(No Model.) 3 Sheets—Sheet 1.

S. P. M. TASKER.

WET PULVERIZING MACHINE.

No. 265,713. Patented Oct. 10, 1882.

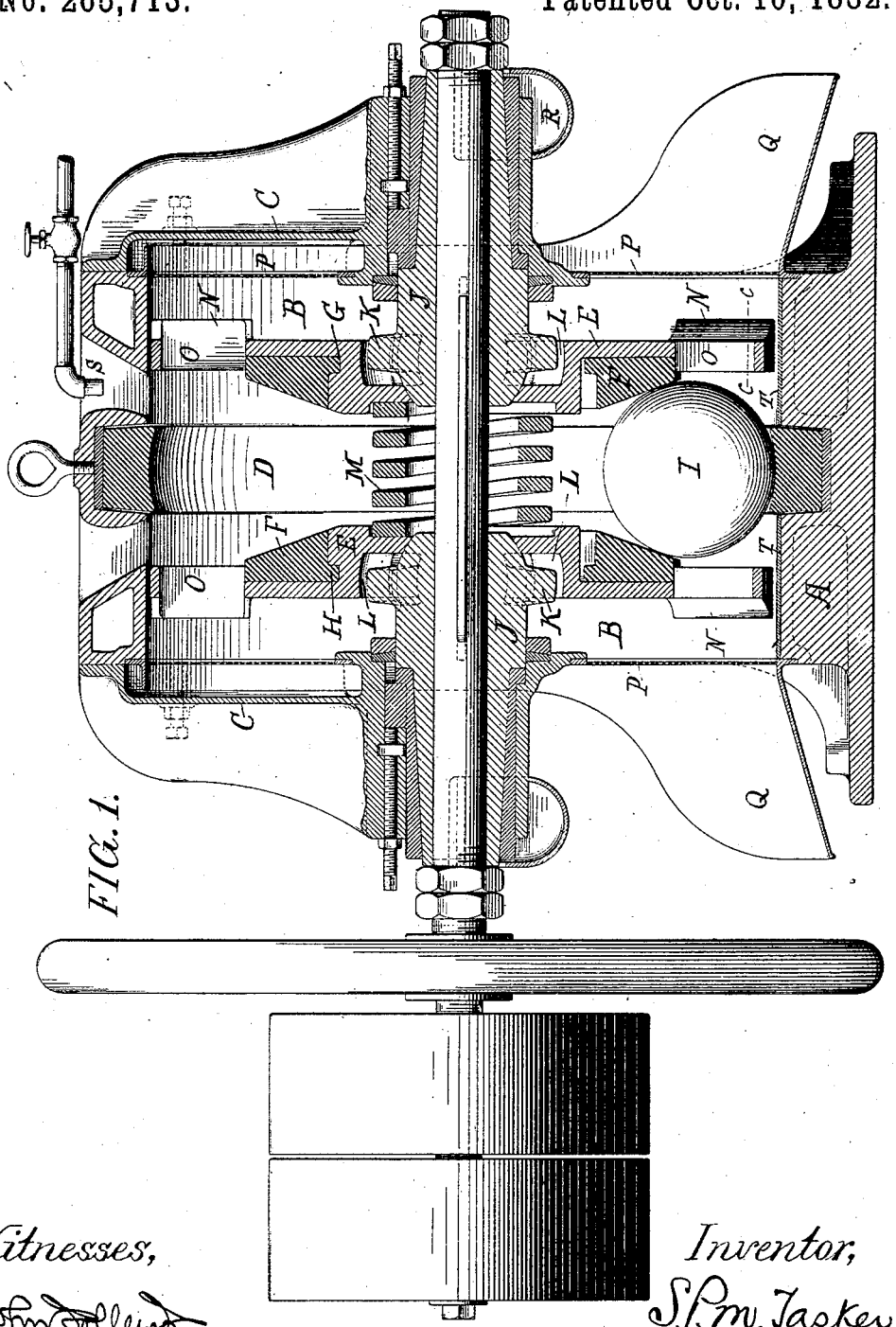

FIG. 1.

