(No Model.) 4 Sheets—Sheet 1.

H. B. FELDMANN.

PULVERIZING MACHINE.

No. 265,791. Patented Oct. 10, 1882.

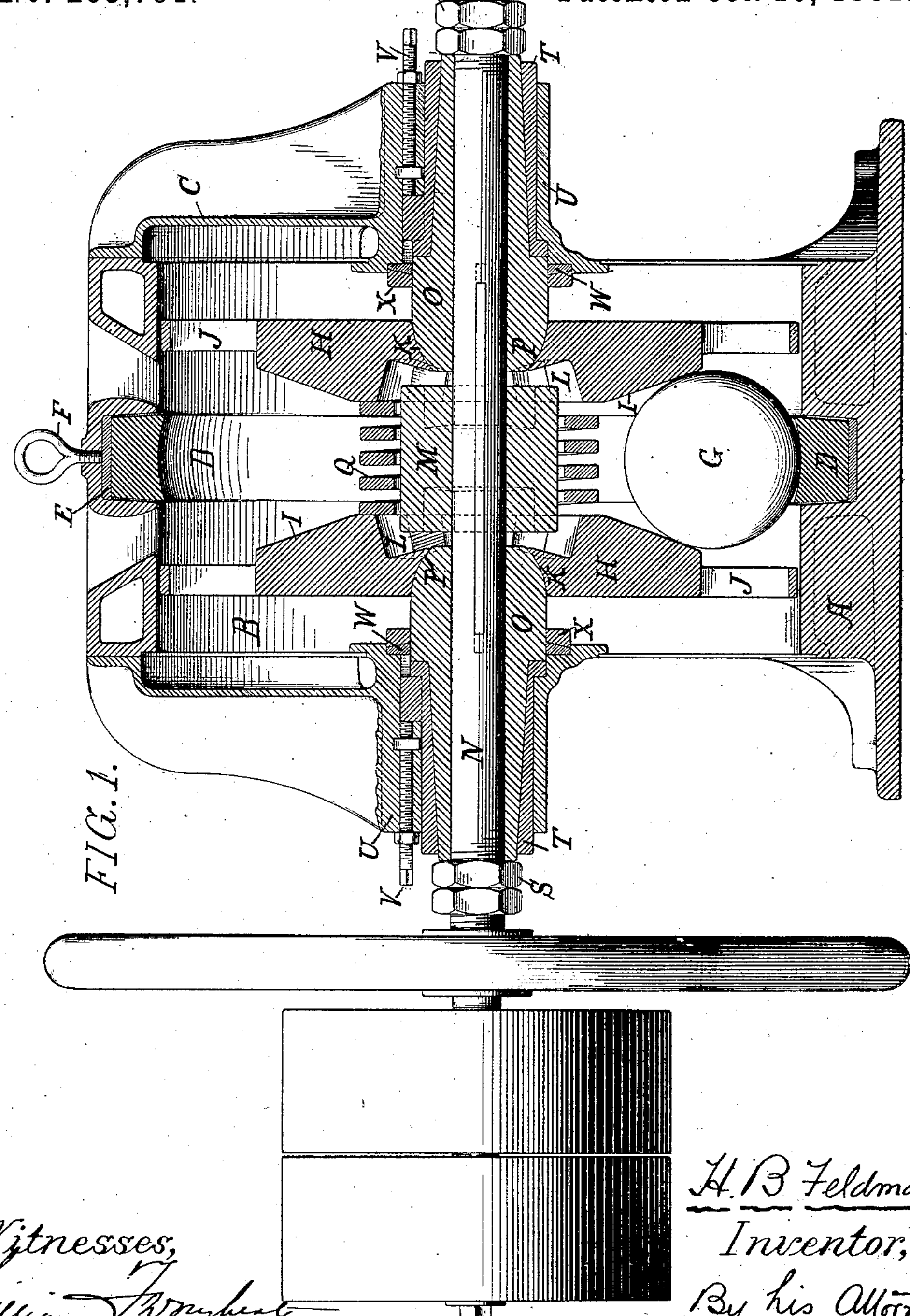

FIG. 1.

