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LINER PLATE FOR JAW CRUSHERS

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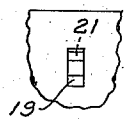


Fig. 2

Fig. 1

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LINER PLATE FOR JAW CRUSHERS

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1

This invention concerns an improvement in jaw crusher jaw structure in which a crusher jaw body is provided with a detachable wear plate forming a supporting seat for mounting a detachable jaw liner plate.

It has been long known to provide replaceable liner plates or jaw plates detachably mounted on the jaw body structure of jaw crushers. In order to guard against wear of the seat for the jaw plate on the jaw body proper, it has been customary to provide abutments positively fixing the position of the jaw plates on the jaw in addition to the holding bolts securing the jaw plate to the body. Difficulty has been experienced with some arrangements due to the tendency of the hard tough jaw plate to expand laterally under the pounding and crushing action of the stone or other material being crushed. Such expansion has strained the jaw body structure and the abutments used to fix the plate on the body, sometimes causing breakage of the jaw body structure where the jaw plate was rigidly confined without provision for expansion. Furthermore, the jaw plates sometimes became loosened so that relative motion with respect to the jaw structure caused wear on the seat for the jaw plate so that when an old plate was replaced by a new one the new plate could not be firmly secured to the jaw structure because of irregularity of the jaw plate seat.

An object of this invention is to provide an improved crusher jaw in which the jaw plate or liner is rigidly supported at one point and free to expand in service without damage to the supporting structure.

Another object is to provide a crusher jaw structure having a renewable wear plate forming a jaw plate or liner supporting abutment and wearing surface for the body of the jaw.

The present invention having the above and further objects which may appear herein may best be carried into practical effect as fully described herein in connection with the accompanying drawing, in which:

Fig. 1 is a vertical cross sectional view through a jaw type crusher embodying the present invention; and

Fig. 2 is a fragmentary elevation on the plane II—II of Fig. 1, with the hook removed.

The crusher illustrated in Fig. 1 is an ordinary jaw type crusher having the working faces of the jaws equipped according to the present invention. The frame of the crusher is shown at 1 and has a stationary jaw body 2. A swinging jaw body 3 is pivoted to the frame 1 at 4 and has a crushing movement imparted to it by a crusher toggle 6 actuated by mechanism well known in the art and forming no part of the present invention.

2

The swinging jaw 3 is provided with a pressure receiving face 7 and may be provided at its lower end or toe with a step 8 forming an abutment running transversely across the face of the jaw body. One or more wear plates are detachably mounted in pressure transmitting relation on the face 7 of the swinging jaw. The lower edge of at least one of these wear plates 11 may rest against the step 8 of the toe of the swinging jaw 3. The wear plates 11 are securely attached to the face 7 of the swinging jaw 3 as by bolts 12. The outer surface of the wear plates 11 when attached to the swinging jaw body 3, forms a flat mounting surface or seat for the jaw liner, formed of liner plates 13, which forms the working surface of the swinging jaw.

In the crusher illustrated in the drawing, there are shown a pair of flat wear plates 11 spaced longitudinally of the jaw body 3 forming an interrupted seat for the jaw liner, the space between the wear plates 11 forming a groove across the said seat. As shown, the jaw liner is made up of a pair of separate liner plates 13 on swinging jaw 3, each having a working face 14 and a plane rear face 16 which is machined to fit the seat formed by wear plates 11. Liner plates 13 may be securely fastened in position on the moving jaw by bolts 17 passing through the plates and the jaw body 3 and having rectangular tapered heads 18 countersunk in the working face of the liner plates in suitable recesses 19. In the body of the liner plates, adjoining the holes through which bolts 17 pass, a tapered recess 21 may be formed in such a manner that in addition to the bolt holes there will be an intersecting recess extending through the liner plates 13 from the working face 14 toward the rear face 16 in the direction of one end of the plate, for a purpose to be more fully described hereinafter.