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(No Model.) 3 Sheets—Sheet 2.

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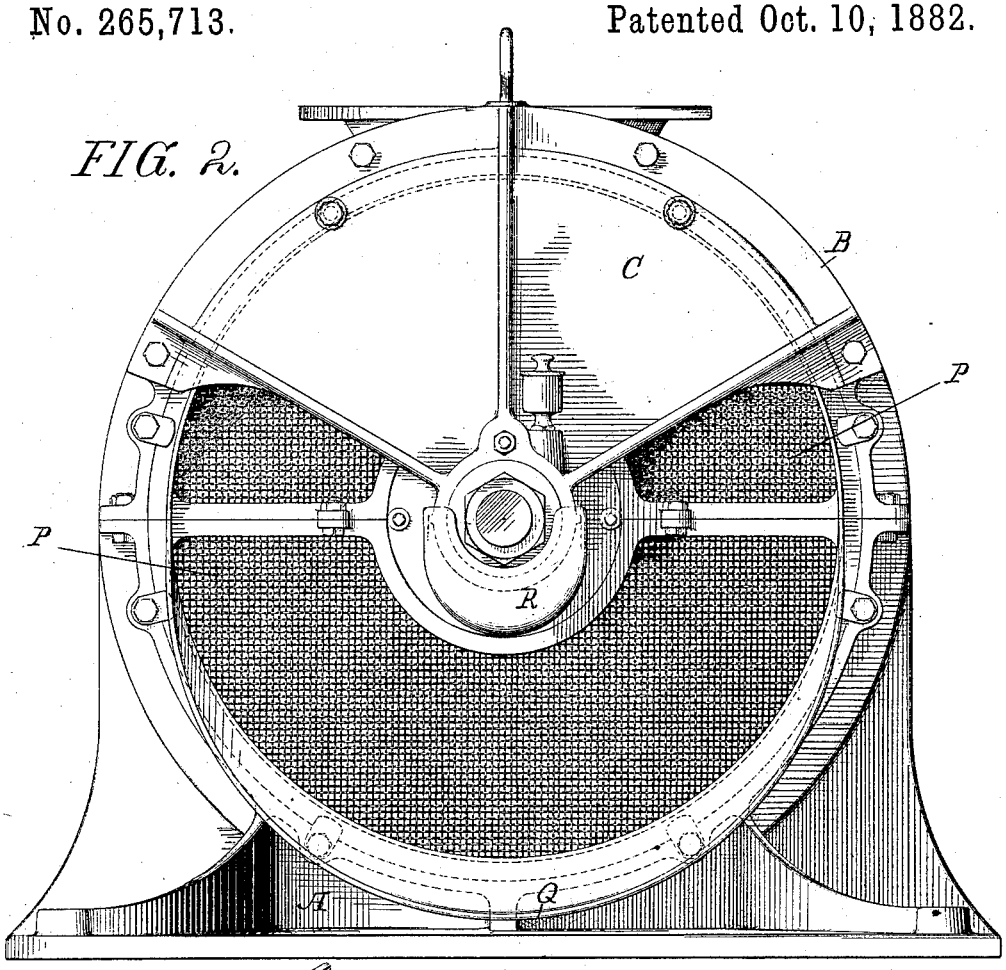
FIG. 2.



