2 Sheets—Sheet 1.

G. & A. RAYMOND.

Grinding-Mill.

No. 226,196. Patented April 6, 1880.

Fig. 1.

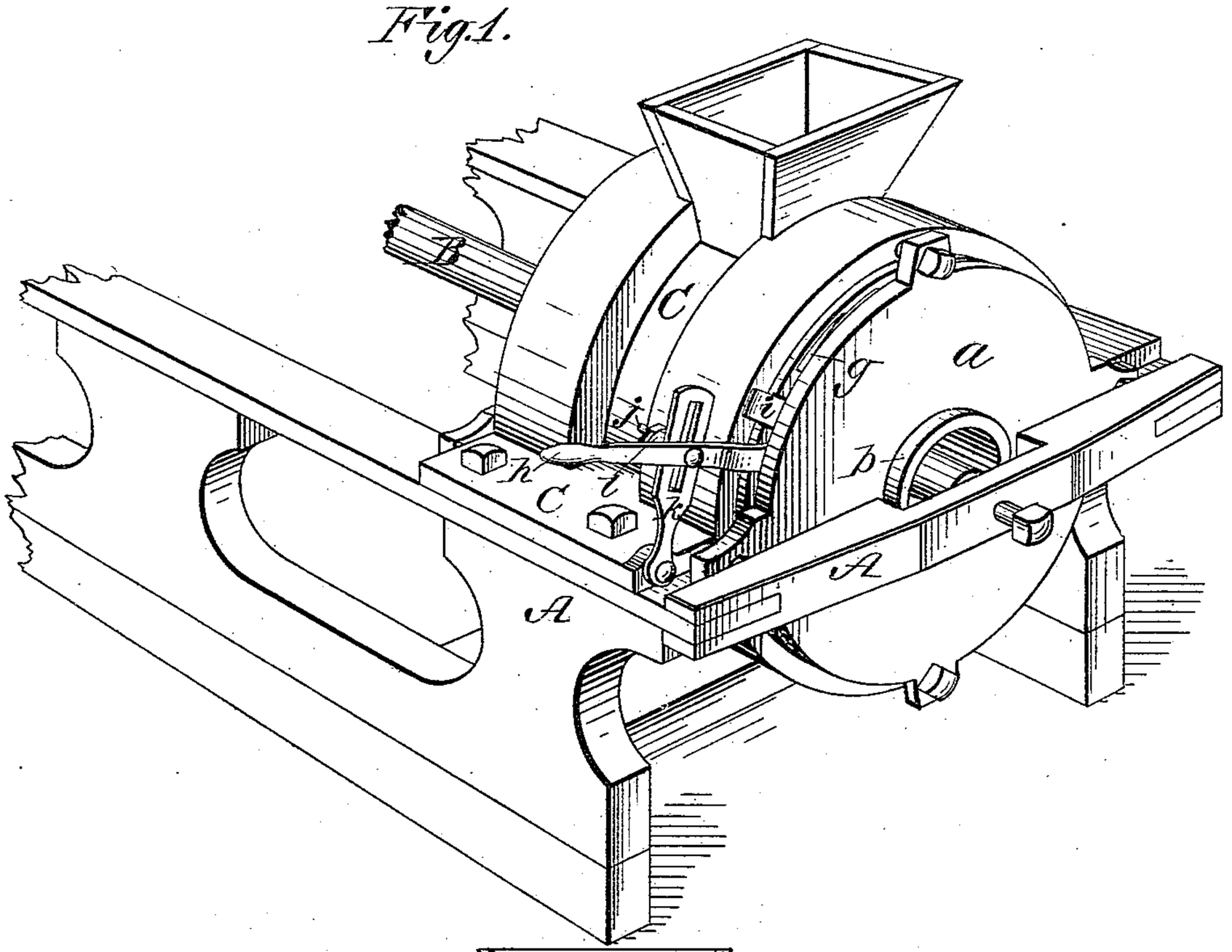

Fig. 2.

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2 Sheets—Sheet 2.

