(No Model.) 3 Sheets—Sheet 1.

J. B. ALLFREE.

ROLLER GRINDING MILL.

No. 342,671. Patented May 25, 1886.

Fig. 1.

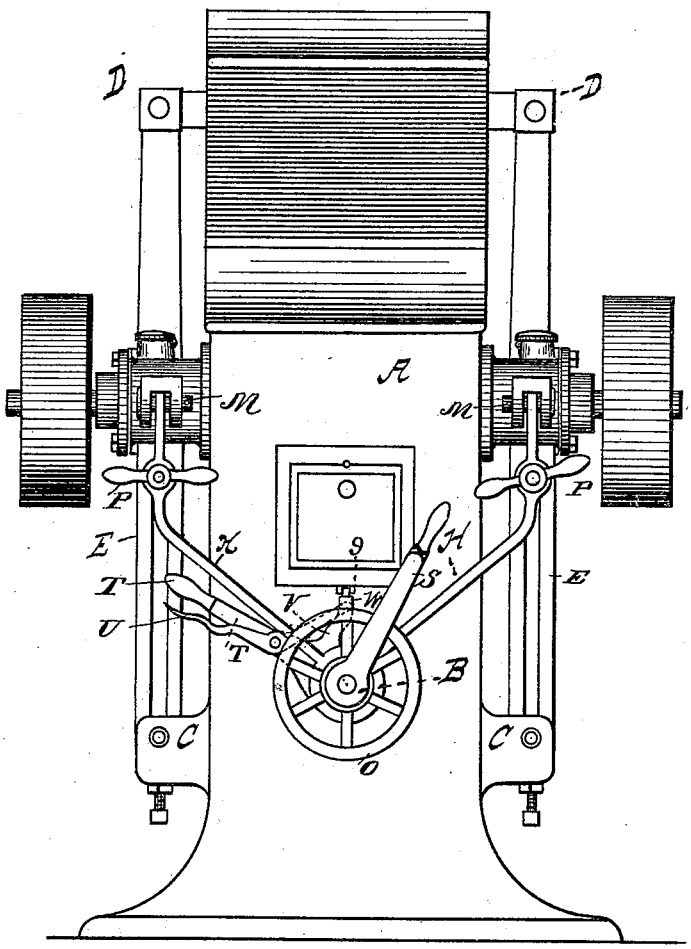
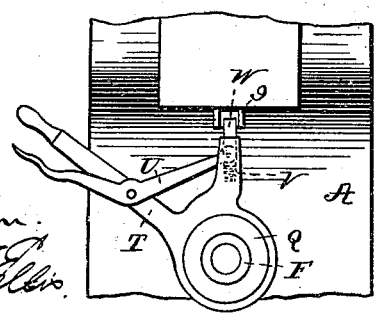


Fig. 8.



WITNESSES.
Wm. Rheem.
E. Everett Ellis.

James B. Allfree
INVENTOR.
By Wm. C. Whittemore
ATTY.

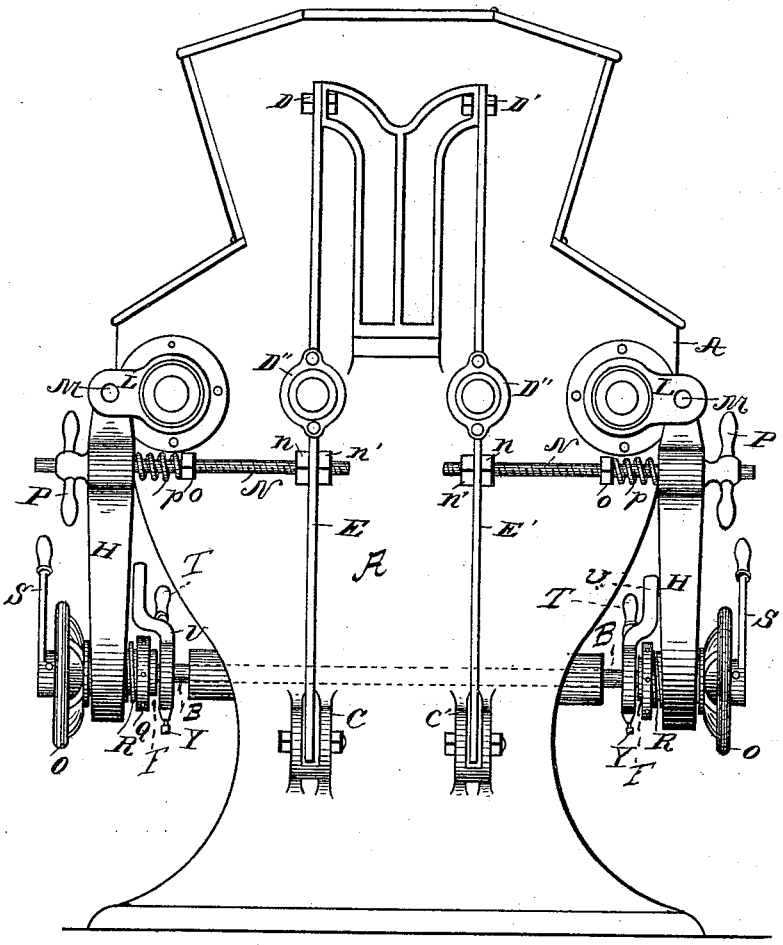
(No Model.) 3 Sheets—Sheet 2.

