

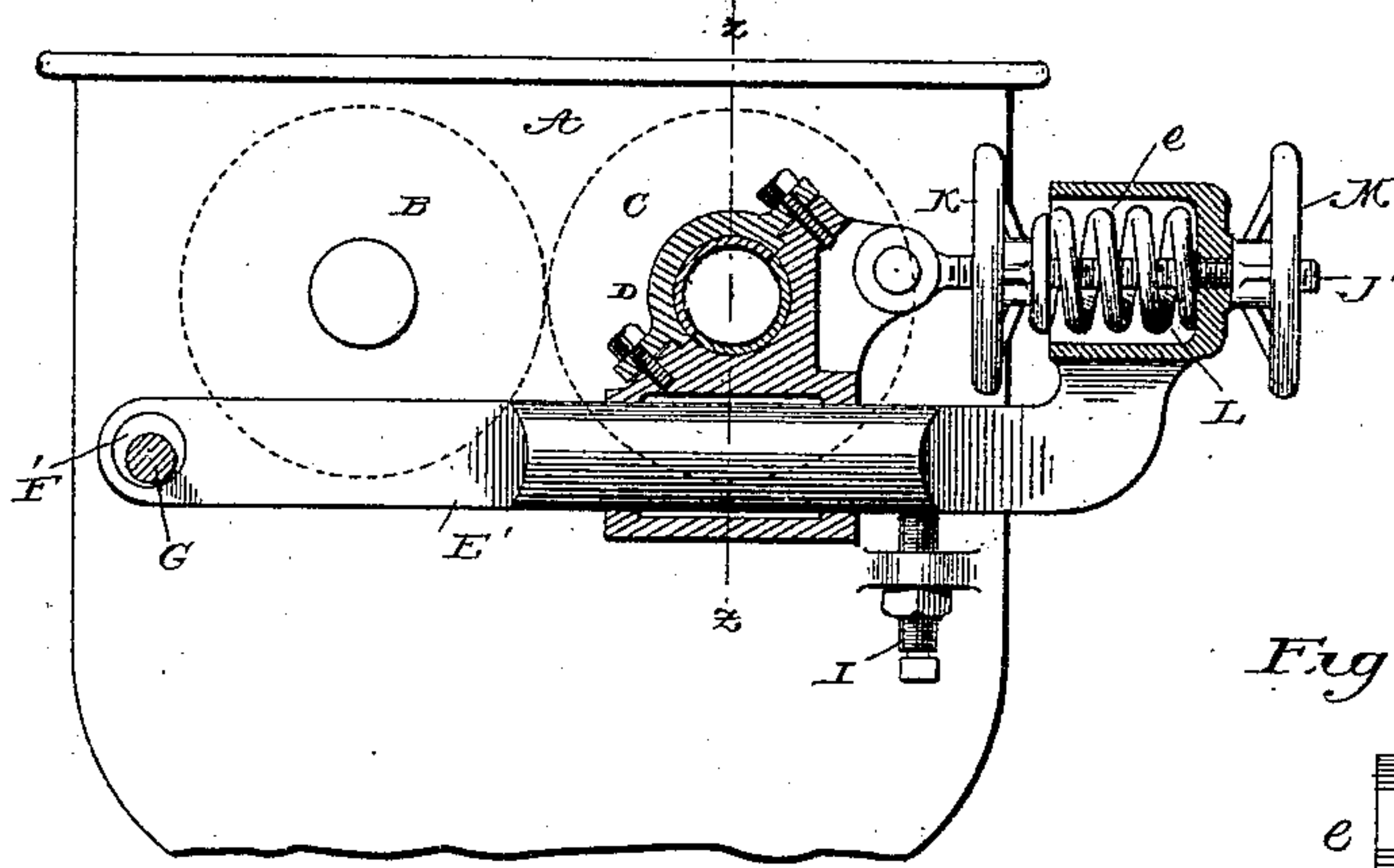
(No Model.)

