

Dec. 29, 1936.

J. RASMUSSEN

2,065,612

ROCK CRUSHER

Filed Feb. 1, 1935

3 Sheets--Sheet 1

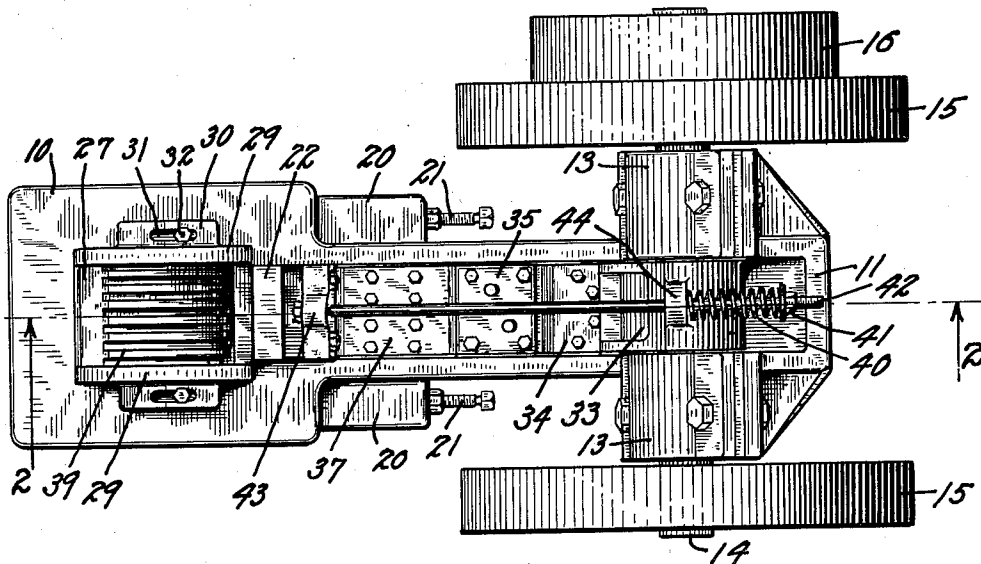
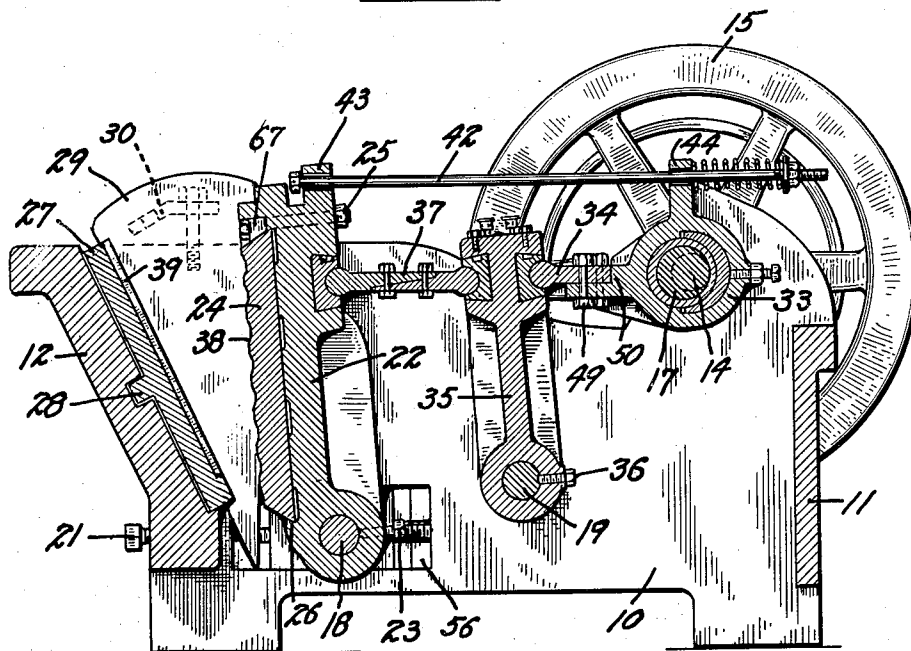


Fig. 1.



