April 8, 1930. J. P. POLSTER 1,753,474

MILL PULVERIZER

Filed May 2, 1929

Fig. 2.

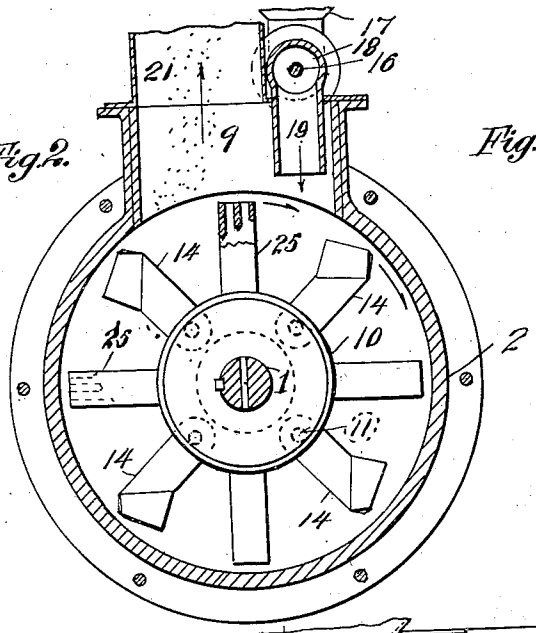


Fig. 3.

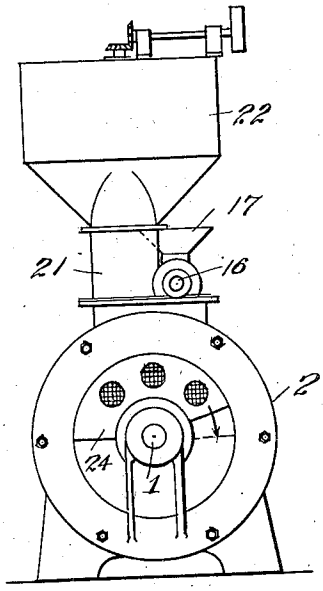
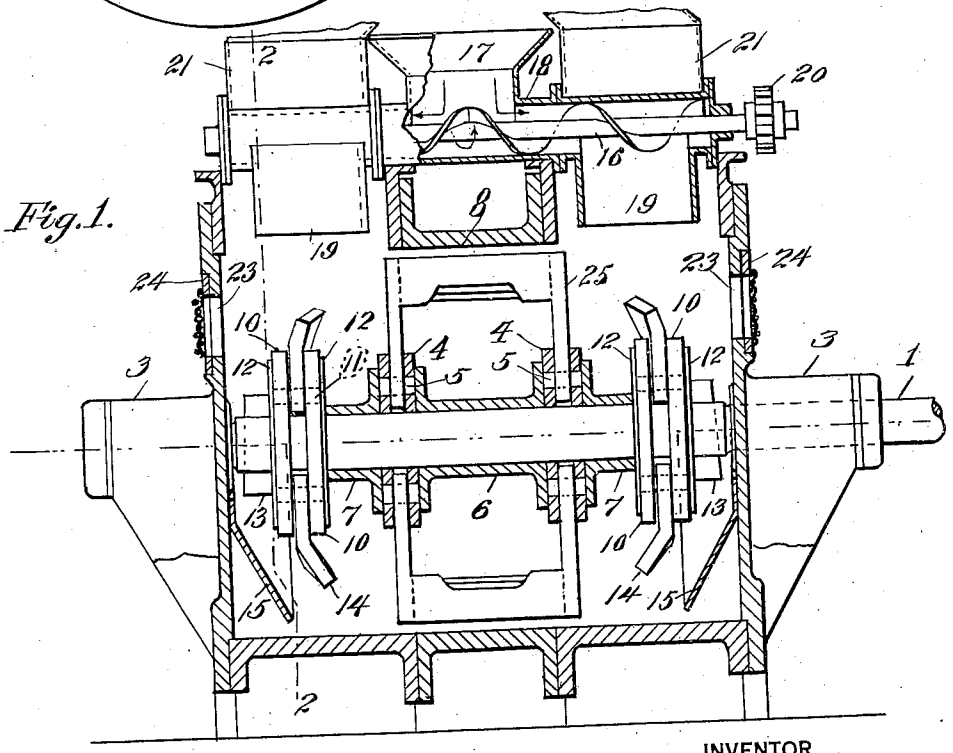


Fig. 1.