W. D. GRAY.  
ROLLER GRINDING MILL.

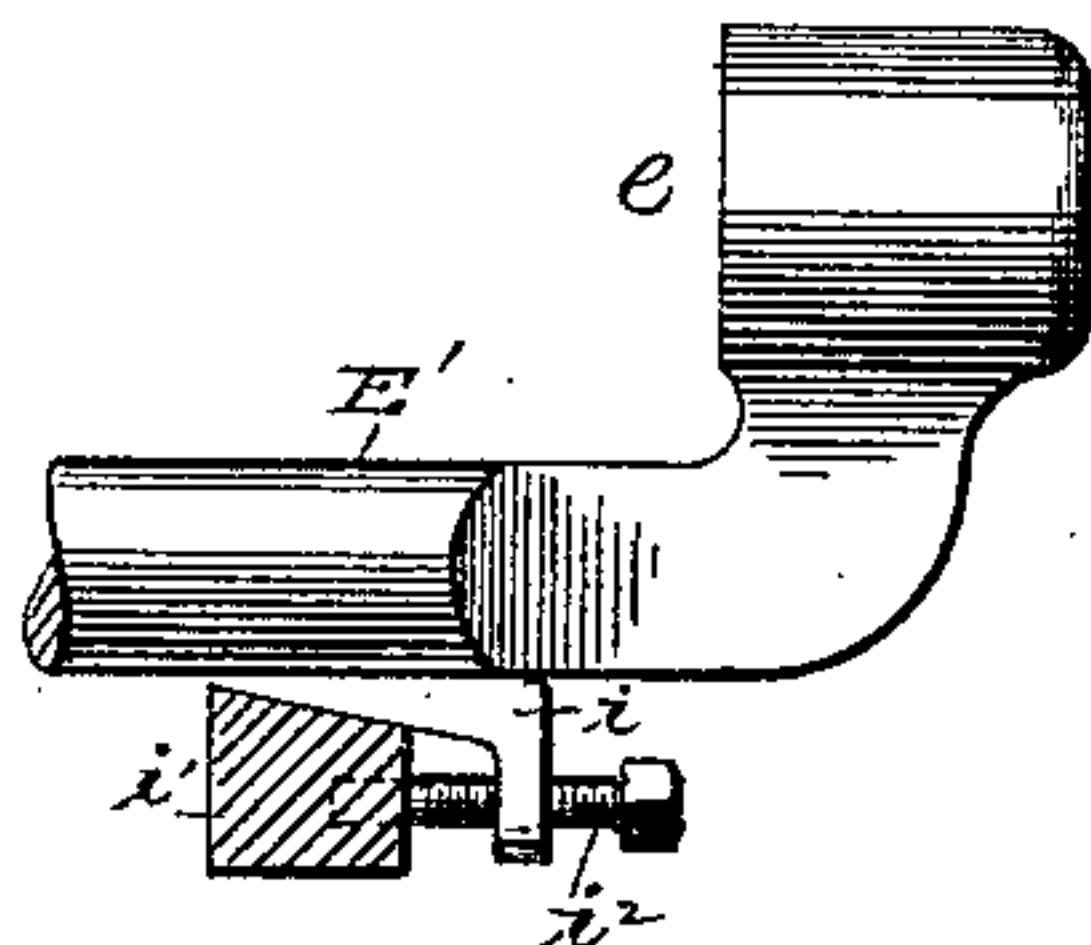
No. 444,348.

Patented Jan. 6, 1891.

