Aug. 27, 1935. E. L. BARTELS 2,012,416

HAMMER MILL

Filed Sept. 12, 1932

Fig. 1

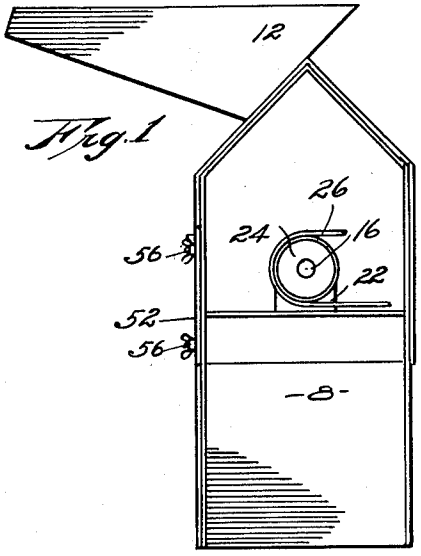
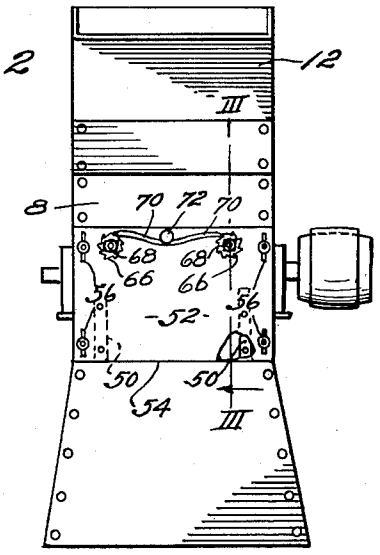


Fig. 2



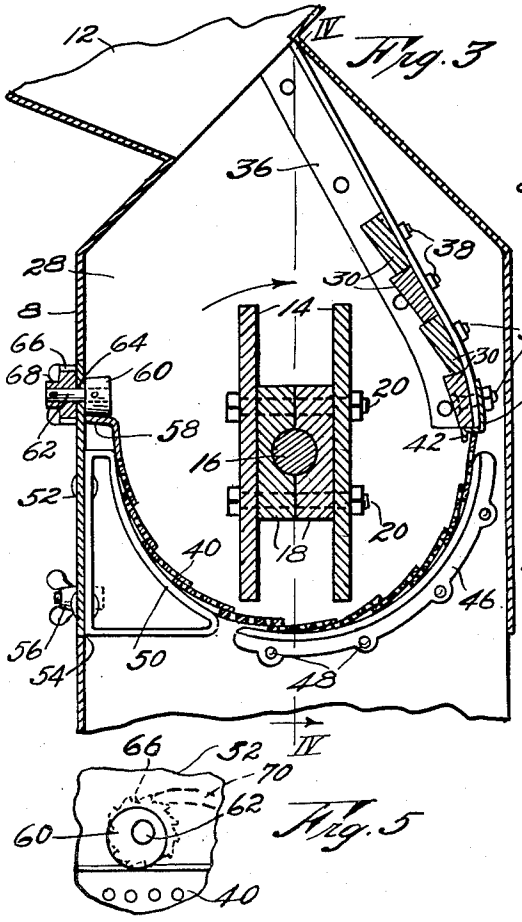


Fig. 3

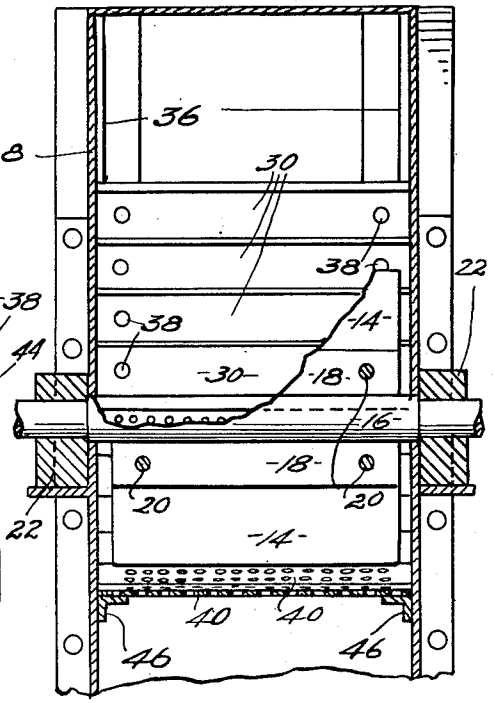


Fig. 4

Fig. 5

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2,012,416

HAMMER MILL

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8 Claims. (Cl. 83—11)

This invention relates to improvements in machines for grinding or reducing material, and particularly to a hammer mill in which a rotor is arranged for rapid rotation within a casing to engage and pulverize the material therein.

The principal object of this invention is the provision of a hammer mill wherein the parts are novelly arranged to facilitate easy and accurate placement and removal of the screen.