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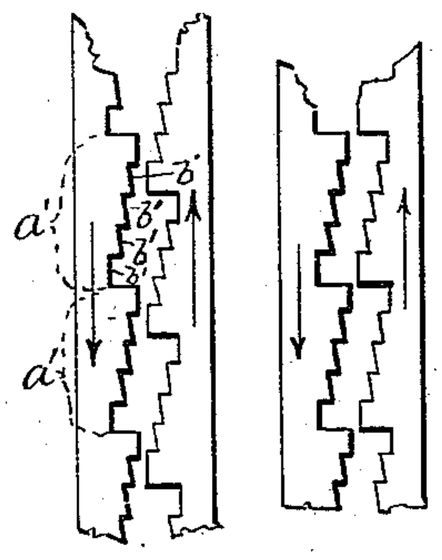
Fig. 3.



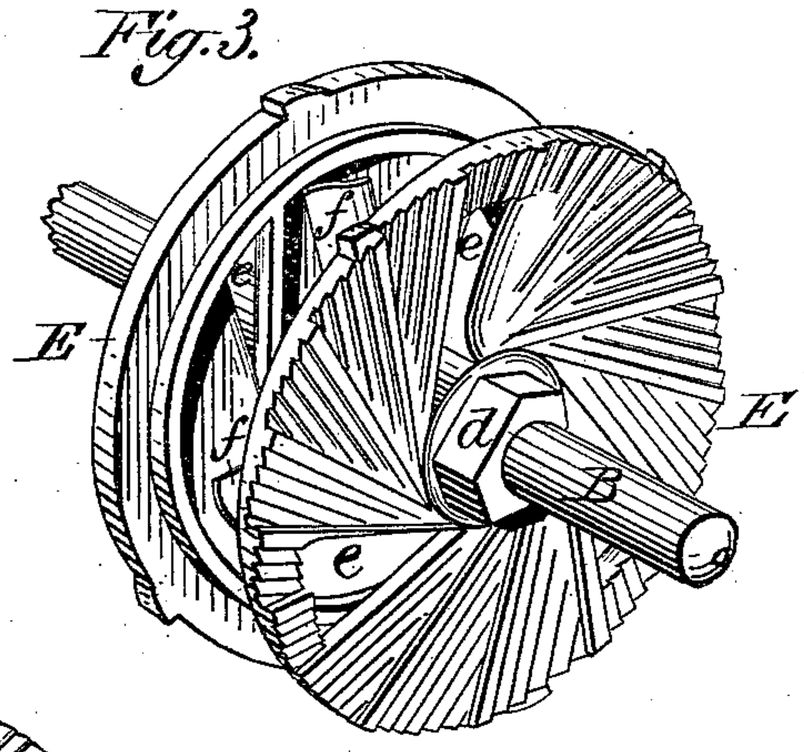


Fig. 4.

