May 22, 1928. 1,670,748

H. J. SHELTON

CRUSHER

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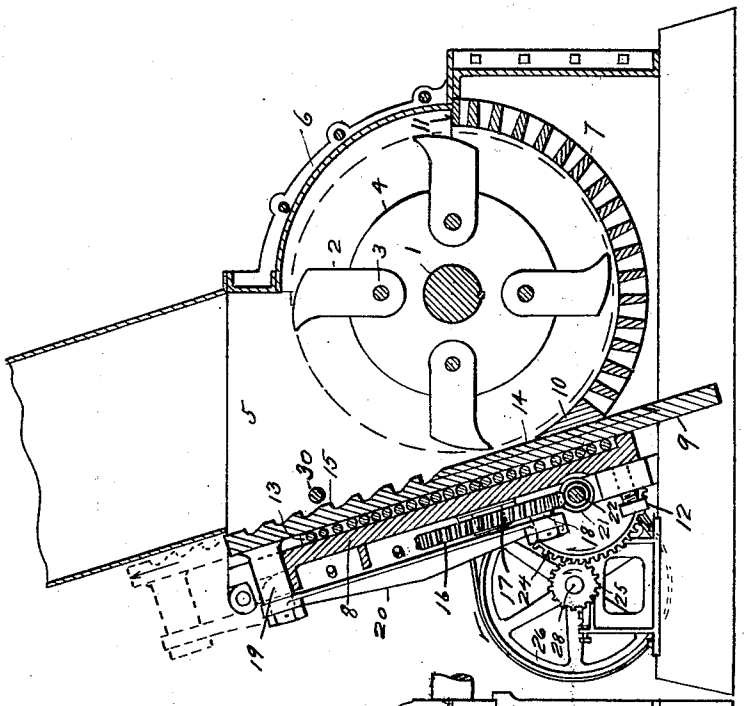


Fig. 2.

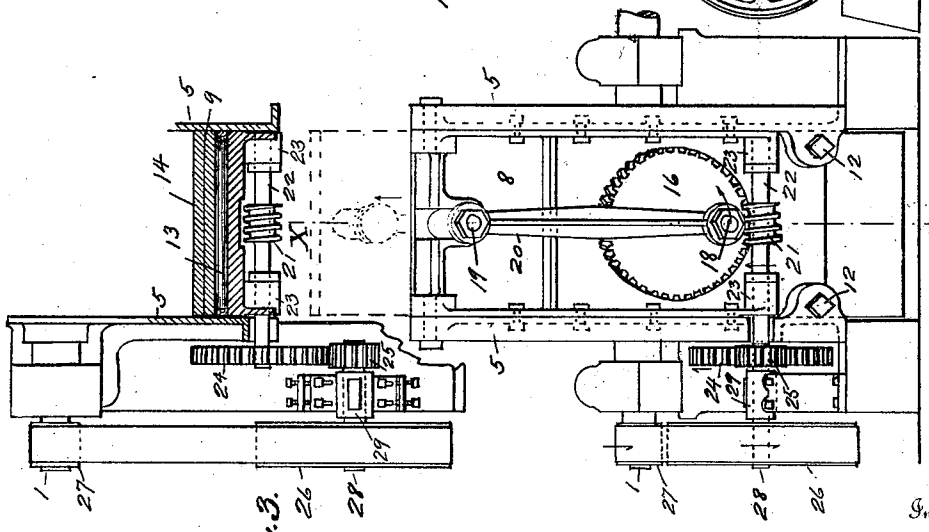


Fig. 1.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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CRUSHER.

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This invention relates to certain new and useful improvements in crushers, pulverizers, and like machines for crushing clay, shale, rock and other material, especially such as are adhesive in a damp and partly crushed condition.

The main object of my invention is to provide a reciprocating impact or breaker plate for a machine of the class described; secondly, to provide a slidably mounted reciprocating impact plate; thirdly, to cause such a plate to slide up and down substantially tangentially to the path of the hammers or other rotary crushing elements; fourthly, to adjust such a plate toward and away from the path of the rotary crushing elements, and thus vary the clearance; fifthly, to improve the feeding operation of the material entering the crusher; and sixthly, to operate automatically the said impact plate in its reciprocating movement.

In the accompanying drawing on which like numerals indicate corresponding parts,

Fig. 1 represents a front view of a crusher with my improvements applied thereto:

Fig. 2, a vertical sectional view at and near the center line X X of Fig. 1; and

Fig. 3, a plan view of the driving mechanism with part of the crusher in section.

When wet shale, clay or similar material is fed to a crusher of the usual style, the feed tends to adhere to the usual stationary breaker plate and throat of the hopper beyond and above the path of the hammers; and as the hammers continually throw off the adhesive partly crushed material, this material tends to pack in a mass in the throat above and beyond the hammer circle, thus reducing the effective opening, and sometimes even arches over the hammers and shuts off the feed till the obstruction is removed. My reciprocating impact plate herein described is designed to obviate this difficulty.

Referring to the drawings, the numeral 1 designates the rotor shaft of a suitable crusher in which the hammers 2 are pivotally mounted on rods 3 carried eccentric to the shaft by disks 4 keyed thereon and constituting the rotor. Side housings 5, cover 6, and cage 7, enclose the rotor which is belt driven or direct connected to the usual motor (not shown). An inclined breast plate 8, preferably hinged at the top, is secured to the side housings at the front by bolts in slotted holes to allow adjustment of the clearance of the hammer circle.

