(No Model.)

5 Sheets—Sheet 1.

J. T. CASE.

VERTICAL DISK GRINDING MILL.

No. 332,233. Patented Dec. 15, 1885.

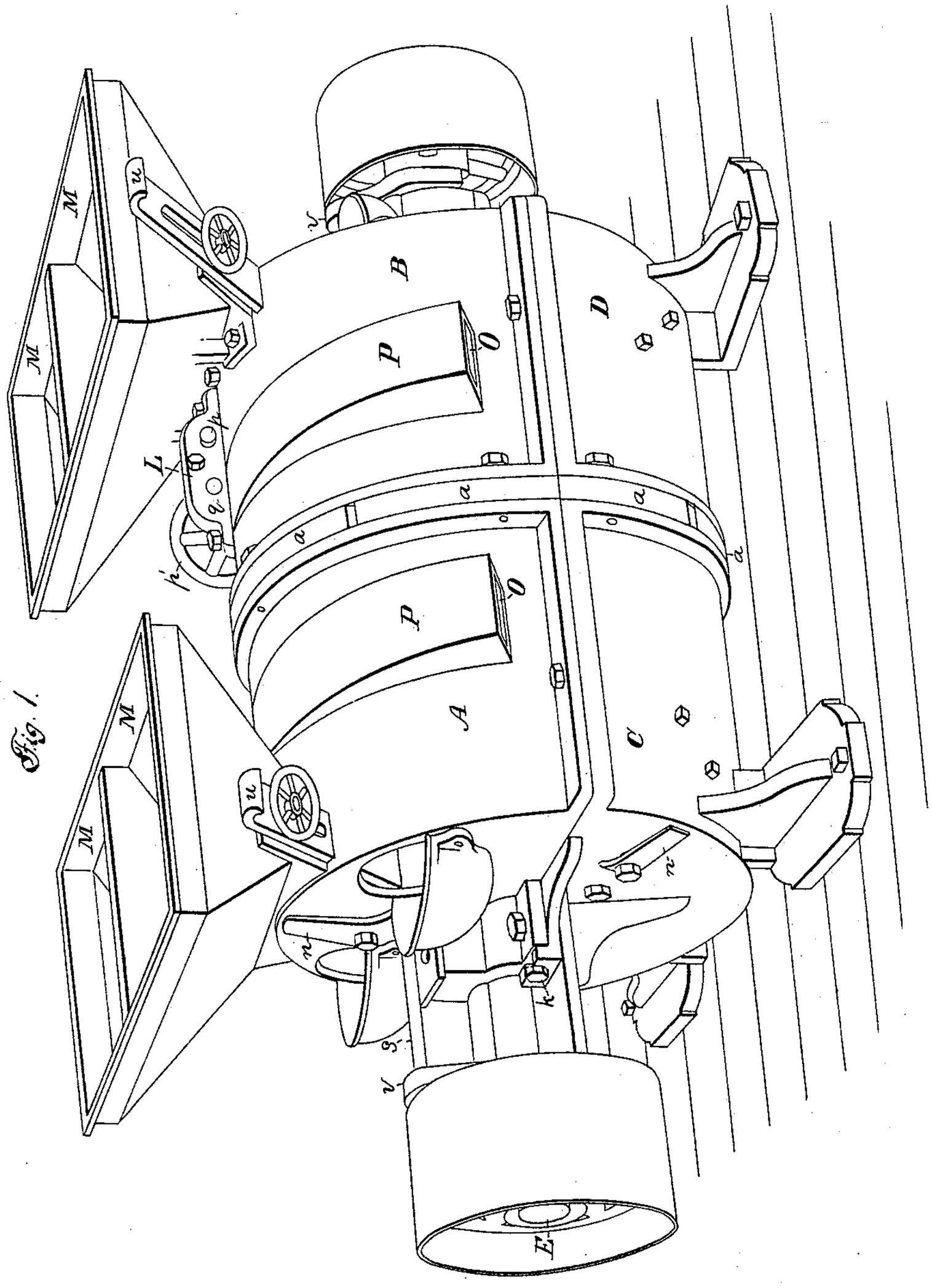

Fig. 1.

Witnesses:
John Edwards Jr.
Eddy N. Smith

Inventor.
Joel T. Case
By James Shepard
Atty.

