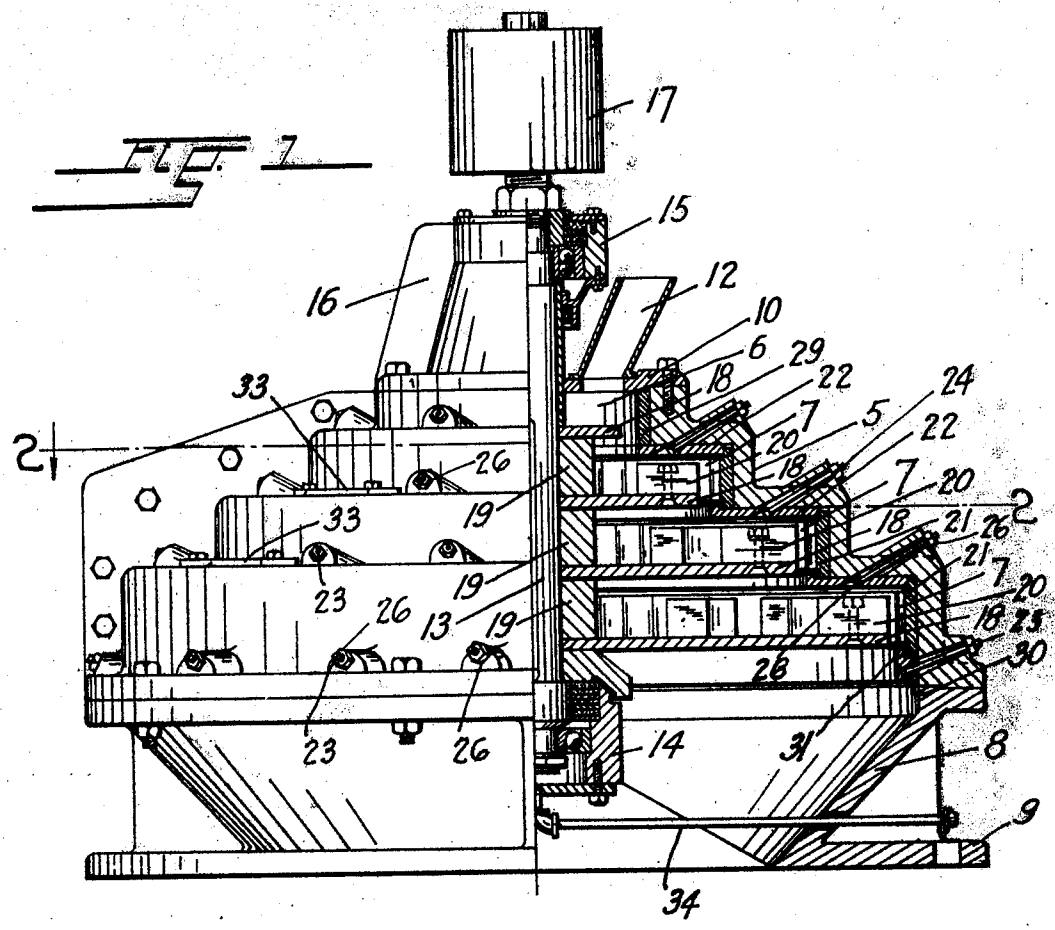
Sept. 19, 1933. J. D. CANARY 1,927,277

GRINDING MILL

Filed Dec. 15, 1930 2 Sheets-Sheet 1

FIG. 1



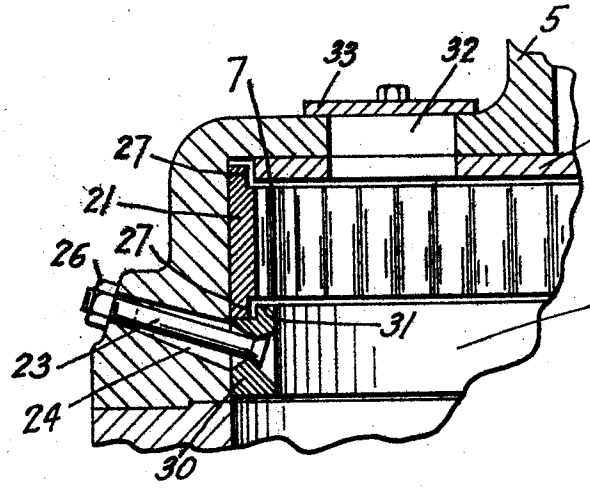


FIG. 3.