The working face of the stationary jaw body 2 is formed in a manner similar to that of the swinging jaw 3, flat wear plates 22 and 23 are shown secured to the face 9 of the stationary body 2 at the upper and lower ends thereof, respectively, as by bolts 24. Wear plates 22 and 23 form a pressure receiving seat for the jaw liner, shown as made up of liner plates 26 and 27 which form the working surface of the stationary jaw. Jaw liner plates 26 and 27 are secured in position on the stationary jaw by bolts 17 in a manner similar to that in which the moving jaw liner plates 13 are secured.

At one end of the plane rear face 16 of each

liner plate there may be formed a projecting ledge 28 extending a distance of less than the thickness of wear plates 11, 22 and 23. The ledges 28, when the liner plates are secured to the position on their respective jaws, will engage one edge of the corresponding wear plate to prevent longitudinal displacement of the liner plate with respect to its corresponding jaw body in at least one direction.

It will be noted that, in the crusher shown in the drawing, the jaw liner is formed as a pair of liner plates mounted on each jaw of the crusher with the ledges 28 in abutting relation at about the central portion of the jaw, substantially filling the space between the wear plates 11 on the swinging jaw and the wear plates 22 and 23 on the stationary jaw. It will be understood, however, that the invention can be applied in crushers having only one liner plate on each jaw, that is by placing the ledge 28 at one end only of each liner plate and using only a single wear plate in a manner which can be clearly visualized by a consideration of the lower half only of the jaws of the crusher shown in the drawing. Furthermore, a single integral liner plate could be used having a single ledge running across its plane rear face intermediate the ends, such as would be achieved if the separate liner plates 13 as shown on the swinging jaw 3 in the drawing were formed integrally as one liner plate.

It has been found that in the operation of the jaw type crushers having liner plates formed of manganese steel, the crushing impact of the rock on the surface of the liner plate causes the liner plate to expand laterally by cold working action. This expansion is more marked directly at the working surface and results in a warping of the plate so that it becomes more or less convex in service. If the ends of the liner plate are confined between fixed abutments on the jaw body, the expansion of the plate in service will cause a tremendous strain on the abutment, and has been known to cause breaking off of the fixed shoulders or abutments between which it is confined. The present arrangement permits the liner plates to be fixed at one portion only of their length with relation to the jaw body, and leaves the plate unconfined and free to expand laterally in all directions without throwing any strain on any part of the jaw body. The warping of the liner plate mentioned hereinabove causes stretching of the bolts which hold the liner plate in the jaw body, and frequently results in a loosening of the liner plate so that, under crushing pressure, it moves around relative to the seat or mounting surface prepared for it on the jaw body, causing irregular wear of the mounting surface on the jaw body, particularly at the corners of the plates. As a result of this irregular wear, when the liner plates have become worn and it is desired to replace them with new plates, the plane rear surfaces of the new plates, which have been machined to fit flat seats on the jaw body, will not fit the irregular surfaces resulting from the wearing action of loose plates. The lack of a good fit between the rear faces of the new plates and their worn seats on the jaw body may make it difficult to securely fasten the liner plates on the jaw body to obtain the desired rigid jaw structure. The interposition of the flat wear plates 11, 22 and 23 between the liner plates 13, 26 and 27 and the mounting faces 7 and 9 on the jaw bodies 2 and 3 provides a renewable seat on the jaw body to take any wear due to loose liner plates that may occur during operation of the crusher. The wear plates 11, 22 and 23 may be

replaced whenever new liner plates are installed on the crusher, creating a fresh and perfect seat for the plane rear faces of the new liner plates.

It will be noted that the liner plates 13 of the swinging jaw are interchangeable so that if one liner plate wears faster than the other they may be reversed to increase the wearing life of the jaw liner. If the liner plates of the stationary jaw are made identical instead of curved as shown in the drawing, they may also be reversed to increase the life of the liner.

