No. 751,488. PATENTED FEB. 9, 1904.

J. A. ENGEL.

FEED GRINDER.

APPLICATION FILED JUNE 25, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

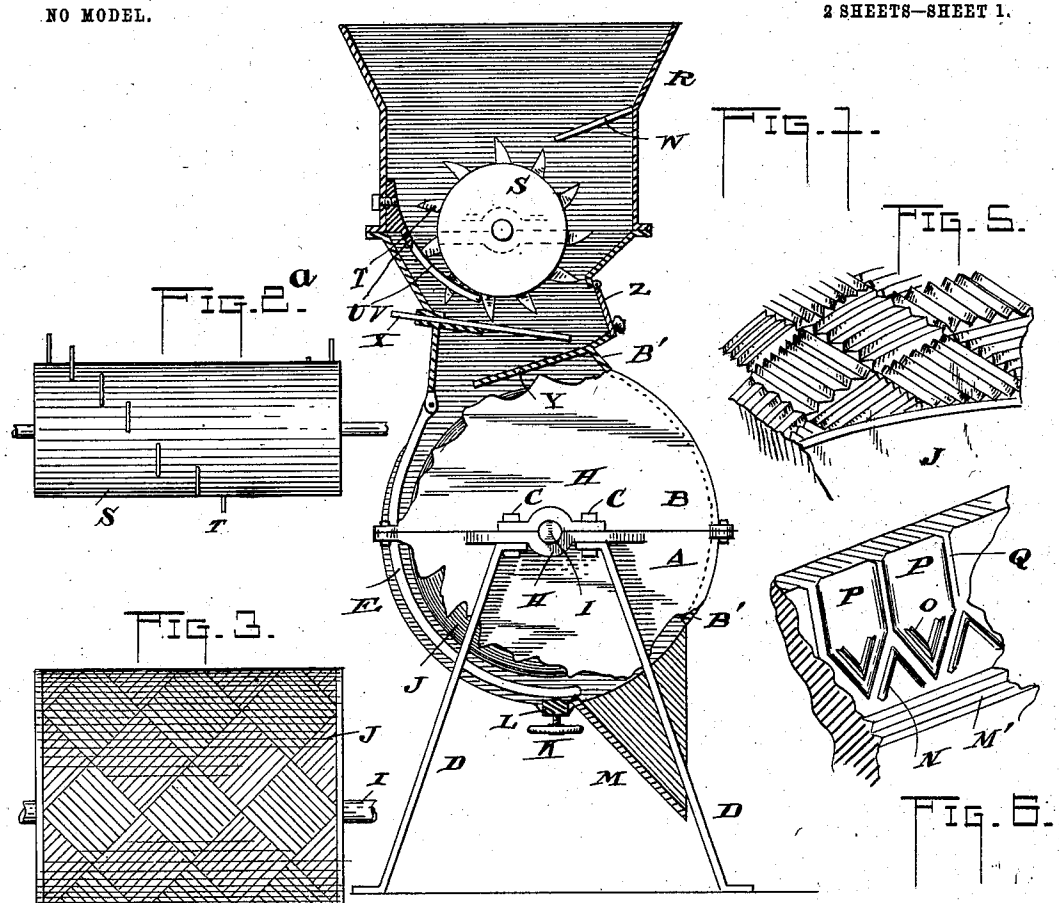

FIG. 1.

FIG. 5.

FIG. 2.

FIG. 6.

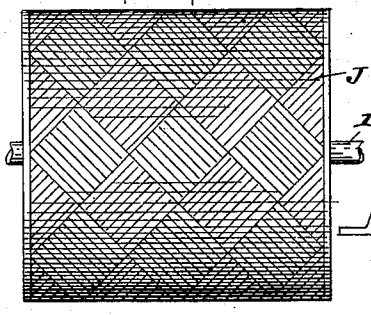

FIG. 3.

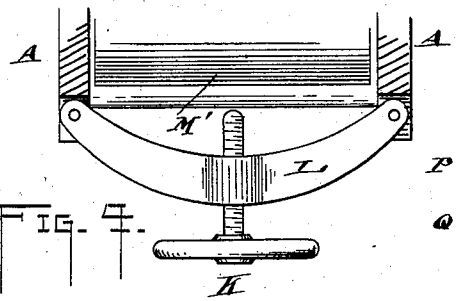

FIG. 4.