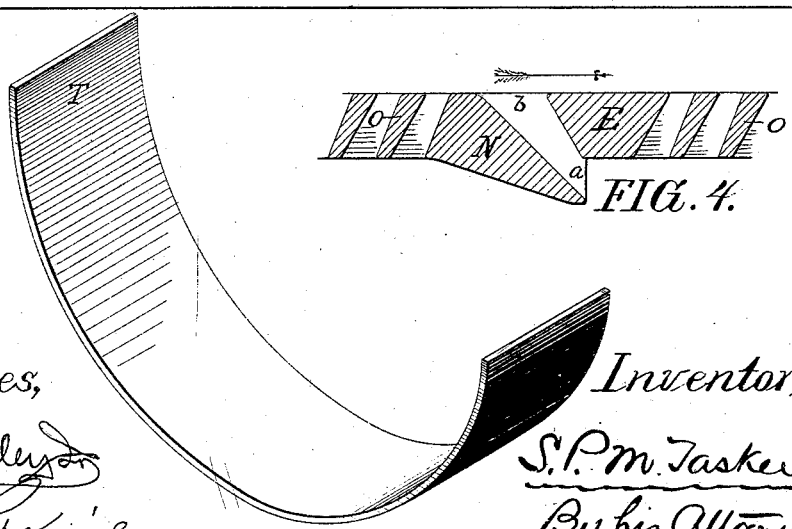


FIG. 3.

FIG. 4.

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(No Model.) 3 Sheets—Sheet 3

S. P. M. TASKER.

WET PULVERIZING MACHINE.

No. 265,713. Patented Oct. 10, 1882.

FIG. 5.

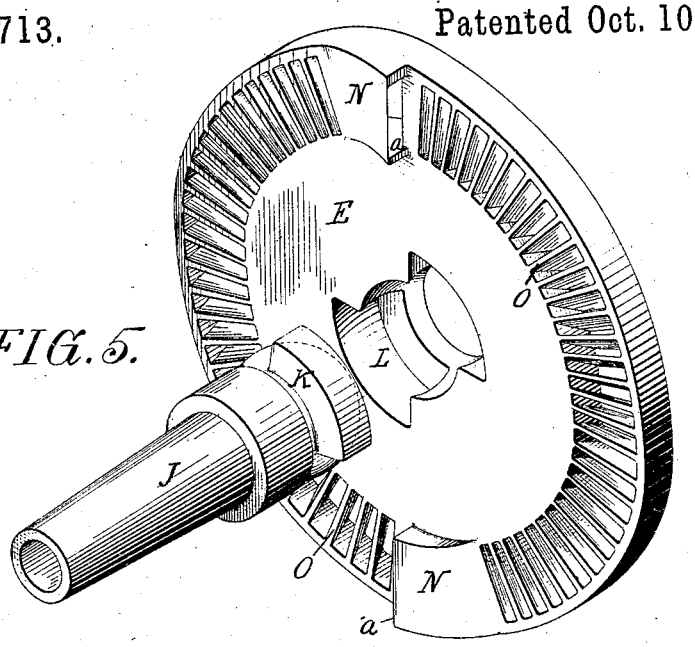
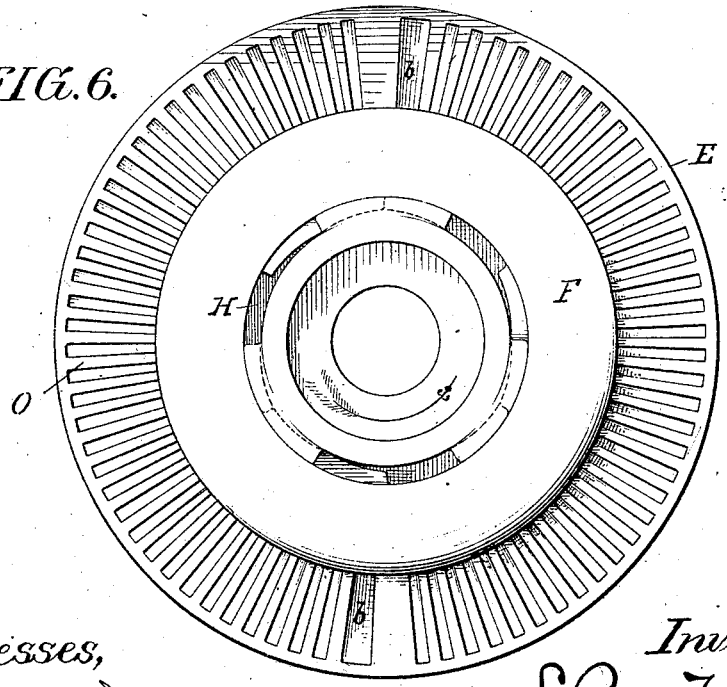


FIG. 6.