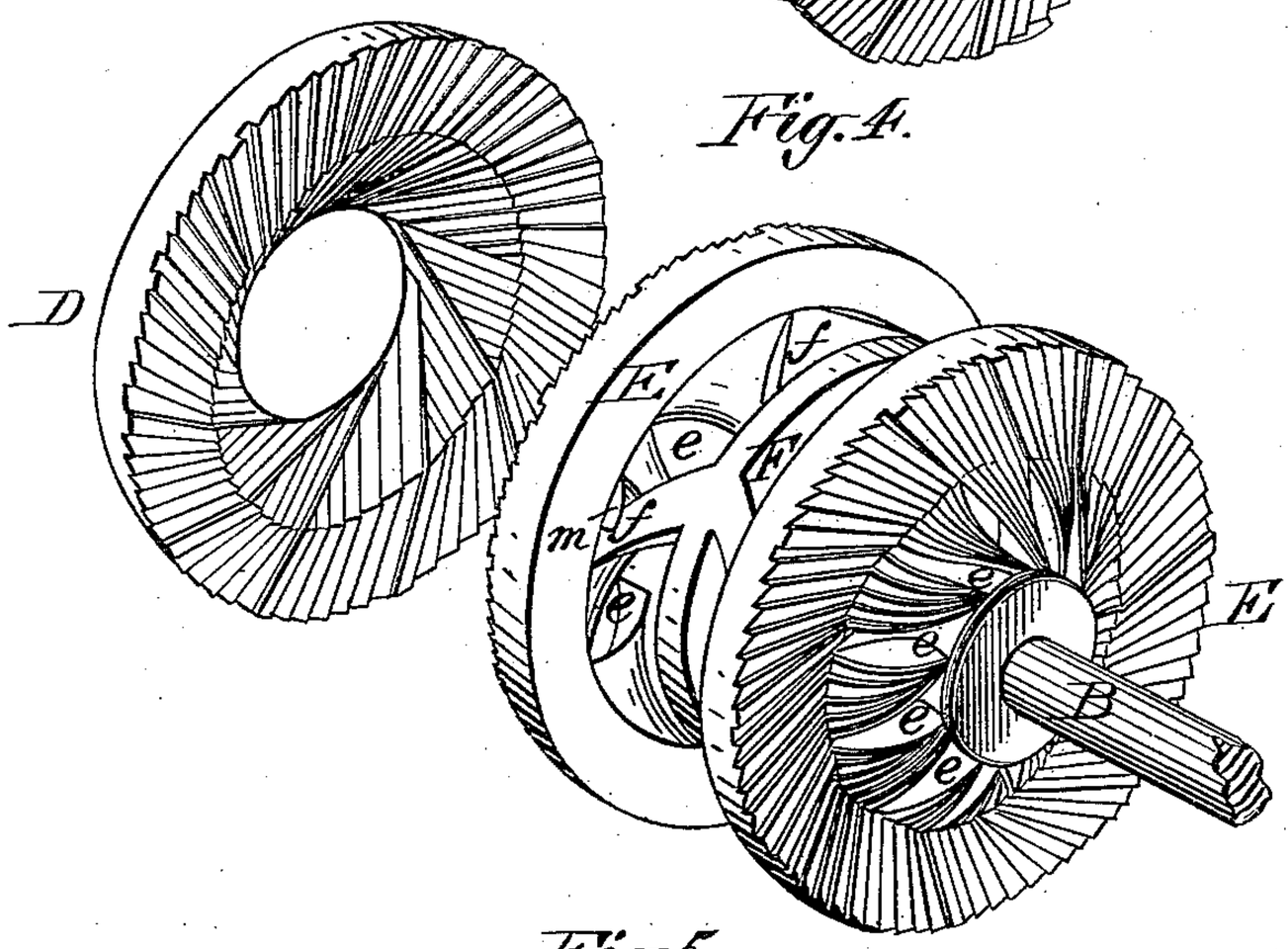
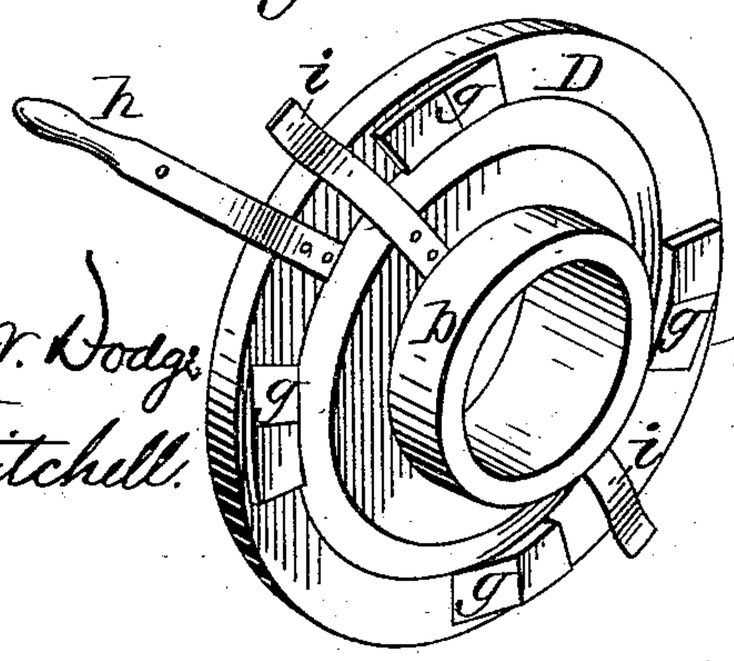


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE RAYMOND AND ALBERT RAYMOND, OF WAUPUN, WISCONSIN.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 226,196, dated April 6, 1880.

