(No Model.) 2 Sheets—Sheet 1.

C. T. HANNA.

ROLLER GRINDING MILL.

No. 253,698. Patented Feb. 14, 1882.

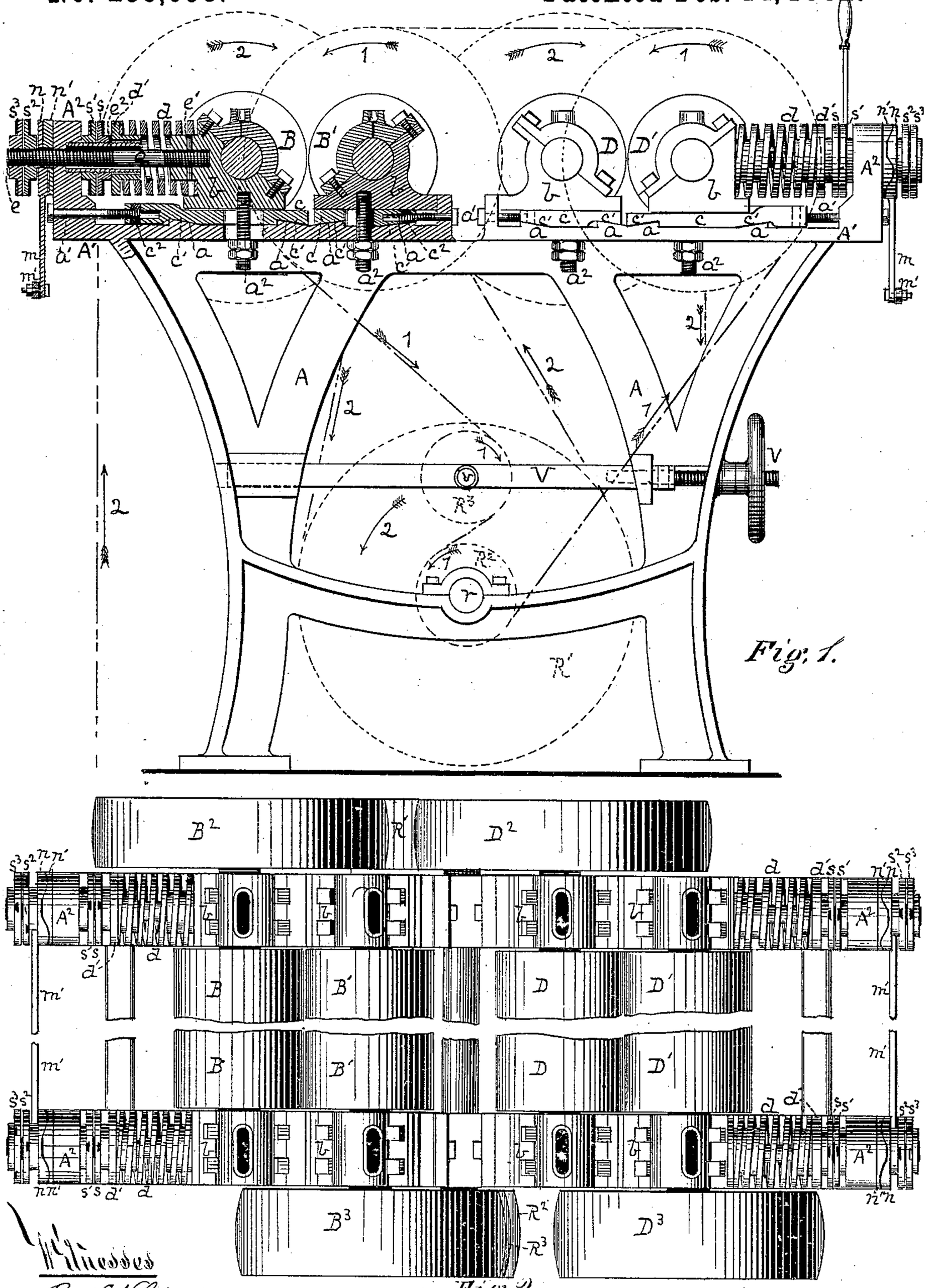

Fig. 1.

