H. M. PLAISTED.

REDUCING MACHINE.

APPLICATION FILED JUNE 10, 1918.

1,306,772.

Patented June 17, 1919.

2 SHEETS—SHEET 1.

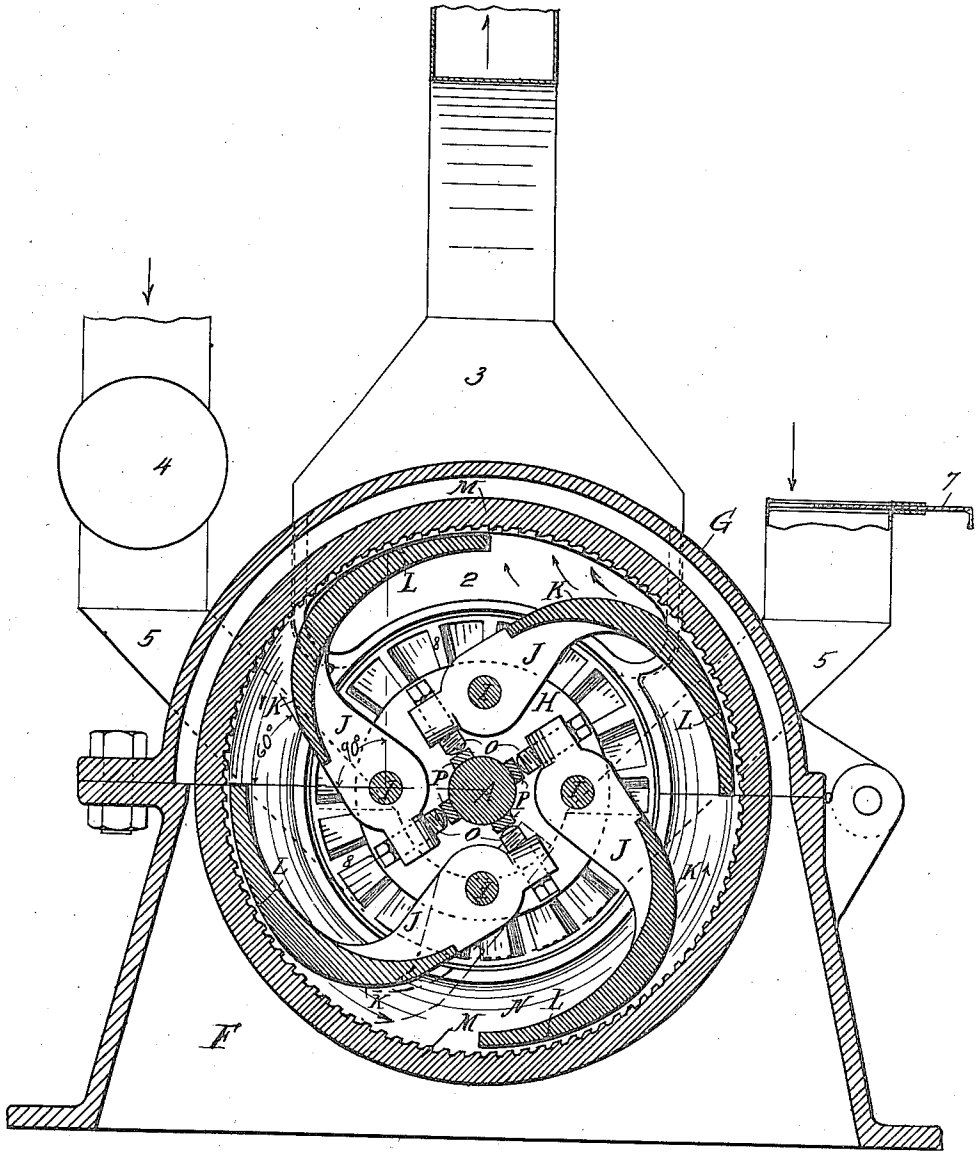


Fig. 1.

