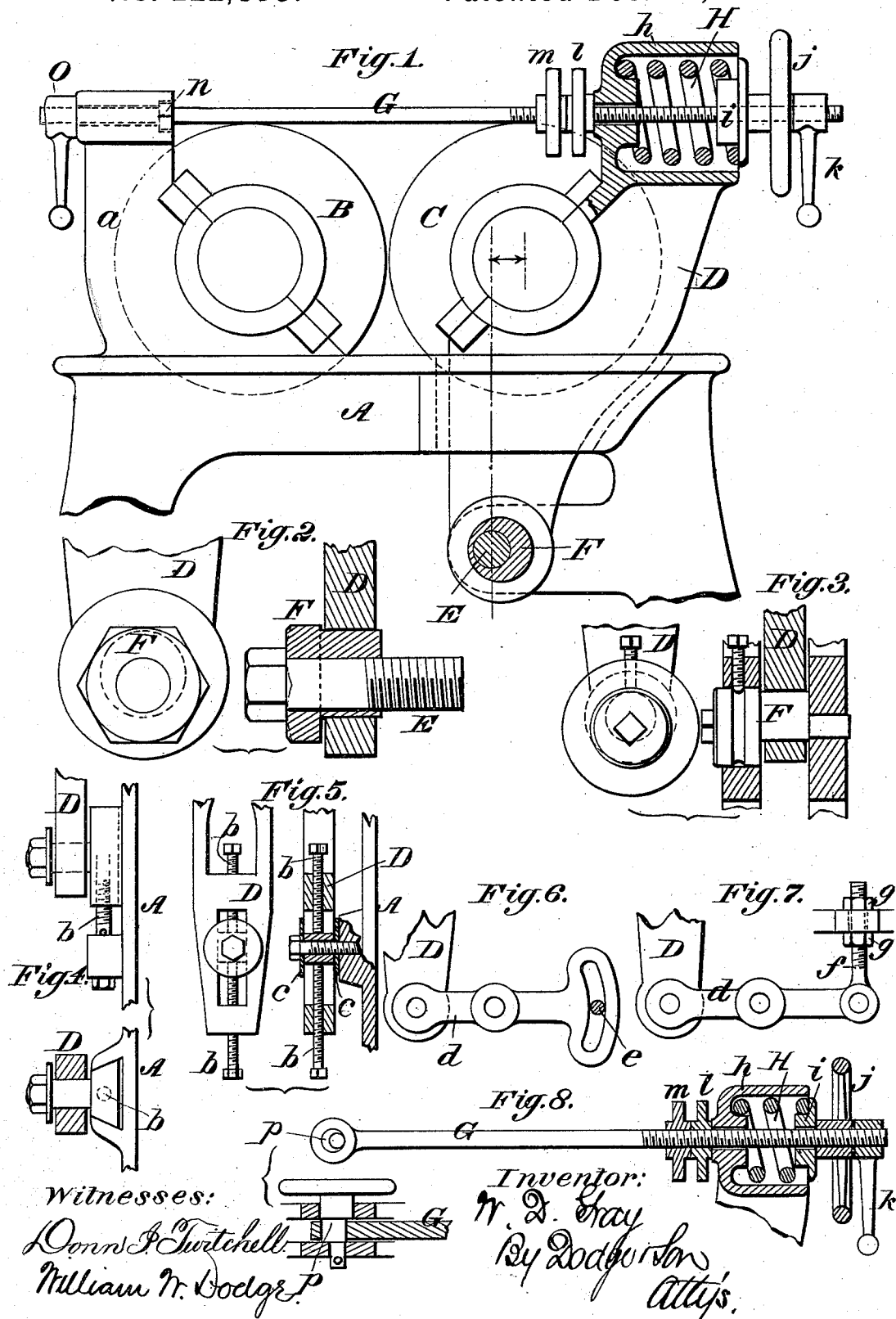


W. D. GRAY.
Roller-Grinding Mill.

No. 222,895.