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(No Model.) 4 Sheets—Sheet 2.

H. B. FELDMANN.

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FIG. 2.

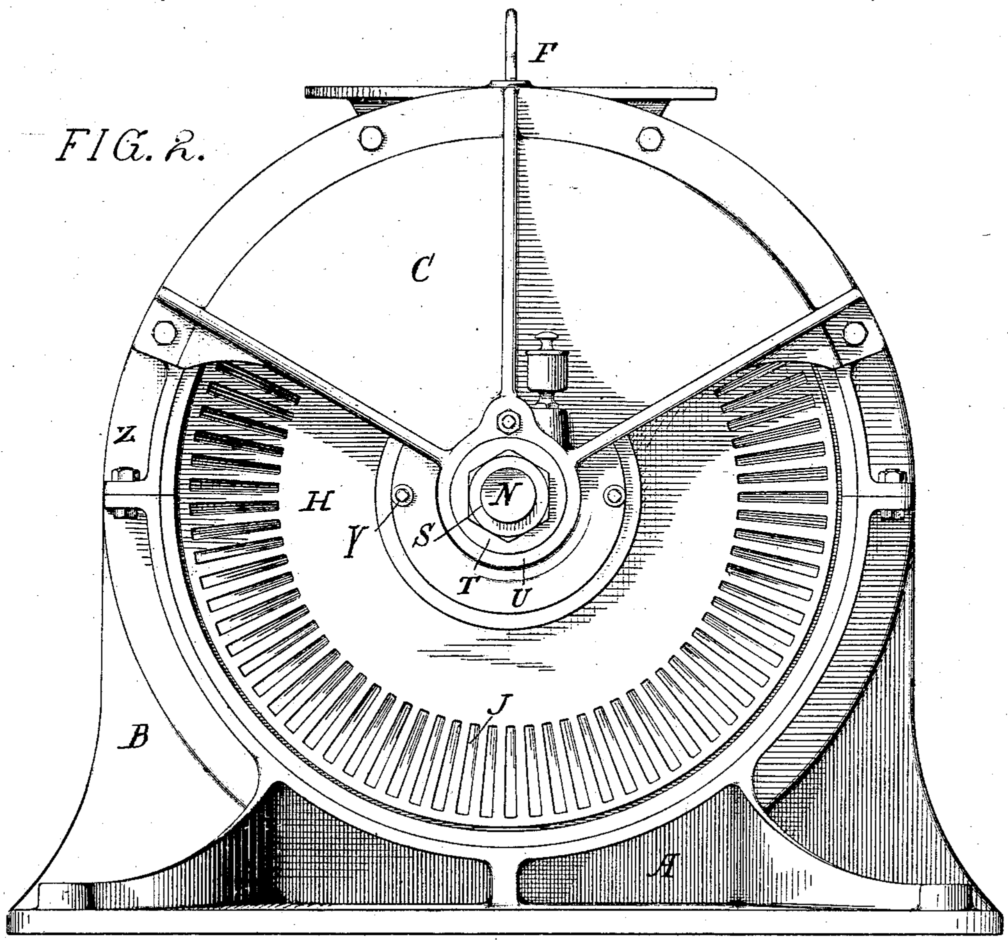
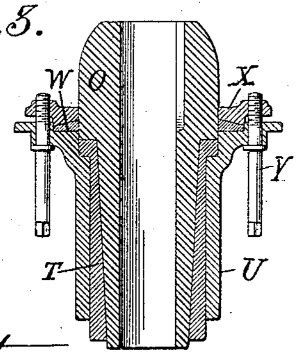


FIG. 3.



