T. J. STURTEVANT.

ROTARY BEATER MILL.

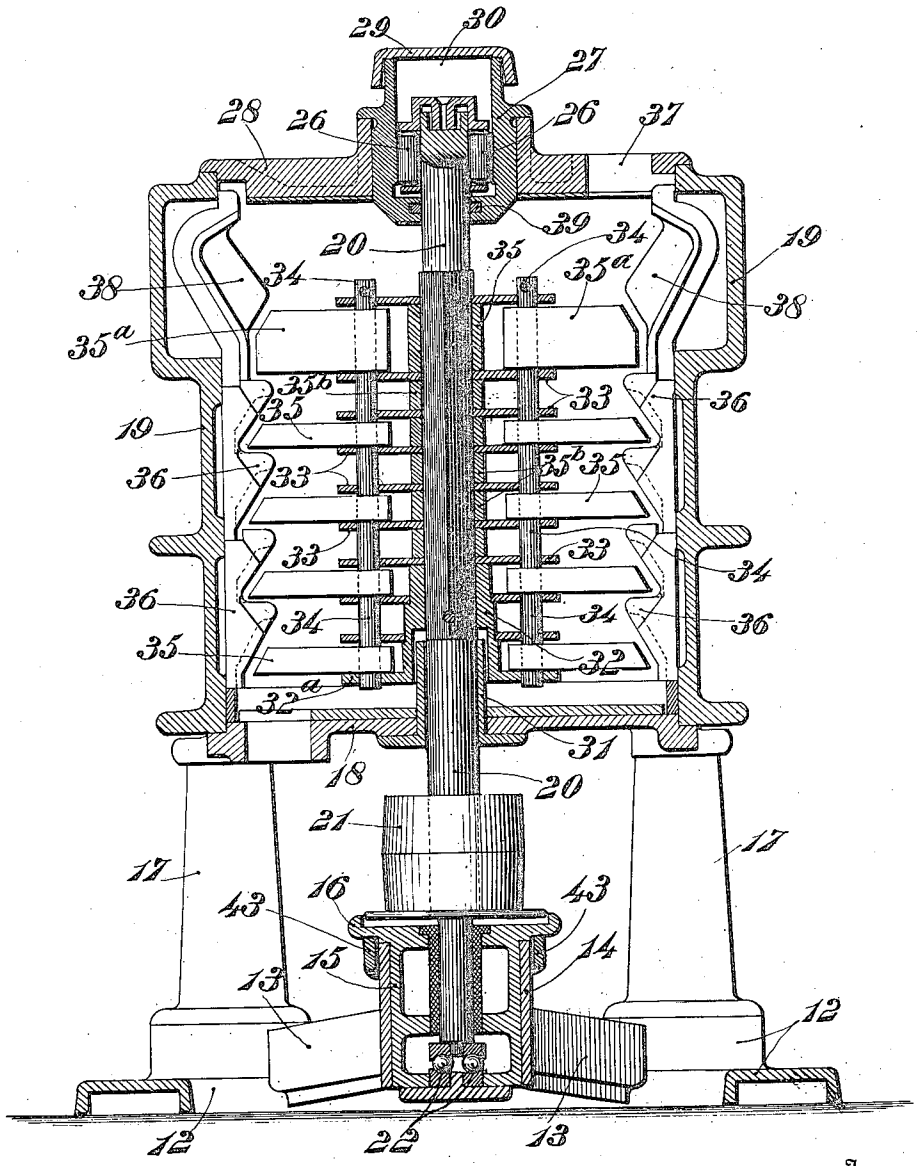
APPLICATION FILED JULY 27, 1916.

1,212,418.

Patented Jan. 16, 1917.

2 SHEETS—SHEET 1.

Fig 1.



