Jan. 30, 1951 C. W. GORDON 2,539,775

QUICK-OPENING CAGE MILL

Filed June 7, 1947 2 Sheets-Sheet 1

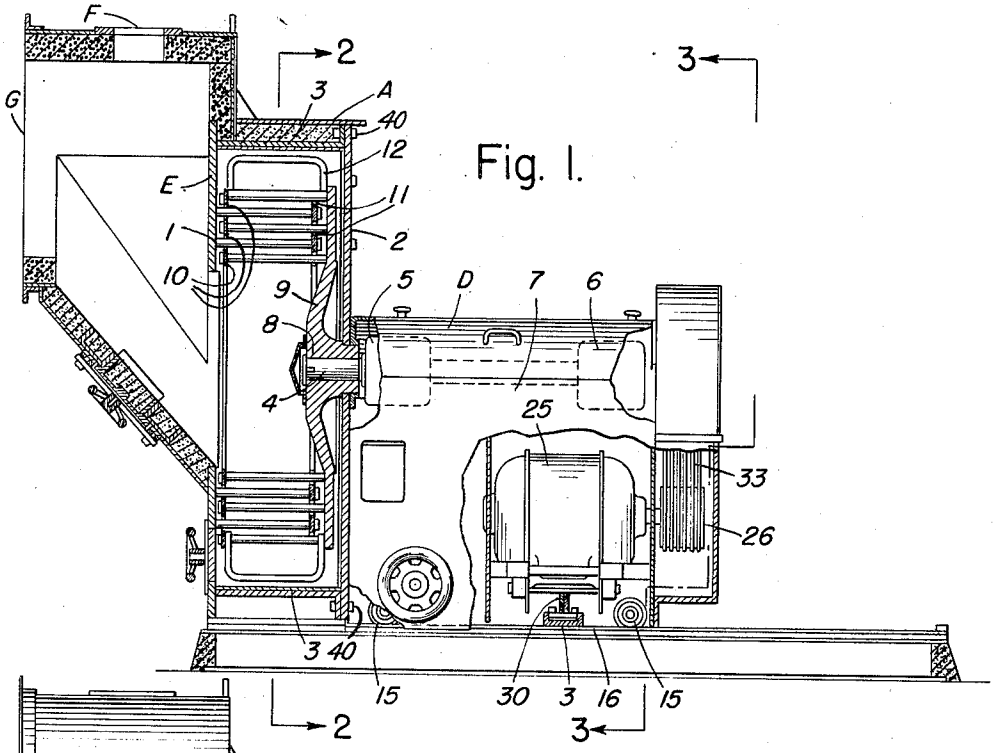


Fig. 1.

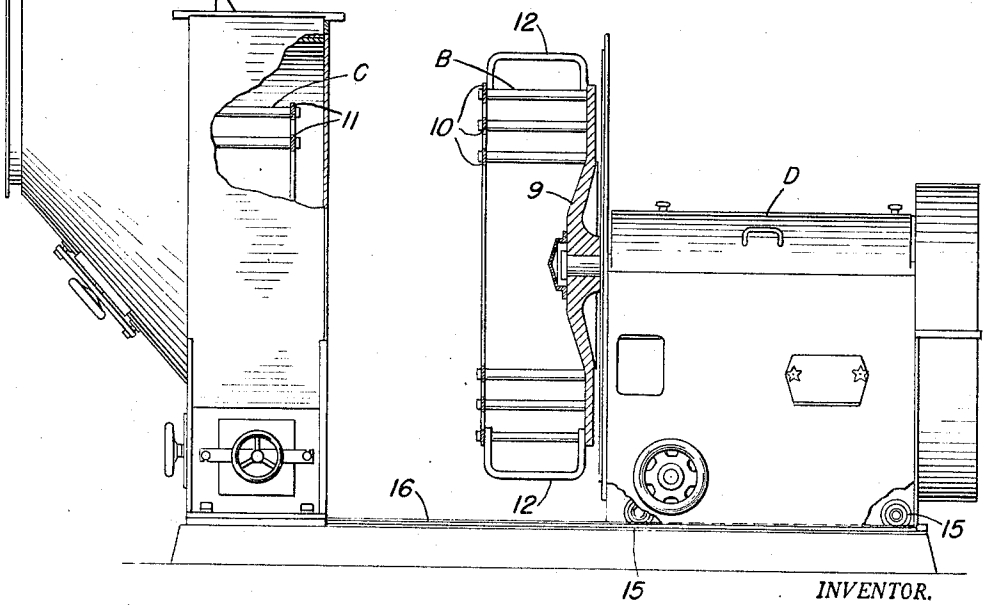


Fig. 4.

