(No Model.)

2 Sheets—Sheet 1.

C. T. HANNA.

ROLLER GRINDING MILL.

No. 272,043.

Patented Feb. 13, 1883.

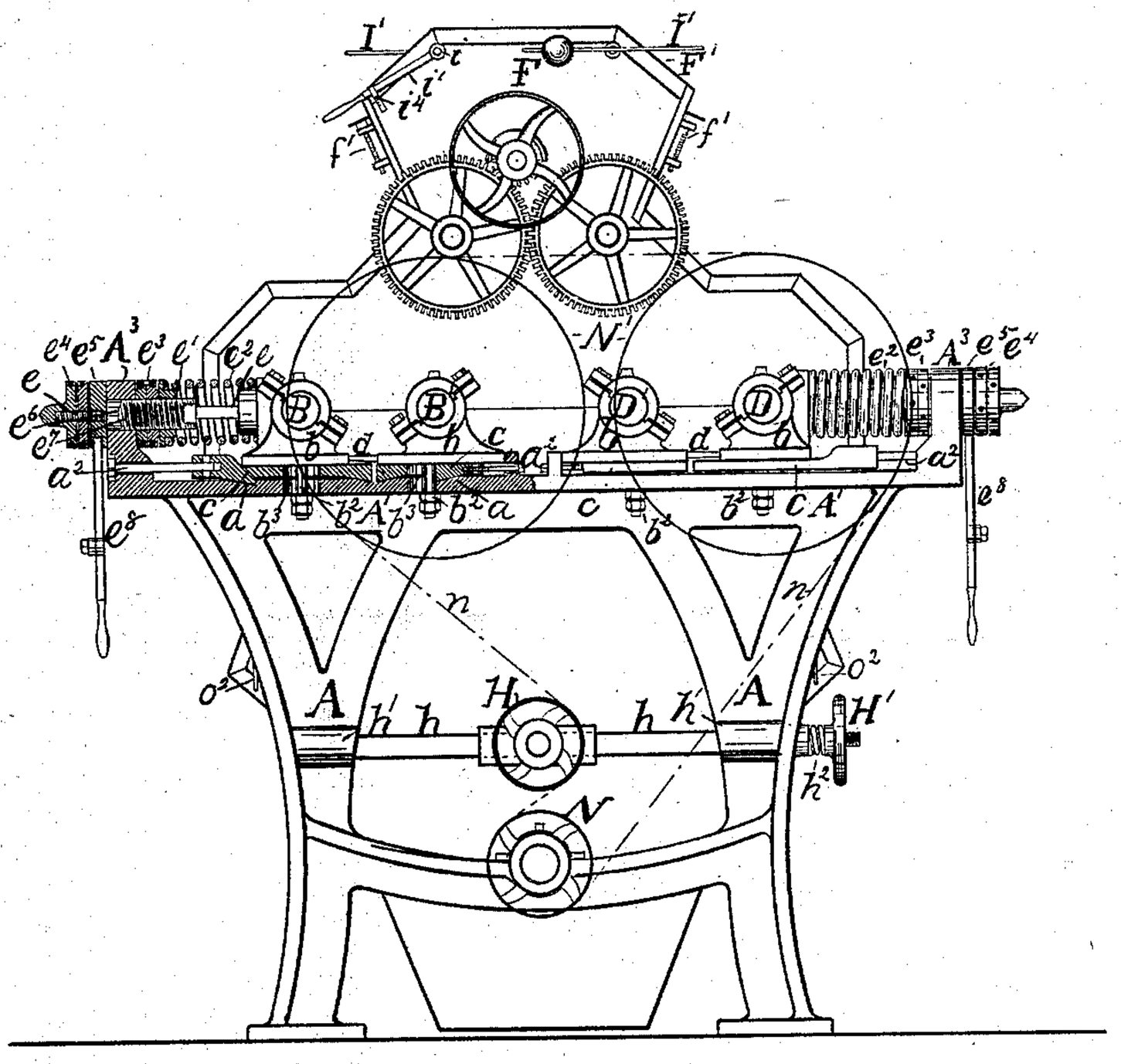

Fig. 1.

