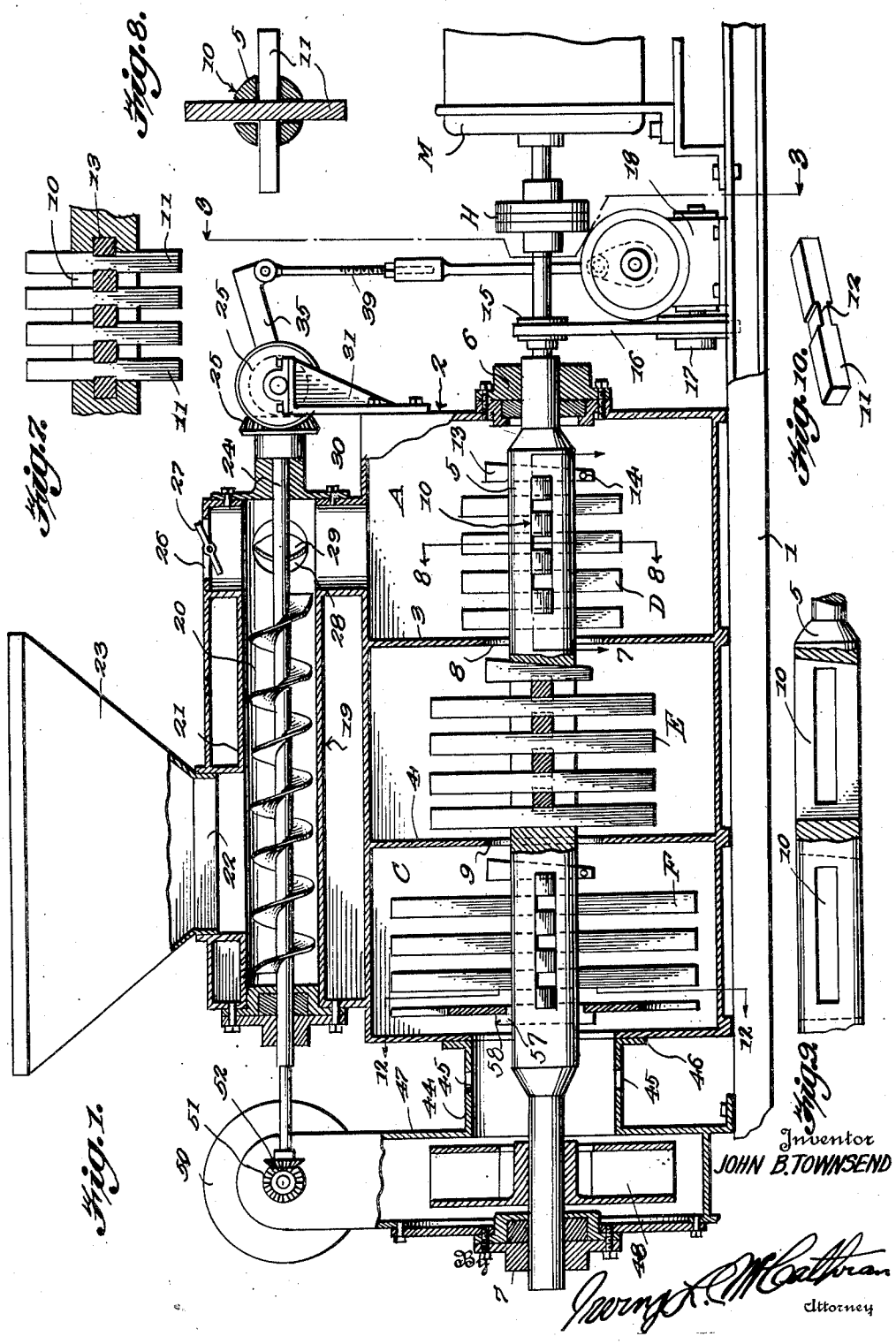
Oct. 16, 1934. J. B. TOWNSEND 1,977,501

COAL PULVERIZER

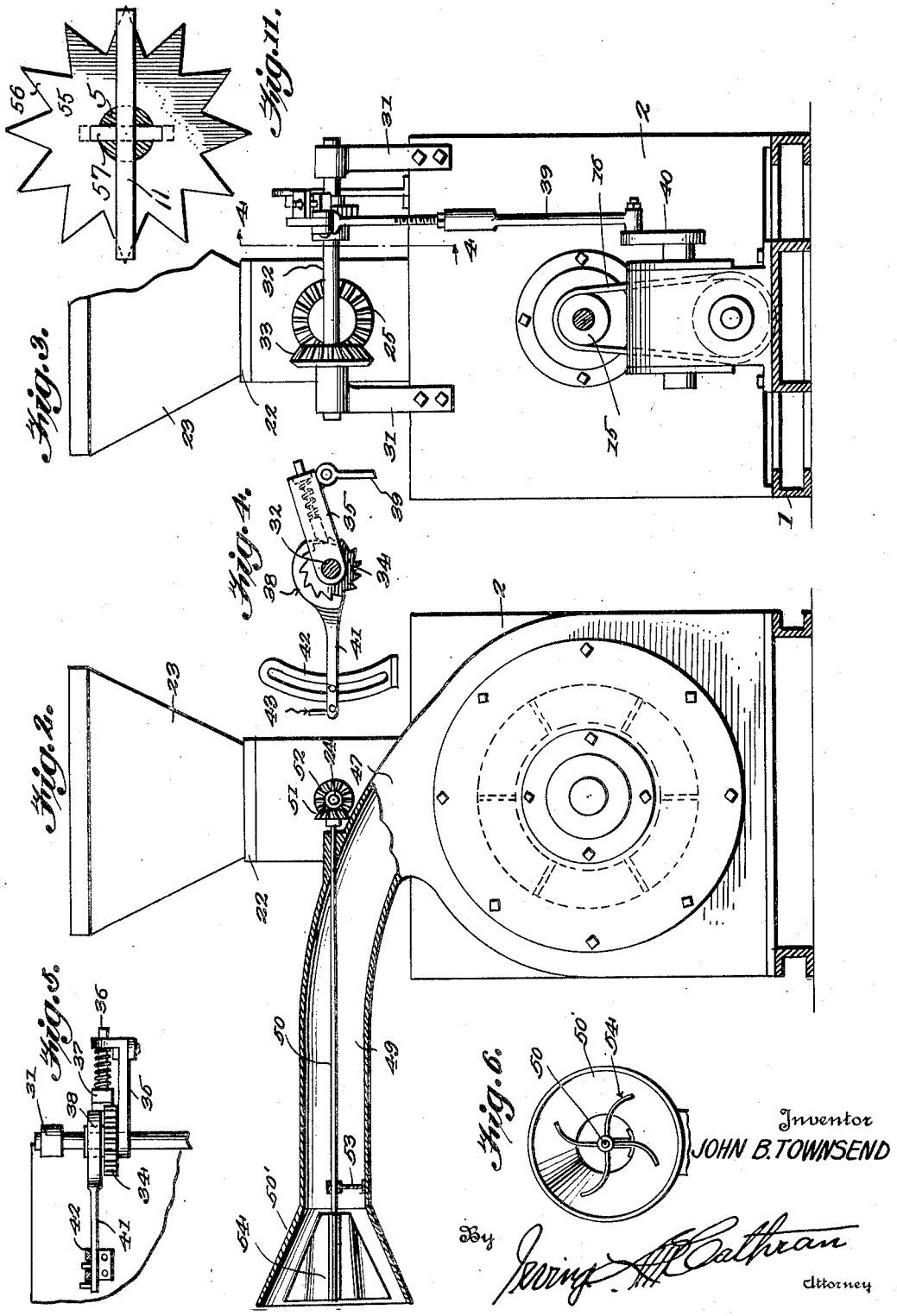
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COAL PULVERIZER

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## COAL PULVERIZER

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4 Claims. (Cl. 83—11)

This invention relates to coal pulverizers, or coal pulverizing mills, and has for its object the production of a simple and efficient coal pulverizer which will reduce friction to a minimum and which will pulverize the coal with a minimum amount of power.

Another object of this invention is the production of a simple and efficient means for supporting the pulverizing hammers upon the rotor and mounting the same within the pulverizing casing so as to facilitate the breaking up of the coal and the complete pulverization thereof.

A still further object of this invention is the production of a simple and efficient means for controlling the feeding of the coal to the pulverizing containers, and also the provision of means for discharging the pulverized coal from the pulverizing bins or compartments.

With these and other objects in view, this invention consists in certain novel constructions, combinations and arrangements of parts as will be hereinafter more specifically described and claimed.

In the drawings:

Figure 1 is a vertical sectional view partly in side elevation of the improved pulverizing apparatus;

Figure 2 is an end elevation of the pulverizer, showing the discharge funnel or tube in section;

Figure 3 is a section taken on line 3—3 of Figure 1, looking in the direction of the arrow;

Figure 4 is a section taken on line 4—4 of Figure 3;

Figure 5 is a top plan view of the feed control ratchet mechanism;

Figure 6 is an end elevation of the discharge tube of the pulverizing apparatus;

Figure 7 is a longitudinal sectional view taken on line 7—7 of Figure 1;

Figure 8 is a section taken on line 8—8 of Figure 1;

Figure 9 is a top plan view partly in section of a portion of the rotor shaft; and

Figure 10 is a detail perspective view of one of the pulverizing hammers; and

Figure 11 is an end elevation of the toothed disc which is adapted to be supported by the central rotating shaft nearest the end of the fan, one of the hammers and the securing cleat being shown in their relative positions.

