May 19, 1931. W. E. McMURRAY 1,806,077

GRINDING AND MIXING PAN

Filed Oct. 10, 1928

Fig. 1

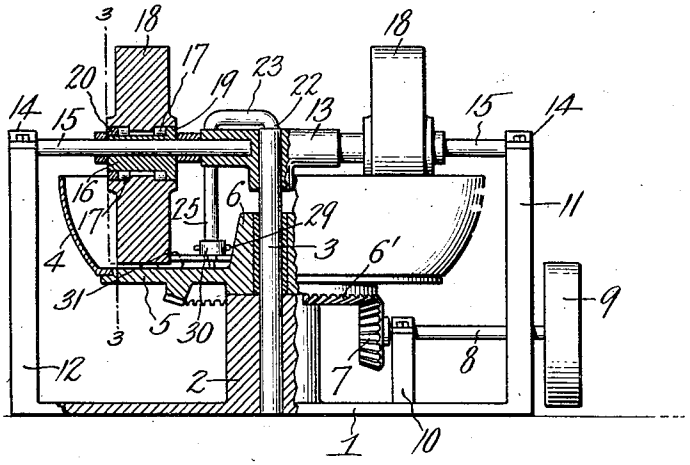


Fig. 3.

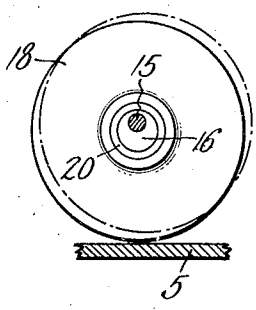


Fig. 2.

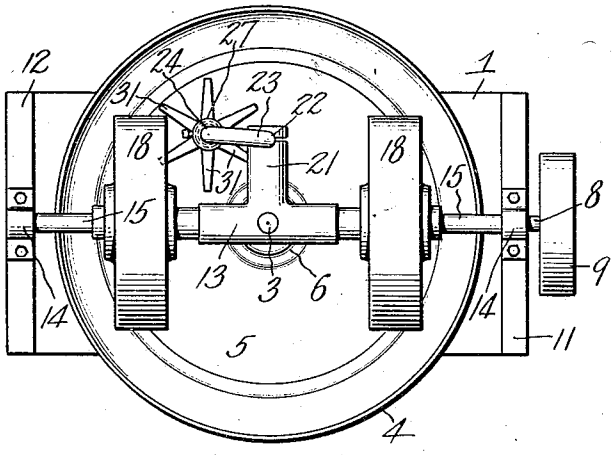
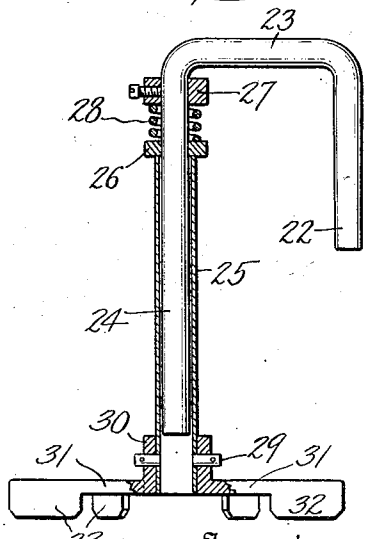


Fig. 4.



WITNESS

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UNITED STATES PATENT OFFICE

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GRINDING AND MIXING PAN

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This invention relates more especially to grinding and mixing machines of the type commonly known as wet pans and has for its primary object to provide an improved construction and arrangement of the parts whereby the operation of a machine of this character may be rendered more effective in breaking up the material and in preventing the material from packing and adhering to the pan.

One of the objects of my invention is to provide means of improved construction for rotatably mounting a muller roll with respect to a grinding or mixing pan between which and said muller roll there is relative rotary movement for the purpose of grinding or mixing the material.

Another object of my invention is to provide a rotary scraper of improved construction and an improved arrangement of said scraper with respect to the pan bottom and muller roll.

In its preferred embodiment my invention contemplates a stationary muller shaft employed as a tie bar between spaced members of a main frame to eliminate the necessity for using the tie rods or cross bracing commonly employed in grinding and mixing machines of this type.