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UNITED STATES PATENT OFFICE.

WILLIAM D. GRAY, OF MILWAUKEE, WISCONSIN.

IMPROVEMENT IN ROLLER GRINDING-MILLS.

Specification forming part of Letters Patent No. **222,895**, dated December 23, 1879; application filed July 30, 1879.

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 Improvements in Roller Grinding-Mills, of which the following is a specification.

My invention relates to roller grinding-mills; and it consists in a peculiar construction and arrangement of devices for adjusting the rolls vertically as well as horizontally, whereby any unevenness in the wear of the rolls or their journals or bearings may be compensated for, and the grinding or crushing surfaces kept exactly in line.

The invention also consists in the special devices for separating the rolls when not in action, and in other details.

In the accompanying drawings, Figure 1 represents a side elevation of a portion of a roller-mill embodying my improvements in one form, a portion of the figure being shown in section; Figs. 2, 3, 4, 5, 6, and 7, views showing modifications of the devices for adjusting the roll vertically; and Fig. 8, a view of the device for separating the rolls when not in action.

In the use of roller-mills it is found that the roller-bearings wear unequally at opposite ends, and also that they wear more rapidly on the under than on the upper side, and that, consequently, the rolls lose their parallelism and their proper vertical height.

It is to overcome these difficulties that the present invention is designed; and to this end the parts are constructed and arranged as represented in the accompanying drawings, in which—

A represents the frame of the machine or mill, and B and C, respectively, the fixed and adjustable rolls, two rolls only being shown, though, of course, any number of sets may be employed. The roll B is mounted in fixed bearings *a*, formed upon or attached to the main frame; but the roll C is journaled at its ends in independent swinging or pivoted arms or supports D, as shown in Fig. 1. The arms or supports D extend downward below the rolls, and are attached to the main frame by pivoted bolts E, thus enabling the roll to be swung toward or away from the stationary roll, as required.

In order that the arms or supports may be

adjusted vertically, and the ends of the roll C thereby elevated or lowered, I mount upon each bolt E an eccentric sleeve, F, Fig. 2, seated and free to be turned in an eye or opening in the lower end of the arm or support, as shown, said sleeves being furnished with a suitable head to receive a wrench by which to adjust them.

By turning the sleeve F the arm may be moved up or down, as desired, and when the adjustment has been made the sleeve is clamped firmly in place by means of the bolt E, which draws its end against the main frame, the sleeve then becoming the pivot or journal on which the arms or supports D move when being adjusted horizontally.

Instead of making the eccentric F in the form of a sleeve, as shown in Fig. 2, it may be made solid, as in Fig. 3, journaled at its ends in the frame, and retained in position by a set-screw or equivalent device.

In Fig. 4 the pivot of the arms is shown formed upon a dovetailed block, adjusted vertically by a screw-stem, *b*, the upper end of which enters the block, while its lower end is journaled in a projection formed on the frame. By turning the screw the block and arms D may be raised or lowered, as desired.

Instead of employing the single screw-stem, as in Fig. 4, the block or pivot may be attached to the arm or support D by means of a bolt or screw passing through the same, as in Fig. 5, and adapted to draw a plate or washer, *c*, against the faces of the slotted frame A, in which it is adjusted by means of two vertical screw-stems, *b*, one above and the other below the block, as shown; or, in lieu of the above-described arrangements, the arms or supports D may be pivoted to the free end of a pivoted or rocking lever, *d*, as in Figs. 6 and 7, the opposite end of said lever being slotted to receive a clamping-bolt, *e*, or provided with an adjusting threaded stem, *f*, passing through an ear on the frame and jointed to the lever, and raised and lowered by nuts *g*, one above and one below the ear, as shown.

It will be observed that the effect of each of these devices is to raise or lower the arms or swing-boxes D, and that while differing somewhat in construction, they all accomplish the same end.

