July 29, 1930. A. MÜLLER 1,771,505

STONE CRUSHER

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Fig. 1.

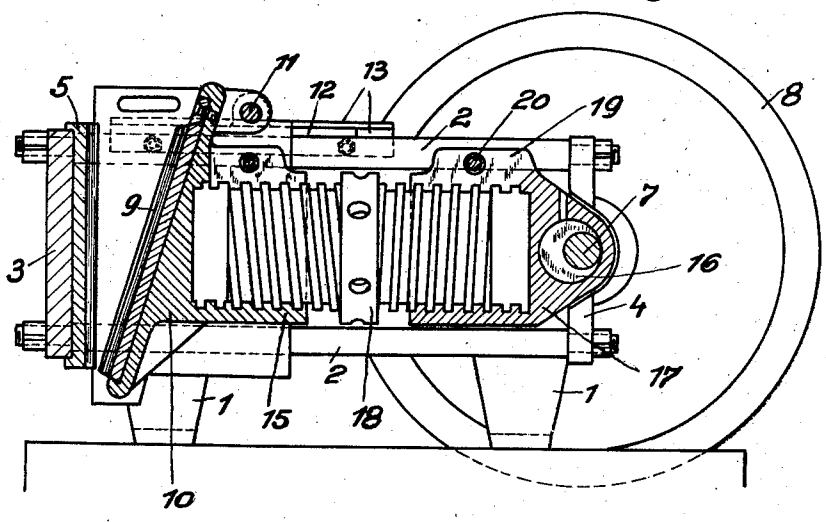
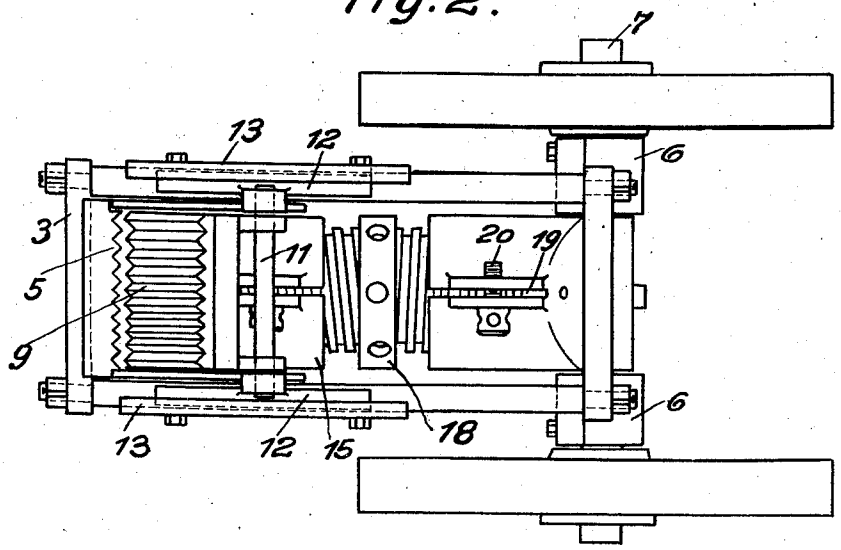


Fig. 2.



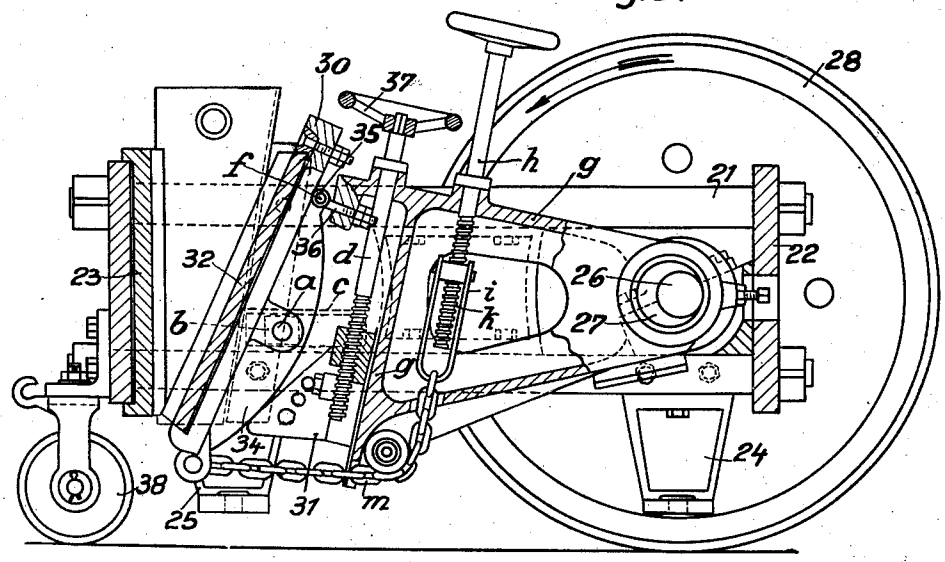
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Fig.3.