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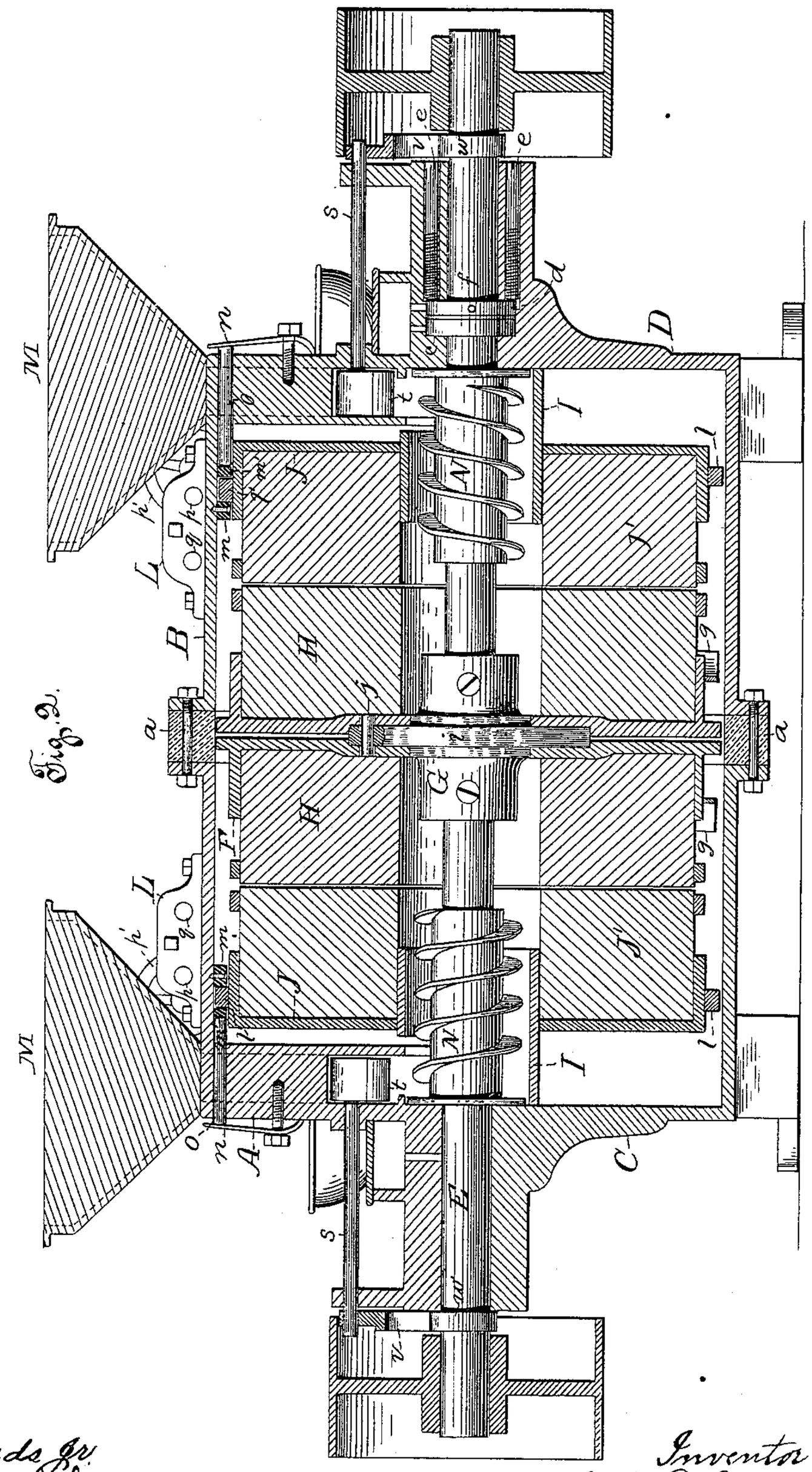

Witnesses.
John Edwards Jr.
Eddy N. Smith

Inventor
Joel T. Case.
By James Shepard
Atty

(No Model.)

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J. T. CASE.