Application filed March 31, 1879.

To all whom it may concern:

Be it known that we, GEORGE RAYMOND and ALBERT RAYMOND, of Waupun, in the county of Fond du Lac and State of Wisconsin, have invented certain Improvements in Grinding-Mills, of which the following is a specification.

Our invention relates to grinding-mills; and it consists in a novel manner of arranging two grinding disks or surfaces upon one shaft, whereby the side pressure is equalized and one hopper is made to feed both grinders; in a grinding plate or disk arranged to receive the grain through openings located between the skirt and eye or center; in means for adjusting the stationary disks in relation to the runners and of permitting them to be forced back in the event of hard substances entering between the grinding-faces; in a peculiar form of dress for the grinding-faces, and in various other details hereinafter explained.

In the accompanying drawings, Figure 1 represents a perspective view of our improved mill; Fig. 2, a longitudinal vertical central section of the same; Fig. 3, a perspective view of the runner-plates removed; Fig. 4, a similar view, showing a slight modification of the same; Fig. 5, a perspective view of one of the stationary plates removed.

In the drawings, A represents a strong frame, in which is mounted a horizontal longitudinal driving-shaft, B, and one or more cases or chambers, C, in which the grinding plates or disks are located. The shaft may be carried through any convenient number of grinding-chambers, the construction and arrangement being such that a number may be placed in a very small space.

The chambers or cases C are each furnished with detachable heads or ends *a*, secured to the cases by bolts, as shown, whereby they may be removed to permit the insertion or removal of the grinding plates or disks.

D D represent the stationary or bed plates, provided each with a central collar or sleeve, *b*, through which the driving-shaft B passes, and which passes through and supports the bed plate or disk in the end plate or head *a*, as shown in Figs. 1 and 2; and E E represent two runner plates or disks secured upon the driving-shaft between the bed plates, and having their grinding-faces opposed thereto, as shown.

The runner-plates may be secured upon the shaft in any convenient manner, though in practice it is preferred to form each with a central conical eye and draw them against a block or sleeve, F, placed upon the shaft between them by means of conical nuts *d*, as shown in Fig. 2. The disks E E are thus held firmly upon the shaft at the desired distance from each other.

Directly above the space between the disks E E is arranged a feed-hopper, opening through the top of the case C, and serving to deliver the grain between said disks, whence it is passed through openings *e*, formed through the disks, and delivered between the opposing grinding-faces of the bed and runner plates, being directed and assisted in its passage through the runners by wings or blades *f*, mounted in and revolving with the collar or sleeve F, as shown. The grain is thus passed through the face of the runners, ground, and delivered at the periphery, and is discharged through suitable openings in the lower side of the chamber.

For the purpose of facilitating the feeding of the grain through the openings in the runner or rotary disk, oblique blades are arranged at the edge of said openings, as shown, the openings likewise being cut obliquely through the runner. By thus perforating the rotary disk directly in the grinding-face a direct and uniform feed is secured, which is further improved by the oblique form of the openings and blades.

In order that the grinding-faces may be accurately adjusted in relation to each other to regulate the degree of fineness to which the grain shall be reduced, the bed or stationary plates D and the heads or end plates, *a*, are each furnished on their opposing faces with a series of inclines, *g*, and the bed-plates are each provided, further, with a lever or handle, *h*, by which they may be rotated, and thereby cause the inclines of the opposing parts to ride upon each other and force the bed-plates forward or permit them to be forced back by springs *i*, secured to their backs and bearing at their ends upon the face of the case C, as shown in Fig. 1.

