June 17, 1930. D. C. ADDICKS 1,764,138

DISINTEGRATING MACHINE

Filed Aug. 19, 1927 2 Sheets-Sheet 1

Fig. 1.

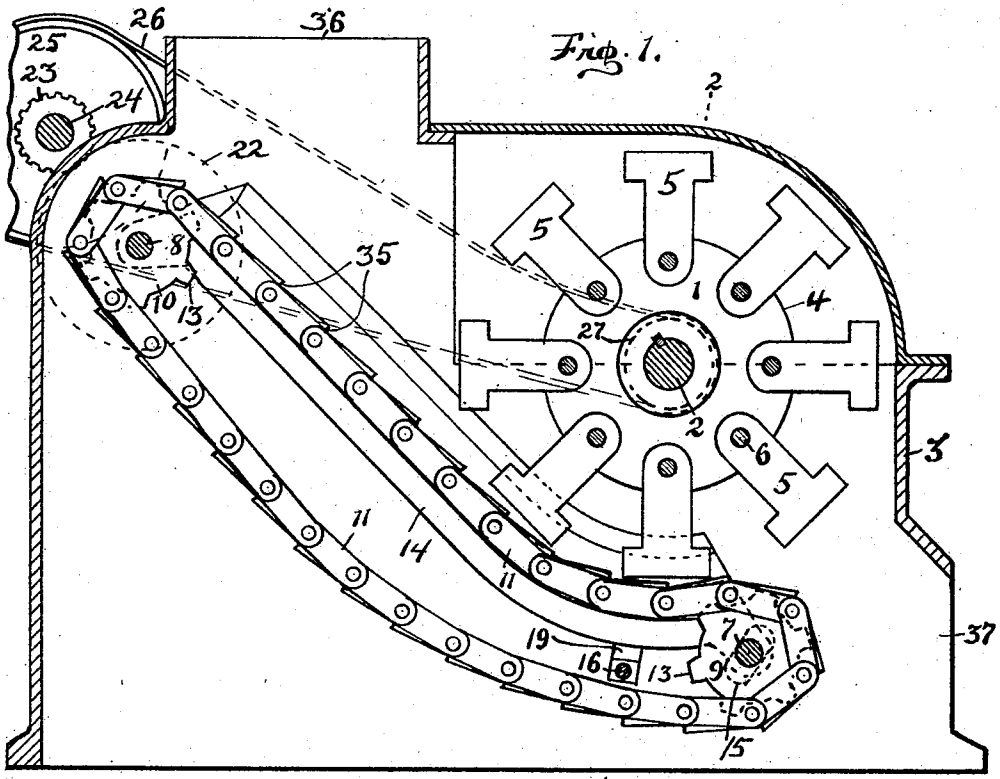


Fig. 2.

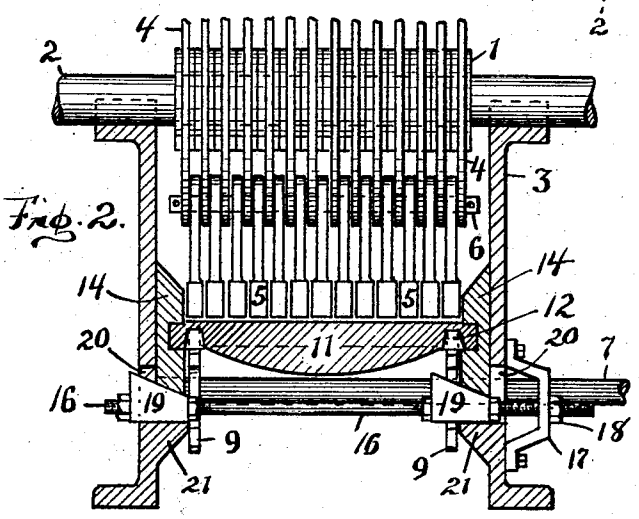
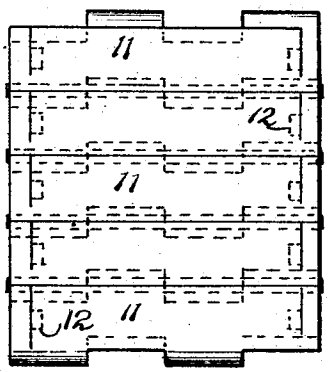


Fig. 3.



