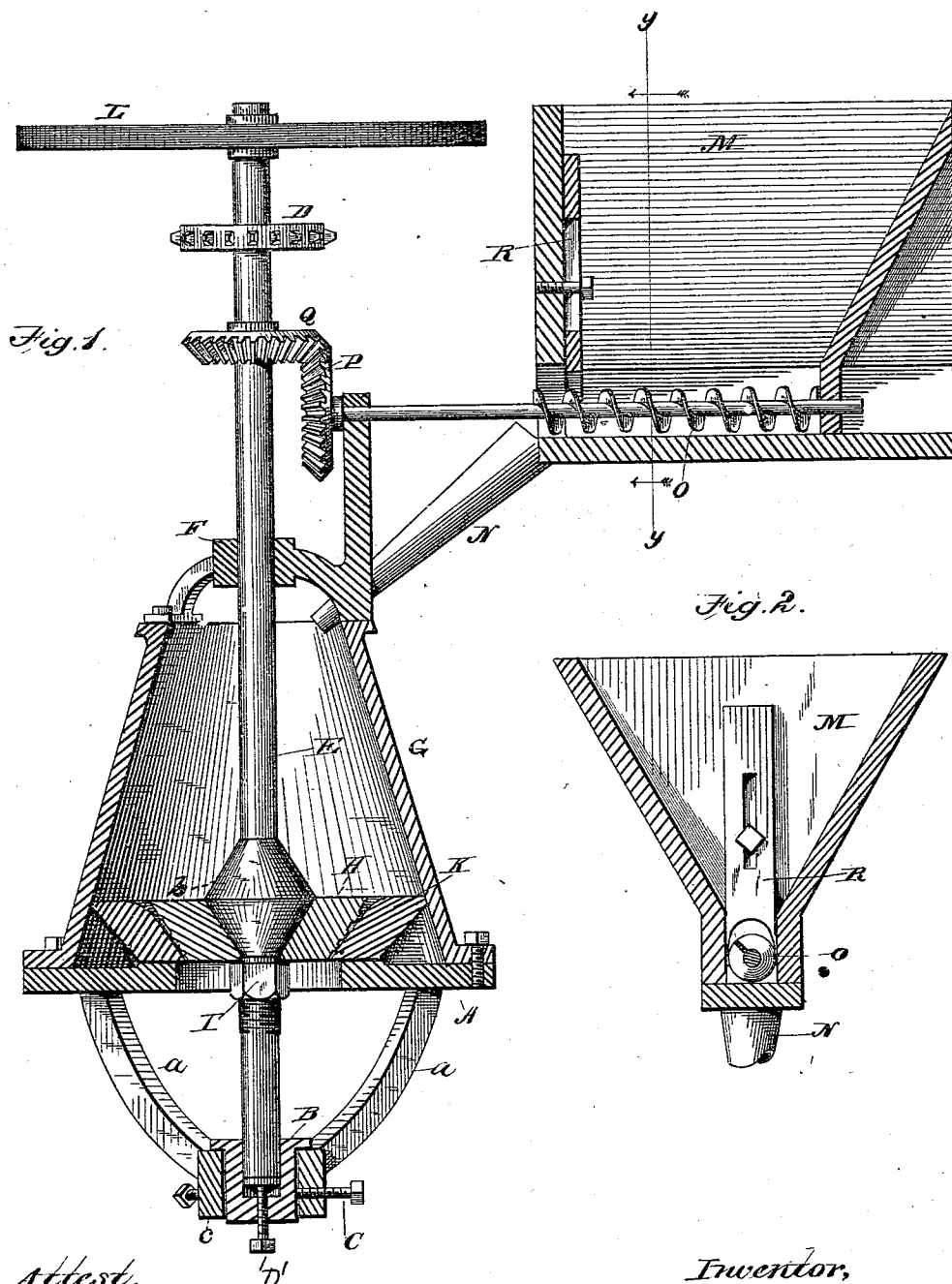


(No Model.)

E. G. HASTINGS.
GRINDING MILL.

No. 278,954.

Patented June 5, 1883.



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GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 278,954, dated June 5, 1883.

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To all whom it may concern:

Be it known that I, EDWIN G. HASTINGS, of Nevada, in the county of Story and State of Iowa, have invented certain Improvements in Grinding-Mills, of which the following is a specification.

The aim of this invention is to produce an exceedingly cheap, simple, and compact mill, designed more particularly for the purpose of reducing grain, corn-cobs, and similar material to a coarse meal, and to provide the same with a positively-acting feed mechanism, to provide for the relief of the grinding-surfaces in the event of refractory materials passing between them, and to effect the automatic stoppage of the feed whenever the grinding operation ceases.

To this end it consists in the combination and arrangement of various members, as hereinafter explained and claimed.

Referring to the accompanying drawings, Figure 1 represents a sectional elevation of my improved mill. Fig. 2 is a cross-section of the feed-hopper on the line *x x*.

In constructing my mill I first provide a base-plate, A, preferably of circular form, with an opening at the center, and with a number of depending arms, *a*, which give support to a central ring or hub, *c*. In the hub *c* I mount a step or bearing, B, for the vertical spindle, this step being provided with and sustained by an annular flange upon the upper end of the hub *c*. Horizontal screws C, inserted through the hub *c* and bearing against the step B, serve as a means of adjusting the latter laterally as may be required to secure the proper adjustment of the shaft and the grinding-surfaces. A vertical screw, D, inserted through the bottom of the step B, with or without a bearing-plate on its upper end, serves as a means of supporting the lower end of the vertical spindle and adjusting the same vertically to regulate the distance between the grinding-surfaces.