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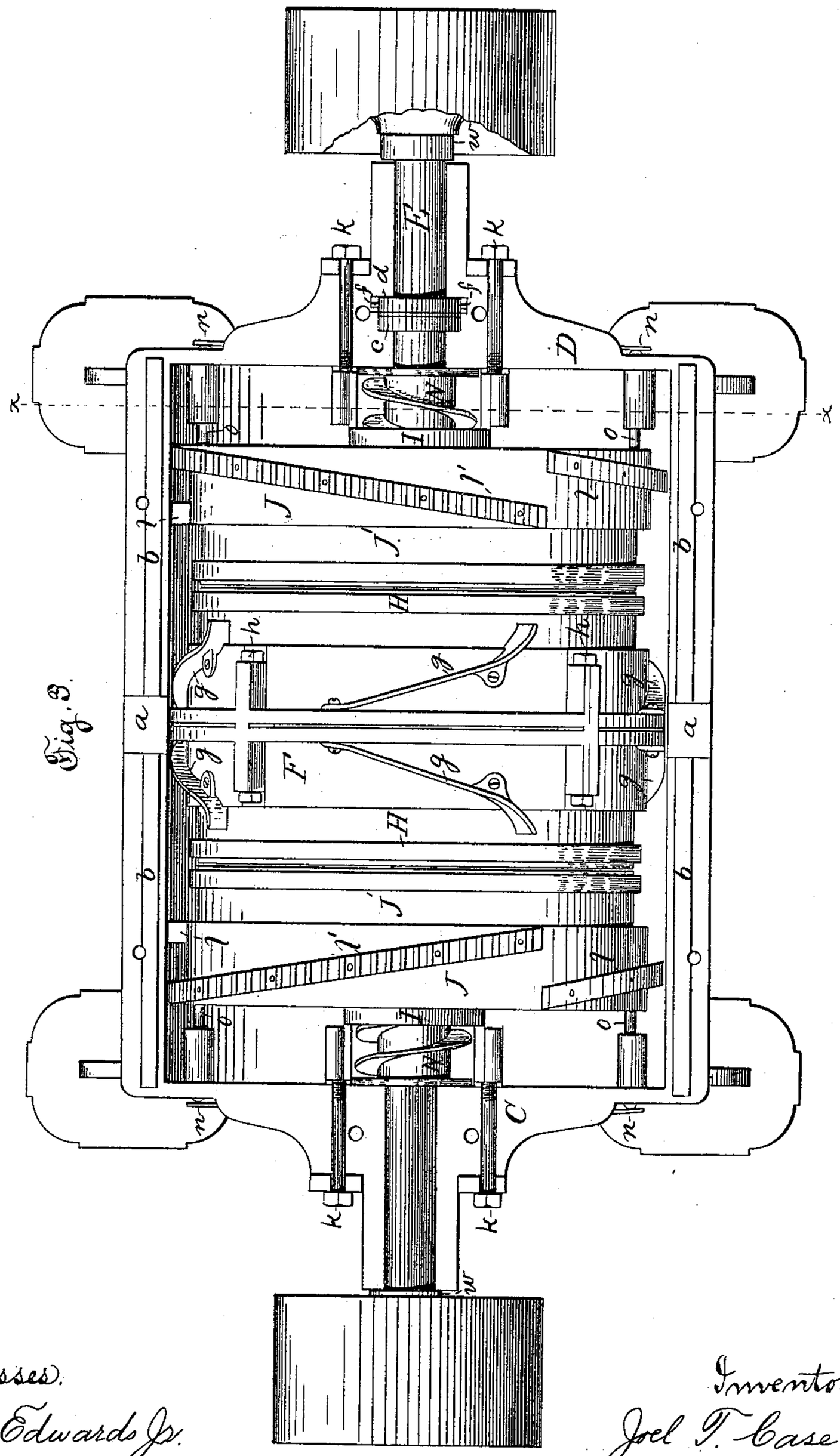

Fig. 3.

Witnesses.
John Edwards Jr.
Eddy N. Smith

Inventor
Joel T. Case.
By James Shepard
Atty

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J. T. CASE.

VERTICAL DISK GRINDING MILL.