Diedrich C. Addicks INVENTOR

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June 17, 1930. D. C. ADDICKS 1,764,138

DISINTEGRATING MACHINE

Filed Aug. 19, 1927 2 Sheets-Sheet 2

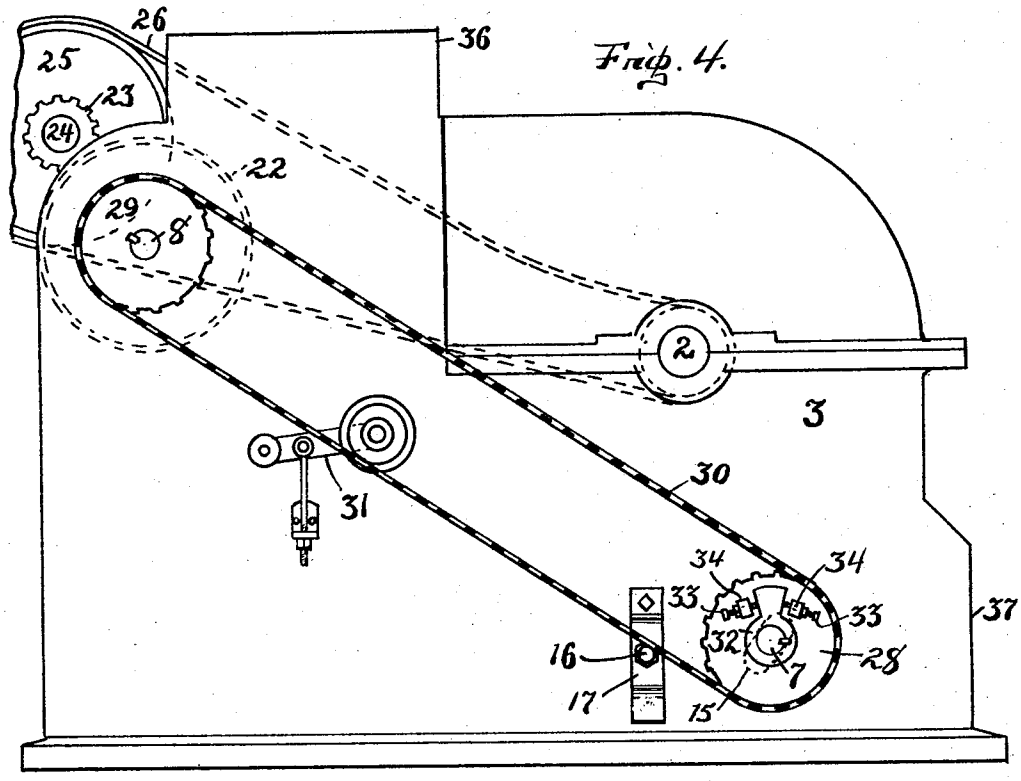

Fig. 4.

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Patented June 17, 1930 1,764,138

UNITED STATES PATENT OFFICE

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DISINTEGRATING MACHINE

Application filed August 19, 1927. Serial No. 214,035.

This invention relates to improvements in disintegrating machines of that type wherein a rotor, having a series of pivoted hammers, is used in conjunction with a breaker member disposed in a housing, the present invention contemplating a breaker member so constituted as to function as a feeder as well as a breaker for the material to be disintegrated. The objects of the improvements are: To provide a hammer mill without the use of the ordinary "cage-bars" which frequently become "blinded" by accumulations of materials, especially when the materials are damp, which interfere with the proper discharge of the ground product; to provide in a mill of the class indicated a series of traveling anvils in linked formation so disposed as to carry the material to be crushed into the range of the revolving hammers and sustain the material as it is broken by said hammers; and to so construct the machine that the material will be forcibly fed into contact with the hammers and become discharged through an unrestricted outlet.

These objects are accomplished by the construction illustrated in the accompanying drawings, in which:—

Fig. 1 is a vertical section of a construction embodying the invention;

Fig. 2 is a partial transverse section of Fig. 1 on the line 2—2 thereof;

Fig. 3 is a fragmentary plan view of the breaker belt; and

Fig. 4 is a side elevation of the machine.

