

J. T. CASE.  
GRINDING MILL.

No. 309,196.

Patented Dec. 16, 1884.

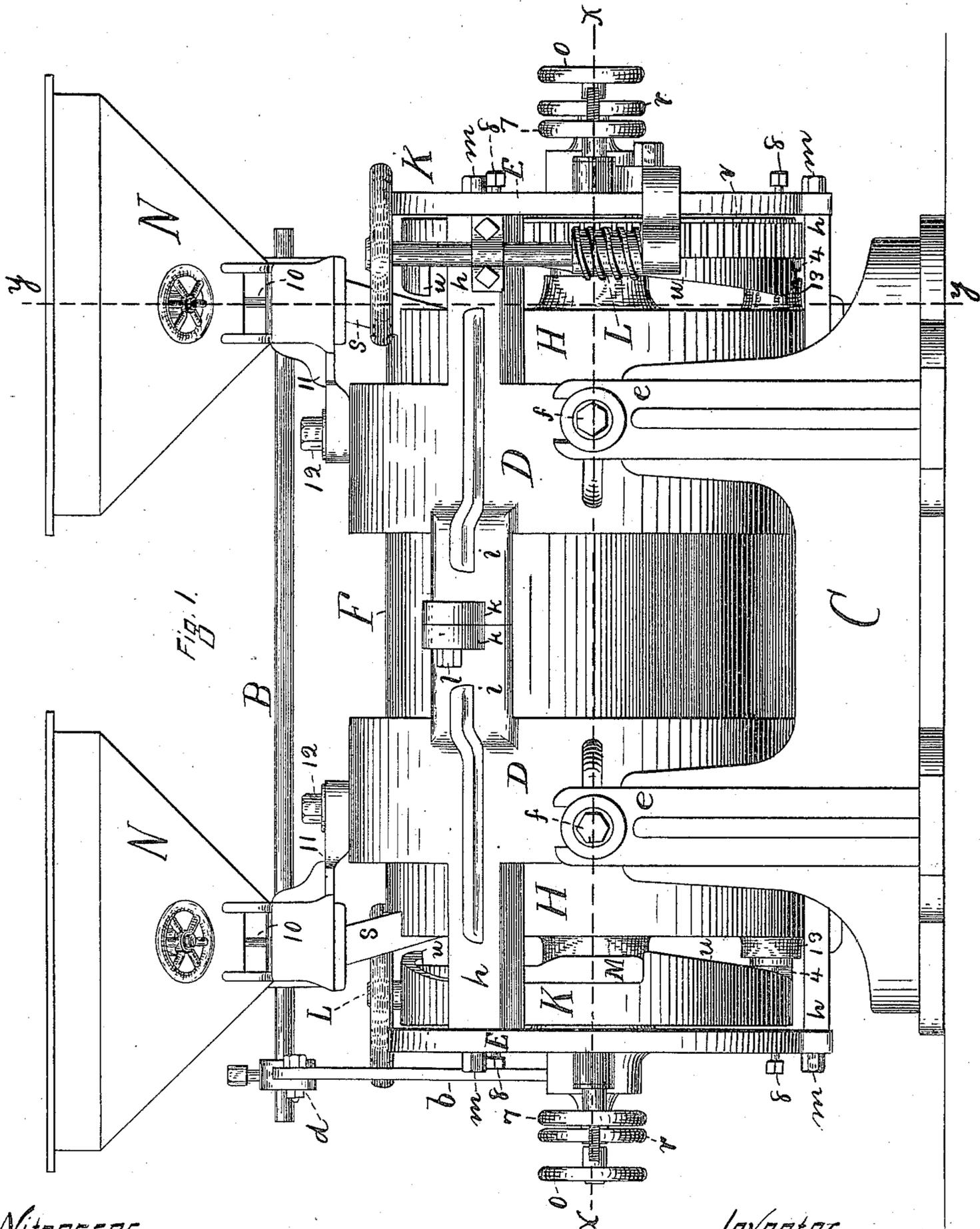


Fig. 1.

