T. J. STURTEVANT.

CRUSHING MILL.

APPLICATION FILED DEC. 27, 1910.

988,403. Patented Apr. 4, 1911.

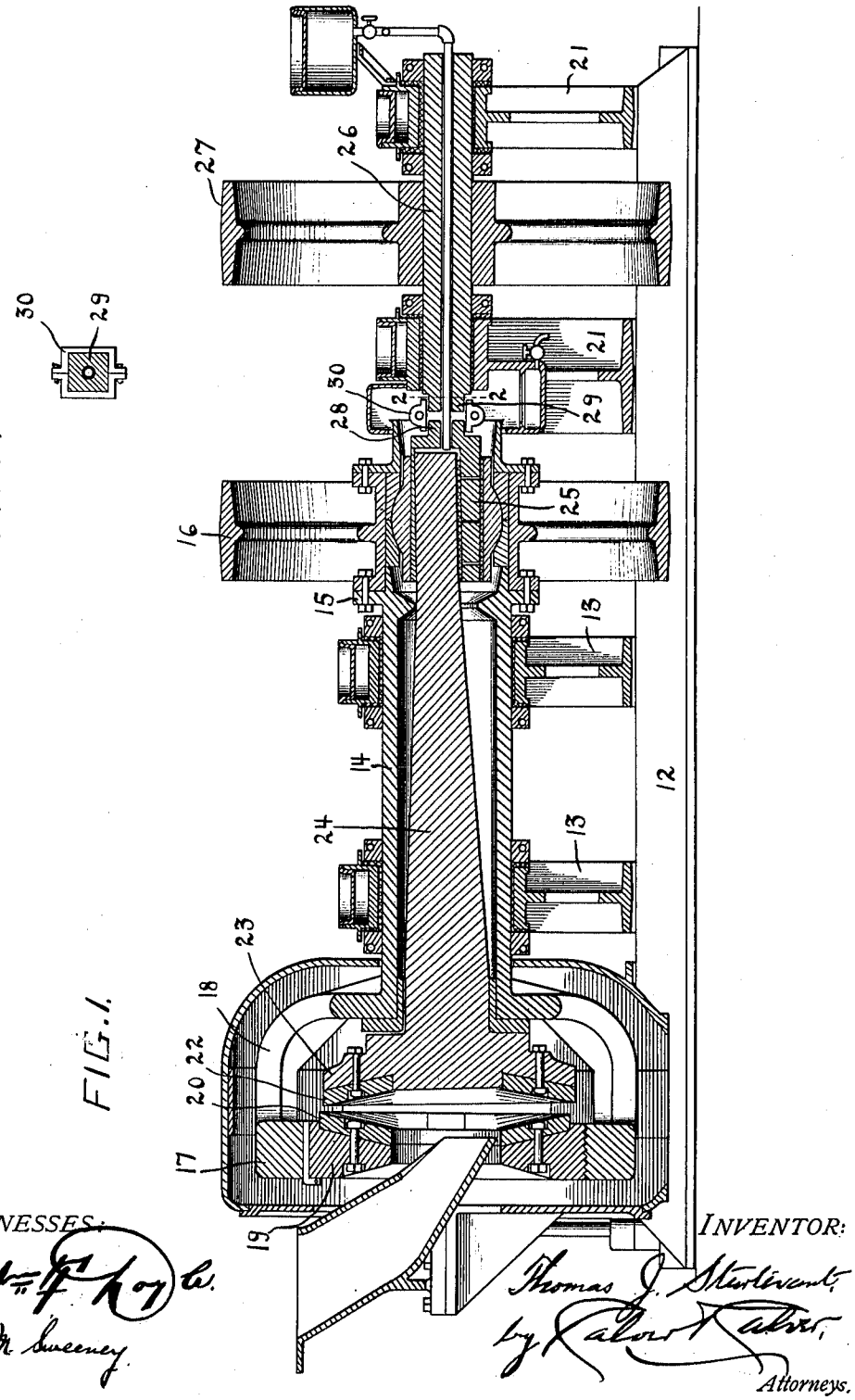

FIG. 2.

FIG. 1.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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CRUSHING-MILL.

988,403. Specification of Letters Patent. Patented Apr. 4, 1911.

Application filed December 27, 1910. Serial No. 599,569.

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 Crushing-Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in the crushing mill shown and described in my Patent No. 977,235, granted November 29, 1910. In the mill of the said patent, as in the present mill, the material is crushed between rotating crushing disks carried by shafts one of which is within the other, and the axes of which are inclined to or out of line with each other; so that when the machine is in operation certain parts of said disks will be constantly approaching each other, while the diametrically opposite parts of said disks will be constantly receding from each other, thereby causing an opening and closing crushing action of said disks as they rotate together. In the operation of the mill of my said patent, in order to get its full crushing capacity, it is necessary to rotate the shafts at a comparatively high speed, in order to effect a rapid opening and closing crushing action of the crushing disks; and it has been found in practice that with the mill driven at such high speed the crushed rock, or similar hard material, is discharged with considerable violence against the interior of the mill casing, causing somewhat rapid wear.