The characters appearing in the description refer to parts shown in the drawings and designated thereon by corresponding characters.

The invention comprises a rotor 1 mounted upon a drive-shaft 2 which extends horizontally through a housing 3. The rotor is of usual construction consisting of a series of discs 4 spaced apart and mounted concentrically upon the drive-shaft, so as to gyrate numerous hammers 5 that are arranged in groups, each group of hammers being secured upon a corresponding rod 6 that extends laterally through the series of discs.

In the housing are mounted a pair of shafts 7 and 8, each of which has mounted thereon a pair of sprocket-wheels 9 and 10 respectively, and upon said sprocket-wheels are carried a belt constituting a breaker member consisting of a series of anvil bars 11 linked together in successive order. Each anvil bar has made in its under side adjacent each end thereof a socket 12 in which the teeth 13 of said sprocket-wheels are received. Said breaker member is located in a slanting position with its lower portion extending beneath the rotor in close proximity thereto.

A pair of guides 14 for the upper portion of the belt composed of the anvil bars, are pivotally mounted upon the shaft 8, and in the lower ends of which guides the shaft 7 is mounted, there being a slot 15 in the housing through which one end of the shaft 7 extends, and which slot admits adjustable movement of said shaft 7 upon the axis of the shaft 8.

In the lower part of the housing is mounted a shaft 16, transversely disposed therein, and arranged to be longitudinally adjustable, there being a bracket 17 through which one end of the shaft extends, and a nut 18 on the shaft for sustaining it in adjusted position.

Upon said shaft 16 are adjustably secured a pair of wedges 19 so disposed as to afford support for the guides 14, respectively adjacent the lower ends thereof, there being an opening 20 in each wall of the housing through which said wedges have movement, and a corresponding seat 21 upon which the corresponding wedges are sustained. Upon adjustment of the rod 16, the wedges are moved so that the guides supported thereon are raised or lowered, and the breaker member accordingly spaced relative to the rotor.

The breaker member belt is driven by the sprocket-wheels 9 and 10, and the shaft 8 upon which the sprocket-wheels 10 are fixed, is actuated by a transmission mechanism that includes a gear 22 on the shaft 8 that meshes with a pinion 23 on a countershaft 24, which shaft has thereon a pulley 25 that is driven by a belt 26, the belt being actuated by a pulley 27 on the rotor shaft 2.

The shafts 7 and 8, each extend through one of the walls of the housing and have mounted thereon upon their extending ends corresponding sprocket wheels 28 and 29 respectively, and upon said sprocket wheels is

trained an endless chain 30, there being arranged in connection with the lower strand of said chain a tightener 31 of ordinary construction whereby the slack of the chain is taken up. The sprocket wheel 29 is fixed upon the shaft 8, and the sprocket wheel 28 is adjustably rotatable upon the shaft 7, there being a dog 32 fixed on the shaft 7, and adjusting screws 33 positioned in lugs 34 on the sprocket wheel 28 so disposed as to engage the dog upon opposite sides thereof. Upon adjustment of the screws, the sprocket wheel 28 may be advanced or retarded, so that the upper strand of the breaker member belt may be thereby slackened or tightened accordingly.

A feature of the invention consists in the form of the breaker member which is composed of the linked anvil bars. Each bar is shaped so that its exposed outer face is inclined so that its forward edge is elevated relative to its rear edge, whereby the breaker member has a corresponding series of offsets 35, that tend to drag material that is deposited through the hopper 36 onto the belt, into contact with the rotor. Also, because of the inclined faces of the anvil bars, the material carried upon the breaker member tends to become wedged between the anvil bars and the rotor as the breaker member progresses, so that the material is subjected to the action of the rotor with increasing pressure until discharged from between the rotor and breaker, whereupon it passes from the machine through the outlet 37. The offsets further afford shelter for the hinge connections between the anvil bars and reduces that tendency of the finely ground material to become packed in the connections.