Witnesses,  
 John Edwards Jr.  
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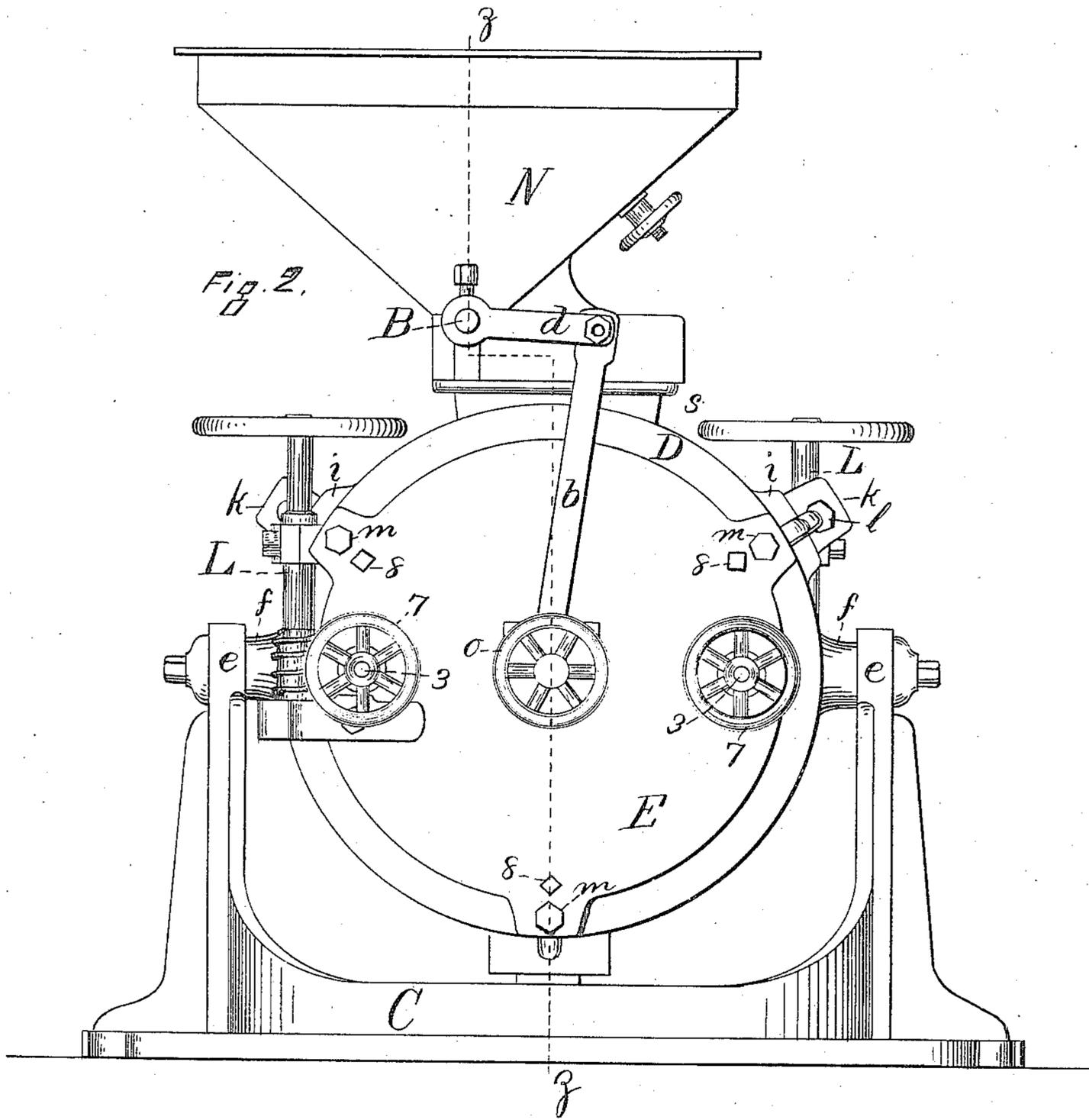
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 Joel T. Case.  
 By James Shepard

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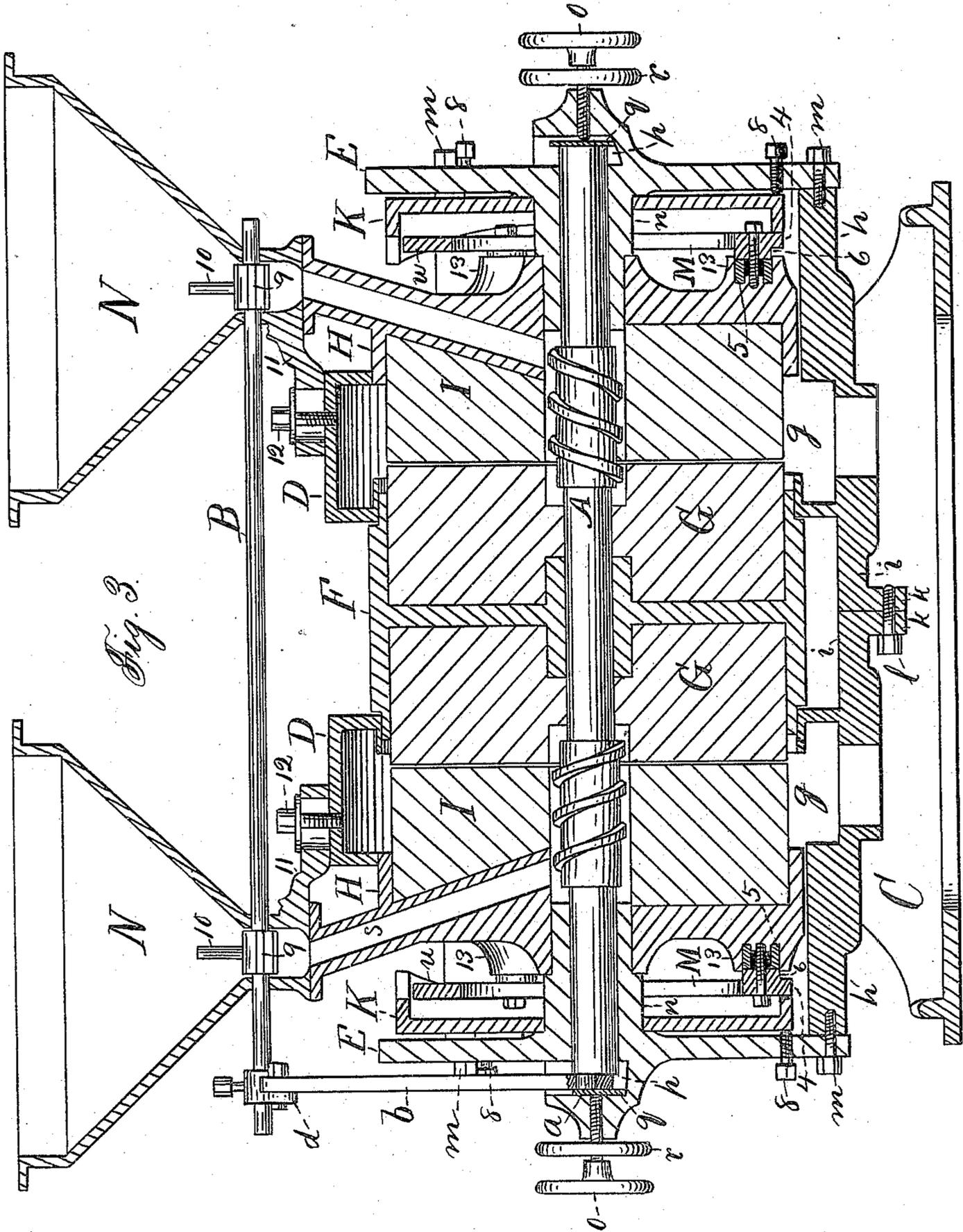
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(No Model.)