Witnesses,
John Dalleyder
C. A. Perkins.

Inventor,
S. P. M. Tasker
By his Attorneys
W. C. Strawbridge
J. Bonsall Taylor.

UNITED STATES PATENT OFFICE.

STEPHEN P. M. TASKER, OF PHILADELPHIA, PENNSYLVANIA.

WET-PULVERIZING MACHINE.

SPECIFICATION forming part of Letters Patent No. 265,713, dated October 10, 1882.

Application filed March 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN P. M. TASKER, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain Improvements in Wet-Pulverizing Machines, of which the following is a specification.

My invention, broadly considered, 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 escaping 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."

My invention also relates to and embodies in its structure certain improvements upon the Thompson machine, which are the invention of Hermann Bernhard Feldmann, of Philadelphia, Pennsylvania, and which are embraced in an application for Letters Patent executed by him February 2, 1882, and filed in the United States Patent Office, March 2, 1882.

These improvements, briefly stated, consist

of the application to the shaft of sleeve-journals keyed thereto, so as to revolve therewith. Each of these sleeve-journals is of the form of a Parrott gun, the rounded breech of which corresponds in curvature with a hemispherical socket in the rear face of the disks in such manner that the disks fit closely upon the breech. They also consist in the application of a spiral spring surrounding the shaft and abutting against the opposing faces of the disks.

They also consist of journal-boxes and packings for the shaft and its surrounding sleeve-journals of such construction as not only to enable a very perfect and smooth revolution, but also to exclude pulverized material from the revolving surfaces.

They, in addition, consist of the provision of tightening up nuts upon the shaft, adapted to enable the endwise adjustment or set of the sleeve-journals.

Generally stated, my invention embraces, first, the application of a clutch device between the sleeve-journals and rear faces of the disks; again, the application to the disks of a removable peripheral beveled bearing-plate of chilled iron or other fit material; again, the combination, with the blades of the disks, of what I term "take-ups," for returning to the action of the ball material not sufficiently fine to escape through the screen; finally, the provision, in connection with the casing, of combined screens and discharging-chutes.

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 view in perspective of one of the wearing-plates. Fig. 4 is a sectional top plan view taken through one of the take-ups and certain of the blades of the disk on the line *c c* of Fig. 1. Fig. 5 is a view in perspective of one of the ball-operating disks, looking toward its outside or rear face, showing the seat for the clutch-lugs of the sleeve-journal, and showing, also, the sleeve-journal and clutch-lugs which operate the disks. Fig. 6 is a front elevational view of one of the disks, indicating the manner of application of the removable peripheral beveled bearing-plates.

Similar letters of reference indicate corresponding parts.

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 by the side plates, C.

D is the continuous ball-track, being a ring of metal made in one piece, according to the invention of Mr. Feldmann.

E are the disks, whose removable peripheral beveled bearing-plates are denominated by the letter F. I am the first to make these bearing-plates removable, and I accomplish such result by any fit mechanical means. As it will be readily understood that many methods of application may be resorted to, I have represented in Figs. 1 and 6 of the drawings a convenient means of applying the same. I provide within the face of the disk, which is shaped to receive the plate, arc-shaped peripherally-disposed seats G, and apply around the interior opening of the bearing-plate arc-shaped tapering-surfaced lugs, by which arrangement, which is a familiar one to all mechanics, the separate bearing-plate can be applied to the front face of the disk, the lugs entering the seats, and then be given a partial revolution, in order to occasion the engagement of the projecting lugs with the undercut portions of the seats. This method is serviceable for the reason that the revolution of the disks with the ball can be made available for the constant tightening up of the lugs within their seats. The method is also preferable to attachment by screws or bolts.

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

J are the sleeve-journals of Feldmann. The rear face of each disk is centrally reamed out in the form of a hollow hemispherical socket adapted to seat itself upon the rounded breech of the sleeve-journals, and corresponding in curvature thereto in such manner that the disks fit closely upon the breech.

