

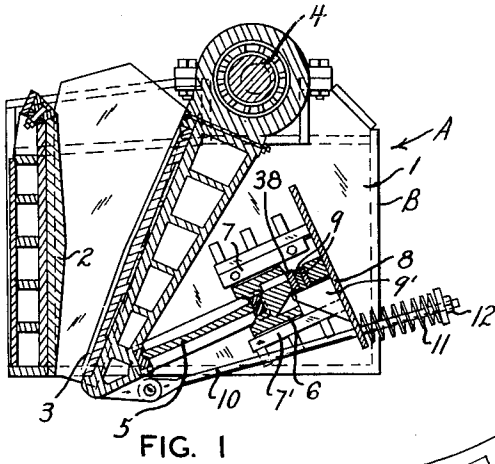
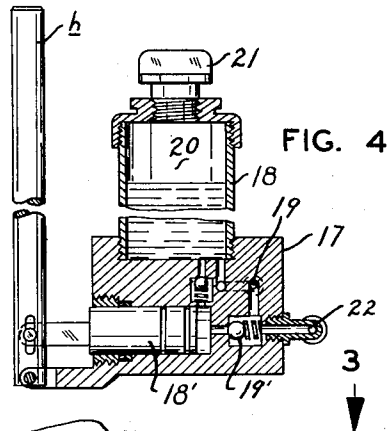
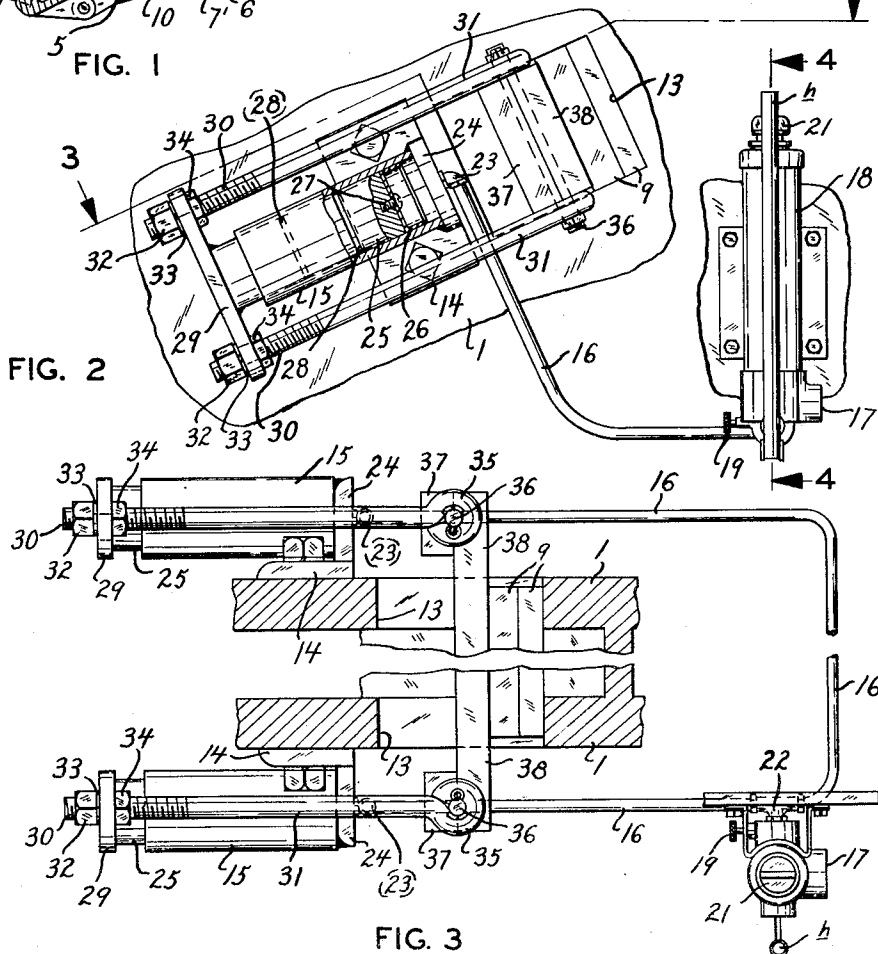
Sept. 4, 1951

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2,566,583

JAW CRUSHER

Filed Oct. 8, 1947



UNITED STATES PATENT OFFICE

2,566,583

JAW CRUSHER

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Application October 8, 1947, Serial No. 778,556

3 Claims. (Cl. 241-217)

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This invention relates in general to jaw crushers and, more particularly, to jaw crushers provided with a hydraulic shim jack.