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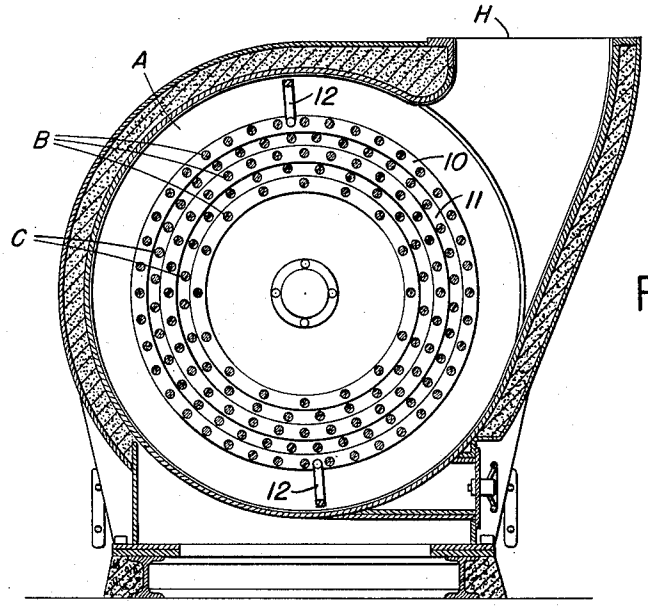


Fig. 2.

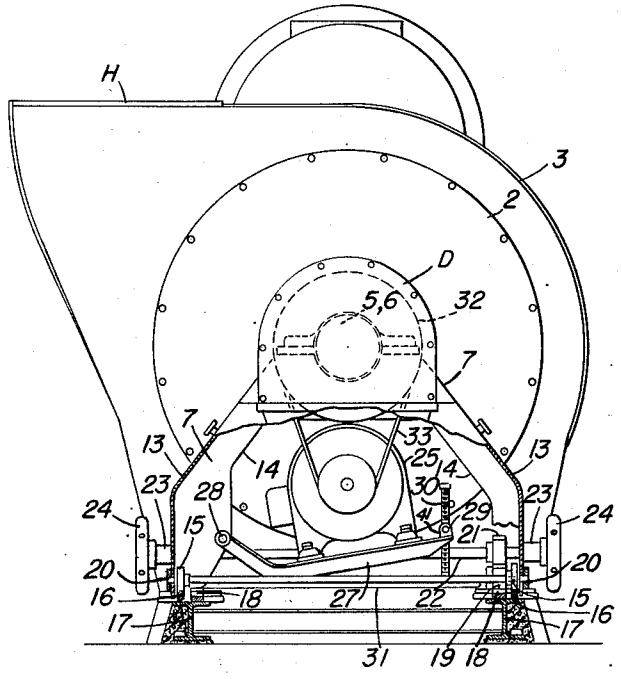


Fig. 3.

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2,539,775

QUICK OPENING CAGE MILL

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1 Claim. (Cl. 241—186)

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This invention relates to certain new and useful improvements in cage mills of the flash drier type, more particularly to an improved apparatus for expeditiously and efficiently disassembling and reassembling the drier mill for the purpose of quick inspection and cleaning.

Briefly described, the apparatus comprises a mill or disintegrator having a substantially closed cylindrical casing in which one or more disintegrating cage structures are mounted for rapid rotation about the central horizontal axis of the mill. The wet material, together with highly heated gases, is delivered into the casing through one end wall thereof, substantially in line with or adjacent to the central axis and within the rotary disintegrating elements of the cage structures. The material is broken up by the cage structures and thrown outwardly by centrifugal force against the inner peripheral wall of the casing, and the hot gases are also drawn or whirled outwardly through the cage structures so as to be brought into intimate contact with the disintegrated material and absorb the moisture therefrom.

An opening is provided in the peripheral wall through which dried and disintegrated material and the gases may pass out. A rotary scraper is mounted in the casing for rotation about the central axis in proximity to the inner peripheral wall of the casing, to scrape loose the material and direct it toward the outlet opening. After being discharged through the outlet opening the dried material is carried away in any suitable manner. In the form of apparatus here shown, this material is carried away in suspension in the gases.

The principal object of this invention is to provide an improved cage-mill drying apparatus of the type briefly described hereinabove and disclosed more in detail in the specifications which follow. In the accompanying drawings:

Figure 1 is a side elevation of the assembled apparatus, portions being broken away to show the interior construction.

Figure 2 is a vertical section taken substantially on the line 2—2 of Figure 1.

Figure 3 is a vertical section taken on the line 3—3 of Figure 1.

Figure 4 is a view similar to Figure 1 showing portions of the apparatus disassembled.

In general, the apparatus herein represented comprises the disintegrating mill A in which are the rotary disintegrating elements B that are supported and rotated by the assembly indicated at D positioned outside of the mill casing at one end

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thereof. Stationary disintegrating members C are supported by the mill casing E. The wet material is delivered into opening F and the hot gases through inlet G into the mill. The dried material and gases pass out through the outlet passage H.

The mill A, comprises a substantially-closed, preferably cylindrical casing consisting of spaced-apart end walls 1 and 2 connected by bolts 40 to the outer peripheral wall 3.

The supporting and rotating assembly D comprises a substantially horizontal shaft 4 which is rotatively supported on the bearings 5 and 6 carried by supporting structure 7. The hub 8 is keyed on the inner end of shaft 4, projects through the end wall 2 of the casing and makes a close fit therewith.

