T. J. STURTEVANT.

MILL.

APPLICATION FILED AUG. 6, 1917.

1,296,134.

Patented Mar. 4, 1919.

3 SHEETS—SHEET 1.

Fig. 1.

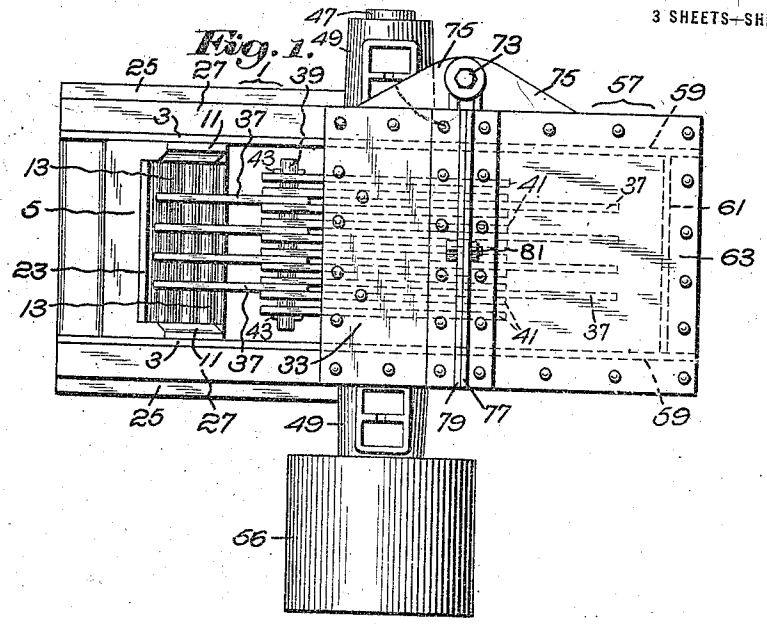
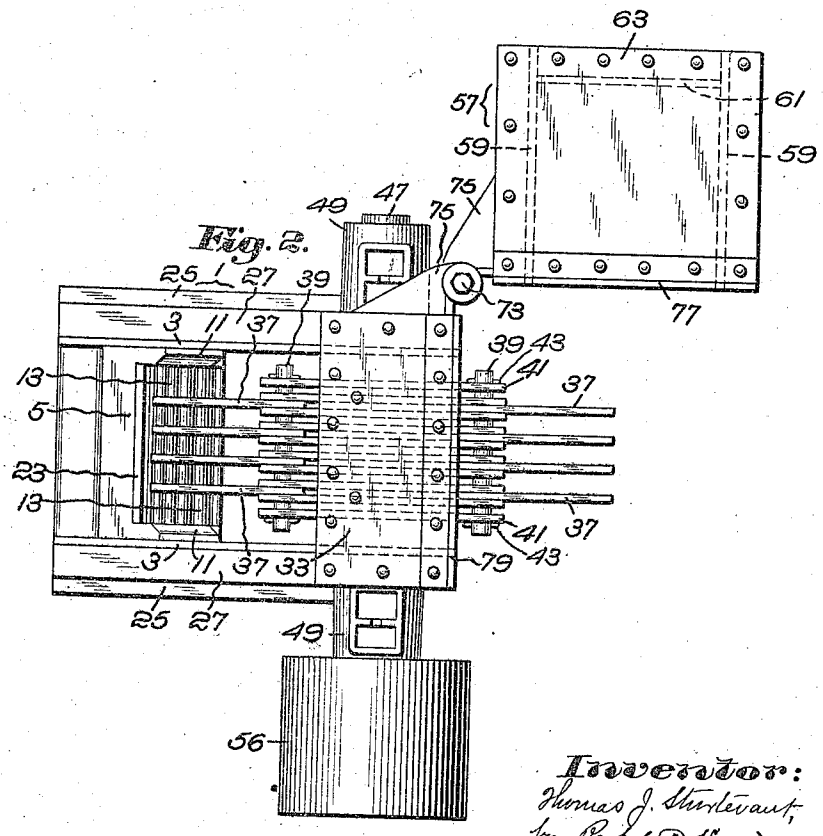


Fig. 2.