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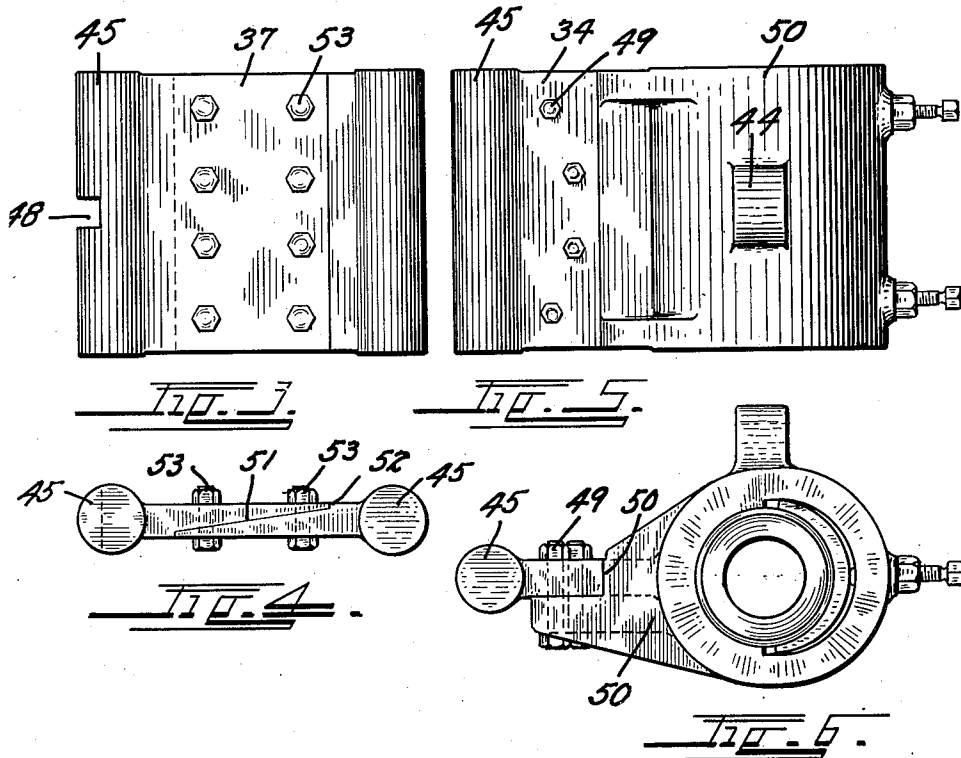
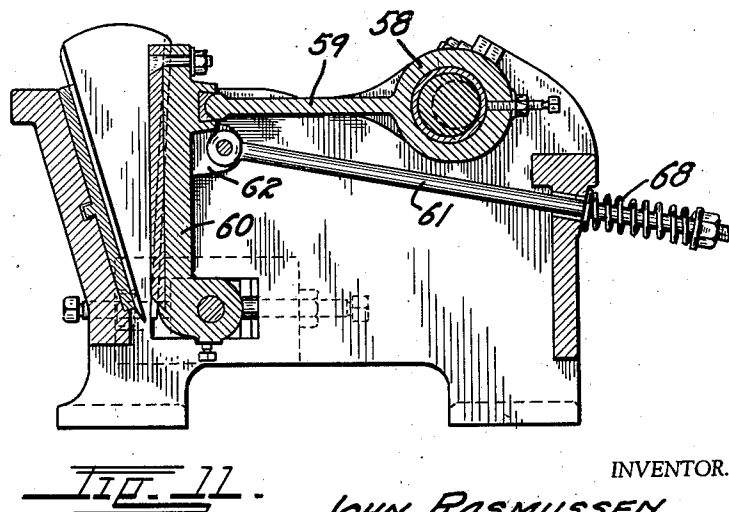
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