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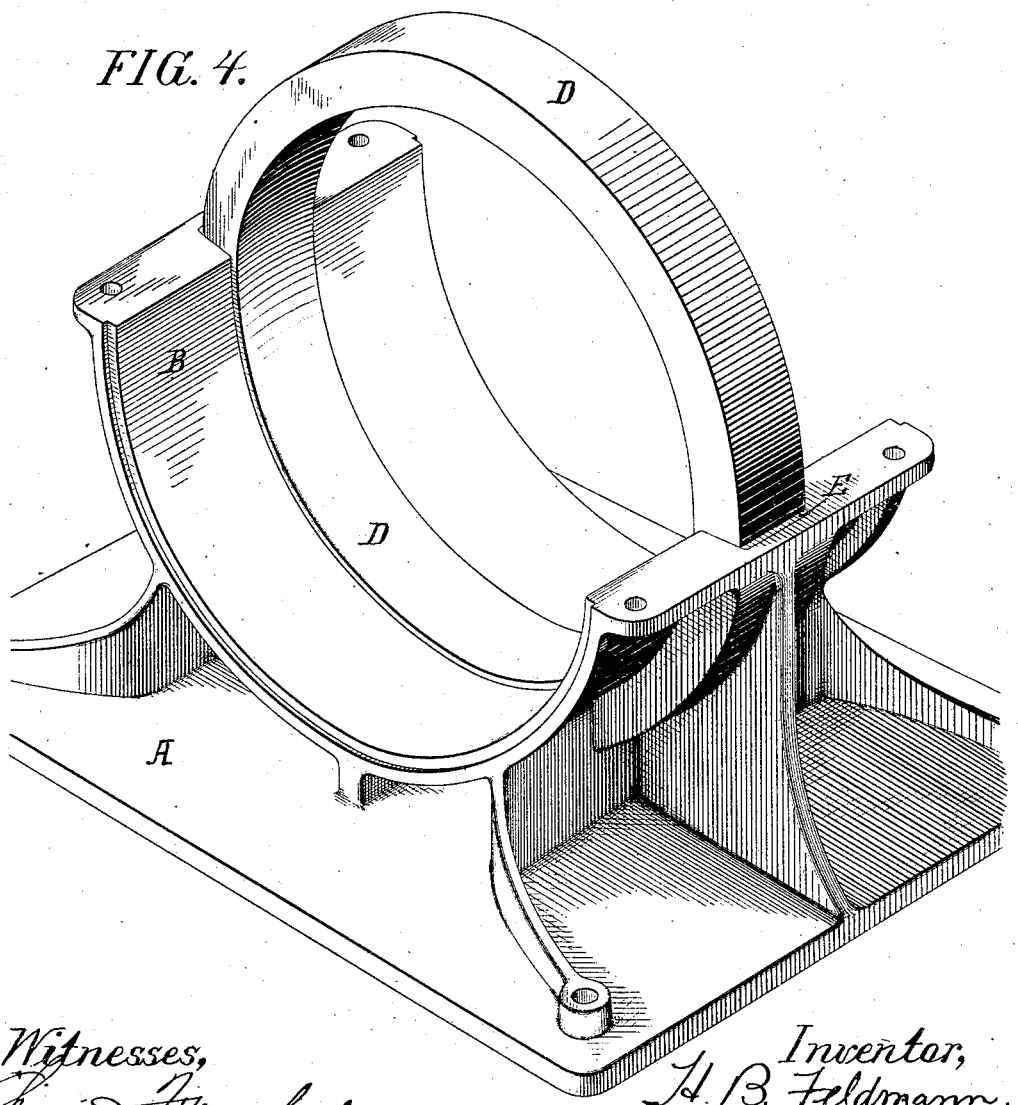
(No Model.) 4 Sheets—Sheet 3.

H. B. FELDMANN.

PULVERIZING MACHINE.

No. 265,791. Patented Oct. 10, 1882.

FIG. 4.



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(No Model.) 4 Sheets—Sheet 4.

H. B. FELDMANN.

PULVERIZING MACHINE.

No. 265,791. Patented Oct. 10, 1882.