J. B. ALLFREE.

ROLLER GRINDING MILL.

No. 342,671. Patented May 25, 1886.

Fig. 2.



Witnesses.
Wm Rheem
E. Everett Ellis

James B. Allfree
Inventor.
By Wm. C. Linthicum
Atty.

(No Model.) 3 Sheets—Sheet 3.

J. B. ALLFREE.

ROLLER GRINDING MILL.

No. 342,671. Patented May 25, 1886.

Fig. 3.

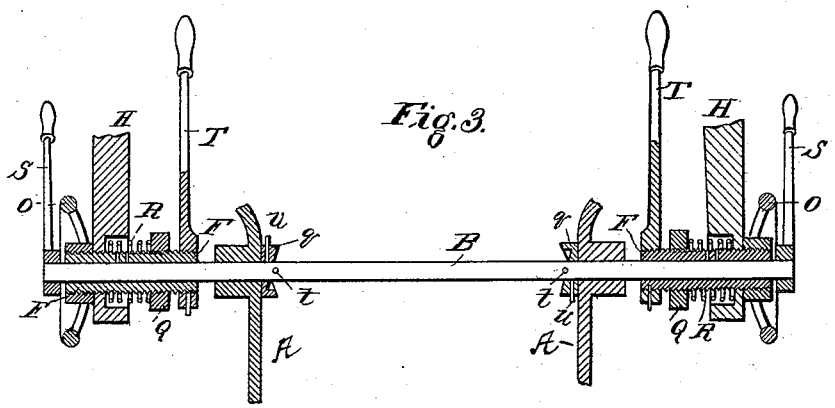


Fig. 4.

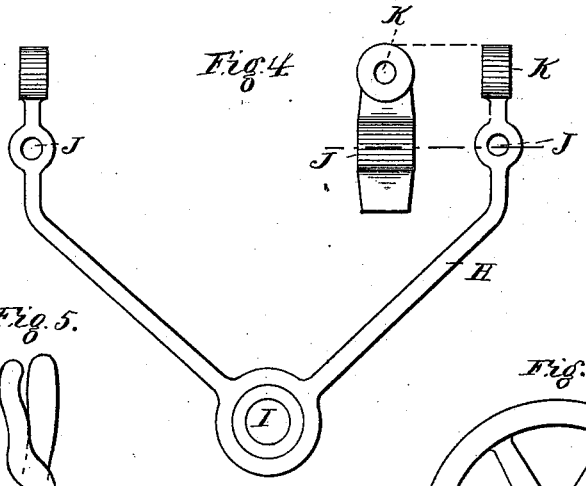


Fig. 5.

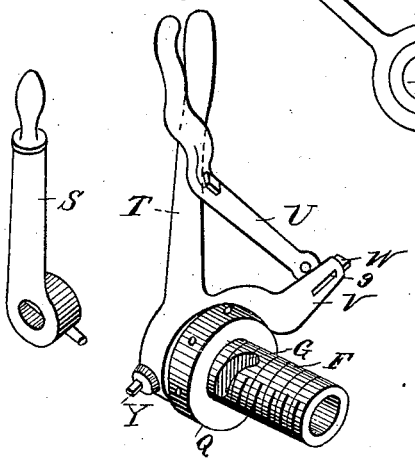


Fig. 6.