Another purpose, contemplated by the present invention, is the substitution of completely closed bearings for the open guide bearings which are commonly arranged in the end frames. A further purpose is to arrange the muller-roll bearing entirely within the muller-roll and thus to provide a greatly simplified construction which makes it unnecessary to mount the mullers in swinging arms pivotally supported from the sides of the machine. This construction in consequence greatly facilitates the loading and unloading of the pan and at the same time gives free access to the pan from opposite sides for other purposes.

Another object of my invention is to provide an improved mount for a muller-roll which, by means of an eccentric movement of its rotary axis about the axis of the shaft, is adapted to provide a more gradual rise of the muller-roll, under the displacement of material passing thereunder and at the same time to develop a reduced pressure as compared to that developed under a direct vertical lift. This pressure is furthermore eased off by the eccentric movement of the roll for the reason that it yields in the direction in which the material is moving.

A particular object of my invention is to provide an improved rotary scraper mounted on a vertical axis eccentric to the axis of said pan and provided with radial vanes which operate in an improved manner to cut into and break up the material and to convert it to a fluffy condition as it is delivered into the path of the muller-roll.

These and further objects of invention will appear in the appended claims in connection with the accompanying drawings which show a preferred embodiment of my invention.

In the drawings:

Figure 1 is a side elevation and vertical section of a wet pan rotary mill constructed in accordance with the principles of my invention.

Figure 2 is a top plan view of the same.

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

Figure 4 is an enlarged side elevation of the rotary scraper detached, parts being broken away and parts shown in section.

Referring more particularly to the drawings, according to the embodiment of my invention shown therein, a fixed frame which includes a base plate 1 and a centrally disposed pedestal 2, serves to mount a vertical shaft 3. As shown in the drawings, the grinding or mixing pan comprises a rim portion 4 and a central bottom plate 5 provided with a hub portion 6 which is journalled upon the upright shaft 3, said hub portion 6 being rotatably supported at the upper end of the pedestal 2. An annular bevel gear 6′ is driven by a bevel pinion 7 mounted on a drive shaft 8 which carries a belt pulley 9 at its outer end. The drive shaft 8 is journalled at its inner end in a bracket-support 10 and in its outer end in an upright 11, said upright 11 being disposed diametrically opposite to another upright 12 which is arranged on the opposite side of the vertical

shaft 3. Surmounting the vertical shaft 3 is a bracket frame 13 provided with oppositely presented bearing arms which are coaxially aligned with bearings 14 mounted in the uprights 11 and 12. The vertical shaft 3, bracket-support 10, uprights 11 and 12, and bracket-frame 13 together with the base-plate 1 and pedestal 2, constitute the fixed frame of the machine. Mounted within the bearings 13 and 14 are stationary shafts 15 which in effect constitute with the bracket 13 a rigid tie between the end frames 11 and 12. Rotatably mounted on each of the stationary shafts 15 is an eccentric bearing block 16. Journalled upon the eccentric bearing block 16 by means of anti-friction rollers 17 is a muller-roll 18, said muller-roll being provided with an interior bearing surface concentric to the central axis of the bearing block 16. Said bearing block 16 is provided at one end with a peripheral flange 19 which closes one end of the bore in muller-roll 18, the other end of said bore being closed by a bearing ring 20 mounted upon the cylindrical bearing surface of the eccentric bearing block 16. It will be understood from this description that when material to be ground or mixed is loaded into the rotary pan 4 it will be operated upon under a yielding pressure due to the eccentric mounting of the muller-roll 18. Thus by referring to Figure 3, it will be seen that an accumulation of material to the right of the muller-roll 18 will have a tendency to displace said muller-roll toward the right and into broken line position indicated in this figure. This eccentric yielding action of the muller-roll will be operative under less intense pressures than are required for a direct vertical lift of the muller-roll and moreover the yielding tendency will be in a direction away from the oncoming material which is to be ground or mixed.

As shown in Figure 2, the bracket support 13 is provided with a radial arm 21 in which is movably mounted one arm 22 of a scraper frame or support 23, the other arm 24 of said scraper frame being arranged to depend in any desired position to which the frame 23 may be adjusted about the arm 22. A sleeve 25, which is journalled freely upon the depending branch 24 of the scraper frame, is provided above with an abutment collar 26 between which and a fixed abutment 27 is arranged a compression spring 28. The collar 27 may be adjusted axially of the branch 24 of the scraper frame for adjusting the pressure exerted by the spring 28 upon the rotary scraper. Secured to the lower end of sleeve 25 by means of radial pins 29 is a cylindrical head 30 provided with radial arms 31 which carry at their outer ends downwardly presented scraper blades 32 which are adapted to bear against the bottom plate 5 of the rotary pan. By an inspection of Figure 2, it will be seen that the rotary scraper is journalled upon a vertical axis which is eccentric to the rotary pan and adjustable relatively to the muller-roll about another axis which is also eccentric to the rotary pan axis.