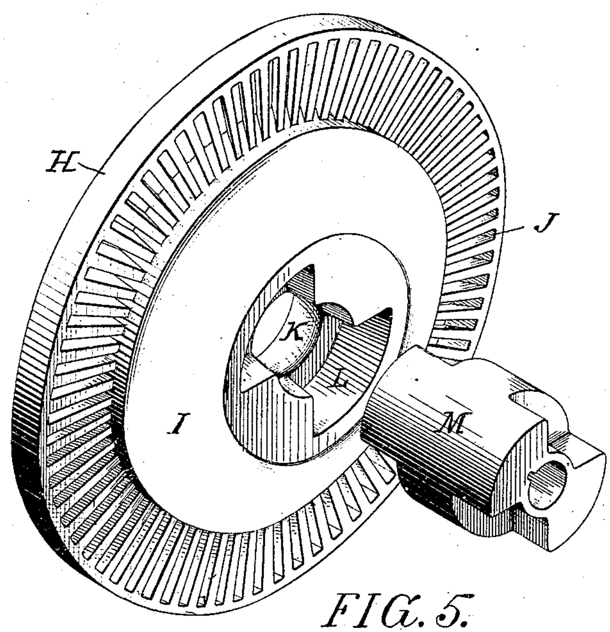

FIG. 5.

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UNITED STATES PATENT OFFICE.

HERMANN B. FELDMANN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO STEPHEN P. M. TASKER, OF SAME PLACE.

PULVERIZING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 265,791, dated October 10, 1882.

Application filed March 2, 1882. (No model.)

To all whom it may concern:

Be it known that I, HERMANN BERNHARD FELDMANN, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain Improvements in Pulverizing-Machines, of which the following is a specification.

My invention relates to a certain novel pulverizing-machine invented by William Henry Thompson, of Islington, county of Middlesex, Kingdom of Great Britain, and patented to him in and by Letters Patent of the United States No. 249,489, dated November 15, 1881, to which Letters Patent reference is to be made for a more clear comprehension of my improvements.

Broadly stated, Thompson's invention consists in the combination, within a suitable inclosing case embodying in its own structure a vertically-erected hollow circular track, of an independent sphere or ball adapted to revolve around the casing, and of given means for imparting to the ball not only revolution around the casing-track, but also rotation about its own axis. Certain other features of construction enter into the Thompson invention which are dispensed with by me, as the organization of my machine avoids their employment.

In the Thompson machine, as also in mine, material to be pulverized is fed through a hopper into the casing, and is crushed by the combined revolution and rotation of the sphere or ball. The means employed by Thompson for effecting the combined movement of the ball are a pair of vertically-erected disks provided with peripheral beveled bearing-surfaces, and arranged face to face at some distance on either side of the center of a shaft horizontally journaled through the casing, and by which they are revolved. The disks are capable of rocking movements by virtue of being each loosely hung or supported on the shaft between two collars having curved bearing-faces. The collars prevent a lateral movement of the disks at their centers. Exterior to their peripheral bearing-surfaces the disks are provided with a circular series of blades adapted by means of their location, inclination, and proximity to each other to prevent the escape of material under treatment until it has become sufficiently pulverized, but thereafter adapted to permit of its escape into a receptacle exterior to the casing, from which receptacle the sufficiently-pulverized material is by suitable means removed.