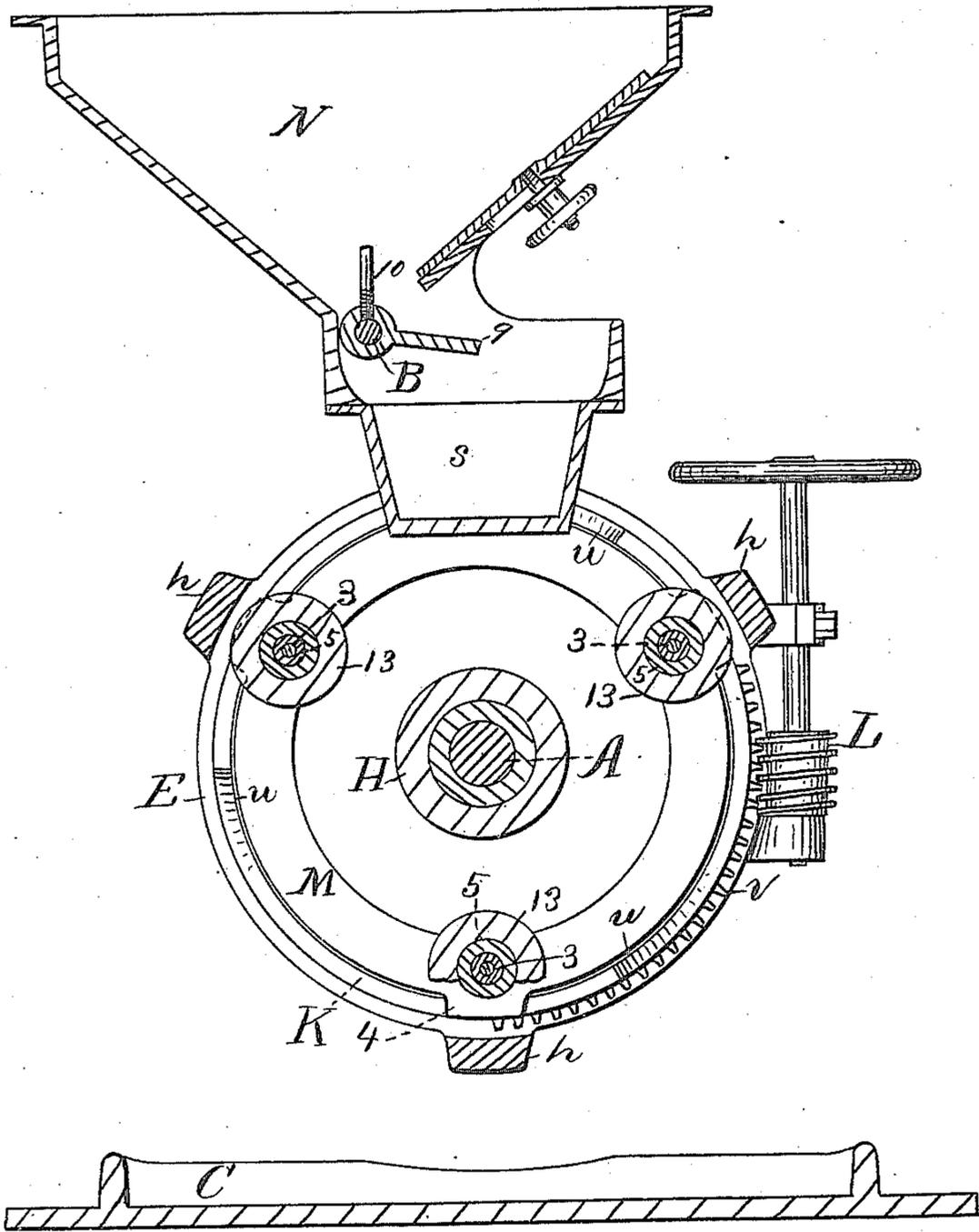
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*Fig. 4.*



