March 7, 1961 O. DANYLUKE 2,973,909

REVERSIBLE PULVERIZER AND DUST GATE ASSEMBLY

Filed July 3, 1958 2 Sheets-Sheet 1

FIG. 1

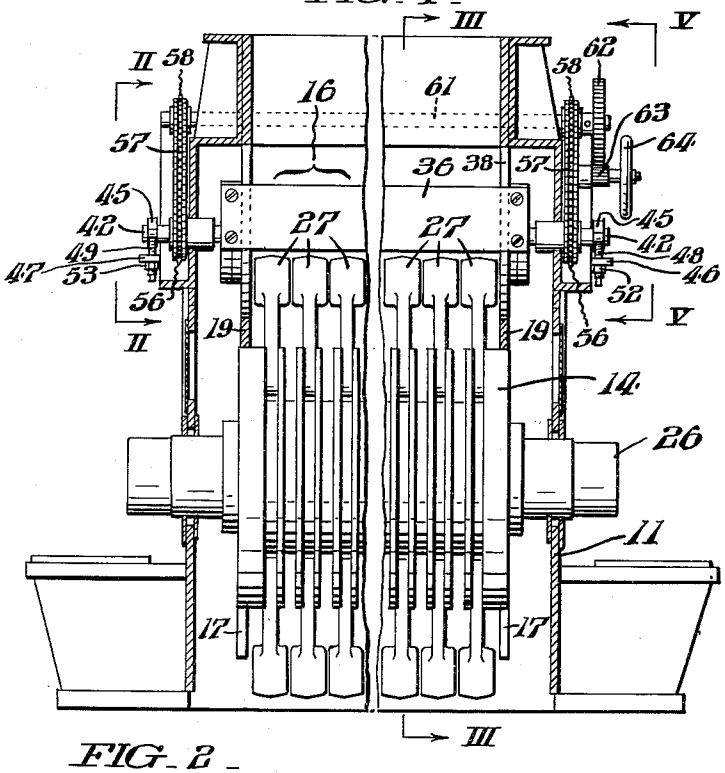


FIG. 2

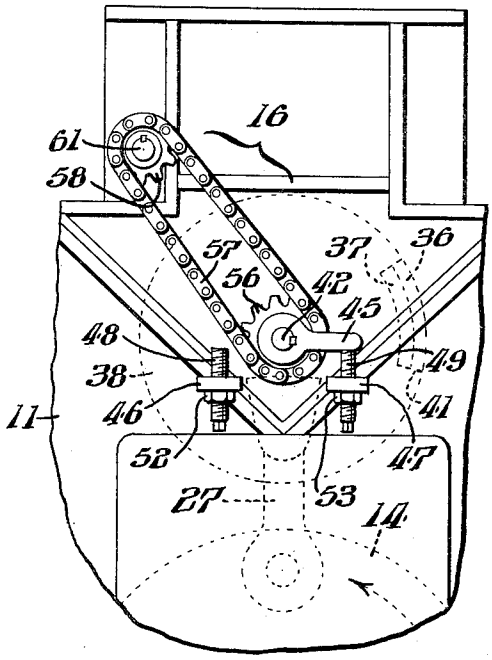
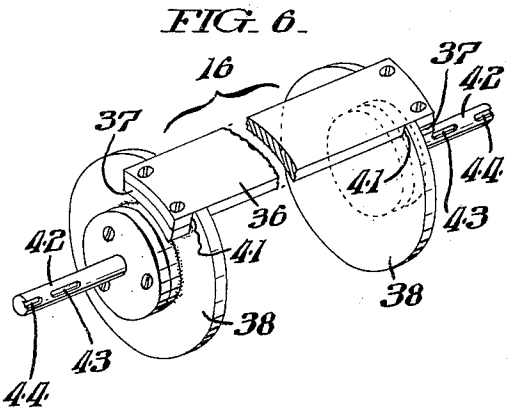