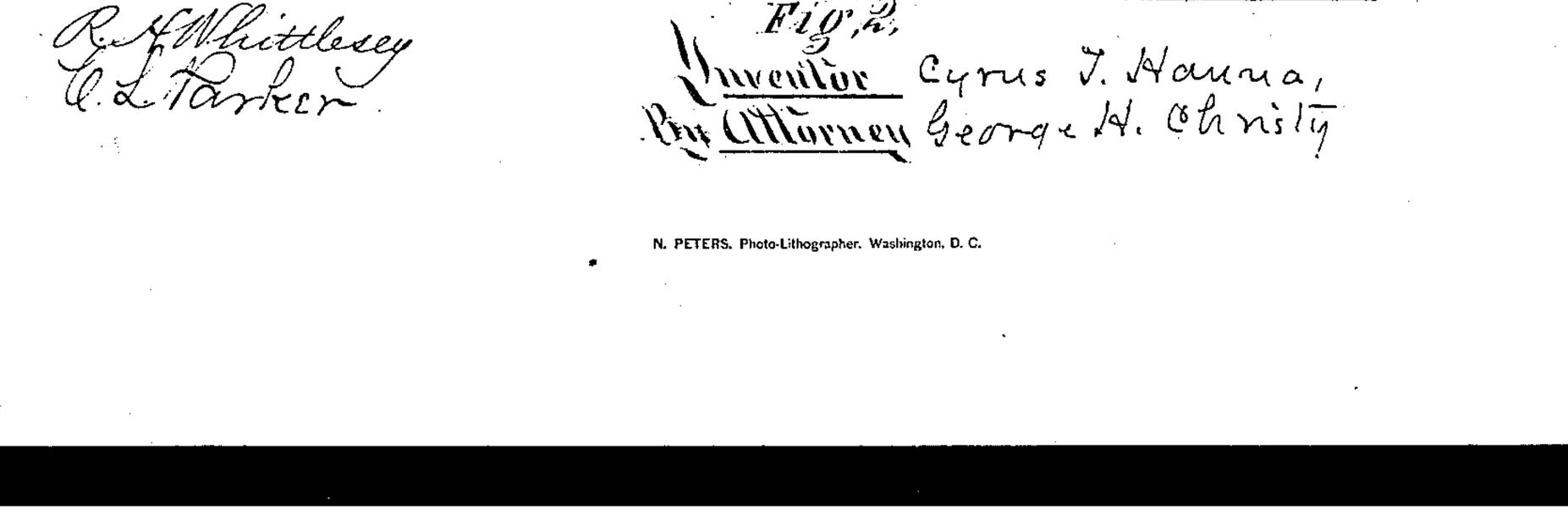

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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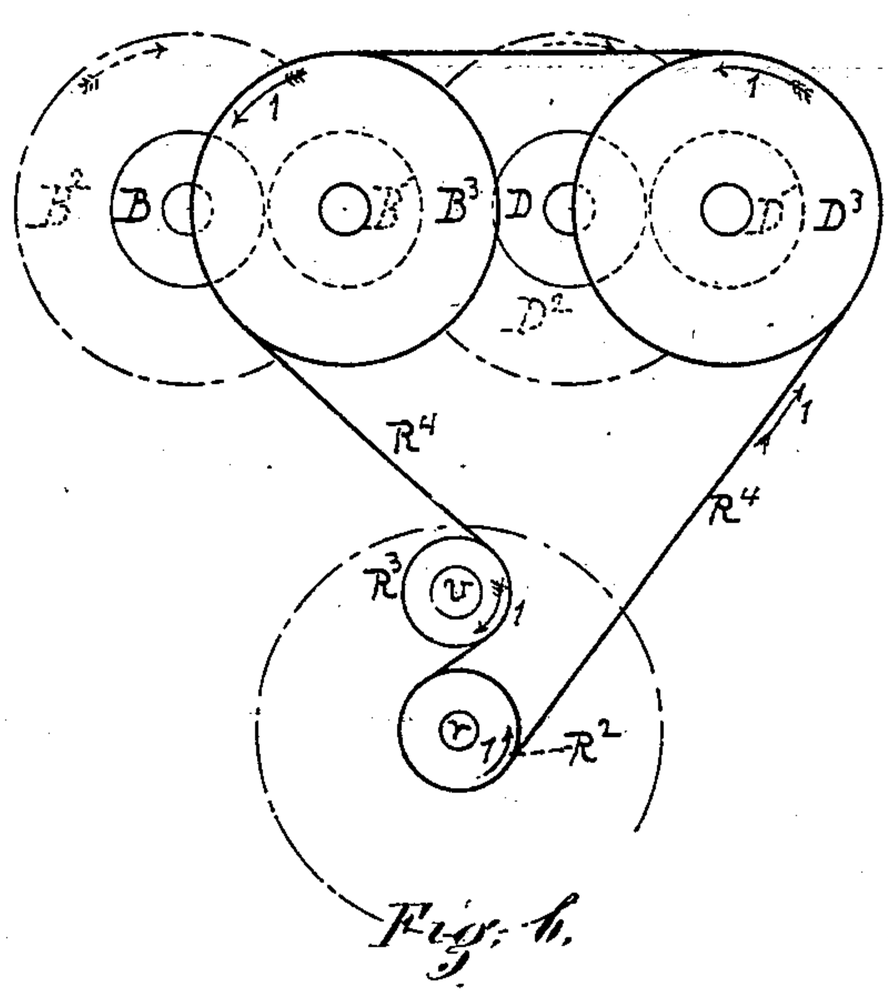