Heretofore, jaw crushers generally comprised a fixed jaw and a rocking jaw which is fulcrumed upon a toggle block. In order to vary the degree of fineness of the material crushed, it was necessary to adjust the rocking jaw and toggle block in relation to the stationary jaw, and thereby vary the discharge opening between the lower extremities of the jaws. This adjustment is ordinarily accomplished by shutting down the crusher, releasing a number of bolts and spring rods, and, with chains or similar accessories, pulling the rocking jaw out of the way to permit shifting the toggle block forward and inserting or removing shims behind the toggle block. As is well understood by all mechanics and operators who have made such adjustments, the operation is costly, time-consuming, inconvenient, and frequently dangerous.

The primary object of the present invention is to provide a jaw crusher having externally operated means for adjusting the discharge opening between the jaws which is simple, speedy, convenient, economical and safe.

It is a further object of the present invention to provide a jaw crusher having power driven jaw adjustment mechanism which, if necessary or desirable, can be operated without shutting down the crusher.

Another object of this invention is to provide a jaw crusher having a hydraulic shim jack to permit the insertion of shims with the minimum of manual effort in an effective and economical manner.

With the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawing—

Figure 1 is a vertical sectional view of a jaw crusher constructed in accordance with and embodying the present invention;

Figure 2 is a fragmentary side view of the jaw crusher partly broken away to illustrate in more detail the hydraulic shim jack forming a part of the present invention;

Figure 3 is a transverse sectional view along line 3-3 of Figure 2; and

Figure 4 is a vertical sectional view taken along line 4-4 of Figure 2.

Referring now in more detail, and by reference characters to the drawing, which illustrates

an improved embodiment of the present invention, A designates a jaw crusher including a frame or housing B having spaced parallel side walls 1, a stationary front jaw 2, a rockable rear jaw 3 operably mounted at its upper end upon an eccentric 4. Adjacent its lower end, the rear jaw 3 is rockably fulcrumed upon a toggle plate 5 which is, in turn, fulcrumed in a toggle block 6, the latter being at its ends slidably mounted and clamped in adjustment ways or guides 7, 7'. Welded or otherwise secured at its end upon the inner faces of the side walls, and extending transversely across the interior of the housing B, is a rigid back plate 8 and removably interposed between the forwardly presented face of the plate 8 and the rear face of the toggle block 6 is a plurality of shims 9, which are vertically supported from beneath by shim brackets 9'. Hingedly mounted on the lower extremities of the rear jaw 3 are spring rods 10 extending loosely through the plate 8 and provided on their extended ends with spiral springs 11 and take-up nuts 12. The side walls 1 are provided, in the region of the back plate 8, with aligned rectangular apertures 13, through which shims 9 may be inserted and removed, as may best be seen in Figure 3.

Mounted by brackets 14 on the exterior faces of each of said side walls 1, forward of the aperture 13, are hydraulic jack-cylinders 15, connected by suitable tubing 16 to a manual oil pump 17, of the conventional type, preferably mounted in an accessible location on the rear frame B. The pump 17 is provided with a pivotally mounted handle *h*, a cylinder 18, a piston 18', a needle-type stop valve 19, a check valve 19', a sump or oil reservoir 20, and a filling cap 21, all as best seen in Figure 4. From a two-way fitting 22 mounted on the outlet side of the check valve 19', the tubing 16 leads to each of the hydraulic jack-cylinders 15 and is connected thereunto by suitable fittings 23 mounted in a top plate 24 which is welded or otherwise integrally connected with the bracket 14. Fitted for longitudinal sliding movement within each jack-cylinder 15 is a piston 25, having an oil seal cup 26 secured upon its inner end by a screw 27. Uniformly spaced along the length of said piston 25 are annular grooves 28 for facilitating the hydraulic movement and actuation of the piston 25. The lower projecting end of the piston 25 is integrally provided with a cross head 29 for receiving the threaded ends 30 of pull-rods 31, which are held adjustably therein by retaining nuts 32, lock-washers 33, and lock-nuts 34.

