

(No Model.)

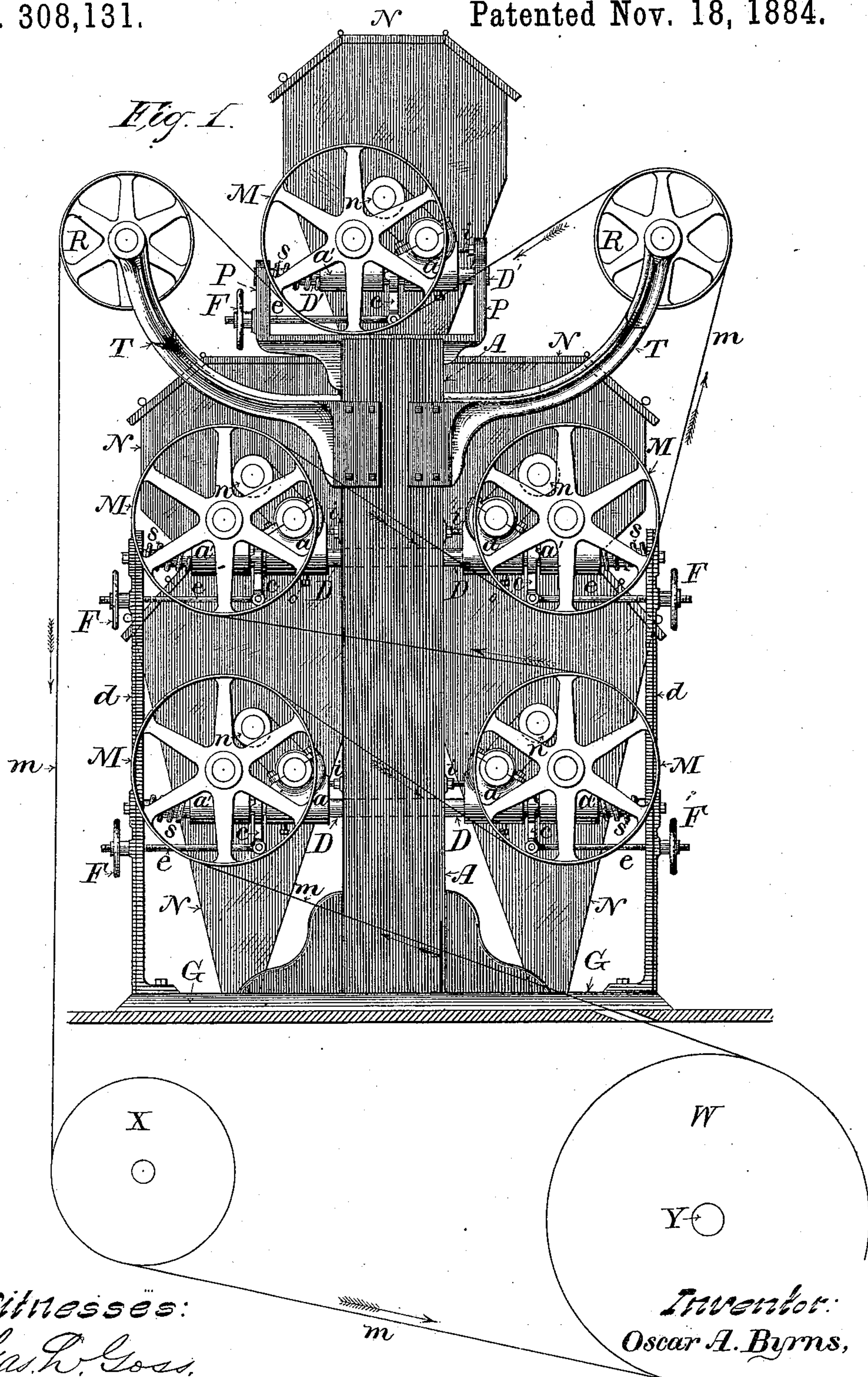
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O. A. BYRNS.

ROLLER MILL.

No. 308,131.

Patented Nov. 18, 1884.



Witnesses:  
Chas. H. Goss.  
George Goll.

Inventor:  
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(No Model.)