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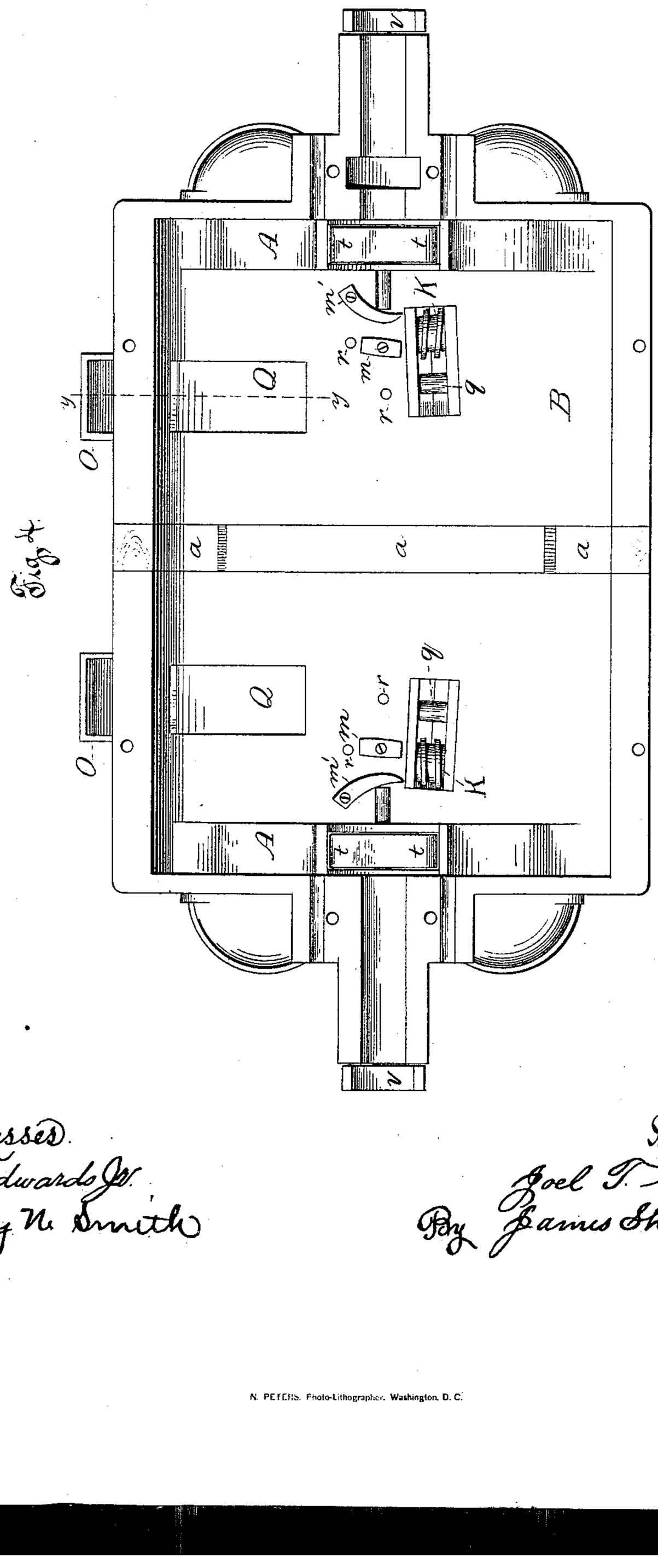

Witnesses.
John Edwards Jr.
Eddy N. Smith

Inventor.
Joel T. Case
By James Shepard.
Atty

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J. T. CASE.

VERTICAL DISK GRINDING MILL.

No. 332,233. Patented Dec. 15, 1885.

Fig. 5.

