

June 30, 1936.

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2,045,688

REDUCING MACHINE

Filed Sept. 19, 1931

2 Sheets-Sheet 1



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Fig. 2

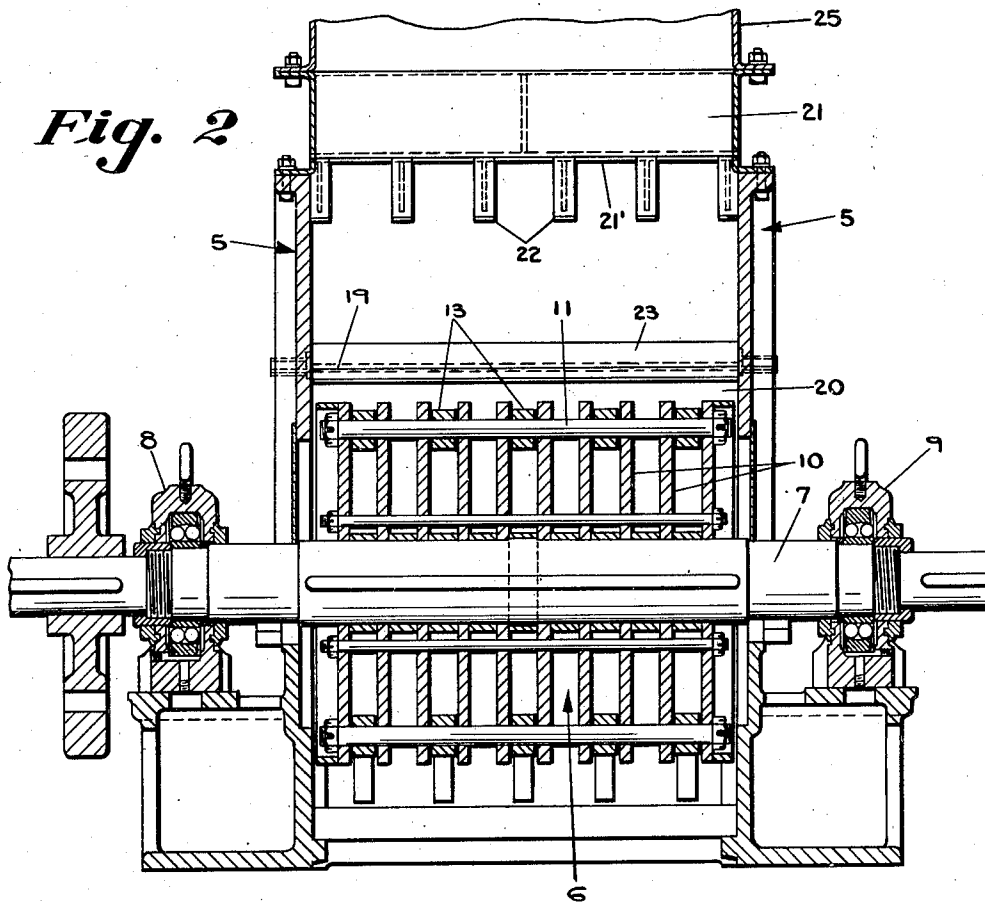
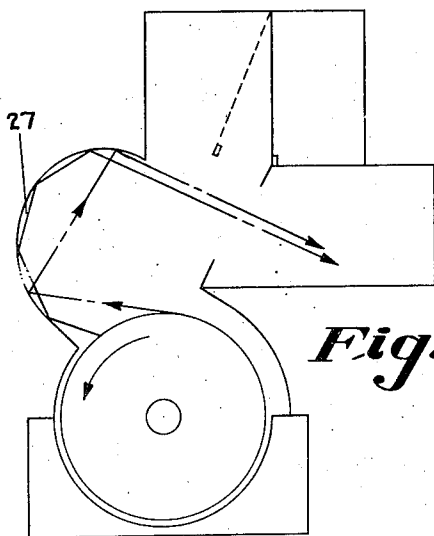


Fig. 3

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UNITED STATES PATENT OFFICE

2,045,688

REDUCING MACHINE

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Application September 19, 1931, Serial No. 563,853

15 Claims. (Cl. 83-11)

The present invention relates to rotary reducing machines and particularly to provisions in such machines for the escape of unpulverable fragments.

