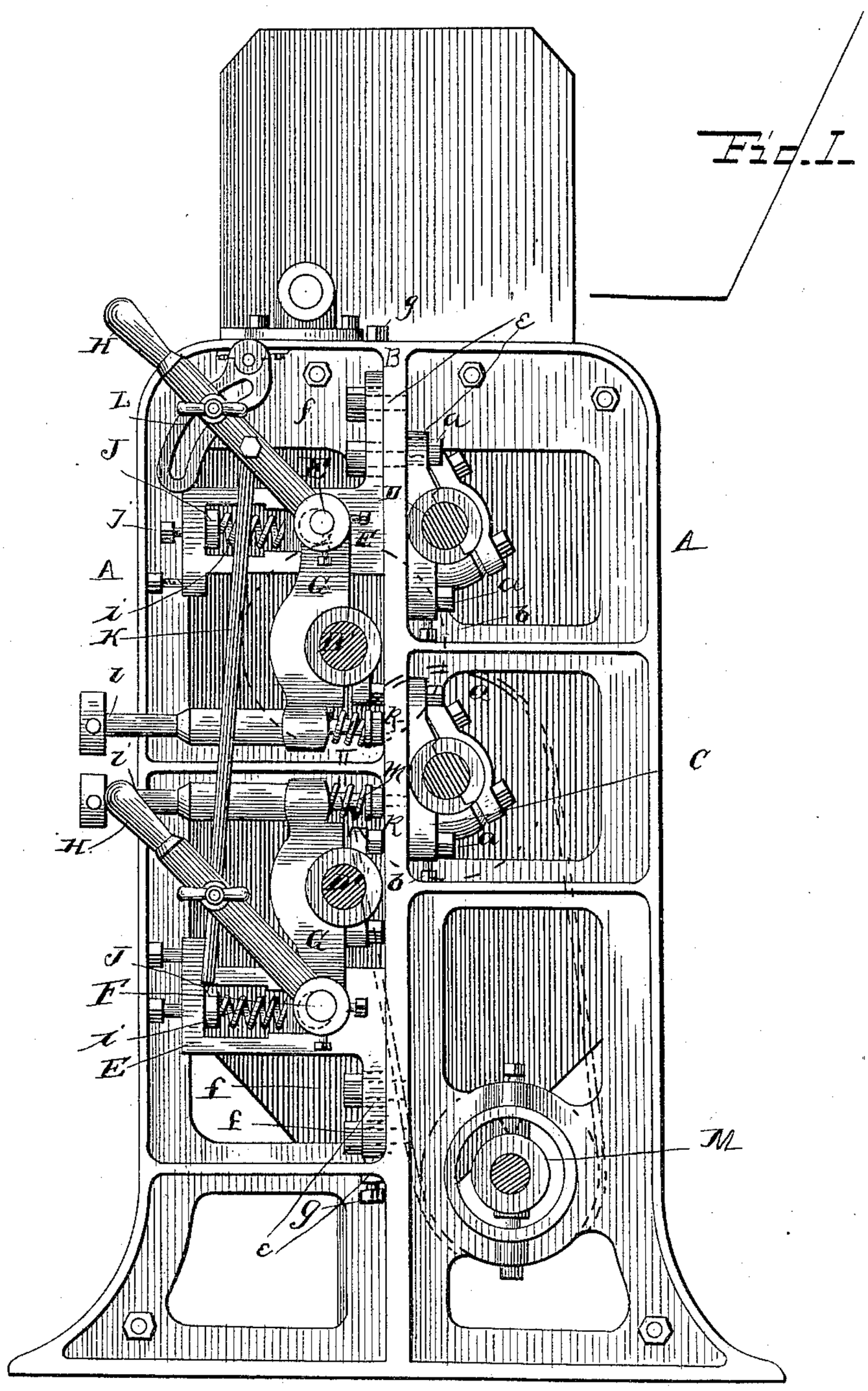
(No Model.)

4 Sheets—Sheet 1.

J. B. ALLFREE.

GRINDING MILL.

No. 401,872. Patented Apr. 23, 1889.