Inventor:
Thomas J. Sturtevant,
by Robt. P. Harris.
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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3 SHEETS—SHEET 2.

Fig. 3.

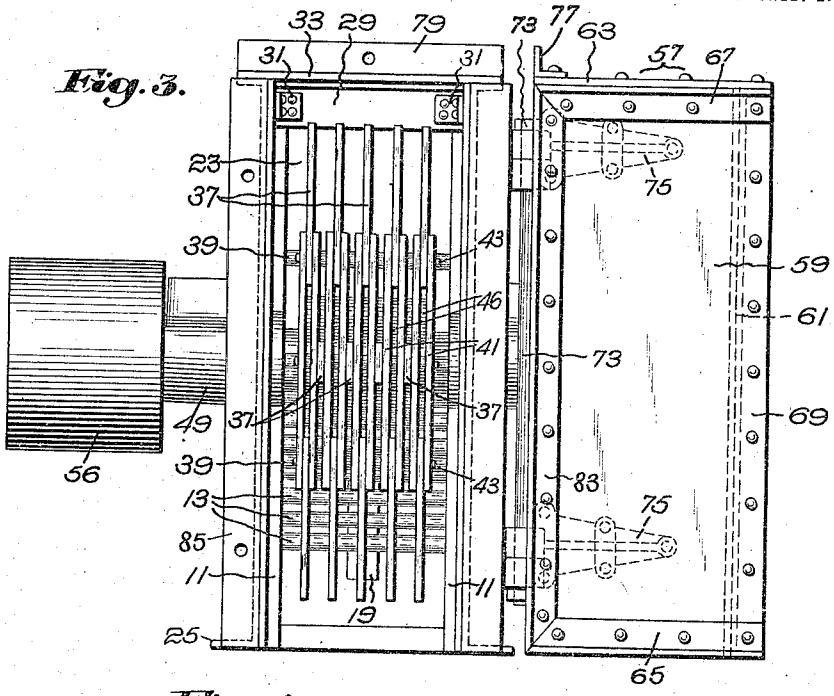
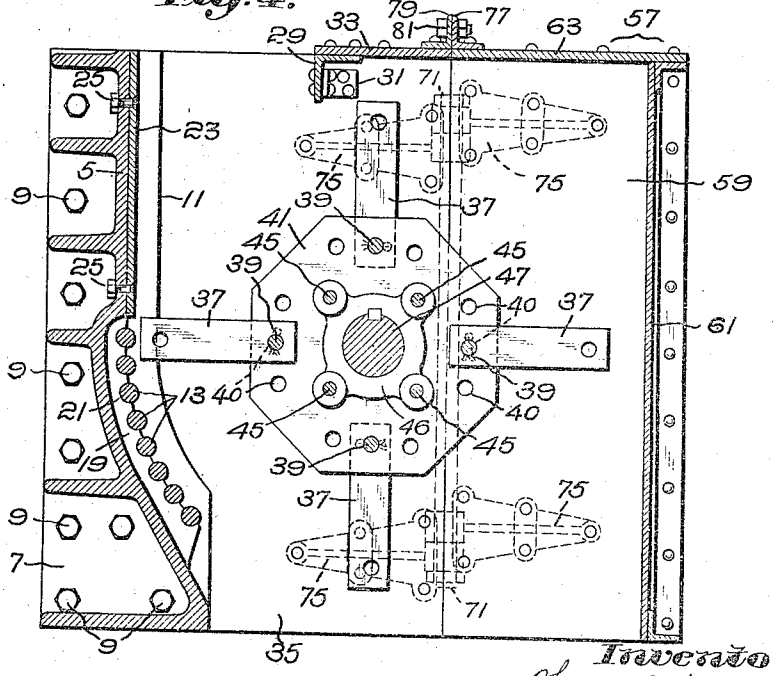


Fig. 4.



Inventor:
Thomas J. Sturtevant,
by Robt. P. Haines.
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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3 SHEETS—SHEET 3.