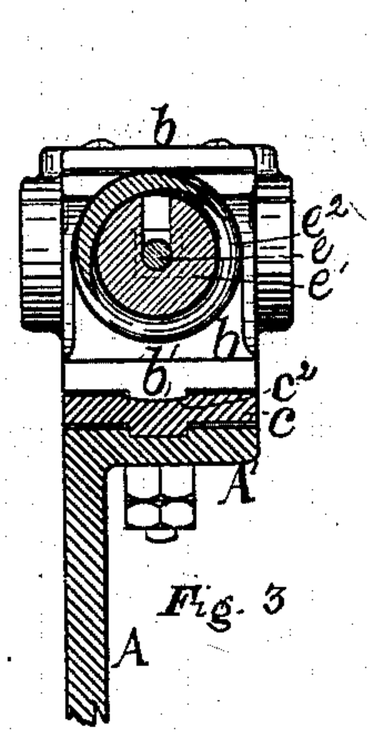

Fig. 3

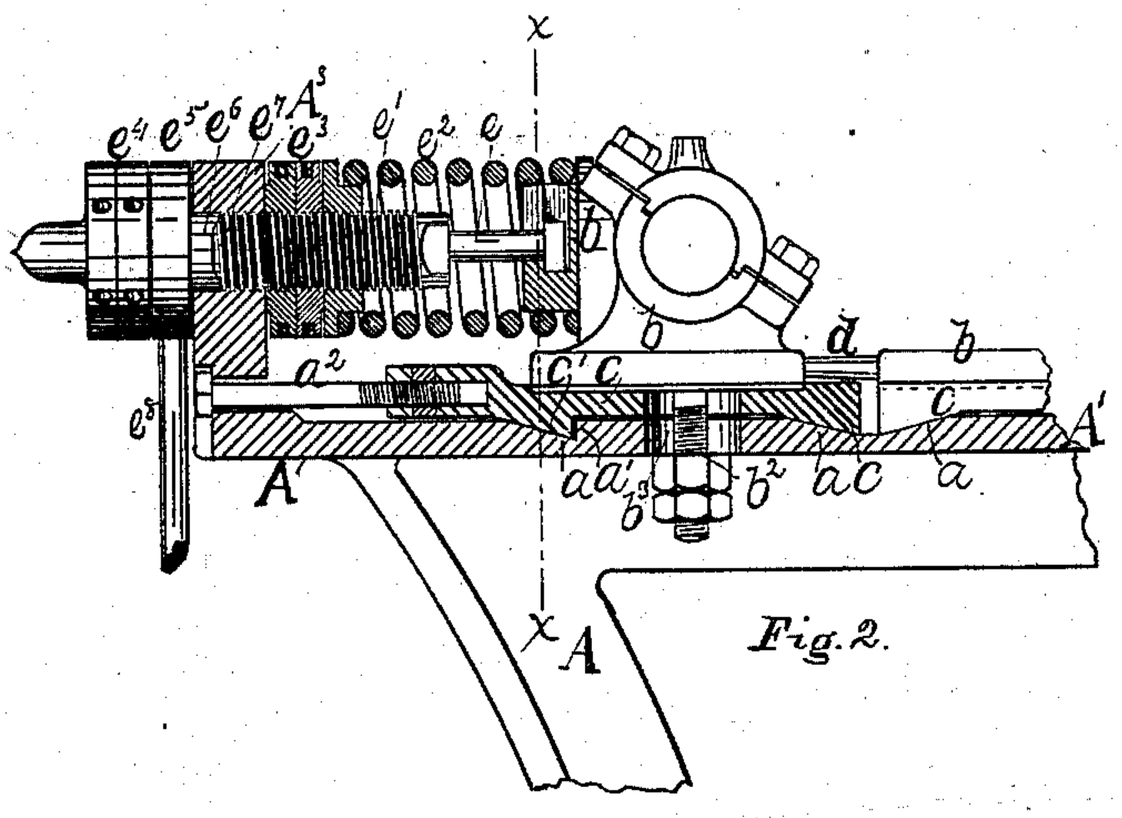

Fig. 2.