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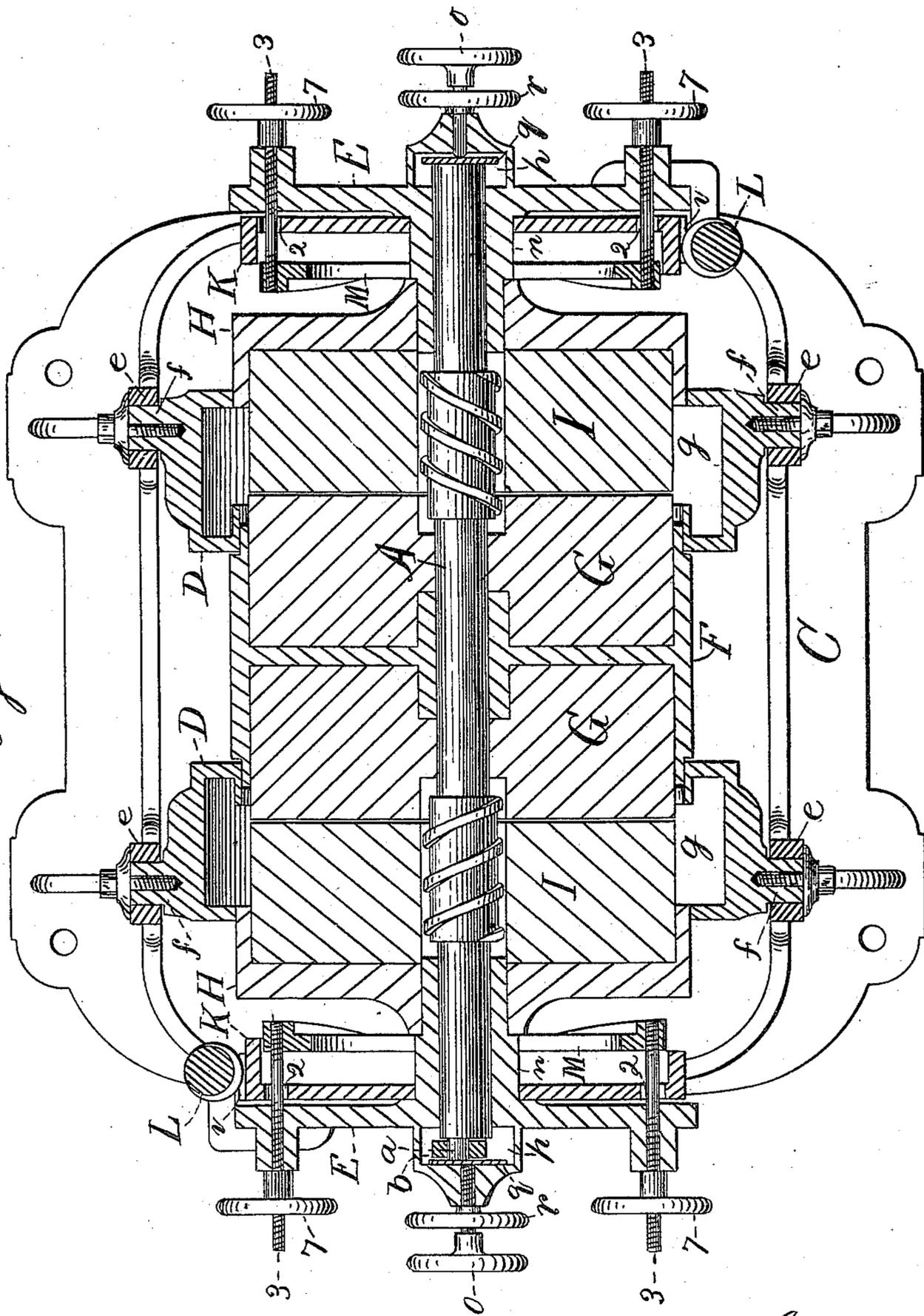
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Fig. 5.