The present invention has for its object to avoid this difficulty by providing means whereby the opening and closing crushing action of the disks will be relatively rapid when the said disks are running at a relatively low rate of speed. To this end the eccentric bearing for the inner shaft, instead of being held stationary as in the machine of my said patent, is caused to rotate in a direction opposite to the rotation of the shafts carrying the crushing disks, and preferably at a higher speed than the speed of rotation of said shafts, thereby causing a comparatively rapid opening and closing crushing action of the disks while they may be rotating at a relatively low rate of speed.

In the accompanying drawings Figure 1 is a longitudinal section of the improved crushing mill. Fig. 2 is a detail section on line 2—2, Fig. 1.

Referring to the drawings, 12 denotes a suitable base from which rise standards 13 affording bearings for a hollow driving shaft 14, the said shaft being preferably provided at its rear end with a flange 15 to which is bolted a driving pulley 16. The shaft 14 carries at its forward end the head 17 which is connected with said shaft by a spider 18 the separated arms of which afford spaces for the free discharge of the crushed material, and in the said head is mounted a ring 19 to which the outer crushing disk 20 is rigidly secured. Coöperating with the outer crushing disk 20 is an inner crushing disk 22 bolted to the head 23 of a solid shaft 24 inclosed within the hollow driving shaft 14, said inner shaft 24 having a bearing at its rear end in an eccentric sleeve 25.

The parts of this improved machine above referred to are, or may be, the same as in the machine of my said Patent, No. 977,235, in which the said parts are correspondingly numbered. In the present improved machine the base 12 is formed somewhat longer than in the machine of my said patent, and is provided with additional standards 21 in which is journaled an independent shaft 26 to which is affixed a driving pulley 27. The sleeve 25 is provided at its outer end with a squared or polygonal portion 28, and the adjacent inner end of the shaft 26 is provided with a corresponding squared or polygonal portion 29. The said squared or polygonal portions of the said sleeve and shaft are joined together by a clamp-coupling 30 which, while of sufficient strength to cause the said eccentric sleeve normally to rotate with the said shaft 26, is not so strong but that, should some uncrushable or unusually hard material get between the crushing disks, the said coupling 30 would break and thus avoid a greater damage which might result from the breaking of other parts of the mill if the said coupling should not give way.

In the operation of the present improved crushing mill, as in the mill of my said patent, the material to be crushed is gripped between the tilting or opening and closing crushing disks 20 and 22 in such a manner as to cause the disk 22 and the shaft with which it is connected to be rotated in unison

with the driving shaft 14 carrying the outer crushing disk 20; and in the rotation of these tilting or opening and closing crushing disks the material will be reduced as in the mill of my said patent. In the present improved mill, however, the independent shaft 26, driven by the pulley 27, will be caused to rotate in a direction opposite to, and preferably at a somewhat greater rate of speed than, the driving shaft 14 driven by the pulley 16. The rotation of the said shaft 26 will cause a corresponding rotation of the eccentric sleeve 25, and the rotation of said sleeve, in opposition to the direction of the rotation of the driving shaft 14, will cause a comparatively rapid opening and closing crushing action of the disks 20 and 22 when said disks are rotating at a relatively low rate of speed.

While the shaft 14 will preferably be positively driven by means of power applied to its pulley 16, so that the inner shaft 24 will also be rotated, when the machine is in crushing operation, by means of the material gripped between the crushing disks 20 and 22, it is not positively necessary in this improved mill, comprising the rotating eccentric sleeve bearing 25, that the said shafts and disks should rotate for the crushing action, in that the rotation of the said eccentric sleeve bearing will cause a tilting crushing action to be imparted to the disks 20 and 22, whether said disks be in rotation or not.

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

1. In a crushing mill, the combination with two rotating crushing disks, of inner and outer shafts by which said disks are carried, an eccentric bearing for the said inner shaft, and means for rotating said eccentric bearing independently of said shafts.

2. In a crushing mill, the combination with two rotating crushing disks, of inner and outer shafts by which said disks are carried, said outer shaft being provided with a driving pulley, of an eccentric bearing for said inner shaft, an independent shaft coupled to said eccentric bearing and provided with a pulley by which it may be driven.

3. In a crushing mill, the combination with two rotating crushing disks, of inner and outer shafts by which said disks are carried, said outer shaft being provided with a driving pulley, of an eccentric bearing for said inner shaft provided with a polygonal end portion, a shaft which is independent of the disk-carrying shafts and which is also provided with a polygonal end portion arranged adjacent to said polygonal end portion of said eccentric bearing and a breakable clamp coupling joining said polygonal portions of said bearing and shaft.

4. In a crushing mill, the combination with two rotating crushing disks, of shafts by which said disks are carried, a rotating eccentric bearing for one of said shafts, and a fixed bearing in which said eccentric bearing rotates, said eccentric bearing being located at a point widely separated from the disk carried by said shaft.

5. In a crushing mill, the combination with two crushing disks, of inner and outer shafts by which said disks are carried, an eccentric bearing for said inner shaft, and means for rotating said eccentric bearing.

6. In a crushing mill, the combination with two crushing disks which are tilted or inclined relative to each other, of two shafts carrying said disks and one of which is inclosed within the other, the axis of one of said shafts being inclined relative to the axis of the other, an eccentric sleeve affording a bearing for the said inner shaft at a point widely removed from said disks, and means for rotating said eccentric sleeve.

In testimony whereof I affix my signature, in presence of two witnesses.

THOMAS JOSEPH STURTEVANT.

Witnesses:

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