Another object of the present invention is the contemplation of a hammer mill having a screen mounted therein to form the lower circumferential wall of a grinding chamber, said screen being held in the operative position by means carried by a closure adapted to cover an opening in the casing through which the screen may be inserted.

Other objects of this invention are simplicity and economy of manufacture, ease and efficiency of operation, and adaptability to the grinding of materials to varying degrees of fineness.

Minor objects of the invention will appear during the course of the detailed specification, referring to the accompanying drawing, wherein the invention is fully shown.

Figure 1 is a side elevation of a hammer mill embodying this invention.

Fig. 2 is an end elevation of the same.

Fig. 3 is an enlarged sectional view taken on line III—III of Fig. 2.

Fig. 4 is a sectional view taken on line IV—IV of Fig. 3, with parts broken away.

Fig. 5 is a detailed view of the cam members in the operative position and with some of the parts shown in dotted lines.

Like reference characters designate similar parts, and the numeral 8 indicates a casing or housing made of a suitable material, such as sheet iron, which is adapted to properly enclose the grinding members. Casing 8 is provided with a material inlet 10 adjacent its upper portion which communicates with a suitable hopper 12. Hammers 14 are mounted on shaft 16 by means of blocks 18, and bolts 20. Shaft 16 is horizontally disposed, with its outer portions extending through the housing and rotatably mounted in bearings 22 which are carried by the side walls of the housing.

Any suitable driving means, such as pulley 24, is rigidly secured to one end of shaft 16, and is adapted to be driven through the intermediacy of belt 26 by a suitable motor. A grinding chamber 28 is formed within casing 8 by anvils 30, and screen 40, which are mounted in the following manner. Securely attached to the opposite side walls 34 are two angled members 36, to which the horizontally disposed anvils 30 are secured at their opposite ends by means of bolts 38. In order to permit of the proper feeding of materials between the rotatably mounted hammers and the anvils, the outer anvils are positioned tangentially to the direction of travel of the outer ends of said hammers.

The lower circumferential wall of the grinding chamber 28 is formed by a perforated plate or screen 40, the inner surface of which is concentric with the direction of travel of the hammers, and is spaced apart from the outer ends of said hammers a sufficient distance to facilitate proper grinding or shredding of material therebetween. Screen 40 is substantially semi-circular with its diametrically opposite edges substantially parallel with the axis thereof. One of these edges is adapted to fit behind a ledge 42 formed on the angled iron 44 and extending substantially across the grinding chamber 28.

Angled member 44 is secured at its ends to angle iron 36 by means of bolts 38, which also secure one of the anvils in position. It should be noted that ledge 42 is set slightly outside of the face of anvil 30, thus precluding any possible chance of wear due to the action of the material being ground.

Screen 40 is supported adjacent its opposite ends by means of brackets 46 which are securely attached to side walls 34 by means of rivets 48. It is very apparent that these brackets or lugs 46 may be integral with walls 34. Brackets 46 are supplemented by short, arcuate brackets 50, which are securely attached to a closure 52 that is adapted to securely close opening 54 formed through one of the end walls of the casing adjacent said screen. This closure 52 is removably attached to the casing 8 by means of easily removable wing nuts 56. The edge of screen 40 adjacent closure 52 is provided with a slightly inclined flange 58 which is positioned above arcuate bracket 50 and beneath a pair of eccentric rollers or cams 60 which, when the closure is in the operative position, are adapted to be adjusted to force the screen downwardly so that its diametrically opposite edge will be forced tightly against angled iron 44.

It will be noted that cams 60 are substantially the frustrum of a cone, with the large end thereof extending inwardly, thus preventing the adjacent end of the screen 40 from moving inwardly. Cams 60 are provided with pins 62 which extend through openings 64 formed through closure 52 and are provided on their outer ends with ratchet wheels 66. These ratchet

wheels are provided with squared hubs 68 which serve to receive a wrench, by means of which the cams 60 can be rotated.

Referring to Fig. 2 it will be noted that the teeth of the ratchet wheels 66 are disposed in opposite directions and that a spring pawl 70, fulcrumed on trunnion 72, is disposed with its outer ends respectively engaging the teeth of said ratchet wheels to preclude their rotation in one direction, thus making it possible to hold the cams in the operative position and against accidental movement. With two separate adjusting cams 60 it is apparent that should the flanged edge 58 of the screen be out of parallel with the axis of the hammers, the screen can still be properly forced to the operative position by turning the cams through different arcs. The screen as shown is a composite of several narrow, perforated sheets rigidly attached together to present shoulders opposed to the direction of travel of the hammers, thus facilitating the proper grinding of the material. However, in this invention it is not essential that this type of screen be used since a plain, semi-cylindrical, perforated plate would answer the same purpose.

Hammer mills of this type are used for the production of ground materials of different fineness, and it is necessary that the screen 40 be replaced by screens having different sized perforations. This structure permits of easy and rapid changing of these screens in the following manner.

