No. 619,892. Patented Feb. 21, 1899.

H. KELLY.

GRINDING MILL.

(Application filed Oct. 27, 1898.)

(No Model.)

FIG. 1.

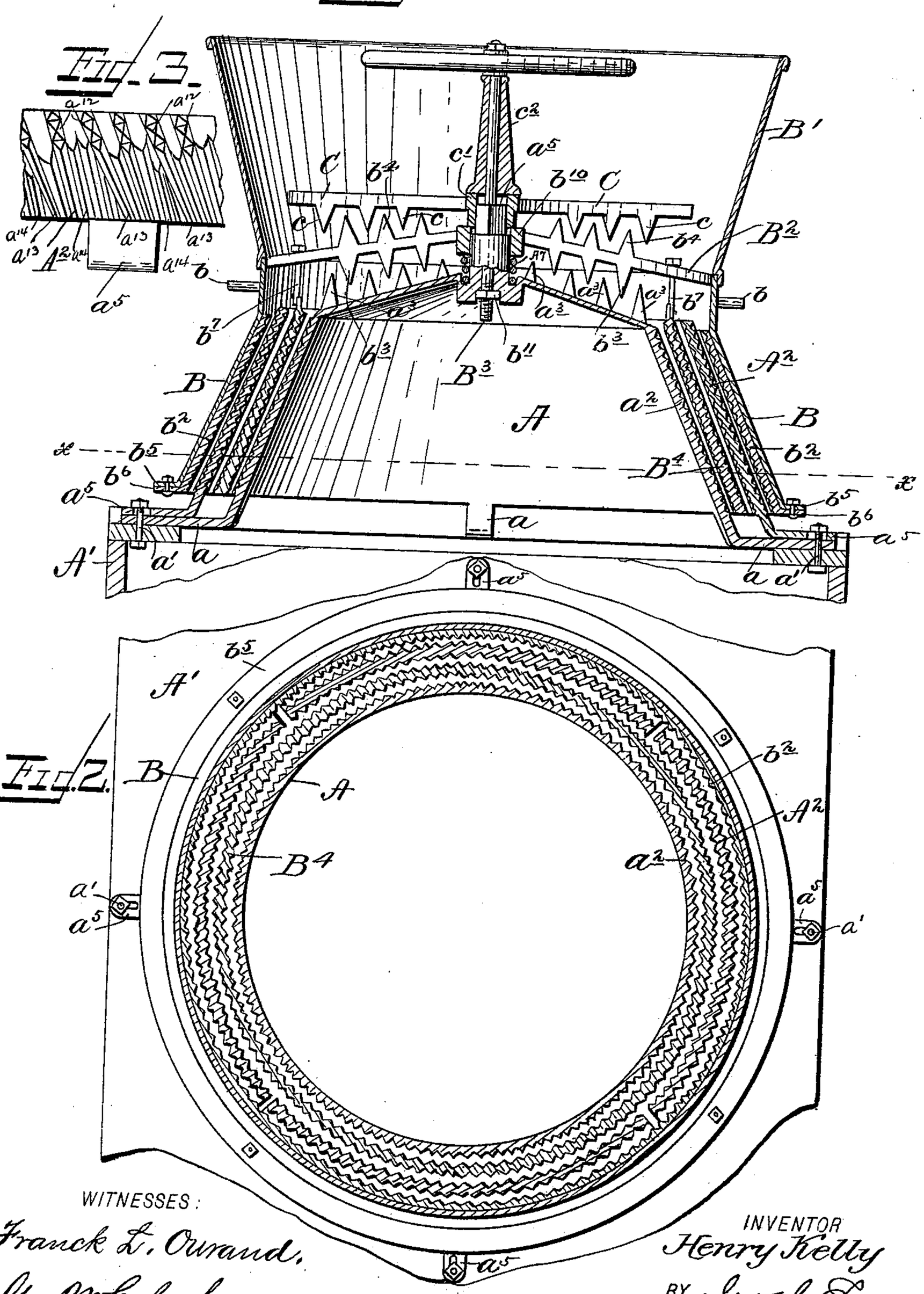

FIG. 2.

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HENRY KELLY, OF WATERLOO, IOWA, ASSIGNOR TO HIMSELF AND O. B. TANEYHILL.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 619,892, dated February 21, 1899.