WITNESSES,
Thos. H. Elliott.
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(No Model.)

4 Sheets—Sheet 2.

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Fig. 2.

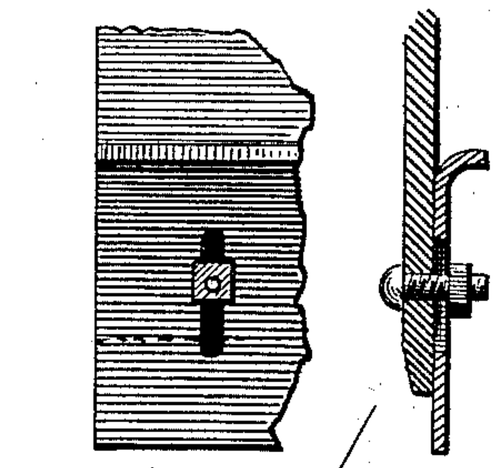


Fig. 3.

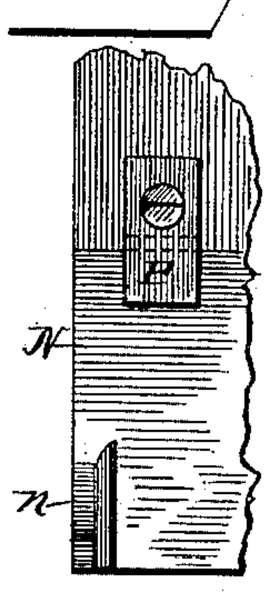
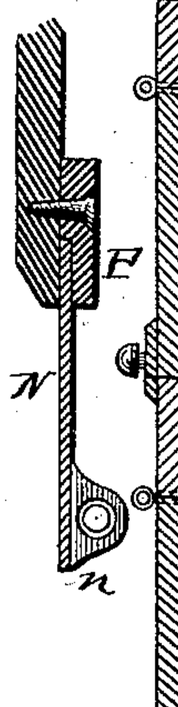
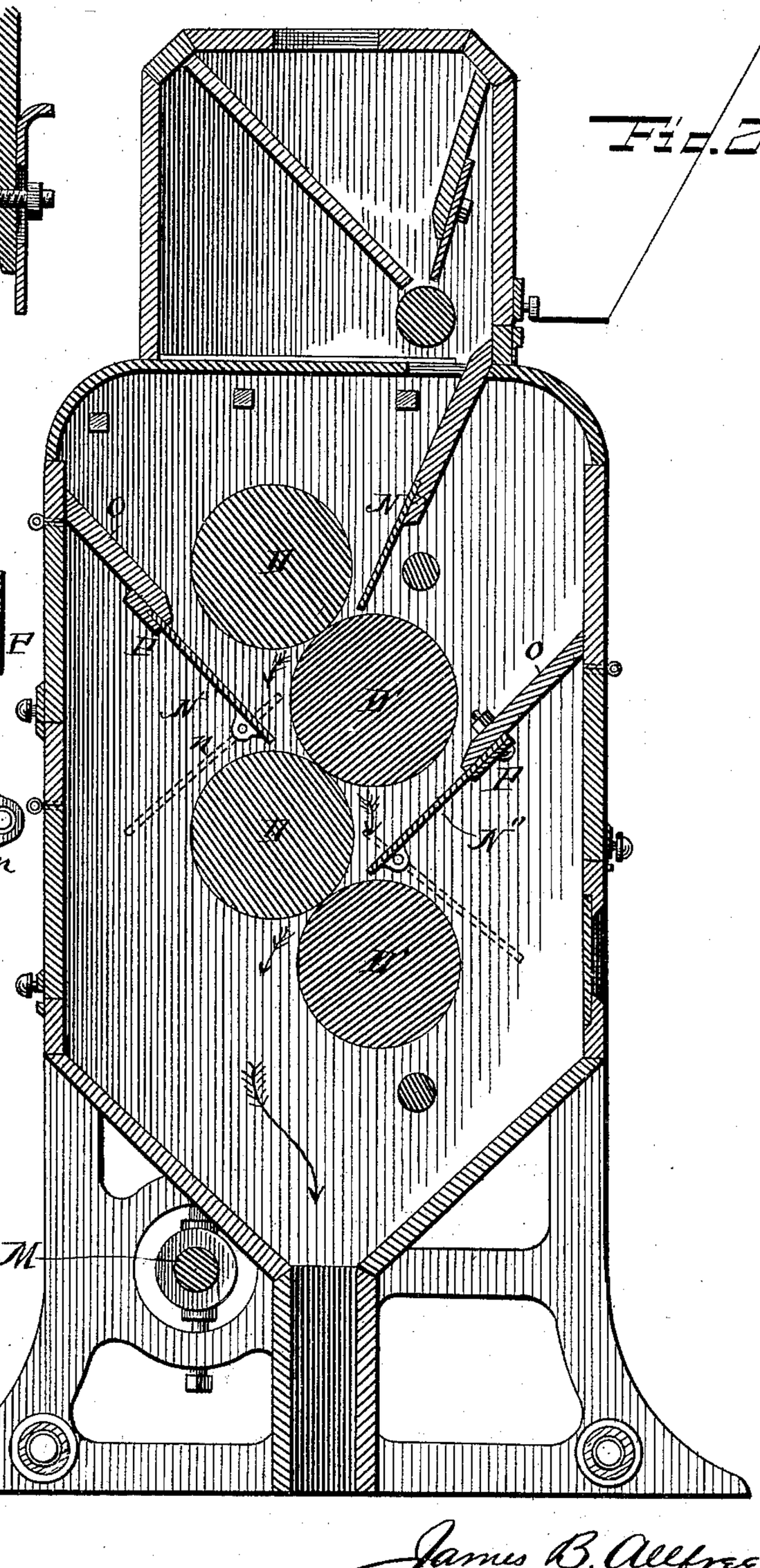