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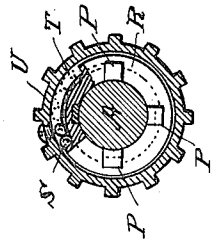


Fig: 4.

Fig: 2.

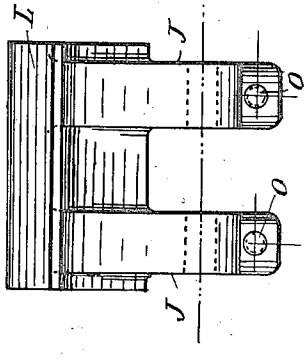


Fig: 3.

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UNITED STATES PATENT OFFICE.

HAROLD M. PLAISTED, OF GRANITE CITY, ILLINOIS.

REDUCING-MACHINE.

1,306,772. Specification of Letters Patent. Patented June 17, 1919.

Application filed June 10, 1918. Serial No. 239,194.

To all whom it may concern:

Be it known that I, HAROLD M. PLAISTED, a citizen of the United States, residing at Granite City, in the county of Madison and State of Illinois, have invented certain new and useful Improvements in Reducing-Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in reducing machines, such as pulverizers, fine grinders, etc., the peculiarities of which will be hereinafter described and claimed.

The main object of my invention is to provide a reducing machine that will have a dragging, bur stone action on the material supplied to the machine, and is capable of close adjustment while running to secure fine reduction.

In the accompanying drawings, on which like reference letters indicate corresponding parts,

Figure 1 represents a vertical transverse section of a reducing machine embodying my invention; Fig. 2 a longitudinal section on a vertically disposed plane through hammer rods, slide bars and shaft,—the hammers being indicated by dashed lines; Fig. 3, a detail rear view of one hammer according to my invention; and Fig. 4, a cross section of the shaft and adjusting sleeve, taken on the line X—X of Fig. 2. The letter A designates a shaft with flywheel B and driving pulley C, mounted in suitable bearings D—D, carried by brackets E—E from the sides of a body casing F—F having a cover casing G. On said shaft are fastened hammer mounts, preferably consisting of disks H—H and spacer rods I on which are pivoted rotary hammers, each consisting of an arched body with legs J—J, through which pass the rods I. The body portion is substantially the width of the casing and starts with a curved face K making substantially a 60 degree angle with a radius through the pivot, and gradually curving outward and backward so as to form an operative face L, substantially similar in curve to said cage. The curve portion K collects the material being ground and guides it to the rear portion L, which latter allows of close adjustment to a cylindrical grinding cage M that is provided with serrations similar to a bur stone, with slanting faces presented to the approaching hammers, alternating with radial faces. In cooperation with the hammer faces, these serrations act on the material with a mashing or dragging effect, as distinguished from a cutting effect. Some mastic material such as sugar or flaky material such as middlings is thus reduced effectively. Other forms of serrations may be used.

The cage is preferably solid and continuous as shown. The inside wall of the casing is provided with a semi-circular or other shaped circumferential groove N beginning at the inner surface of the cage. Surplus material carried around by the faces K of the hammers, will be forced out laterally into this clearance space on each side and returning, will be subject to the action of the following hammers. This groove also coöperates with the hammers in discharging the material as explained later. The centrifugal force of the rotating hammers, as exerted on the material interposed between the cage and the face L, is increased by the rearward location of this operative face, which, it will be seen from Fig. 1, is located substantially at right angles to a radius through the pivot. The pressure of the face L is therefore exerted substantially normal to the sloping sides of the cage serrations shown, which improves the dragging action on the material being reduced.