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Fig. 4.

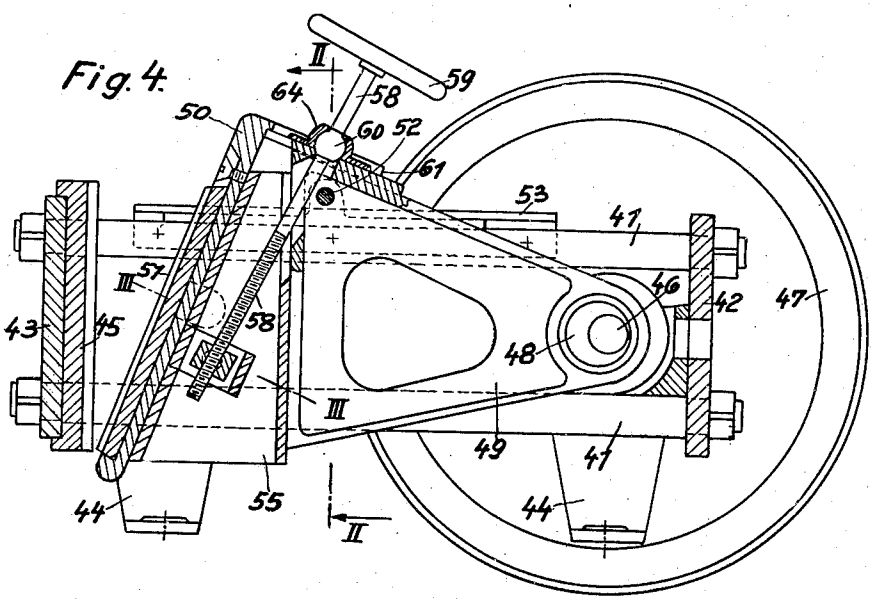


Fig.6.

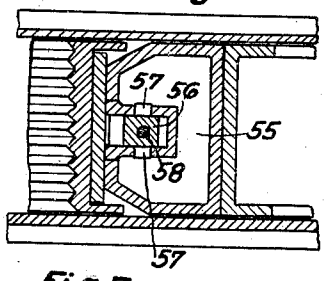


Fig.7.

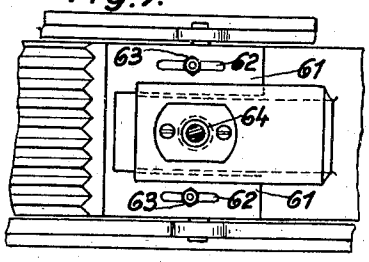
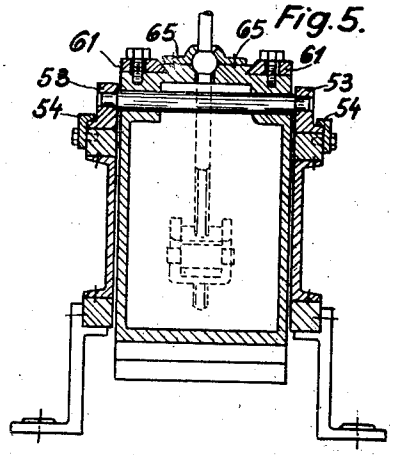


Fig.5.



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UNITED STATES PATENT OFFICE

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STONE CRUSHER

Application filed March 16, 1927, Serial No. 175,836, and in Germany November 1, 1926.

This invention relates to a stone crusher with an eccentric drive for the movable crushing jaw.

In the stone crusher according to the invention, the movable crushing jaw is guided in an approximately horizontal direction by being pivotally suspended on pivots and such pivots sliding on the frame in slideways. By virtue of this arrangement the action of reducing stone to small pieces is analogous to handwork.

The stone crusher according to the invention is so constructed that the gap or width of the throat is adjustable in a simple and practicable manner, which is effected by a portion of the rocker, which transmits the drive of the eccentric to the movable crushing jaw, being made adjustable. For example, a screwing portion may be interposed in the rocker, which by rotation thereof the rocker is lengthened or shortened. Other arrangements for adjusting the width of the throat are also possible.