Fig. 4.





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(No Model.) 4 Sheets—Sheet 3.

J. B. ALLFREE.

GRINDING MILL.

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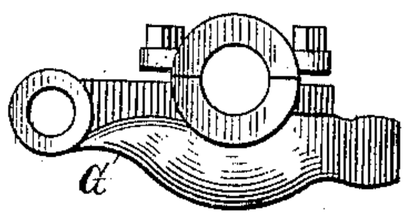


Fig. 10.

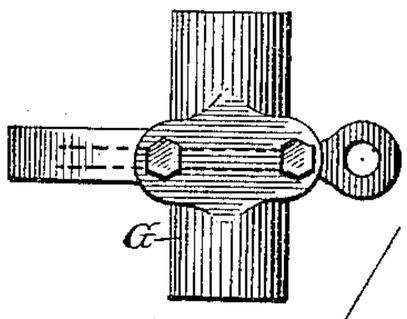


Fig. 11.

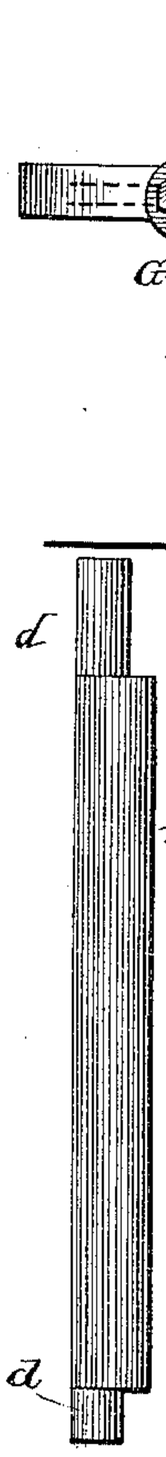
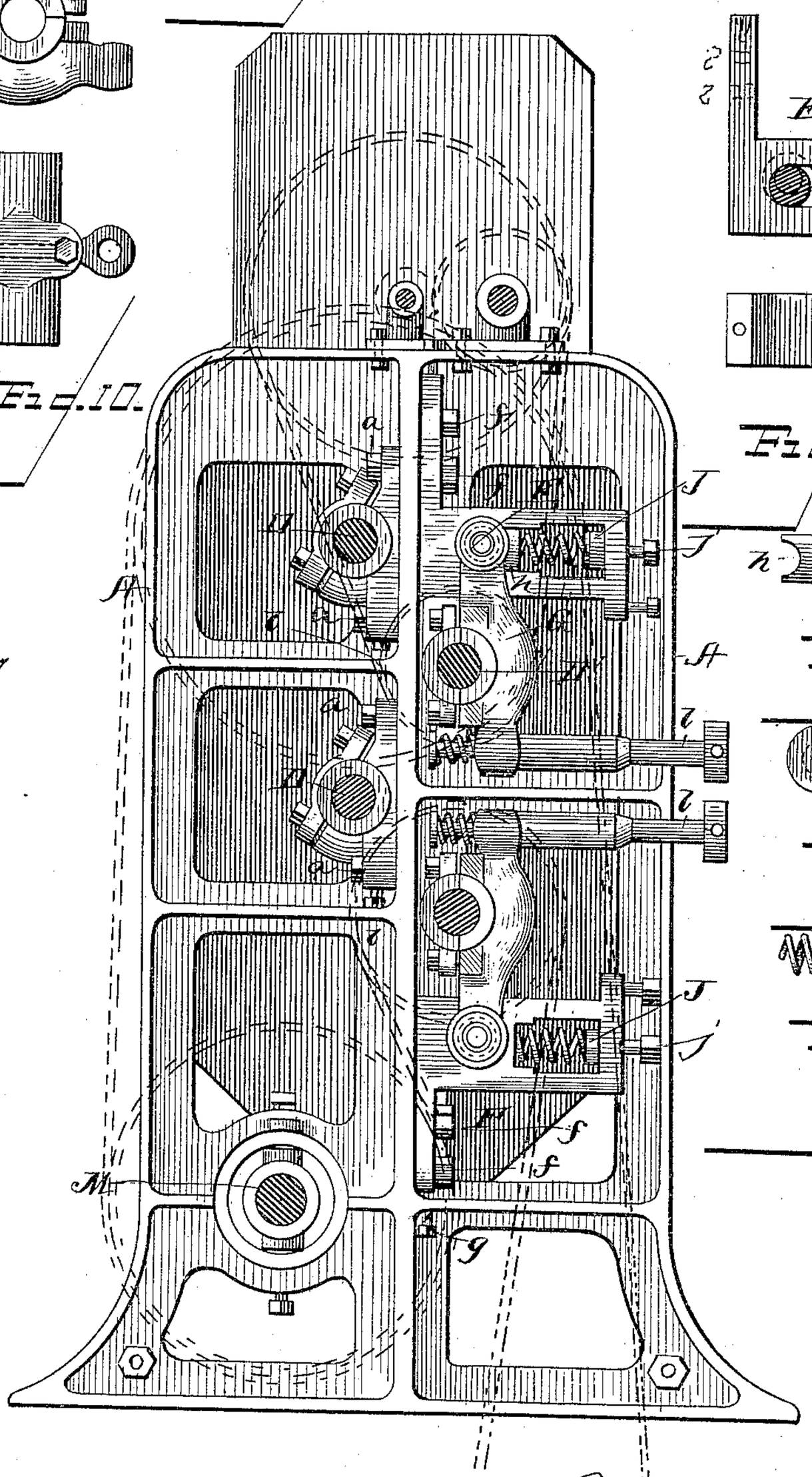


Fig. 5.



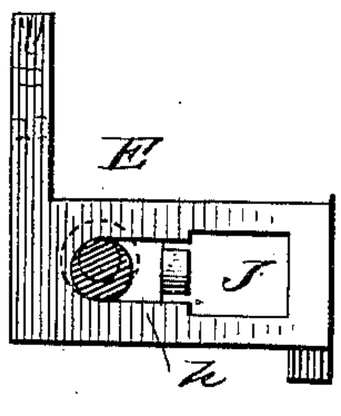


Fig. 6.

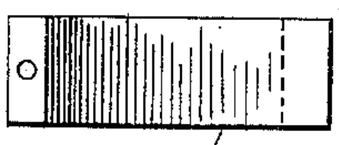


Fig. 7.

Fig. 8.

Fig. 9.

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(No Model.)