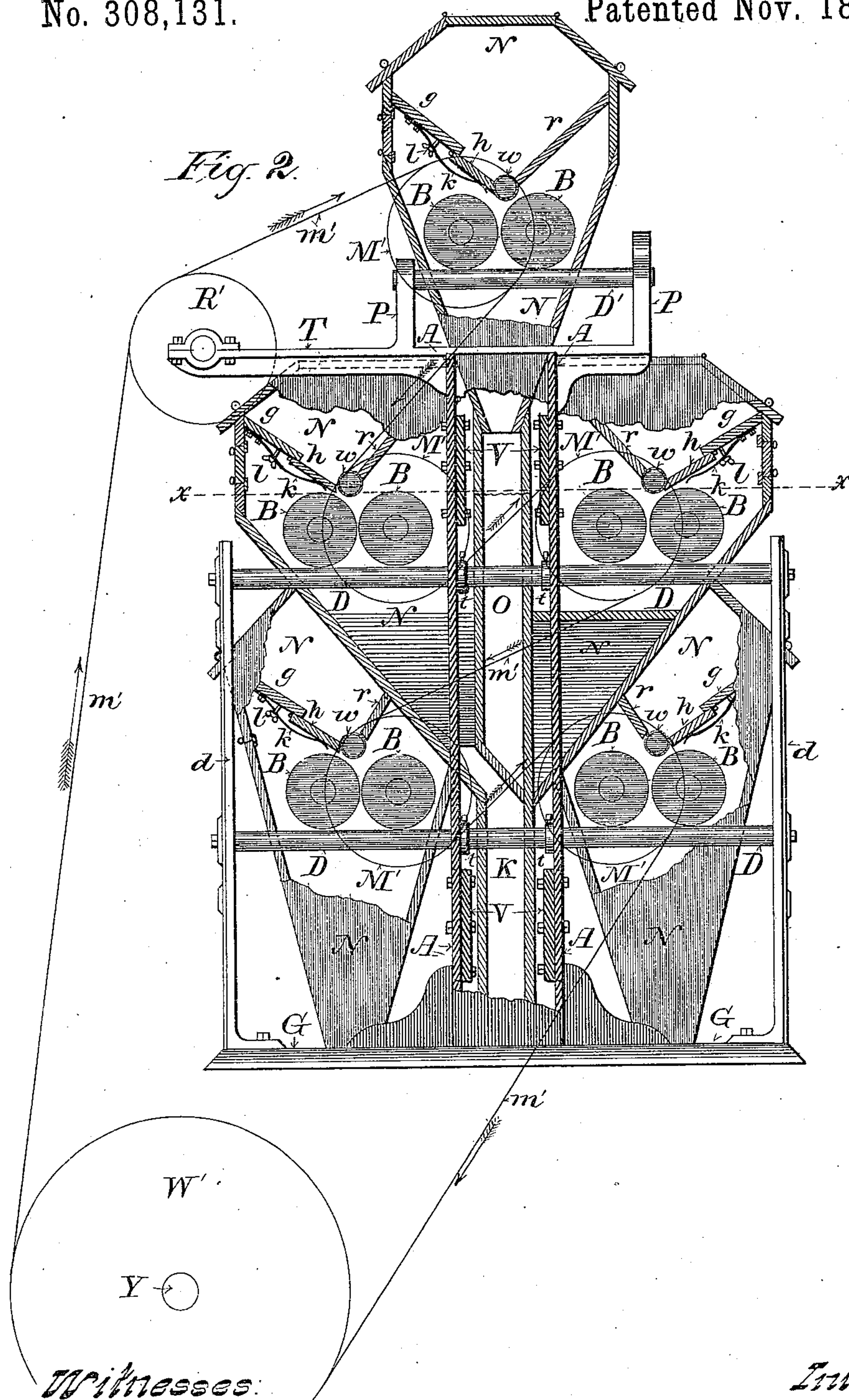
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O. A. BYRNS.

## ROLLER MILL.

No. 308,131.

Patented Nov. 18, 1884.



Witnesses:  
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(No Model.)