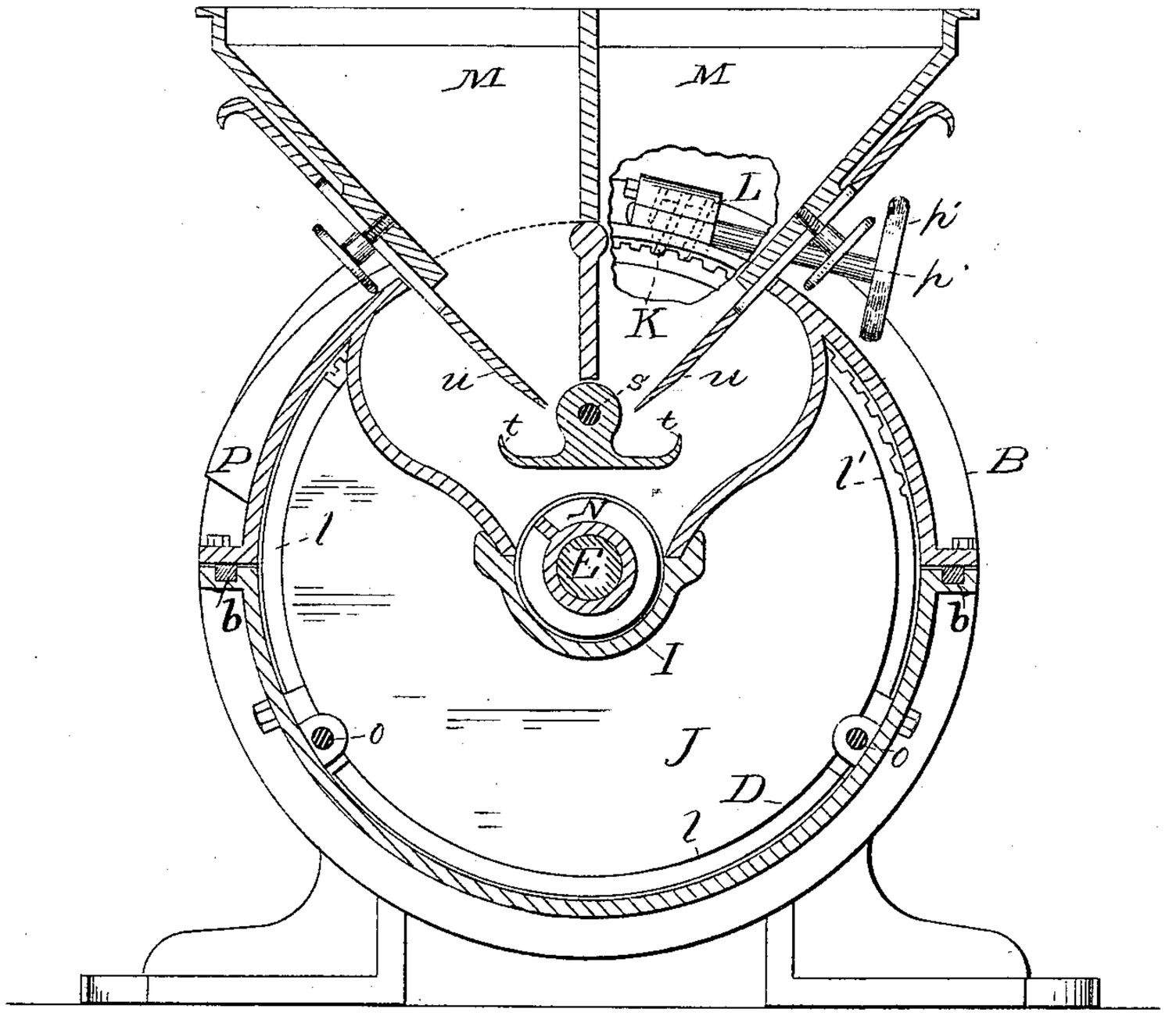


Fig. 6.

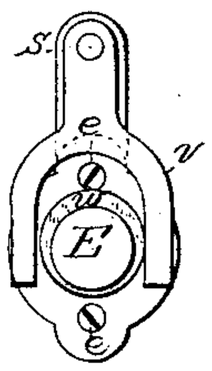


Fig. 7.