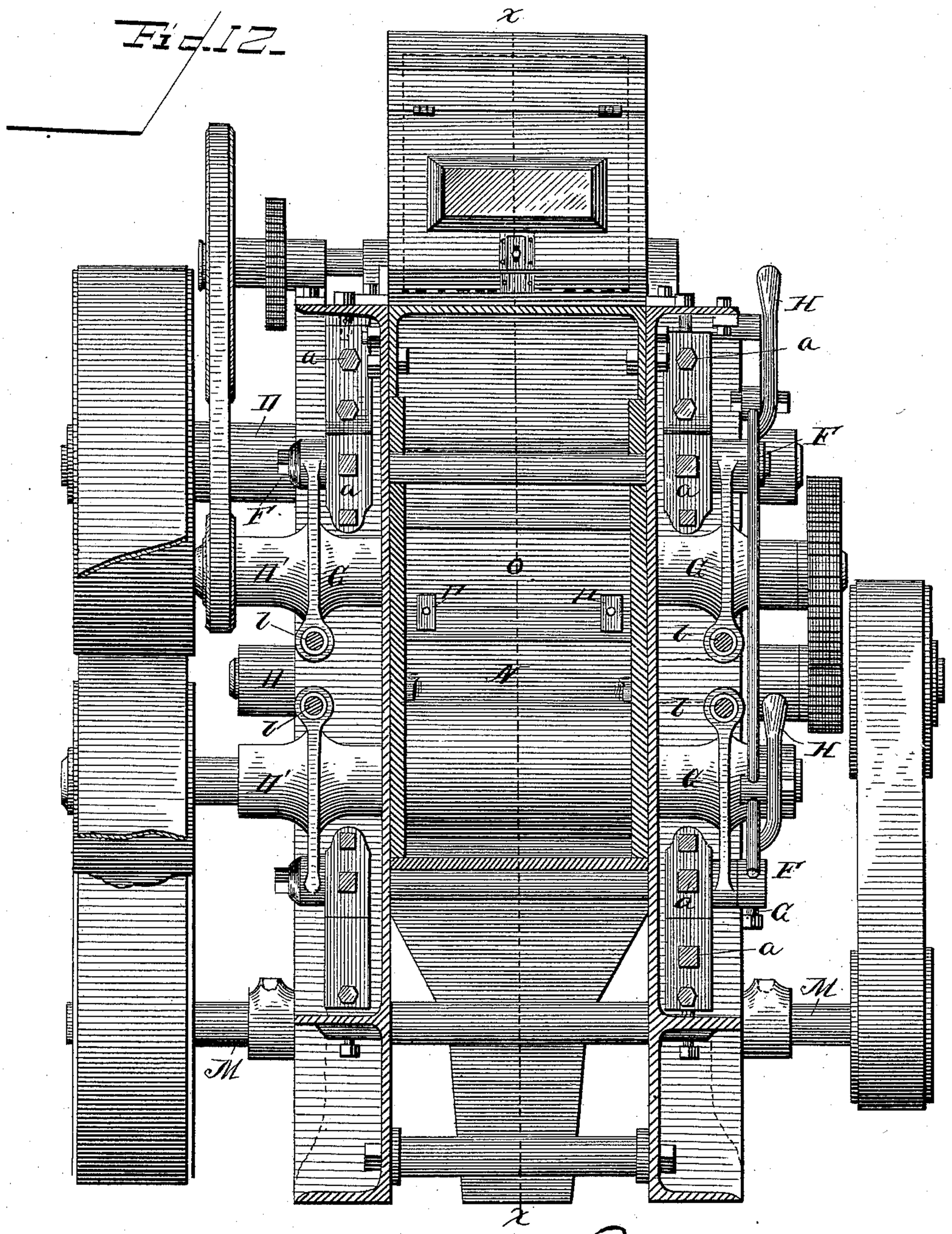
4 Sheets—Sheet 4.

J. B. ALLFREE.

GRINDING MILL.

No. 401,872. Patented Apr. 23, 1889.

Fig. 12.



WITNESSES,
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UNITED STATES PATENT OFFICE.

