R. C. NEWHOUSE.

JAW CRUSHER.

APPLICATION FILED FEB. 26, 1916.

1,309,807. Patented July 15, 1919.

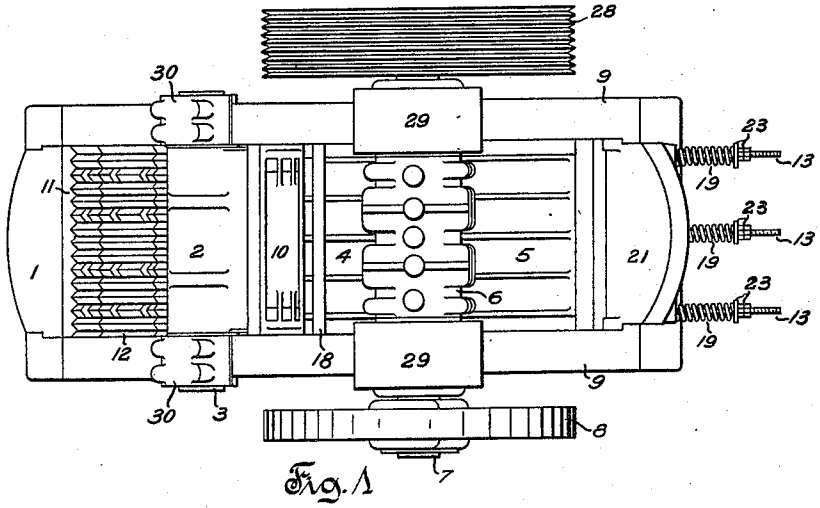



Fig. 1

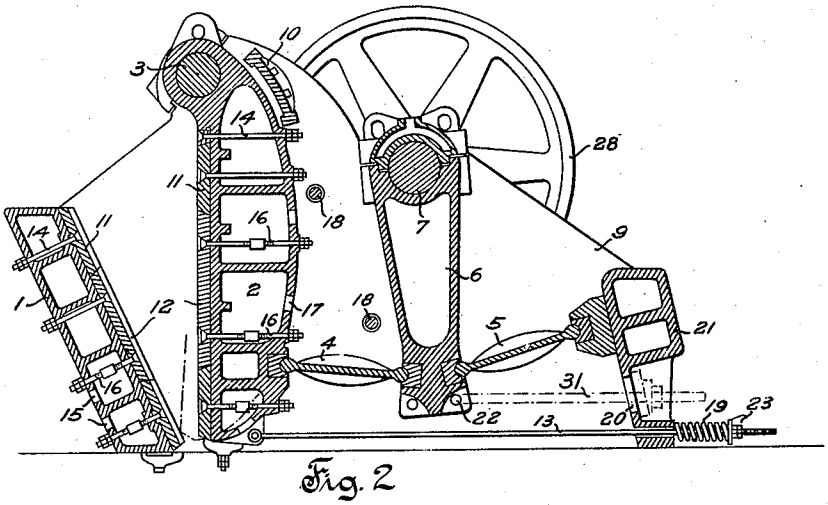



Fig. 2

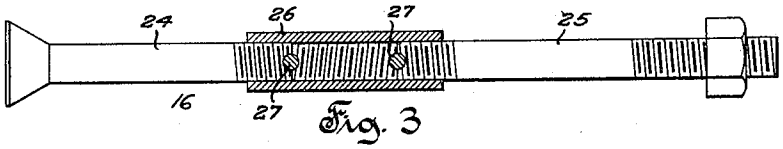



Fig. 3

Inventor

R. C. Newhouse

by G. J. Olwin

Attorney

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

RAY C. NEWHOUSE, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS MANUFACTURING COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF DELAWARE.

## JAW-CRUSHER.

1,309,807. Specification of Letters Patent. Patented July 15, 1919.

Application filed February 26, 1916. Serial No. 81,048.

*To all whom it may concern:*

Be it known that I, RAY C. NEWHOUSE, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Jaw-Crushers, of which the following is a specification.

This invention relates to improvements in the construction of crushers and is especially applicable to jaw crushers of massive design and large capacity.

An object of the invention is to provide a jaw crusher which is simple in construction, efficient in operation, and may be readily assembled and disassembled. One of the more specific objects is to provide means for permitting ready assembling and removal of the actuating mechanisms of jaw crushers having very heavy crusher elements. Another specific object is to provide means for permitting ready removal of the wearing liners of jaw crushers. A further specific object is to provide a crusher structure which will effectively withstand the severest strains to which it may be subjected.