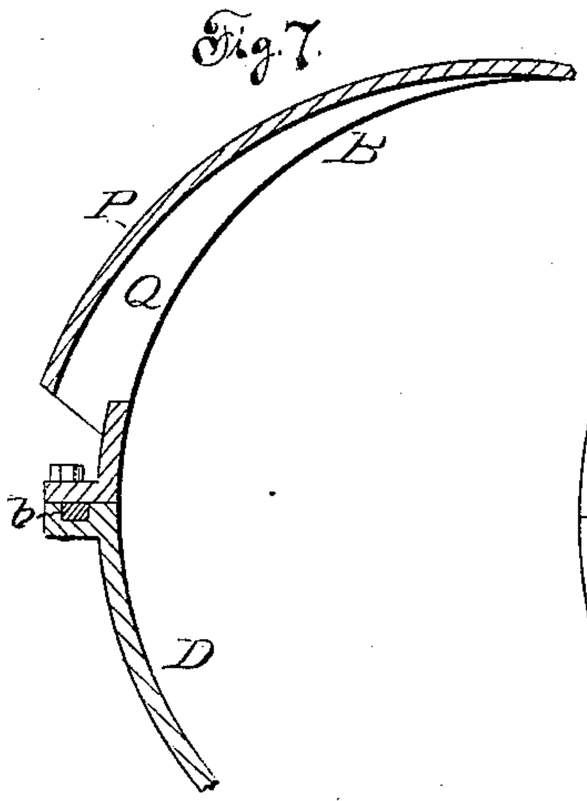
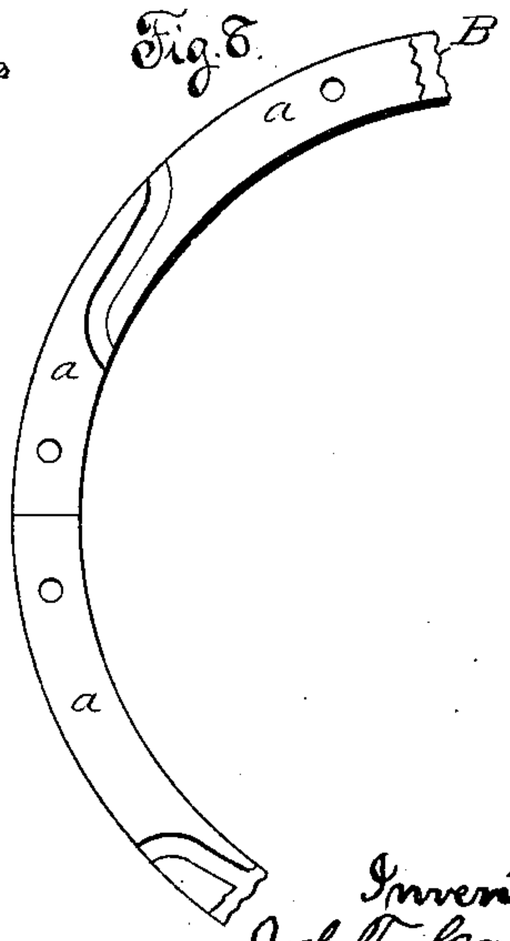


Fig. 8.



Witnesses.
John Edwards Jr.
Edely N. Smith

Inventor
Joel T. Case.
By James Shepard
Atty.

UNITED STATES PATENT OFFICE.

JOEL T. CASE, OF BRISTOL, CONNECTICUT.

VERTICAL DISK GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 332,233, dated December 15, 1885.

Application filed February 16, 1885. Serial No. 156,029. (No model.)

To all whom it may concern:

Be it known that I, JOEL T. CASE, a citizen of the United States, residing at Bristol, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Vertical Disk Grinding-Mills, of which the following is a specification.

In the accompanying drawings, Figure 1 is a perspective view of my mill. Fig. 2 is a central longitudinal section of the same, partly in elevation. Fig. 3 is a plan view of the same with the upper half of the case removed. Fig. 4 is a reverse plan view of the upper half of the case of my mill. Fig. 5 is a transverse vertical section of said mill on line *x x* of Fig. 3. Fig. 6 is a partial end view of said mill with the driving-pulley removed. Fig. 7 is a sectional view of part of the case of my mill on line *y y* of Fig. 4; and Fig. 8 is a side elevation of a part of one piece of the case of said mill and the filling-strips to go between the parts.

The general form of the case of my mill is cylindrical, and I cast it in four parts, A, B, C, and D. These parts are provided with flanges or rims, which extend lengthwise, with the case between the upper and lower halves, and around the complete case at the middle of its length. Between these latter flanges I secure filling-strips of hard wood *a*, with their ends cut off in a general oblique direction, but somewhat curved, the strips being so short that their ends do not meet, as shown in Fig. 8, thereby forming openings for ventilation, as shown in said figure. The filling also enables me to fit the two parts A and B, and C and D together more conveniently, and consequently cheaper, than if the two flanges of metal came directly together.

A and B constitute the upper half of the case, and C and D the lower half. In the front and rear confronting edges of the lower half I form longitudinal recesses, in which I place hard-wood packing-strips *b*, Figs. 3 and 5, which may be planed off to insure a proper fit. These four parts of the case are secured together by bolts through their respective flanges.