FIG. 6



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FIG. 3

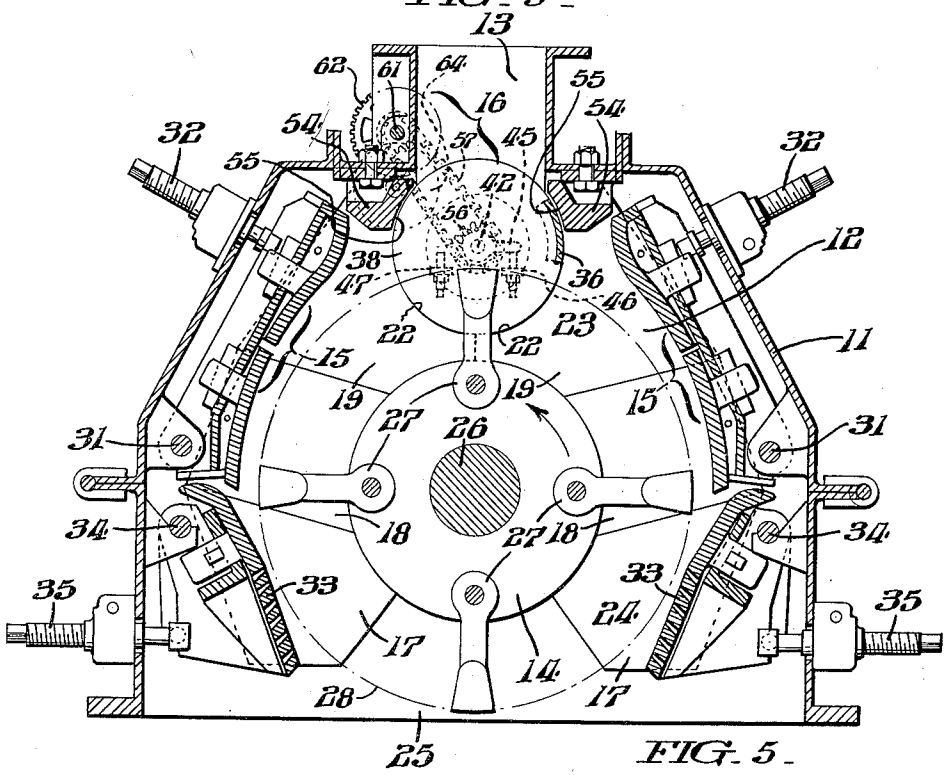


FIG. 5

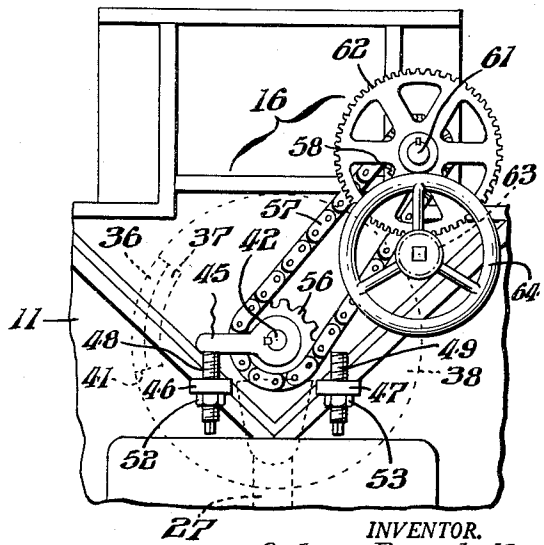
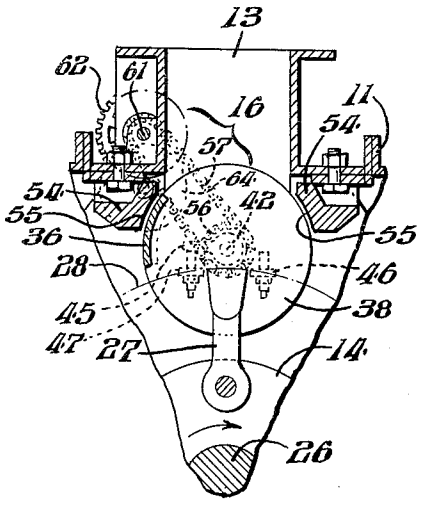


FIG. 4



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REVERSIBLE PULVERIZER AND DUST GATE ASSEMBLY

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Filed July 3, 1958, Ser. No. 746,420

4 Claims. (Cl. 241—186)

This invention relates to improvements in apparatus for pulverizing coal and the like, and more particularly concerns a reversible pulverized utilizing a hammer rotor, and to a dust gate assembly for use in the reversible pulverizer.

It is an object of this invention to provide a reversible pulverizer in which the air and dust flow from the interior of the pulverizer to the feed entrance is kept to a minimum. It is another object of this invention to prevent air and dust from escaping from the interior of the pulverizer through the feed entrance to cause a cloud of fine dust in the area surrounding the pulverizer.

It is another object of this invention to provide a reversible pulverizer having an adjustable dust gate means which prevents the escape of air and dust through the feed entrance, which adjustable dust gate means, is adjustable from the outside of the pulverizer.