Fig. 5

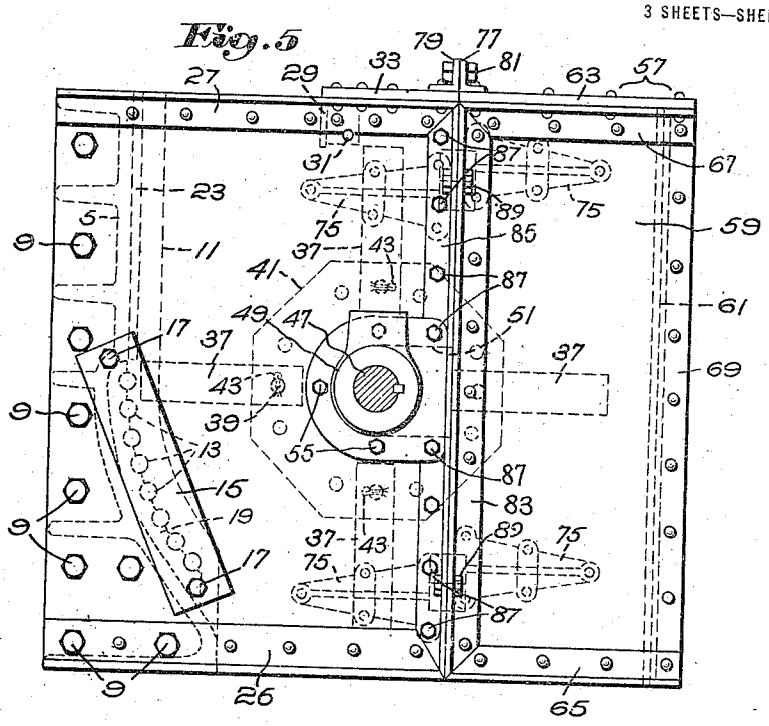
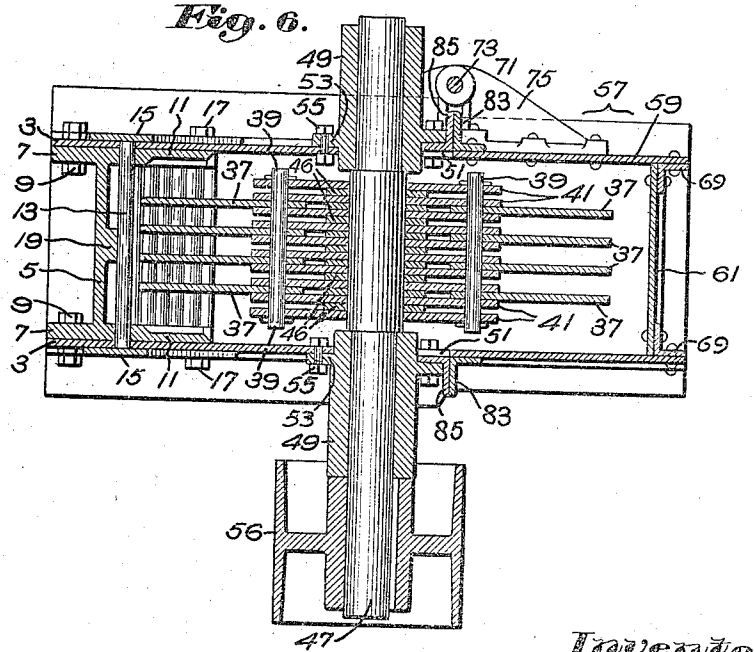


Fig. 6.



Inventor:
Thomas J. Sturtevant
by Robt. P. Harris.
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS J. STURTEVANT, OF WELLESLEY, MASSACHUSETTS, ASSIGNOR TO STURTEVANT MILL COMPANY, OF HARRISON SQUARE, MASSACHUSETTS, A CORPORATION OF MAINE.

MILL.

1,296,134. Specification of Letters Patent. Patented Mar. 4, 1919.

Application filed August 6, 1917. Serial No. 184,570.

To all whom it may concern:

Be it known that I, THOMAS J. STURTEVANT, a citizen of the United States, residing at Wellesley, county of Norfolk, and State of Massachusetts, have invented an Improvement in Mills, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The invention hereinafter described relates to pulverizing mills for reducing fertilizer, bone, clay, minerals and other materials.