The first of the above mentioned specific objects is attained by suspending the movable jaw from a pivot which is so located with reference to the center of gravity of the movable jaw, that this jaw will automatically swing to a position permitting free vertical removal of the jaw moving mechanism upon release of the means which normally maintains the jaw in engagement with this mechanism. This feature of applicant's invention is of considerable importance in very large crushers where the enormous weight of the movable jaw would otherwise necessitate the use of special apparatus in order to move the jaw to a position permitting free removal of the jaw moving mechanism. The feature has been embodied in a crusher having an inlet opening as large as 7 ft. long by 5 ft. 6 in. wide, such a crusher weighing over 500,000 pounds. The second of the specific objects is attained by making the bolts which secure the jaw liners in place, of several detachable sections, and providing means for permitting ready assembling and disassembling of the bolts. This second feature permits ready removal of the liners without necessitating displacement of the massive crusher jaws. The third specific object is accomplished by providing a stiffening web member parallel to and adjacent the movable jaw member, and connecting the side frames of the crusher. This latter feature permits construction of a frame having requisite strength, at minimum cost.

A clear conception of an embodiment of the invention may be had by referring to the drawing accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Figure 1 is a top view of a crusher embodying the present invention.

Fig. 2 is a transverse vertical section through the crusher disclosed in Fig. 1.

Fig. 3 is an enlarged part sectional view of one of the sectional lining securing bolts.

The jaw crusher disclosed in the drawing comprises essentially a stationary jaw 1, a movable jaw 2, side frames 9, a rear frame 21, and actuating mechanism for the movable jaw. The stationary jaw 1 is secured to the side frames 9 and has a crushing surface provided with liners 11, 12, facing the movable jaw 2. The movable jaw 2 is suspended from a pivot 3 mounted in bearings 30 in the side frames 9, and has a crushing surface provided with liners 11, 12, facing the stationary jaw 1. The pivot 3 and stationary jaw 1 are located on the same side of the vertical plane passing through the center of gravity of the jaw 2. The extreme end portions of the side frames 9 are secured to a rear frame 21 which serves to space and properly stiffen the adjacent portions of the frames 9. The frames 9 are also secured to each other by means of tie rods 18 and a stiffening web member 10. The web member 10 is located adjacent and parallel to the movable jaw 2, and is of considerable width whereby relative shifting of the adjacent portions of the frames 9 is prevented. If necessary, several web members 10 may be provided.

The mechanism for moving the jaw 2 comprises essentially a main shaft 7 having eccentric end portions mounted in bearings 29 of the side frames 9, a pitman 6 suspended from the shaft 7, and toggle elements 4, 5. The front toggle element 4 has

its one end bearing against the lower rear portion of the jaw 2, and has its opposite end engaging a bearing in the lower front portion of the pitman 6. The rear toggle element 5 has its front end engaging a bearing in the lower rear portion of the pitman 6, and has it rear end engaging a bearing on the front portion of the rear frame 21. The shaft 7 is rotatable by means of a rope wheel 28 mounted on one of the overhanging ends of the shaft, and has a fly wheel 18 secured to the opposite overhanging end thereof. The movable jaw 2 is normally held in engagement with the toggle element 4 and the elements 4, 5, are held in position by means of rods 13 secured to the lower end of the jaw 2 and passing through openings in the rear frame 21. The rods 13 are provided with adjustable nuts and collars 23 between which collars and the frame 21, helical compression springs 19 are located.

The upper liners 11 of the jaws 1, 2, are held in place by means of single-piece through bolts 14 of ordinary construction. The lower liners 12 of the jaws 1, 2, are held in place by means of sectional bolts 16. Each of the bolts 16 comprises a headed section 24, a threaded section 25, and a sleeve section 26, see Fig. 3. The adjacent ends of the sections 24, 25, have screw threads which engage the threaded interior of the sleeve section 26. The sleeve section 26 is provided with transverse through holes, which with the bolt assembled, register with notches in the adjacent ends of the sections 24, 25. Pins 27 passed through these registering holes and notches serve to lock the sleeve section 26 to the adjacent sections 24, 25. The jaws 1, 2, are provided with cored openings 15, 17, adjacent the bolts 16, which permit ready assembling and disassembling of the sectional bolts.

During the normal operation of the crusher, the main shaft 7 is rotated by means of power applied to the rope wheel 28, causing the pitman 6 to move back and forth in a substantially vertical direction whereby the toggle elements 4, 5, are moved. The motion of the toggle elements 4, 5, is transmitted to the movable jaw 2 which swings back and forth relative to the jaw 1 about the pivot 3. The material to be crushed is fed into the inlet opening at the upper end of the crushing space between the jaws 1, 2, and passes downwardly through the crushing chamber, the crushed material being eventually delivered through the discharge opening at the lower end of the jaws.

