(No Model.)

L. GATHMANN.

MILL DISK.

No. 254,814. Patented Mar. 14, 1882.

Fig. 1.

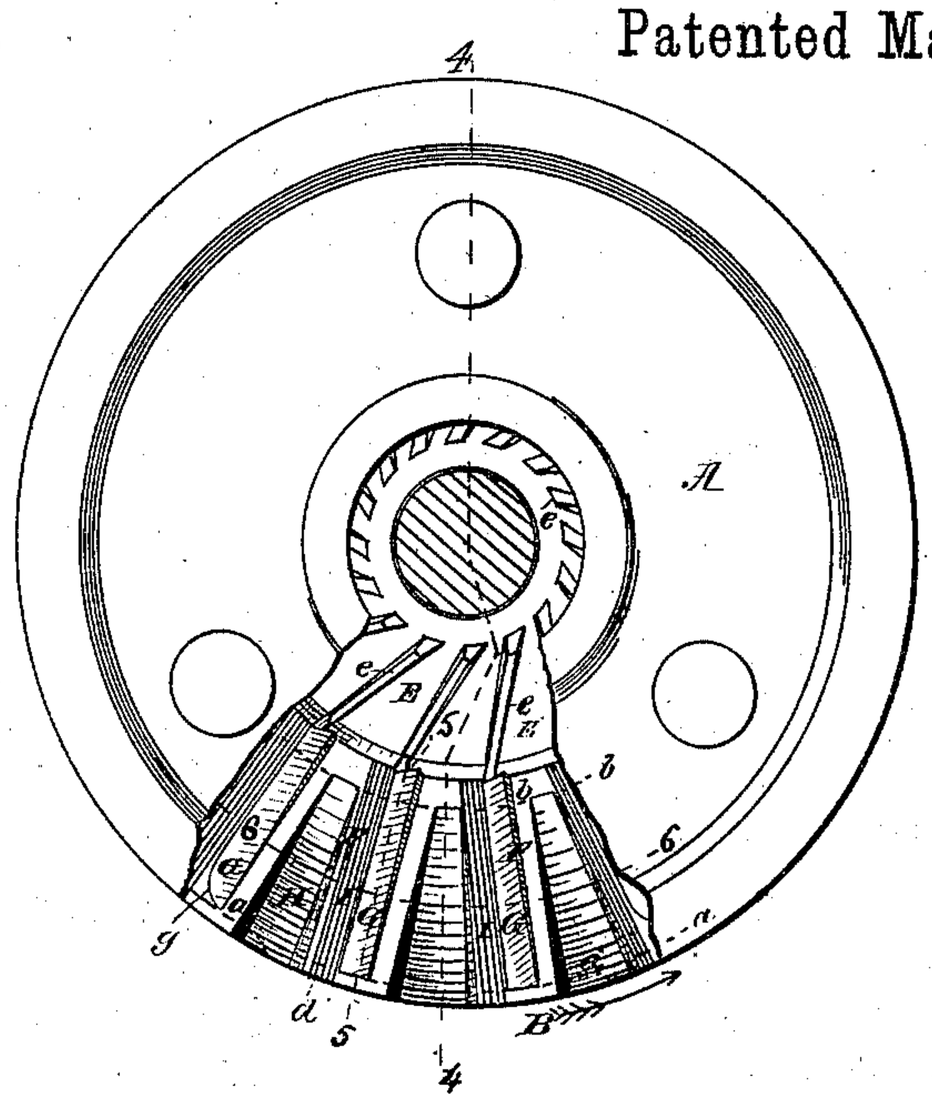


Fig. 2.

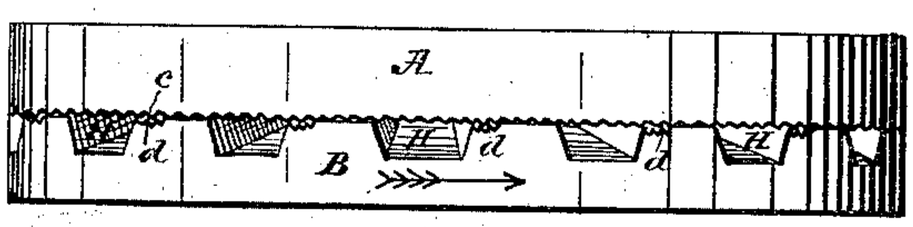


Fig. 3.