It will be noted that an oblique walled recess adjoins at least one liner plate bolt hole in the body of each liner plate, providing an oblique walled recess in the liner plates opening to the working face through the bolt hole and recess 19. This oblique walled recess is provided to facilitate the handling of the liner plates when they must be removed or replaced. As shown in Fig. 1, one of the bolts 17 which hold the upper liner plates 26 on the stationary jaw is shown removed. The recess 21 adjoining the bolt hole in the body of liner plate 26 is made in such relation to the counter recess 19 in the working face 14 that a clear opening having an obliquely upwardly extending upper wall is formed. This oblique wall forms a good hold for the tip of a hook 29 which may be inserted therein for attaching lifting gear. With the hook 29 in place, the remaining bolts 17 may be removed from the liner plate and the liner plate may be readily hoisted away from the jaw. Without the provision of this hold for the lifting hook 29, which is protected during operation of the crusher by bolt head 18, it would be necessary to pry the liner plate away from its seat and insert the lifting hook in some hook hold provided in rear face 16 of the liner plate. The present arrangement makes a very convenient hook hold which is in the working face of the plate and is therefore always readily available and protected by the bolt head 18 from abnormal wear or filling up by crushed material during crusher operation.

It will be understood that the specific device described herein and illustrated in the drawing is exemplary only, and that the invention is intended to include such modifications and equivalents as may readily occur to persons skilled in the art, the invention being limited only by the terms of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. In a crusher jaw, a jaw body having a face, an abutment projecting from said face, a flat wear plate of greater thickness than the depth of said abutment resting against said face and engaging said abutment along one edge surface, a jaw plate having a working face and a plane rear face fitting said flat wear plate, a ledge of less depth than the thickness of said wear plate projecting from the rear face of said jaw plate for engaging an edge surface of said wear plate opposite said abutment engaging edge surface in the same interfacial plane, and means to clamp said jaw plate against said wear plate and jaw body to form an operative unit.

2. In a crusher jaw structure, a jaw body having a pressure receiving face, a pair of replaceable wear plates rigidly secured to said body in pressure transmitting relation to said face in longitudinally spaced relation, to form a wear receiving jaw plate mounting surface for said jaw body having a transverse groove intermediate its length, a pair of interchangeable jaw plates for said jaw each having a working face, a rear face and a transverse ledge projecting from one end

of said rear face, of depth less than said groove and thickness approximately half the width of said groove, said jaw plates being mounted on said jaw plate mounting surface with their ledge ends abutting and the ledges engaged in said groove to prevent longitudinal displacement of said jaw plates, and means securing said jaw plates firmly against said jaw plate mounting surface and said jaw body to form an operative unit.

3. In a jaw crusher, a jaw body having a pressure receiving face, a pair of detachable flat wear plates rigidly secured to said body in pressure transmitting relation to said pressure receiving face and longitudinally spaced to form an interrupted jaw liner mounting seat, a jaw liner for said jaw body having a working surface and a rear face, a transverse projecting ledge on said rear face intermediate the ends of said rear face, and means securing said jaw liner against said mounting seat in pressure transmitting relation, with said ledge engaging one of the opposed edge surfaces of said wear plates to fix the longitudinal position of said liner, said jaw body being free of projections obstructing longitudinal expansion of said liner in working.

4. In a crusher jaw structure, a jaw body having a pressure receiving face, a pair of replaceable wear plates rigidly secured to said body in pressure transmitting relation to said face in longitudinally spaced relation, to form a wear receiving jaw plate mounting surface for said jaw body having a transverse groove intermediate its length, a pair of jaw plates for said jaw each having a working face, a rear face and a transverse ledge projecting from one end of said rear face, of depth less than said groove and thickness approximately half the width of said groove, said jaw plates being mounted on said jaw plate mounting surface with their ledge ends abutting and the ledges engaged in said groove to prevent longitudinal displacement of said jaw plates, and means securing said jaw plates firmly against said jaw plate mounting surface and said jaw body to form an operative unit.

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