JAMES B. ALLFREE, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO ROBERT SHRIVER AND HARRISON SWARTZWELDER, OF CUMBERLAND, MARYLAND.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 401,872, dated April 23, 1889.

Application filed September 1, 1887. Serial No. 248,555. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. ALLFREE, a citizen of the United States, residing at Indianapolis, Indiana, have invented new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention has for its object to provide an improved roller-mill, cheap and simple in construction, and durable and effective in use, for the purpose of reducing corn and other cereals to meal or a finely-divided state. To obtain these objects, I make use of four chilled-iron rolls, their surfaces being corrugated, arranged in such relation to each other that three distinct reductions or operations will be had upon the material to be reduced during its passage through the machine, inasmuch as it is found in practice that less than three reductions on the material will not produce the desired result. By this means and arrangement of parts I obtain the desired result without resorting to means for elevating the material from one machine to another.

I will now proceed to a full description of my machine, reference being had to the accompanying drawings, of which—

Figure 1 is an end elevation. Fig. 2 is a central vertical cross-section taken at the line *x x* of Fig. 12, and deflected laterally to pass through the deflecting-shelves near their ends. Fig. 3 is a detail view in plan and cross-section of a part of the feed-gate. Fig. 4 is a similar view of a deflecting-shelf. Fig. 5 is an end elevation taken from the opposite side to that shown at Fig. 1. Fig. 6 is a detail view of one of the adjustable brackets employed for supporting the throw-out shaft to which the adjustable roll-carrier is hung. Figs. 7, 8, and 9 are detail views of parts connected with the bracket shown at Fig. 6. Fig. 10 is an end and side elevation of one of the adjustable roll-carriers. Fig. 11 is a plan view of the throw-out shaft; and Fig. 12 is a side elevation, partly in section.

A casing or frame, A, having a central vertical rib, B, through its entire height, is provided for the purpose of inclosing and maintaining in position the several parts of the machine. At suitable positions near the center, bearings C are attached to the rib for the purpose of carrying the fixed rolls D D. These bearings have slotted holes through which the securing-bolts *a* pass, and are provided at their lower ends or sides with set-screws *b*, by which they may be adjusted or leveled, said screws bearing against a projecting rib or lug, *c*, on the frame of the machine for that purpose. At suitable positions on the other side of the vertical rib I provide two L-shaped brackets, E, each adapted to carry a throw-out shaft, F, extending through the machine, having necks *d* at either end, (see Fig. 11,) projecting beyond the brackets. These necks are eccentric to the body of the shaft, and are for the purpose of carrying the adjustable roll-carriers G, and at one end the throw-out levers H as well.

In the upper arm of the L-shaped brackets E are vertical slots, (shown by dotted lines *e*, Fig. 6,) through which the securing-bolts *f* pass. They are also provided with adjusting-screws *g* at one of their ends for tramming the rolls, also with a long horizontal opening, J, (see Fig. 6,) the inner end of which is made round to receive and fit the shaft F. In this slot and against the shaft I place a small block, *h*, having one side concave to fit the said shaft, (see Fig. 7,) and it is adapted to slide freely in the slot. This block is held in place by a small spirally-coiled spring, *i*, which may be set to any desired tension by a set-screw, *j*, introduced through the end of the bracket and bearing against the spring. The purpose of this spring and concave block, fitted in the slot, as described, is to provide a yielding support for one end of the throw-out shaft F, the eccentric end of which passes through one end of the adjustable roll-carrier G, which is pivoted thereon, and consequently should any hard or unyielding substance pass between the rolls they would be permitted to separate through the action of the throw-out shaft, block *h*, and spring *i*. The other ends of the adjustable roll-carriers are held in place and adjusted at will by double-ended screws *k*, projecting from the central rib through a hole in the end of said roll-carrier.

Upon this screw is a hollow sleeve-nut, *l*, projecting beyond the side of the machine, for the purpose of setting the roll to or from its mate or mates for the purpose of obtaining the desired degree of fineness for grinding. Between that portion of the roll-carrier through which the screw-rod passes and the central rib of the machine I introduce a spirally-coiled spring, *m*, behind which is a nut and washer. This spring is for the purpose of keeping out all the lost motion and holding the roll-carrier in place to keep the rolls from wear when no grain is passing through the machine.