5 According to the invention an escape opening for unpulverable fragments is disposed immediately below the feed opening so that fragments may pass out directly without coming into contact with the rotor. Such fragments as reach
10 the rotor and are struck by the hammers are deflected by a deflecting surface across the feed and through the escape opening. The arrangement has been found particularly effective in machines used for the reduction of metal turn-
15 ings in which oversize fragments of iron occur, but it will be understood that the application of the invention is not limited in this respect since the invention may be applied to rotary reducing machines generally.

20 In order that the invention may be clearly understood I shall describe it with respect to two practical embodiments as shown in the accompanying drawings.

In the drawings:

25 Figure 1 is a vertical section of a machine with the present invention applied thereto, the section being taken transversely of the rotor axis.

Figure 2 is a vertical axial section of the machine of Figure 1, and

30 Figure 3 is a diagrammatic showing of a slightly modified form of machine.

Referring to Figures 1 and 2 of the drawings, reference numeral 5 designates generally a casing in which is mounted a rotor generally design-
35 ated at 6. The rotor is mounted on a horizontal shaft 7 supported in bearings 8 and 9 which are external of the casing. The rotor comprises a series of discs 10 keyed to the shaft within the casing and supporting a series of
40 axially extending bars 11 and 12. Beaters or hammers 13 are swung on bars 11 so that upon rotor rotation the beater heads are projected as shown in full lines in Figure 1, the projection of the beater heads being limited by the bars 12.
45 Upon the cessation or counter-action of centrifugal force, the beaters are adapted to move inwardly of the discs to the dotted line position shown in Figure 1.

Above the rotor the casing is provided with a
50 feed opening 14 and forwardly of the feed opening with respect to the direction of rotor rotation (which is that of the arrow in Figure 1) the casing is provided with a substantially vertical liner 15 which extends substantially from
55 the level of the rotor axis to terminate upwardly

somewhat above the level of feed opening 14. Opposite the liner or deflecting surface 15, the casing is provided with an escape or discharge opening 16 for unpulverable fragments, opening
5 16 constituting the mouth of a forwardly directed pocket 17 which is provided with a clean-out door 18.

The lower edge 19 of the opening 16 lies directly above the forward edge of the curved casing wall portion 20, this wall portion being dis-
10 posed above and rearwardly of the rotor shaft with respect to the direction of rotor rotation. The top edge 21' of the opening is defined by a substantially radial wall portion 21 and it will be noted that the edges 19 and 21' lie in a
15 plane substantially radial to the rotor, the edge 19 being in advance of the edge 21 so that the escape opening is inclined beneath the feed opening.

Projecting downwardly from the upper edge 20 of opening 16 are a number of fixed fingers 22 whose outer surfaces are substantially in the plane of the opening 16. Along the lower edge
19 of the opening is fixed an angle strip 23.

Between the top of the vertical deflecting sur-
25 face 15 and the feed opening, the casing is provided with a horizontally extending liner or deflecting surface 24, the forward portion 24' of the liner being inclined downwardly so that its plane includes the line of the top edge of open-
30 ing 16.

As here shown, feed is adapted to be effected through a chute 25, the direction of feed being toward deflecting surface 15. Within the chute
35 is suspended a curtain 26 which normally takes the full line position shown in Figure 1 but which is swung by the fed material to the dotted line position to permit the material to pass through feed opening 14 into the reduction
40 chamber.

Fingers 22 serve to guide the fed material across opening 16 for entrainment by the hammers. Unpulverable fragments or foreign matter, how-
45 ever, may fall directly through opening 16 into the pocket, material in the pocket being retained by strip 23.

The upper and lower edges of opening 16 lie in a plane which is steeply inclined to the vertical, the lower edge being closer to the vertical axial plane of the rotor than the upper edge.
50 The surface 21 is inclined as the plane of the upper and lower edges of the opening, as here shown, and tends to guide the material to be reduced past the lower edge of the opening di-
55 rectly to the reducing zone. Heavy impulverable

fragments, however, may gravitate directly through the opening 16.

Such fragments of foreign matter as fail to fall directly into the pocket are struck by the hammers and thrown against the deflecting surfaces 15 and 24 to be deflected thereby through opening 16. Since surface 24 is above the top of opening 16, the inclined marginal portion 24' is provided. It will be noted that deflected fragments pass directly across the path of fed material and will pass through any material encountered.

It will be noted the pocket being forwardly faced and disposed above wall 20, the hammers have no tendency to force the material to be reduced into the pocket. The entire disposition is such that very little of the material to be reduced finds its way into the pocket, the escape facilities for unpulverable fragments, however, being particularly effective. Curtain 26 intercepts fragments deflected upwardly through the feed opening.

