Sept. 21, 1943. M. MACEK, SR., ET AL 2,330,067

MILLSTONE

Filed Dec. 26, 1941 2 Sheets-Sheet 1

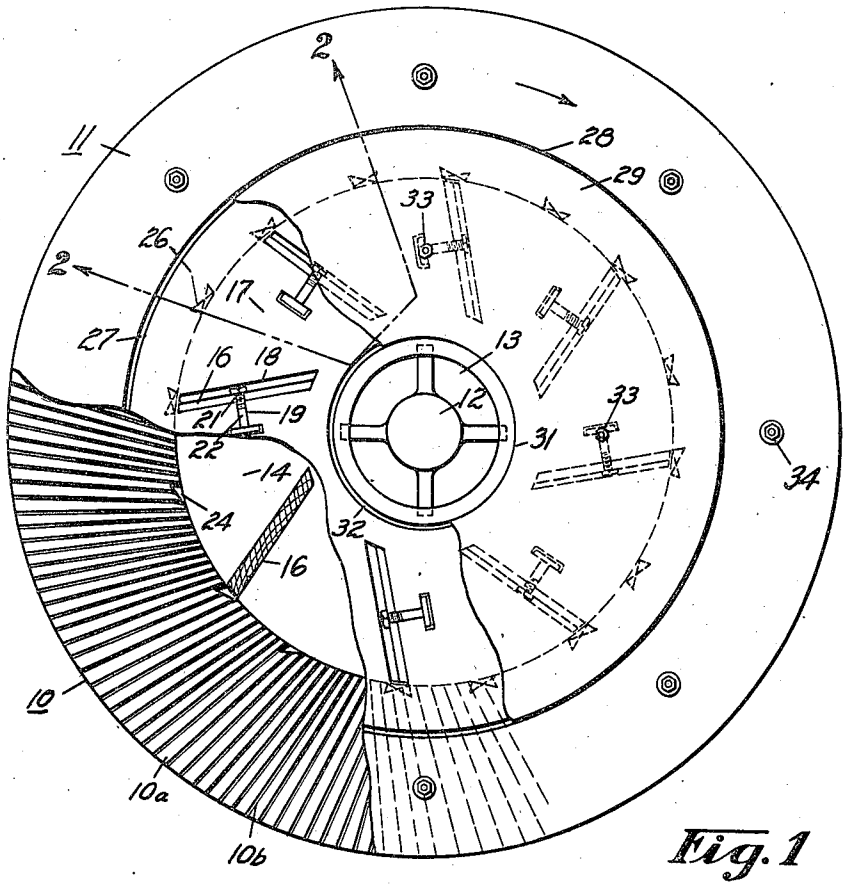


Fig. 1

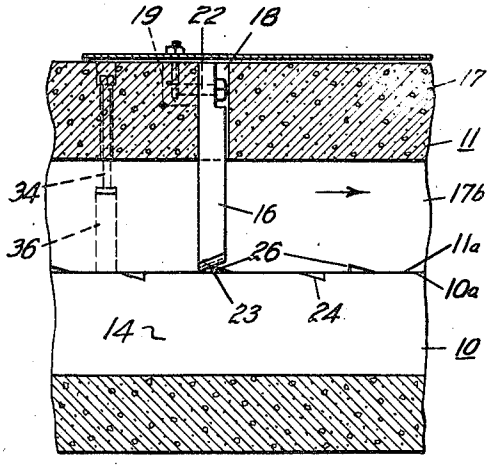


Fig. 2

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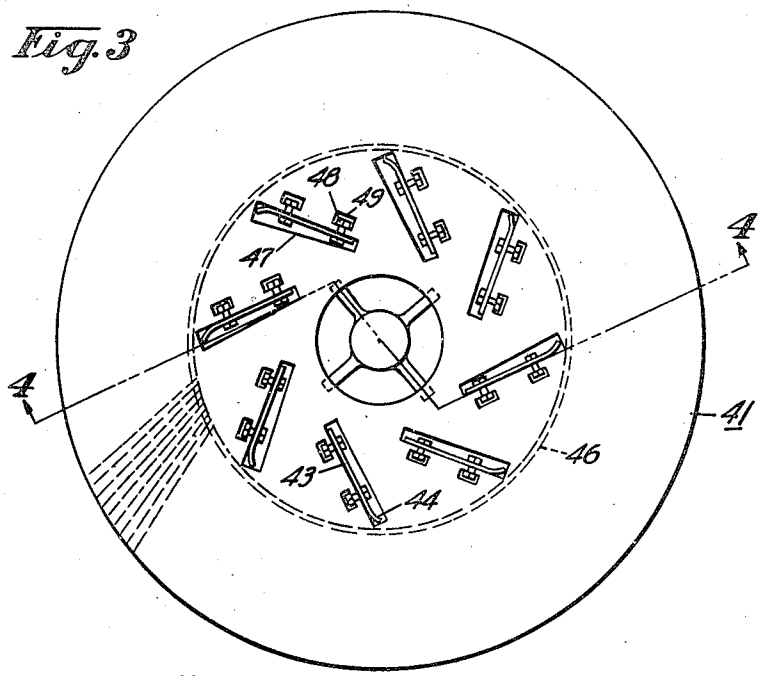
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MILLSTONE

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Fig. 3



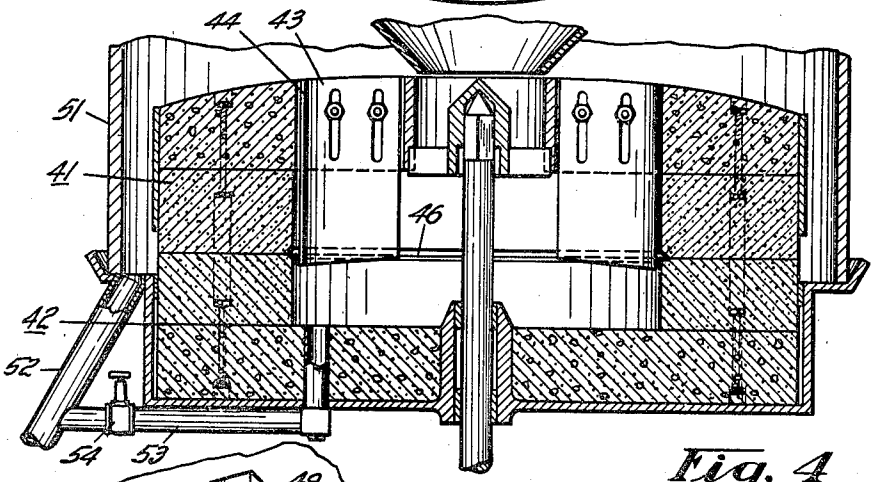


Fig. 4

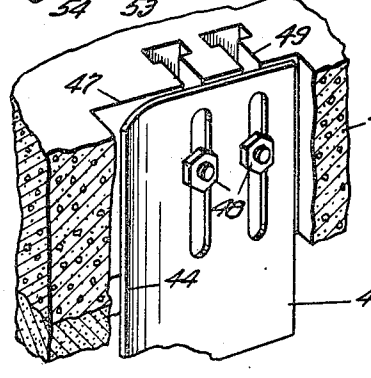


Fig. 5

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2,330,067

MILLSTONE

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Application December 26, 1941, Serial No. 424,422

4 Claims. (Cl. 83—7)

This invention relates to grinding mills and has particular relation to improvements in such devices for pumping or feeding material between the grinding surfaces of the mill stones.

In grinding mills, such as are employed in grinding flour, meal, mustard and other commodities of this nature, stationary and rotatable milling stones are employed, and the material to be ground is fed downwardly through the open center of the upper mill stone into a centrally disposed cavity from which cavity, it is fed outwardly between the milling faces of milling stones.

It has been our experience, particularly with mills of relatively large size, that the weight of the upper mill stone is frequently so great that the material to be ground cannot find its way between the milling surfaces of the stones. Various devices have been suggested for overcoming this difficulty, which devices, however, we have found to be objectionable in themselves from an operating viewpoint. When the milling faces of the mill stones, in mills employing these devices of the prior art, wear down after a period of operation, it is necessary to completely disassemble the mill in order to adjust the pumping or feeding mechanism.

It is therefore a primary object of our invention to provide an improved grinding mill in which means are not only provided for pumping, or feeding, the material to be ground between the grinding faces of the stones, but in which the pumping means may be easily adjusted as the milling stones wear, and without dismantling the mill.