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Filed Dec. 15, 1930 2 Sheets-Sheet 2

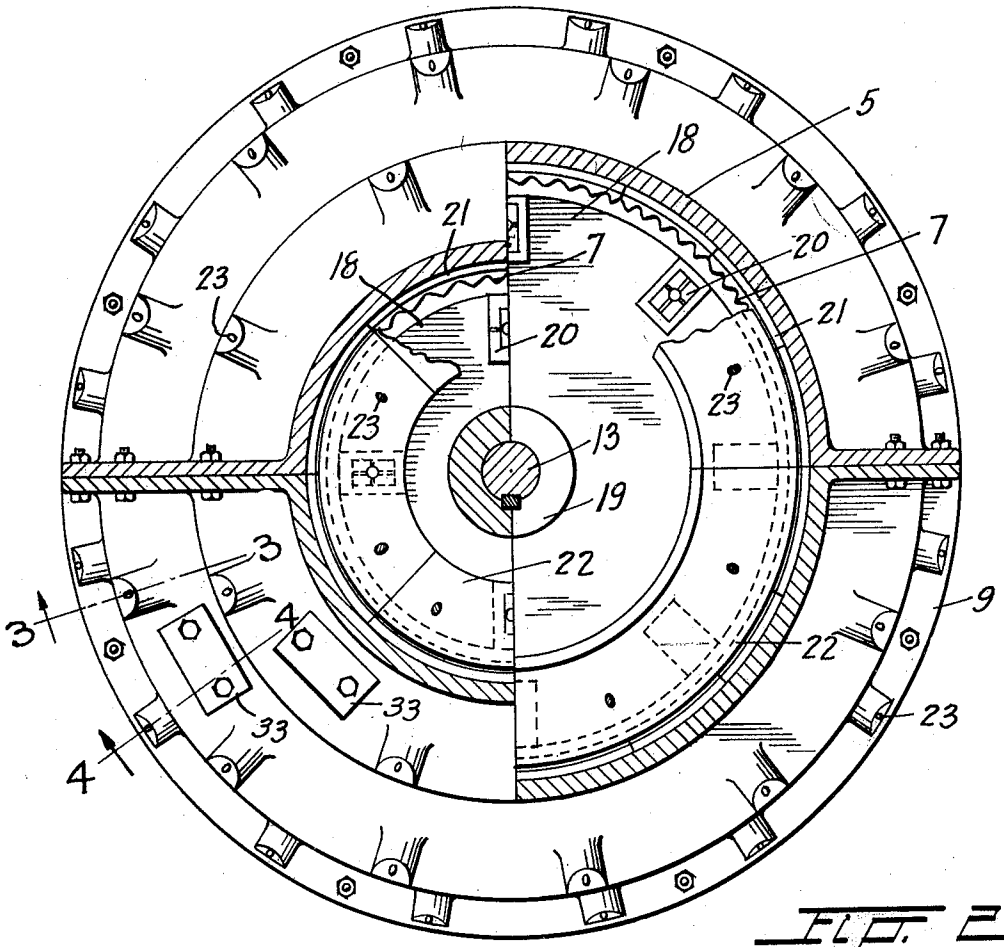


FIG. 2

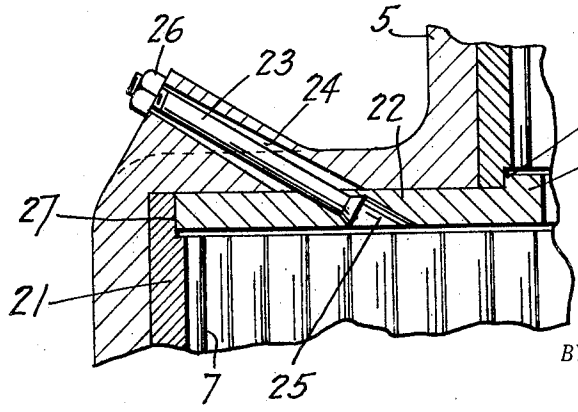


FIG. 4

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UNITED STATES PATENT OFFICE

1,927,277

GRINDING MILL

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Application December 15, 1930
Serial No. 502,497