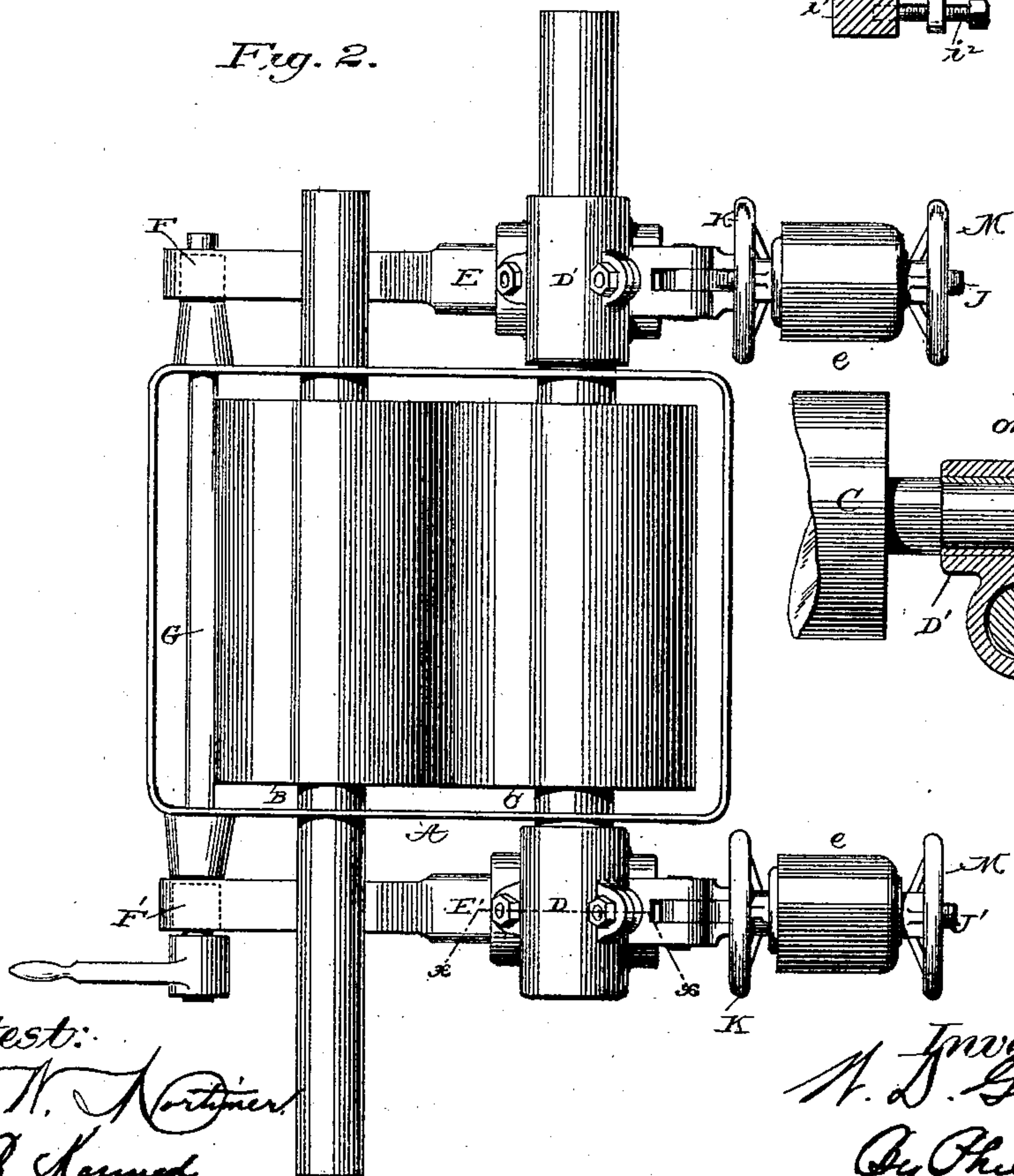
*Fig. 1.*  
*on line x-x*



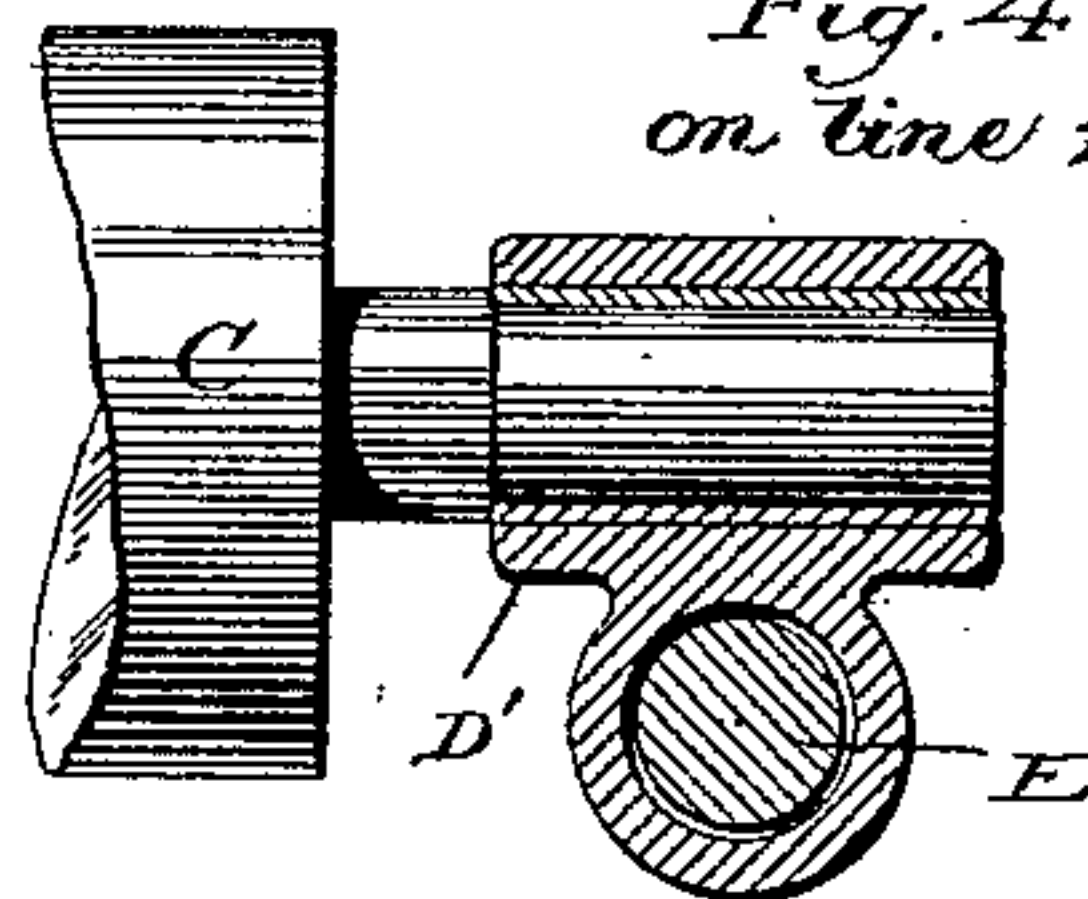
*Fig. 3.*



*Fig. 2.*



*Fig. 4.*  
*on line z-z*



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# UNITED STATES PATENT OFFICE.

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## ROLLER GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 444,348, dated January 6, 1891.

Application filed August 24, 1889. Serial No. 321,812. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM D. GRAY, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain  
5 Improvements in Roller Grinding-Mills, of which the following is a specification.

My invention relates to roller-mills used for the reduction of grain and grain products, in which it is necessary that the active sur-  
10 faces of the opposing rolls shall be maintained in parallel lines, so as to secure a uniform grinding action throughout their length.

At the present day it is the general custom to mount one roll in stationary and the  
15 other in movable bearings and to combine with the bearings of the movable roll adjusting and controlling devices to limit the approximation of the rolls, to urge the movable roll toward its companion with a yielding  
20 pressure, to permit the instantaneous separation or spreading of the rolls to stop the grinding action, and, further, to permit the independent adjustment of the roll-bearings in such manner as to compensate for wear  
25 in the various parts of the mill and maintain the requisite parallelism of the grinding-surfaces.

My present invention relates to improved means for sustaining and adjusting the movable roll, having in view as one of its principal objects provision for the convenient and accurate adjustment to maintain the alignment.