K are clutch-lugs formed upon the sleeve-journals back of the curved surface of the breech, and preferably cast as lateral projections from said journals.

L are lug-seats formed in the rear face of the disks, into which the clutch-lugs of the sleeve-journals are entered. The seats are of proper size to permit of a rocking of each disk upon its sleeve-journal with respect to the clutch-lugs.

M is the spiral spring surrounding the shaft, and operating upon the opposing faces of the disks.

N are what I term my "take-ups," which are scoop-shaped devices formed in connection with the blades O of the disks, and being in effect oblique openings around the periphery of the disks, communicating from the rear to the front face thereof. Their mouth or receiving-opening *a* is on the rear face of the disk, and in the revolution of the latter the take-ups operate as scoops to catch such particles of pulverized material as have escaped through the blades, but which are not of sufficient size to escape through the screens. The take-ups catch these particles, and in the revolution of the disks return them through their discharging-openings *b* to the space between the disks, so as to subject them to a further crushing action by the sphere. That form of take-up which is represented in the drawings I regard as an advantageous although not as a restrictive form, for it will be easily understood that any scoop-shaped device the mouth or scooping end of which is exterior to the operating-face of the disk and the discharging end of which is upon the opposite side of the disk will act to return the particles.

P are screens, with which I inclose the en-

tire sides of the casing, and which are made of such mesh as is desirable in view of the resultant size of the particles had in view. The screens may, if desired, be made removable, so that sets of different mesh may be employed in the same machine, thereby enabling its use for the production of ground material of different degrees of fineness.

Q are chutes, also applied to the casing at the lower portion thereof and exterior to the screens. Material of such size as to pass through the mesh of the screens finds its discharge by means of these chutes.

R are oil-cups, which I apply in connection with the journal-surfaces of the sleeve-journals and shaft.

S is an inlet for water, opening within the hopper of the machine.

T are curved wearing-plates, of steel or chilled iron, of hemispherical form, and of the character represented in Fig. 3. Two of these plates are inserted within the casing, around the lower portion thereof, on either side of the ball-track. They form a lining to the casing of sufficient strength to withstand the constant attrition of the particles of material to be pulverized. They are removable when worn out, and can be replaced by others.

Such being a description of my improved apparatus, which, as stated, is a wet pulverizer, its operation will be readily understood. I deem it sufficient to say that the operation of the screens in connection with the take-ups of the disks renders practicable the thorough pulverization to a predetermined degree of the material to be operated upon. As heretofore stated, all such material as is not at first crushed to the desired degree of fineness and which has escaped to the exterior of the disks is returned by the take-ups and subjected a second time, or, if necessary, a series of times, to the operation of the ball.

Having thus described my invention, I claim—

1. In a pulverizing-machine of the class herein set forth, in combination with a casing containing two revolving disks and a ball carried thereby, screens incasing the sides of the casing, and outwardly and downwardly inclined discharging-chutes, substantially of the character represented and described.

2. In a pulverizing-machine of the class herein set forth, in combination with the disks, peripheral beveled bearing-plates and means for removably attaching the plates to the disks, substantially as and for the purpose specified.

3. In a pulverizing-machine of the class herein set forth, in combination with disks, radial blades, and take-ups or material-returning devices which catch material exterior to the disks and discharge it between the disks, substantially as set forth.

4. In a pulverizing-machine of the class herein set forth, in combination with the sleeve-journals, clutch-lugs or kindred devices, as and for the purpose specified.

5. In a machine of the class herein recited, in combination with sleeve-journals revolving upon and in connection with a driving-shaft, two disks surrounding said shaft and fitted to rock upon the sleeve-journals, a spiral spring surrounding said shaft and abutting between the facing-surfaces of the disks, and clutch devices between the disks and sleeve-journals, operating upon the rear faces of the disks, as and for the purpose specified.

In testimony whereof I have hereunto signed my name this 8th day of February, A. D. 1882.

STEPHEN P. M. TASKER.

In presence of—
J. BONSALL TAYLOR,
W. C. STRAWBRIDGE.