It is desirable to be able to adjust the hammers by fine gradations with regard to the cage, while the machine is in operation. The leg J is provided with an inward extension past the pivot point, and located on the opposite side of the radius through said pivot from the location of the operative face L. A contact point on said extension is provided by a set screw O having a rounded end, and threaded through the extension on a substantially radial line from the shaft through the axis of said set screw. The outward centrifugal tendency of the hammer body portion, produces an inward radial pressure by said contact point. An adjustable bar P, preferably rectangular, is provided with wedge shaped surfaces Q, that are normally engaged by the respectively adjacent contact point; and a sliding movement of said bar will force said contact screw away from the shaft A, or allow it to approach, thereby likewise changing the relation of the operative face L to the cage. Guides are formed for said bar, either by slots in the hubs of the disks H in conjunction with the shaft A, or otherwise. The

bottom of the bar is supported by the shaft in the preferred position, against the reactive pressure of the contact screws. A bar is provided for each hammer and a wedge shaped surface or wedge for each screw contact, and the adjusting screw O allows of a proper adjustment of the hammers. Each bar preferably extends outside the casing and has a circumferential ring R recessed into each bar, or otherwise fastened, so as to connect them, and also form a race for a double row of balls S—S, divided by an intervening ring T, on the inside of a sleeve U or otherwise. The ring T is fastened to the sleeve by screws after assembling. The sleeve is axially adjustable, preferably by being threaded on an extension V at the back of a bearing D; by rotating said sleeve the ring T bears against one or the other row of balls, which transmit the pressure through the ball race ring to the slidable bars. The shaft revolves at high speed, but the sleeve, when moved toward the left, will by means of the wedges and screws increase the space between the hammer faces L and the cage; when moved to the right, it will diminish said distance. A set screw W or other means prevents accidental movement of the sleeve.

The hammer bodies act as the blades of a fan, and force a blast of air carrying the "fines" of the reduction, upward and out through discharge openings 2, located above the shaft in the upper side walls of the casing. These discharge openings are preferably located in the said groove N, and thus are adjacent to the inner face of the cage near the top. The drag face hammers assist the discharge through these openings on account of the tendency of the surplus material to splay out laterally under the grinding action of the dragging face L. A boot 3 at each side of the casing receives the "fines" and delivers them to a place of storage.

The material to be ground is passed through a feeder 4 in regular quantities, and spouted through a pipe 5 at each side of the casing, down to an arched inlet opening 6 in the side of the casing, below the shaft and the disk H. This feed inlet is duplicated for the other side. A plate fan 8 is mounted on the hammer rods outside each of the disks, having the blades bent outward to engage the feed and air, and assist delivery to the inside of the casing. The fan operates past the feed and air inlets, but not past the discharge openings.

An air inlet with regulating slide 7, is provided opposite the feed inlet on each side to secure the necessary quantity of air to handle the "fines."

The stream of air, meeting obliquely the stream of feed at the elongated arched inlet openings 6, assists the entrance of feed to the casing. Also the inlet openings, being in each side of the casing, balance the entrance of feed, distribute it on the cage, and avoid banking up the feed at one side of the cage.

I claim:

1. A reducing machine comprising a solid cylindrical cage, a shaft, rotary hammers having inclined faces adapted to act as a blast fan, a casing having feed and air inlet openings in the sides below the shaft and discharge openings in the sides above the shaft, and fan blades at each side operating past said feed and air openings but not said discharge openings, substantially as described.

2. A reducing machine comprising a casing with suitable inlet and outlet openings, a shaft, hammer mounts on said shaft, rotary hammers pivoted in said mounts and provided with adjustable stop contacts, bars with wedge surfaces adapted to be engaged by said contacts and extending outside said casing, and an adjustable sleeve operatively connected to said bars.

3. A reducing machine comprising a casing, a shaft, hammer mounts, rotary hammers pivoted on said mounts and each having an inward extension circumferentially adjacent to said shaft and provided with a contact point radially adjustable with regard to said shaft, regulating bars extending outside the casing having wedge surfaces adapted to be compressively engaged by respective hammer contacts, and slidably adjustable on said shaft to vary the radial distance of said hammer contacts, and means to effect the slidable adjustment of said bars.

4. A machine of the character described comprising a casing, a rotary shaft, a cylindrical cage, and pivoted hammers having a body portion substantially the width of the casing and arched backward,—said casing having a circumferential groove on the inside faces of the side walls, adjacent to the inner face of the cage and coöperating with the hammers, and having outlet openings in the path of said groove.

In testimony whereof I have affixed my signature.

HAROLD M. PLAISTED.