The frame of the stone crusher may advantageously be built up of parallel rails with front and rear cross pieces, so that the main parts are easily constructed in steel and the whole can be taken to pieces conveniently for transport.

Various constructional forms of the stone crusher according to the invention are illustrated on the accompanying drawings, in which:—

Figs. 1 and 2 are a vertical longitudinal section and plan of a form of construction having an adjusting member screwed in the rocker.

Fig. 3 is a side elevation, partly in section, of a modified form in which the adjustment of the width of the throat is effected by a vertically adjustable wedge.

Fig. 4 is a vertical longitudinal section of a further modified form of construction.

Fig. 5 is a fragmentary section taken on line II—II of Fig. 4.

Fig. 6 is a fragmentary section taken on line III—III of Fig. 4.

Fig. 7 is a fragmentary top view of the construction of Fig. 4.

In the modified form according to Figs. 1 and 2, in the rear extension of the movable crushing jaw, which acts as a rocker and transmits the drive from the eccentric to the crushing jaw, is interposed a screw portion formed with right and left hand screw threads, such that by a comparatively small rotation of the screw portion ample adjustment of the gap can be effected.

In detail the stone crusher illustrated is constructed as follows: The frame supported on feet 1 consists of four rectangular steel bars 2 having screwed on heads 3 and 4. The fixed crushing jaw 5 is secured to the front head 3; the rear head 4 carries the bearings 6 for the driving shaft 7 with the flywheels 8, which can also serve as road wheels. The carrier 10 of the movable crushing jaw 9 is pivotally mounted on a shaft 11, the ends of which are provided with sliding members 12. These members 12 slide in horizontal guides 13 on the upper steel rails 2. The carrier 10 is at the rear formed as a tube 15 slit on top, and provided internally with a screw thread.

On the eccentric 16 of the driving shaft 7, is mounted the tail end member 17 of the rocker, which in front is likewise formed as a slit tube with an internal screw thread. The internal screw thread of the jaw carrier 10 is a right hand thread; that of the tail 17 is a left hand thread, but may be vice versa. In the two, the internal screw threads engage the massive adjusting bolt 18, which towards one end is provided with a right hand thread and towards the other end with a left hand thread. In its smooth middle portion it is provided with holes for the insertion of a tommy bar. By rotation of the adjusting bolt the movable crushing jaw is displaced to the front or rear by twice the amount due to the pitch of the screw thread, whereby the width of the gap is correspondingly altered. The machine can be locked with the parts in the adjusted position by clamping the slit tubular nut portions 10 and 17 by tightening screws 20 which draw together the slits 19.

On the head end 3, a roller can be provided, which together with the flywheels 8 serves to transport the stone crusher. In other cases the stone crusher can however be transported

in a small compass by disassembling and stacking the parts.

In the modified form of the stone crusher according to Fig. 3, the movable crushing jaw bears against a wedge, which can be adjusted by a spindle, and against which it can be firmly drawn by a second spindle.

The frame is here also constructed of four rectangular strong steel rails 21, on which a front wall 23 and a rear wall 22 are placed and secured by nuts. In operation the steel rails 21 are supported in front on feet 25 and behind on feet 24. On the rear wall 22 are the bearings for the driving shaft 26 with the driving eccentric 27 and flywheels 28. By means of the eccentric 27 the rocker *g*, formed as a hollow member, is reciprocated, and on the one hand is connected to the movable crushing jaw or its carrier 30, and on the other hand carries the wedge abutment 31 and the adjusting devices for the movable crushing jaw. The frame 30 of the movable crushing jaw 32 has a supporting shaft extending therethrough, the journals *a* of which laterally protrude from the frame and are furnished with bushes *b*, which are constructed as slides and slide in rectilinear guides *c*, which are mounted on the lower steel rails 21 of the frame of the machine. The frame 30 of the movable jaw 32, which, as above described, is pivoted about the axis of the shaft, is at the rear formed with a curved rib or the like 34, which bears against the wedge abutment 31. On top in the frame rib 34 a bolt *f* is inserted, which is embraced and supported by a hook 35 of a bolt 36, firmly secured by nuts in the rocker *g*. By means of a spindle *d* provided with a handwheel 37 which engages by a screw thread in a bore of the wedge 31, the wedge 31 can be displaced in the direction of such spindle. The wedge thereby displaces the frame 30, and 34 of the movable jaw 32, thereby swinging about the axis of the journals *a*, whereby the rocker *g* also makes a certain angular displacement. By means of a second screw spindle *h* provided on the rocker, a chain *m* may be tightened or loosened, the screw-threaded terminal link *i* of the chain being by means of the screw-thread *k* of the spindle moved upwards or downwards. If, by means of the spindle *d* and lowering of the wedge 31 the width of the gap is increased, by tightening the chain *m* by means of the spindle *h*, the movable jaw is secured in the new position. Inversely, by slackening the chain *m* and thereupon drawing up the wedge 31, the width of the gap can be decreased. Either, as illustrated, each of the spindles can be provided with a separate handwheel at the appropriate height, or one and the same handwheel can alternately be applied to one or the other spindle. The two spindles may even be interconnected by a drive, conveniently a friction drive which up to a certain limit effects a common, opposite adjustment of both spindles, but however permits a final adjustment of either spindle independently of the other spindle.