By referring to the drawings, it will be seen that 1 designates the base which may be formed of any suitable or desired structure, but may be preferably constructed of a channel-iron structure, such as is illustrated in Figures 2 and 3 of the drawings. Upon the base 1 is mounted the pulverizing casing 2 which is divided into a plurality of pulverizing compartments, A, B, and C, through the medium of the dividing partitions 3 and 4. A centrally mounted rotor or hammer supporting shaft 5 extends longitudinally of the pulverizing casing 2 and passes transversely through all of the compartments A, B and C, as illustrated, one end of the rotor 5 being supported upon a suitable bearing 6 near one end, and a suitable bearing 7 at the other end. The partitions 3 and 4 are each provided with enlarged centrally located apertures 8 and 9 respectively, through which the hammer supporting rotor 5 extends, as shown. This rotor 5 is provided with a plurality of longitudinally extending cross slots 10, within which are nested the transversely extending pulverizing hammers 11, the hammers being arranged alternately in cross relation so as to extend alternating at right angles to each other, as shown. These hammers 11 are preferably square in cross section and are provided with notches 12 intermediate their ends, the notches of the cross hammers 11 interfitting when arranged in nested relation so as to lock the respective hammers against displacement, the respective hammers being firmly held within the cross shaped slots 10 through the medium of a locking wedge 13 shown clearly in the drawings. A retaining cotter pin or other suitable means 14 may be carried by the small end of the wedge shaped key 13 to prevent the accidental removal of the key 13. The rotor 5 is provided with a plurality of these longitudinally extending cross shaped slots for receiving similar pulverizing hammers such as have just been described, and this series of hammers may be increased to any desired number without departing from the spirit of the invention.

For the purpose of illustration and description, the series of hammers in the compartment A are indicated in general by the letter D, those hammers in the compartment B, by the letter E, and those hammers in the compartment C by the letter F.

As shown in the drawings, the rotor 5 is driven through the medium of a suitable motor M and a suitable motor connection H is carried by the rotor 5. A pulley 15 is carried by the rotor shaft 5 over which pulley a belt 16 passes, the belt 16 being driven by a pulley 17 carried by the reducing gear structure 18.

The pulverizing casing 2 supports a feeding casing 19 upon the top thereof which is provided with a longitudinally extending tubular chan-

nel 20 in which is mounted a screw conveyor 21, the tubular channel 20 communicating with the discharge opening 22 of the feeding hopper 23 mounted upon the top of the feeding casing 19. The screw conveyor 21 is supported upon a suitable shaft 24 which is driven through the medium of a beveled gear 25. The feeding casing 19 is provided with an air port 26 for the purpose of permitting the entrance of air into the casing and this may be controlled by means of a suitable valve 27, if desired. A preheated air port 28 communicates with the inner end of the tubular channel 20 to which may be supplied preheated air by any suitable or desired means and a suitable valve 29 may be employed for controlling the entrance of this preheated air into the channel 20. The inlet ports 26 and 28 are arranged at right angles to each other so as to cause the air entering same to intersect their respective paths. The feeding casing 19 is provided with a discharge spout 30 which discharge spout communicates with the compartment A previously described. The pulverizing casing 2 carries a plurality of brackets 31 which brackets 31 support a transversely extending shaft 32 carrying a beveled gear wheel 33 which beveled gear wheel 33 meshes with the beveled gear 25 carried by the shaft 24. This transversely extending shaft 32 carries a ratchet wheel 34 keyed to the shaft 32, as shown. A pawl carrying arm 35 is loosely mounted on the shaft 32 and this pawl carrying arm 35 carries a spring pressed pawl 36 which is provided with a ratchet wheel engaging tooth 37 of greater width than the ratchet wheel 34, the ratchet wheel engaging tooth 37 projecting laterally with respect to the ratchet wheel 34 and in the path of movement of the cam 38 which cam 38 is also loosely mounted upon the shaft 32, as shown. The pawl carrying arm 35 is connected to a pitman rod 39 which pitman rod 39 is adjusted as to its length and is connected to an eccentric disc 40 at its lower end to facilitate the operation of the pawl carrying arm 35. The cam 38 carries a projecting arm 41 which works upon the quadrant 42 and may be connected in any suitable or desired manner to an operating means 43 whereby this operating arm 41 may be swung manually, thermostatically, or in any desired manner for the purpose of swinging the cam 38 so as to cause the cam 38 to push the tooth 37 out of engagement with the ratchet wheel 34 to prevent the further rotation of the shaft 24, and the operation of the screw conveyor 21. It should be understood that as the pitman rod 39 is raised and lowered and when the tooth 37 engages the ratchet wheel 34, the shaft 32 will rotate thereby driving the screw conveyor 21. At a desired time, however, when it is desired to prevent the rotation of the screw conveyor 21, the operating arm 41 may be raised thereby swinging the cam 38 into contact with the tooth 37 and pushing the same out of engagement with the ratchet wheel 34, this operation permitting the actuation of the arm 35 and the pitman 39 without causing the pawl 37 to contact with the ratchet wheel 34 subsequently discontinuing the operation of the screw conveyor 21.