The embodiment of the invention shown in Figure 3 is similar to that above described with the exception that a curved or concave deflecting surface 27 replaces the vertical and horizontal deflecting portions 15 and 24 of the embodiment shown in Figures 1 and 2. The action of the deflecting surface will be evident from the drawings.

It will be understood that many modifications of the described embodiments are possible without departure from the invention and accordingly I do not limit myself except as in the following claims.

I claim:

1. In a reducing machine, a casing, a rotor within the casing rotatable on a horizontal axis, a deflecting surface within the casing, the casing having an opening opposite said surface for the discharge of unpulverable fragments deflected by said surface, said surface being in advance of said opening with respect to the direction of rotor rotation, the casing having a feed opening substantially between said surface and said discharge opening, the discharge opening being inclined beneath the feed opening to directly receive unpulverable fragments from the latter, and downwardly projecting fingers at the top of said discharge opening and inclined as the discharge opening to prevent the passage of material to be reduced directly between said feed and discharge openings.

2. In a reducing machine, a casing, a rotor rotatable in said casing on a horizontal axis, said casing having a feed opening above the rotor and a discharge opening below the feed opening and between the latter and the rotor and on the rearward side of the feed opening with respect to the direction of rotor rotation, said discharge opening being adapted to receive directly and pass unpulverable fragments fed through the feed opening, and non-continuous material guiding means at the upper edge of the discharge opening and extending over the upper portion of said discharge opening toward the lower edge thereof.

3. In a reducing machine, a casing, a rotor rotatable in said casing on a horizontal axis, said casing having a feed opening above the rotor and also defining an inclined discharge opening below the feed opening and between the latter and the rotor, said discharge opening having a lower edge in advance of its upper edge with respect to the direction of rotor rotation, and non-continuous material guiding means at the upper edge of the discharge opening and extending

over the upper portion of said discharge opening toward the lower edge thereof.

4. In a reducing machine, a casing, a rotor rotatable in said casing on a horizontal axis, said casing having a feed opening above the rotor and also defining an inclined discharge opening below the feed opening and between the latter and the rotor, said discharge opening having a lower edge in advance of its upper edge with respect to the direction of rotor rotation and material guiding fingers fixed at the upper edge of the opening and extending toward the lower edge thereof.

5. In a reducing machine, a casing, a rotor rotatable in said casing on a horizontal axis, said casing having a feed opening above the rotor and also defining a discharge opening directly below the feed opening in a plane substantially radial to the rotor and on the rearward side of the opening with respect to the direction of rotor rotation, said discharge opening being disposed below the feed opening and between the latter and the rotor and non-continuous material guiding means at the upper edge of the discharge opening and extending over the upper portion of said discharge opening toward the lower edge thereof.

6. In a reducing machine, a casing, a rotor rotatable in said casing on a horizontal axis, said casing having a feed opening above the rotor and also defining a discharge opening in a plane substantially radial to the rotor, said discharge opening being disposed below the feed opening and between the latter and the rotor, and material guiding fingers extending substantially in the plane of said discharge opening.

7. In a reducing machine, a casing, a rotor within the casing rotatable on a horizontal axis, said casing having a top feed opening, a deflecting surface within the casing forward of the feed opening with respect to the direction of rotor rotation, the casing having an opening at the rear side of said feed opening with respect to the direction of rotor rotation and positioned to pass directly impulverable fragments mixed in the fed material or to pass such impulverable fragments when deflected by said deflecting surface, and guide means to prevent the passage of material to be reduced directly from said feed opening to said rearward opening.

8. In a reducing machine, a casing, a rotor within the casing rotatable on a horizontal axis, said casing having a top feed opening, a deflecting surface within the casing forward of the feed opening with respect to the direction of rotor rotation, the casing having an opening at the rear side of said feed opening with respect to the direction of rotor rotation and positioned to pass directly impulverable fragments mixed in the fed material or to pass such impulverable fragments when deflected by said deflecting surface, said rearward opening being inclined beneath the feed opening to lie at least in part directly beneath the latter, and guide means to prevent the passage of material to be reduced directly from said feed opening to said rearward opening.