3 Sheets—Sheet 3.

O. A. BYRNS.

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*Fig. 3.*

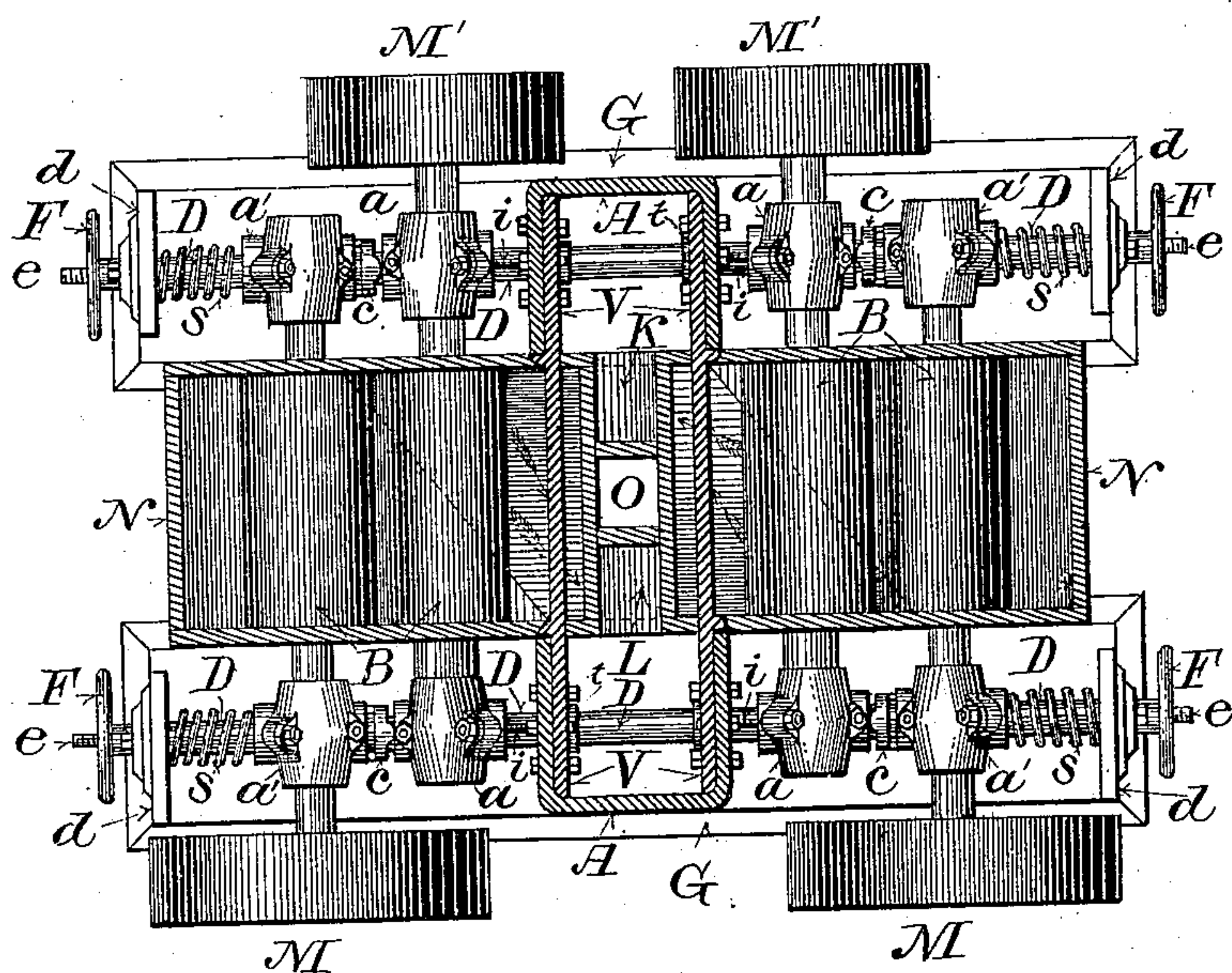


Fig. 4.