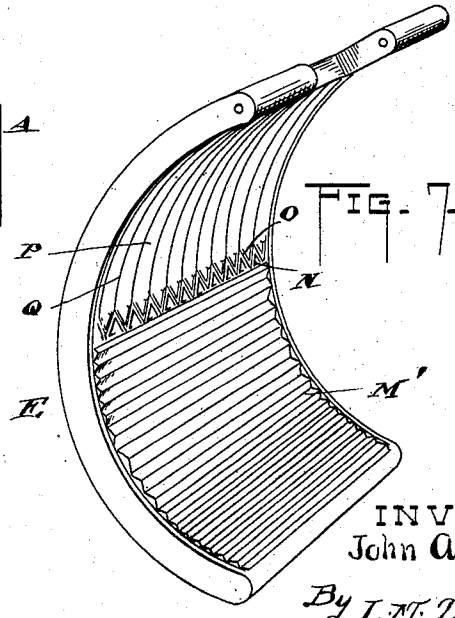

FIG. 7.

WITNESSES

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FEED GRINDER.

APPLICATION FILED JUNE 25, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

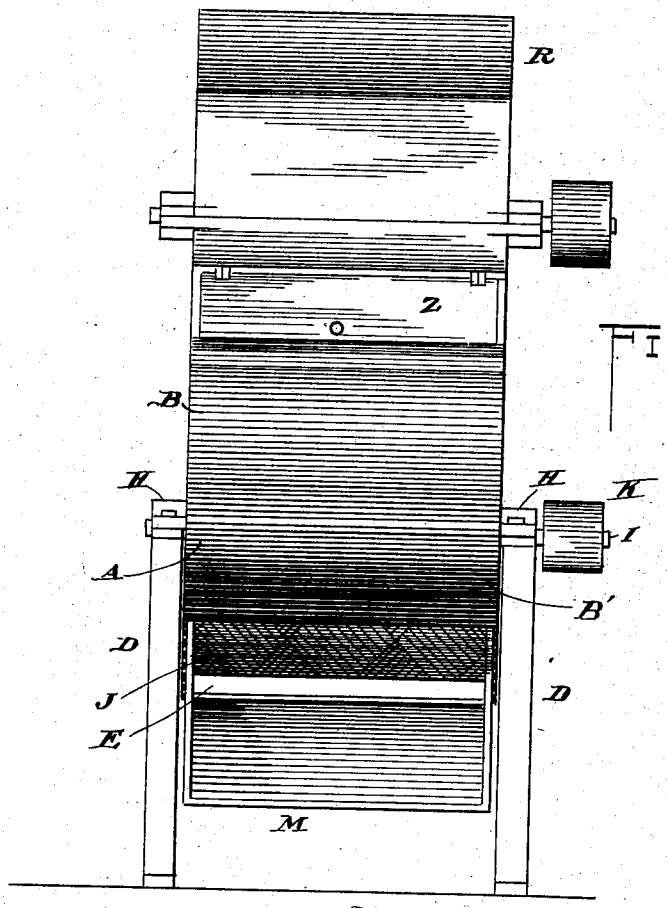

FIG. 2.

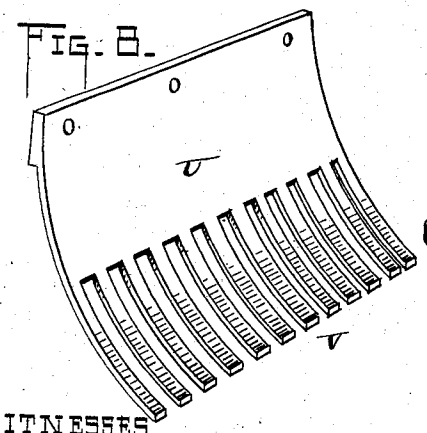

FIG. 8.

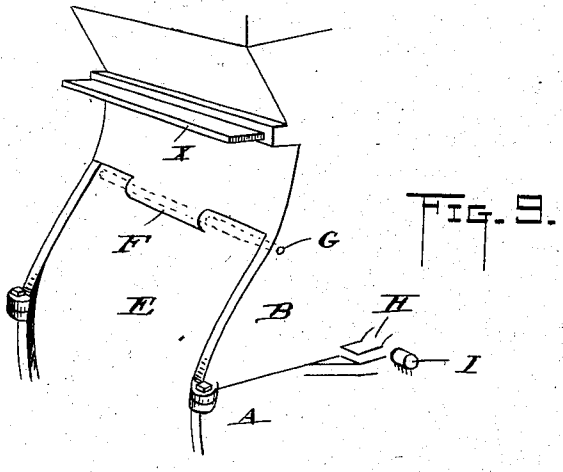

FIG. 9.