The wedge abutment 31, which effects the adjustment of the movable crushing jaw, conveniently is so weakened by bored holes or the like in respect to its capability of resisting pressure, that on pressure above the normal being exerted on the crushing jaws, in working the machine, it will break before more expensive portions of the frame or drive are damaged by the excessive pressure or shock. Such a wedge can be easily replaced, and a reserve of such substitute parts would be provided.

On removal of beams on which in the drawing the feet 24 and 25 are assumed to be resting, the stone crusher can be moved about like a vehicle, the flywheels 28 serving as road wheels and a roller 38 being provided in front.

In the modification of the stone crusher according to Figs. 4 to 7, the device for displacing the wedge against which the movable crushing jaw bears, is different from that above described. This device is particularly suitable for wide crushers and is capable of adoption in fine crushers as well as in coarse crushers.

In this construction also the frame consists of rectangular rails 41, held together by heads 42 and 43 and resting on feet 44. On the front head 43 is mounted the fixed crushing jaw 45, and on the rear head 42 the bearings for the driving shaft 46 with flywheel 47. The shaft 46 drives by means of an eccentric 48 the rocker 49, on which the carrier plate 50 of the movable crushing jaw 51 is adjustably mounted. The rocker is suspended from a transverse shaft 52, which is journalled in lateral slides 53. These slippers 53 slide on the machined upper surface of the upper rails 41 and are guided by overhanging guide plates 54. Between the rocker 49 and the crushing jaw holder 50 is arranged a hollow wedge 55, in which a nut 56 is pivotally secured on journals 57. In this nut engages by means of a screw thread an adjusting spindle 58 provided with a handwheel 59. A ball joint 60 on the one hand permits angular displacement of the spindle and on the other hand also secures the spindle against axial displacement. By rotating the spindle the wedge can be displaced upwards and downwards. After such displacement it can always be brought to bear against the rocker 49. Likewise the holding plate 50 of the movable crushing jaw 51 can at each position of the wedge be brought to bear against the inclined surface of the wedge. For this purpose, the plate 50 is provided with two flanges 61 offset at an angle (Fig. 7), which rest on top of the rocker 49 and are provided with slots 62 for the passage of clamping bolts 63.

On slackening these bolts 63 the wedge 55 can be adjusted in position by means of the spindle 58 and the carrier plate 50 set to conform to the new position of the wedge, whereupon the bolts 63 are again tightened. Any desired width of gap can thus be set. Conveniently the top of the rocker on each side of the bearing 64 for the spindle 58 is formed to provide a laterally undercut guide 65, beneath which the correspondingly profiled flanges 61 of the plate 50 can be inserted from the front.

The adjusting wedge 55 is made hollow in order that in the event of an unduly hard foreign body obstructing closure of the throat of the crusher, it will offer less resistance than other parts of the crusher and break before such other parts are affected.

I claim:

1. In a stone crusher, a fixed crushing jaw, a driving shaft, an eccentric on said driving shaft, a rocker having an interposed length-adjusting screw and operated by said eccentric, a crushing jaw movable by said rocker relatively to said fixed crushing jaw, a pivot on said movable crushing jaw, and horizontal slideways on which said pivot slide.

2. In a stone crusher, a fixed crushing jaw, a driving shaft, an eccentric on said driving shaft, a rocker having an interposed right and left handed length-adjusting screw and operated by said eccentric, a crushing jaw movable by said rocker relatively to said fixed crushing jaw, a pivot on said movable crushing jaw, and horizontal slideways on which said pivot slide.