E designates the main shaft, which extends longitudinally through the case and is supported by suitable bearings formed in the ends of said case. Near one end of the shaft and within the bearing a collar or flange, *c*, is formed upon the shaft E or rigidly secured thereto, as if made in one piece, and by the side of said flange and around the shaft I place a loose collar, *d*, which is faced with Babbitt metal, so as to constitute the step for receiving the endwise thrust of the shaft in one direction. Within the hub of the casing, within which the bearing for this end of the shaft is formed, I secure set screws or bolts *e e*, Figs. 2 and 6, the ends of which may be brought to bear against the outer face of the loose collar *d*. I also provide this collar with one or more pins or projections, *f*, Fig. 3, which prevent the collar from turning with the shaft. Whenever the parts are worn so that there is an endwise play of the shaft, this play can be taken up by tightening up the set-screws *e*.

In the middle of the shaft E is the runner-frame F, the outside of which is provided with floats *g*, so that the runner-frame serves as a fan. This runner-frame is made in two halves, and secured together by bolts *h h*, Fig. 3; but instead of forming the hub directly upon the frame I form the runner-hub G separately from the runner-frame and provide it with a flange, *i*, Fig. 2, within which I secure a dog or driving-pin, *j*. The halves of the runner-frame are recessed upon their confronting sides, so as to receive the flange *i* of the hub G, and at the same time each part is perforated to receive the dog or driving-pin *j*, all as shown in Fig. 2. The axial bore of the runner-frame is large enough to admit the hub G at the base of the flange, as shown. The hub G is rigidly secured in place upon the main shaft before the runner is placed thereon. After the two parts of the double runner H H have been fitted within the respective halves of the runner-frame they are placed upon the hub G, so as to embrace the flange *i*, as shown in Fig. 2, and are then firmly bolted together, which will securely hold them upon said hub, while the driving-pin or dog *j* will necessitate their revolution with the hub G. This manner of securing the runner upon the main shaft has several advantages, one of which is that the hub may be cast in a single piece, while the rest of the frame may be cast in halves. The hub does not have to be loosened from the main shaft in order to

remove the runner, and after the shaft is taken out of the case the runner-stones may be handled separately for dressing. Upon the inside of the case at each end is the tubular bearing I for the bed-stone frames J. I prefer to cast these separately and secure them to the case by bolts *k*, Figs. 1 and 3. The axial bores of the bed-stone frames J are such as to fit properly the tubular bearings I, so that said frames and bed-stones J′ may partially revolve thereon. The periphery of each of bed-stone frames J is provided with three oblique flanges, *l l l′*, of which *l′* is toothed at its edge to form a rack, while all three of the flanges serve as cams. At three points within each end of the case, one of which points is shown in Figs. 2 and 4, I secure a rigid stop, *m*, for engaging one side of the flanges *l l l′*, and positively preventing the bed-stone at either end from moving in that direction so long as it does not turn on its axis. These rigid stops are upon that side of the flanges which face the runner, so that the bed-stones are each held a positive distance from the runner, thereby avoiding any possibility of the bed-stones and runner coming into actual contact, no matter how fine the adjustment may be. Upon the other sides of said flanges I secure yielding stops *m′*, which for convenience are pivoted to the case. Upon the outside of the case at each end I secure as many strong springs, *n*, (see Fig. 2,) as there are yielding stops, and extending through the end walls of the case I place rods *o*, with their outer ends pressed upon by the upper ends of the springs *n*, and with their inner ends resting against the swinging ends of the yeilding stops *m′*. These springs are strong enough to keep the bed-stones pressed firmly toward the runner under the normal action of the mill in grinding; but in case a nail, stone, or other hard substance should be fed into the mill the yielding stops will give, so as to allow the bed-stone to move away from the runner and let the substance pass out, after which the stone will be returned to its former position.

Within suitable lugs or caps, L, upon the outside of the case and projecting through a slot therein, is a worm, K, Fig. 4, which engages the teeth of the inclined flange or cam *l′*. Said worm is secured upon a shaft, *p*, the outer end of which is provided with a wheel or handle, *p′*, for turning said shaft and worm. By rotating said worm the bed-stone will be partially revolved on the hollow bearings I, while the inclines or cams, acting against the stops *m m′*, will move the bed-stone frame and its stone toward or from the runner, according to the direction that the worm is rotated.