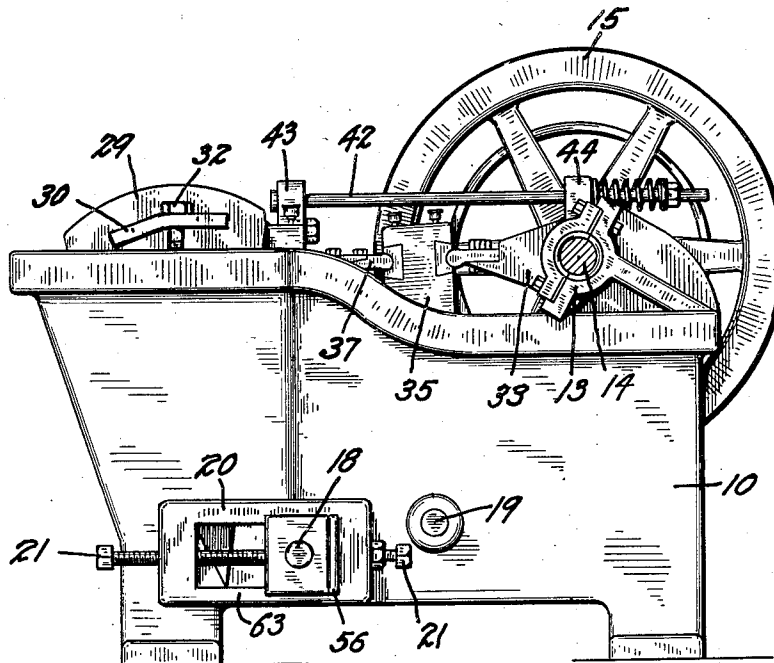


Fig. 7.

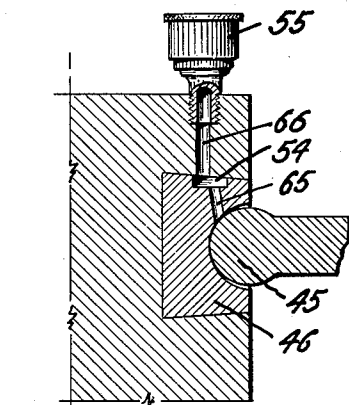
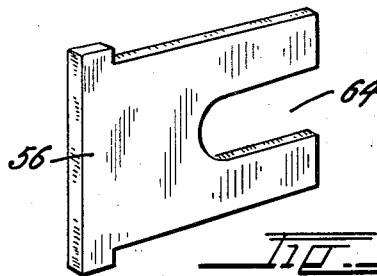


Fig. 10.

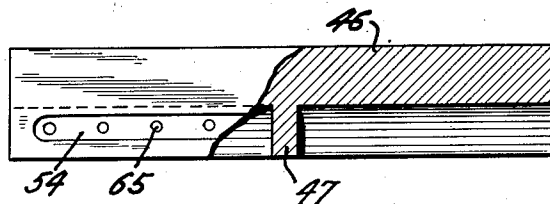


Fig. 9.

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ROCK CRUSHER

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2 Claims. (Cl. 83—53)

This invention relates to a rock crusher. The usual rock crusher operates from a heavy pitman suspended from an eccentric drive shaft which requires the operating motor to constantly lift the weight of the pitman and its associated toggle system. Also in the usual crusher, the line of force to the crushing body is below and out of alignment with the drive shaft. This indirect application of the crushing force results in destructive bending stresses in the frame and operating mechanism and causes frictional strains which result in great loss of power.

The principal object of the present invention is to provide a rock crusher construction in which the line of force from the power shaft to the point of maximum crushing will be in a straight line; in which the power will not be required to lift a heavy pitman or toggle system; in which the power will be applied to the crushing jaws opposite the location of the largest rocks; and in which the moveable jaw will move inwardly to crush the rock and downwardly to grind and move the rock toward the discharge.

Another object of the invention is to provide crushing faces which will grip smooth rocks of the "niggerhead" type and yet which will allow a rapid discharge of the crushed material.

A further object of the invention is to so construct the crusher that should tramp steel or other uncrushable material accidentally enter between the jaws, easily replaceable bolts will be sheared without damage to the crusher mechanism.

A still further object is to provide a crusher in which the various parts will be interchangeable when worn so as to equalize the wear thereon and increase the life thereof.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:—

Fig. 1 is a plan view of the preferred form of the improved crusher.

Fig. 2 is a longitudinal section therethrough, taken on the line 2—2, Fig. 1.

Fig. 3 is a plan view of the toggle plate.

Fig. 4 is a side view thereof.

Fig. 5 is a plan view of the eccentric member.

Fig. 6 is a side view of the eccentric member.

Fig. 7 is a side view of the crusher of Fig. 1.

Fig. 8 is an enlarged section through the thrust bearing and block.

Fig. 9 is a plan view, partially in section, of the thrust block.

Fig. 10 is a detail perspective view of a shim plate employed in the crusher.

Fig. 11 is a longitudinal section through an alternate form of the invention.

