



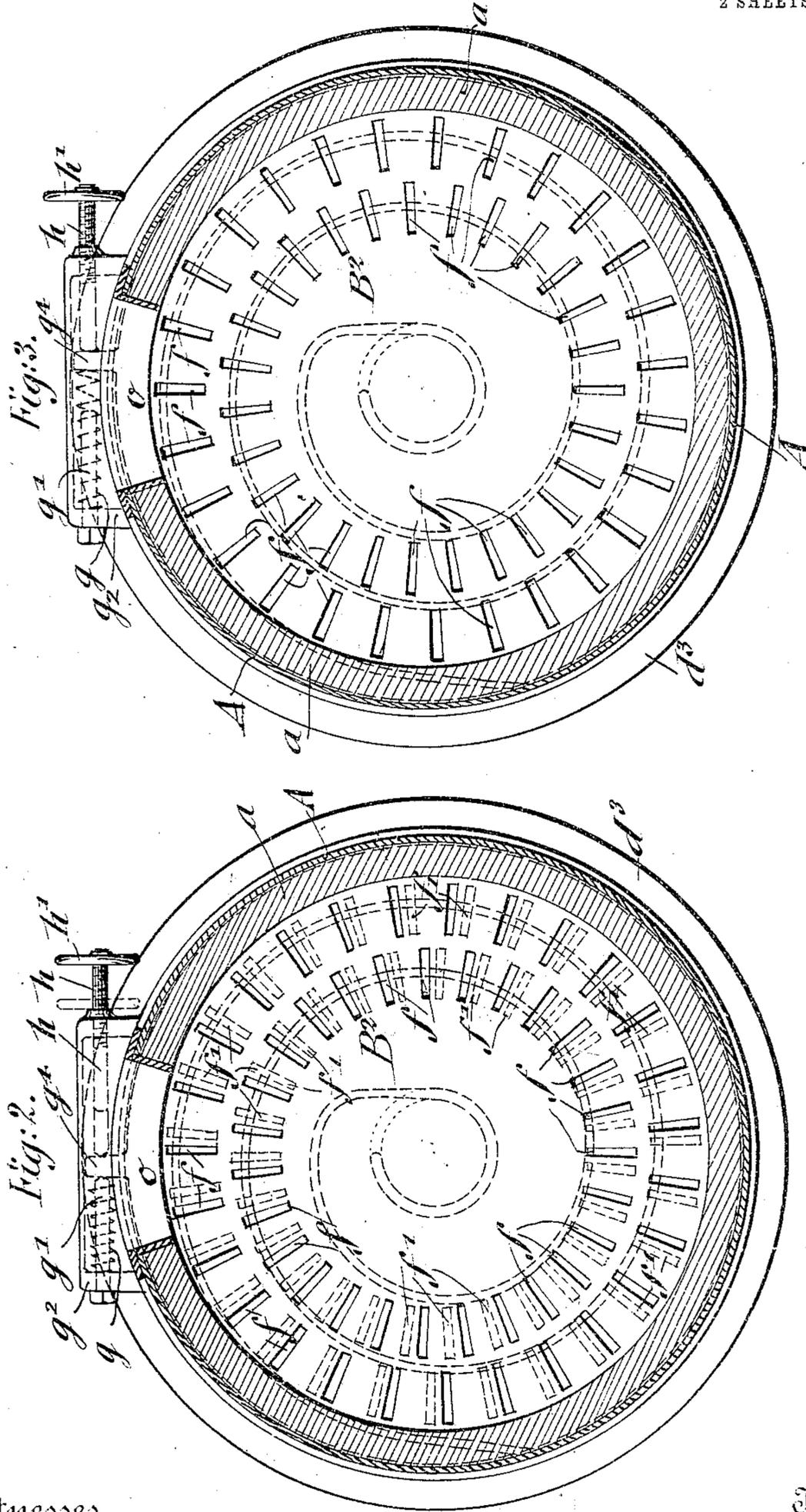
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PATENTED JUNE 26, 1906.

M. F. ABBÉ.  
GRINDING MILL.

APPLICATION FILED AUG. 24, 1904.

2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

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## GRINDING-MILL.