The levers or handles *h* are extended outward to a convenient position for operation, and are held at any desired point by means of a bolt, *j*, passing through the lever and through a pivoted slotted arm, *k*, attached to the frame or case, an elastic washer, *l*, being placed upon the bolt between the nut and the arm *k* for the purpose of drawing the lever and arm together sufficiently to hold the lever in any adjusted position by friction simply, at the same time permitting the amount of friction to be perfectly regulated by turning the nut and allowing the lever to move when the disk or bed-plate D is forced back and rotated by the entrance of any hard substance between the grinding-faces, the rotation being caused by the action of the inclines *g* upon each other.

The limits of adjustment of the bed-plate or stationary disk may be varied and controlled by the nuts which secure the heads *a* to the case or chamber C, by turning which the heads may be brought nearer to or moved farther from the same.

In connection with the peculiar manner of feeding the grain to the grinding surfaces, we propose to use the peculiar form of dress represented in Fig. 3, which we find particularly adapted to this manner of feeding. This dress, as shown in Figs. 3 and 4, consists of a series of large or main inclines, *a'*, inclining in the direction of the path of rotation, and a series of small or secondary inclines, *b'*, formed in the faces of the main inclines and sloping in the opposite direction. In other words, it consists of a series of long laterally-inclined surfaces, each commencing on a line tangential with the central eye of the disk and sloping gradually downward or backward into the disk, and each traversed radially or tangentially by a series of narrow inclines slanting in a direction the reverse of that of the main inclines. Each of the small inclines has an inclined face on one side and a sharp cutting-edge on the other.

The action of this dress is best illustrated by the diagrams in connection with Fig. 3, a large space for the entrance of grain being afforded when two of the long inclines stand directly opposite each other, which spaces become smaller, and finally decrease to merely the distance between the bed and runner disks as they move past one another, thereby giving a rapid and certain action to the grinding-plates.

While the above-described dress is considered the best that can be employed, it is apparent that other forms may be used—as, for instance, that represented in Fig. 4, consisting of a series of cutting edges or shoulders and, at suitable intervals, lands, to give the proper feeding action or movement of the ground material.

The blades *f*, which direct the grain through the runners, may also be made as represented in Fig. 4, cast in one piece with the hub or collar F, and locking against shoulders *m* on the runner-disk to insure its rotation with the shaft.

The machine or mill as above constructed is intended more particularly for grinding corn and similar substances for stock, and is designed to employ metallic grinding disks or plates.

It will be seen that when the two grinding-disks are mounted on one shaft, as shown, the feeding of the two from one and the same hopper is of great importance, since it prevents the possibility of grain being delivered to one and not to the other, the result of which would be that the disk which received grain would cause injury to the other by drawing it directly against its opposing surface.

Having thus described our invention, what we claim is—

1. In a grinding-mill, the combination of a vertical stationary disk, a vertical rotary disk having a series of feed-openings through its body and grinding-surface at different points around the center, and a single feed-hopper communicating with the feed-openings, whereby a constant and equal feed is secured between the grinding-surfaces at all points.

2. The combination of the grinding-plates D, having the series of inclines upon the back, the lever, and springs *i*, secured to the plate, and the frame-plate provided with inclines *g*.

3. In combination with the grinding-plate D, adapted to be adjusted to and from the runner by rotation about its center, an operating-lever, *h*, secured to said plate and held in its adjusted position by friction, substantially as described.

4. The herein-described dress for grinding-faces, consisting of a series of long inclines extending in the path of rotation, and each having a series of small reversed inclines thereon, as shown.

5. A grinding-disk for vertical mills having a series of feed-openings cut obliquely through its body and through the grinding-surface, as described and shown, whereby the disk is adapted to facilitate the feeding of the grain.

6. In a grinding-mill, the combination of a vertical rotary grinding-disk provided with feed-openings through its body and grinding-surface, and a feed-hopper located in rear of said disk and communicating with said openings, whereby the feed of the mill is effected through and by means of the rotary disk.

7. The combination of the two outside disks, D, two inside perforated disks, E, mounted on shaft B, and a central feed-chamber, F, located between disks E, as shown.

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