My invention is susceptible of embodiment  
35 in various modified forms, as will clearly appear to the skilled mechanic after reading this specification; but I have represented in the drawings the details of construction which I find best adapted for general use.

40 In the accompanying drawings, Figure 1 is an elevation of part of a mill having my improvement incorporated therein, the bearing and adjusting devices at one end of the movable roll being shown in vertical section on the line  $x x$ , Fig. 2. Fig. 2 is a top plan view  
45 of so much of the mill as is necessary to an understanding of my invention, the hopper, feed mechanism, driving devices, and other customary parts foreign to the invention being omitted. Fig. 3 is a side elevation illus-

trating certain modifications. Fig. 4 is a partial section on the line  $z z$  of Fig. 1.

Referring to Fig. 1, A represents the main frame, which may be of any suitable form and construction; B, the horizontal grinding-  
55 roll sustained in fixed bearings in the frame, as usual, and C is the movable roll on a level with and acting in opposition to the roll B, as usual.

D D' are journal boxes or bearings sustaining the respective ends of the movable roll C. These boxes are sustained by and adjustable  
60 lengthwise of the horizontal arms E E', respectively. These arms are preferably made, as shown in Fig. 4, of circular cross-section  
65 at the point where the boxes are mounted thereon, the boxes being bored out to fit closely upon them. This construction admits of the various parts being cheaply constructed,  
70 of an accurate fit being readily established, and of the boxes tipping or rocking around the arms in such manner as to prevent the possibility of the journals binding thereon in the event of the parts being thrown in any  
75 manner out of line. The two arms lie on opposite sides of the main frame and are mounted at one end at a distance from the boxes D D' on horizontal axes or supports,  
80 so that the ends which support the boxes may rise and fall to a limited extent in order to vary the height of the respective ends of the movable roll and thus secure its exact alignment or parallelism with the fixed roll. The  
85 vertically-movable ends of the arms E E' are sustained by devices which admit of their being raised and lowered with extreme accuracy of adjustment.

I commonly use as a means of adjustment screws I, passed vertically through lugs on the main frame and acting beneath the arms,  
90 as shown in Fig. 1; but, if preferred, I may employ at each side a wedge  $i$ , lying between the arm and a beveled support  $i'$  on the main frame, and adjust it endwise by the screw  $i^2$ ; or, in place of either of these adjusting de-  
95 vices, I may use any equivalent device familiar to the skilled mechanic which will act to change the height of the box-sustaining arms.

The horizontal axes around which the arms swing may be of any construction familiar  
100



to the mechanic; but I prefer to mount the arms on eccentrics  $F F'$ , mounted in turn on a common rock-shaft  $G$ , seated in bearings in the main frame, so that when the shaft is turned the eccentrics will move the arms  $E$  and the boxes thereon horizontally in order to effect the instantaneous closing or spreading of the rolls, so as to throw the mill into or out of operation, as required. It will be observed that the eccentrics thus arranged serve, first, as horizontal pivots or axes to sustain the arms and allow them to swing vertically, and, second, as adjusting devices to shift the arms endwise.

It is to be understood that my invention comprehends the use of any pivotal support which will allow the arms to swing vertically and any adjusting device the equivalent of the eccentrics which will move the arms horizontally to spread the rolls.

In order to adjust the movable roll and its boxes lengthwise of the sustaining-arms—that is to say, horizontally to and from the fixed rolls—I propose to employ between the arms  $E E'$  and the boxes  $D D'$  adjusting devices of any suitable character.