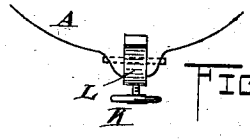

FIG. 10.

WITNESSES

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No. 751,488. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

JOHN A. ENGEL, OF WASHINGTON, ILLINOIS.

FEED-GRINDER.

SPECIFICATION forming part of Letters Patent No. 751,488, dated February 9, 1904.

Application filed June 25, 1903. Serial No. 163,053. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. ENGEL, a citizen of the United States, residing at Washington, in the county of Tazewell and State of Illinois, have invented certain new and useful Improvements in Feed-Grinders; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in grinding-mills for reducing grains of all kinds.

An object of the invention is to provide a peculiar structure in a mill by which feed and grain can be reduced with a minimum of heating to the materials.

Another object is to provide a machine in which ear-corn can be first broken and then ground.

A still further object is to provide a peculiar grinding-surface for the cylinder and its concave, all of which will be hereinafter fully described.

In the accompanying drawings, Figure 1 is a side elevation, in part section, of my improved machine. Fig. 2 is a front elevation of the machine. Fig. 2ª is a view of the breaker-cylinder. Fig. 3 is a view of the grinding-cylinder, showing peculiar arrangement of the grinding-surface. Fig. 4 is a sectional view of the bottom of the machine, showing an adjusting-screw for the concave. Fig. 5 is a detail view in perspective of a portion of the grinding-cylinder, illustrating the arrangement of the grinding-surface. Fig. 6 is a detail view of a portion of the concave, showing its grinding-surface. Fig. 7 is a perspective view of the concave, showing its inner grinding-surface. Fig. 8 is a perspective view of a concave used in the operation of my machine employed for breaking the ear-corn. Fig. 9 is a perspective view of a portion of my device, showing the pivoted concave. Fig. 10 is a detail view of a portion of the side of the machine, showing the adjusting device illustrated in Fig. 4.

The body of my improved grinder is formed by two castings, as represented by A and B, the latter resting upon the former and fastened thereto by bolts C, which also pass through supporting-legs D. The front of these portions A and B are closed by a wall B′, (shown in Figs. 1 and 2,) while the back is open. In the opening at the rear of B is hinged a concave E, as shown in Figs. 1 and 9, a lug F being cast with the said portion B, through which a hinge-pin G passes, as fully shown in said Fig. 9, said pin passing also through the sides of B. Half-bearings H are cast with A and B, forming a boxing for a shaft I, carrying a grinding-cylinder J, driven by a pulley K on said shaft I. The grinding-surface of this cylinder is of peculiar form, consisting of a series of short ribs whose ends adjoin the ribs of other series running at right angles. To make this clear, it may be said that the periphery of the cylinder is divided into squares placed diagonally of the length of said cylinder. Each square is filled with parallel ribs or teeth of **A**-shaped cross-section, those of one square lying at right angles to those of each neighboring square.

The concave E referred to is shown in Fig. 7 and is made to follow the curved surface of the cylinder J. Its lower end is adjusted to and from the cylinder by means of a hand-wheel K, carried in a bar L, whose ends are held in the sides of the body portion A. Said bar lies across the machine, as shown, one end being held by a metal pin, while the other is a breakable pin of wood, so that if any hard foreign substance enters the machine between the concave and the cylinder the breakable pin will release the said concave and neither it nor the cylinder will be injured, as will be understood. Between the end of the concave and the front wall B′ of the machine is a delivery-spout M, by which the feed is carried away after being ground. The lower one-half of the concave is provided with parallel raised **A**-shaped ribs M′, which at the bottom are very close together, gradually getting farther apart as they approach the middle of the plate. Adjoining the said ribs above are **A**-shaped ribs N, and still farther above are **V**-shaped ribs O, as indicated in Fig. 6, and adjacent to the said ribs are depressions P, which extend to the top of the concave and leave the vertical ribs Q between them.

