(No Model.) 2 Sheets—Sheet 1.

H. CUTLER.

VERTICAL DISK GRINDING MILL.

No. 283,328. Patented Aug. 14, 1883.

Fig. 1

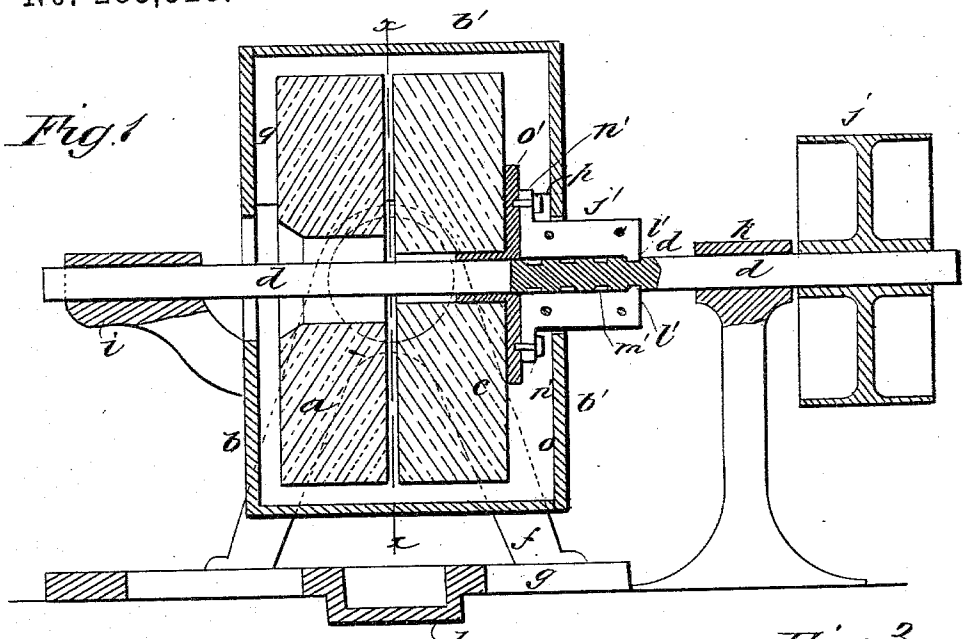


Fig. 2

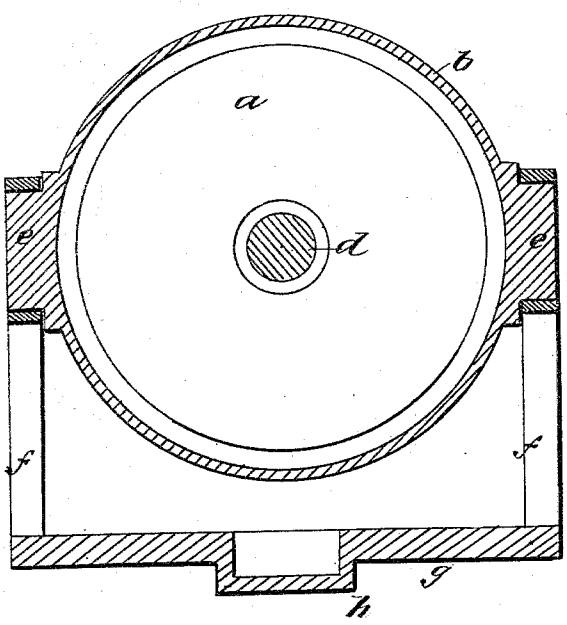
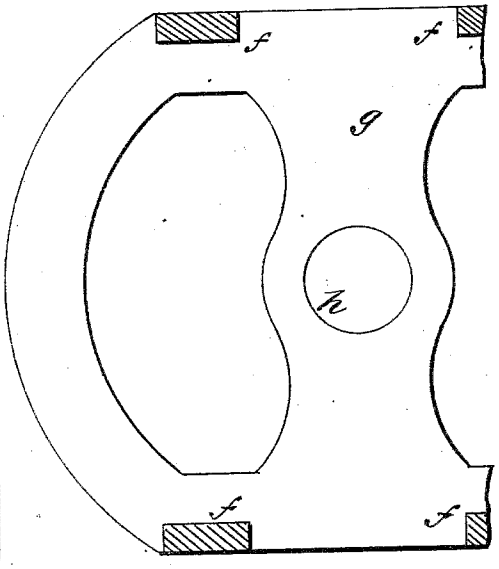


Fig. 3



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(No Model.) 2 Sheets—Sheet 2.

