

## Grinding Mill.

No. 94,952.

Patented Sept. 21, 1869.



*Witnesses:*

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# United States Patent Office.

MORRISON FOSTER, OF CLEVELAND, OHIO.

Letters Patent No. 94,952, dated September 21, 1869.

## IMPROVEMENT IN GRINDING-MILLS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, MORRISON FOSTER, of Cleveland, in the county of Cuyahoga, and State of Ohio, have invented a new and improved Mill; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a front elevation of my improved mill.

Figure 2 is a section taken centrally through the mill, in the vertical plane indicated by line *x x*, fig. 1.

Figure 3 is a sectional view, showing a conical-surface crushing-head, working upon a flat-surface crushing-head.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements on mills for crushing, grinding, pressing, or mixing various substances, wherein the work is performed between two disks, which are applied to shafts whose axes are oblique to each other, so that parts of the acting-surfaces of the disks are parallel to each other.

The nature of my invention consists—

First, in providing for feeding the material to be ground, crushed, pressed, or mixed, through the centre or axis of one of two crushing-disks to the acting-surfaces thereof, when these disks are arranged to operate with their axes oblique, as will be hereinafter explained.

Secondly, in the combination of a flat or concave surface grinding, crushing, pressing, or mixing-disk, with a convex disk, when the axes of the two disks are oblique to each other, as will be hereinafter explained.

To enable others skilled in the art to understand and use my invention, I will describe its construction and operation.

In the accompanying drawings—

A A' represent two disks, the lower one, A, of which has a concave grinding-face, and the upper one, A', has a convex grinding-face. These faces are the segments of spheres.

The concave disk A is secured by pin *i*, or otherwise, in a receptacle formed in a circular base, B, which is fixed on a vertical shaft, C, and which is supported by a step, *a*, resting upon a bed or foundation, D.

A wedge, *b*, is inserted beneath step *a*, for the purpose of elevating or depressing the shaft C.

The cap or journal-box *c* confines the shaft C to the frame E, and allows it to rotate freely.

The convex disk A' is inverted, and has its axis inclined, or arranged obliquely to the axis of the disk A. This disk A' is secured by a pin, *i*, or otherwise in the

inverted cup-shaped circular head B', which latter is fixed on the lower end of the shaft C', whose axis coincides with that of its disk A', as shown in fig. 2.

The inclination of shaft C' is such that the faces of the two disks are brought together at a point running from their centres to their peripheries, thus leaving between them, on each side of said impinging points, a gradually-diverging space.

The shaft C', of the upper disk A', is kept in place by the journal-box cap *c'*, which is secured to the pillow-block *e*.

This pillow-block or bearing *e* is attached to frame E, by means of screw-bolts *f*, or their equivalents, which pass through vertically-oblong slots made through the said frame. By loosening these bolts, the pillow-block can be adjusted so as to set the disk A' nearer to or further from the surface of disk A, according to the degree of fineness required of the substance being reduced.

The wedges *b' b'* should be withdrawn wholly or in part previous to the adjustment of the block *e*, and after it is adjusted, these wedges are driven firmly into their places again between the pillow-block and cap F, so as to resist upward strain during the operation of the mill.

The shaft C' is hollow, and the opening is extended through the head B' and disk A', so that any substance introduced into the upper flaring end *g*, of the said shaft, will pass down and escape between the acting-surfaces of the disks, as shown in fig. 2.

The disks or grinders A A' may both be secured directly upon the ends of their respective shafts, or they may be confined within the spaces formed in the faces of the heads B B', which heads are rigidly applied to their respective shafts.

If the heads B B' are used, they may be made with depressions in them, to receive corresponding elevations on the backs of the disks or crushers, to prevent the latter from slipping, and screws, keys, or other suitable fastenings may be adopted to afford additional security against the casual detachment or working loose of the disks.

On the shafts C C', suitable gearing may be applied, connected to gears on a driving-shaft, whereby both of these shafts can be rotated at the same or at different speeds, either in the same direction or in opposite directions. Either rotary or oscillatory motion may be given to one or both of the disks or grinders, by any well-known mechanical contrivance adapted to the purpose.

For the purpose of clearing the mill, a scraper may be inclined toward the crushers, and arranged to extend from the circumference to the axes of the crushers, between and in contact with both of their acting-surfaces. Such scraper may be sustained by a cross-



bar secured to the caps *c c'*, of the journal-boxes, or it may be extended around and secured to the frame *E*.

For the purpose of preventing a substance which is being reduced from escaping prematurely from the space between the crushers, there can be used a curved guard or fender, which may be secured to the frame *E* in any suitable manner, and arranged on one side of the crushers so as to extend around them to the point of discharge.

It is obvious that the machine hereinabove described may be reversed, that is to say, inverted, and the shaft of the concave disk, which would then be upmost, constructed with a hole leading through it, through the part *B*, and through disk *A*. Under this arrangement, the shaft *C'*, head *B'*, and convex disk *A'*, would be solid. Or if desired, the machine may be arranged in a horizontal plane, or nearly so, and the substances to be reduced fed directly between the concave and convex disks, or between a conical, convex, and flat-

face disk, by means of a hopper or spout, or any other suitable contrivance.

I do not confine myself to the precise forms of crushing-disks described and shown, as there are other forms which will operate well when applied to a mill of this description. Nor do I claim, broadly, the use of two convex disks, arranged to operate together as crushers, as such disks are set forth in Letters Patent numbered 52,363.

Having described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

The reducing-disks, which are arranged and constructed to work together, with their axes oblique to each other, in combination with a central feed-passage, *C*, substantially as herein described.

Witnesses: MORRISON FOSTER.

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