It is another object of this invention to provide a reversible pulverizer having a dust plate which is provided with a combined adjustable stop and position indicating means.

It is another object to provide a dust gate assembly which is prevented from being rotated in the path of the hammers of the hammer rotor.

It is another object of the invention to provide means for adjusting the distance of the dust gate plate from the path of the hammers of the hammer rotor.

It is another object of the invention to provide a reversible pulverizer with means including a dust gate assembly confining the material to be crushed to a desired area.

Other objects and advantages of this invention, including its simplicity and economy, as well as the ease with which it may be used with existing equipment, will further become apparent hereinafter and in the drawings, in which:

Fig. 1 is a sectional view in front elevation of a reversible pulverizer constructed in accordance with this invention;

Fig. 2 is a partial view in elevation of the left end of the pulverizer shown in Fig. 1, taken as indicated by the lines and arrows II—II which appear in Fig. 1;

Fig. 3 is a view in cross section of the pulverizer of Fig. 1 taken as indicated by the lines and arrows III—III which appear in Fig. 1;

Fig. 4 is a partial view of the pulverizer as shown in Fig. 3, but with the hammer rotor rotating in the opposite direction and with the dust gate plate in its alternative normal position to correspond with the direction of hammer rotor rotation;

Fig. 5 is a partial view in elevation of the right end of the pulverizer shown in Fig. 1, taken as indicated by the lines and arrows V—V which appear in Fig. 1; and

Fig. 6 is a perspective view of a portion of the dust gate assembly constructed in accordance with this invention.

In describing the preferred embodiment of the invention illustrated in the drawings, specific terminology

will be resorted to for the sake of clarity. However, it is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

Turning now to the specific embodiment of the invention selected for illustration in the drawings, there is shown a reversible pulverizer which includes a frame 11 having a pulverizing chamber 12 formed therein, a feed hopper 13, a reversible hammer rotor 14 positioned inside pulverizing chamber 12 below feed hopper 13, breaker blocks 15 mounted on the interior of frame 11 and positioned about hammer rotor 14, and an adjustable dust gate assembly 16 which prevents dust and air currents from entering feed hopper 13 from pulverizing chamber 12.

Pulverizing chamber 12 includes outer frame end pieces 17, 18, and center frame end pieces 19 which have cut out portions with generally semicircular edge 22. Pulverizing chamber 12 is generally divided into an impact zone 23 between the center frame end pieces 19 wherein the coal is subjected to the impact of the rotating hammers 27, and a grinding zone 24 wherein the coal which has already been subjected to impact, is subjected to a grinding action. Positioned below hammermill 14 is a delivery chute 25.

Hammer rotor 14 is provided with a reversible rotor 26 and hammers 27 which when rotated define a hammer circle 28.

Breaker plates 15 are pivotally mounted on frame 11 by rods 31 and are provided with jack screws 32 with which to adjust the position of plates 15 as to distance from hammer circle 28. Positioned below breaker blocks 15 are perforated grinding blocks 33 which are pivotally mounted to frame 11 by rods 34 and are provided with jack screws 35 for adjusting the position of grinding blocks 33 relative to the hammer circle 28. It is to be noted that blocks 15, 33 are fully adjustable relative to their distance from hammer circle 28 and are adjustable from the outside of the pulverizer.

Adjustable dust gate assembly 16 includes a rotatable dust plate 36 which is supported on the ledges 37 of end flanges 38 and fits within recesses 41 of end flanges 38 so that the surface of dust plate 36 is flush with the surface of the end flanges 38. It is to be noted that end flanges 38 are disk-shaped and are disposed within the cut away portions of center frame end pieces 19. The semicircular edges 22 of center frame end pieces 19 conform closely to the shape of the end flanges 38, and end flanges 38, together with frame end pieces 17 through 19, confine the coal to the area between end flanges 38.

End flanges 38 are mounted on shafts 42 which are rotatably supported in frame 11, and which are provided with sprocket keyways 43 and indicator keyways 44.

Keyed to shafts 42 are indicator arms 45 which point to dust plate 36 to indicate the position of the dust plate. Indicator arm 45 is mounted on the outside of the pulverizer and is easily seen by the operator.