In order to provide for the adjustment of

the rolls to and from each other horizontally a rod or bolt, G, is extended from the stationary box or bearing *a* at each side of the machine to the upper end of the swinging arm or support D at the same side, as shown in Fig. 1. The upper end of each arm or swing-box D is formed with an enlarged spring case or chamber, *h*, perforated on its inner side to permit the passage of the stem or rod G through it, a strong spring, H, being placed in said chamber, and retained therein by means of a washer or plate, *i*, placed upon the rod and held against the spring by a wheel-nut, *j*, which screws upon the threaded end of the rod or bolt G, and is in turn held by a jam-nut, *k*. By turning the nut-wheel *j* the tension or compression of the spring H may be perfectly and delicately adjusted, the spring serving to allow the separation of the rolls upon the entrance of hard substances between them. A nut, *l*, and jam-nut *m* are placed upon the rod or bolt G, in front of the spring case or chamber, to regulate the forward movement of the roll.

By reference to Fig. 1 it will be seen that the pivots of the arms or supports D are located slightly forward of the journals of the roll C, whereby the roll is caused to fall back away from roll B by its own gravity when released or loosened. This backward movement or separation of the roll is very important in mills of this class, particularly when porcelain rolls are employed, in order that their surfaces may not come in contact when there is no grain between them, and in order, also, that the grain may not wedge between them while out of operation, in which event the mill is subjected to great and injurious strain in starting.

In order to permit the ready separation of the rolls and insure their return to place when desired without alteration in their adjustment, one end of the rod or stem G is passed through the upper portion of the stationary box *a*, and is provided with a square shoulder, *n*, to enter a corresponding recess in the inner face of the same, as shown in Fig. 1, its outer end being threaded and furnished with a nut, *o*, as shown. By releasing or partially turning off the nut *o* the roll C is allowed to fall back; but by again turning up the nut the roll is drawn forward until the shoulder *n* bears upon the face of its seat, when the roll will stand in precisely the same position as before.

In Fig. 8 there is represented a modification of the above arrangement, an eccentric, *p*, provided with a hand-wheel, being substi-

tuted for the nut *o*. The eccentric or wheel will in practice be furnished with a stop to limit its rotation, or else the rod G will be shouldered, as above, in order that the roll shall be brought to the same point each time.

By the above devices the working of the mill is greatly improved and its action rendered uniform, while the adjustments are rendered more easy.

It is apparent that the roll B may also be made adjustable; but the plan shown and described is considered best.

Having thus described my invention, what I claim is—

1. In a roller-mill, the combination of the stationary roll B and the adjustable roll C, mounted in the upper end of pivoted supports D, the pivots of which are located in advance of the axis of the roll, as shown and described, whereby the roll is caused to fall back by gravity, and so remain when released.

2. In a grinding-mill, the combination of a roll, an upright swinging arm at each end of said roll, an eccentric adjustable pivot located at the lower end of said arm, and devices, substantially such as shown, acting against the upper end of the arm.

3. The combination of a roll and upright swinging sustaining-arms, having their lower ends mounted on vertically-adjustable pivots, the latter thus serving both to sustain and adjust the rolls.

4. In combination with the movable roller-bearing, the rod G, adjustable stop devices to limit the inward movement of the bearing, an outside spring urging the bearing inward, and adjusting devices, substantially such as shown, to regulate the tension of the spring.

5. In combination with the roller-bearing, the adjusting-rod provided at one end with a stop to limit the inward movement, a spring, and means for adjusting the latter, and provided at the other end with a stop and holding devices, substantially as shown and described.

6. The combination of the bearing D, rod G, nut *l*, spring H, nut *j*, stop *n*, and nut *o*.

7. The combination of the roller, the upright supporting-arm D, the eccentric sleeve F, having the lower end of the arm mounted thereon, and the screw E, applied as shown, and securing the sleeve against rotary movement.

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Witnesses:

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