Formed with the body portion B is a hopper R, within which is a breaker-cylinder S, whose construction is shown in Fig. 2ª. The cylinder is perfectly plain, except for a series of teeth T, set in a spirally-arranged row, so placed that they make a complete turn around the cylinder, as indicated. A concave is provided for this cylinder, being shown at U in Figs. 1 and 8. Said concave is made in the form of a comb with teeth V, which extend between the teeth T of the cylinder, and consequently permit the said teeth T to pass between them. Ear-corn deposited in the hopper finds its way between the concave and cylinder, being guided therebetween by an overhanging shelf W. The teeth of the concave catch the ears of corn and break them into small pieces and partially remove the kernels from the cob. When so reduced, the broken material falls upon an adjustable slide X below the cylinder and from there falls upon a shelf Y and from thence between the concave J and cylinder E. The slide X being adjustable permits the operator to vary the quantity of material fed to the latter concave and cylinder. By pushing said slide in to about the position shown but a small quantity of the material will be permitted to find its way to the cylinder J. The kernels of corn will first be carried down the recesses P and brought against the **V**-shaped ribs O and broken, the ribs N also assisting in that operation. From thence the broken portions reach the horizontal ribs M and are continually ground finer and finer as they descend. The obliquely-placed ribs of the cylinder assisting the ribs M must of necessity result in the proper reduction of the grain.

It has been found that this form of machine grinds the corn with much greater rapidity and with less power than the older forms of grinders and with much less heating of the material. This is by reason of the peculiar construction and surfaces of the grinding portions and by reason of the quick passage through the machine, the material not being continually worked over and over to properly reduce it. The ear-corn is readily broken by the peculiar form of cylinder S and its concave.

At Z is a door through which the interior of the grinder may be inspected and watched, and other like conveniences may be provided, as desired.

I do not wish to confine myself to the exact structure shown and described, since various changes may be made without departing from the spirit and intent of the invention.

I claim—

1. In a grinding-mill, a grinding-cylinder provided on its periphery with parallelograms composed of parallel ribs of **A**-shaped cross-section, each set of ribs lying at right angles to those of a parallelogram immediately adjoining, said parallelograms lying diagonally of the direction of rotation of the cylinder substantially as described and shown in combination with a concave for assisting in the grinding operation.

2. In a grinding-mill, a grinding-cylinder having its periphery divided into squares each of which has one of its diagonals parallel with the axis of the cylinder, and a series of parallel ribs of **A**-shaped cross-section filling each square, the ribs of one square lying at right angles to those of a neighboring square as shown.

3. In a grinding-machine, the body of the machine, a grinding-cylinder adapted for revolution therein, a concave pivotally supported in said machine adjacent to the cylinder for assisting in the grinding and constituting one of the grinding members, a series of horizontal parallel ribs formed with the concave and occupying the lower one-half of the surface of said concave, said ribs being **A**-shaped in cross-section and lying close together at the lower extremity of the concave and gradually separating as they rise, a series of vertically-arranged ribs extending from near the top rib of the horizontal series to near the top of the concave, there being a depression between each pair of said vertical ribs as described, an **A**-shaped rib lying between the top rib of the series of horizontal ribs and the lower end of each of the vertical ribs, and a **V**-shaped rib between the **A**-shaped ribs with the depressions between the vertical ribs all as shown and described and for the purposes described.

4. In a grinding-mill, the body of the mill, a receiving-hopper at the top thereof, a cylinder therein for breaking the ear-corn fed thereto, teeth for the cylinder, a concave adjacent to the cylinder the same being in the form of a comb and having its teeth extending between the teeth of the cylinder, a second cylinder beneath the first, a cut-off between the two cylinders for regulating the flow of grain to said second cylinder and a concave pivoted adjacent to the latter cylinder and adjustable thereat and means for gaining such adjustment substantially as set forth.

5. In a grinding-mill, the body thereof, a receiving-hopper at the top thereof, a cylinder therein for breaking the ear-corn, teeth for the cylinder, the same being arranged in a single row in a spiral manner around the said cylinder, a concave adjacent to the cylinder, the same being in the form of a comb and having its teeth extending between the teeth of the cylinder close to the body of the latter, a second cylinder beneath the first and having its grinding-surface divided into squares lying diagonally to the length of the cylinder, a series of raised ribs of **A**-shaped cross-section filling each square, the ends of the ribs of one square lying adjacent to the sides of the ribs of each neighboring square as shown, a concave pivoted adjacent to the latter cylinder and adjustable for the purposes described, a series of horizontal ribs on the lower half of

the grinding-surface of the concave the said ribs being A-shaped in cross-section and lying close together at the lower extremity but separating toward the top, a series of vertical ribs, A shape in cross-section, for the upper half of the concave, there being depressions between them, an A-shaped rib lying between the lower end of each vertical rib and the top horizontal rib and a V-shaped rib occupying a position between the said A-shaped ribs all substantially as shown and described.

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

JOHN A. ENGEL.

Witnesses:
E. J. ABERSOL,
L. M. THURLOW.