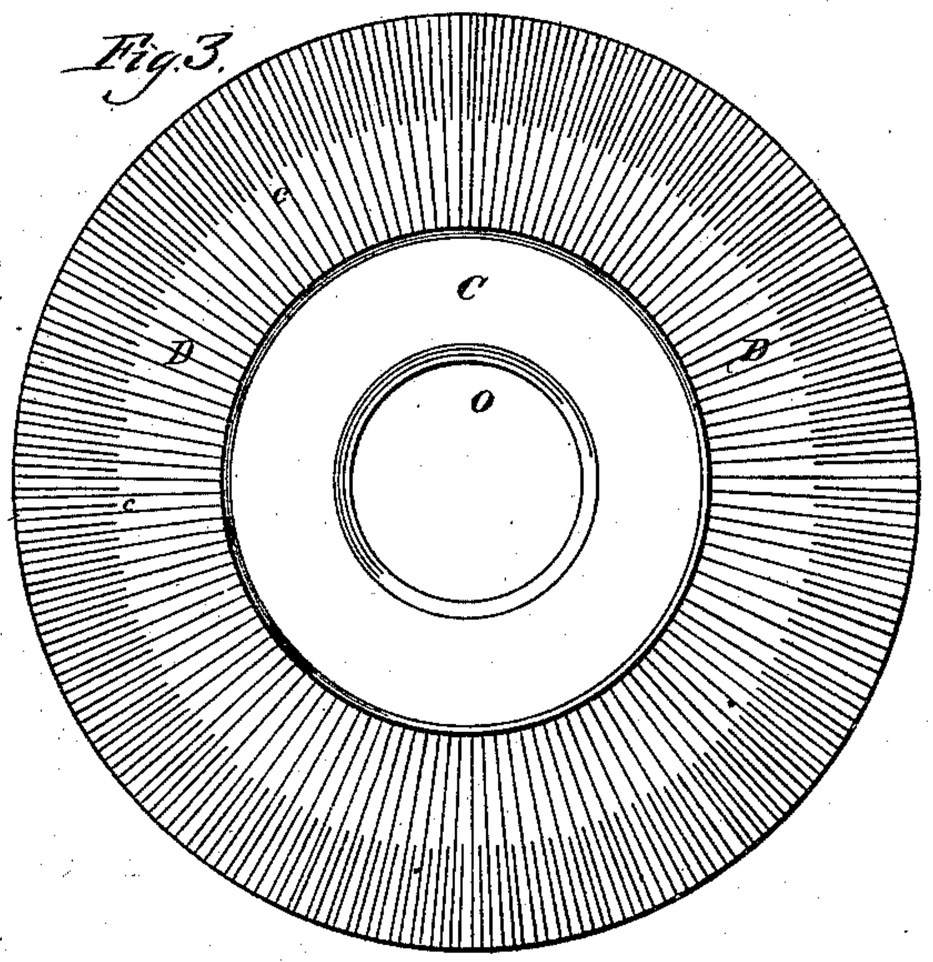


Fig. 5.

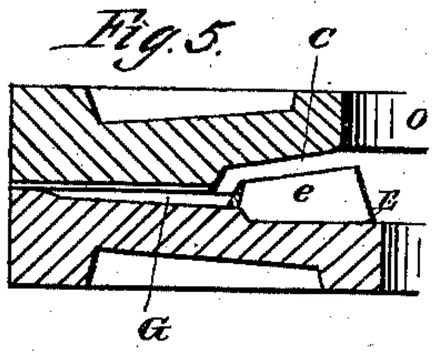


Fig. 6.

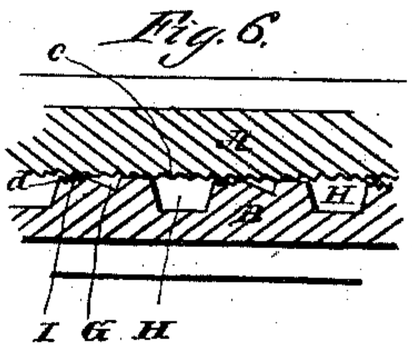
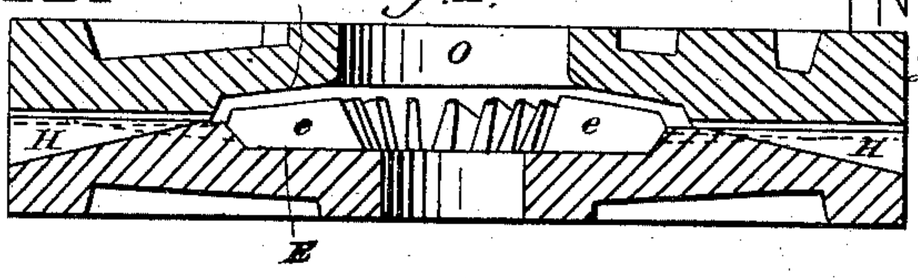


Fig. 4.