The invention comprises: a supporting and enclosing frame 10 preferably consisting of two side plates integrally joined by a head strut 11 and an inclined fixed jaw support 12. The upper edge of the frame 10 supports two angle bearings 13 in which a power shaft 14 is carried. The shaft 14 is provided with the usual fly wheels 15 and drive pulley 16 and intermediate the bearings 13, with an eccentric 17.

A jaw shaft 18 and a pitman shaft 19 also extend between the side plates of the frame 10. The extremities of the jaw shaft 18 are carried in sliding boxes 63 which may be moved horizontally in box frames 20 formed on the side plates of the frame 10, by means of suitable set screws 21. The pitman shaft 19 is permanently journaled in the side plates of the frame 10.

The jaw shaft 18 carries a movable jaw member 22 which is fixed thereon by means of a set screw 23. A movable jaw plate 24 is clamped to the forward face of the jaw member 22 by means of suitable clamp bolts 25. The upper and lower edges of the jaw plate 24 are bevelled and the lower edge rests on a similarly bevelled shoulder 26. The clamp bolts 25 have bevelled gibs 67 under their heads for clamping the upper edge. This construction allows the jaw plate 24 to be removed and inverted when it becomes worn along its lower face.

A removable stationary jaw plate 27 is carried on the inner face of the frame jaw support 12. On the back of the plate 27 is a laterally extending rib 28 which fits into a laterally extending groove in the jaw member 12 to prevent the plate from shifting thereon.

The crushing space between the plates 24 and 27 is closed at the sides by means of removable cheek plates 29 which are similar to each other and reversible as to position. Each plate carries a V-shaped clamping flange 30 provided with a slotted opening 31 through which a clamp screw 32 passes to hold the cheek plate down in place. When the plates are reversed as to position, the bolt 32 will occupy the other extremity of the

slotted opening 31 and the other leg of the V-shaped flange 30.

The motion of the eccentric 17 is transmitted to the movable jaw member 22 by means of three members: an eccentric member 33, a pitman 35, and a toggle plate 37. The eccentric member 33 surrounds the eccentric 17 and extends forwardly therefrom, terminating in a removable thrust plate 34. The thrust plate contacts the upper extremity of the pitman 35 which extends upwardly from the pitman shaft 19, upon which it is secured by means of a suitable set screw 36. The motion of the pitman 35 is transmitted to the movable jaw member 22 by means of the toggle plate 37.

It can be readily seen that the above construction transmits the eccentric motion of the eccentric 17 to the pitman 35 so as to impart a rocking motion to the latter. This motion is then transmitted to the movable jaw member 22 to cause its crushing plate 24 to approach and withdraw from the plate 27.

It is desired to call attention to the fact that the forward face of the jaw member 22 is offset in front of the axis of the shaft 18. Owing to the forward position of the plate 24 with reference to the shaft 18, this plate will swing both inwardly and downwardly as indicated by the arrows in Fig. 2. The forward face of the plate 24 is grooved laterally, as indicated by the corrugations 38. The forward face of the plate 27 is grooved vertically, as indicated by the corrugations 39. The lateral corrugations allow the movable plate to grip smooth rock surfaces so as to hold the latter between the jaws. The vertical corrugations allow the crushed rock to readily flow downwardly. It is preferred to terminate the corrugations above the discharge space between the bottoms of the jaws so as to prevent passage of oversize material.

The entire toggle system is held together by means of a compression spring 40 acting under an adjusting nut 41 on a spring rod 42. The forward extremity of the spring rod engages an ear 43 on the movable jaw member 22 and extends through an ear 44 on the eccentric member 33. No power is absorbed in compressing the spring 40 since it moves with the movement of the jaws.

The toggle plate 37 and the thrust plate 34 are formed at their pressure points with rounded cylindrical bearing edges, as indicated at 45, Fig. 8. To receive the thrust of these heads and to provide a renewable wearing surface therefor, a thrust block 46, as shown in Fig. 9, is inserted in both faces of the pitman 35 and the rear face of the movable jaw member 22. The thrust blocks 46 are dovetailed in shape and slide into place in horizontal dove-tailed grooves in their respective members. The block 46 in the movable jaw member 22 is provided with a central lug 47 which engages a recess 48 in the toggle plate to prevent side movement of the latter. The thrust plate 34 is attached to the eccentric member 33 by means of suitable attachment bolts 49 so that the contacting edge can be replaced without requiring replacement of the entire eccentric member 33.