An adjustable stop means is provided for dust plate 36, said stop means comprising lugs 46, 47 which are welded to the outside of frame 11 and which are threaded to receive screws 48, 49 having nuts 52, 53. Screws 48, 49 are adjustable from the outside of frame 11 and cooperate with indicator arm 45 to support dust plate 36 in a desired position relative to hammer circle 28. Screws 48, 49 also prevent dust gate 36 from being rotated in the hammer circle when being rotated from one normal position as illustrated in Fig. 3 for counterclockwise rotation of hammer rotor 14, to an alternative normal position for clockwise rotation of hammer rotor 14 as illustrated in Fig. 4.

Cooperating with dust plate 36, to keep the air and dust from escaping from pulverizing chamber 12 through feed hopper 13, are upper breaker blocks 54 which are supported from the interior of frame 11 and which are provided with curved surfaces 55 which conform with the curve of the dust plate 36. The curves of dust plate 36 and of curved surface 55 are concentric.

Dust plate 36 is rotatable by a drive mechanism which includes sprockets 56 mounted on shafts 42 and connected by chains 57 to sprockets 58 mounted on a shaft 61. Keyed to shaft 61 at one end is a spur gear 62 which meshes with a pinion 63 which is operable by turning a handwheel 64.

In operation, the coal, or similar material to be pulverized, is delivered to the pulverizer through feed hopper 13. Dust plate 36 is positioned at the desired distance from hammer circle 28 by rotating handwheel 64 and by setting the screws 48 and 49. Indicator arms 45 show the position of plate 36, and rotor 14 rotates so that hammers 27 strike the coal and pulverize it through the force of impact. The dust gate 36 cooperates with upper breaker blocks 54 and the end flanges 38 cooperate with the frame end pieces 17, 18, 19 to confine the coal to the pulverizing chamber 12 and to prevent dust and air currents from entering feed hopper 13 from the pulverizing chamber 12.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment. Various changes may be made in the shape, size, and arrangement of parts. For example, equivalent elements may be substituted for those illustrated and described herein, parts may be reversed, and certain features of the invention may be utilized independently of the use of other features, all without departing from the spirit or scope of the invention as defined in the subjoined claims.

Having thus described my invention, I claim:

1. In a reversible pulverizer for coal or the like having outer end frame pieces and center frame end pieces, a feed hopper at the top of the pulverizer; a hammer rotor disposed within the pulverizer chamber between the center frame end pieces below the feed hopper; breaker blocks positioned between the center frame end pieces and defining with the hammer rotor respectively at opposite sides of the latter within the pulverizing chamber, downward flow channels for the coal; an adjustable gate means for preventing dust laden air from escaping upwardly through the feed hopper during operation of the pulverizer, said gate means being located between the feed hopper and the hammer rotor and comprising a pair of circular disks laterally spaced from each other and arranged to downwardly overlap, with slight intervening clearances, the sides of the ends of the outermost hammers of the rotor during operation of the pulverizer and disposed, with close working clearances, within conformative openings in the center end frame pieces, a deflecting plate extending horizontally between the peripheries of the disks, and trunnions extending axially outward from the respective disks and rotatively borne in the opposite outer frame end pieces; and operating means whereby the gate means can be turned to swing the plate over the axis of the trunnions in one direction or the other to form a deflecting obstruction between the bottom of the hopper and the hammer circle crosswise of the entrant end of one or the other of said channels depending upon the direction of rotation of the hammer rotor.

2. A pulverizer characterized as in claim 1, further comprising stop means for limiting the turning movement of the gate means is restricted substantially to an arc to prevent the plate from fouling the rotor hammers.

3. A pulverizer according to claim 2, wherein the stop means includes an arm affixed to the outer end of one of the trunnions of the gate means, and laterally spaced lugs on one of the outer frame pieces with screws adjustable therein for engagement alternately by said stop arm.

4. A pulverizer in accordance with claim 2, wherein the stop means includes arms respectively affixed to the outer ends of the trunnions of the gate means, and laterally spaced lugs respectively on the outer frame pieces with screws adjustable therein for engagement alternately by said arms; and wherein the gate operating means includes sprocket pinions also respectively affixed to the outer ends of the trunnions, an actuating shaft extending crosswise of the top of the pulverizer alongside the hopper, sprocket pinions on said shaft connected by sprocket chains to the sprocket pinions on the trunnions of the gate means, and manual means for rotating the actuating shaft, including a spur wheel on said shaft, and a hand wheel with a spur pinion thereon in mesh with said spur wheel.

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UNITED STATES PATENT OFFICE

CERTIFICATION OF CORRECTION

Patent No. 2,973,909 March 7, 1961

Ostap Danyluke

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 17, for "pulverized" read -- pulverizer --.

Signed and sealed this 20th day of June 1961.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents