T. RIOS.

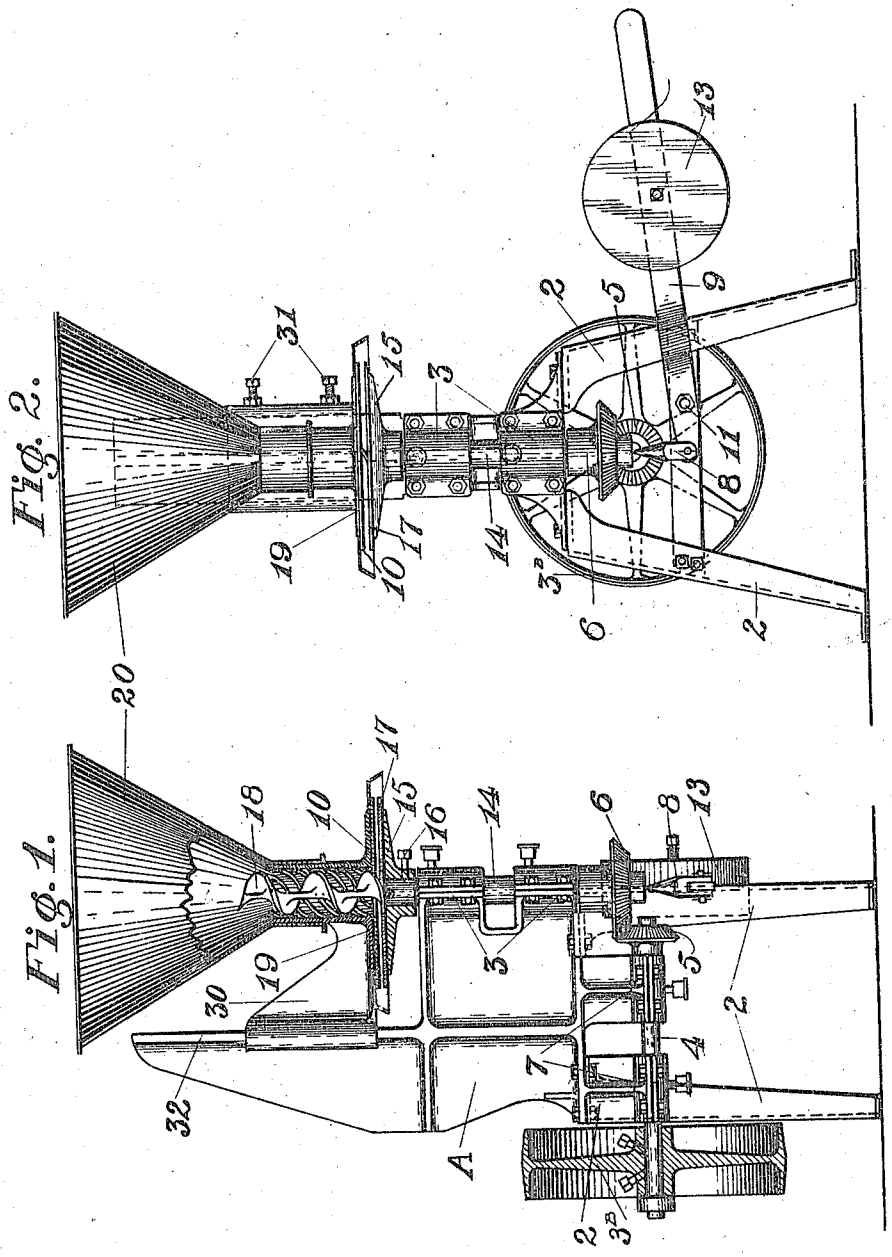
VERTICAL GRINDING MILL.

APPLICATION FILED APR. 17, 1916.

1,233,911.

Patented July 17, 1917.

2 SHEETS—SHEET 1.



WITNESSES:

Charles Tickles

INVENTOR

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T. RIOS.

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2 SHEETS—SHEET 2.

Fig. 3.

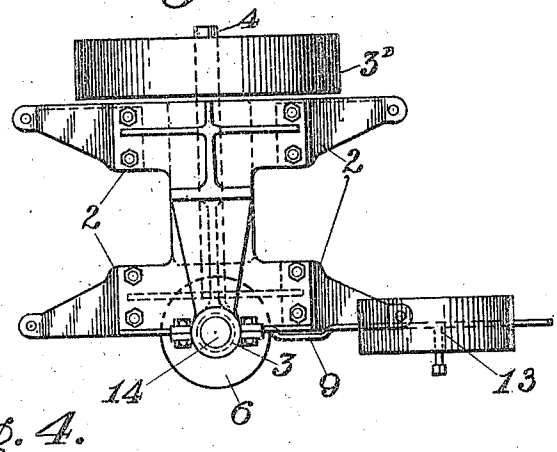


Fig. 4.