Another primary object of our invention is the provision, in a grinding mill, of means for greatly increasing the grinding capacity.

Another primary object of our invention is the provision in a grinding mill of means for increasing the life of operation and for facilitating service and maintenance operations.

Other and further features and objects of our invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawings and following specifications, wherein are disclosed exemplary embodiments of the invention, with the understanding, however, that such changes may be made therein as fall within the scope of the appended claims, without departing from the spirit of the invention.

In the drawings:

Figure 1 is a plan view of a grinding mill constructed in accordance with a preferred embodiment of our invention with portions thereof removed to better illustrate the structure.

Figure 2 is a fragmentary view in section of the grinding mill illustrated in Figure 1 and as taken on the lines 2—2.

Figure 3 is a plan view of a grinding mill constructed in accordance with a modified form of our invention.

Figure 4 is a vertical cross sectional view of the grinding mill illustrated in Figure 3 and as taken on the lines 4—4, and

Figure 5 is a fragmentary view partly in section illustrating one of the pumping means utilized in the device of Figures 3 and 4.

Referring now to the drawings and to Figures 1 and 2 in particular—grinding mills, as they are normally constructed, employ a lower mill stone, or bed stone, which we have indicated in general at 10, and an upper mill stone, or runner, 11, mounted for rotation above the bed stone and driven through a spider, or driving member 12 by means of a drive shaft, not shown, but extending upwardly through the center of the bed stone. The material to be ground is fed downwardly through an axially disposed opening 13 in the runner stone into a cavity 14 formed in the opposed faces of the grinding stones.

In the improved mill stone shown, we have provided a plurality of paddle-like members 16, which may be of wood or metal and which are disposed in radially spaced positions within the cavity 14. The pumping members are positioned so as to provide a draft which will force the material being ground outwardly between the milling surfaces of the stones. These paddle members 16 are preferably disposed vertically in positions parallel to the axis of the grinding stones and the upper wall, or cap, 17 is slotted for their reception as at 18. A recess in the form of a T-slot is also provided adjacent each slot 18 and as indicated at 19. Each paddle member 16 is slotted vertically downwardly from its upper edge as at 21 and a T-bolt 22 is employed to fixedly and adjustably secure each paddle member 16 in position. Each paddle member may be adjusted to any vertical position required so as to force material outwardly between the milling faces of the stones. However, it is preferable that the lower edge of each paddle be positioned as shown in Figure 2, just opposite the inner edges of the milling surfaces 10A and 11A. It is also preferable that the lower edge of each paddle be chamfered as at 23 (Figure 2) for purposes which will be hereinafter described.

The inner marginal edges of the grinding faces

10A and 11A of the milling stones are provided with a plurality of V-shaped notches, as indicated at 24 and 26 respectively. The notches 26 in the upper milling surfaces are preferably disposed substantially radially opposite the outer edge of each paddle member as well as in intermediate positions between the paddle members. Thus material forced outwardly by the leading surface of each paddle and fed downwardly by the lower chamfered edge 23 of each paddle is forced outwardly into the V-shaped notches 24 and 26 which provide an inclined surface over which the material to be ground may readily pass so as to enter between the closely fitted surfaces of the milling stones. The milling surfaces of the stones are preferably provided with grinding cracks 10—B in accordance with the usual practice.

We preferably provide an annular recess 27 in the upper surface of the cap of the runner into which the flanged edge 28 of a cover member 29, of sheet metal or the like, may be received. The inner edge of the cover member may also be flanged as indicated at 31 and received in a second annular recess 32, in order to seal the top surface of the upper mill stone and prevent the entry of any foreign matter through the paddle slots. This cover member is preferably held in position by means of bolts 33 secured at their lower ends to the T-bolts 22.

It is common practice in constructing such grinding mills to utilize a hollow center annular grinding stone as indicated at 17—B in Figure 2, which stone is secured by cement or the like to the flat and substantially solid upper wall, or cap stone 17, which may be of concrete or the like. It will be understood that when the grinding portion of the stone wears down thin it would be dangerous to employ such a stone as the runner. However, there is no objection to using such a worn stone as the bed stone, or stationary member, and it will be understood that the plate 29 may be employed to close all the openings in the cap stone to permit it to be used as the lower mill stone without leakage.