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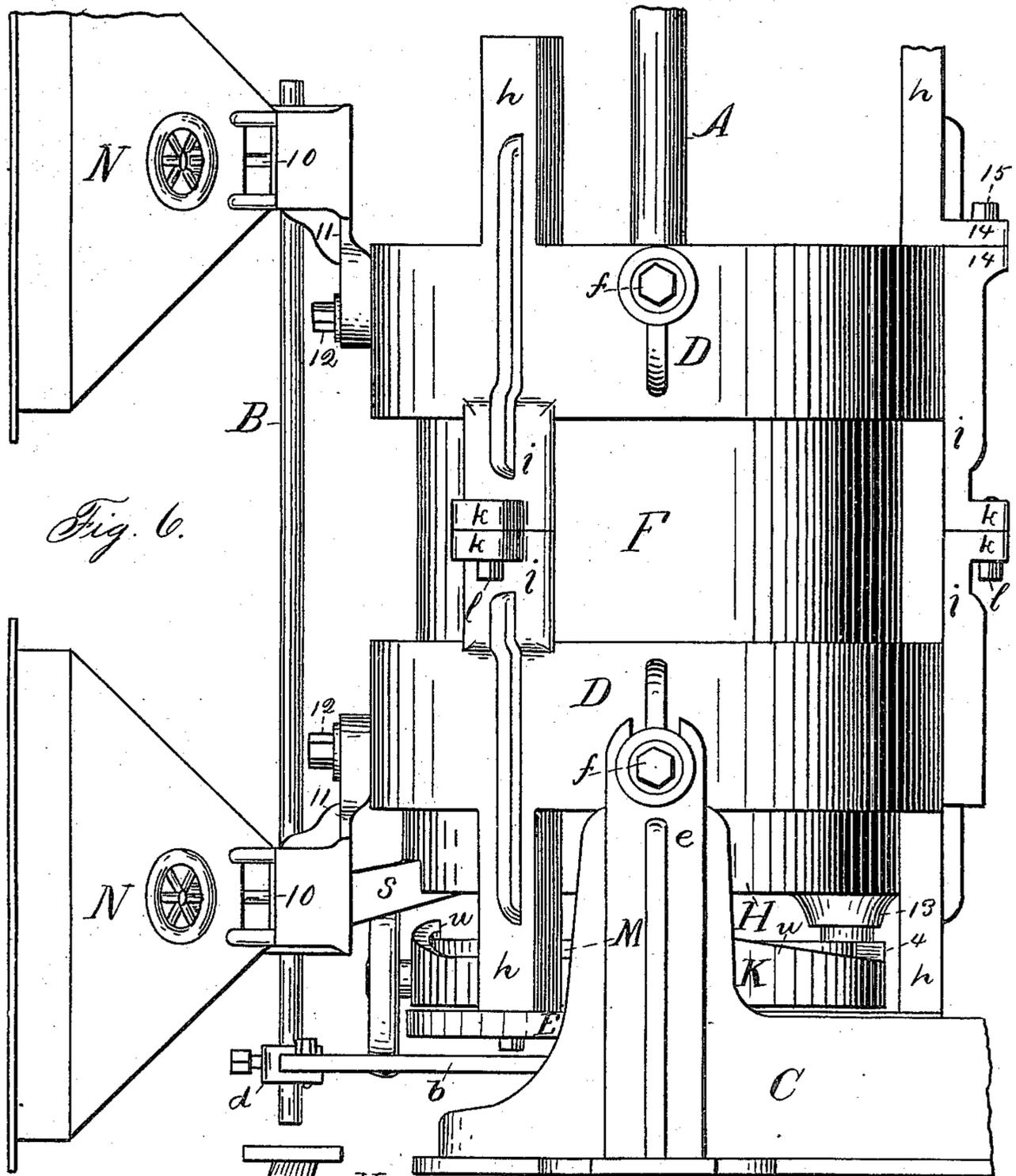


Fig. 6.

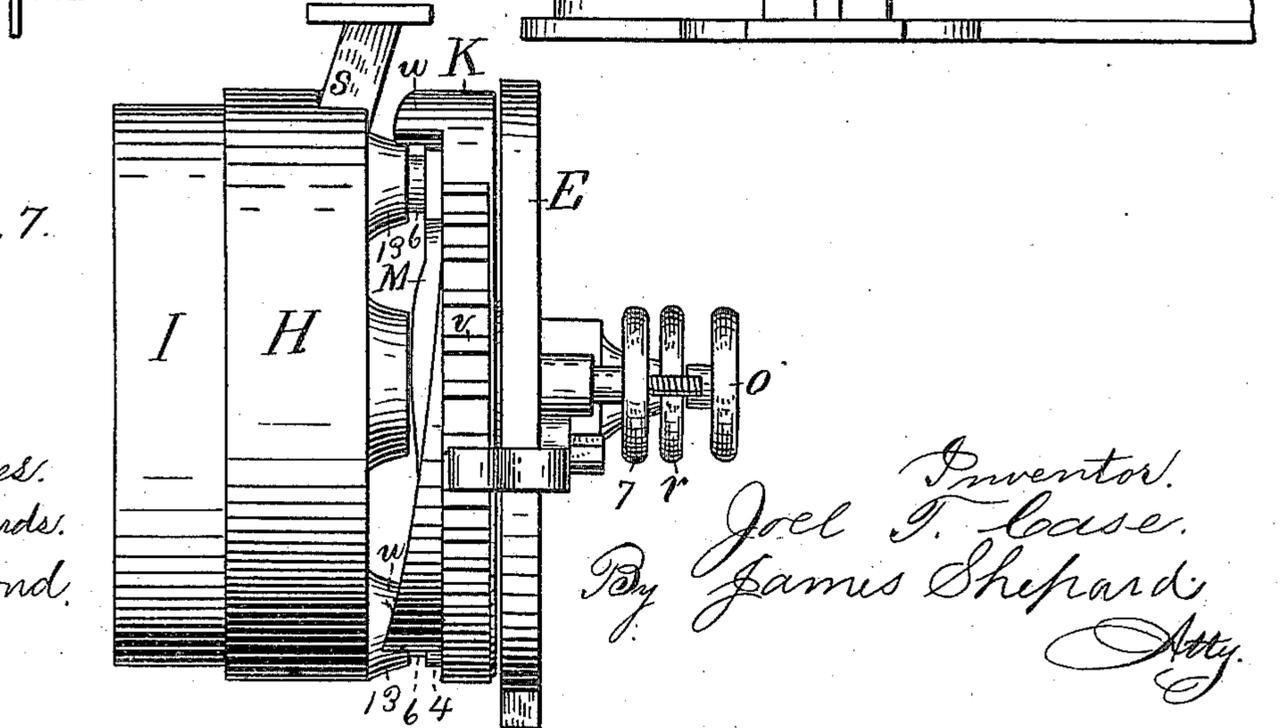


Fig. 7.