When it is desired to instantly separate the rolls, the throw-out shafts F are rotated by means of the levers H, attached to one end of each shaft, thereby moving the roll-carriers supported on the eccentric-necks of the shaft. These levers are adjustably connected by means of a rod, K, one end of which is pivoted to one of the levers H, and the other passes through a swivel eyebolt connected to the other lever H, so that the levers may be adjusted in their relation to each other. One of these levers H, and preferably the upper one, is maintained in any desired fixed relation through the medium of a lock-screw and nut passing through a segmental link, L, the upper end of which is pivotally connected to the frame of the machine, thus allowing sufficient movement of said link to permit the movement of the roll-carrier, which would occur during the passage of any unyielding substance between the rolls, as hereinbefore stated.

M is a counter-shaft held in place by ordinary bearings.

The mill is provided at the top with any suitable feed mechanism.

The rolls consist, as will be clearly seen at Fig. 2, of two stationary rolls, D, and two adjustable rolls, D′, and their relation to each other is such, as will be clearly seen, on opposite sides of a vertical plane, that the grain is subjected to three actions from opposite sides of the rolls, as explained below.

Three deflecting or guiding shelves or chutes, N N′ N″, are arranged within the casing and parallel with the rolls. The upper one, N, directs the grain, as it is fed from the hopper, between the upper fixed roll, D, and the coacting adjustable roll D′, and as the partially-treated grain passes on the opposite sides of said rolls it is deflected by the shelf or chute N′ and directed into the bite of the upper adjustable roll, D′, and the second fixed roll, D, and passing between said rolls, after this second action upon it, it is again deflected in a reverse direction by the shelf or chute N″ into the bite of the lower fixed roll, D, and the lowest adjustable roll, D′, from whence it passes down to the bottom of the mill, as indicated by arrows.

The upper shelf or chute, N, is, as will be observed, a fixed one; but the other two, N′ and N″, are pivoted at their lower ends, as seen at *n*, and their upper edges are connected with a stationary extension, O, by means of a turn-button, P, at each end, in such manner that, whenever desirable or necessary for the purpose of inspection or otherwise of the meal, the shelf N′ or N″ may be dropped down by releasing the turn-buttons, and the meal may then pass out through suitable doors in the casing of the mill, the shelf in its downwardly-inclined position serving as a guide for the meal.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a roller grinding-mill, the arrangement of two fixed and two adjustable rolls in combination with deflecting shelves or chutes, the rolls being arranged, as shown and described, relatively to each other, to secure three reductions, as hereinbefore set forth.

2. In combination with the casing A, provided with a rib, B, the angle-brackets E, adjustably connected to said rib, and adjusting-screws *g*, substantially as set forth.

3. The angle-brackets E, adapted to be secured to the casing, as described, and formed with an opening, J, therein, in combination with the sliding block *h*, throw-out shaft F, spring *i*, and roller-bearings G, substantially as and for the purpose hereinbefore set forth.

4. The roller-bearing G, pivotally connected with the eccentric end of the throw-out shaft F, in combination with the brackets E, blocks *h*, and spring *i*, substantially as and for the purpose set forth.

5. In combination with the adjustable roll D′, roller-bearing G, bracket E, and throw-out shaft F, formed with eccentric *d*, the lever H, substantially as and for the purpose set forth.

6. The combination and arrangement of the roller-bearing G, bracket E, throw-out shaft F, formed with eccentric *d*, lever H, and link L, substantially as and for the purpose set forth.

7. The combination, with the two adjustable rollers, brackets E, and roller-bearing G, connected with the frame of the machine, of the two throw-out shafts F, levers H, and the adjustable connecting-rod K, substantially as and for the purpose set forth.

8. The deflecting shelves or chutes N′ N″, pivoted at their lower ends and connected and held in position at their upper ends to the extensions O by means of turn-buttons P, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES B. ALLFREE.

Witnesses:
E. EVERETT ELLIS,
CURTIS LAMMOND.