We prefer also to secure the milling stones of such a grinding mill to the cap stone by means of a plurality of long bolts 34, which bolts are installed through deep openings 36 in the faces of the mill stones. These openings may be sealed with cork plugs, or the like, to permit the replacement of the milling stones without having to discard the concrete cap stone, or bed stone.

The modified form of mill stone embodying our inventive idea and as illustrated in Figures 3 to 5, inclusive, includes a runner 41 and a bed stone 42, which may be constructed substantially as heretofore described in connection with Figures 1 and 2. The pumping blades 43, however, are preferably constructed of sheet metal such as stainless steel, or the like, and curve rearwardly along their outer vertical edges as indicated at 44 and this curved portion of each blade, in conjunction with the draft provided each blade, forces the material to be ground outwardly against the adjacent faces of the milling stones. The inner marginal edges of the grinding surfaces are chamfered as indicated at 46 to permit the entrance of material between these grinding surfaces. The pumping members 43 are adjustably supported in slots 47 molded in the upper wall or cap of the upper mill stone, substantially as before described, and are fixed in position by means of bolts 48, mounted in T-slots 49 set into the upper surface of the cap stone. This permits the pumping members to be readily adjusted, as the grinding stones become worn, without disassembling the mill.

Material, after having passed through the mill, is received within the outer shell 51 enclosing the mill stones and is discharged through the conduit 52. We prefer to provide such a grinding mill with an auxiliary conduit 53 connected with the inner cavity of the bed stone so as to make it possible to wash or flush out the entire grinding mill when grinding mash or the like, without having to remove the upper mill stone and otherwise disassemble the mill. The conduit 53 is normally closed by means of a gate-valve 54.

Grinding mills embodying our inventive idea, as herein disclosed, are relatively simple and inexpensive to construct, and eliminate a considerable amount of maintenance work necessary in keeping mills of the usual type in operative condition. It is possible to employ these mills for longer periods before servicing or rebuilding becomes necessary. Furthermore, we have found that a grinding mill constructed as shown and described, is capable of handling much greater quantities of material than mills constructed in accordance with the usual practice. We have found, furthermore, that although the capacity of such a mill is greatly increased, the amount of power required to operate the mill is actually decreased.

Although we have described specific embodiments of our invention, it is apparent that modifications thereof may be made by those skilled in the art. Such modifications may be made without departing from the spirit and scope of our invention as defined in the appended claims.

We claim as our invention:

1. In a grinding mill of the disk type a bed stone, a runner stone, the said stones being provided with a cavity in their adjoining faces and spaced from their outer edges, the runner having a plurality of slotted openings extending through the wall thereof, paddle-like pumping members extending through these slotted openings, said pumping members being substantially radially positioned, circumferentially spaced and extending outwardly to the periphery of the cavity.

2. In a grinding mill of the disk type a stationary mill stone, a rotatable mill stone, the said mill stones being provided with a cavity in their adjoining faces and spaced from their outer edges, the rotatable member having a plurality of slotted openings extending through the wall thereof, paddle-like pumping members substantially radially positioned and circumferentially spaced extending through said slotted openings into the cavity at a point adjacent the periphery of the cavity, the said inner marginal area of at least one grinding stone being provided with a plurality of V-shaped notches, a portion of said notches being adjacent said pumping members to facilitate entry of material between the grinding surfaces.

3. In a grinding mill of the disk type, a pair of mill stones having an axially disposed cavity for receiving the material to be ground, one of said mill stones being mounted for rotation and having a plurality of radially spaced openings extending through the wall thereof and into the cavity, paddle-like pumping members disposed within said openings, said pumping members being substantially radially positioned, circumferentially spaced and extending outwardly to the periphery of the cavity, and means for adjustably securing the pumping members in the open-

ings whereby the said pumping members may be adjusted as the grinding surfaces of the stones are worn.

4. In a grinding mill of the disk type having opposed stationary and rotatable mill stones, the opposed faces thereof comprising grinding surfaces, the center portion of said opposed faces being recessed to provide for the reception of the material to be ground, means comprising notches in the inner marginal edge of each grinding surface for facilitating entry of material between said surfaces, and paddle-like members extending through the rotatable mill stone and into the recess for pumping material, to be ground, into the notches, said paddle members being adjustably secured to said rotatable stone by T-bolts attached to said members and received within said stone.

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