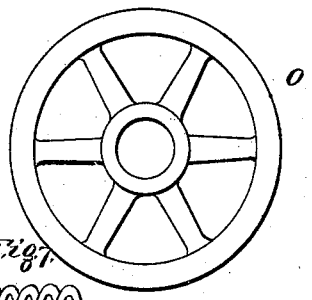
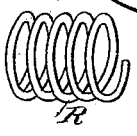


Fig. 7.



WITNESSES.
Wm. Rheem
E. Everett Ellis

James B. Allfree
INVENTOR.
By Wm. C. W. Entire
ATTY.

UNITED STATES PATENT OFFICE.

JAMES B. ALLFREE, OF CUMBERLAND, MARYLAND, ASSIGNOR OF ONE-HALF TO ROBERT SHRIVER AND HARRISON SWARTZWELDER, BOTH OF SAME PLACE.

ROLLER GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 342,671, dated May 25, 1886.

Application filed January 5, 1886. Serial No. 187,679. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. ALLFREE, a citizen of the United States, residing at Cumberland, Maryland, have invented new and useful Improvements in Roller Grinding-Mills, of which the following is a specification.

My invention relates to certain new and useful improvements in roller grinding-mills, and is designed particularly for use in mills in which two pairs of rolls mounted in the same plane are employed, though equally applicable to mills in which but one pair of rolls is employed.

Heretofore in mills employing two pairs of rolls it has been necessary in some instances, when it is desired to separate the rolls for any purpose, for the operative to go from side to side of the mill to separate the members of the different pairs.

The object of my invention is to produce a simple and effective means whereby the members of both pairs of rolls may be separated simultaneously from either side of the machine, or those of one pair parted independently of those of the other; further, the object is to furnish simple means for adjusting the positions of the movable rolls either at each of their ends or the whole roll bodily; further, the object is to provide a simple device for holding the rolls up to their work in such manner as to accomplish the best results in practice, and to reduce the tremor of the machine.

With these objects in view my invention consists, substantially, in the parts as constructed and their particular arrangement and combinations with each other, as will hereinafter be distinctly described and claimed.

In order that those skilled in the art to which my invention relates may know how to construct and operate a machine in conformity therewith, I will now particularly describe the same in connection with the accompanying drawings, in which—

Figure 1 is a side view of a mill containing my improvements. Fig. 2 is an end view, and Figs. 3, 4, 5, 6, and 7 represent the various details employed in the machine. Fig. 8 is a view in detail representing the manner of securing the sleeve F against side movement by virtue of the entrance of a spring-bolt carried by the projection of lever T into a slot or recess formed in the side of the casing of the mill.

In the drawings, A represents the outer casing of the mill, in the lower part of which I mount the rod B, situated at right angles to the rolls. This casing is preferably of cast iron, and its sides have formed therewith or attached thereto projections C C′ and D D′, to which are attached the spring-bars E E′. Two of these bars are placed on each side of the mill, and they are formed with bearings D″, in which the ends of the movable members of the two pairs of rolls are journaled.

Each end of the rod B projects a short distance beyond the casing of the mill, and at these places I provide the sleeves F, which are of a size to slip upon the ends of the rod, and have their outer surfaces screw-threaded. (See Fig. 3.) The sleeves are provided with spiral slots G, (see Fig. 5,) into which enter pins projecting from the rod, so that when the latter is rocked an endwise movement is imparted to the sleeves; and in order to communicate this movement to the movable rolls, I provide the lever-frames H, which are approximately V-shaped, (see Fig. 4,) and provided at their lower ends with openings I, for the reception of the sleeves F, to which they are connected in such manner as to move therewith. The upper ends of these lever-frames are each provided with two openings, J and K. The upper openings, K, receive pins M, which secure the lever-frames to the bearings in which the stationary rolls are journaled, and the lever-frames are capable of vibrating or swinging upon the said pins.

The preferred means of attaching the lever-frames to the movable rolls is by the screw-threaded rods N. The inner ends of these rods are each provided with two nuts, *n n′*, which are placed one on each side of the spring-bars E E′, and may be adjusted to regulate the length of the connection. These rods are also provided with nuts *o o*, situated a short distance inside the lever-frames H, and springs *p* are interposed between these nuts and the

said frames, and co-operate with the side spring-bars, E E′, to form a yielding holding device for the grinding-rolls, which have their bearings at D″, as before explained.

