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GRINDING MILL

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8 Claims. (Cl. 241—70)

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This invention relates to grinding mills in which the comminution of ore or other material is effected by the grinding action of a mass of moving balls, pebbles, or the like, within a rotating cylinder, and in which the comminuted material is discharged through a grated portion of the cylinder. In mills of this type the plugging of the grate openings by worn grinding media, larger particles of ore, or the like constitutes a source of considerable annoyance, necessitates loss of operating time in repeated cleaning of the grates, and results in substantial diminution of mill capacity and efficiency.

The prime object of the present invention is to provide a grated discharge portion of a grinding mill which enables ready egress of ground materials, worn grinding meda, or other materials having certain maximum dimensions without the objectionable clogging tendencies exhibited in prior constructions. The invention provides a mill discharge end which fulfills this purpose in a particularly simple and effective manner; and which enables the advantages of mills of the type mentioned to be utilized fully, without interference by objectionable plugging of the discharge grates.

Other features and advantages of the invention will be hereinafter described and claimed.

In the accompanying drawing:

Fig. 1 is a fragmentary elevation, as viewed from the inside, showing a portion of the discharge end of a grinding mill embodying one form of our invention.

Fig. 2 is a fragmentary view in vertical section, taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal section, on an enlarged scale, taken on line 3—3 of Fig. 1.

Since our invention relates only to the discharge end of the grinding mill, and, as the general construction of such mills is well known to persons familiar with the art, we will describe particularly only the discharge end of the mill.

Referring to the drawing, 2 designates the cylindrical shell or main body portion of the grinding mill, and 3 the head which closes the discharge end of said shell. Secured to said head 3 is the customary centerpiece 4 which, as shown, may include a passage 5, serving as an observation port and as a point of addition of balls or other grinding media. Said centerpiece also has formed therein a diversion passage 6 for the mill product. The shell 2 is provided with a lining 7 of suitable refractory material. A center end liner, which may be of form and material best adapted for grinding conditions, is indicated at 8; while other suitable end liners, disposed outwardly from said liner 8, are shown at 9 and 10. Pulp lifter elements 11 of conventional form are also shown.

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In carrying out our invention, we form discharge slots, such as are shown at 12, by mounting elements 13 of rubber or other suitable resilient material in suitably spaced relationship. In the embodiment illustrated, these resilient elements 13 are mounted in cut out portions of the liners 8, 9, and 10, and are attached to and firmly maintained in position by backing plates 14 welded or otherwise suitably secured to said liners or to the discharge head 3. As shown, said backing plates 14 terminate short of the edges of the rubber elements 13 to enable flexure of said edges to the extent desired.

We furthermore, so space the liners 8, 9, and 10 with respect to each other as to form between them channels 15 of such width or form as to permit ready movement within said channels of the largest ball or other grinding member in the charge. The liners which form the channel also function to prevent direct action of any large portion of the charge of grinding members upon the rubber elements 13.

It will be understood that the cylinder 2, lining 7, head 3, centerpiece 4, liners 8, 9, and 10, and lifters 11 are suitably fastened together to rotate in unison in the operation of the mill. The lifters 11 are integral with the head 3, which is suitably secured to the cylinder 2 and centerpiece 4; while the liners 8, 9, and 10 and associated backing plates 14 are suitably fastened to the lifters 11.

In assembling said liners and associated parts, the liner 10 may first have attached thereto a rubber element 13 and a backing plate 14. The latter may be fastened to the liner by suitable bolts or by welding. Thereafter, said liner 10 may be inserted into the head 3 and secured therein by a suitably tight fit, or by welding or otherwise fastening the backing plate 14 to the lifter 11. Liner 8, after having a rubber element 13 and backing plate 14 attached thereto may then be placed in the desired position on the lifters 11 and, fastened in position through said plate 14. Said liner 8 may also, as shown, have a similar plate 14' interposed between said liner and said lifter and suitably fastened thereto. Then the liner 9, after having rubber elements 13 and backing plate 14 attached thereto, is placed on the lifters 11 in the desired spaced relationship with respect to the liners 8 and 10; following which said liner 9 is secured to said lifters 11 through said plate 14 in any desired manner. The cen-