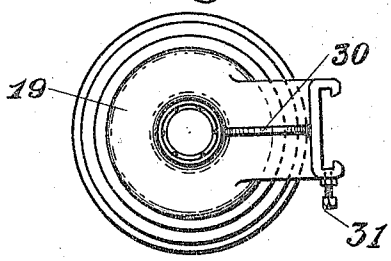


Fig. 7.

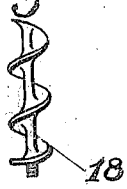


Fig. 5.

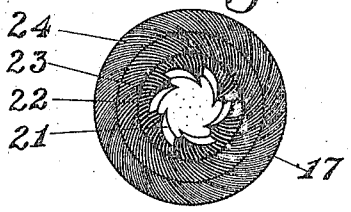


Fig. 6.

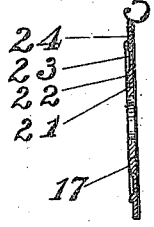
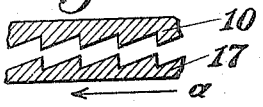


Fig. 8.



WITNESSES:

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UNITED STATES PATENT OFFICE.

THOMAS RIOS, OF SAN FRANCISCO, CALIFORNIA.

VERTICAL GRINDING-MILL.

1,233,911. Specification of Letters Patent. Patented July 17, 1917.

Application filed April 17, 1916. Serial No. 91,609.

To all whom it may concern:

Be it known that I, THOMAS RIOS, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Vertical Grinding-Mills, of which the following is a specification.

This invention relates to a grinding mill.

One of the objects of the present invention is to provide a grinding mill of the vertical type, which is simple and substantial in construction and which may be easily taken apart or assembled to permit the several parts to be readily cleaned and inspected.

Another object of the invention is to provide a novel form of grinding disks, together with an automatic feeding mechanism for same and to provide a yielding support for one of the disks, to prevent injury to same if solid particles such as stones or pieces of metal should happen to enter with the product to be ground.

Further objects will hereinafter appear.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings in which—

Figure 1 is a side elevation partly in section, of the grinding mill.

Fig. 2 is a front elevation of same.

Fig. 3 is a plan view.

Fig. 4 is a plan view of the upper grinding disk, and the connected supporting bracket.

Fig. 5 is a plan view of the grinding face of one of the grinding disks.

Fig. 6 is a cross section of same.

Fig. 7 is a side elevation of the feeding auger.

Fig. 8 is an enlarged side elevation of the grinding disks, partly broken away.

Referring to the drawings in detail, A indicates in general a frame supported upon a base 2. Formed on one side of the frame A is a pair of journals 3, and extending through said journals is a shaft 14 on the upper end of which is secured by means of a set screw 16, a disk 15. Suitably secured on the upper face of said disk is a grinding disk 17 provided with four definite circular rows of grinding teeth such as indicated at 21, 22, 23 and 24. These teeth extend across said rows and the rows are so arranged that the first row of teeth will be comparatively coarse while the outermost row will be correspondingly finer, the intermediate rows being graduated from the coarse inner row to the outer finest row. The grain is thus gradually broken and finally discharges in a comparatively fine ground condition. Slidably keyed upon the lower end of the shaft 14 is a bevel gear 6, and intermeshing with said gear is a bevel pinion 5 which is secured upon a horizontally disposed driving shaft 4 journaled in bearing members 7 carried by the base section 2 of the frame. The shaft 4 may be driven from any suitable source of power by means of the pulley 3^b. Arranged in direct alinement with the shaft 14 is a feed hopper 20 and secured on the lower end of said feed hopper is a stationary plate 19 to which is secured a grinding disk 10 constructed similar to the one indicated at 17. The outer edge of the plate 19 is turned down over the outer edges of the disks 10 and 17 so as to deflect the ground material from the disks into a receptacle not shown. See Figs. 5 and 6. The hopper 20, together with disks 10 and 19 are supported by a bracket arm 30, adjustably secured by means of set screws 31 to a flange 32, formed on the frame A. This construction permits the bracket arm 30, together with the hopper and stationary grinding disk to be raised to and from the lower grinding disk 17 and also permits the several parts to be entirely removed when it is desired to clean the mill. Secured to the upper end of the shaft 14 is a feed auger 18. This auger is centrally disposed with relation to the feed hopper and is sufficiently long to extend a considerable distance up into the feed end of the hopper. The interior of the hopper is provided with spiral ribs 18′, the pitch of which is opposite to the pitch of the auger. The auger revolves in unison with the shaft 14 and attached grinding disk 17 and co-acts with the spiral ribs 18′ in the hopper so as to automatically deliver and evenly distribute the product to be ground