16 Claims. (Cl. 83—11)

This invention relates to grinding mills of the type in which a rotary element is employed to throw material fed thereonto, outwardly by centrifugal force, against a relatively stationary impact wall. The mill is usually composed of a plurality of pulverizing units each including a member of the rotary element in the form of a disk carrying peripheral hammers, a concentric impact ring spaced from the disk, and a horizontal lining above the same, and it is the principal object of the present invention to provide means whereby the impact ring and the lining are held in place in relation to each other and to the housing of the mill by bolts connected with the lining only.

By these means a single adjustment secures both the lining and the impact-plate and draws them in place in case of wear. By the use of this feature of construction the impact-rings can be made in solid sections, unweakened by bolt-holes. The sections may be reversed in case of wear, and they may be individually replaced in case of breakage. All the sections are readily interchangeable, since no bolt holes have to be fitted as in other mills used heretofore.

In the accompanying drawings in the several views of which like parts are similarly designated,

Figure 1 is a composite view of a mill embodying the improvements of the present invention, partially in elevation and partially in section,

Figure 2 is a section taken on the line 2—2, Figure 1, and

Figures 3 and 4 are enlarged fragmentary sections along the lines 3—3 and 4—4, respectively.

The mill is composed of a housing 5 of stepped form, providing a feed-chamber 6 and a plurality of pulverizing chambers 7. The housing may be made in sections bolted together as shown in Figure 2. Beneath the housing is a discharge hopper 8 provided with a flange 9 for the support of the mill upon a suitable foundation. The housing is closed at its upper end by a cover 10 having a spout 12 to feed the material to be treated into the feed-chamber 6. The rotary element of the mill comprises a vertical shaft 13 supported in a step-bearing 14 in the center of the discharge hopper and in a bearing 15 of a super-structure 16 fastened upon the cover.

A pulley 17 at the upper end of the shaft connects with a motor or other source of energy. Mounted on the shaft are a plurality of disks 18 of progressively increasing diameters spaced from each other by collars 19 and extending in the feed chamber and the several pulverizing chambers of the mill. The chambers below the feed chamber and their respective disks constitute the grinding units of the mill. The disks and the collars are keyed on the shaft, and the disks of the grinding units carry at their peripheries, series of hammers 20 which in the operation of the mill throw the material moved outwardly by centrifugal force, violently against the walls of the respective chambers, opposed to the circumferences of the disks. These walls of the chambers are each lined with a breaker or impact ring 21 and the horizontal ceiling-surfaces of the chambers above their impact walls are covered by wear-plates 22.

The wear-plates 22 and the impact-rings 21 are preferably made in sections and they are held in place by bolts 23 slantingly disposed with relation to the wear-plates and projecting through holes 24 in the wall of the housing. The bolts have beveled heads in countersinks of holes 25 in the wear plates registering with the holes of the housing and the holes are enlarged and taper in opposite directions from their adjoining ends in order to permit of lateral movement of the bolts when the wear plates are drawn in place by nuts 26 screwed upon the protruding ends of the bolts.

The horizontal wear plates held in place by the bolts, lock the respective impact or breaker-rings in position against the vertical walls of the grinding chambers. The breaker rings are, with this object in view, rabbeted at their upper and lower edges as shown at 27 and the wear rings project beyond the ceiling-surfaces of the chambers and have upstanding lips 28 at their projecting ends. The wear rings extend at their edges outermost with reference to the axis of the mill, into the rabbets of the breaker-rings in the respective grinding chambers, and the lips at the inner edges of the wear-plates abut in the rabbets at the lower edges of the breaker rings in the grinding chambers immediately above the same. A vertical wear ring 29 in the pulverizing chamber rests upon the projecting end of the wear-plate of the grinding chamber immediately below the same, and a retaining ring 30 below the lowermost grinding chamber of the mill has a lip 31 in the lower rabbet of the impact ring of the same, and is fastened in place by slanting bolts similar to those hereinbefore described.