No. 824,520.

Specification of Letters Patent.

Patented June 26, 1906.

Application filed August 24, 1904. Serial No. 222,024.

To all whom it may concern:

Be it known that I, MAX F. ABBÉ, a citizen of the United States, residing in New York, borough of Manhattan, in the State of New York, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

This invention relates to grinding-mills of that class known as "pebble-mills," in which a cylinder or drum charged with pebbles is rotated in order to reduce the material to be ground to the required degree of fineness.

The invention aims to provide means for discharging the ground material from the drum of the grinding-mill without interrupting the rotary motion thereof and, further, to provide a grinding-mill in which such discharge can be readily and reliably effected by the use of a mechanism of comparatively simple construction at a great saving of time and labor.

With these and other ends in view the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings, in which the same parts are indicated by the same reference characters throughout the several views, Figure 1 is a central longitudinal section through the improved grinding-mill, showing the same in discharging position. Fig. 2 is a central transverse section of the mill, showing the discharge-head in closed position; and Fig. 3 is a similar section showing the discharge-head in discharging position.

Referring to the drawings, A denotes the cylindrical drum of the improved grinding-mill, which is provided with an intermediate charging-opening *o* and a suitable closure (not shown) for said opening. The drum A is provided at its ends with fixed heads B B', which are secured to the body of the drum by means of hoops *d*<sup>2</sup>, constructed of angle-iron, as shown. The heads B B' are provided with hollow trunnions *b*<sup>2</sup> *b*<sup>3</sup>, respectively, the latter trunnion extending into the interior of the drum, as shown in Fig. 1. The head B' is provided upon its inner surface with a spirally-disposed inwardly-extending wall, forming a spiral channel or passage S, leading from the outer portion of said head to the interior of the hollow trunnion *b*<sup>3</sup>. For the purpose of reinforcing the heads of the drum they are provided exteriorly with radially-

disposed ribs, the ribs upon the head D being designated in the drawings by reference character *r*, while those upon the head B' are designated by reference character *r*<sup>3</sup>.

Interiorly of the drum A at a point adjacent to the spiral discharge-channel S of the head B' is disposed the discharge-head of the grinding-mill. Said head is composed of parallel circular plates B<sup>2</sup> B<sup>3</sup>, the plate B<sup>2</sup> being fixed at its periphery to the lining *a* of the drum, while the plate B<sup>3</sup> is interposed between plate B<sup>2</sup> and the spiral passage S and is shiftable angularly with respect to the plate B<sup>2</sup> by means to be presently described. The plates constituting the discharge-head are each provided with two concentric rows of radially-disposed slots, the slots in the fixed plate B<sup>2</sup> being denoted by reference-letter *f* and the slots in the shiftable plate B<sup>3</sup> by reference character *f*<sup>1</sup>. In each plate the slots in the inner and outer rows are preferably arranged in staggered relation, as shown.

The angularly-shiftable plate B<sup>3</sup> is provided with a peripheral lug extending outwardly therefrom in the plane of the same through a transverse slot in the wall of the drum. Said slot is covered by a casing *g*<sup>2</sup>, in which is adjustable a hand-screw *h*, adapted to engage one side of the lug *g*<sup>4</sup> and operated by a hand-wheel *h*<sup>1</sup>. At the opposite side of the casing or housing *g*<sup>2</sup> is a bolt *g*<sup>1</sup>, which is positively held in place and extends inwardly toward the lug *g*<sup>4</sup>. Said bolt *g*<sup>1</sup> is surrounded by a helical spring *g*, bearing at one end against the end of the casing and at the other end against the lug *g*<sup>4</sup>, said spring being disposed in the plane of the shiftable discharge-plate B<sup>3</sup> and serving to normally maintain the same in discharging position—that is to say, with its slots or openings *f*<sup>1</sup> in register with the corresponding slots or openings *f* in the fixed plate B<sup>2</sup> of the discharge-head.