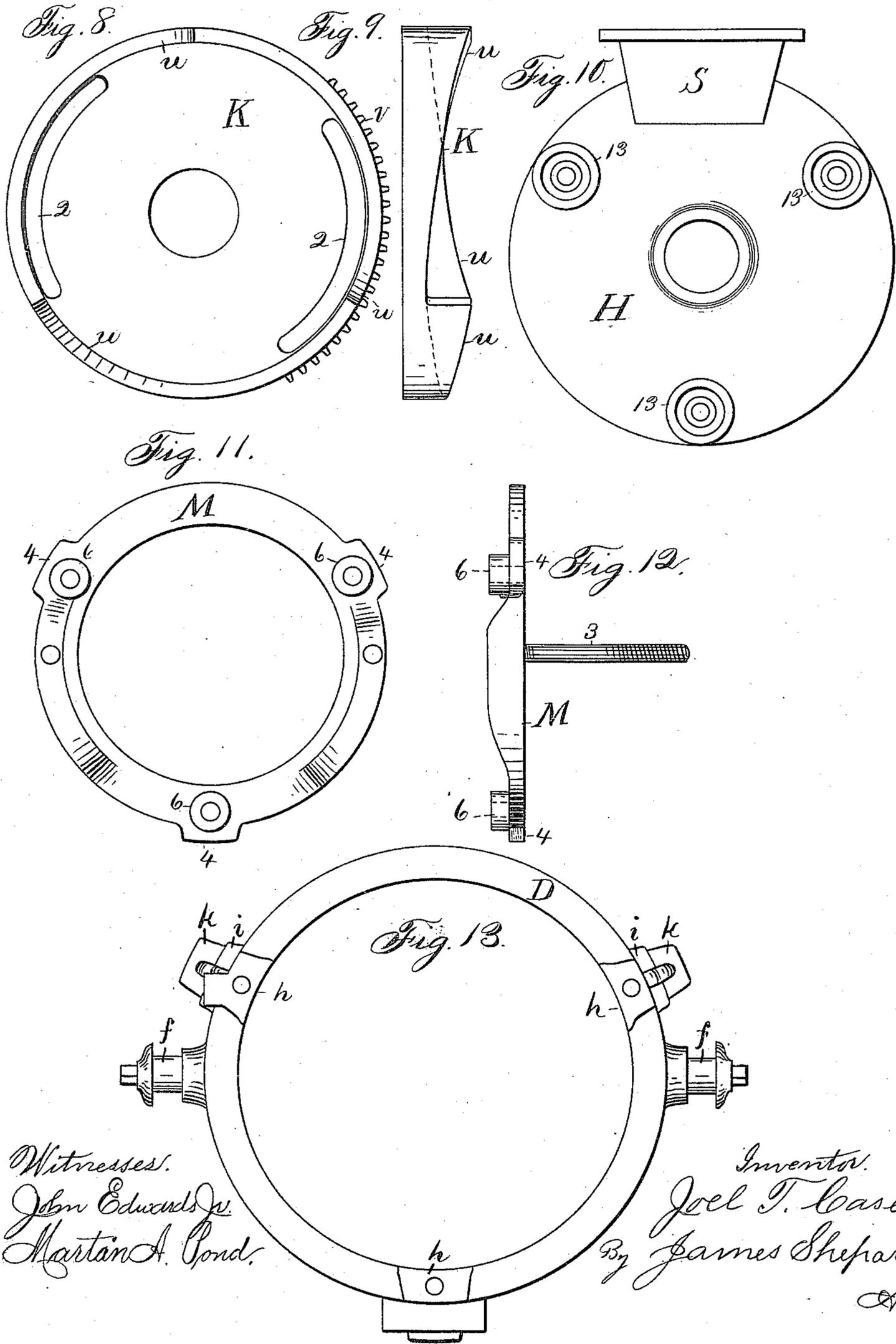
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# UNITED STATES PATENT OFFICE.

JOEL T. CASE, OF BRISTOL, CONNECTICUT.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 309,196, dated December 16, 1884.

Application filed October 15, 1883. (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 Grinding-Mills, of which the following is a specification.

My invention relates to improvements in grinding-mills of the class known as "vertical-disk mills," and the objects of my improvements are to better support the runner, to facilitate adjusting the stones for grinding finer or coarser, and to otherwise improve the construction, as hereinafter specified. I attain these objects by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a mill which embodies my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical section thereof on line *z z* of Fig. 2. Fig. 4 is a vertical section thereof on line *yy* of Fig. 1. Fig. 5 is a horizontal section thereof on line *xx* of Fig. 1. Fig. 6 is a front elevation of parts thereof, showing the same tipped over on the trunnions for dressing the runner. Fig. 7 is a front elevation of one bed-stone and the parts which are removed with it to furnish access to one side of the runner for dressing. Figs. 8, 9, 10, 11, 12, and 13 are detached views of various parts, which will be hereinafter more particularly described.

I have herein shown two mills in one, or, in other words, a double mill; but some of my improvements are applicable to single mills. With the exception of crank or eccentric *a*, pitman *b*, and arm *d*, for connecting the main shaft A with the agitator-shaft B, one end or half of my mill is substantially a duplicate of the other half.

I mount my mill upon a stationary frame, C, whose general form is most clearly shown by Figs. 1, 2, and 5, said frame having uprights *e*, in the upper ends of which are formed bearings for the trunnions *f*. These trunnions are formed on opposite sides of the casings D D. Said casings are provided with annular flour-spaces *g*, as shown in Figs. 3 and 5, and with arms *h h h* and *i i i*, the latter being provided with lugs *k*, to receive the fastening-bolts *l*. The arms *h* are to receive the fasten-

ing-bolts *m*, by which to secure the end pieces, E E, to the ends of said arms.