The operation of the disks and ball is described by Thompson in the following language, which I regard as of importance to restate here, in order that a more thorough comprehension of my improvements may be had. Thompson says:

"The operation of the disks and ball is substantially as follows: When the disks are revolved their tendency is to assume a position exactly at right angles to the shaft; but as they cannot do this, for the reason that the diameter of the ball at the point of contact exceeds the distance between the adjacent bearing-faces, it follows that they bear or press upon the ball in their effort to assume this position, and crowd the latter against the casing with greater or less force, according to the rapidity of the revolution. The disks also, by the friction of the contact, carry the ball with them in their revolution about the casing, and thus communicate to it a centrifugal action. The disks also, by the friction of this contact, communicate to the ball also an axial rotation. The ball, then, it will be understood, is caused to act upon the material to be pulverized with a resultant force, which is obtained from three distinct sources, as follows: first, the direct radial thrust which is received from the efforts of the disks to assume a position at right angles to the shaft, the bearing-faces of the same acting as inclined planes to crowd the ball against the inner surface of the casing; second, the centrifugal action which results from the rapid revolution of the ball around the casing, and, third, the grinding action which results from the rotation of the ball upon its axis. By adapting the disks to rock upon the shaft the ball is permitted to move on radial lines to and from the shaft, according to the amount of material in the casing, without being free at any time from the action of the disks."

Generally stated, my invention embraces the provision of improved means whereby the ball-operating disks are applied to their shaft and connected therewith in such manner as to be

not only rotated thereby, but to be free for such rocking movements as are desirable.

It also embraces certain other improvements which are hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents in longitudinal vertical sectional elevation a pulverizing-machine embodying my improvements. Fig. 2 represents the same in side elevation. Fig. 3 is a horizontal sectional view taken through one of the sleeve-journals and its journal-bearing and packing-box. Fig. 4 is a view in perspective of the lower portion of my casing, representing in place therein a continuous solid ball-track. Fig. 5 is a view in perspective of one of the ball-operating disks, looking toward its inside or working-face, showing also the clutch which operates the disks.

Similar letters of reference indicate corresponding parts in all the views.

In the drawings, A represents the base of the casing, being a casting of any desired configuration adapted to support the casing B, which is a cylindrical frame-work conveniently made in two sections centrally united, inclosed as to its upper side portions by the side plates, C. A good mechanical construction of this casing is that represented in the drawings.

D is a ball-track, being a continuous solid ring of metal, preferably of chilled iron. It is seated in the casing in any preferred manner—for instance, in that represented in Fig. 4—and is inserted at the time that the upper and lower sections of the casing are put together.

E is a packing-ring applied between the exterior of the ball-track and the peripheral seat therefor, Z, in the casing. This packing is applied in order to retain the ball-track rigidly in position, and it is provided with a set-screw, F, or kindred device, to enable its tightening up. The inner face of the ball-track is slightly curved in cross-section, preferably in an arc of greater radius than that of the radius of the ball.

G is the ball or crushing-sphere, which revolves upon the ball-track.

H are the disks, whose peripheral beveled bearing-surfaces are denominated by the letter I, while J are openings (blades) around their extreme periphery. The form of the disks is well represented in Fig. 5. The rear face of each disk is centrally reamed out into the form of a hollow hemispherical socket, K, while the front face is centrally provided with a clutch-seat, L, into which is fitted, free to play, a clutch, M, of any preferred construction, but preferably of that represented in Fig. 5.

N is the driving-shaft, which is centrally journaled in the casing in a direction at right angles to the disks. The clutch is keyed on this shaft, which also passes through the disks.

O are sleeve-journals, Figs. 1 and 3, snugly fitted to and keyed upon the shaft, so as to revolve therewith. These sleeve-journals may be described to be each of the form of a Parrott gun, the rounded breech P of each of which corresponds in curvature with the hemispherical socket in the rear face of the disks in such manner that the disks fit closely upon the breech.

Q is a compressed spiral spring surrounding the clutch upon the shaft and abutting against the opposing faces of the disks. The clutch-seats being of proper size to permit of a rocking of each disk upon its sleeve-journal with respect to the clutch, it is obvious that the spiral spring acts, in the absence of opposing instrumentality, to maintain the disks in parallel vertical planes, while it also acts under the varying movement of the ball, as in riding over material of different thickness, to permit of such rocking movement in the disks as shall accommodate them to said varying movement of the ball without causing them to lose their grip thereupon. It will now be understood that upon a suitably-imparted revolution of the shaft the sleeve-journals, disks, clutch, and spiral spring are together rotated, while the disks not only carry the ball around, but yield or rock to accommodate themselves to any varying movement of the ball upon the track without strain or detachment, and without releasing their carrying-grip upon said ball.