H. CUTLER.

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Fig. 4.

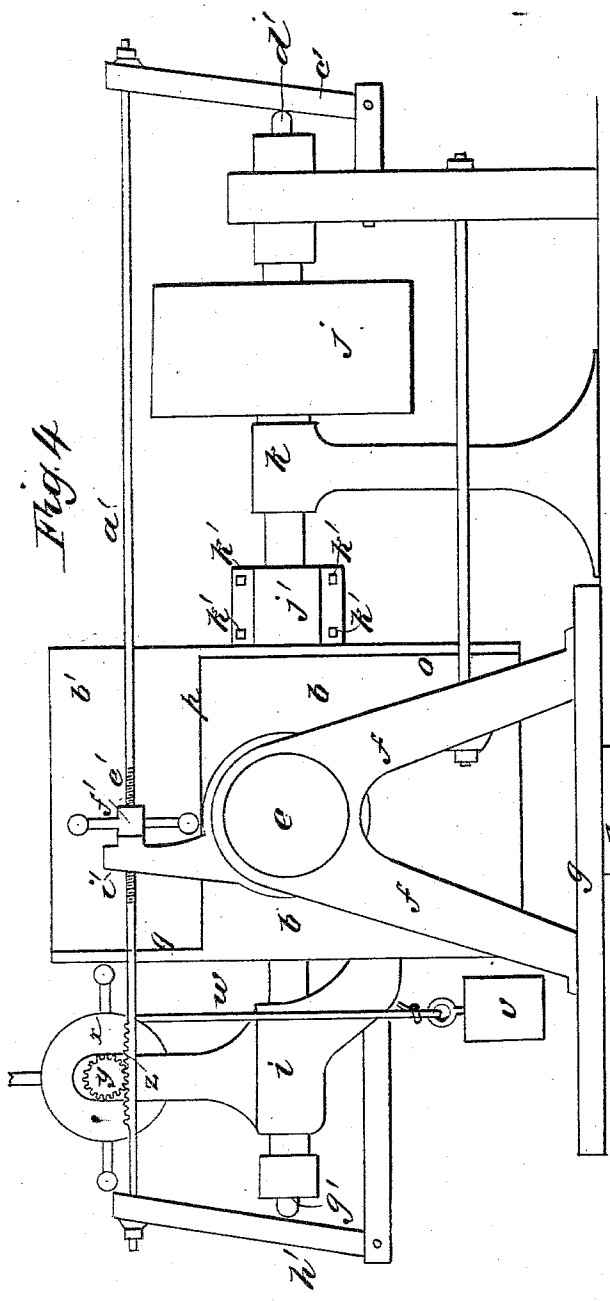


Fig. 6.

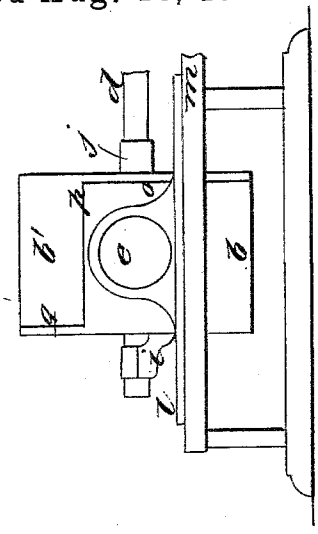


Fig. 5.