WITNESSES.

F. B. Townsend

W. C. Adams.

INVENTOR.

Louis Gathmann

per W. E. Dayton

Attorney.

UNITED STATES PATENT OFFICE.

LOUIS GATHMANN, OF CHICAGO, ILLINOIS.

MILL-DISK.

SPECIFICATION forming part of Letters Patent No. 254,814, dated March 14, 1882.

Application filed October 11, 1880. Renewed August 29, 1881. (No model.)

To all whom it may concern:

Be it known that I, LOUIS GATHMANN, of Chicago, State of Illinois, have invented certain new and useful Improvements in Mill-Disks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to disks for reducing grain and other materials, and for other purposes for which disk and other forms of grinding and reducing apparatus are used. It has for its object to subject the grain or other material passed between the disks to a practically uniform and determinate action therefrom, whereby the product is made more regular in the size of its particles, and whereby all portions thereof may be equally preserved from overheating or from other harmful effects of too long subjection to the grinding action.

To these ends it consists in the novel form or construction of the disk-faces, hereinafter fully set forth and claimed.

In those forms of dress heretofore given to millstones or grinding-disks there is nothing, so far as I am aware, to prevent some portions of the material being ground from being retained much longer than others between the grinding-faces. This is one of the serious objections hitherto urged against the disk form of grinding-face as compared with the roller or cylindric form.

In the case of two cylinders, or of a cylinder and concave, the extent of the grinding action is practically the same upon all parts of the mass subjected thereto—that is to say, in reducing wheat, for example, by cylinders, or by a cylinder and concave, each kernel of the mass of grain passes over the same extent of surface and remains subject to the grinding action the same length of time, practically, as every other kernel of the mass. This I mean to say has not been true of disk grinding-faces as heretofore constructed. The disk form of mill has, however, many important advantages over the cylindric forms mentioned, particularly in their less cost and more easy management. I have therefore sought in this invention to obviate the objections mentioned by establishing the same conditions in the disks that are present in the said cylindric forms of mill. In what manner this is done will be understood from the following description, in which reference is made to the accompanying drawings.

Figure 1 is a top view of the two disks, the upper one being broken away to reveal the upper or working face of the lower disk. Fig. 2 is a side elevation of the two disks in working relation. Fig. 3 is a plan view of the working-face of the upper disk of Figs. 1 and 2. Fig. 4 is a central vertical section of the two disks through the indirect line 4 4 of Fig. 1. Fig. 5 is a partial vertical section of said disks through the indirect line 5 5 of Fig. 1, and Fig. 6 is a vertical section through the curved line 6 6 of Fig. 1.

The disks herein described may be mounted in any approved frame-work to run either with a vertical or with a horizontal axis, and should be housed and otherwise fitted and accompanied after the usual manner of disks in a disk-mill. The invention, in short, relates solely to the construction of the working disk-faces, to which, therefore, this description will be limited.

In a vertical axis arrangement of the disks, (which I prefer,) A is the upper disk, and B is the lower disk. As here represented, A should be stationary, and B should rotate in the direction of the arrows of Figs. 1 and 2. Said disks may be of any desired size or material; but, as now advised, I prefer to make them of steel or chilled iron and about eighteen or twenty inches in diameter.

The upper disk, A, has a central aperture, O, through which the material to be operated upon is fed between the disks, and a depressed portion or bosom, C, surrounded by the annular working-face D. Said face D is preferably not more than three or four inches in width, and is dressed in fine ridges *c*, either radial or directed on any desired draft. The disk B also has a central depression or bosom, E, and a marginal working-face, F, corresponding in radial width with that of the disk A. When the two disks are mounted in working relation, the faces D and F are parallel, whether plane

or conical, and should be separated by a space less than the thickness of the material to be ground.