Application filed October 27, 1898. Serial No. 694,702. (No model.)

To all whom it may concern:

Be it known that I, HENRY KELLY, a citizen of the United States, residing at Waterloo, Black Hawk county, Iowa, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

My invention relates particularly to that class of mills for grinding ears of corn for stock-feed—such, for instance, as the mill shown in my Patent No. 612,776.

The objects of the invention are to increase the capacity of the mill by providing a plurality or gang of grinding-rings between the grinding-surfaces of the mantle and cone, said rings being provided on both of their sides with grinding-surfaces and lying one within the other, with their upper edges at or within the lower open end of the hopper, and the rings being alternately carried by the mantle and the cone; to improve the grinding-faces of the rings; to provide for the adjustment of one or more of the said rings when the mantle is raised or lowered, and to form the alternate rings in sections to provide for such adjustment and to form a perfectly true ring. These objects I accomplish by the mechanism shown in the accompanying drawings, in which—

Figure 1 is a central vertical section through my improved mill. Fig. 2 is a horizontal section of the mill through the grinding-surfaces, and Fig. 3 is a detail view of a portion of a ring to show the grinding-surfaces.

A is the inner stationary cone, having lateral lugs a projecting from its lower edge and secured by bolts a' to the upper portion of the box A'. The outer face of the cone is provided with a suitable grinding-surface a^2, and its top is provided with the usual coarse breaker-teeth a^3.

B is the conical mantle, having lugs b for attaching a sweep by which it is rotated about the cone A, and the upper portion of the mantle is provided with a hopper B'. The mantle is also provided across its open upper end with cross-bars B^2, at the center of which is a hub b^{10}, turning on the central post a^5, rigid with the cone A and forming the axis of the mantle. The cross-bars B^2 are provided on their lower sides with cob-breaking teeth b^3, which coöperate with similar teeth a^3, and the upper sides of the bars B^2 are provided with similar teeth b^4, which coöperate with cob-breaking teeth c on the lower edge of the spider-like frame C, having its hub c' mounted on the squared upper end of post a^5, which prevents rotation, but allows a slight vertical movement. This hub c' rests on the upper edge of the mantle-hub b^{10}, and a loose sleeve c^2 rests on the upper end of hub c'.

B^3 is an adjusting-bolt extending down through the sleeve c^2, hub c', and post a^5 and is provided at its lower end with a nut b^{11}, which fits within a squared socket in the lower end of post a^5.

The inner face of the mantle B is provided with a grinding-surface by means of a closely-fitting conical ring b^2, corrugated or roughened on the inner side and attached by a flange b^6 on its lower edge, bolted to the lower flanged edge b^5 of the mantle. This ring b^2 is of the same width as the annular grinding-surface a^2 and lies in the same horizontal plane.

B^4 is a conical grinding-ring, corrugated or toothed on both faces and suspended next to the grinding-surface a^2 by means of its upwardly-projecting arms or bolts b^7, which are secured to the cross-arms B^2 of the mantle, so that the ring B^4 rotates with the mantle.

A^2 is a second conical ring corrugated or toothed on both faces and located between the outer face of the ring B^4 and the adjacent grinding-surface b^2 on the inner side of the mantle B. This ring A^2 is formed in several sections, each one of which is provided at its lower edge with an outwardly-projecting slotted ear, resting on the cone-lugs a and secured by the bolts a', which secure the cone to the box A'. This construction provides for the adjustment of the grinding-ring A^2 with respect to the outer grinding-surface of the ring B^4 and the inner grinding-surface b^2, which adjustment is rendered necessary by reason of the ring B^4 moving away from the ring A^2 when the mantle is lowered, which would cause finer grinding between the outer surface a^2 of cone A and the inner face of ring B^4 than between the outer face of ring B^4 and the inner face of ring A^2. The adjustment of segmental ring A^2 causes the corn to be ground to the same fineness between all the grinding-surfaces.

The ring A^2 may be termed, broadly, an "expansible and contractible double-face grinding-ring." The number of these alternately stationary and rotary double-face grinding-rings may be increased, if desired; but by the two shown, in connection with the two on the cone and mantle, six grinding-surfaces are afforded instead of four, as would be the case with the rings placed in different horizontal planes, as in my patent before referred to.