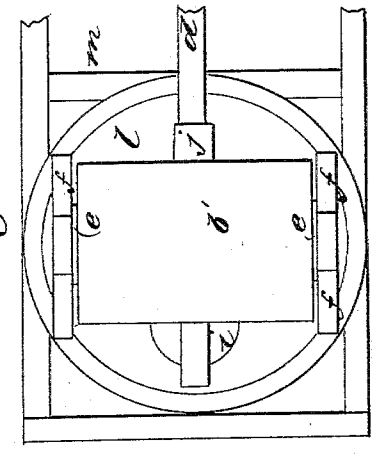
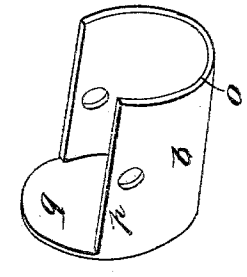


Fig. 7.



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UNITED STATES PATENT OFFICE.

HENRY CUTLER, OF NORTH WILBRAHAM, MASSACHUSETTS.

VERTICAL-DISK GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 283,328, dated August 14, 1883.

Application filed May 1, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY CUTLER, of North Wilbraham, in the county of Hampden and State of Massachusetts, have invented a new and Improved Vertical-Disk Grinding-Mill, of which the following is a full, clear, and exact description.

The object of my invention is to improve disk grinding-mills, as hereinafter described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional elevation of my improved mill in the longitudinal axis of the spindle. Fig. 2 is a transverse sectional elevation on the line *x x* of Fig. 1. Fig. 3 is a horizontal section of the supporting-frame. Fig. 4 is a side elevation of the mill. Fig. 5 is a plan view, showing a modified arrangement of the supporting devices for enabling the stones to be self-adjusting to the wear of the spindle-bearings. Fig. 6 is a side elevation of the mill as arranged in Fig. 5, and Fig. 7 is a perspective view of part of the case.

Vertical-disk mills run at very high speed, and the boxes wear rapidly; the belt-pulley is always on the end of the spindle and tending to pull the spindle out of line. In the common way of hanging the millstone the spindle soon gets out of line, causing the faces of the stones to touch each other at an angle. This wears the face of the running-stone in a conical form, and one side of the bed-stone will be beveled off by the same cause. Well-adjusted millstones should be so true and exact at their faces that they will run within only a hundredth part of an inch without striking together. The wearing of a spindle-box a sixteenth of an inch will therefore spoil a mill for good work.

My self-adjusting mill is constructed with the bed-stone *a* firmly set in a strong iron case, *b*, from which it need never be moved until entirely worn off. The running-stone *c* is attached firmly to the spindle *d*. The case *b* has journals or trunnions *e*, which are fitted in the housing-frame *f*, standing on the base *g*, which has a vertical center pivot or journal, *h*, on which the frame may turn or adjust horizontally. The case *b* also has a bracket, *i*, in which the spindle *d* has a bearing at one end, so as to turn with the case, while the other end of the spindle, on which the driving-pulley *j* is mounted, has a bearing in the standard *k*, which is secured to the foundation independently of the stone-supporting frame, so that the spindle, stones, case, and bearings *i* may all turn on the pivot *h* to line properly with the bearing *k*, as it may wear laterally by the pull of the belt. At the same time the trunnions allow the case to shift vertically, so as always to line with the spindle-bearing, no matter how much it may wear vertically. Thus it will be seen that I have my mill mounted on supports, allowing, practically, universal adjustment, so that the stones and spindle cannot change their relation to each other.

I am aware that there are mills that have trunnions on the bed-stone, with boxes that can be adjusted by hand, but none with boxes moving in a circle, and with a spindle-bearing attached to the bed-stone or case—that is to say, none that have the four ways of adjustment above described—viz., trunnions and spindle-bearing attached to the bed-stone or case, with a journal or pivot on the bed-frame, holding the trunnions in such a manner as to be equivalent to a universal joint, or equivalent to two stones hung on one shaft, and being therefore self-adjusting.