While either disk may be rotated in an operative machine, I prefer that the under disk shall be the runner, and it is here so shown. In the bosom E of the runner B are fixed a number of wings or vertical flanges, *e*, which are inclined from the radii of the disk suitably to throw the material to be ground outward when the runner is in motion. The face F of the disk B is formed as follows: G G are furrows leading outward from the bosom E, either radially or on a draft, as may be preferred, and terminating a short distance inside the periphery of the disk—say in the circle *a*, Fig. 1. They may therefore be called "blind" furrows. These furrows are, in sectional form, like the furrows of an ordinary millstone—that is, they have a gradual upward and rearward slope to the level of the face F. Alternating with the furrows G are the deep recesses H H, which open broadly in the periphery of the disk, as shown, but terminate at their inner ends in the face F, a short distance outside the inner edge of said face, or, say, in the circle *b*, Fig. 1. The radial sides of said recesses H are abrupt or nearly vertical, and said sides diverge in the lines where they cut the face F, so as to leave lands I in said face, of substantially equal width throughout their length, between the circles *a* and *b*. The several land-faces of the disk B are also of equal width one with another. The lands I are herein shown as having a dress consisting of a number of narrow radial ridges, *d;* but said ridges may be oblique or of other form, if preferred.

In the operation of the disks, when mounted as described, the material to be ground is thrown outward by the wings *e* and enters the furrows G. Having no other escape, it thence passes over the lands I, where it is ground, and the product falls into the recesses H. The rear walls of these recesses being abrupt, as stated, said product cannot again rise to the face F, but is by centrifugal action thrown out of said recesses at their open ends in the periphery of the disk.

It is plain that no material can pass outward from the disk-bosom except through the furrows G, since these are the only outward passages therefrom; but as these furrows are closed at their outer ends the material in each must all find escape over the adjacent land I. Having passed one land, it can be no more acted upon, but is at once discharged. The lands being of substantially equal and uniform width, as described, the grinding action is practically the same in extent of time and space upon each and every part, fragment, or kernel passed through the machine, and the limit of this action may be predetermined in fixing the breadth of the lands I. If further reduction or grinding of the same material be necessary, said material may be again passed through the disks, set closer than before; or a series of mills may be arranged to take the product from one to the other successively. A series of screens may be also arranged with a series of the machines in alternation, as is customary in flouring-mills.

I do not restrict myself as to the character of the dress *d* on the lands I, or that of the disk A. Both should be comparatively fine, and the latter should be uniform throughout its whole extent, in order that all parts thereof may present the same acting surface in opposition to the narrow lands I.

The recesses H being solely for the purpose of discharging the ground product, they may evidently be bottomless; or, in other words, they may form simple notches in the edge of the disk, or apertures extending vertically through the disk.

If for any reason it shall be preferred to make the disk A the runner, the wings *e* should be applied thereto in order to throw the grain or other material to be ground into the furrows G. Said furrows being filled, the material will be carried out of the furrows and upon the lands by contact with the rough or ridged face D, and the subsequent grinding action will be the same as though the disk B were the runner.

At *g*, Fig. 1, the outer end of the furrow G is shown curved, as it appears when cut or dressed out by an emery-wheel. The land I of course correspondingly widens opposite this curve, but the practical effect is not modified thereby, since only a small part of the material passes over the land at this point.

Having thus described my invention, I claim—

1. In a grinding-mill, the combination, with an opposing disk having a relatively plane working-face, of a disk, B, provided in its working-face with alternating blind feeding-furrows G, lands I, and recesses H, having abrupt rear walls and discharge-openings, arranged and operating substantially as and for the purposes set forth.

2. In a grinding-mill, the combination, with an opposing disk having a relatively plane working-face, of a disk, B, having in its working-face furrows G, leading from the bosom outward and terminating near the periphery, recesses H, having abrupt rear walls and extending inward from the periphery nearly to the bosom, and intervening lands I, of practically uniform width, substantially as and for the purposes set forth.

3. In a grinding-mill, the combination, with an opposing disk, of the disk B, having the blind feeding-furrows G, the discharging-recesses H, and the intervening lands I, of practically uniform width, arranged in alternation as shown, substantially as and for the purposes set forth.

4. In a grinding-mill, the combination, with the disk B, having blind furrows G, discharg-

ing-recesses H, and intervening lands I, arranged in alternation as shown, of the opposing disk A, unlike the disk B, in having a relatively plane and uniform surface, whereby all parts thereof present the same acting surface in opposition to the lands I, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

LOUIS GATHMANN.

Witnesses:
M. E. DAYTON,
JESSE COX, Jr.