In the particular construction herein shown the forward or distal ends of the arms  $E E'$  are turned upward and provided with horizontal pockets  $e$ , open on the side next to the boxes and each containing a strong spiral spring  $L$ . Screw-rods  $J J'$  are pivoted or otherwise attached to the respective boxes, and extended thence outward through the spiral-springs and through the upturned ends of the arms. Each of these screws has upon its inner end a hand wheel or nut  $K$ , acting directly or through an intermediate washer upon the inner end of the spring. The spring being pressed between the arm and the wheel  $K$  acts through the latter to urge the screw inward, the screw in turn forcing the box and roll toward the stationary roll. The approximation of the rolls is, however, limited by a hand wheel or nut  $M$ , applied to the outer end of the screw  $J$  and seated against the upturned end of the arm. By adjusting the wheel  $M$  the distance between the rolls when in operative position may be regulated with great nicety. When turning the wheel  $K$  the tension of the spring may be increased, so as to hold the roll to its operative position with any required degree of pressure, the roll being, however, permitted to retreat in the event of excessive resistance due to the passage of refractory objects between the rolls or to other causes.

My improvement may be applied in duplicate to machines having two pairs of rolls, in which case the one eccentric-shaft will spread both pairs of rolls, as in other double machines.

It is to be observed that in my structure the journal-boxes of the movable roll slide upon and are sustained wholly by the horizontal arms, that these arms wholly sustain the pressure-springs and attendant parts act-

ing upon the sliding boxes and commonly known as the "pressure mechanism," and that the spreading and closing of the rolls are effected by moving the rods bodily endwise, together with the box and pressure mechanism mounted thereon.

By the expression "horizontal arms" as here employed I mean arms which are approximately horizontal. A slight deviation from the horizontal is not material.

What I claim is—

1. In a roller grinding-mill, a grinding-roll, two horizontal arms, and roll-sustaining boxes sustained by and movable on said arms, in combination with means for adjusting said arms endwise in unison and adjusting devices to raise and lower the arms independently.

2. In a grinding-mill and in combination with a grinding-roll, a pair of horizontal vertically-adjustable arms, each provided with and wholly sustaining a sliding journal-box, a spring to advance the box along the arm, and an adjustable stop to limit the advance of the box.

3. In a roller-mill, a grinding-roll and journal-boxes sustaining its ends, in combination with horizontal arms by which said boxes are sustained and on which they are arranged to slide, a vertically-adjustable stop for each arm, a pressure mechanism mounted on one end of each arm and acting to advance the box thereon, and a roll-spreading device connected to the opposite end of the arm to move the same endwise.

4. In a roller grinding-mill, a grinding-roll, two horizontal roll-sustaining arms mounted at one end on eccentrics on a common shaft, and adjustable supports for raising and lowering said arms independently at their free ends.

5. In a roller grinding-mill, a main frame and a grinding-roll mounted in fixed bearings therein, in combination with a movable roll, its sustaining-boxes, two horizontal arms on which the boxes slide and by which they are sustained, pressure devices sustained by the arms and urging the boxes toward the fixed roll, mechanism for moving the arms endwise to spread and close the rolls, and adjustable supports for raising and lowering the arms independently to align the rolls.

6. In a roller grinding-mill, the movable roll, its sustaining-boxes, and the horizontal arms on which the boxes slide and by which they are sustained, in combination with the eccentrics sustaining the arms at one end, the vertically-adjustable devices sustaining the arms at the opposite ends, the threaded rods attached to the box and extended through the upturned ends of the arms, their stop-nuts, and the springs acting to urge the boxes inward, said elements arranged for joint operation substantially as described.

7. In a roller grinding-mill, a main frame and a grinding-roll mounted in fixed bearings therein, in combination with a coacting mov-



able roll, boxes sustaining the said movable roll, arms of circular cross-section by which said boxes are sustained and on which they are free to rock, pivotal supports at one end  
5 of said arms, and vertically-adjustable supports at the opposite ends of the arms, whereby the movable roll may be aligned with the stationary roll.

8. In a roller-mill and in combination with  
10 the grinding-roll, journal-boxes sustaining the same, the horizontal arms whereon the boxes are sustained and arranged to slide, said arms

pivotaly sustained at one end and upturned at the opposite end, the springs seated between the boxes and the upturned ends, and 15 the screws or their equivalents to raise and lower the free ends of the arms.

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

WILLIAM D. GRAY.

Witnesses:

RICHARD HOPPIN,  
EDW. F. BYRON.