These mills usually comprise a casing provided with a shaft journaled therein having a carrier with hammers pivotally connected thereto coöperating with a suitable surface in the casing to reduce materials fed therebetween.

Certain classes of materials pulverized by these mills, such, for example, as phosphates, are of a sticky character, which causes them to pack in and tend to clog the machine. Consequently, frequent access must be had to the interior of the casing for the purpose of cleaning the same.

The heavy duty on the hammers in performing their work of crushing, wears and reduces the active surfaces thereof, and therefore, from time to time they must be adjusted to different positions on their carrier to compensate for this wear, or new hammers must be substituted therefor. Here again is necessity for convenient access to the interior of the casing.

Also, convenient access to the interior of the casing is desired at times for the purpose of inserting the shaft, carrier and hammers into the casing and removing the same therefrom.

Heretofore, so far as I am aware, mills of this type have been so constructed that the parts thereof within the casing are not readily accessible, but on the contrary can be reached only with great difficulty, inconvenience and loss of time.

One of the objects of the invention is to provide a mill whereby access may be had conveniently and readily to the parts, referred to, for the purposes set forth.

Another object of the invention is to provide a strong and effective crushing surface in the casing coöperating with the hammers for reducing the materials.

The character of the invention may be best understood by reference to the following description of one good form thereof shown in the accompanying drawings, wherein:

Figure 1 is a plan of the mill shown herein as embodying the invention;

Fig. 2 is a similar view showing the door of the casing in open position;

Fig. 3 is a front elevation of the mill showing the door in open position;

Fig. 4 is a vertical section through the mill;

Fig. 5 is a side elevation of the mill; and

Fig. 6 is a horizontal section through the mill.

Referring to the drawings, the pulverizing mill shown therein as embodying the invention comprises a casing having a body 1 composed of side walls 3 and a heavy rear wall 5 interposed between said side walls and provided with vertical flanges 7 secured by bolts 9 to said side walls.

The heavy rear wall also has inwardly projecting flanges 11 curving downwardly and forwardly for a purpose to be described.

A crushing surface may be mounted within the casing, and in the present instance of the invention, comprises a series of strong steel rods 13 extending horizontally across the casing through holes in the flanges 11 and side walls, said rods being confined against longitudinal movement by cover plates 15 extending across the ends of said rods and secured to the side walls by screws 17. To contribute to the support of the rods, the rear wall may have a portion 19 between the flanges 11 and curving forwardly and downwardly with a series of grooves 21 receiving said rods.

The construction is such that the rods may be readily inserted in place and removed for purposes of replacement and repair thereof, and at the same time the rods are effectively supported to withstand the heavy duty which they are called upon to perform.

To protect the upper portion of the rear wall 5 from wear from the bombardment of materials thereon, it may be provided with a breaker plate 23 detachably secured thereto by bolts 25 permitting the plate to be removed when worn and permitting a new one to be substituted therefor.

To strengthen the side walls of the casing,

it may have angle bars 26 at the lower edges thereof secured by rivets to the side walls and secured by bolts to the flanges 7 of the rear wall. The side walls may also have angle bars 27 at the upper edges thereof secured by rivets to the side walls and by bolts to the flanges 7 of the rear wall. A transverse angle bar 29 or equivalent member may extend between the side walls adjacent the upper edges thereof and be secured thereto by angle brackets 31. A narrow top plate 33 is mounted on and riveted to the horizontal legs of the upper angle bars 27. The space between this top plate and the rear wall 23 constitutes an inlet between which materials to be crushed are introduced to the mill. The material after being crushed escapes through the outlet 35 between the side plates and the rear wall at the bottom thereof.

Rotary hammer means may be provided coöperating with the breaker plate 23 and the rods 13 to crush materials fed between them. In the present instance of the invention, this hammer means comprises groups of hammers or bars 37 pivotally mounted on pins 39 on a carrier conveniently in the form of a series of spaced plates 41 having series of holes 40 therein through which the pins 39 extend, the latter being confined against longitudinal movement by cotter pins adjacent the ends thereof.

