the drawings, A denotes the wheel, composed of a series of curved deflectors or floats, *a a a*, and two conical or frusto-conical annuli or pieces, *b b*, such annuli being nearest together at their outer peripheries, and being fixed to the rims of two spoked wheels, B B, mounted on a shaft going concentrically and horizontally through the wheel and its case.

I prefer to make the wheel with from twelve to eighteen curved floats rather than with four straight ones, or about that number, as blast-wheels have heretofore been made, as I find by experience that such insures economy of power and increase of blast.

a^3 a^3 are radial arms running from the wheel-shaft. Each of these arms is fastened to the base of one float, the apex of which is connected with the next arm by a connecting rod or stay, a^4, leading from such apex to a boss, a^5, projecting from the arm, such being to hold the floats in place and prevent longitudinal expansion of them while the wheel may be in revolution. This prevents uneven expansion, tending to throw the wheel out of balance when it is in revolution.

The case D, instead of fitting closely, or nearly so, to the sides and periphery of the wheel, is formed as represented, so that there shall be within it and about the periphery of the wheel and on its opposite sides a large air space or chamber, *c*, of sufficient capacity, and provided with an educt, *d*, large enough to allow the air while the wheel is in revolution to fully and freely escape or be discharged from it practically to or nearly to the extent of the ability of the wheel to receive and deliver it.

The reason why I make the sides of the wheel conical and arrange them with respect to each other, as represented, is to enable the air to flow more freely into and through and be delivered from it than it could be were the sides of the wheel parallel.

The reason I make each of the floats curved instead of straight in its length is, that when the wheel is revolved in the direction of the convexity of the float, or as denoted by the arrow *e* in Fig. 3, such wheel will deliver more

air and to better advantage than it will when revolved in the opposite direction, or when each of its floats is straight instead of being curved. This I have found by experience to be the case.

The large air-reservoir about the wheel will enable the wheel to revolve more freely, or with much less friction within the air discharged from the wheel than would be the case were the sides and periphery of the case brought within, or very close, or in closer proximity to the wheel. The friction will be so little on the air in the case that there will be little or no rise of temperature of the case and wheel, such as is apt to take place with fan-blowers as ordinarily constructed.

The wheel-shaft C is supported in tubular bearings E E, sustained in tripod and single-arm brackets F F′ by means of ball-joints *f f*, whereby the bearings are enabled to accommodate or adjust themselves to the shaft while in revolution.

Each of such bearings has a tubular bushing, *d′*, arranged in it, the outer end of which is closed except in being provided with a hole in which a screw, g^1, is screwed, it being made tubular to receive and to rest against a tubular bushing or bearing, b^4, which rests against the adjacent end of the shaft, the said screw being to bring the wheel into its proper position in the case. There is a set-nut, *h*, on each of such screws g^1. The bushings are to enable the bearing parts of the boxes, when too much worn, to be removed and fresh ones substituted.

The bolt-shaped bearing b^4 has a longitudinal bore extending partly through it and opening into transverse passages leading through the bolt. These passages open against an annulus or stuffing, c^4, of cloth, arranged in an annular chamber formed in the screw.

There are openings d^4 leading through the screw into an annular chamber, c^1, to be hereinafter described, such chamber being intended to receive oil from a lubricating apparatus placed over the screw.

Should the bearing-surfaces of the shaft C and the bearing b^4 become dry, or at any time be not properly supplied with oil while the shaft may be in revolution, the bearing b^4 will revolve with the shaft, and thus will not be worn by it.

There are two chambered driving-pulleys, G G, fixed on the shaft C, they being arranged with respect to the wheel in manner as represented in the drawings. The outer end of each of such pulleys is open.

Within the pulley, and surrounding the shaft C, and fastened to the bearing E, is an annular box or oil-intercepter, from the lower part of which a pipe, K, leads to an oil-receiver, *l*, supported by an arm, *m*, extending down from the shaft-bearing.

An oil-cup, *y*, provided with a cover, *n*, is arranged on each shaft-bearing, and furnished with a conduit or wick-tube, *o*, to lead oil into the bearing and upon the shaft. As the bearing extends into the chamber P of the pulley and to the intercepting-case H, the oil discharged from the bearing will flow into and be caught by the case or intercepting-chamber H, and from thence it will be discharged into the cup or vessel *l*, out of which it may be drawn by a faucet inserted in the lower part of such vessel *l*.

By means of the oil-case H we are enabled to catch the waste oil, which otherwise is liable to be thrown from the shaft into the current of air rushing into the wheel, and which, by such current, would be forced into the wheel and its case, and from thence through the educt of the case and be lost. By thus preventing the oil from being carried into the wheel-case we prevent all collections of dirt and oil in the case and on the wheel, such as would be injurious to the correct operations of the wheel or tend to throw it out of balance.