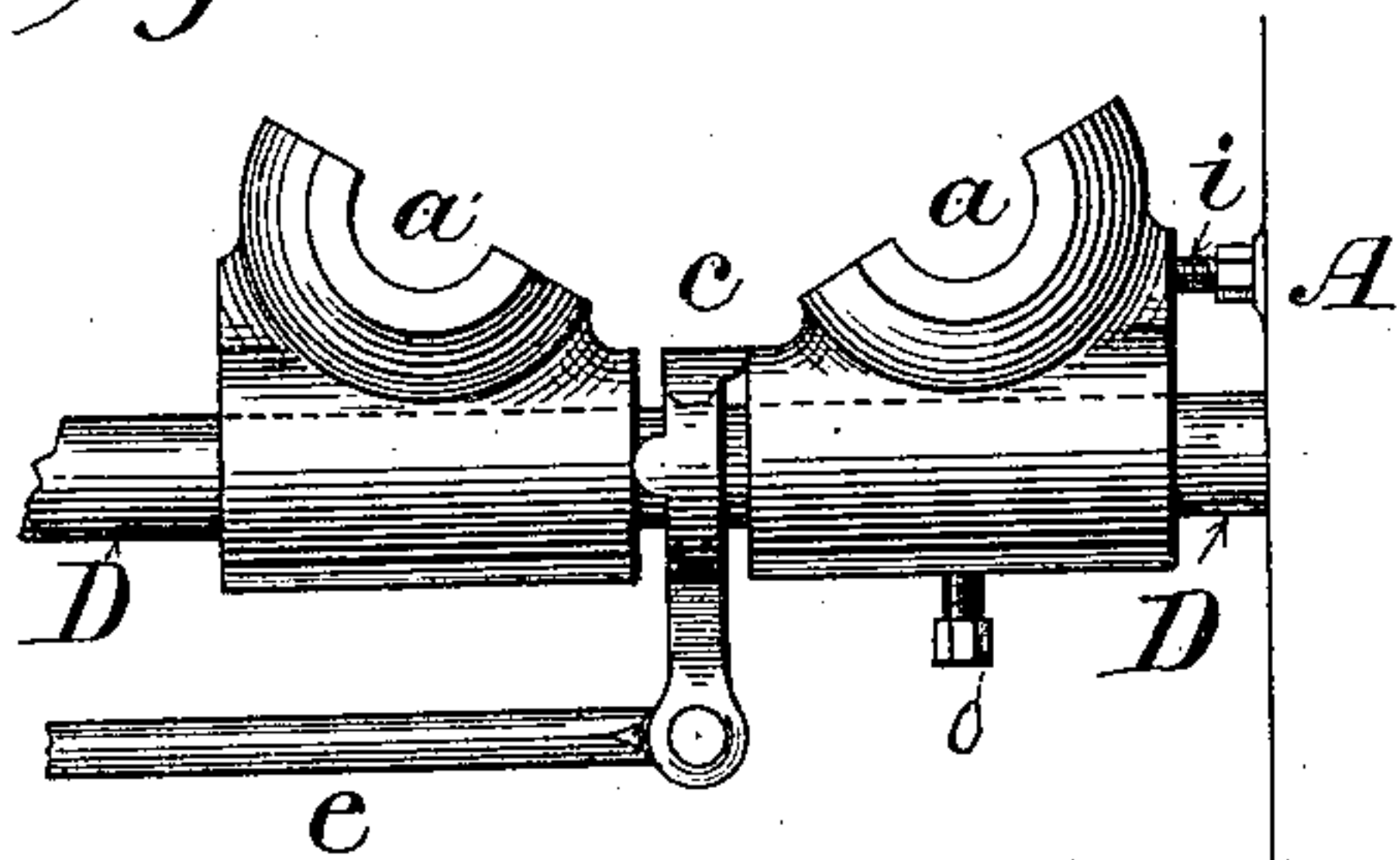
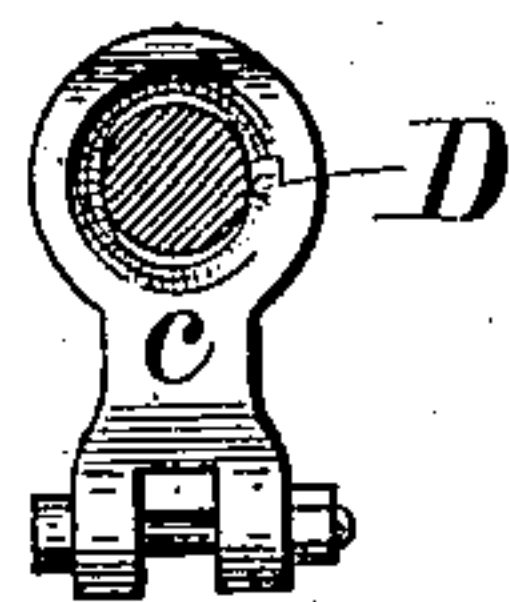