Instead of the bed-frame being fitted with the pivot *h*, the trunnion-supports *f* are made shorter and mounted on a ring, *l*, Figs. 5 and 6, which, being supported on the frame *m*, so as to turn, will accomplish the same thing, and is practically the same device so far as the operation is concerned. The case *b* is made in two parts, which separate along the line *o p q*, and the stone is made accessible, when required, by the removal sidewise of the upper part, *b'*, from the lower part, *b*, which latter is made very strong, and has the trunnions cast together with it, or firmly attached to it, for the support of the bed-stone, which is never removed from it. When the stones are to be dressed, the running-stone and spindle are removed, after previously removing the upper part, *b'*, of the case *b''*, and the bed-stone is turned face up on the trunnions therefor.

In a vertical-disk mill the weight of the mill-

stone cannot, as in a horizontal mill, be utilized for forcing the stones together for grinding; neither will they fall apart when the pressure is removed. A screw is therefore commonly used to force them together, and they are expected to go apart by rubbing against each other when the pressure is removed or another screw is used for the purpose. This is very objectionable, as the spindle carrying a heavy millstone will not move endwise easily. The screw will not yield to let through iron or other hard substances that work in with the grain. Consequently when such accidents occur great strain is produced when the stone is running at high speed, which breaks the stones or frame, or both. I use for this purpose a weight, *v*, attached by a wire rope or chain, *w*, to the rim of a pulley, *x*, the pulley having a pinion, *y*, which gears with a toothed rack, *z*, on the presser-rod *a'*, by which the stones are pressed together by pulling the lever *c'* against the end of the spindle at *d'*. This weight is heavier than is required to hold the millstones together, but the excess of the weight is prevented from effecting any unnecessary friction on the end of the spindle by a screw, *e*, on the presser-rod *a'*, having a hand-wheel nut, *f'*, on it, which is used, together with said weight, to adjust the stones at a proper distance from each other. This pressure-rod *a'* is made to act on the other end, *g'*, of the spindle at the same time by a lever, *h'*, for positively controlling the stones in their movements toward and from each other. When any iron or other foreign substance gets into the mill, the weight attached to the pulley geared with the pressure-rod will be lifted and the substance will pass safely through, after which the stones will return to their proper adjustment, the adjusting nut or wheel *f'* shifting away from its bearing *i'* with the rod and returning again thereto without turning on the rod.

For adjusting the running-stone on the spindle to make up the loss caused by wearing away of both the runner and the bed-stone, I make the collar *j'*, by which the runner *c* is connected to the spindle, in two parts, to be clasped on the spindle and fastened together by bolts *k'*, the collar being provided with an internal lip or flange, *l'*, which fits into a groove, *m'*, in the spindle, which is provided with a series of such grooves, so that by opening the collar from time to time and shifting the stone along the spindle it may be set up frequently with but very little trouble, so that the bed-stone need not be disturbed, as it is in the common way of taking up the wear by resetting it. This collar *j'* has a broad flange, *n'*, at one end, that is turned true and bolted to the back of the stone, which has a plate, *o'*, also turned true to match flange *n'* of the collar, and thus keep the running-stone perfectly true.

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

1. The combination, with the stones, spindle, and drive-pulley, of the case *b*, having bracket *i*, with a bearing for the spindle, the housing-frame, the base having the pivot *h*, and the bearing-standard *k*, the stones and case being adapted to turn on said pivot *h*, as and for the purpose described.

2. The combination, with the spindle *d* and levers *c'* and *h'*, of the weight *v*, rope *w*, pulley *x*, carrying pinion *y*, and the rod *a'*, having rack *z*, whereby the stones may be pressed together, as described.

3. The case composed of two separable parts, having trunnions on the sides, and a bearing for one end of the spindle, and being divided to allow the runner to be removed and to adjust and support the bed-stone for dressing, substantially as described.

4. The combination, with the runner, of the spindle having grooves *m'*, and the two-part screw-clamped collar *j'*, having the lip *l'*, whereby the runner may be set up without disturbing the bed-stone, as described.

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