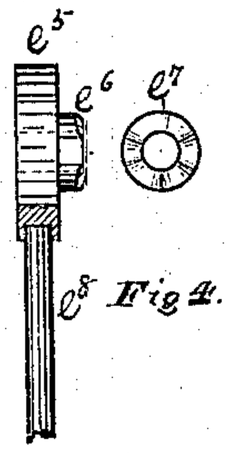

Fig 4.

Witnesses.
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R. N. Whittlesey

Inventor.
Cyrus T. Hanna
by George H. Christy
his Attorney

(No Model.) 2 Sheets—Sheet 2.

C. T. HANNA.

ROLLER GRINDING MILL.

No. 272,043. Patented Feb. 13, 1883.

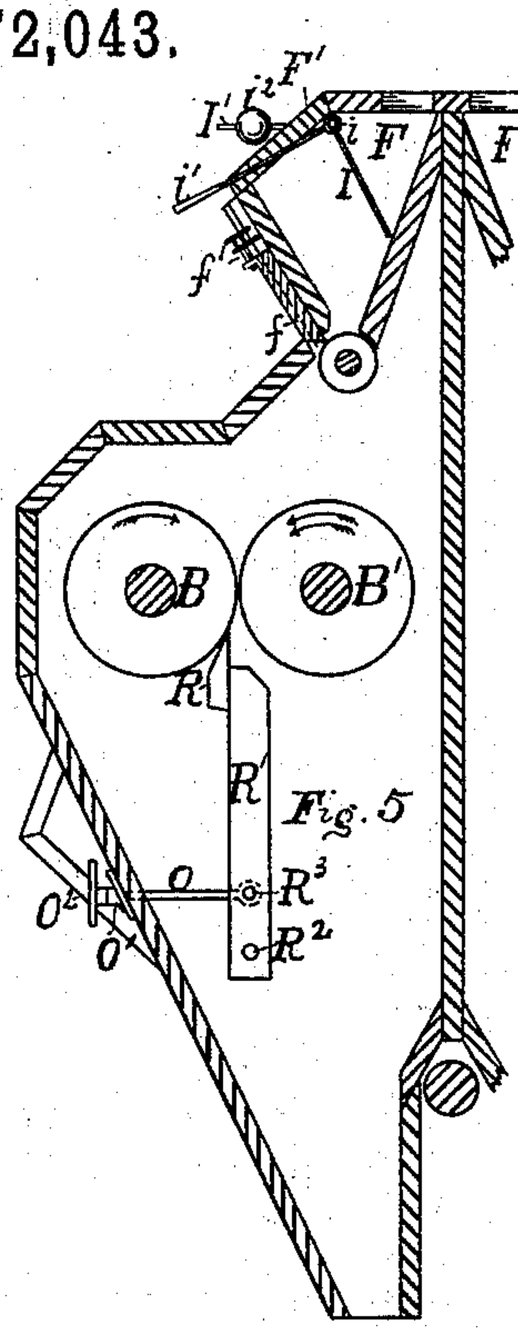

Fig. 5

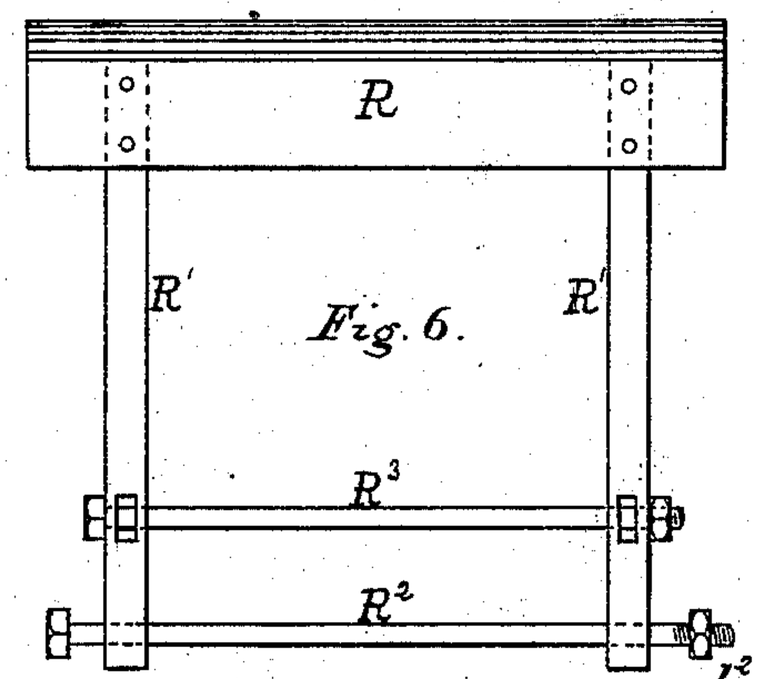

Fig. 6.

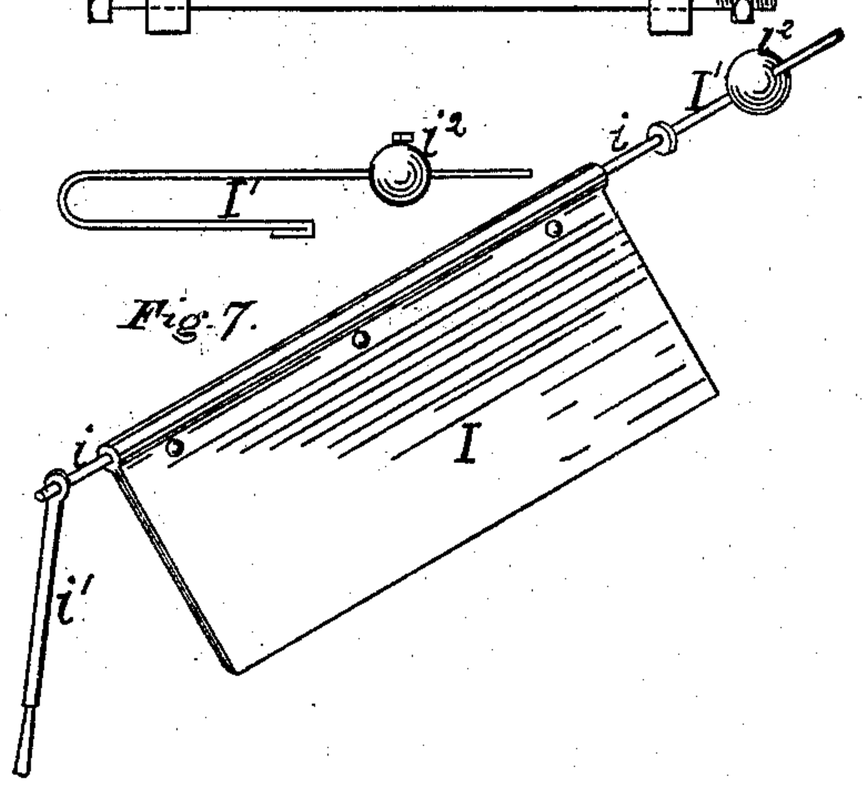

Fig. 7.

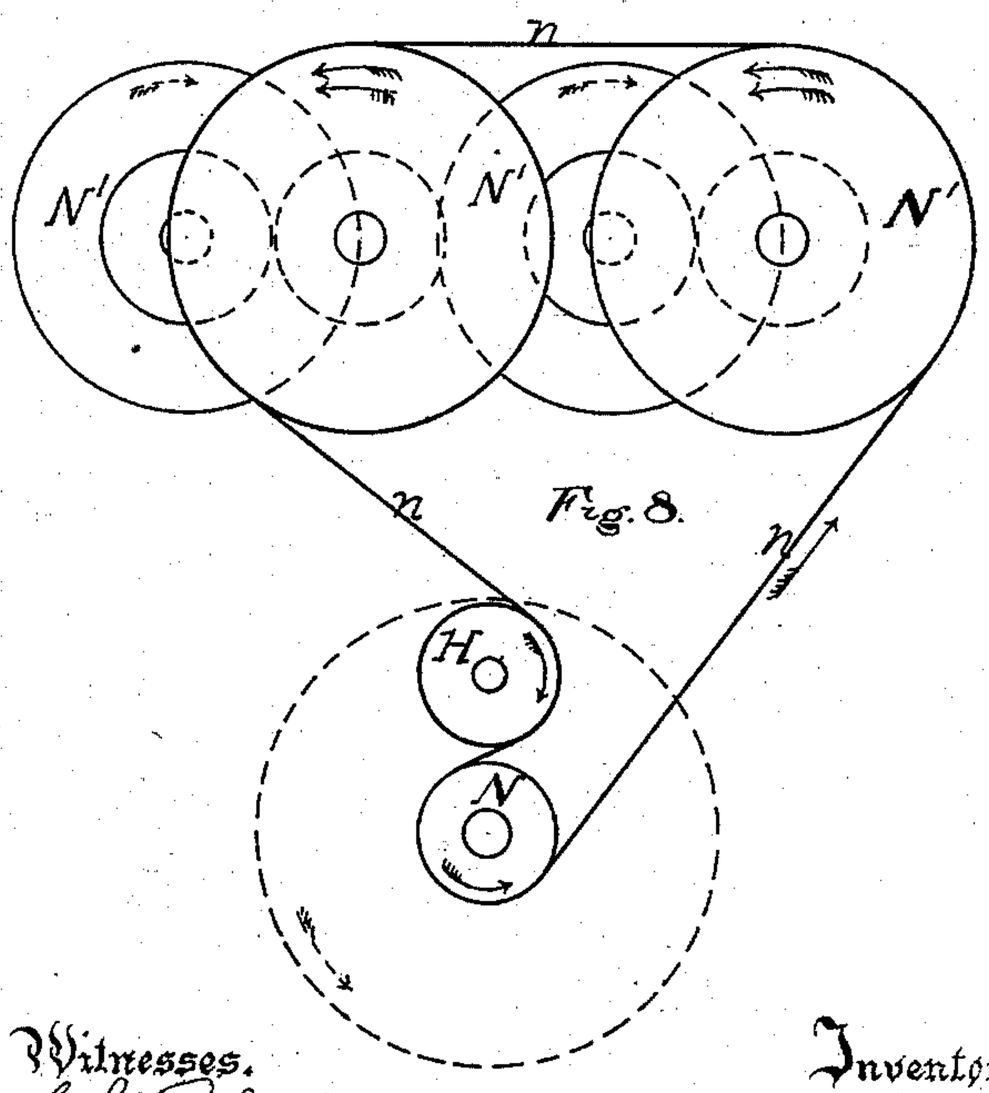

Fig. 8.

Witnesses.
C. L. Parker
R. N. Whittlesey

Inventor. Cyrus T. Hanna
by George H. Christy.
His Attorney

UNITED STATES PATENT OFFICE.

CYRUS T. HANNA, OF ALLEGHENY, PENNSYLVANIA.

ROLLER GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 272,043, dated February 13, 1883.