On this breast plate is preferably mounted my impact plate 9. The movement of this impact plate shown is up and down or reciprocating parallel to the breast plate or other support and substantially tangent to the hammer circle, but may be otherwise. (The ordinary breaker plate is fixed to the breast plate.) My impact plate 9 extends downward below the first bar 10 of the inserted cage bars that rest in grooves in the side housing in the usual manner, but the bar 10 is triangular so as to be practically tangent to the face of my impact plate, preferably, with one inclined face lying in close proximity thereto. A filler bar 11 of lesser thickness than shown is inserted to allow backward adjustment of the front bar when the breast plate and impact plate are moved closer to the hammer circle by adjusting screws 12 when varying the clearance of the hammers while maintaining the cage clearance.

A rack of rollers 13 or other antifriction device is preferably interposed between the supporting breast plate and impact plate as shown in Figs. 2 and 3, to facilitate the sliding movement of the impact plate, and a removable face plate 14 is secured to the impact plate near its lower end and adjacent to the hammer circle for replacement under wear. This plate 14 is preferably reversible and made of manganese steel. The upper face of the impact plate is preferably corrugated with downwardly pointed teeth 15 to assist in feeding the material downward into the path of the hammers, and to pass the material on the upward movement of said plate.

This reciprocating action of the impact plate may be effected by any suitable means. I have shown the preferred means as consisting of a crank disc 16, mounted on a stud shaft 17 projecting from the breast plate or other support and having a crank pin 18 coupled to a stem 19 near the top of the impact plate, by a connecting rod 20. The crank disc has teeth on its periphery matching a worm 21 mounted on a shaft 22 in bearings 23, preferably carried by the breast plate as shown in Figs. 1 and 3. This worm shaft is preferably driven by reduction gears 24 and 25 and belted pulleys 26 and 27, from the crusher shaft 1, but may be

otherwise driven. A counter shaft 28 carrying the pinion 25 and pulley 26, is mounted in a bearing 29 having screw adjustment to maintain the gears in mesh when the breast plate is adjusted by said screws 12.

It is evident that the feed material that becomes packed upon the impact plate will be brought into the path of the hammers as the said plate moves downward from the position indicated by dotted lines in Figs. 1 and 2, to that shown by full lines, and thereby be scraped off. Also that this downward movement of said plate will assist in feeding the material down in the hopper of the crusher, whether or not the said plate be provided with corrugations; and that the corrugations, sharp on their under sides and rounded above, will assist in feeding the material on the downward stroke, especially if it be in lumps, and will tend to slide through it on the upward stroke. Also that this reciprocating movement of the impact plate will occur automatically in the preferred construction shown, under the constant operation of the actuating mechanism, which is designed to effect a full up and down stroke about every minute of operation. And finally, that my impact plate is adapted to function as a combined feeder and breaker plate. The rate of travel of the impact plate may be from one to ten reciprocations per minute.

In comparatively slow movement of the impact plate and consequent deposit of feed material thereon near the end of the downward stroke, or when such material tends to accumulate on the upper part of the plate out of reach of the hammers without a longer stroke than is desirable, a scraping device is provided such as rod 30 closely adjacent to the face of the plate and above the plane of deposit and mounted in the side housing or otherwise. This rod fixed or otherwise, will scrape off the adhering deposit as the impact plate moves upward and carries the deposit into contact with the rod.

I claim:

1. A crusher comprising rotary crushing elements, a reciprocating impact plate cooperating therewith, an adjustably hinged breast plate supporting said reciprocating plate, antifriction devices interposed between said plates, and means to adjust both plates and said interposed devices to vary the clearance between said elements and the impact plate.

2. A crusher comprising rotary crushing elements, a reciprocating impact plate cooperating therewith, a hinged breast plate supporting said impact plate, reciprocating means operatively connected to said impact plate and mounted on said breast plate, and speed reducing means operatively connected to said reciprocating means.

3. A crusher of the class described, comprising rotary crushing hammers, an arcuate cage below and a reciprocating impact plate in front, both cooperating with said hammers,—said plate extending below said cage and above and beyond the path of said hammers,—means to reciprocate said plate, and means to adjust said plate toward and away from said hammers.

4. A crusher of the class described, comprising rotary hammers, a reciprocating impact plate cooperating therewith, an adjustable support for said plate provided with a projecting stud shaft, a crank disc having worm teeth mounted on the stud shaft, shaft bearings carried by the adjustable support, a worm shaft in said bearings, a worm on said shaft meshing with the disc teeth, and means to operate said worm shaft in any adjustment of the said support.

5. A crusher of the class described, comprising rotary crushing hammers, a reciprocating impact plate cooperating therewith and subject to deposit of adhering feed material thrown off by said hammers, and a rigid scraping device located closely adjacent to the face of said plate above the plane of deposit and in the path of the adhering deposit on the upward stroke of said reciprocating plate.

6. A crusher of the class described, comprising rotary crushing hammers, a reciprocating impact plate cooperating therewith and subject to deposit of adhering material thrown off by said hammers, and a scraping device consisting of a rod rigidly mounted in the side housings and extending across and adjacent to the face of said plate, substantially as and for the purpose described.

In testimony whereof I have affixed my signature.

HARRY J. SHELTON.