At the outer or discharge end of the pulverizing casing 2, is a tubular neck 44 having air-inlet openings 45 located at convenient points around its circumference. The compartment C is provided with an enlarged discharge opening 46 communicating with this neck 44.

A fan casing 47 is carried by the outer end of the neck 44 and supports a suitable fan 48 and this fan casing 47 is provided with a laterally extending neck 49 projecting from the top thereof having at its outer extremity an enlarged funnel 50. A shaft 51 projects longitudinally through the neck 49 and this shaft 51 carries a beveled gear 51' meshing with the beveled gear 52 carried by the shaft 24. The shaft 51 is supported near its outer end upon a bracket 53 and a fuel distributor 54 is carried by the outer end of the shaft 51 comprising a plurality of distributor blades which taper inwardly and conform to the contour of the funnel 50.

From the foregoing description it will be seen that a very simple and efficient means has been produced for facilitating the pulverization of coal wherein the coal is subjected to a series of crushing actions and wherein the coal is passed from one compartment to another, each compartment more thoroughly and completely pulverizing the coal. The coal will be dumped into the hopper 23 and be fed by the conveyor 21 and down through the discharge spout 30 into the first compartment A where the hammers D will primarily pulverize the coal and the passage of the air will carry the small particles of coal through the opening 8 in the compartment B. The coal will then be further acted upon by the hammers E in compartment B, and the small particles of coal will be blown or drawn through the opening 9 into the compartment C where the coal will be further pulverized by being subjected to the hammers F. The coal will then pass out through the neck 44 through the blower or fan casing 47 and finally be discharged in a completely pulverized condition from the funnel 50.

As shown in Figure 1, and in detail in Figure 11, a disc 55 is mounted upon the hammer supporting shaft 5 near the fan end thereof, and this disc 55 is provided with a plurality of teeth 56 to facilitate the more efficient chopping-up of the material passing through the machine. The disc 55 is mounted upon the shaft 5 and is held in place by means of a securing cleat 57 having shoulder portions 58 at the ends engaging one side of the disc, the opposite face of the disc being engaged by the right-angularly extending hammer 11, as shown. The cleat 57 will pass through one of the longitudinal apertures 10 of the shaft 5, and be seated therein.

It should be understood that certain detail changes in the mechanical construction may be employed so long as these changes fall within the scope of the appended claims.

Having described the invention, what is claimed as new is:—

1. A pulverizer of the class described comprising a pulverizing casing having a plurality of compartments, a rotor mounted within said compartments, said compartments arranged to communicate with each other, said rotor provided with longitudinally extending cross shaped slots, elongated hammers alternately fitting in cross shaped relation through said slots, said elongated hammers provided with notches formed intermediate the ends, the notches of one hammer being adapted to interfit within the notches of the adjoining hammer, and a wedge-shaped key for locking said hammers in nested and anchored relation.

2. A pulverizer of the class described comprising a pulverizing casing having a plurality of compartments, a rotor mounted within said compartments, said compartments arranged to communicate with each other, said rotor provided

with longitudinally extending cross shaped slots, elongated hammers alternately fitting in cross shaped relation through said slots, said elongated hammers provided with notches formed intermediate the ends, the notches of one hammer being adapted to interfit within the notches of the adjoining hammer, a wedge-shaped key for locking said hammers in nested and anchored relation, and said hammers being substantially square in cross section.

3. A device of the class described comprising a casing, a shaft, a plurality of pulverizing hammers carried thereby, said casing provided with a discharge outlet, a chopping disc carried by said shaft near the discharge outlet and having a plurality of radiating teeth on the periphery thereof, a clamping cleat passing through said shaft and engaging said disc for locking the disc upon said shaft, said cleat provided with shoulders engaging one face of said disc for holding the disc against movement in one direction upon said shaft, and said disc abutting against one of said pulverizing hammers for holding the disc against longitudinal movement upon said shaft in the opposite direction.

4. A pulverizer of the class described comprising a casing, a rotor mounted within said casing, said rotor having longitudinally extending cross shaped slots formed therein, elongated hammers alternately fitting in cross relation through said slots, and means for binding said hammers one against the other and within said slots for rigidly holding said hammers in locked relation with respect to each other and within said slots and preventing independent swinging movement of said hammers with respect to each other and with respect to said rotor.

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