Fig. 6.

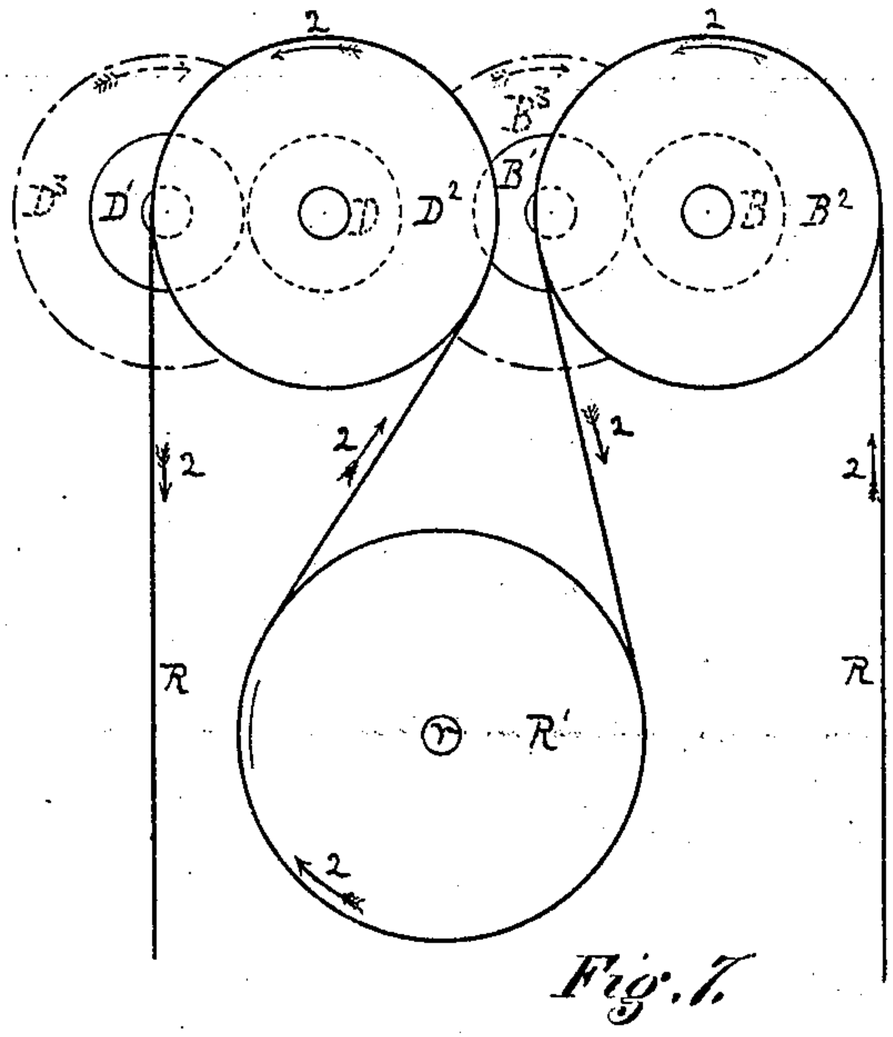

Fig. 7.

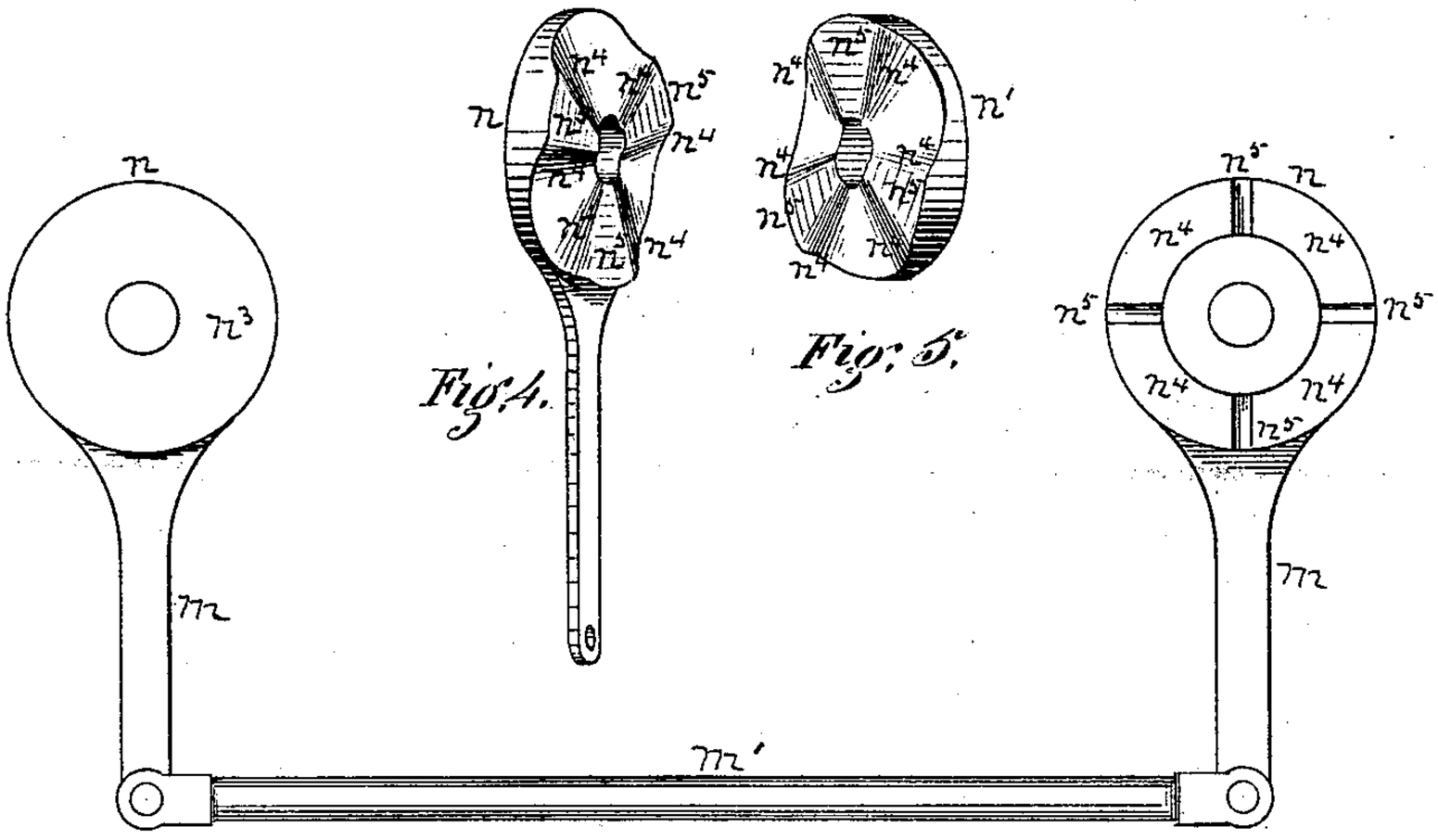

Fig. 4. Fig. 5.

Fig. 3.

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UNITED STATES PATENT OFFICE.

CYRUS T. HANNA, OF ALLEGHENY, PENNSYLVANIA.

ROLLER GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 253,698, dated February 14, 1882.

Application filed September 19, 1881. (No model.)

To all whom it may concern:

Be it known that I, CYRUS T. HANNA, of 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, is a view, partly in end elevation and partly in vertical section through the roll-bearings, of a roller grinding-mill embracing my present improvements. Fig. 2 is a top or plan view thereof, the middle part of the machine being broken away and the ends brought up together for compactness of illustration. Fig. 3, Sheet 2, is a detached view, to an enlarged scale, of the crank and eccentric connections for shifting the rolls clear of each other when in motion and no material is passing through. Figs. 4 and 5 are detached views, in perspective, of one pair of the cam-faced dies so employed. Fig. 6 is a diagram view in elevation to a reduced scale, illustrating the belt-driving gear employed at one end of the machine for driving the slow rolls, the same being indicated by the line of arrows 1 1 in Fig. 1, and the end of the machine referred to being in this case what appears as the lower end in Fig. 2; and Fig. 7 is a like diagram in elevation, as looked at from the other end of the machine, illustrating the belt-driving gear employed for driving the fast rolls, the same being indicated by the arrows 2 2.

My present invention relates more particularly to devices for adjusting the rolls, also for throwing them clear of each other when in motion and no material is passing through, and to the arrangement of the pulleys and belts for driving the rolls.

In the drawings, A represents any suitable frame-work, and I have shown two sets or parts of crushing and grinding rolls, B and D being the fast-moving rolls, and B′ D′ being the slow rolls; but the number of sets is not material. Such rolls, in order to do good work, have to be adjusted with great accuracy, and the feature of invention which I will first explain relates to the horizontal adjustment of the movable roll, which for convenience is usually the outer roll, and to the vertical adjustment of both rolls of each set. For the latter purpose inclined seats *a* are made in the bed-plate A′ of the frame, such seats in each case sloping downward toward the vertical plane of feed, and the seats for each plumber-block *b* of each roll are the one forward of and the other back of the vertical plane of the roll-axis. The plumber-blocks *b* rest each on a sliding or adjustable wedge-plate, *c*, on the lower face of which, in position corresponding to the inclines *a*, I make counter-inclines *c′*, so that the inclines *c′* sliding up or down the inclines *a′*, as the case may be, will raise or lower the plumber-blocks and rolls.

Any suitable means may be employed to shift or adjust the wedge-plates *c*, one convenient way being by the use of screw-bolts *a′*, the threaded ends of which take into tapped nuts c^2, let into the wedge-plates at the proper points. When by the use of these devices the rolls have been properly adjusted in a vertical direction they are secured in place by the use of bolts and nuts a^2, or by other suitable means.

For purposes of horizontal adjustment it is only necessary that one of the rolls of each pair be movable. To effect such motion I employ threaded stems *e*, which I screw into the plumber-blocks in a horizontal direction, and as near as may be in the horizontal plane of the roll-axis, and the more accurately the connection is made in such plane the better will be the results, since that being the plane of greatest strain the resistance in the same plane prevents the tendency, which would otherwise exist, for the roll to tip on its axis. Each stem is secured to its plumber-block by a bolt or key, *e′*. Each stem passes through a fixed stem, A^2, and also through an exteriorly-threaded sleeve, e^2, which is screwed into the tapped hole in the post. On this sleeve, inside the post, are two nuts, *s s′*. The tightening or bearing nut *s* works against a shouldered socket, *d′*, and a comparatively stiff spring, *d*, is arranged to bear at one end against the socket, and at its other end against a shoulder

or seat on the plumber-block. These devices are chiefly for setting the rolls nearer together. For adjustment in the opposite direction I employ these same devices along with nuts s^2 s^3, outside the post, and outside the cam-faced disks n n', presently to be described. These nuts work on the threaded stem e, but being turned up or tightened tend to draw the stem, and with it the plumber-blocks and roll, outwardly, so as to separate the rolls.

The manner of working the nuts in order to set or adjust the rolls in either direction, and clamp or secure them in the desired position of horizontal adjustment, will be readily understood by the skilled mechanic, and need not be explained at length.

In the working of rolls of this class it is important that when no material is going through the rolls be thrown entirely clear of each other for the time being, but in such way that the adjustments for work shall not be interfered with, and so that when feeding is resumed the rolls may at once be set back into working position without requiring a new adjustment. To this end I arrange outside of each post A^2, and inside the nuts s^2 s^3, a pair of cam-faced disks, n n'. (More fully shown in Figs. 3 to 5.) The back or outer faces, n^3, of the disks are made plain, or of other form, such as to give a firm bearing against the post or nut, as the case may be.