9. In a reducing machine, a casing, a rotor within the casing rotatable on a horizontal axis, said casing having a top feed opening, a substantially vertical deflecting surface within the casing forward of the feed opening with respect to the direction of rotor rotation, the casing having an opening at the rear side of said feed opening with respect to the direction of rotor rota-

tion and positioned to pass directly impulverable fragments mixed in the fed material or to pass such impulverable fragments when deflected by said deflecting surface, and a substantially horizontal auxiliary deflecting surface between the top of said vertically disposed deflecting surface and the feed opening, the marginal portion of said horizontal deflecting surface adjacent the feed opening being downwardly inclined toward said discharge opening.

10. In a reducing machine, a casing, a rotor within the casing rotatable on a horizontal axis, said casing having a top feed opening, a deflecting surface within the casing forward of the feed opening with respect to the direction of rotor rotation, the casing having a discharge opening at the rear side of said feed opening with respect to the direction of rotor rotation faced toward said surface, there being an unobstructed space in the casing between said deflecting surface and said discharge opening, said discharge opening having top and bottom edges in a plane steeply inclined to the vertical, the lower edge being closer to the vertical axial plane of the rotor than the upper edge, guide means above the lower edge for directing the material to be reduced fed through the feed opening past the lower edge of the discharge opening to the reducing zone, intermixed heavy impulverable fragments gravitating directly through said discharge opening, said discharge opening also passing impulverable fragments deflected by said deflecting surface.

11. In a reducing machine, a casing, a rotor within the casing rotatable on a horizontal axis, said casing having a top feed opening, a substantially upright deflecting surface within the casing forward of the feed opening with respect to the direction of rotor rotation and a top substantially horizontal deflecting surface, the casing having a discharge opening at the rear side of said feed opening with respect to the direction of rotor rotation faced toward said substantially upright surface, there being an unobstructed space in the casing between said substantially upright surface and said discharge opening, said discharge opening having top and bottom edges in a plane steeply inclined to the vertical, the lower edge being closer to the vertical axial plane of the rotor than the upper edge, guide means above the lower edge for directing the material to be reduced fed through the feed opening past the lower edge of the discharge opening to the reducing zone, intermixed heavy impulverable fragments gravitating directly through said discharge opening, said discharge opening also passing impulverable fragments deflected by said deflecting surfaces.

12. In a reducing machine, the combination with a casing having a feed opening in its upper side, of pulverizing mechanism comprising a rotary crusher in the lower portion of said casing and spaced below said feed opening, mechanism

affording a discharge opening in one side of said casing between the said feed opening and said rotary crusher and rearwardly of the direction of rotation of said rotary crusher, the inner walls of said casing forwardly of said feed opening with respect to the direction of rotation of said rotary crusher being provided with surfaces in position to receive from said rotary crusher heavy impulverable fragments and deflect them rearwardly across the space between said feed opening and said rotary crusher into said discharge opening.

13. In a reducing machine, the combination with reducing mechanism comprising a rotary crusher, of an enclosure comprising a feed opening for directing to said rotary crusher the material to be reduced, means affording a discharge opening between said feed opening and said rotary crusher at one side of a compartment in said enclosure above said rotary crusher and rearwardly thereof with respect to the direction of rotation thereof and deflecting means within said enclosure opposite said discharge opening and forwardly of said feed opening in position to direct impulverable material into said discharge opening.

14. In a reducing machine, the combination with a casing having a lower reducing compartment and an upper receiving and separating compartment, the upper compartment having a feed opening in its top and a discharge opening in one side with a side vertical deflecting surface and a top horizontal deflecting surface on its interior opposite said discharge opening, and reducing mechanism comprising a rotary crusher in said lower compartment spaced below said feed opening and adapted to rotate in such direction as to throw impulverable material against said vertical and top horizontal deflecting surfaces for separation and discharge rearwardly of said upper compartment into said discharge opening.

15. In a reducing machine, the combination with a casing having a lower reducing compartment and an upper receiving and separating compartment with a feed opening in the top of said upper compartment, of reducing mechanism comprising a rotary crusher in the lower compartment, mechanism to afford vertical side wall and roof deflecting surfaces in the upper compartment forwardly of the feed opening with respect to the direction of rotation of said rotary crusher, and an auxiliary casing having a receiving opening in that side of said upper compartment opposite said deflecting surfaces and between said feed opening and said rotary crusher in position to receive impulverable material thrown by said rotary crusher against said deflecting surfaces and directed rearwardly thereby across said upper compartment between said feed opening and said rotary crusher.

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