Extending inwardly through the hollow trunnion *b*<sup>3</sup> of the head is a spindle *i*, rotatable by means of an exterior wheel *i*<sup>1</sup>. This spindle is threaded at its inner end, and its threads engage a central hub or boss *i*<sup>2</sup>, extending inwardly from the fixed plate B<sup>2</sup>, as shown in Fig. 1. Said spindle passes freely through the central portion of the shiftable plate B<sup>3</sup>, forming a bearing therefor, and has fixed to the same adjacent the outer face of said plate a collar *i*<sup>3</sup>, which when the spindle *i* is fed inwardly engages said shiftable plate and locks the same in frictional engagement

with the fixed plate B<sup>2</sup>. The collar i<sup>5</sup> is made conical, as shown, for a purpose which will hereinafter appear.

For the purpose of increasing the frictional locking action of the plates constituting the discharge-head the central portions of the adjacent faces of said plates are depressed, as shown at *m*, whereby a certain spring is imparted to said central portions of the two plates and the clamping action of the collar i<sup>5</sup> materially increased.

In order to limit the movement of the locking-spindle *i*, the same is provided with a shoulder i<sup>3</sup>, adapted to abut against a shoulder i<sup>4</sup>, formed at the forward portion of the hub or boss i<sup>2</sup>, as shown in Fig. 1.

The operation of the improved mill is essentially as follows: The mill is charged with pebbles and the material to be ground through the charge-opening, after which the latter is closed and the drum rotated by any suitable means, the trunnions b<sup>2</sup> b<sup>3</sup> being supported in suitable bearings. (Not shown.) During the rotation of the mill the discharge-head is of course maintained in closed or locked position—that is to say, the fixed and shiftable discharge-plates are frictionally interlocked in closed position by the collar i<sup>5</sup>, acting against the shiftable plate through the medium of the locking-spindle *i*. During the operation of the mill the hand-screw *h*, by which the shiftable head is shifted to closed position, is retracted from the lug *g*<sup>4</sup> of said shiftable plate. The rotation of the drum continues until the material is ground to the desired degree of fineness, when the same is discharged by releasing the collar i<sup>5</sup> from engagement with the shiftable plate, and consequently releasing the fixed and shiftable plates from their frictionally-locked engagement. As soon as this has been effected the spring *g*<sup>1</sup>, which has been tensioned by the shifting and locking mechanisms, is released and acts upon the shiftable head B<sup>3</sup> in the plane thereof through the medium of the lug *g*<sup>1</sup>, so that said head is thereby shifted to discharging position. It is obvious that the spindle *i* may be operated by its hand-wheel *i*<sup>1</sup> without interrupting the rotation of the drum. As soon as the shiftable plate is shifted by the spring *g* the ground material passes through the registering openings or slots *f* *f*<sup>1</sup> and thence into the spiral passage S upon the inner face of the head B<sup>1</sup>. The ground material is thereby conducted from the outer or peripheral portion of the drum to the central portion thereof, where it is deflected outwardly by the conical surface of the clamping-collar i<sup>5</sup> and into the hollow trunnion B<sup>3</sup>, from whence it drops into any suitable receptacle. The rotation of the drum is continued until the entire charge of material is ground and discharged.

When all the material is discharged, the mill is stopped and recharged with material.

The shiftable plate is returned to closed position by the hand-screw *h*, and the spring *g* is thus again set to tension. The shiftable plate is then clamped to the fixed plate of the discharge-head by turning the spindle *i* until the frictional clamping of the collar i<sup>5</sup> upon the plates B<sup>2</sup> B<sup>3</sup> overcomes the action of the spring *g*, after which the hand-screw *h* is turned in the opposite direction, so as to be retracted from the lug *g*<sup>4</sup>, leaving the latter free to move in the casing *g*<sup>2</sup> when the heads B<sup>2</sup> B<sup>3</sup> are released from frictional engagement.

The improved mill requires no casing for discharging the ground material, and the lifting of the casing for recharging the mill is dispensed with. Not only can the discharging operation take place in a very convenient and effective manner, but the effective grinding of all the material contained in the mill is insured.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a grinding-mill, a discharge-head embodying two plates one of which is shiftable with respect to the other, and a spring acting on said shiftable plate and normally holding the same in discharging position only.

2. In a grinding-mill, a discharge-head constituted by a fixed plate having openings therein and a plate angularly shiftable with respect to said fixed plate and provided with openings adapted to register with the openings thereof, and a spring acting upon said shiftable plate in the plane thereof to maintain the same in discharging position.

