H. M. PLAISTED.

REDUCING MILL.

APPLICATION FILED FEB. 3, 1919.

1,322,339.

Patented Nov. 18, 1919.

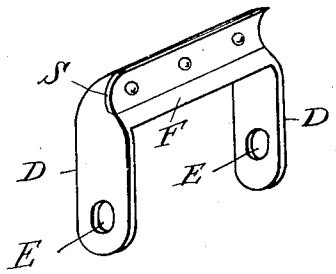


Fig. 2.

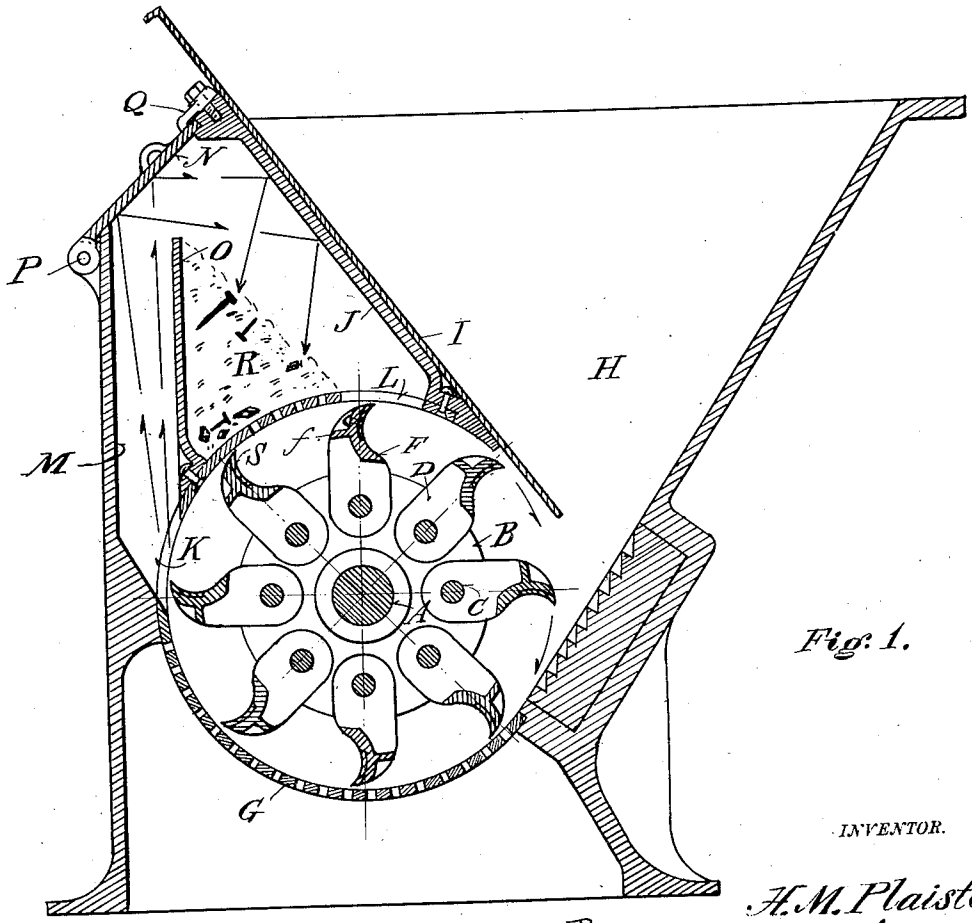


Fig. 1.

INVENTOR.

H. M. Plaisted,

By Mason Fenwick Lawrence,

Attys.

UNITED STATES PATENT OFFICE.

HAROLD M. PLAISTED, OF ST. LOUIS, MISSOURI, ASSIGNOR TO WILLIAMS PATENT CRUSHER AND PULVERIZER CO., OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

REDUCING-MILL.

1,322,339. Specification of Letters Patent. Patented Nov. 18, 1919.

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To all whom it may concern:

Be it known that I, HAROLD M. PLAISTED, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Reducing-Mills, of which the following is a specification.

This invention relates to certain new and useful improvements in reducing mills for feed and like material.

The main object of my invention is to provide rotary pivoted means for cutting the feed, as distinguished from pounding or beating it, and to throw the feed forward into the path of the hammers and outward against the cage. Another object is to provide a by-pass for catching metal, gravel, and like foreign matter, that the hammers throw outward with the feed, and separating the foreign matter while allowing the feed to return to the cage.

In the accompanying drawing on which like reference letters indicate corresponding parts, Figure 1 represents a reducing mill illustrating my invention, the view being a sectional elevation across the shaft; and Fig. 2 a detail perspective view of a preferred form of hammer as mounted in said mill.

The letter A designates the shaft of a mill of the character described, on which are mounted end disks B carrying hammer rods C on which are pivotally mounted stirrup hammers by their legs D—D,—the inner ends of which are provided with holes E for said hammer rods.

The outer ends of said legs are shaped to a point lying substantially in a radial plane through the pivot and shaft and these points are connected by a cross bar F which is of the shape of a portion of a cylinder with the concave face toward the front, and said portion of the cylinder lying approximately in the radial plane through the pivotal points of the legs and center of the shaft. The normal position of the outer edge of the cross bar at the front face is slightly in front of said radial plane, and is chamfered from said outer edge backward to the rear to give clearance for the cutting edge thus produced. The inner side face of said bar is practically at right angles to the radial plane through the pivots and the center of gravity of the hammer when rotating, and meets the front face in an acute angle that facilitates passing through the feed being operated on, after the curved front face engages the material in front of it and acts upon it in the following manner. The inner edge of said cross bar is preferably a farther distance in front of said radial plane than the outer edge; and on account of the concave shape of the front face and the normal position of the hammer in operation, the material being operated on is cleared from the cutting edge by the backward and inward slope of the outer portion of the front face, and is then thrown outward again toward the cage by the reversely curved outer portion of said front face. The rear face of the bar is convex, being preferably curved concentric with the front face, and together with the outer and inner side faces, constituting a bar that is comparatively thin in the direction of rotation and pressure, and the forwardly projecting outer and inner sides of the bar due to its curved form, increase its stiffness while they also cut through the material; and when this hammer is cast in one piece it is ribbed or otherwise formed to resist the pressure of the material.