Application filed September 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, CYRUS T. HANNA, a citizen of the United States, residing at Allegheny, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Roller Grinding-Mills; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, shows an end elevation, partly in section, of my improved roller-mill. Fig. 2 is an enlarged view of the parts shown in section in Fig. 1. Fig. 3 is a transverse sectional view of one bearing, such section being taken in the plane of the line *x x*, Fig. 2. Fig. 4 illustrates a coupling connection or device employed for throwing the rolls into and out of working relation. Fig. 5, Sheet 2, is a vertical sectional view of a part of the wooden case and some of the operative parts illustrative of details in construction. Fig. 6 shows detached parts of the scraper mechanism employed. Fig. 7 shows parts of an automatic feed-gate employed in my improved machine; and Fig. 8 is a diagram illustrative of the arrangement of driving belts and pulleys and of adjustable tightening-pulley.

My present invention relates to certain improvements in that class of roller grinding-mills for which Letters Patent of the United States No. 253,698 were granted to me February 14, 1882; and it consists in certain combinations of devices for effecting both vertical and horizontal adjustment of the reducing-rolls, for regulating the feed-supply to the rolls, for driving the rolls, and for preventing accumulation of meal thereon, as hereinafter more fully described and claimed.

In the drawings, A represents a cast-iron frame-work, which may be of any suitable form, having bed-rails A′ on either side for support of two or more sets of rolls, B B′ and D D′. Upon the upper faces of these rails are formed inclined faces or seats *a a*—two for each roll-bearing—which terminate at their depressed ends by abrupt shoulders *a′*. Adjustable or sliding wedge-plates *c*, having correspondingly-inclined under faces, *c′ c′*, are seated on the inclines *a a*, and support or carry the pillow-blocks *b b*, the latter being connected to the frame by bolts b^2 b^2, which pass through enlarged holes or slots b^3 in the bed and wedge plates and screw into the under faces of the pillow-blocks. Screw-bolts a^2 are employed to move the wedges longitudinally, and thus raise either or both ends of the rolls for the usual purposes of adjustment. These features of construction are substantially the same as in the prior patent to me above referred to, and therefore need not be again described in detail.

In my present invention I make connection between the pillow-blocks *b* of the rolls and the wedge-plates *c* by means of longitudinal grooves c^2 in each wedge-plate, having a concave or hollowed bottom curved transversely or across the groove, as illustrated in Fig. 3, and tongues *b′* on the pillow-blocks having a correspondingly-rounded under face, adapted in form to take a full bearing upon the bottom of the grooves through a short range of rocking motion of the pillow-blocks—such, for example, as would be imparted by raising or lowering the ends of the rolls unequally. If the bearing-faces between the tongues and grooves were flat, such tipping would cause the tongues to rest on one edge, and thereby decrease their stability, and, perhaps, to bind in the grooves; also, the small openings under the raised edges would become clogged and obstructed with dust. By rounding these bearing-faces, as shown and described, such difficulties are obviated and a full bearing-contact is secured through the whole range of adjustments required in practice.

In order to adjust the rolls horizontally, I make use of substantially the same devices as shown and described in my prior patent, No. 253,698, but have introduced therewith certain features of improvement. These devices consist of threaded rods *e*, which are passed through corner uprights A^3, and screwed into the pillow-blocks—one in each—in the central plane of the roll-bearings. Each of these rods is also passed through an exteriorly-threaded sleeve, *e′*, and a coiled spring, e^2, surrounds both the sleeve and rod and bears at one end upon the pillow-block *b*, and at the other end upon a double nut, e^3, screwed on the sleeve. By turning these nuts the pressure of the springs upon the pillow-blocks may be regulated at pleasure. A similar double-nut, e^4, is also

screwed on the outer end of rod *e*, by turning which the rolls B D may be adjusted toward or from the fixed rolls B′ D′ at pleasure, the movable rolls being held up to working position by the pressure of springs e^2. In order to remove the rolls B D without disturbing the working adjustment secured by rods *e*, cam-shaped sleeves e^6 are formed on the sides of collars e^5, which collars are secured on the rods as against longitudinal movement thereon, but are free to turn circumferentially. Also, a corresponding cam-face, e^7, is made on the end of each sleeve *e′*. By turning the cams e^6 with levers e^8, the ends of the sleeves *e′* being screwed fast in the standards A^3, the rods *e* and pillow-blocks *b* will be given horizontal movement corresponding to the pitch or elevation of cams e^6 e^7; or, in other words, the rolls may be drawn outward against the springs e^2 when not at work by turning the cam-projections upon each other; or, by turning them so that the elevations of one register with the depressions of the other, the springs e^2 will force the rolls into such working relation as may previously have been determined by the rods *e*.

