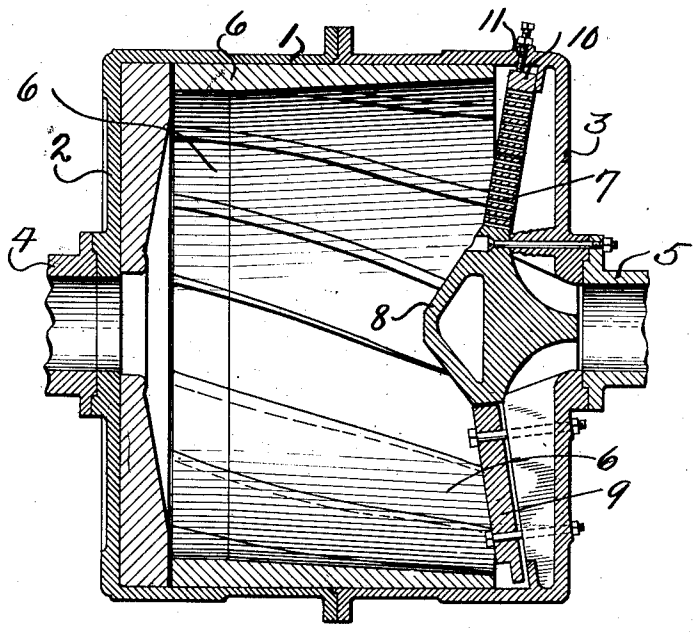
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MILL

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UNITED STATES PATENT OFFICE.

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MILL.

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This invention relates to an improvement in reducing mills in which the material to be reduced is confined within a rotary drum or barrel together with the reducing medium which may be in the form of balls, pebbles, cubes, rods, etc., the material being crushed or reduced by impact and attrition as the mill load tumbles and cascades due to rotation of the mill drum.

One of the objects of my invention is the provision of a mill of the type above indicated, in which the oversize of the load is worked away from the grate to effect increased efficiency of operation.

In mills of the type to which this invention is directed, there is a constant migration of the mill load toward the discharge end, due to the continuous feeding of material to the drum and the constant discharge of material from the discharge end of the mill, and the present invention provides for increasing this migrating action and for movement of the oversize of the load in the opposite direction, i. e., toward the feed end, this not only resulting in a more circuitous travel of the mill load but effecting a marked increase in the discharge of fines from the mill, in that the grate is thereby maintained relatively free of oversize and reducing medium to permit of the ready escape of the fines through the grate openings.

It will be seen, therefore, that the present mill is of such a character that migration of the entire load toward the discharge end is expedited while means are provided for moving the reducing medium and oversize away from the grate, thereby to reduce plugging or blocking of the grate openings by the oversize and reducing medium, permitting the fines to escape from the mill through the grate openings and increasing thereby the efficiency of the mill.

In the drawing accompanying this application, an embodiment of my invention is shown in sectional elevation, the drawing being somewhat diagrammatic.

Referring to the drawing in detail, 1 designates the mill drum which is provided with a feed head 2 and discharge head 3, and with a feed trunnion 4 and discharge trunnion 5. It will be understood of course, that this drum is mounted in suitable bearings, but inasmuch as the same constitutes no part of the present invention these bearings have not been illustrated.

The drum 1 is provided on its interior with liners 6, these liners, as illustrated, being so constructed and arranged as to slope toward the discharge head 3 at the ascending side of the mill drum, it being assumed that the drum is rotating toward the observer, as viewed in the drawing. Adjacent the discharge end of the mill I provide grate sectors 7 disposed about a substantially conical member 8, the grate sectors abutting this conical member and being held in place by clamp bars 9, together with end clamp bars 10 which are set up from the exterior of the mill by bolts 11. The grate sectors, as will be seen from the drawing, are inclined outwardly relatively to the longitudinal axis or axis of rotation of the mill drum and provides a frusto-conical structure the base of which faces the discharge end of the mill. The conical member 8 is centrally disposed with respect to the grate and the inner face of this conical member projects inwardly a short distance beyond the inner face of the grate or grate sectors 7.