The outer portion of the front face of the cross bar is preferably provided with a concave blade S of hardened steel, mounted in a recess in the front face so that the said blade will form a continuous curve with the balance of the front face of the cross bar, and will form the cutting outer edge that normally in operation is located closely adjacent to the cage. In practice, this stirrup hammer has been made in cast steel and the curved cross bar has been provided with a strengthening rib *f* at the rear and near the center, and the hardened steel face plate has been riveted in the recess as shown on the drawing. If desired, however, the face plate may be omitted and the hammer be cast in manganese steel, or other suitable material according to requirements. It is preferred however to provide a comparatively soft metal for the body of the hammer and fasten to the front face the concave cutting blade, which is reversible so that the cutting edge when worn may be replaced by reversing the blade in the recess.

The cage G is of perforated metal but may be otherwise formed. The housing of the mill is provided with a suitable hopper H, and regulating slide I supported by a slanting wall J forming one side of the hop-

per. The cage is provided with an opening outlet K just above the horizontal plane through the center of the rotor at the back, and another opening L near the top of the cage and located between the outlet K and the feed inlet and adjacent to the lower end of the slant wall J, to which the upper end of said cage is conveniently fastened. The back wall M of the housing extends upward from the said opening K, and a top wall N extends from the back wall forward, at about an angle of 45 degrees with the vertical, to its connection with the reversely slanting wall J. An inner partition wall O extends upward from said opening K and parallel to the back wall M, but not reaching the top wall N. A vertical guiding passage is thus formed from the opening K, and a pocket R is formed by the partition wall O and the upper portion of the cage adjacent and between the openings K and L, which openings together with the guiding and deflecting walls described, constitute a by-pass with the intermediate pocket. The rotation of the hammers in the direction of the arrow tends to drive the feed outward and upward through the vertical passage between the walls M and O, and it is deflected horizontally over the top of the partition O by the slant wall N, and then downward into said pocket by the slant wall J. The pocket will naturally fill up with the feed and contained matter that is foreign to the feed, such as metal and gravel, but the surplus material will flow inward again through the opening L after the natural slope of material is formed in the pocket as indicated in Fig. 1. Any metal will be driven into the feed material and gravitate to the lower angle of the pocket above the cage and toward the wall O. The perforations in the cage that forms the bottom of said pocket, will allow a sifting of the feed material backward to the cage, but will retain the metal and gravel and like foreign matter in the pocket.

The top wall N that is slanting forward from the back wall M is preferably removable to form a door,—such as by providing hinges P at its lower side edge connecting it to the back wall, and a suitable fastening such as a button Q for the top edge.

I claim:

1. A mill of the character described comprising a cage having an outlet opening and an inlet opening for a by-pass, and a casing having walls forming a by-pass connecting said cage openings, and having a recess pocket in the lower side of said by-pass for catching metal particles, and a removable door giving access to said pocket.

2. A mill of the character described comprising a casing having guiding and deflecting and partition walls forming a by-pass, and a cage forming with said partition wall a recess pocket in said by-pass having a perforated bottom, and having openings at each side of said bottom forming the outlet and the inlet respectively of said by-pass, substantially as described.

3. A mill of the character described, comprising rotary hammers, a cage having outlet and inlet openings for a by-pass—said outlet being near the central horizontal plane,—a back wall and a partition wall forming a vertical passage communicating with said outlet, a top wall inclined toward said partition, a reversely inclined wall in front of said partition, and a pocket below the reversely inclined wall and adjacent to said inlet opening, substantially as described.

4. In a mill of the character described a hammer carrier and a shaft therefore, a hammer pivot on the carrier with its axis parallel to the shaft's axis; and a cutting hammer pivoted on the pivot and having its greatest radial length from its own pivot in its longitudinal medial plane so that in action its cutting edge moves in its nearest position to the cage of the mill and in rearward movement of the hammer on its inner pivot causes its edge to recede from the cage; the cutting edge being in the radial plane of greatest length, the cutting hammer having a transverse bar which is concaved on its face transversely from end to end, the inner edge of the concave being in advance from the outer or cutting edge.

5. In a mill of the character described, a hammer adapted to be pivoted on an axis parallel to the main shaft of the mill and having a pair of spaced side or end arms to receive the pivoting means, and a transverse tie connecting the swinging ends of the arms and being concaved on its front face from end to end, the outer longitudinal or toe edge of the bar being close to the medial, axial plane of the arms and the heel or inner, longitudinal, front edge of the bar being in a plane in advance of the toe edge.

6. In a mill of the character described, a hammer adapted to be pivoted on an axis parallel to the main shaft of the mill and having a pair of spaced side or end arms to receive the pivoting means, and a transverse tie connecting the swinging ends of the arms and being concaved on its front face from end to end, the outer longitudinal or toe edge of the bar being close to the medial axial plane of the arms and the heel or inner, longitudinal, front edge of the bar being in a plane in advance of the toe edge, and a cutting blade mounted on the face of the bar.

In testimony whereof I have affixed my signature.

HAROLD M. PLAISTED.