Witness:

Harry King

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Thomas J. Sturtevant,

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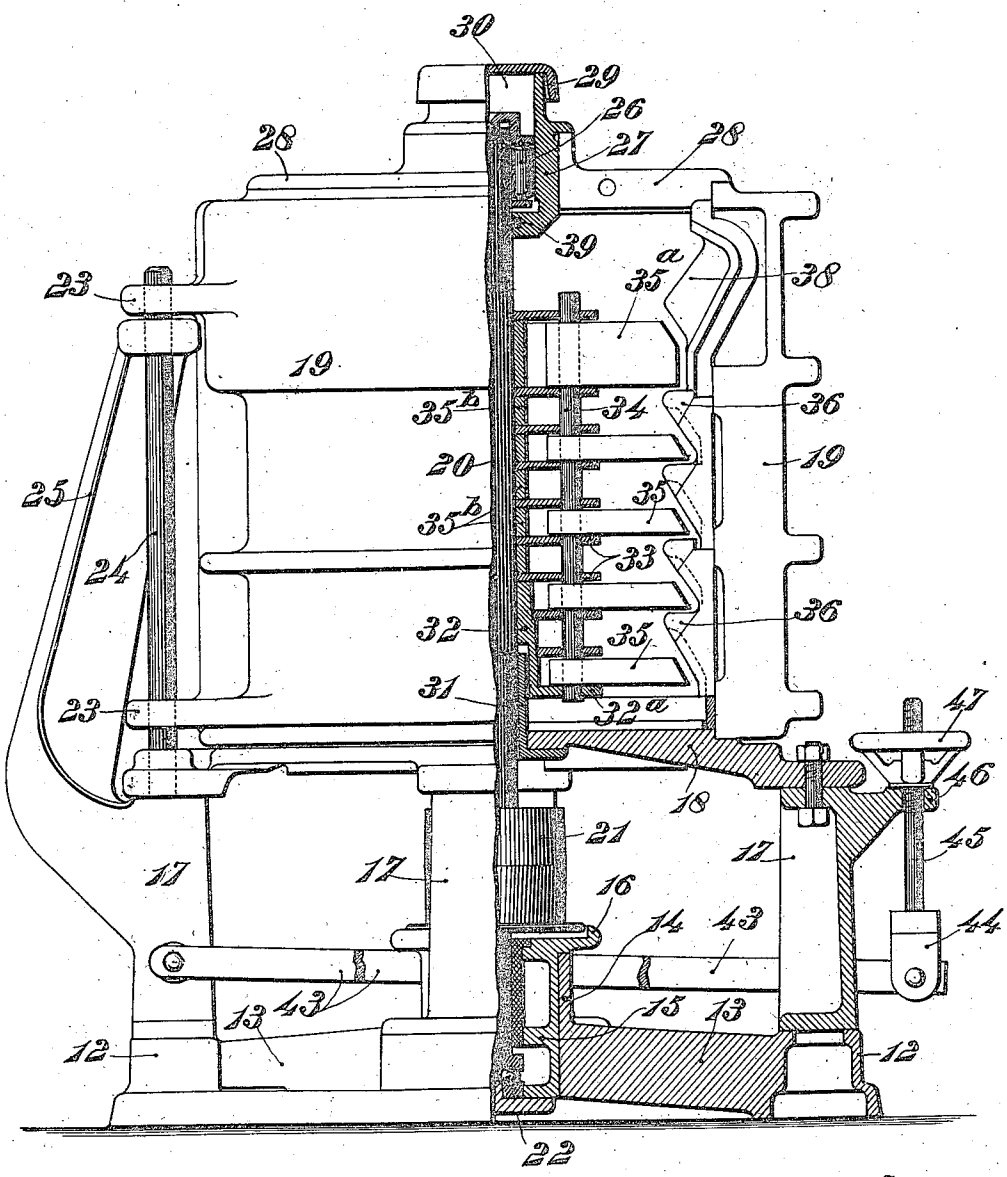
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS JOSEPH STURTEVANT, OF WELLESLEY, MASSACHUSETTS, ASSIGNOR TO STURTEVANT MILL COMPANY, A CORPORATION OF MAINE.

ROTARY-BEATER MILL.

1,212,418. Specification of Letters Patent. Patented Jan. 16, 1917.

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To all whom it may concern:

Be it known that I, THOMAS J. STURTEVANT, a citizen of the United States, residing at Wellesley, in the county of Norfolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Rotary-Beater Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of crushing and pulverizing mills employing hinged or pivoted rotary beaters, and the invention has for its object to provide a vertical mill of this type which will be simple in construction and efficient in operation.