These holes 40 are different radial distances from the axis of the carrier and permit the pins to be adjusted to positions farther outward from said axis as the hammers are reduced in length from the wear thereon.

In the present instance of the invention, four groups of hammers are shown, two of the diametrically opposed groups occupying the same spaces between the plates and the other two diametrically opposed groups occupying spaces between the plates alternating with the spaces for the first two groups. Spacing members 46 may hold the plates in proper spaced relation. The assembly of plates may be secured together by through rivets 45.

The carrier thus formed may be mounted fast on a shaft 47 journaled in boss bearings 49 supported in horizontal slots 51 having open ends at the front of the casing. These boss bearings have collars 53 which may be detachably secured to the side walls of the casing by bolts 55.

The construction is such that on release of the bolts 55 the boss bearings, shaft, carrier and hammers may be removed from the casing as a unit by sliding the boss bearings horizontally outward through the openings of said slots.

The shaft may have a pulley 56 fast thereon which may be driven by a belt from any suitable source of power.

Next will be described a door or section 57 of the casing composed of side walls 59, the front wall 61 and a top 63. The side walls may be strengthened by angle bars 65 at the lower edges thereof and angle bars 67 at the upper edges thereof. The top 63 may be riveted to the upper angle bars. The front wall 61 may be strengthened and connected to the side walls by angle bars 69 riveted thereto.

To permit convenient access to the parts within the casing, the door or section 57 may be connected to said casing by hinges 71 having a pin 73 connecting the same, and long arms 75 secured to the casing sections and distributing the strain thereof.

To secure the door in closed position, suitable locking means may be provided, in the present instance of the invention, in the form of an angle bar 77 on the top 63 of the door and an opposed bar 79 on the top plate 33 of the casing. When the door is closed, these bars will be brought together and may be secured by a bolt 81 extending through registering holes therein, (Fig. 2).

The door may also have an angle bar 83 riveted thereto on its side opposite from the hinges and opposed to an angle bar 85 detachably secured by bolts 87 to the front edge of one of the side walls of the casing. When the door is closed, these bars are brought together and may be secured by bolts 89 entered through registering apertures therein.

Whenever it is desired to have access to the interior of the casing for purposes of cleaning, repair, replacement or adjustment of the parts therein, it is merely necessary to release the three bolts 81 and 89 and then the door may be swung on the vertical axis of its hinges to open position. The vertical or substantially vertical axis on which the door swings is a very important feature, since the weight of the door is carried by the hinge in such a manner that the door may be opened by a horizontal swinging movement thereof without the necessity of lifting the door.

The door, in the present instance of the invention, is recessed, so that it receives a part of the hammer mechanism and constitutes a section of the casing, but the working parts of the mill are carried by the main body of the casing.

It will be noted that the boss bearings for the hammer shaft are located in slots which are adjacent to the front of the casing, so that the open ends of said slots may be exposed when the door is swung to its open position. This facilitates insertion of the hammer shaft into and removal of the same from the casing. To accomplish this, it is merely necessary to remove the detachable angle bar 85 which crosses one of the horizontal bearing slots, and remove the bolts which secure the bearing collars to the sides of the casing. Then the bearing and the parts carried

thereby may be readily removed from the casing.

The door may be readily swung open at the times desired to expose the material in the casing or the door for cleaning out any sticky material which may have accumulated in the casing or door or on the parts contained in the former.

Also, the door may be easily opened to permit reversing of the hammers from end to end or adjusting the pins on which they are mounted to other holes in the carrier to compensate for wear on the hammers.

In operation the material to be pulverized is fed through the inlet into the machine and thrown by the hammers against the breaker plate 23 and initially crushed thereby. The material passes thence downward between the series of crushing rods 13 and the hammers, where it is further pulverized. The material thus reduced passes thence downward through the outlet at the bottom of the casing.

The door may be readily opened in a very few moments at any time by a single operator, to ascertain whether or not the parts of the mechanism are in proper condition, and enables ready adjustment and repair thereof, thereby materially contributing to the practicability and usefulness of the mill.