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UNITED STATES PATENT OFFICE

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MILL PULVERIZER

Application filed May 2, 1929. Serial No. 359,874.

This invention relates to certain new and useful improvements in mill pulverizers for coal, petroleum coke and other suitable material, the peculiarities of which will be hereinafter fully described and claimed.

The main objects of my invention are to provide for feeding the material around the whole periphery of the pulverizing rotor in the mill; secondly, around such periphery at each end of said rotor and then laterally into both ends of a central pulverizing chamber; thirdly, to effect such lateral feeding into the spaces between the pulverizing hammers; fourthly, to feed and discharge through the same opening; and fifthly, to effect other improvements hereinafter described and claimed.

In the accompanying drawing in which like reference numerals indicate corresponding parts,

Fig. 1 represents a vertical longitudinal section near the center of a mill pulverizer embodying my improvements;

Fig. 2, a cross section on the line 2—2 of Fig. 1; and

Fig. 3, an end elevation of the same on a reduced scale with a separator mounted thereon.

Referring to the drawing, the numeral 1 designates a shaft centrally mounted in a horizontal cylindrical casing 2 having bearings 3 at the ends thereof, and adapted to be rotated by direct-connected motor or pulley drive (not shown).

The casing is preferably in three flanged sections and ends, provided with holes for through rods or other fastening means.

Midway in said casing is mounted on said shaft two pairs (or more) of discs 4 having holes circumferentially arranged for pivot pins 5, on which are pivotally mounted a set of stirrup hammers (four being shown), preferably of the form illustrated and described in my pending application Serial No. 261,471,—but they may be of other suitable form. The heads of these pulverizing hammers consist of parallel spaced bars (Fig. 2) radially disposed, and forming openings for the passage of material being reduced, as fully described in said prior application.

A center spool spacer 6 and outer spacers 7, locate said discs at suitable distance on the shaft to correspond with the shanks of said hammers, and also preferably hold said pivot pins from end play in the disc holes, as shown in Fig. 1.

The central part of the casing cooperating with these hammers in the pulverizing operation is a complete circle constituting a bull ring cage 8, of smooth or otherwise inner surface adjacent to the heads of said hammers, and preferably made in a detachable section from the outer sections that have openings 9 at the top (or elsewhere). The casing is thus cylindrical or substantially barrel-shaped with openings near or at the ends on top (preferred) for the entrance of feed material and the discharge of finished product, as will be described later.

On said central shaft in the outer sections are mounted other discs 10 in pairs having similar pivot pins 11 held by thin plate discs 12, and all secured by keys 13—or otherwise—from lateral movement on the shaft. On these pins 11 are mounted a like number of (four) hammers 14, having heads bent backward and inward toward the middle hammers so as to throw the entering feed from both end sections into the path of the pulverizing hammers in the middle section. Three sets of hammers are thus provided in this construction.

As these twisted, feed-deflecting hammers are pivoted opposite the spaces between the pulverizing hammers (Fig. 2), the partly ground material is thrown between—instead of against—the shanks of the pulverizing hammers, and this arrangement promotes efficient action, as well as practically avoids wear on the end faces of said shanks.

There is nothing between the ends of the feeding hammers and the circumferential spaces of the central pulverizing hammers, so that the feed material is directed inward from both ends of the casing from the oppositely twisted ends of the feeding hammers and practically avoids wear on the shanks of the stirrup hammers.

As it is preferred to leave quite a space between the end casing and the feed hammers

for the entrance of feed material, the feed that is not intercepted by the feed hammers on entering, drops down past the shaft to the bottom of the outer sections. I have therefore provided a plate 15, secured to the inside face of each end casing (Fig. 1), and bent inward below the shaft, adapted to deflect the feed into the path of the feed hammers. By this arrangement, the feed is thrown into the middle section from all around the ends of the rotor and periphery of the sections, and into the spaces between the pulverizing hammers in the preferred alternate arrangement above described.

The feed is delivered to the outer sections in regulated quantities through said preferred top openings, by right and left hand screw blades on a shaft 16 extending in opposite directions from a feed hopper 17 mounted above a tubular casing 18 having discharge outlets 19 extending downward near the front of the respective openings 9. The feed screw is rotated through a ratchet or other wheel 20 thereon. At the rear of this feed screw casing, the balance of each opening 9 is connected by a leg 21 to a suitable separator 22 subject to the suction of an exhaust fan (not shown), in the usual or any approved manner.