Fig. 13 shows in side elevation one of the casings D as detached from the other parts. The end pieces, E E, have each a central hub, *n*, (see Figs. 3, 4, and 5,) which furnishes bearings for the main shaft A. These end pieces, E, and casings D, when bolted together, as shown, constitute the swinging frame of the mill proper, which swinging frame is supported by its trunnions *f* upon the stationary frame C. A projection or hub on the outside of the end pieces, E, receives the set-screws *o*, and is provided with recess *p*, within which a plate or step, *q*, may be interposed between the ends of the set-screw *o* and shaft A. By means of the screws *o o* the main shaft may be adjusted endwise and secured against endwise movement. The stop-nuts *r* perform the ordinary office of such nuts.

At the middle of the length of the shaft A, I mount the runner-shell F, the outer surface of which answers as the driving-pulley, and the interior of which is provided with stones G G, which form the two-faced runner, as shown in Figs. 3 and 5. The connecting-arms *i i i* of the casings D D are far enough from the surface of the shell F to allow a driving-belt to pass under either of them, as may be desired. (See the right-hand side of Fig. 6.)

H designates the bed-stone ring or frame, having the chute *s* formed therein, and having also the bed-stone I secured thereto, the back of said stone being grooved or channeled on one side sufficiently to receive so much of the chute as projects from the inner face of the bed-stone frame. The bore of the hub in the bed-stone frame H is fitted to the exterior of the hub *n* of the end piece, E, so as to be centered thereby, and in like manner the bed-stone frame at its largest diameter is fitted within the casing D. (See Figs. 3 and 5.) A side elevation of the bed-stone frame H is shown in Fig. 10 as viewed from the side which is opposite the bed-stone. The hub *n* of the end piece, E, also centers the adjusting-cam K, the same having the general form of a disk, with a flange-ring having inclines *u u u* on the edge. Said cam is also provided with peripheral teeth, *v*, for engagement with the worm L, (see Figs. 1, 2, and 4,) by means of

which the cam may be partially rotated. The body of this cam is also provided with curved slots 2, to permit stay-bolts 3 to pass from the intermediate ring, M, through the body of said cam to the outside of the end piece without interfering with the partial rotation of said cam. These stay-bolts 3 are rigidly secured to the ring M, preferably by being screwed in, as shown in Fig. 12. This intermediate ring is provided with three radial projections, 4 4 4, (see Figs. 3, 4, and 11,) for being acted upon by the inclines *u u u*, while the rest of the ring is so small as to come just inside of said inclines.

Figs. 8 and 9 show side and front elevations, respectively, of the cam K, and Figs. 11 and 12 corresponding views of the intermediate ring, M.

I provide the outside of the bed-stone frame with projections 13 13 13, chambered out to receive suitable cushions, 5, and the confronting face of the intermediate ring, M, is provided with projections 6, which enter said chambers and bear upon the cushions, as shown in Fig. 3. The stay-bolts 3 are provided with nuts 7 upon the outside of the end pieces. The cams K K, as shown, rest upon the middle portions of the end pieces, E E, which is a sufficient support when the mill is new; but in order to support the cam by an adjustable backing to compensate for wear I provide the end pieces with three bolts, 8 8 8.

N N designate the hoppers. The agitator-shaft B, whose connections with the main shaft A have been before described, extends through both hoppers. Upon this shaft, at the throats of the hoppers, I affix a hub having a small shelf-like arm, 9, which radiates from the hub laterally, and the movement of the shaft is such that this shelf-like arm is not moved greatly from its lateral position. In other words, it vibrates only a little above and below a horizontal position. Its vibrations are rapid, so that it moves downward faster than the grain will fall by the force of gravity, and then it returns and strikes the grain with such force as to throw it up from the shelf-like arm and let it fall down into the chute *s*, so that the throat of the hopper will never clog. I also provide a radial pin, 10, which is threaded, and serves the double purpose of a set-screw and assistant agitator. I secure the hopper to the case D by means of the arm 11 and screw or bolt 12, said arm 11 being slotted to permit the hopper to be placed in proper position over the upper end of the chute *s*. The upper end of this chute is flanged, and fits close up under the throat in the bottom of the hopper. There are no fastening devices at said flanged end; therefore the chute may be moved with the bed-stone, when desired, without changing the position of the hopper. The bed-stones have central openings, within which the worms on the main shaft work to convey the grain from the lower ends of the chutes *s* to the spaces between the runner and bed-

stones. The main shaft is set so as to have practically no longitudinal movement, and thereby it holds the runner in a fixed position. The bed-stones are upon opposite sides of the runner, and are adjusted to and from the runner to regulate the mill for coarse or fine grinding.

In order to adjust my mill to make it grind finer than before, I loosen the nuts 7 7, so as to release the intermediate ring, M, then turn the worm L in the direction which will force the inclines *u u u* against the ring M. Said ring acts upon the bed-stone frame through the projections 6 and cushions 5 within the chamber of projections 13, to force the bed-stone frame and its stone toward the runner. I then tighten the nuts 7 7, to draw the ring M firmly back against the inclines *u u u* of the cam K, and take up all the slack or give of the parts from the ring M to the worm L, inclusive, so that the bed-stone is backed by a very firm and rigid support, whereby the flour or meal ground by the mill will be of a uniform fineness. This feature of taking up the slack or give in the adjusting mechanism is considered very important.