Hammers 14 are stopped in a substantially horizontal position, the operator removes thumb screws 56 and pulls the closure, together with arcuate bracket 50, outwardly, thus exposing the screen 40 which may be easily lifted from its support on brackets 46 and from underneath ledge 42. The other screen is then placed in position with its outer edge behind ledge 42 where it will be held in a suitable position so that the closure may again be positioned and secured by means of the thumb nuts.

Before removing closure 52, the operator releases pawl 70 and turns the cam to the raised position where it remains until after the closure has again been positioned and the cams are again forced downwardly against flange 58 to properly seat the screen.

It is apparent that screen 40 may be made without the inclined flange 58 since the cam 60 might rest against the narrow edge of the screen to force the same to the operative position. Furthermore, flange 58 might be formed by simply attaching to the screen, in any suitable manner, an angle iron. When the angled portion is omitted it would be necessary to place the screen against the closure 52 in order to preclude the escape of materials between the screen and closure.

It is desired to reserve the right to make any changes or alterations in this structure that might reasonably fall within the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A hammer mill comprising a casing having an opening through one of its end walls; a closure for said opening in said casing; a hammer rotatably mounted within said casing; an arcuate screen mounted in said casing in operative relation with said hammer; and means including arcuate brackets carried by said closure to engage beneath said screen to support it in the operative position.

2. A hammer mill comprising a casing having an opening formed through one of its end walls and having a grinding chamber therein; hammers mounted for rotation in said chamber; a screen removably mounted within said casing to form the lower wall of said grinding chamber; a closure for said opening; brackets carried by said closure adapted to extend beneath said screen and adjustable means carried by said closure to force said screen against said brackets to secure said screen in the operative position.

3. A hammer mill comprising a casing having an opening formed through one of its end walls and having a grinding chamber therein; hammers mounted for rotation in said chamber; a screen removably mounted within said casing to form the lower walls of said grinding chamber; a closure for said opening; and a rotatably mounted cam carried by said casing within said chamber operable from the outside of the casing to clampingly engage the edge of said screen to secure it in the operative position.

4. A hammer mill comprising a casing having an opening formed in one of its end walls and a grinding chamber formed therein; hammers mounted for rotation within said grinding chamber; a removable semi-cylindrical screen positioned in said casing to form the lower circumferential wall of said grinding chamber with its opposite straight edges respectively adjacent the end walls of said casing; one of the straight edges of said screen being disposed between the top and bottom of the opening formed in the adjacent end wall of the casing; a closure for said opening; and arcuate brackets carried by said closure adapted to engage the arcuate surface of said screen when the parts are in the operative position.

5. A hammer mill comprising a casing having an opening formed in one of its end walls and a grinding chamber formed therein; hammers mounted for rotation within said grinding chamber; a removable semi-cylindrical screen positioned in said casing to form the lower circumferential wall of said grinding chamber with its opposite straight edges respectively adjacent the end walls of said casing; one of the straight edges of said screen being disposed between the top and bottom of the opening formed in the adjacent end wall of the casing; an angled member supported between the end walls opposite said opening adapted to serve as an abutment for the other edge of said screen; a closure adapted to close said opening; and means carried by said closure vertically adjustable to engage the adjacent edge of said screen and force the opposite edge thereof tightly against said angled member when the closure is secured in the closed position, said screen-engaging means having operating means positioned outside of said chamber when the closure is in the operative position.

6. A hammer mill comprising a casing having a grinding chamber with revoluble hammers mounted therein; a screen removably mounted in said casing to form the lower circumferential wall of said chamber; brackets carried by the walls of said casing to support said screen; a closure adapted to close an opening formed through the wall of said casing; and members carried by said closure, shaped to conform to the outside contour of said screen and to extend

therebeneath at its opposite sides to serve as supports therefor.

7. A hammer mill comprising a casing having an opening formed through one of its end walls and having a grinding chamber therein; hammers mounted for rotation in said chamber; a screen removably mounted within said casing to form the lower wall of said grinding chamber; a closure for said opening; clamping means positioned within said chamber and supported for vertical adjustment on said closure; and operating means for said clamping means extending through said closure and adapted to be operated from the outside of the chamber to move the clamping means toward or from the edge of said screen.

8. A hammer mill comprising a casing having an opening formed in one of its end walls and a grinding chamber formed therein; hammers mounted for rotation within said grinding chamber; a closure for said opening, an abutting member carried by the end wall opposite said opening; a removable semi-cylindrical screen positioned in said casing to form the lower circumferential wall of said grinding chamber with its opposite straight edges respectively adjacent the end walls of said casing; one of the straight edges of said screen being disposed between the top and bottom of the opening formed in the adjacent end wall of the casing and the other of said straight edges being positioned beneath said abutment; and means including a cam carried by said closure and vertically adjustable thereto to engage the adjacent straight edge of the screen to force the opposite edge of the screen against said abutment.

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