In the accompanying drawing Figure 1 is a vertical section of a rotary beater mill embodying the present invention, and Fig. 2 is a view of the same, taken at right angles to Fig. 1, partly in elevation and partly in vertical section.

Referring to the drawings, 12 denotes the base of the mill which supports a spider 13 having a central hub 14 in which fits a bearing sleeve 15 having a flanged top 16.

Rising from the base 12 are standards 17 which support a table 18 on which the mill casing parts 19 rest. The vertical mill shaft 20, provided with a driving pulley 21, is stepped in the bearing sleeve 15, the weight of said shaft being sustained by a ball-bearing 22 in said bearing sleeve which is adapted to contain lubricating oil.

The casing parts 19 are provided with ears 23 by which they are hinged to a vertical rod 24 partly supported by a bracket 25 so that said casing parts, when unbolted, may be swung aside horizontally like doors, thus affording convenient access to the mill chamber.

The vertical mill shaft 20 is journaled at its upper end in a roller bearing 26 housed in a sleeve 27 supported by the top-plate 28 of the mill, said sleeve being preferably provided with a cover 29 affording access to the lubricant-containing chamber 30 in said sleeve above said roller bearing. The sleeve 27 is provided, below said roller bearing, with a recess receiving a packing washer 39 which serves to retain the oil by which said roller bearing is lubricated, and also serves to exclude dust or grit from said bearing.

Fixed to the table 18 is a sleeve 31 the upper end of which is received in a recess at the lower end of a sleeve 32 pinned to the mill shaft 20. The overlapping parts of the sleeves 31 and 32 afford a dust-lock at the lower part of the mill chamber, to keep dust and grit away from the vertical mill shaft 20.

The sleeve 32 has an integral flange 32^a through which and a series of spaced disks 33 pass the hinge pins 34 of the hinged or pivoted rotary beaters 35 and 35^a. Most of the disks 33 are spaced apart by rings or bushings 35^b, these parts being supported by the sleeve 32 fixed to the shaft 20. The said shaft 20 is preferably square in cross-section, so that said disks and rings or bushings on said shaft will rotate therewith without being fixedly secured thereto.

Owing to the fact that the sleeve 32 is pinned to the shaft 20, and is thus held against longitudinal displacement, it serves as a vertical support for the disks 33, and the spacing rings or bushings 35^b mounted, as are also most of said disks, on the square or polygonal portion of said shaft, so that these parts thus connected with said shaft afford a rigid structure or support for the hinge-pins 34 on which the rotary beaters 35 are pivoted, and which hinge-pins pass through the said disks and the flange 32^a on the said sleeve.

The outer ends of the hinged or pivoted rotary beaters 35 are preferably inclined, as shown, said beaters coöperating with stationary crushing elements preferably consisting of corrugated liners or blocks 36 attached to the inside of the casing parts 19 and preferably formed in steps affording inclined faces, opposite the inclined ends of said beaters, and horizontal shelves above which said beaters work. Owing to this construction the crushing spaces between the inclined outer ends of the rotary beaters and the inclined faces of the corrugated liners may be varied, for the purpose of taking up wear, or for varying the fineness of the output of the mill, by adjusting the said shaft 20 vertically by means hereinafter de-

scribed. The horizontal shelves referred to serve to check the downward movement of the material, and thereby add to the efficiency of the mill in its crushing operation.

In this preferred construction of the vertical form of mill the hinged beaters 35^a in the upper part of the mill chamber, and which first act on the material entering the mill chamber through the feed opening 37 in the top plate 28, are of relative massive form, or in other words, are made much heavier than the hinged beaters 35 in the lower part of the mill casing. Thus these heavy hinged beaters 35^a, cooperating with the corrugated liners or breaking plates 38, will serve as crushing beaters to break up the larger pieces of material in the upper part of the mill chamber, which is made high enough to receive as large blocks of material to be reduced as the heavy beaters are capable of crushing properly, while the lighter hinged beaters 35, disposed in the lower part of the mill chamber and coöperating with the corrugated liners 36, serve as pulverizing beaters to reduce the material, which has been crushed by the heavy beater elements, to the desired degree of fineness. By feeding the material to be reduced into the cylindrical mill chamber through the opening 37 at one side of the top thereof the entering material will be directly presented to the action of the heavy beaters between the outer ends of which and the corrugated breaking plates or liners the first crushing reduction of the material is effected.