S is a double set of tightening and locking nuts, threaded upon the extremities of the shaft exterior to the outer extremities of the sleeve-journals, which are designed and adapted to set the journals up and retain them in close contact with their hemispherical sockets in the disks, and also to regulate the grip of the disks upon the ball and their compressive action upon the spring.

T are conically-tapered tubular journal-bearings surrounding and fitted to correspond as to their tapered bores with the sleeve-journals. These bearings are fitted within tubular journal-boxes U, cast with the side plates of the casing, and are adapted to be set in place by means of adjusting-screws V, which bear against them, are threaded through fixed nuts within the tubular journal-boxes, and are locked by locking-nuts in a manner represented in the drawings and very familiar to mechanics. The journal-boxes and the journal-bearings together form the means for retaining the sleeve-journals in place free for revolution and for adjusting them in any given position.

W is a packing-ring fitted within or against that face of the journal-boxes U which opens within the casing, and retained and compacted in place by means of a circular packing-collar, X, made adjustable against the journal-box by means of the tightening-up screws Y, which latter are conveniently operated from the outside of the casing. The office of this packing collar and ring is to prevent pulverized material from gaining access to the revolving surfaces of the sleeve-journals.

From the foregoing description it will be understood that while I have provided means of journaling the shaft and its disks I have made these means capable of adjustment, and have also excluded from them particles of pulverized material, and that I have also provid-

ed in a very perfect manner means for not only revolving the disks, but for so adjusting them as to render them automatically capable of any such rocking action as is desirable.

Having thus described my invention, I claim—

1. In a pulverizing-machine, the combination of a casing, a shaft journaled in the casing, two disks upon the shaft, and a clutch upon the shaft located at a point between the disks and engaged with both disks, so as to revolve them.

2. In a pulverizing-machine, the combination of a casing, a shaft journaled therein, two oppositely-placed sleeve-journals surrounding and revolving with said shaft, and rounded as to their inner extremities, and two disks, likewise surrounding said shaft and fitted upon the rounded inner extremities of the sleeve-journals, so as to be capable of being rocked thereupon.

3. In a pulverizing-machine, the combination of a casing, a shaft journaled therein, two sleeve-journals mounted upon and revolving with the shaft, and having rounded inner extremities, two disks fitted upon the rounded inner extremities of the sleeve-journals, a clutch fitted upon the shaft between the disks, revolving with the shaft and connected with the disks, and a spiral spring compressed between the opposing faces of the disks.

4. In a pulverizing-machine, the combination, with a casing provided with a circular ball-track, of a shaft journaled in the casing axially with respect to said ball-track, two disks revolving with the shaft, and free to rock with respect thereto, a spiral spring compressed between the opposing faces of the disks, and a ball resting upon the track and embraced between the disks.

5. In combination with the externally-tapered sleeve-journals, the correspondingly-tapered journal-bearings, the journal-boxes, and the adjusting-screws, substantially as described.

6. In a pulverizing-machine, the combination, with an inclosing casing having journal-boxes formed in its sides, of conically-tapered journal-bearings fitted in said journal-boxes, two sleeve-journals keyed to a central shaft and fitted in said journal-bearings, and two packing rings and collars, substantially as and for the purposes specified.

7. In a pulverizing-machine, in combination, the shaft, the spiral spring, the disks, the sleeve-journals, and tightening-up nuts, whereby the set of the sleeve-journals upon the shaft and the tension of the spring upon the disks are regulated, substantially as set forth.

In testimony whereof I have hereunto signed my name this 2d day of February, A. D. 1882.

HERMANN BERNHARD FELDMANN.

In presence of—
J. BONSALL TAYLOR,
JOHN JOLLEY, Jr.