The disintegrating structure or cage including the elements B comprises the supporting disc 9 extending radially from the hub 8 and preferably integrally cast therewith, placed substantially parallel to the adjacent end wall 2 of the casing. A series of spaced-apart breaker bars B are secured at one end to the disc 9, the bars preferably extending substantially parallel to the axis of shaft 4 in three spaced-apart concentric rows. The opposite ends of the breaker bars B are connected for support by the circular rings 10. A second series of breaker bars C are mounted at one end in end wall 1 of the casing and are connected at the other end by supporting rings 11.

In this embodiment there are two groups of bars C arranged in two concentric rows parallel to and intermediate the rows of bars B. The bars B and C may be in all respects alike excepting that they are arranged in alternate concentric rows as shown. Slingers 12 are attached to the outside row of bars B and rotate therewith closely adjacent casing wall 3 to sweep the casing clean.

It is vitally important to have a cage mill of the character described so constructed as to be quickly accessible when trouble is experienced due to plugging the cages as a result of overfeeding, or due to sticking because of inadequate dryness of the material being fed into the mill. Easy accessibility to the interior of the mill for inspection is important when abrasive materials are encountered. Furthermore the mill should be capable of being quickly cleaned of the old material when a different material is to be treated.

According to the invention the assembly D which supports the rotary disintegrator elements B and the casing end wall 2 is segregated into a general structure 7, including plates 13 stiffened by ribs 14, which rests upon wheels 15 riding on

rails 16 arranged parallel to the shaft 4. The rails 16 rest upon a base 17, in this instance comprising parallel I beams. Mounted on the base 17 parallel to the rails 16 are racks 18. The pinions 19 mesh with the racks 18 and rotate on pivot pins 20 mounted on plates 13. A second set of pinions 21 mesh with pinions 19 and are keyed to a shaft 22 which extends through bearings 23 mounted on plates 13. Fastened to the ends of the shaft 22 extending outside of plates 13 are hand wheels 24. After unfastening the casing end wall 2 from the peripheral wall 3, the hand wheels 24 and the pinions 21 and 19 are rotated to move along rack 18 and thereby the entire assembly D together with the disintegrators B and the casing wall 2 may be moved longitudinally along the rails 16.

The assembly D includes the mill driving motor 25 which is provided with a pulley 26 and is mounted upon beams 27 (see Figure 3) fastened at one end by hinges 28 to the stiffening ribs 14 and supported at the other end by a member 29 which in turn is centrally supported by a nut 41, engaging an adjusting screw 30. Screw 30 rests upon a channel 31 fastened at both ends to the plates 13 of the supporting structure 7. By rotating screw 30 the member 29 and therewith the ends of beams 27 and the motor 25 are raised or lowered.

The end of the disintegrator shaft 4 is provided adjacent bearing 6 with a pulley 32. A belt 33 passes over pulley 32 and the pulley 26 attached to motor 25. The tension of this belt 33 is maintained by means of the adjusting screw 30.

Figure 1 shows the assembly D moved into position so that the disintegrator elements B and C are in operative relation and the casing wall 2 is fastened (by the removable bolts represented) to the casing peripheral wall 3.

Figure 4 shows the assembly D with the casing end wall 2 unfastened, and moved into position so that the distintegrator elements B are removed from and spaced apart from the remaining casing and the disintegrator elements C thereby permitting easy access to the interior of mill A.

While the preferred embodiment of my invention has been shown and described, it will be understood that changes in construction, combination and arrangement of parts may be made without departing from the spirit and scope of the invention as claimed.

I claim:

An apparatus of the character described comprising a substantially cylindrical closed casing having one end wall and an opposed other end wall; means forming an inlet opening in said one end wall thereof and means forming an outlet opening leading from the peripheral wall of the casing; a pair of disintegrating cage structures mounted in overlapping relation within the casing about an axis thereof, one of those cage structures being mounted on said one end wall and the other cage structure being mounted for rotation on a shaft coincident with the axis and extending through the other end wall; means for detachably securing said other end wall of the casing in operating position against a mating portion of the casing's said peripheral wall; a bearing for the shaft external to the casing adjacent the other end wall; a motor also external to the casing and coupled to the shaft in operative position to impart rotation thereto; a pedestal structure supporting the bearing, cage carrying shaft, shaft rotating motor and said other end wall of the casing; rails for supporting the pedestal structure together with the aforesaid bearing, cage carrying shaft, shaft rotating motor and the other end wall of the casing, said rails extending parallel to the shaft, whereby, when said other end wall is freed from the casing's peripheral wall, the assembled parts including the pedestal structure, the other end wall, the cage carrying shaft and the said rotating motor mounted in operative position on said pedestal structure may be moved along the rails away from the remaining casing and the other disintegrating cage at least to a point where said shaft carried cage is separated from said remaining casing by an axial distance substantially less than the cylindrical casing's axial depth; and means for moving said assembled parts along the rails.

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