It will thus be seen that the bolts 23 hold all the wear plates and all the breaker-rings of the several pulverizing units, rigidly in place, and that wear on any of the parts is readily taken up from outside the housing by screwing the nuts upon the respective bolts, to refusal. The impact-

rings which at their inner surfaces are toothed or corrugated are interchangeable and they may be reversed in case of wear. Owing to the absence of bolt holes, the impact rings are strong and durable.

Hand-holes 32, normally closed by covers 33, are provided to give access to the grinding chambers.

In the operation of the mill, material fed into the feed-chamber through the spout 12, is evenly and uniformly distributed upon the disk of the upper pulverizing unit, by the rotary motion of the feed disk. The rotary movement of the disks of the grinding units moves the material outwardly by centrifugal force, into the path of the respective hammers which throw the material violently against the toothed breaker-rings. The impact of the material with the teeth of the breaker-rings causes it to rebound against the hammers, and the material is in this manner batted back and forth until it is reduced to a size that permits of its passing downwardly into the next grinding chamber. The material is thus gradually reduced to the desired fineness and it is discharged from the mill through the hopper 8.

A pipe 34 is provided to supply a lubricant to the step bearing.

What I claim and desire to secure by Letters Patent is:

1. In a pulverizing mill, a housing providing a grinding chamber which has an impact-surface and a ceiling-surface at the inside of its wall, a breaker-plate on the impact-surface, a wear-plate for the ceiling-surface above said breaker-plate abutting laterally against the breaker-plate, and a slanting bolt connecting the wear-plate with the wall of the housing and capable of adjustment to draw the wear-plate and the breaker-plate simultaneously against the respective surfaces of the wall.

2. In a pulverizing mill, a housing providing a grinding chamber which has an impact-surface and a ceiling-surface at the inside of its wall, a breaker-plate on the impact-surface, a wear-plate for the ceiling-surface abutting laterally against the breaker-plate, the wear-plate and the wall having registering bolt-holes tapering from their adjacent ends on an upwardly and outwardly slanting line, and bolts in the holes, adapted to adjust the wear-plate in a combined upward and outward movement, whereby to draw the wear-plate and the breaker-plate against the respective surfaces of the wall.

3. In a pulverizing mill, a housing providing a grinding chamber which has an impact-surface and a ceiling-surface at the inside of its wall, a breaker-plate on the impact-surface, a wear-plate for the ceiling-surface abouting laterally against the breaker-plate, the wear-plate and the wall having registering bolt-holes tapering from their adjacent ends on an upwardly and outwardly slanting line, a bolt in each hole, carrying the wear-plate, and a nut on the bolt, bearing upon the wall to draw the wear-plate and the breaker-plate against the respective surfaces of the wall.

4. In a pulverizing mill, a housing providing a grinding chamber which has an impact-surface and a ceiling-surface at the inside of its wall, a rabbeted breaker-plate movable on the impact-surface, and a movable wear-plate for the ceiling surface adjustably fastened to the wall of the housing and abutting laterally in the rabbet of the breaker-plate to hold the same in place.

5. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling-surface at the inside of the wall of the housing, breaker-plates on the impact-surfaces of adjoining chambers, and a wear-plate on the ceiling of the lower chamber and between said breaker-plates, fastened to the wall of the housing and abutting upon both of said breaker-plates in a lateral direction to press them in place against the respective surfaces of the wall.

6. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling-surface at the inside of the wall of the housing, breaker-plates on the impact-surfaces of adjoining chambers, and a wear-plate on the ceiling of the lower chamber and between said breaker-plates, adjustably fastened to the wall of the housing and abutting upon both of said breaker-plates in a lateral direction to press them in place against the respective surfaces of the wall.

7. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling-surface at the inside of the wall of the housing, breaker-plates on the impact-surfaces of adjoining chambers, a wear-plate on the ceiling of the lower chamber, fastened to the wall of the housing, and abutting against the upper edge of one of the said breaker-plates and having a lip engaging the other breaker-plate whereby to hold both breaker-plates in place against the respective surfaces of the wall, and means engaging the wear-plate and the wall of the chamber and acting upwardly and outwardly of the chamber to hold the plates in position.

8. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling surface at the inside of the wall of the housing, rabbeted breaker-plates on the impact-surfaces of adjoining chambers, a wear-plate on the ceiling of the lower chamber, fastened to the wall of the housing, abutting in a rabbet of one of said breaker-plates and having a lip in a rabbet of the other breaker-plate to hold both breaker-plates in place against the respective surfaces of the wall, and means engaging the wear-plate and the wall of the chamber and acting upwardly and outwardly of the chamber to hold the plates in position.

9. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling-surface, at the inside of the wall of the housing, breaker-plates on the impact-surfaces of the grinding-chambers, wear-plates for the ceiling-surfaces, fastened to the wall of the housing and engaging the breaker-plates to hold them in place against the respective impact surfaces, and an adjustable retaining-member beneath the lowermost grinding chamber, fastened to the wall of the housing having a lip in engagement with the breaker-plate of said chamber, to hold it in place against the respective impact-surface.

10. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling-surface, at the inside of the wall of the housing, breaker-plates on the impact-surfaces of the grinding-chambers, wear-plates for the ceiling-surfaces, fastened to the wall of the housing and engaging the breaker-plates to hold them in place against the respective impact-surfaces, and an adjustable retaining-member beneath the lower-

most grinding chamber, adjustably fastened to the wall of the housing, in engagement with the breaker-plate of said chamber, to hold it in place against the respective impact-surface.

11. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling-surface, at the inside of the wall of the housing, breaker-plates on the impact-surfaces of the grinding-chambers, wear-plates for the ceiling-surfaces, fastened to the wall of the housing and engaging the breaker-plates to hold them in place against the respective impact-surfaces, a retaining-member beneath the lowermost grinding chamber, in engagement with the breaker-plate of said chamber to hold it in place against the respective impact-surface, and a bolt fastening the retaining-member to the wall of the housing and capable of adjustment to draw the member into place.

12. In a pulverizing mill, a grinding chamber, a sectional wear plate and a breaker ring in the chamber relatively arranged to cause lateral adjustment of the wear plate to be transferred to the breaker ring, and means to effect lateral adjustment of the wear-plate.

13. In a pulverizing mill, a grinding chamber, a sectional wear plate and a sectional breaker ring in the chamber relatively arranged to cause lateral adjustment of the wear plate to be transferred to the breaker ring, and means to effect a combined upward and lateral adjustment of the wear ring.

14. In a pulverizing mill, a grinding chamber, a sectional wear plate and a breaker ring in the chamber relatively arranged to cause lateral adjustment of the wear plate to be transferred to the breaker ring, and an upwardly and outwardly slanting bolt on a wall of the grinding chamber, connecting with the wear plate for its combined upward and lateral adjustment.

15. In a pulverizing mill, a grinding chamber, a wear plate and upper and lower breaker rings in the chamber, relatively arranged to cause lateral adjustment of the wear plate to be transferred to both breaker rings, and means to effect lateral adjustment of the wear plate.

16. In a pulverizing mill, a housing providing a plurality of vertically successive grinding chambers, each having an impact-surface and a ceiling-surface at the inside of the wall of the housing, laterally movable breaker-plates on the impact-surfaces of adjoining chambers, a laterally movable wear-plate on the ceiling of the lower chamber, fastened to the wall of the housing, and abutting against the upper edge of one of said breaker-plates and having a lip engaging the other breaker-plate whereby to hold both breaker-plates in place against the respective surfaces of the wall, and adjustable fastening means engaging the wear-plate and the wall of the chamber, and acting upwardly and outwardly of the chamber to simultaneously adjust the plates.

JAMES D. CANARY.