3. A grinding-mill provided with a discharge-head embodying a fixed plate and a shiftable plate cooperating therewith, means for locking said shiftable plate in non-discharging or closed position, and self-acting means for returning said head to discharging position upon the release of said locking means.

4. A grinding-mill provided with a discharge-head embodying a fixed plate and the shiftable plate cooperating therewith, means for frictionally interlocking said plates, and means releasable by said locking means for shifting said shiftable plate to discharging position.

5. In a grinding-mill, the combination with a fixed discharge-plate, of a discharge-plate shiftable with respect to the first, means for shifting said shiftable plate to non-discharging position, separate means for locking the same in such position, and self-acting means for shifting said plate to discharging position upon the release of said locking means.

6. In a grinding-mill, a discharge-head comprising a fixed plate and a plate angularly shiftable with respect to the same, means for moving the shiftable plate to non-discharging position, means for locking the

same in such position, and a spring releasable by said locking means to shift said plate to discharging position.

7. In a grinding-mill, a discharge-head comprising a fixed discharge-plate, a shiftable discharge-plate, means to yieldingly hold the latter in discharging position, and means to shift said head to non-discharging position in opposition to said first-named means.

8. A grinding-mill including in its construction a fixed discharge-plate, a shiftable discharge-plate, a spring acting upon said plate in the plane thereof for normally maintaining the same in discharging position, and means for shifting said head to non-discharging position, in opposition to said spring.

9. A grinding-mill including in its construction a fixed discharge-plate, a shiftable discharge-plate, a spring for normally maintaining the latter in discharging position; means for shifting said last-named plate in opposition to said spring, and means releasable during the rotation of the mill for interlocking said plates.

10. A grinding-mill having a fixed head provided with a hollow trunnion, an interior discharge-head comprising discharge-plates one of which is shiftable with respect to the other, and means extending through said trunnion for interlocking said plates.

11. A grinding-mill having a fixed head provided with a hollow trunnion, an exterior discharge-head comprising discharge-plates one of which is shiftable with respect to the other, and means for interlocking said plates embodying a spindle extending through said trunnion and having an exteriorly-disposed hand-wheel mounted thereon.

12. A grinding-mill one of the heads of which is provided with an inwardly-disposed spiral discharge-passage and with a hollow trunnion into which said passage leads, an interior discharge-head comprising cooperating plates, and means extending through said trunnion for interlocking said plates, said means comprising a deflecting member disposed within said trunnion at the inner end thereof.

13. A grinding-mill including in its construction a discharge-head comprising discharge-plates one of which is angularly shiftable with respect to the other, means dis-

posed centrally of said plates for interlocking the same, and means acting upon the periphery of said shiftable head for shifting the same to discharging position upon the release of said locking means.

14. In a grinding-mill, the combination, with a rotary drum having a fixed discharge-plate provided with discharge-openings, a shiftable discharge-plate adjacent to said fixed plate and having openings adapted to be placed in or out of register with the openings thereof, continually-acting means for normally holding said shiftable plate in discharging position, means for shifting the same to closed position in opposition to said first-named means, and means to frictionally interlock or release said plates during the rotation of the drum.

15. In a grinding-mill, in combination, a drum having a fixed discharge-plate provided with discharging-openings, a shiftable discharge-plate adjacent said fixed plate and provided with openings adapted to register with the openings thereof, a lug extending from said shiftable head, a spring engaging said lug and disposed in the plane of said plate, and means for engaging the opposite side of said lug and shifting said plate to closed position, and means for interlocking said plates.

16. In combination, a drum having a fixed discharge-plate provided with discharge-openings, said drum being provided with a transverse slot adjacent to said plate, a shiftable discharge-plate having discharge-openings adapted to register with said first-named openings, a lug on said shiftable head extending through the slot in said drum, a casing on the drum extending over said slot, a spring in said casing bearing against one side of said lug, a hand-screw for engaging the opposite side thereof, and means releasable during the rotation of said drum for interlocking said discharge-plates.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

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Witnesses:

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HENRY J. SUHRBIER.