I claim:—

1. In a rotary mill of the character described, the combination with a rotary pan, of a roll-supporting shaft, a bearing block movable eccentrically about the axis of said shaft, and a roll journalled on said bearing block and rotatable about an axis eccentric to the axis of said roll-supporting shaft.

2. In a rotary mill of the character described, the combination with a rotary pan, of a fixed radial shaft, a bearing block movable around said shaft and provided with a cylindrical bearing surface eccentric to the axis of said shaft, and a roll journalled on said bearing surface being movable about an axis eccentric to the rotary axis of said roll.

3. In a rotary mill of the character described, the combination of a fixed vertical shaft, a fixed horizontal shaft extending away from said fixed vertical shaft, a rotary mixing and grinding pan coaxial with said vertical shaft, a muller-roll operating in said mixing and grinding pan, and a bearing block eccentrically mounted on said horizontal shaft and rotatably mounting said muller-roll on an axis eccentric to the axis of said horizontal shaft.

4. In a rotary mill of the character described, the combination with a rotary mixing and grinding pan, of a rigidly mounted shaft extending radially of said rotary mixing and grinding pan, a muller-roll operating in said mixing and grinding pan on an axis eccentric to the axis of said rigidly-mounted shaft, and a bearing block movable eccentrically about the axis of said rigidly-mounted shaft and having said roll freely journalled thereon.

5. In a rotary mill, the combination of a grinding pan, a muller-roll operating therein, a radial arm movable about an axis and provided with a depending branch, and a rotary scraper head journalled upon said depending branch of the radial arm and provided with downwardly-presented scraper blades.

6. In a rotary mill, the combination of a rotary pan, a muller-roll operating therein, a fixed support, a radial arm movable about an axis eccentric to the rotary axis of said pan, said radial arm being provided with an inner branch pivotally mounted in said fixed support and a depending outer branch, a rotary sleeve journalled upon said depending outer branch, and a scraper head secured to the lower end of said rotary sleeve and comprising radial arms provided at their outer ends with downwardly-presented scraper blades.

7. In a rotary mill, the combination of a

rotary pan, a muller-roll operating therein, a fixed support, a radial arm movable about an axis eccentric to the rotary axis of said pan, said radial arm being provided with an inner branch pivotally mounted in said fixed support and a depending outer branch, a rotary sleeve journalled upon said depending outer branch, a scraper head secured to the lower end of said rotary sleeve and comprising radial scraper arms, a fixed collar mounted on the depending outer branch of said radial arm above said sleeve, and a compression spring interposed between said fixed collar and the upper end of said sleeve.

8. In a rotary mill, the combination of a rotary pan, a muller-roll operating therein, a fixed support, a radial arm movable about an axis eccentric to the rotary axis of said pan, said radial arm being provided with an inner branch pivotally mounted in said fixed support and a depending outer branch, a rotary sleeve journalled upon said depending outer branch, a scraper head secured to the lower end of said rotary sleeve and comprising radial arms provided at their outer ends with downwardly-presented scraper blades, an adjustable fixed collar on the depending outer branch of said radial arm, and a compression spring interposed between said fixed collar and the upper end of said sleeve.

9. In a rotary mill of the character described, the combination with a centrally disposed pedestal, of a rotary pan rotatably supported by said pedestal, an upright arranged outside of the periphery of said rotary pan, a horizontal shaft supported at its inner end by said pedestal and at its outer end by said upright, an eccentrically mounted bearing block movable freely about the axis of said horizontal shaft, and a roll journalled on said bearing block.

10. In a rotary mill of the character described, the combination of a centrally disposed pedestal, spaced uprights on opposite sides of said pedestal, a rotary pan rotatably mounted on said pedestal, horizontal shafts mounted at their inner ends on said pedestal and at their outer ends on said spaced uprights respectively, eccentrically mounted bearing blocks movable freely around said horizontal shafts, and rolls journalled on said bearing blocks.