It is desired to call attention to the fact that the thrust plate 34 rests against the shoulder 50 on the eccentric member 33 so as to transmit its push in a straight line to the axis of the eccentric 17 without exerting a shearing action on the bolts 49.

End plates and jaw plates of crushers are often

broken by tramp steel entering between the jaws, such as sledge-hammers, drills, etc. In this invention, however, means are provided for relieving this strain. This is accomplished by forming the toggle plate 37 of two similar parts which overlap each other on a diagonal plane, as indicated at 51, in Fig. 4. Each part is formed with a shallow shoulder 52, against which the edge of the other part rests for alignment purposes. The two parts are then bolted together by means of clamp bolts 53.

Should incompressible material enter between the jaws, the two parts of the toggle member will slide upon each other so as to shear the bolts 53 and completely relieve the strain on the remaining portions of the machine. In crushing easily crushed material, only a few of the bolts 53 need be inserted so that they will easily shear, should more difficultly crushable material enter between the jaws.

The pressure zones of the bearing edges 45 are lubricated from lubrication grooves 54 formed along the top of each thrust block. Oil holes 65 lead from the grooves 54 to the upper sides of the bearing edges. The lubrication then works downwardly to the friction zones. Oil or grease is fed to the grooves 54 from suitable lubricators 55.

The fineness of the crushing is of course determined by the space between the bottom edges of the two plates 24 and 27. This space can be regulated by means of the set screws 21. It has been found, however, that in actual use, the vibration and pressure upon these set screws is sufficient to upset and distort them. This upsetting action may be relieved by means of shim plates 56 as shown in Fig. 11. These plates are furnished in various thicknesses and, after the set screws have been adjusted may be inserted in the box frames 20 to receive the pressure of the sliding boxes 63. Each of the plates 56 is provided with a notch 64 for allowing it to pass the set screw 21.

In Fig. 9, an alternate form of the invention is illustrated, particularly designed for small laboratory machines and the like. In this form the invention is similar to the preceding form with the exception of two features. In this form, the pitman 35 and the toggle plate 37 have been eliminated, and a single eccentric member 58 has been used in their place which carries formed thereon a relatively long thrust arm 59 which pushes directly against the rear of a movable jaw plate 60. In this form the spring rod 42 and its appurtenances have been eliminated and a spring rod 61 employed in its place. The spring rod 61 connects directly to an ear 62 on the back of a movable jaw plate 60 and passes through the rear of the supporting frame to a compression spring 68.

On this form it is necessary for the power to compress the spring 68 during the crushing operation, but owing to the fact that this construction is employed only on the very small machine only a light spring is necessary.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:—

1. A rock crusher comprising a frame, a fixed jaw support carried by said frame, a drive shaft supported by said frame, a movable jaw member

supported by said frame in coacting relation to said fixed jaw support, an eccentric on said drive shaft, an eccentric member riding on said eccentric, a pitman hinged at its lower extremity in and to said frame below said eccentric and extending upwardly for receiving the thrust from the eccentric member, a toggle plate extending from the upper extremity of said pitman to said movable jaw member, said pitman having a portion engaged between said eccentric member and said toggle plate, and spring controlled means carried by the movable jaw member and the eccentric member for holding abutting portions of the movable jaw member, toggle member, pitman, and eccentric member in contact with each other.

2. A rock crusher comprising a frame, a fixed jaw support carried by said frame, a drive shaft supported by said frame, a movable jaw member supported by said frame in coacting relation to the fixed jaw support, an eccentric on said drive shaft, an eccentric member riding on said eccentric, a pitman hinged at its lower end in and to

said frame below said eccentric and extending upwardly for receiving the thrust from the eccentric member, a toggle member extending between the upper end portion of said pitman and a confronting upper portion of said movable jaw member, ears extending upwardly from the eccentric member and the movable jaw member, a rod extending between the eccentric member and the movable jaw member over said pitman and loosely engaged through said ears, said rod having a head at one end engaging the ear of the movable jaw member and its other end portion projecting from the ear of the eccentric member, a spring about the projecting end portion of said rod having one end bearing against the ear of the eccentric member, and an abutment for the other end of the spring adjustably carried by said rod, said rod and spring constituting spring controlled means for holding abutting portions of the movable jaw member, toggle member, pitman and eccentric member in contact with each other.

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