3. A stone crusher comprising a frame consisting of parallel horizontal bars, a front transverse head secured at one end to said bars, and a rear transverse head secured to the other end of said bars; a fixed crushing jaw secured on the front head; a movable crushing jaw pivotally and slidably mounted on said bars; a shaft mounted on the rear head; a tail end member; a bolt having right and left-hand threads and screwthreaded on the end member at one end and on the movable jaw at the other end whereby rotation of the bolt will adjust said movable jaw horizontally relative to the fixed jaw; and an eccentric mounted on the shaft adapted to operate the movable jaw about its pivoted mounting by means of the end member and the bolt.

4. A stone crusher comprising a frame consisting of parallel horizontal bars, a front transverse head secured at one end to said bars, and a rear transverse head secured to the other end of said bars; a fixed crushing jaw secued on the front head; a movable crushing jaw pivotally and slidably mounted on said bars; a shaft mounted on the rear head; a tail end member; a bolt having right and left-hand threads and screwthreaded on the end member at one end and on the movable jaw at the other end whereby rotation of the bolt will adjust said movable jaw horizontally relative to the fixed jaw; an eccentric mounting on the shaft adapted to operate the movable jaw about its pivoted mounting by means of the end member and the bolt; and means for tightly securing the movable jaw and the end member around the bolt.

5. A stone crusher comprising a frame consisting of parallel horizontal bars, a front transverse head secured at one end to said bars, and a rear transverse head secured to the other end of said bars; a fixed crushing jaw secured on the front head; a movable crushing jaw and carrier pivotally and slidably mounted on said bars and having a slit screwthreaded tube; a shaft mounted on the rear head; a tail end member having a slit screwthreaded tube; a bolt having right- and left-hand threads and screwthreaded in the slit tubes of the carrier and the end member whereby rotation of the bolt will adjust the movable jaw relative to the fixed jaw; and an eccentric mounted on the shaft adapted to operate the movable jaw and carrier about its pivoted mounting by means of the end member and the bolt.

6. A stone crusher comprising a frame consisting of parallel horizontal bars, a front transverse head secured at one end to said bars, and a rear transverse head secured to the other end of said bars; a fixed crushing jaw secured on the front head; a movable crushing jaw and carrier pivotally and slidably mounted on said bars and having a slit screwthreaded tube; a shaft mounted on the rear head; a tail end member having a slit screwthreaded tube; a bolt having right- and left-hand threads and screwthreaded in the slit tubes of the carrier and the end member whereby rotation of the bolt will adjust the movable jaw relative to the fixed jaw; an eccentric mounted on the shaft adapted to operate the movable jaw and carrier about its pivoted mounting by means of the end member and the bolt; and means for tightly securing the carrier and the end member around the bolt.

7. A stone crusher comprising a frame consisting of parallel horizontal bars, a front transverse head secured at one end to said bars, and a rear transverse head secured to the other end of said bars; a fixed crushing jaw secured on the front head; sliding members mounted to slide on the bars and connected together by means of a shaft; a movable crushing jaw and carrier pivotally mounted on the shaft of the sliding members and having a slit screwthreaded tube; a shaft mounted on the rear head; a tail end member having a slit screwthreaded tube; a bolt having right- and left-hand threads and screwthreaded in the slit tubes of the carrier and the end member whereby rotation of the bolt

will adjust the movable jaw relative to the fixed jaw; and an eccentric mounted on the shaft adapted to operate the movable jaw and carrier about its pivoted mounting by means of the end member and the bolt.

8. A stone crusher comprising a frame consisting of parallel horizontal bars, a front transverse head secured at one end to said bars, and a rear transverse head secured to the other end of said bars; a fixed crushing jaw secured on the front head; sliding members mounted to slide on the bars and connected together by means of a shaft; a movable crushing jaw and carrier pivotally mounted on the shaft of the sliding members and having a slit screwthreaded tube; horizontal guides mounted on the rails for the sliding members; a shaft mounted on the rear head; a tail end member having a slit screwthreaded tube; a bolt having right- and left-hand threads and screwthreaded in the slit tubes of the carrier and the end member whereby rotation of the bolt will adjust the movable jaw relative to the fixed jaw; and an eccentric mounted on the shaft adapted to operate the movable jaw and carrier about its pivoted mounting by means of the end member and the bolt.

9. A stone crusher comprising a fixed crushing jaw; a movable crushing jaw; an eccentric; a pair of tubular portions, one on the movable jaw and the other on the eccentric; a bolt in screwthreaded engagement with the tubular portions, said tubular portions and bolt comprising an adjustable and rigid connection between the eccentric and the movable jaw to drive the movable jaw; and horizontal sliding members in which the movable jaw is pivotally mounted.

In testimony whereof I have signed my name to this specification.

AUGUST MÜLLER.