Fig. 5.



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# UNITED STATES PATENT OFFICE.

OSCAR A. BYRNS, OF APPLETON, WISCONSIN.

## ROLLER-MILL.

SPECIFICATION forming part of Letters Patent No. 308,131, dated November 18, 1884.

Application filed May 5, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, OSCAR A. BYRNS, of Appleton, in the county of Outagamie and State of Wisconsin, have invented certain new and useful Improvements in Roller-Mills; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to roller-mills for the grinding and reduction of grain to flour, meal, &c.

The objects of my invention are, first, economy of space; second, simplicity and cheapness of construction; third, strength and durability, and, fourth, to do away with cross-belts for driving the rolls.

In the accompanying drawings like letters refer to the same parts in the several figures.

Figure 1 is an elevation of the side of the machine upon which the outer rolls are driven. Fig. 2 is an elevation of the reverse side of the same with the journal-boxes removed, and with portions of the standard and the casing cut away. Fig. 3 is a horizontal section on the line *xx*, Fig. 2. Fig. 4 is an enlarged view of a side of one of the adjusting-levers in connection with a pair of boxes; and Fig. 5 is a front view of said adjusting-lever.

*A A* are iron posts open on the sides which face each other, and provided with feet or bases *G G*. They are held in position at the desired distance from each other by iron plates *V V*, Figs. 2 and 3, which are made longer or shorter, according to the length of rolls desired, and are rigidly secured to said posts *A*, forming therewith a central hollow standard in effect.

*B B* are the grinding-rolls, of the usual form, construction, and material. They are mounted in pairs upon the transverse rods or shafts *D D*, passing horizontally through posts *A A*, and extending on each side thereof sufficiently to receive a pair of boxes, *a a'*, the lower segments of which are provided with transverse sleeves fitted upon said shafts. By means of collars *t t* and set-bolts passing through the

same against said shafts *D D*, just inside of posts *A A*, said shafts are secured in position therein, as shown in Figs. 2 and 3. By the same means, also, they may be removed therefrom when bent or broken, and repaired, or their places supplied by new ones. The collars *t t* may be formed upon the posts *A*, or made distinct therefrom. The inner boxes, *a a*, are set in the desired position upon the shafts *D* by means of set-bolts *o o*, passing through their sleeves against said shafts. In case said set-bolts become loosened the boxes *a a* are held at the desired distance from the central standard by additional set-bolts, *i i*, inserted into the rear of said boxes and bearing at their heads against the faces of the posts *A A*, Figs. 1 and 3.

Between each pair of boxes *a a'* is inserted a collar-like lever, *c*, surrounding the shaft *D*, upon which the boxes are mounted, fulcrumed at the top against the sleeve of the inner box, and provided on the opposite side with a lug or boss, which bears against the horizontal center of the sleeve of the outer box, Figs. 1 and 4. The ends of the shafts *D D* are secured to and supported by perpendicular bars *d d*, which are attached to and rise from the bases *G G* of the standard. Between said bars *d d* and the sleeves of the outer boxes, *a' a'*, are inserted the spiral springs *s s* over the shafts *D D*. The boxes *a' a'* are thereby held snugly up against the levers *c c*, to the depending arms of which are pivoted the threaded eyebolts *e e*, passing horizontally through perforations in the upright bars *d d*. The protruding threaded ends of said eyebolts *e e* are provided with the hand-wheels *F F*, which bear against the outer faces of the upright bars *d d*, Figs. 1 and 3. By this arrangement the outer rolls will be held as close to the inner rolls as the levers *c c* and adjusting-wheels *F F* will permit, and at the same time the springs *s s*, forming in effect an elastic cushion to the outer rolls, will allow any hard lumps or particles which chance to be in the grain to pass between the rolls without injury thereto. When an even number of pairs of rolls is employed, they are mounted, as described, in pairs upon the protruding ends of the shafts *D*, and are placed opposite each other on each side of the central standard; but