P represents hand-nuts, which are screw-threaded and capable of being moved back and forth on the outer ends of rods N, to regulate the distance between the lever-frames H and the bearings of the movable rolls, and in this way the said rolls may be adjusted at either or both ends, so as to change their positions in relation to the stationary rolls, the springs *p* automatically taking up the changed position of the hand-nuts.

The lower ends of the lever-frames are held against outward movement and their position regulated by means of wheels O, which are screwed upon the sleeves F and move therewith, and which also furnish the means for adjusting the rolls bodily. Upon the inner ends of the sleeves F, between the sides of the mill and the lever-frames, I place the screw-threaded adjustable collars Q and the springs R, (see Figs. 2, 3, 5, and 7,) which bear at one end against the collars and at the other end against the lower ends of the lever-frames, and the tension of these springs is regulated by means of the collars.

S S represent operating-levers, which are keyed or otherwise secured to the outer ends of the rod B, and by means of which the said rod is rotated or rocked. The slots in the sleeves at opposite ends of the rod being inclined in opposite directions, a rotary or rocking motion of the rod will cause the sleeves, and consequently the two lever-frames, to move inward or outward simultaneously, the sleeves being held from turning by the levers T, as will presently be described.

With a view to preventing any longitudinal movement of the rod B, and in this way impairing the effectiveness of the device, I provide two collars, *q q*, placed just inside the casing of the mill opposite each other, and through which the rod passes. The inner faces of these collars are inclined each in a direction opposite that of the other, and pins *t t* project from the rod and bear against the inclined faces of the collars. When the collars are turned to such positions as to render longitudinal movement of the rod impossible, the set-screws *u u* are screwed through the collars, and thus the permanency of the relative positions is secured. The outer surfaces of the collars and that part of the casing of the mill against which they bear being perfectly smooth, the rod bearing the collars is free to turn with them.

It will be apparent that by the construction so far set forth both movable rolls are moved every time the rod B is rocked, and therefore in order that the movable member of one pair of rolls may be separated from its fellow without moving the other movable roll, it is necessary to provide a device by which one sleeve may be rotated, and thus one lever-frame moved without affecting the other. This I effect by means of the lever T, which is provided near its lower end with an opening of a size to receive the sleeve, and a set screw, Y, is passed through the lower part of the lever and bears on the sleeve, so that when a lever, T, at one end is turned the sleeve to which it is attached is also turned and given a longitudinal motion on the rod, thus operating the movable roll at that end of the mill through the medium of the lever-frame and connections. The levers T are provided with auxiliary thumb-levers U, and with projections V, in the end of each of which is a sliding latch or bolt, W, which is forced out by an ordinary coil or other spring. (See dotted lines, Fig. 8.) This latch engages with a suitable opening or keeper in a projection, *g*, from the casing of the mill. The opening in this projection is so formed as to allow the latch a limited movement in a direction longitudinal of the sleeve, but will prevent any side movement or revolution of the sleeve, whereby the operation of the throw apart would be affected when it is desired to separate the members of both pairs of rolls simultaneously.

From the foregoing it will be apparent that when the mill is in operation the grinding will be done without causing any appreciable tremor of the mill, by reason of the fact that the movable roll on each side is held in position by what is practically a spring-yoke consisting of the spring side pieces, upon which a slight tension is imposed when the movable roll is drawn up to its work, and the springs R, which exert a strain in an opposite direction to that exerted by the side pieces; also that the force by which the movable roll is held to its work is exerted by the springs R. The tension of springs R may be regulated at will by means of the wheels O and collars Q, and they are preferably kept at such tension as to allow the rolls to be forced apart by the passage of any foreign substance between them, and at the same time exert the pressure necessary to perform the work of grinding.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a roller grinding-mill, the combination of a fixed and a movable roll, vertical spring-bars E E′, constituting bearings for the latter, the lever-frames H, and adjustable elastic connections N *p* between the said frames and spring-bars, whereby a positive yet yielding contact of the rolls is established, substantially as described.