It will be understood that the invention is not limited to the specific embodiment shown, but that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What is claimed is:—

1. A crushing mill, comprising, in combination, a casing having opposed hollow parts, a crushing surface mounted in said casing, a horizontal shaft mounted in one of said parts adjacent the juncture of said parts and extending substantially parallel to said crushing surface, hammers carried by said shaft and coöperating with said crushing surface to reduce materials introduced between them, said hammers being partly inclosed by each of said parts, hinge means connecting said parts on a substantially vertical axis, that one of said parts may swing laterally to open position and give ready access to the swing hammers and crushing surface, and means detachably to secure said parts in closed relation.

2. A crushing mill, comprising, in combination, a casing having opposed hollow parts, a crushing surface mounted in said casing, a horizontal shaft mounted in one of said parts adjacent the juncture of said parts and extending substantially parallel to said crushing surface, swing hammers carried by said shaft and coöperating with said crushing surface, the casing part carrying the shaft being provided with an inlet at the upper end thereof to admit materials to be reduced between said crushing surface and hammers, and hinge means connecting said parts on a substantially vertical axis, that one of said parts may swing laterally open and give ready access to the members in the other part, said swinging part having a closed top and closed side walls to partly inclose said hammers and having an open bottom through which the materials reduced by the swing hammers and crushing surface may escape from the casing.

3. A crushing mill, comprising, in combination, a casing having opposed hollow parts, hinge means connecting said parts on a substantially vertical axis, one of said parts being stationary and the other of said parts being adapted to swing thereon to open and closed positions, said swinging part being provided with a closed top, three vertical side walls and an open bottom, a horizontal shaft mounted in said stationary part adjacent the juncture of said parts, swing hammers carried by said shaft and housed by both of said parts when closed and exposed when the swinging part is in open position, and a crushing surface mounted in said stationary part coöperating with said swing hammers to reduce materials introduced between them.

4. A crushing mill, comprising, in combination, a casing having opposed hollow parts, hinge means connecting said parts on a substantially vertical axis, one of said parts being stationary and the other being adapted to swing on said axis to open and closed positions, said stationary part having an inlet in the top thereof, a breaker plate in said stationary part beneath said inlet, a crushing surface in said stationary part beneath said breaker plate, and a horizontal shaft mounted in said stationary part and extending substantially parallel to said breaker plate, hammers carried by said shaft and adapted to project into both of said hollow parts in the course of the rotation thereof and coöperating with said breaker plate and crushing surface to reduce materials introduced through said inlet into said casing.

5. A crushing mill, comprising, in combination, a casing having opposed hollow parts, one of said parts having a series of holes in a wall thereof, a series of grate bars adapted to be inserted through said holes to and from positions in the casing, a plate covering the ends of said bars and detachably secured to a wall of the casing to confine said bars therein, a horizontal shaft mounted in one of said parts and extending substantially parallel to said bars, hammers carried by said shaft and coöperating with said bars to reduce materials fed between them, and hinge means connecting said parts on a substantially vertical axis, that one of said parts may swing on the other to an open position giving ready access to said hammers.

6. A crushing mill, comprising, in combi-

nation, a casing having opposed hollow parts, hinge means connecting said parts on a substantially vertical axis, a horizontal shaft mounted on one of said parts adjacent the juncture of said parts, a carrier on said shaft having a series of holes therein adapted to project beyond the casing part on which the shaft is mounted in the course of the rotation of the latter, hammers, pins projecting into the holes in said carrier to detachably connect the hammers thereto, said pins being accessible for attaching the hammers to and removing the same from the carrier beyond the juncture of the casing parts, and a crushing surface coöperating with said hammers to reduce materials introduced between them.

7. A crushing mill, comprising, in combination, a casing having opposed hollow parts, hinge means connecting said parts on a substantially vertical axis, that one of said parts may swing on said hinge means to open and closed positions, one of said parts having recesses therein open at the juncture of said parts, bearings mounted in said recesses and removable through the open ends thereof, a horizontal shaft mounted in said bearings, hammers carried by said shaft, and a crushing surface coöperating with said hammers to reduce materials introduced between them.

In testimony whereof, I have signed my name to this specification.

THOMAS J. STURTEVANT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."