In utilizing the invention, the rotor is actuated in the usual manner from a suitable source of power (not shown), and the breaker member is accordingly set in motion through the medium of the transmitting mechanism above described, so that the anvil bars are progressed in successive order downwardly in the guides and beneath the revolving disintegrating member. The rock, or other material to be ground, is deposited through the hopper onto the breaker member, and is carried thereby into contact with the hammers, whereupon it is reduced to a pulverulent state by impingement between the hammers and breaker member. The pulverulent material is expelled through the outlet in the housing as it passes from the disintegrating and breaker members.

By adjustably shifting the wedges 19 in the housing, the guides 14 are moved so that the spacing between the breaker member and the disintegrating member is varied and the grade of fineness of the ground material accordingly regulated.

A further and particular feature of the invention is that those portions of the guides 14 that extend beneath the rotor are of arcuate form, so that the corresponding portion of the breaker member in passing through the arcuate portions of the guides partakes of corresponding curvature in concentric relation with the rotor, and in this manner the anvil bars are maintained, for a protracted period, in more or less uniform proximity to the hammers, whereby the material passing between the rotor and breaker is subjected to prolonged action of the hammers which augments the effectiveness of the grinding operation.

What I claim is:—

1. In a grinding machine of the class described, a housing having an inlet and an outlet opening; a rotor including a multiplicity of hammers; a pair of guide members spaced apart and positioned in the housing, the lower portions thereof being of arcuate form and extending beneath the rotor in concentric relation therewith; a breaker member comprised of a series of transversely disposed anvil bars linked together in the form of an endless belt; a driving member comprised of a rotatable shaft mounted in the housing and having sprocket wheels fixed thereon that have actuating and supporting relation with the breaker member at one end thereof; a second driving member comprised of a shaft supported in said guides at the lower ends thereof and having sprocket wheels fixed thereon that have actuating relation with said breaker member at the lower end thereof; adjustable supporting mechanism for the lower portions of said guides; another sprocket wheel on each of said shafts, one of which has means in connection therewith whereby it may be selectively advanced or retarded adjustably on its shaft; an endless chain connecting said other sprocket wheels; an idler engaging said chain for taking up the slack thereof; and mechanism for actuating the first mentioned driving member.

2. In a grinding machine of the class described, a housing having an inlet and an outlet opening; a rotor including a multiplicity of hammers; a pair of guide members spaced apart and positioned in the housing, the lower portions thereof being of arcuate form and extending beneath the rotor in concentric relation therewith; a breaker member comprised of a series of transversely disposed anvil bars linked together in the form of an endless belt; a driving member comprised of a rotatable shaft mounted in the housing and having sprocket wheels fixed thereon that have actuating and supporting relation with the breaker member at one end thereof; a second driving member comprised of a shaft supported in said guides at the lower ends thereof and having sprocket wheels fixed thereon that have actuating relation with said breaker member at the lower end thereof; adjustable supporting mechanism for the lower

portions of said guides; and mechanism for actuating one of said driving members.

3. In grinding mechanism of the class described, a rotating disintegrating member; guide members pivoted at their upper ends, the lower portions thereof being of arcuate form and extending beneath the disintegrating member in approximately concentric relation therewith; a breaker member comprised of a series of transversely disposed anvil bars linked together in the form of an endless belt; driving means supporting said belt and having actuating relation therewith; and adjustable supporting mechanism for the lower portion of said guides.

4. In grinding mechanism of the class described, a rotating disintegrating member; guide members pivoted at their upper ends, the lower portions thereof being of arcuate form and extending beneath the disintegrating member in approximately concentric relation therewith; a breaker member comprised of a series of transversely disposed anvil bars linked together in the form of an endless belt; and driving means supporting said belt and having actuating relation therewith.

5. In a grinding mill, a housing; a rotatable disintegrating member; a breaker member in the form of an endless traveling belt made up of a series of anvil bars hinged together, the face of each bar being disposed upon an incline lengthwise of the belt; guideways for the opposite sides of said belt, those portions thereof adjacent said disintegrating member being arcuate and concentric therewith; and mechanism for imparting continuous movement to said disintegrating member and breaker member.

In testimony whereof I affix my signature.

DIEDRICH C. ADDICKS.