E represents the vertical spindle or shaft, sustained at its lower end in the step B and at its middle in a collar or bearing, F, which latter is connected to and sustained from the base-plate A by means of a conical shell or body, G, or by means of legs substituted for said shell. The spindle E is provided at or above the base-plate with an enlargement, *b*, tapering

in both directions. Around the lower end of this enlargement *b* is placed the inner grinding ring or plate, H, having a tapering or conical outer surface provided with teeth or serrations of any approved form. This grinding-ring H is held to its place by means of a nut, I, threaded upon the spindle E, and bearing against the lower end of the ring in such manner as to force the same firmly against the conical surface *b*. This connection secures the application of sufficient power to turn the ring H, and admits of the latter remaining at rest in the event of its encountering an excessive resistance sufficient to overcome its frictional hold upon the part *b*. The grinding-ring H co-operates with an outer grinding-ring, K, the inner surface of which is dressed or toothed in any appropriate manner. The outer ring, K, is seated and secured rigidly in position upon the upper surface of the base-plate A, being held in place in any suitable manner. It is preferred, however, as the most simple construction, to secure the same by arranging the shell or casing G to bear thereon, as represented in the drawings, the shell thus serving the double purpose of holding the grinding-ring and sustaining the bearing F.

To the upper end of the spindle I attach a fly-wheel, L, designed to secure steadiness of action and to prevent the mill from being checked in the event of a sudden increased resistance between the grinding-surfaces. The spindle is arranged in its bearings in such manner that it may rise freely, being held to its place simply by its own weight and the weight of the parts attached thereto. This construction insures the proper pressure of the grinding-surfaces upon the intermediate material, but admits of their readily separating in the event of the entrance of refractory material between them, thus avoiding the danger of injury to the mill. The arrangement is also advantageous in that it avoids the necessity of devices for depressing the upper grinding-surface, as required in mills of ordinary construction.

For the purpose of delivering the material with uniformity to the mill, I provide a feed-hopper, M, having a spout, N, leading from its lower side to a point above the grinding-rings. In the base of this hopper I mount a horizontal worm, O, serving to deliver mate-

rial through an opening in the end of the same into the conductor N. This worm has its shaft provided with a bevel or miter gear, P, engaging with the under side of and driven by a corresponding gear, Q, attached to the mill-spindle. This arrangement imparts a positive motion to the worm and insures the operation of the same whenever the grinding-disks are in action. When, however, the grinding disk and shaft are elevated by the entrance of foreign matters, as before explained, the pinion Q is thereby elevated out of contact with the pinion P, whereby the feed-worm is permitted to remain at rest during the time that the grinding-surfaces are out of action. It will be perceived that this arrangement prevents the feeding of the material to the grinding-disks at improper times.

The rate of feed may be regulated as may be required by means of a vertically-adjustable gate, R, arranged in the mouth of the hopper, as represented in the drawings, to vary the size of the outlet-opening. The inner end of the worm-shaft is preferably sustained, as shown, by means of an arm formed integral with the upper spindle-bearing, F. If desired, an arm may also be cast upon said bearing to give support to the hopper.

While it is preferred, for various reasons, to retain the grinding-surfaces in the conical form, as shown, they may be modified in form to a greater or less extent without affecting the general mode of action.

The spindle E is provided with a sprocket-wheel, D, through which motion may be communicated to the machine from any suitable motor by means of a chain. A driving-pulley, driving-gear, or other equivalent devices may be employed, however, to impart a rotary motion to the spindle.

The present invention is restricted to those matters and things which are hereinafter claimed, and as to all matters which may be described or shown, but which are not claimed, the right is reserved to make the same the subject of a separate patent.

While it is preferred to employ the fly-wheel L, for the reasons before stated, it may be dispensed with, and the grinding-disk and shaft made of suitable weight to insure the application of the proper pressure to the material passing between the grinding-surfaces.

By the expression "free to rise and fall in its bearings," as herein employed in connection with the driving-spindle, is meant that said spindle is free to rise and fall independently of the bearings and other parts of the mill, except such as are attached thereto and carried thereby, and is not connected, as usual, with weighted levers, screws, or other pressure devices for controlling its motion endwise.

Having thus described my invention, what I claim is—

1. In combination with the lower grinding-ring, the upper grinding-ring, and a gravitating shaft secured to the upper grinding-ring and mounted vertically and freely in bearings, as described, whereby the weight of the shaft and grinding-disk is applied to secure the proper pressure upon the material between the grinding-surfaces and the separation of said surfaces permitted in the event of the passage of refractory substances between them.

2. In combination with the lower grinding-ring, the upper grinding-ring, the gravitating shaft free to rise and fall endwise, and the fly-wheel applied to said shaft, as described, whereby it is caused to produce a uniform motion and to secure the required pressure between the grinding-surfaces.

3. In combination with the stationary and movable grinding-rings, the vertically-movable spindle provided with a pinion, Q, and the feed mechanism provided with the corresponding pinion engaging therewith, substantially as described, whereby the separation of the grinding-surfaces is caused to stop the feed mechanism.

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Witnesses:

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