In order to cover these cams e^6 e^7, and thereby protect them from dust, dirt, and other foreign matter which might adhere to the cam-faces and disturb the feed adjustment, I have placed them within suitable chambers or recesses made in the standards A^3; or, as an equivalent construction, hoods, boxes, or other suitable covers may be secured to the standards in proper position to inclose the cams, and thereby afford the desired protection. In the prior patent to me these cams are uncovered and exposed to dust, dirt, and injury. In my present improvement they are effectually protected without increasing the cost of construction. This in practice will materially increase the efficiency and uniformity of feed adjustment in this class of machines. In order to prevent injurious contact of the rolls, I cast projecting pins or lugs *d* on each of the fixed pillow-blocks of the rolls B′ D′, which extend toward the movable blocks of the rolls B D, by preference in the central vertical plane of the roll-bed or base of the pillow-blocks, and they are made of such length by accurate filing or other trimming that when their outer ends abut against the movable blocks of the rolls B D the rolls shall be in the closest adjustment practicable without injury by contact. Heretofore adjustable screw-stops have been used which are liable to be disturbed or moved by the constant tremor and jarring of the machine. With my improved construction of stops no such disturbance is possible. The stop is rigid, certain, and fixed, and by bearing in the vertical central plane of the roll-bearings there is no tendency to tip the pillow-blocks by pressure upon the stops. The rolls are driven by belts *n*—one on either end of the frame—which are run from counter-shaft pulley N over pulleys N′ N′ (see Fig. 8) on the ends of the roll-shafts. Each belt drives two rolls—one in each set, as shown—and they are geared to drive their respective rolls at different speed, the fast rolls being represented by double-arrows and the slow rolls by single arrows.

In order to keep the belts at proper tension I make use of tightening-pulleys H—one for each belt—which are arranged to bear upon the belts between the counter-shaft pulleys N and roll-pulleys N′. The tightening-pulleys H are supported on endwise-movable bars *h*, which have bearings *h′* on the frame. The bars are given endwise adjustment by means of a hand-screw, H′, so as to tighten or loosen the pulleys upon the belts. The horizontal movement of the rolls B D above described tends to tighten and strain the driving-belts; and, in order to counteract such tendency or to prevent injury therefrom, I seat a coiled spring, h^2, between the adjusting-screw H′ and the frame, so that increased strain upon the belt will compress the spring and afford relief by easing the tightening-pulley.

In order to regulate the feed or supply of grain to the rolls, I make use of a double hopper, F, Figs. 1 and 5—one division for each set of rolls. Sliding gates *f f*, regulated by adjusting-screws *f′ f′*, are employed to increase or diminish the feed-aperture in the hopper-bottom. These gates and slides, as well as the hoppers, may be of the usual or any desired construction, and need not be described in detail, similar devices being in common use on roller-mills. Within the hopper are two swinging plates, I, (see Fig. 7,)—one for each set of rolls—which are pivoted by rods *i* at or near the upper edge of doors F′, which open into either side of the hopper. To one extended end of each of these rods is secured a hand-lever, *i′*, for turning the plates I upon their pivots, and to the other end is secured a reflex or U-bar, I′, on which is mounted a sliding counter-weight, i^2. This weighted bar is set at such angle to the plane of plate I that its weight shall press the lower edge of the plate against the side of the hopper, as illustrated in Fig. 5, the degree of pressure depending upon the position of the weight i^2 on its bar. Also, by means of the reflex bend in bar I′ it is carried both sides of the vertical plane of the pivot-rod, and thus provision is made for adjusting the weight to either side such plane, so as to make it operative in regulating the grain-supply, as described. Or, if desired, in reducing light grain or meal the plate may be held down by the weight out of the line of feed. This feature of improvement in balancing or overbalancing the plate in either direction I consider important.