If it is desired to disassemble the crusher, an element 31 having a hooked end and shown in dot and dash lines in Fig. 2, is first passed through the opening 20 in the rear frame 21 and the hooked end is inserted in the opening 22 at the lower end of the pitman 6. This element 31 is then secured to the frame 21 by means of a nut and washer, as disclosed, so as to prevent forward swinging of the lower extremity of the pitman 6. The nuts and collars 23 on the rods 13 are then removed, causing the movable jaw 2 to swing toward the stationary jaw 1, as indicated in dot and dash lines in the figure. When the jaw 2 has swung into engagement with the jaw 1, the toggle element 4 will drop out of place. The lower extremity of the pitman 6 may then be released by removing the element 31, causing the pitman to assume a vertical position and permitting the toggle element 5 to drop out of place. The pitman 6 and jaw 2 may then be removed if desired. The crusher may be readily assembled by reversing the series of steps necessary for disassembling. The rods 13 besides serving as means for assembling the crusher, normally coact with the springs 19 and collars 23 to resiliently retain the jaw 2 against the toggle element 4.

It should be noted that the location of the pivot 3 and the stationary jaw 1 on the same side of the center of gravity of the movable jaw 2, and the provision of sufficient space between the lower extremities of the jaws 1, 2, causes the jaw 2 to swing sufficiently to permit free vertical removal of the toggle elements, when the rod 13 is released. The pitman 6 is also suspended in such a manner that the toggle element 5 is freely vertically removable when the lower end of the pitman is released.

In order to remove the upper liners 11 it is necessary only to remove the nuts at the outer extremities of the bolts 14 and to slide these bolts endwise into the crushing chamber. Due to the fact that the jaws 1, 2, are relatively close to each other at their lower extremities, the lower bolts 16 if formed in one piece, could not be removed endwise through the crushing chamber. By forming these bolts in sections 24, 25, connected by the removable sleeves 26, the bolts 16 may be readily removed without displacing the jaws 1, 2. Access to the sleeves 25 and pins 27 is permitted through the cored openings 15, 17, formed in the jaws 1, 2, respectively. The utility of these features of applicant's invention will be readily noted when it is considered that in very large jaw crushers the weight of a movable jaw member approximates fifty tons.

By providing one or more stiffening web members 10 adjacent and parallel to the movable jaw and directly connecting the side frames 9, relative shifting of the side frames is effectively prevented. The tie rods 18 and rear frame 21 also serve to increase the rigidity of the structure and together with the web 10 provide a frame which is capable of withstanding enormous strains.

It should be understood that it is not desired to be limited to the exact details of con-

struction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,—

1. In combination, a pair of opposed jaws, a liner, and means for securing said liner to one of said jaws, said securing means being removable transversely of said jaws and being of greater length than the adjacent distance between said jaws, and said securing means including means for permitting endwise removal of said securing means without displacing either of said jaws.

2. In combination, a pair of spaced jaws, a liner, and a bolt for securing said liner to one of said jaws, said bolt being axially removable transversely of said jaws and being of greater length than the adjacent distance between said jaws, and said securing means including means for permitting endwise removal of said bolt without displacing either of said jaws.

3. In a crusher, a frame, a jaw movably suspended from said frame, a toggle element for moving said jaw, means for actuating said toggle element, frame bracing means between said jaw and said actuating means and above said element, and means for maintaining engagement between said jaw and said element, the space above said engagement maintaining means and below said toggle element being vacant and said jaw being formed to automatically release said element when said engagement maintaining means is released.

4. In a crusher, a frame, a jaw movably suspended from said frame and having a pivot at its upper end, a toggle element for moving said jaw, means for actuating said toggle element, frame bracing means between said jaw and said actuating means and above said element, and means for maintaining engagement between said jaw and said element, the space above said engagement maintaining means and below said toggle element being vacant and the center of gravity of said jaw being so located that said jaw will swing away from said element and release the same when said engagement maintaining means is released.

5. In combination, a movable jaw having an upper pivot located at one side of a vertical plane passing through the center of gravity of said jaw, a pitman having an upper pivot located on the same side relatively to a vertical plane passing through its center of gravity as the pivot of said movable jaw, a frame, mechanism connecting said movable jaw and said pitman, other mechanism connecting said pitman and said frame, and means for maintaining engagement between said jaw, pitman, frame and said mechanisms, said mechanisms being freely vertically removable when said engagement-maintaining means is removed.

6. In combination, a movable jaw member having an upper pivot located at one side of a vertical plane passing through the center of gravity of said member, a pitman member having an upper pivot located on the same side relatively to a vertical plane passing through its center of gravity as the pivot of said jaw member, a frame member, a toggle member connecting said pitman member and said frame member, a second toggle member connecting said pitman and said jaw member, means for maintaining engagement between all of said members, and means for maintaining engagement between said pitman member, frame member and the intervening toggle member when said engagement maintaining means is removed whereby said second toggle member is freely vertically removable.

In testimony whereof, the signature of the inventor is affixed hereto.

RAY C. NEWHOUSE.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**