2. In a roller grinding-mill, the combination of the casing, fixed and movable rolls, a horizontal rod, B, mounted in the lower part of the casing transverse to the axis of the rolls, longitudinally-movable sleeves F on each end of the rod, and lever-frames H and intermediate connections, N *o p*, between the lever-frames and movable rolls, whereby the movement imparted to the sleeves is communicated to the said movable rolls, substantially as set forth and described.

3. In a roller grinding-mill, the combination of the casing, a rod, B, mounted in the lower part thereof and provided with a pin near each end, sleeves F on each end of the rod, provided with spiral slots G, through which such pins pass, fixed and movable rolls, the lever-frames H, and the intermediate elastic connections, N *o p*, between such frames and the movable roll, whereby on a rotation of the rod the position of the movable roll will be correspondingly changed, substantially as described.

4. In a roller grinding-mill, the combination of the casing, a rod, B, mounted in the lower part thereof, sleeves F on the ends of the rod, screw-threaded on their outer surfaces and adapted to be reciprocated by movement of the rod, springs R and collars Q, surrounding the sleeves, movable and fixed rolls, lever-frames H, connecting the sleeves and fixed rolls, and rods N and springs *p* between such frames and the movable rolls, substantially as and for the purpose described.

5. The combination, with the casing A and rod B, of the collars *q q*, mounted on the ends of the rod, their inner faces being inclined in opposite directions to each other, the pins *t t*, projecting from the rod, and the set-screws *u u*, substantially as described.

6. In a roller grinding mill, the combination of fixed and movable rolls, the spring bars supporting the movable rolls, the rod B, the lever-frames H on each end of the rod, the springs R, bearing against the lower ends of the lever-frames, and the rods N, and springs *p*, exerting a combined yielding pressure in a direction opposite that of the springs R, whereby the movable rolls are practically held between opposing springs, substantially as and for the purpose described.

7. In combination with the movable roll of each of the pairs of rolls, the rod B, mounted in the frame of the mill and provided with projecting pins, the sleeves F, carried upon the said rod and provided with spiral grooves G, extending in different directions, lever-frames H, connected to the movable sleeves, and suitable means for connecting the movable rolls with said lever-frames, substantially as described.

8. In combination with the movable rolls of a roller grinding-mill, the rod B, provided with pins, and operating-levers S S, the sleeves F, mounted on the said rod and provided with spiral grooves for the reception of the pins on the said rod, the collars Q, springs R, lever-frames H, connected to the sleeves, and suitable means for connecting the movable rolls with the lever-frames, substantially as described.

9. In combination with the movable rolls, the rod B, provided with pins and operating-levers S, the sleeves F, mounted upon the said rod and having spiral grooves G, entered by the pins on the rod, the said sleeves having mounted thereon the wheels O, springs R, operating-levers S, and collars Q, the lever-frames H, connected at one end to the stationary rolls and to the sleeves at the other, and elastic connections between said lever-frames and movable rolls, substantially as described.

10. The herein-described means for holding the movable rolls in a roller grinding-mill to their work, consisting of the spring-bars E E′, the rod B, mounted in the frame of the mill, the longitudinally-movable sleeves F, mounted upon the rod, the lever-frames H, connected at one end to the sleeves and at the other with the ends of the rolls, rods N, and the springs *p* and R, bearing against the lever-frames, and the latter exerting a pressure in a direction opposite to that exerted by the spring side pieces.

11. In combination with the movable rolls of a roller grinding-mill, the rod B, mounted in the frame of the mill and provided with pins, the sleeves mounted on the said rod and having spiral grooves entered by the pins of the rod, the lever-frames connected at their lower ends with the movable sleeves, suitable devices connecting the upper ends of the lever-frames with the movable rolls, and the levers T, substantially as described.

12. In combination with the movable rolls, the rod B, provided with projecting pins, the sleeves F, placed on each end of the rod and each having a spiral groove extending in an opposite direction to the other, which are entered by the said pins, the collars Q, springs R, the lever-frames H, and devices connecting the lever-frames and the movable rolls, substantially as described.

13. In a roller grinding-mill, the combination of the movable rolls, the lever-frames, devices connecting such rolls and lever-frames, the rod B, and sleeves F, the levers T, having auxiliary levers U and projections V, the said projections having spring-bolts which enter a projection from the casing of the mill, substantially as shown and described.

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

JAMES B. ALLFREE.

Witnesses:
A. C. PECKHAM,
CHAS. C. LEARNED.