In operation, grain or material to be reduced is fed to the hopper above the plates I, which will retain the grain until sufficient weight has accumulated to overbalance the counter-weight i^2, when the plates I will be opened and a steady uniform run or stream of such material will pass to the rolls through the openings made by the adjustable plates *f f* at the bottom of the hopper. If it is desired to shut off the supply without disturb-

ing the adjustment of plates *f*, the lever *i'* is pressed down and passed under a catch, i^4, Fig. 1, thus holding the lower edge of the plate I firmly against the side of the hopper, so as to close the passage. By the use of two regulators I secure a very uniform feed, and provide for shutting off feed, when desired, without disturbing the feed-regulator nearest to the rolls. I am also enabled better to detect and remove hard substances, which would injure the flour or the machine.

In order to prevent accumulation of meal upon the faces of the slow rolls, I make use of scrapers R—one for each set of rolls—which are mounted within the case of the mill below the rolls, and are supported by vertical bars R', pivoted at their lower ends by rod R^2 to the sides of the frame or the wooden case within the frame. Also, from a rod, R^3, above or below the pivot, a pull-rod, *o*, is passed outward horizontally through the case, and through a metallic washer, *o'*, which is fastened to the case on the outside, and so beveled on its faces as to fit the inclination of the case, and afford a full bearing for a hand-screw, o^2, which is run on the threaded end of rod *o*. By turning the wheel the scrapers may be set at any desired distance from the surface of the roll and there held rigidly, so that any substance adhering to the roll will be removed with certainty. By mounting these scrapers within the case below the rolls dust is prevented from escaping. Also, by extending the adjusting-rods outside the case the screws o^2 are brought into convenient reach of the miller. I thus combine the advantages of inclosed scrapers and those having an unyielding support to hold them to their work.

I claim as my invention—

1. In a roller grinding-mill, the combination of inclined faced bed-rails *a a*, sliding wedges *c*, having grooves c^2 therein, with transversely-curved bottoms to such grooves, and pillow-blocks *b* for the rolls, having tongues *b'*, with rounded faces adapted to fit the curve in the bottoms of the grooves, substantially as set forth.

2. The combination of pillow-blocks *b*, screw-rods *e*, sleeves *e'*, springs e^2, standards A^3, and collars e^5, such collars and sleeves having cam-faces e^6 e^7 on their adjacent ends, which are inclosed within and covered by the standards, substantially as and for the purposes set forth.

3. In a roller grinding-mill, the combination of pillow-blocks *b*, rods *e*, standards A^3, cams $e^6 e^7$, and the means, substantially as described, for inclosing and protecting the cams.

4. In combination with the rolls and driving-belts of a roller grinding-mill, a tightening-pulley, H, endwise-movable bar *h*, carrying such pulley, spring h^2, and adjusting-screw H', substantially as and for the purposes set forth.

5. In combination with counter-shaft pulley N, roll-pulleys N' N', and belt *n*, a tightening-pulley, H, in line between the pulleys N' N' and N, movable supporting-bar *h*, and adjusting-screw H', substantially as set forth.

6. In combination with the reducing-rolls and inclosing-case of a grinding-mill, a scraper, R, and pivoted supporting-arms R', mounted within the case below the rolls, a rod, *o*, extending from the scraper-support within the case to the exterior of the case, and an adjusting-screw, o^2, on the threaded end of the rod outside of the case, substantially as and for the purposes set forth.

7. The combination of hopper F, plate I, pivot-rod *i*, reflex bar I', extending on both sides of the vertical plane of the pivot-rod, and counter-weight i^2, adjustable on the reflex-bar to either side of such vertical plane, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand.

CYRUS T. HANNA.

Witnesses:

C. L. PARKER,

S. HARVEY THOMPSON.