The upper edges of the grinding-rings B^4 A^2 extend up to or within the hopper-opening, so that three annular inlet-spaces are formed to admit corn to the grinding-surfaces. It is obvious, therefore, that the output of the mill will be greatly increased and that a common objection to existing mills of this class—viz., slow grinding—will be thereby obviated. Moreover, by making certain of the grinding-rings in sections they will be more perfect in contour, for in casting these rings in one piece they are frequently oval by reason of defective casting.

All of the annular grinding-surfaces are one within the other and lie in the same horizontal plane, and the corrugations or teeth are coarse at the upper edges and gradually increase in fineness toward the lower edges.

The upper portions of all the grinding-surfaces are serrated to form the pyramidal or pointed teeth a^{12}, in line with the usual inclined teeth or ribs a^{13}. These pointed teeth a^{12} insure the entrance of the material broken by the breaker-teeth c b^4 a^3 b^3 into the spaces between the several grinding-rings and prevent the choking of the mill, which not infrequently takes place with mills having only the long inclined ribs or corrugations a^{13}, separated by the similar shorter and finer ribs a^{14}. These serrations or pointed teeth a^{12} I find by actual experiment greatly improve the action of the mill.

It will be seen that by tightening the screw B^3 the mantle will be forced down to effect a finer grinding. On the other hand, if the screw is loosened the mantle will be raised by the grain between it and the ring A^2, as the tendency is to raise the mantle during the grinding operation. The usual spring A^7 may be provided, however, if desired, under the mantle-hub b^{10} to raise the mantle when the screw B^3 is loosened.

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

1. A grinding-mill comprising a cone having an external annular grinding-surface, a conical mantle having an internal annular grinding-surface, means for adjusting the mantle on the cone, a conical double-face grinding-ring suspended from the mantle next to the cone and an outer adjustable double-face grinding-ring in the space between the first-named ring and the inner surface of the mantle; the adjustment of the outer ring serving to maintain it an equal distance from the mantle and inner ring, when the mantle is adjusted and all of the grinding-surfaces lying in the same horizontal plane, substantially as described.

2. A grinding-mill comprising a cone having an external annular grinding-surface, a conical mantle having an internal annular grinding-surface, means for adjusting the mantle on the cone, a conical double-face grinding-ring suspended from the mantle next to the cone, and an outer double-face grinding-ring formed of horizontally-adjustable, segmental sections movable toward and from the inner face of the mantle and the outer face of the inner ring to maintain said segmental ring an equal distance from the inner ring and the mantle, when the latter is adjusted; all of the grinding-surfaces lying in the same horizontal plane, substantially as described.

3. A grinding-mill comprising, a cone having a central vertical post, an external annular grinding-surface, and provided with attaching-lugs at its lower edge, a mantle having an internal annular grinding-surface and cross-bars having a central hub turning on said post, a screw in the post for adjusting the mantle, a double-face grinding-ring next to the cone and having upwardly-extending bolts or projections connected to said cross-bars, a second double-face grinding-ring between the mantle and the first-named ring and formed in sections each having at its lower edge a slotted ear adjustable on the cone-lugs; all of the grinding-surfaces lying in the same horizontal plane with their upper edges at or within the hopper extension of the mantle.

4. A grinding-mill comprising, a cone provided with a central vertical post having a squared socket in its lower end, an external annular grinding-surface and breaker-teeth on its top, a rotary conical mantle having an internal annular grinding-surface and provided with cross-bars having a hub turning on the post and provided with upper and lower breaker-teeth, non-rotating arms mounted on the post above the cross-bars and having teeth on their lower sides, a sleeve above the hub on the non-rotating arms, a screw or bolt extending down through the sleeve and post and provided with a nut in said squared socket, a plurality of concentric conical grinding-rings between the mantle and cone, having grinding-surfaces on both faces and connected alternately to the cone and mantle, the non-rotating grinding-ring being adjustable in the space between the inner face of the mantle and the outer face of the inner ring; all of the grinding-surfaces lying in the same horizontal plane and of about the same width.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY KELLY.

Witnesses:
G. H. JACKSON,
O. B. TANEYHILL.