The flange 16 of the bearing sleeve 15 rests on adjusting bars 43 pivoted to one of the standards 17 and jointed at their free ends to a head 44 at the lower end of a rod 45 extending through a bearing lug 46 on the machine frame, said rod being threaded at its upper end for the reception of a hand wheel 47 which may be turned to raise and lower the adjusting bars 43 and thereby adjust the shaft 20 vertically, for the purpose hereinbefore indicated.

From the foregoing it will be understood that the invention provides an efficient vertical rotary beater mill in which coarse blocks of the material to be reduced will first be crushed and properly broken up by the heavy hinged beaters 37, the crushed material will then pass downward to be reduced to the desired degree of fineness by the pulverizing beaters 35 in the lower part of the mill casing; and the reduced material will finally be discharged from the mill casing through the opening 48 at or near the bottom of the mill chamber.

Having thus described my invention I claim and desire to secure by Letters Patent:

1. In a rotary beater mill, the combination with a vertical mill casing having a feed opening at its upper part and provided with stationary crushing elements, of a vertical shaft in said casing, relatively massive or heavy pivoted beaters carried by said shaft in the upper part of said casing, and relatively light pivoted rotary beaters carried by said shaft below said heavy beaters.

2. In a rotary beater mill, the combination with a vertical mill casing having a feed opening at its upper part and provided with stationary crushing elements, of a vertical shaft in said casing, relatively massive or heavy pivoted beaters carried by said shaft in the upper part of said casing, and relatively light pivoted rotary beaters carried by said shaft below said heavy beaters, the upper part of the said mill casing affording a high chamber above said massive or heavy beaters so as to accommodate relatively large pieces of material to be crushed.

3. In a rotary beater mill, the combination with a vertical mill casing provided with stationary crushing elements, of a vertical shaft in said casing, relatively massive or heavy pivoted rotary beaters carried by said shaft in the upper part of said casing, and relatively light pivoted rotary beaters carried by said shaft below the said heavy beaters, the outer working ends or faces of said relatively light beaters being inclined relative to the axis of said shaft, and the inner faces of the said stationary crushing elements being also inclined to correspond to the working ends or faces of said beaters, and means for adjusting said shaft vertically to vary the distance between said beaters and stationary crushing elements.

4. In a rotary beater mill, the combination with a vertical mill casing provided with stationary crushing elements, of a vertical shaft in said casing, relatively massive or heavy rotary beaters carried by said shaft in the upper part of said casing, and relatively light pivoted rotary beaters carried by said shaft below the said heavy beaters, the outer working ends or faces of said relatively light beaters being inclined relative to the axis of said shaft, and the inner faces of the said stationary crushing elements being also inclined to correspond to the working ends or faces of said beaters, said stationary crushing elements forming a series of steps affording horizontal shelves, and means for adjusting said shaft vertically to vary the distance between said beaters and stationary crushing elements.

5. In a rotary beater mill, the combination with a vertical mill casing provided with stationary crushing elements, of a vertical shaft in said casing, relatively massive or heavy pivoted rotary beaters carried by said shaft in the upper part of said casing, and relatively light pivoted rotary beaters carried by said shaft below the said heavy beaters, said casing being provided at its top at one side with a feed hopper so as to

enter the material between the outer ends of said heavy beaters and said stationary crushing elements.

6. In a vertical rotary beater mill, the combination with a mill casing and means for supporting the same, of a vertical shaft, a sleeve fixed to said shaft against longitudinal displacement and provided with a flange, spaced disks on said shaft above and supported vertically by said sleeve, independent spacing bushings encircling said shaft and also supported vertically by said sleeve, hinge-pins mounted in said flange and disks, and beaters pivoted on said hinge-pins and rotating with said shaft.

In testimony whereof I affix my signature.

THOMAS JOSEPH STURTEVANT.