The disk n' is made fast to or as a part of the post A^2, and the other, n, is loose, so as to be capable of a rotary motion. The inner faces of the disks are made with inclines and depressions n^4, corresponding to each other in shape, so that when n is rotated from the positions shown in Figs. 1 and 2 the inclines of the one disk riding up the inclines of the other will tend to force the disks apart, and will thereby press the nuts s^2 s^3 outwardly, and by drawing on the stems e will pull the outer roll far enough from the other for their working-faces to clear each other completely, the springs d being slightly compressed in the operation. And in order that both plumber-blocks of one roll may be thus moved at once and to the same extent I attach a crank-arm, m, to each movable disk, and connect the crank-arms of the disk appropriate to one roll by a connecting-rod, m', which is also the handle, by means of which the workman may shift both disks simultaneously, either in separating the rolls when the feed stops or in letting them go back to position for work under the action of the springs d, when the feeding is again about to be resumed.

The apexes of the inclines should be slightly flattened, as at n^5, in order to give a firm rest or bearing in the back adjustment.

Another feature of improvement relates to the arrangement of the driving-pulleys and belts. Fig. 6 illustrates by full lines the arrangement of pulleys and belts at what in Fig. 1 is the front end of the machine, and in Fig. 2 is represented as the lower end; and Fig. 7 illustrates by full lines the arrangement of pulleys and belts as looked at from the opposite end of the machine, or, in other words, shows the same arrangement as is indicated at the arrows 2 2 in Fig. 1, but in a reversed position. In Figs. 6 and 7 the rolls in dotted or full lines are lettered as in Figs. 1 and 2. B^2 is the driving-pulley of the roll B, and D^2 is the driving-pulley of the fast roll D. The belt R passes from the driving power, usually arranged beneath the floor, following the line of arrows 2 2, over the pulley B^2, down beneath a pulley, R′, fixed on a shaft, r, thence up over the pulley D^2, and down to the driving-pulley beneath. These pulleys are suitably proportioned for giving a comparatively high speed to the fast rolls B and D.

At the other end of the machine I arrange a series of smaller pulleys, such as will give to the other rolls, B′ D′, a slower motion, and as much slower as may be desired. Thus a pulley, B^3, is fixed on the shaft or spindle of the roll B′, and a like pulley, D^3, on the spindle D′. Immediately beneath these pulleys, and on the shaft r, I affix a small pulley, R^2. Above the latter, and on a bearing or spindle, v, affixed to a longitudinally-adjustable support, V, Fig. 1, I arrange a tightening-pulley, R^3, and then carry the belt R^4 around this line of pulleys, as indicated by arrows 1 1. The bar or support V, which carries the tightening-pulley R^3, may be adjusted in the direction of its length by any suitable adjusting-screw, V′. This arrangement of pulleys and belts I have found gives excellent results, and has elements of superiority in its simplicity, compactness, cheapness, and ease of operation.

I make no claim herein to the described arrangement of the driving-pulleys and belts, but show them in order that the operation of the machine may be the more readily understood. In so far as these parts may involve any patentable invention, they will be included in a separate application.

I claim herein as my invention—

1. In combination with the plumber-blocks and bed-plate of a roller grinding-mill, the inclines a a in the bed-plate at each end of the roll, and one on each side of the vertical plane of the roll-axis, and adjustable wedge-plates c, having each a pair of counter-inclines, c', in position corresponding to position of the inclines a, substantially as and for the purposes set forth.

2. In combination with the movable roll of a roller grinding-mill, the stems e, connected to the plumber-blocks in the horizontal axial plane of the roll-axis, adjusting and jam nuts s s' s^2 s^3 on opposite sides of the fixed bearings A^2, sleeves e^2, and springs d, substantially as and for the purposes set forth.

3. The cam-faced disks n n' and suitable mechanism for connecting them together in pairs, in combination with the described horizontal adjusting mechanism, substantially as set forth.

4. As a means of changing or varying the adjustments of a movable roll, a pair of cam-faced disks, $n\,n'$, having inclines and counter-inclines of suitable form terminating at their apexes in flat bearing-points n^5 for imparting motion in one direction, in combination with a spring for effecting the opposite or reverse throw, substantially as set forth.

In testimony whereof I have hereunto set my hand.

CYRUS T. HANNA.

Witnesses:
R. H. WHITTLESEY,
GEORGE H. CHRISTY.