The upper ends of each of the pull-rods 31 are

bent circularly in the provision of eyes 35, for receiving bolts 36 which are threaded into reinforced end sections 37 of a rigid cross bar 38, which extends across the frame B and projects at its ends through the rectangular apertures 13 and rests along its lower edge on the shim brackets 9'. Said cross bar 38 abuts along its forwardly presented face against the rear face of the toggle block 6.

It will, of course, be understood that the different metal shims 9 may be of different thicknesses as required to provide any desired spacial relationship between the toggle block 6 and the back plate 8. The shims 9, furthermore, are equal in length to the distance between the inner opposed faces of the side walls 1.

In use, the spacial relation between the jaws of the crusher may be readily adjusted by closing the needle-type stop valve 19, of the oil pump 17. Thereupon, the pump handle *h* is actuated to pump oil through the tubing 16 into the cylinders 15. The incoming oil will exercise a driving force on the head of the piston 25, causing said piston 25 to move in a downward or outward direction. In the said downward or outward movement of the piston 25, the cross bar 38 is pulled forwardly toward the forward side of the rectangular apertures 13. The piston 25 is so moved by continued pumping of the oil until sufficient clearance is achieved to permit the facile insertion or removal of shims 9, as may be required. Upon the insertion of the desired number of shims 9, the needle-type stop valve 19 is opened permitting the oil in the cylinder 25 to flow back into the oil-containing sump 3 of the oil pump 17. Thereupon, the piston 25 will be forced upwardly under the weight of the jaw 3 back into the cylinder 15 and the cross bar 38 will move into abutment against the inserted shims 9, completing the adjustment. It is to be particularly noted that this adjustment can be made while the jaw crusher is idling, and that it is not necessary to shut the crusher down.

In the event the oil pump 17 should fail or not function properly, the threaded ends 30 of the pull-rods 31, retaining nuts 32, and lock-nuts 34 provide an auxiliary method of moving the cross bar 38. Said nuts 32 and 34, upon being threaded upwardly on the pull-rods 31, will cause the cross bar 38 to be moved in the provision of clearance for releasing and permitting removal or insertion of shims 9. It should also be noted in this connection that a motor driven hydraulic pump may, if desired, be substituted for the manually operable oil pump 17.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the jaw crusher may be made and substituted for those herein shown and described, without departing from the nature and principle of my invention.

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

1. A jaw crusher having a housing, a movable jaw, a toggle plate for rockably supporting the lower end of said jaw, a toggle block for rockably supporting the toggle plate, a back support in said housing, a plurality of removable shims disposed between the toggle block and back sup-

port for adjusting the position of the toggle block in relation to the back support, bracket means within the housing for supporting the shims, said housing being provided with openings adjacent the end of the shims for permitting ready insertion and removal thereof, a cross bar interposed between the block and the shims extending at its ends outwardly through the openings, hydraulic jacks operably connected to the ends of the cross bar, and a fluid pump actuating said jacks, said pump having a fluid reservoir and a return valve associated therewith to control the returned flow of the fluid from the jacks.

2. A jaw crusher having a stationary jaw, a movable jaw, a toggle plate, a shiftably mounted toggle block, a cross bar disposed abuttingly against the toggle block and extending at its ends outwardly on opposite sides of the toggle block, hydraulic jacks mounted on opposite sides of the housing forwardly of the openings, each being operably connected to one end of the cross bar, and a fluid pump connected by suitable tubing to the jacks for actuation thereof, said pump having a fluid reservoir and a return valve associated therewith to control the return flow of the fluid from the jacks.

3. A jaw crusher having a housing, a movable jaw, a toggle plate for rockably supporting the lower end of said jaw, a toggle block for rockably supporting the toggle plate, a back support in said housing, a plurality of removable shims disposed between the toggle block and back support for adjusting the position of the toggle block in relation to the back support, bracket means within the housing for supporting the shims, said housing being provided with openings adjacent the end of the shims for permitting ready insertion and removal thereof, a cross bar interposed between the block and the shims extending at its ends outwardly through the openings, hydraulic jacks rigidly mounted upon the side walls of the housing, each of said jacks further being mounted on the opposite side of the cross bar with respect to the shims, said jacks respectively being operably connected to the ends of the cross bar, and a fluid pump actuating said jacks, said pump having a fluid reservoir and a return valve associated therewith to control the returned flow of the fluid from the jacks.

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