over the innermost teeth of the grinding disks. The intermediate shaft 14 carrying the lower grinding disk 17 is yieldably mounted to permit particles of metal or other hard material entering with the grain to discharge without breaking the burs or grinding teeth of the disks. This is accomplished as follows: Pivotally mounted as at 11 in the base frame 2 is a lever 9, upon which is adjustably mounted a weight 13. The inner end of the lever is provided with a pivotally mounted thrust bearing 8 which engages the lower end of shaft 14. The beveled gear 6, mounted on the lower end of the shaft is slidably keyed to the shaft to permit longitudinal movement of the shaft with relation to the gear. It can therefore be seen that any hard article entering between the disks will merely force the lower disk 17 with connected shaft 14 in a downward direction, this being permitted as the lower disk is only held against the upper disk by means of the weighted lever 9 and the thrust bearing 8. The amount of pressure brought to bear by the lower disk against the upper disk may be varied by adjusting the position of the weight 13.

The grinding mill here illustrated is particularly constructed for grinding nixtamal. Nixtamal is a product produced by grinding half-cooked corn while in a wet condition. The dough or mixture thus produced is particularly used for baking tortillas. In actual practice it has been found advantageous to grind the half-cooked corn in one operation as regrinding the same tends to destroy the flavor and aroma contained in the corn.

The operation will be as follows: The half-cooked corn is first placed in the hopper 20. Power is then applied to the pulley 3^b and is thus transmitted through the shaft 4 and the gears 5 and 6 to revolve the shaft 14 and the lower grinding disk 17. The feed auger will then revolve in unison with same and will consequently force the corn through the lower end of the hopper and out between the grinding disks. The first set of teeth 21 will first break or tear up the individual kernels, the second teeth will break the product still finer; the third and fourth sets will similarly reduce the corn and will finally permit same to discharge in a finely ground condition around the outer periphery of the disks.

By referring to Fig. 8, it will be seen that the lower disk 17 revolves in the direction of arrow *a*. This causes the teeth to pull away from each other and therefore to act reverse. This movement tends to eliminate the cutting or breaking action usually employed by other grinding mills and instead produces a mashing tendency which is particularly beneficial in grinding nixtamal. A receiving hopper or pan not here shown, may be placed directly below the disks, 17 and 19, and as these are mounted above any of the lubricated bearings indicated at 3 and 7, it can be seen that no oil or foreign matter can possibly enter or mix with the discharging product. The yieldable mounting provided for the lower disk positively prevents breaking of the grinding burs formed on the disks and furthermore provides a means whereby the pressure between the disks may be adjusted to suit various grades of materials.

The machine as a whole is simple and substantial in construction and as the upper hopper with connected grinding disk can be removed by simply releasing the set screws 31, it can be seen that all parts are easily accessible for cleaning purposes or otherwise.

The materials and finish of the several parts of the invention may be such as the judgment and experience of the manufacturer may dictate.

I wish it understood that various changes in form, proportions and minor details of construction may be resorted to within the scope of the appended claims, and that I do not wish to limit myself to the specific design and construction here shown.

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

1. In a grinding mill, a pair of grinding disks, means for rotating one of said disks with relation to the other, and a deflector plate extending downwardly over the edges of the disks to deflect the ground material downwardly and away from the disks as it passes from between the disks.

2. In a grinding mill, a frame formed with an upwardly projecting flange, a bracket having inturned side flanges slidably engaged over and with the side edges of the flange, a set screw projected through one of said inturned flanges of the bracket and impinging against the adjacent side edge of the flange, a grinding disk secured to said bracket, and a grinding disk journaled in the frame and coöperating with the first named disk.

3. In a grinding mill, a frame, a rotatable grinding disk journaled in said frame, a bracket slidably mounted on said frame, a grinding disk secured to said bracket in grinding relation to said rotatable disk, means for securing said bracket to said frame with the disks in proper grinding relation to each other, a hopper on said bracket above the disk, spiral ribs in the interior of said hopper, and an auger extending from the rotatable disk into said hopper in co-acting relation to said ribs.

4. In a grinding mill, a frame, a hopper having a base plate rigidly connected there-

to and provided with a downturned circular flange, a grinding disk secured to the under face of the base plate and spaced at its periphery from the circumference of said flange, a lower grinding disk extending upwardly within said flange, and means to rotate one of the disks.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

THOMAS RIOS.

Witnesses:
FRANCES V. COLE,
W. W. HEALEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."