when an odd number is used I mount one pair directly over the center of the machine upon short shafts D' D', supported at each end by brackets P P, which rest upon and are secured to the tops of the posts A A, Figs. 1 and 2. By the arrangement just described the equilibrium of the machine is preserved whatever the number of the sets of rolls may be.

In place of the shafts D, I may use brackets secured to the faces of the posts A A upon the opposite sides thereof, although I prefer the construction hereinbefore described, and shown in the drawings.

w w are feed-rollers, provided on one side of the machine with small pulleys or gears n n, secured to the protruding ends of their journals, and connected by belts with similar pulleys secured upon the corresponding ends of the shafts of the inner rolls B, from which said feed-rollers w are driven. The shafts of the outer rolls project beyond the boxes a' a' on one side of the machine, and are provided with pulleys M M, as seen in Figs. 1 and 3, while the shafts of the inner rolls project beyond the boxes a a, and are provided with the pulleys M' M', as shown in Figs. 2 and 3.

W W' are driving-pulleys, mounted upon the same shaft, Y, located underneath and to one side of the machine, as seen in Figs. 1 and 2.

R R are auxiliary pulleys, mounted in forked brackets T T, with their centers in the same horizontal line with the centers of the upper pair of rolls B B, and located in the same vertical plane with pulleys M M. A single belt, m, passing over the driving-pulley W, thence alternately from side to side over each of the lower pulleys M, thence over the pulley R above said pulley W, thence underneath the upper pulley M, thence over the opposite pulley R, and finally down around a pulley, X, located underneath the machine and opposite the driving-pulley W, as shown in Fig. 1, drives each of the outer rolls B B in toward the inner rolls. On the opposite side of the machine I provide a single auxiliary pulley, R', mounted in the forked bracket or arm T', and placed in the same vertical plane with the pulleys M' M', (the rims of which are alone shown in the drawings.) A single belt, m', passing around the driving-pulley W', thence up over the pulley R', thence over the upper pulley M', and thence alternately from side to side about each of the lower pulleys M', drives each of the inner rolls in the proper direction out toward the outside rolls.

By the arrangement of pulleys and the method of belting just described, cross-belts are done away with. A differential speed in the outer and inner rolls is secured by making the pulleys M' M', which drive the inner rolls, smaller than the pulleys M M on the opposite side of the machine, which drive the outer rolls, or vice versa. The same result may be accomplished by making the driving pulleys W W' of different diameters.

N N is the boxing or incasement of the machine, a side elevation of which is shown in

Fig. 1, a view of the interior in Fig. 2, and a horizontal section on the line x x, Fig. 2, in Fig. 3. It is divided into separate and distinct compartments for each pair of rolls, as shown in Fig. 2. Each compartment is subdivided by the downwardly-inclined partitions g, h, and r, which form feeding-hoppers converging toward and opening upon the feed-rollers w w, as shown in Fig. 2. The outer partitions of said hoppers are each made in two sections, g and h, the lower section being hinged horizontally upon the upper section. A curved spring, k, attached at its upper end to the underside of the fixed section g, presses at the other end against the lower part of the hinged section h. By means of a screw secured in said section g and passing through said spring, and provided with a thumb-nut, l, the lower edge of each of said sections h is pressed with greater or less force toward or against the feed-roller w, and the feed of each pair of rolls B B thereby regulated, as desired. The product of the upper central pair of rolls B B is spouted by the converging walls of their incasement N into the central pipe or box, O, inclosed by the central standard, while the product of the two sets of rolls B B next below is conducted in like manner into the boxes K and L, also inclosed with box O in the central hollow standard, Figs. 2 and 3. The product of the two lowest sets of rolls is conducted through the floor underneath them, Fig. 2.