11. In a rotary mill of the character described, the combination of a centrally disposed pedestal, spaced uprights on opposite sides of said pedestal, an upwardly-presented shaft mounted in said pedestal, a rotary pan journalled on said shaft and rotatably supported by said pedestal, a top bracket, a bearing surmounting said shaft, fixed horizontal shafts mounted at their inner ends in said top bracket and at their outer ends in said spaced uprights respectively, bearing blocks revolvable eccentrically on said horizontal shafts, said bearing blocks being provided with bearing surfaces eccentric to said shafts, and rolls journalled on said bearing surfaces.

12. In a rotary mill of the character described, the combination with a main frame comprising a bed plate, a centrally disposed pedestal mounted on said bed plate, spaced uprights on opposite sides of said pedestal, an upwardly-presented shaft mounted in said pedestal, a bearing bracket surmounting said shaft, coaxial horizontal shafts mounted at their inner ends in said bearing bracket and at their outer ends in said spaced uprights respectively, of a rotary pan journalled on said shaft and rotatably supported by said pedestal, a power shaft journalled in one of said spaced uprights and geared to said rotary pan, eccentrically mounted bearing blocks movable freely about the common axis of said horizontal shafts, and rolls journalled on said bearing blocks.

13. In a rotary mill, a rotary pan, a roll operating in said rotary pan, said roll being journalled on an axis movable about and in parallelism with a second axis and a rotary scraper journalled upon a vertical axis and provided with radially-presented scraper blades for propelling materials into the path of said roll.

14. In a rotary mill, a rotary pan, a roll operating in said rotary pan, a central support upon which said pan is rotatably mounted, a fixed radial shaft mounted on said central support for journalling said roll, and a rotary scraper journalled upon a vertical axis and movably mounted on said central support.

15. In a rotary mill, a pedestal provided with a fixed upwardly-presented shaft, a rotary pan journalled on said shaft and supported by said pedestal, a roll operating in said rotary pan, a rotary scraper journalled upon a vertical axis, and a journalling support for said rotary scraper adjustable about an axis eccentric to the axis of said upwardly-presented shaft.

16. In a grinding mill, the combination with a grinding pan, of a roll operating in said grinding pan, and a bearing block upon which said roll is concentrically journalled, said bearing block being oscillatably suspended from an axis eccentric to the journalling axis of said bearing block, said axis being arranged in the same vertical plane in the lowermost position of said roll.

17. In a grinding mill, the combination with a grinding pan, of a roll operating in said grinding pan, a horizontal supporting shaft arranged above and extending radially of said grinding pan, and a bearing block upon which said roll is concentrically journalled, said bearing block being oscillatably suspended from said horizontal supporting shaft.

18. In a grinding mill, the combination

with a fixed frame, of a grinding pan mounted on a vertical axis by said fixed frame, a roll operating in said grinding pan, a scraper-support mounted on said fixed frame and having an arm depending into said grinding pan, a sleeve journalled upon said depending arm, and a plurality of radial scraper blades mounted on the lower end of said sleeve and in operating engagement with the bottom of said grinding pan.

19. In a grinding mill, the combination with a grinding pan and a roll operating therein, of a scraper-supporting arm depending into said grinding pan, said scraper-supporting arm being arranged on an axis eccentric to the axis of said grinding pan, a sleeve journalled upon said scraper-support, a fixed collar mounted on said scraper-supporting arm above the upper end of said sleeve, a compression spring interposed between said collar and said sleeve, and a scraper blade mounted radially on the lower end of said sleeve and presented downwardly against the bottom wall of said grinding pan and adapted by frictional engagement therewith to be revolved with and about the axis of said sleeve.

20. In a rotary grinding mill, the combination of a grinding and mixing pan rotatable on a fixed vertical axis, fixed uprights oppositely arranged with respect to said fixed vertical axis, a rigid connection between said uprights, and a muller roll rotatably supported by said rigid connection on an axis movable eccentrically with respect to the axis of said rigid connection.

21. In a rotary grinding mill, the combination of a rigid frame provided with oppositely arranged uprights, a fixed vertical shaft mounted in said rigid frame between said uprights, a grinding and mixing pan journaled upon said vertical shaft, means rigidly connecting said fixed vertical shaft and oppositely arranged uprights, and a muller roll arranged between said fixed vertical shaft and each of said uprights, said muller roll being provided with a journalling support carried by said rigid connecting means, said journalling support being movable eccentrically on said rigid connection means with respect to the rotary axis of said muller roll.

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