As stated at the outset, the present invention has for one of its objects, the provision of a mill structure in which migration of the mill load toward the grate is expedited, in conjunction with means for preventing the accumulation of oversize material on the grates which would tend to retard the discharge of fines from the mill. These objects are attained by the liners 6, grate sectors 7 and conical member 8, the liners 6 being constructed and so disposed with respect to the mill drum that the material fed into the drum through the feed trunnion 4 will be caused to migrate toward the grates due to the slope of the liners toward the grates on the ascending side of the mill drum. The action of the grates 7 in the rotation of the mill is to screen the material which has been brought to the face of these grates due to the rotation of the mill drum and the action of the liners 6, so that the fines will be discharged through the grates and from thence will find their way through the discharge trunnion 5 to the exterior of the mill. The grates, however, due to their inclination and their cooperation with the conical member 8 will cause the oversize which is not sufficiently reduced to escape through the grates 7 to fall upon the conical member 8 to be deflected thereby toward the feed end of the mill for further reduction. In operation, therefore, it will be

apparent the grates 7, in conjunction with the conical member 8, will clear themselves of oversize and reducing medium to permit of the rapid discharge of fines therethrough which otherwise would be prevented from escaping from the mill due to the grate openings being blocked or plugged by this oversize material.

The net result of this construction is to increase the movement of the mill load toward the grates and to work the oversize material away from the grates thereby enabling an increased amount of material to be reduced and to be discharged from the mill in a given length of time as compared with structures employed in this art heretofore. This application is a division of my co-pending application Serial No. 197,054, filed June 7, 1927.

What I claim is:

1. A mill comprising a rotary drum or barrel, inclined grate members adjacent the discharge end, and a member cooperating with said grates to free the grate members of oversize.

2. A mill comprising a rotary drum or barrel, inclined grate members adjacent the discharge end of the drum, and a member about which the grate members are assembled and with which the grate members cooperate to free the grate members of oversize.

3. A mill comprising a rotary drum or barrel having a feed head and a discharge head, inclined grate sectors at the discharge end of the mill, and a conical member about which said inclined grate sectors are assembled and with which the grate sectors cooperate to free the grate of oversize.

4. A mill comprising a rotary drum or barrel, grates at the discharge end arranged to provide a frusto-conical structure, and a substantially conical member centrally disposed with respect to said grate and cooperating therewith to free the grate of oversize.

5. A mill comprising a rotary drum or barrel, grates at the discharge end providing a frusto-cone having its base facing the discharge end of the mill, a substantially conical member centrally disposed with respect to said grate and cooperating therewith to free the grate of oversize.

6. A mill comprising a rotary drum or barrel, grate sectors adjacent the discharge end, said grate sectors being so disposed as to provide a frusto-conical structure having its base facing the discharge end of the mill, and a substantially conical member positioned centrally of the grate structure about which the grate sectors are assembled and with which they cooperate to be freed of oversize.

7. A mill comprising a rotary drum or barrel, grate sectors within the drum, said grate sectors being inclined with respect to the axis of rotation of the drum to provide a frusto-conical structure having its base facing the discharge end of the mill, a substantially conical member disposed centrally of the grate structure and against and about which the grate sectors are assembled to provide a rigid structure, said centrally disposed member cooperating with the grate sectors to free the same of oversize.

8. A mill comprising a rotary drum or barrel, liners therefor sloping toward the discharge end of the mill on the ascending side of the mill drum, a grate structure at the discharge end of the mill and toward which the mill load is migrated by said liners, said grate providing a frusto-conical structure having its base facing the discharge end of the mill drum, a substantially conical member centrally disposed with respect to the grate structure, said liners, grate structure and centrally disposed member cooperating to effect an increase in the movement of the mill load toward the grate and a decrease in accumulation of oversize adjacent the face of the grate.

9. A mill comprising a rotary drum or barrel, liners therefor sloping toward the discharge end of the drum on the ascending side thereof, and an inclined grate structure adjacent the discharge end of the mill drum and cooperating with the sloping liners, to expedite the discharge of fines through the grate.

10. A mill comprising a rotary drum or barrel, liners therefor sloping toward the discharge end of the mill on the ascending side of the mill drum, a grate structure adjacent the discharge end of the mill and inclined outwardly of the mill drum toward the discharge end of the mill, a substantially conical member disposed centrally of the grate and cooperating with the inclined liners and grate, to expedite the discharge of fines through the grate and to reduce the accumulation of oversize at the grate.

11. A mill comprising in combination a rotary drum or barrel, liners therefor, said liners sloping toward the discharge end of the mill on the ascending side of the drum, and providing a formation for migrating the mill load toward the discharge end of the drum, a discharge head for said drum, grate sectors adjacent said head, a conical member disposed in the axis of rotation of the mill drum and about which said grate sectors are assembled, means for securing said conical member in place, means for clamping the grate sectors in place about said conical member to provide a substantially frusto-conical grate structure the base of which faces the discharge end of the mill drum, said liners, grate sectors and conical member cooperating to expedite movement of the mill load toward the grate and to reduce the accumulation of oversize at the grate.

This specification signed this 19th day of December, 1927.

FRANK E. MARCY.