As shown in the drawings, the worm and stops are fixed in position on the case for adjusting the bed-stone when the stones are new. After the stones are so worn that the inclines have been moved nearly their length, in order to bring the bed-stone and runner into proper position for grinding, the worm-shaft *p* is removed, and with the worm it is secured in a new hole or bearing within the cap at a point nearer the runner, the slot within the case being long enough to permit said change, as shown in Fig. 4, in which figure a wooden plug, *q*, is shown as having been driven into the extra hole for the worm-shaft therein. I also form extra holes *r* in the case for changing the position of the stops *m* and *m′*, whenever the position of the worm is changed. These holes I also plug up until it is desired to change the stops.

I provide my double mill with four hoppers, M, two at each end of the mill, and either of which may be used separately; or they may be all used together, as desired. Within the throat of the hoppers I arrange upon the vibratory agitator-shaft *s* a shelf-like arm, *t*, substantially in accordance with my Patent No. 309,196, dated December 16, 1884, excepting that I arrange two such arms upon a single shaft, and that I curve the end of each arm instead of leaving it straight, so as to better control the feed. I also provide each hopper with a slide or cut-off, *u*, for regulating the discharge from each hopper, or for cutting it off entirely, when desired. Underneath the agitator-shelf, at each end of the mill, the upper sides of the hollow bearings I are cut away, so as to allow the grain to fall from the agitator-shelf down to the feeding-worm N on the main shaft, which worms carry the grain through the hollow bearings to the faces of the stones in the ordinary manner.

Upon the main shaft E, just inside the driving-pulleys, is an eccentric or cam, *w*, Figs. 2 and 3. A forked lever or arm, *v*, is secured to the outer end of the agitator-shaft *s*, the forked end of which arm embraces the eccentric *w*, thereby imparting the necessary vibratory movement to said shaft *s*.

O designates the discharge-openings of the case, which openings are formed in the lower end of an eccentric hood, P. Said hood is formed upon the outside of the case and over an elongated opening, Q, in the walls of the case, which opening is directly opposite the grinding-faces of the stones. By this arrangement the final discharge may be of the ordinary size, while the elongated opening may be made to follow the stones for a much greater portion of their circumference than could be otherwise the case, thereby allowing the meal or other ground material to be very freely discharged, so that the mill grinds with great rapidity and without retaining the grain between the stones long enough to heat it.

I claim as my invention—

1. The herein-described case for grinding-mills, divided transversely near the middle of its length and provided with flanges for bolting the parts together, in combination with the hard-wood filling-strips *a*, secured between said parts and cut short to form ventilator-openings, substantially as described, and for the purpose specified.

2. The herein-described case for mills, divided longitudinally into halves, one of which

is recessed at its front and rear edges, and provided with wood packing-strips *b*, secured within said recessed edges, substantially as described, and for the purpose specified.

3. The main shaft E, provided with the rigid collar *c* and the loose collar *d*, in combination with the bearing in which said collars are inclosed, and set-screws for pressing the collars together, substantially as described, and for the purpose specified.

4. The combination of the case provided with hollow bearings I I and the bed-stone frames J J, fitted to partially revolve on said bearings for longitudinal adjustment, substantially as described, and for the purpose specified.

5. The partially-revolving cylindrical bed-stone frame J, provided with inclined flanges on its periphery, the cylindrical case, the rigid stops secured to said case, with that side of the flanges which face the runner bearing against said stops, the yielding stops bearing against the opposite side of said flanges, and mechanism for partially revolving said bed-stone frame, substantially as described, and for the purpose specified.

6. The combination of the runner, the bed-stone, the bed-stone frame provided with the inclined flanges, rigid stops upon that side of said flanges which face the runner, and yielding stops upon the opposite side, substantially as described, and for the purpose specified.

7. The runner-frame divided into halves, in combination with the separately-formed hub provided with a flange which is inclosed by the halves of said frame, substantially as described, and for the purpose specified.

8. The combination of a double hopper, a single agitator-shaft underneath the division of said hopper, and a double shelf-like arm secured upon said shaft underneath the throats of said double hopper, substantially as described, and for the purpose specified.

JOEL T. CASE.

Witnesses:
JAMES SHEPARD,
EDDY N. SMITH.