Any desired number of rolls may be mounted, as described, upon a single standard, and in each case the machine will occupy the same or about the same amount of lateral space, and the product of each set of rolls, except the two lowest sets, whatever the number, may be conducted away through the required number of pipes or boxes, all inclosed, as described, within said central hollow standard.

Instead of adjusting the distance between each pair of rolls independently, the adjusting-levers c c on each side of the machine may be so connected by a system of levers that all the rolls on each side may be properly adjusted at a single operation.

From the foregoing description of the construction of the machine and the arrangement of its parts, its mode of operation will be manifest.

Each pair of rolls, as shown in the drawings, operates independently of the others, and the product of any one pair may be returned by suitable conveyers and elevators and fed to another pair of rolls for further reduction, and this operation may be repeated any number of times according to the number of sets of rolls employed in the machine and the number of reductions desired.

I claim—

1. In a roller-mill, the combination of an upright hollow standard provided with external supports, upon which the rolls B B are mounted, and with internal conduits, K L O, which conduct away the product of said rolls,



rolls B B, and casing N, substantially as and for the purposes set forth.

2. In a roller-mill, the combination of a central hollow standard composed of the posts A A, connected and braced by cross-plates V V, with rolls B B, mounted thereon in pairs, substantially as and for the purposes set forth.

3. The combination, in a roller-mill, of a central hollow supporting-standard with transverse shafts D D, passing through and secured in said central standard, rolls B B, mounted in pairs upon said shafts D, and mechanism for driving said rolls, substantially as and for the purposes set forth.

4. The combination, in a roller-mill, of a central upright supporting-standard, A A, detachable cross-shafts D D, passing through and secured in said central supporting-standard, boxes *a a'*, provided with transverse sleeves fitting and adjustable upon the shafts D D, rolls B B, mounted in said boxes upon the protruding ends of shafts D, and mechanism for adjusting the distance between each pair of rolls, substantially as and for the purposes set forth.

5. The combination, in a roller-mill, of a hollow central supporting-standard, the rolls B B, mounted in pairs in suitable supports on the sides of said hollow standard, the casing N N, divided into compartments for each pair of rolls, pipes K, L, and O, inclosed within said hollow standard, for conducting away the product of each of the upper sets of rolls, feeding devices, and mechanism for driving and adjusting the rolls, substantially as and for the purposes set forth.

6. In a roller-mill, the combination of a central supporting-standard, transverse rods or shafts D D, rolls B B, mounted in pairs upon the protruding ends of said shafts D, boxes *a a'*, provided with sleeves for the reception of said supporting-shafts D D, levers *c c*,

mounted upon said shafts D between each pair of boxes *a a'*, eyebolts *e e*, pivoted to said levers *c*, and hand-screws F F, whereby said rolls are adjusted in position, substantially as and for the purposes set forth.

7. The combination, in a roller-mill, of the central standard or support, transverse shafts D D, rolls B B, mounted in pairs upon the protruding ends of said shafts D, boxes *a a'*, provided with transverse sleeves to receive shafts D, bars *d d*, to which are secured the ends of shafts D, springs *s s*, placed around shafts D between the outer boxes and the upright bars *d d*, and the mechanism for adjusting the space between each pair of rolls, substantially as and for the purposes set forth.

8. In a roller-mill, the combination of the central hollow supporting-standard, A, rolls B B, mounted in pairs on each side of said standard, feed-rolls *w w*, the casing N, hoppers formed by the walls of said casing and the inclined partitions *g, h*, and *r*, the section *h* hinged to section *g* and supported by spring *k*, screw, and adjusting-nut *l*, substantially as and for the purposes set forth.

9. The combination, in a roller-mill, of the central hollow supporting-standard, A A, rolls B B, externally mounted upon said standard, pulleys M M, fixed upon the shafts of the outer rolls on one side of the machine, pulleys M' M', fixed upon the shafts of the inner rolls on the opposite side of the machine, driving-pulleys W W' upon shaft Y, idlers R R, R', and X, and belts *m m'*, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

OSCAR A. BYRNS.

Witnesses:

LEOPOLD HAMMEL,  
W. H. CHILSON.