By placing the runner between two bed-stones, as shown, there is no chance for any spring or give of the main shaft, and in case more grain works toward the bottom of the stones than toward the top, as the tendency always is in vertical-disk mills, the pressure upon one side of the runner counteracts or balances that upon the opposite side, so that the confronting faces of the runner and bed-stones are always parallel. The cushions 5 are to permit the bed to yield under severe strain—as for instance, when a nail or other hard substance may be accidentally fed into the mill; but said cushions are not essential.

I hang the mill proper in a swinging or tilting frame mounted on a stationary frame for convenience of dressing the stones. By merely removing the set-screw *o* from one end the mill is in condition to be tilted on its trunnions, so as to bring its opposite end uppermost, as shown in Fig. 6. By then removing the upper worm, L, and the bolts *m m m*, the upper end piece, E, cam K, intermediate ring, M, bed-stone frame and bed-stone H I may be removed, as shown in Figs. 6 and 7, thereby furnishing access to the confronting faces of the runner and one bed-stone, so that they may be dressed. It should be noticed that the entire frame of the mill proper is thus tilted, so that neither bearing for the shaft has to be disturbed or removed prior to tilting the mill. After dressing, the parts thus removed may be replaced, the mill let back into its former position, and then its other end may be tilted upward in like manner for the same purpose.

If desired, instead of having the arms *h* formed integral with the case D and the end pieces bolted to said arms, the said arms may be formed integral with the end pieces and bolted to the case D. This change requires

the addition of lugs to receive the fastening-bolts, and such lugs 14 and bolt 15, located at the proper point of division, are shown at the upper right-hand corner of Fig. 6. In this  
5 respect this part of Fig. 6 is a modification of the arms *h*, as elsewhere shown. By placing the runner at the middle of the mill it may be run at a high speed without shaking the mill so much as would be the case with the runner  
10 near one end.

While some features of my invention are necessarily confined to a double mill, it is obvious that other features are applicable to either single or double mills—for instance,  
15 my particular adjusting mechanism; the means for taking up the slack of the adjusting mechanism, the shelf-like arm of the agitator, and other features named in those claims which do not particularly mention the double fea-  
20 tures.

I am aware that prior patents show vertical-disk mills having two-faced runners with bed-stones upon opposite sides thereof; also, such mills with mechanism for finely adjust-  
25 ing the bed-stones to and from the faces of the runner; also, a mill in which the frame, less one of the bearings for the shaft, is hung on trunnions, and I hereby disclaim the same.

I claim as my invention—

30 1. The combination of the two-faced runner *G G*, fixed casings *D D*, bed-stones *I I*, bed-stone frames *H H*, fitted within the casings *D D*, and end pieces, *E E*, substantially as described, and for the purpose specified.

35 2. The combination of the end pieces, *E E*, having hubs *n*, bed-stone frames *H H*, centered on said hubs, bed-stones mounted within the frames *H H*, and a two-faced runner, substantially as described, and for the purpose  
40 specified.

3. The combination of the end pieces, *E E*, having hubs *n*, bed-stone frames *H H*, centered on said hubs, the casings *D D*, runner-shell *F*, and double runner, said runner-shell  
45 and larger diameter of the frames *H H* being fitted within the casings *D D*, substantially as described, and for the purpose specified.

4. The combination of a two-faced runner, bed-stones upon opposite sides thereof, cas-  
50 ings *D D*, hoppers *N N*, affixed to said casings,

bed-stone frames *H H*, having the chutes *s*, end pieces, *E E*, and mechanism for adjusting the bed-stone frames and bed-stones independent of the hoppers *N N*, and casings *D D*, substantially as described, and for the pur- 55  
pose specified.

5. The combination of the adjustable stone-frame, the intermediate ring, the cam, worm *L*, and stay-bolts and nuts for drawing back the ring, substantially as described, and for 60  
the purpose specified.

6. The combination of the end piece, *E*, having hub *n*, the cam and adjustable stone-frame mounted upon said hub, and mechanism for partially rotating the cam, substantially as 65  
described, and for the purpose specified.

7. The combination of the end pieces, *E E*, cases *D D*, connecting arms *h i*, the main shaft *A*, bed-stones *I I*, and the two-faced runner, substantially as described, and for the pur- 70  
pose specified.

8. The combination of the swinging and tilting frame having trunnions *f f f f*, and the stationary frame *C*, having the uprights *e e e e*, whereby the frame is adapted to be tilted al- 75  
ternately upon the trunnions at either end of the mill, substantially as described, and for the purpose specified.

9. The combination of the hopper, the vibratory agitator-shaft, and the shelf-like arm 80  
9, mounted on said shaft and within the throat of the hopper, substantially as described, and for the purpose specified.

10. The combination of the runner having a peripheral pulley-surface, the bed-stone 85  
frames upon opposite sides thereof, and means for uniting said bed-stone frames rigidly together, substantially as described, and for the purpose specified.

11. The double-faced runner consisting of 90  
the shell whose outer surface forms the pulley for driving said runner, and the runner with exposed faces upon either side of said shell, substantially as described, and for the purpose specified.

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