The ball *f* is chambered or made with an annular chamber, n^5, to receive a mass of sponge, h^5, or other proper absorbent. From this chamber one or more passages, i^5, extend in opposite directions lengthwise through the bushing, such passage or passages also being filled with the absorbent material. This material, both in the chamber and passages, is for the purpose of absorbing a sufficient amount of oil to effect the lubrication of the shaft-journal for a considerable period in case of exhaustion of the main supply of oil contained in the cup or vessel *y*.

Fig. 5 exhibits, in section, the oiling apparatus, the screw, the bearing, and shaft on a larger scale than they are shown in Fig. 3.

The purpose of the oil-passages of the screw g^1 and the bearing b^4 is to discharge the oil directly against the center of the end of the shaft. Otherwise the bearing-surfaces of the shaft and the bearing b^4 would be liable not to be lubricated, for any oil which might find its way between them from the bearing would be discharged therefrom by centrifugal force while the shaft might be in revolution.

Each of the brackets F F′, made as represented in the drawings, is connected with the case by screw-bolts *q* and nuts *r*, the heads of such bolts being placed within a circular groove, *x*, dovetailed in cross-section, and made in the adjacent side of the case. By means of such groove and fixtures, the bracket can be so adjusted on the case as to carry its leg *s* or its legs *s s s* out of the way of the belt to run on and give motion to the driving-pulley.

From the bracket, or each leg of it, there is a projection or tenon, k^5, leading into the groove *x*, or fitting against it, so as to keep the bracket centralized relatively to the shaft, while the said bracket may be turned or revolved any distance.

Fig. 6 shows a section of the leg of the bracket, with the tenon k^5.

The case D rests upon a stand or base, I, and is provided with clamp-screws *t*, whose heads are arranged in dovetailed grooves *u u*

in the said stand, such screws being provided with nuts *v v*, by which the case may be clamped down upon the stand. The said stand and case are also provided with an adjusting-screw, L, so applied to them as to enable a person, by revolving such screw, to move the case in either direction upon the stand. The object of such a movement is to effect the tightening of the driving belt or belts.

The eduction-pipe of the case extends into a stationary flanged annulus or pipe-collar, *f'*, supported by a standard, g^2, erected on the base I. The pipe for the conveyance of the blast of air from the said eduction-pipe to a furnace or elsewhere is to be fitted upon the collar *f'*, and to project therefrom, the eduction-pipe being free to slide endwise within the said collar.

I construct the wheel-case D with one or two movable annular sides, l^5 l^5, fastened to the rest of the case by means of screws m^5. By removing such side or sides from the case, the fan or blast wheel can be taken from the case without requiring the latter to be separated at its middle flanges or raised from its foundation. This is important where a very heavy blower-case is used.

Having thus described my improved air-blast apparatus or blower, what I claim therein as of my invention is as follows:

1. I claim my improved blower, as constructed of a wheel made with conical annular disks or sides and curved floats, arranged together, and a shaft, substantially as described, and of a case having within it and on the sides of the wheel and around its periphery large air expansion and receiving chambers or spaces, as set forth, furnished with an outlet, and so formed as to enable the wheel while being revolved to freely discharge air all around it, and operate in other respects substantially as described.

2. I also claim the arrangement and combination of the radial stays a^4 a^4 with the curved floats and the side plates of the wheel, applied together substantially as specified.

3. I also claim the combination of the oil-receiving vessels *l* and *y* with the receiver H and its eduction-pipe, the whole being arranged and combined with the shaft and bearing, substantially as specified.

4. I also claim the arrangement and combination of the ball-joints *f f* with the wheel-shaft, its tubular bearings E E, and sustaining-brackets F F', made adjustable on and relatively to the case, substantially as set forth.

5. I also claim the arrangement and combination of the pipe-collar or holder *f'* with the base I and with the air-blower, applied to such base so as to be movable thereon, as described.

6. I also claim the combination of the bearing b^4 with the screw g^1, the two being made so that the oil from the cup *y* may be discharged into and through the screw and upon the shaft C and the said bearing b^4, as and for the purpose described.

7. I also claim the combination and arrangement of the chamber n^5, with its passages and its mass of absorbent material, with the ball-joint *f* and the bearings E.

8. I also claim the arrangement of the bracket, the ball-joint, the driving-pulley, and the oiling apparatus of such ball-joint.

9. I also claim the bracket as made with the tenon k^5, extending from the leg and into the groove *x*, as and for the purpose set forth.

BENJ. F. STURTEVANT.

Witnesses:

R. H. EDDY,

F. P. HALE, Jr.