Air inlets 23 are provided at the end casings or elsewhere, and are preferably screened to prevent the larger particles of feed being thrown out. A circular segment 24 with matching holts—or other regulating means—allows of regulating the size of the air inlets and quantities of air admitted. The pulverized material is thus drawn outward through the openings 9 which also serve to admit feed material as above described.

Tests of this mill have indicated high efficiency as a pulverizer. Thus, with a rotor 32″ diameter operating on petroleum coke at 1180 R. P. M., the following percentages of fineness were obtained:

79% through 325 mesh.
89% through 200 mesh.
97% through 100 mesh.
All through 60 mesh.

I claim:

1. A mill pulverizer comprising a horizontal cylindrical casing having an opening for feed and discharge near one end, and a rotor shaft having sets of pivoted hammers operatively mounted in said casing, the inner set being pulverizing hammers and the outer set being primary crushing hammers inclined inward and respectivcely disposed opposite the open circumferential spaces between said pulverizing hammers, substantially as described.

2. A mill pulverizer comprising a horizontal cylindrical casing having openings for feed and discharge near the ends, and a rotor shaft having three sets of pivoted hammers mounted in said casing,—the middle set being pulverizing stirrup hammers and the outer sets being inclined inward and respectively mounted opposite the open unobstructed circumferential spaces between the hammers of the middle set and adapted to deflect the feed from both ends of said casing into the path of the middle set, substantially as described.

3. A mill pulverizer comprising a horizontal cylindrical casing having upper openings for feed entrance and discharge of pulverized product near each end of said casing and providing an annular centrally disposed bull ring forming a complete circle and grinding surface and open at opposite ends for unobstructed entrance of feed in both directions, a rotor shaft mounted in said casing, pivoted stirrup hammers operatively mounted on said shaft and cooperating with said bull ring for pulverizing action, a set of feeder hammers carried by said shaft at each end of said casing, and means to deflect the feed material from each end casing into the path of said feeder hammers, substantially as described.

4. A mill pulverizer comprising three cylindrical sections detachably connected together,—the end sections forming the ends of a casing and having upper openings adapted for feed inlet and outlet of pulverized material and the middle section forming a complete circle and having a pulverizing surface,—a rotor shaft mounted in said casing, stirrup hammers operatively mounted on said shaft and coacting with said pulverizing surface of the middle section, and a set of rotary pivoted hammers operatively mounted near each end casing and having their ends bent inward and backward adapted to deflect the feed material into the middle pulverizing section and disposed respectively opposite the circumferential spaces between said pivot hammers, substantially as described.

5. A mill pulverizer comprising a horizontal cylindrical casing having upper openings for feed inlet and discharge of pulverized material near its ends,—the centrally disposed portion of said casing forming a full circle with pulverizing surface and unobstructed at each end for lateral feeding, a rotor shaft mounted in said casing, pulverizing hammers operatively mounted on said shaft opposite said pulverizing surface, feeding hammers operatively mounted at each side of said pulverizing hammers, a feed shaft having right and left hand screw blades, a tubular casing therefor delivering to said feed inlets, a feed hopper centrally disposed on said feed shaft, and a separator having legs connected to said discharge openings, substantially as described.

6. A mill pulverizer comprising a casing having openings adapted for feed entrance and discharge of pulverized product near each end,—the central portion of said casing forming a complete circle and surface adapted for pulverizing action, a rotary shaft mounted in said casing, a central spool spacer

on said shaft and outer spacers cooperating therewith, a pair of perforated discs between the center spacer and each outer spacer, stirrup hammers having legs with eyes respectively disposed between said pairs of discs, and having heads cooperating with said grinding surface, pivot pins passing through said eyes and discs and controlled by said spacers, a pair of outer discs mounted on said shaft between said outer spacers and the respective ends of said casing, hammers pivotally mounted between said outer discs having ends adapted to deflect the feed inward from both directions and respectively disposed opposite the circumferential spaces between said stirrup hammers to avoid lateral wear thereon, substantially as described.

In testimony whereof I have affixed my signature.

JOHN P. POLSTER.