J. M. LANDRUM.

ROCK CRUSHER.

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1,004,663.

Patented Oct. 3, 1911.

Fig. 3.

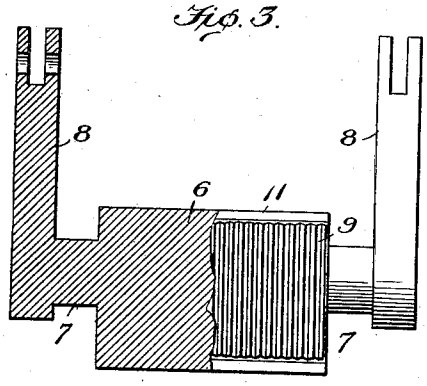
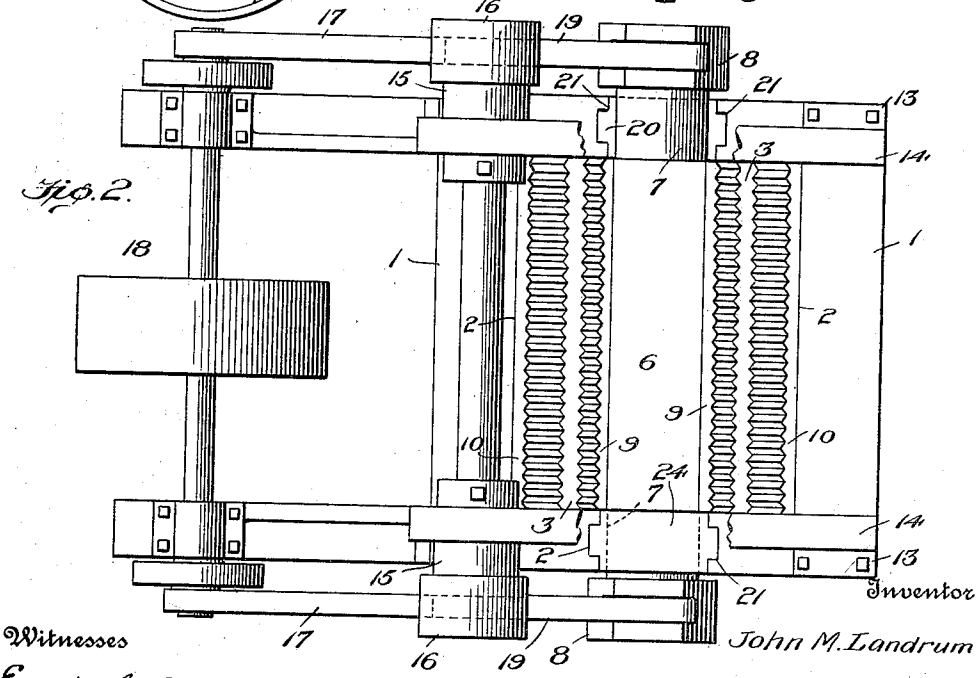


Fig. 1.

Fig. 2.



Witnesses

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ROCK-CRUSHER.

1,004,663. Specification of Letters Patent. Patented Oct. 3, 1911.

Application filed November 19, 1910. Serial No. 593,173.

To all whom it may concern:

Be it known that I, JOHN M. LANDRUM, a citizen of the United States, residing at East Lake, in the county of Jefferson and State of Alabama, have invented new and useful Improvements in Rock-Crushers, of which the following is a specification.

My invention relates to an improvement in rock crushing machinery of the type wherein an oscillating breaker shaft works in a crusher box, acting as it is rocked from side to side to gradually break the rock or stone to the size desired.

The particular object of my invention is to improve this type of crusher by greatly increasing the output due to the fact that the crusher or breaker shaft is so designed and pivoted, with reference to the crusher box, that with each oscillation it acts to crush on both sides of its pivotal center, crushing the larger stone above the center on one side while crushing the smaller stone on the opposite side below the center. By making the crusher adjustable in the box I am able to regulate the degree to which the stone will be crushed.

The peculiar design of the crusher shaft and the crusher box is such as to prevent any dead point existing where the material can lodge in the machine. The entire surface of my crusher shaft is effectively in cooperation with the box as the shaft rocks, thereby insuring at all points a positive crushing and down feeding action on the stone.

A further advantage derived from my improved manner of hanging the breaker shaft lies in the fact that by crushing at diagonally opposite points above and below its axis, I remove practicaly all strain from the bearings of the breaker shaft, since the action of simultaneously crushing stone on both sides of the breaker shaft will largely absorb this strain.

A further object of my invention is to so design the breaker shaft and its operating arms that they may be cast integrally and at a very low cost so as to be readily inserted into and withdrawn from the crusher box.

My invention further comprises the details of construction and arrangement of parts hereinafter more particularly described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 shows a vertical cross-sectional view through the crusher with the breaker shaft in neutral position. Fig. 2 is a top plan view of Fig. 1. Fig. 3 is a detail view of the breaker shaft shown reduced in size.

Similar reference numerals refer to similar parts throughout the drawings.

As illustrated, I preferably form the crusher box 1 of an integral metal casting oblong in shape and provided in its center with an opening having downwardly converging walls 2 which opening forms the crusher box 3. The walls 2 are cut away at the points 4 to leave clearance spaces 5 on each side between the bottom sides of the box and the bottom edges of the breaker shaft 6. As shown in Fig. 3, this breaker shaft is preferably an integral casting which comprises the crusher section 6, the trunnion bearings 7 and the operating arms 8. The crusher 6, as shown in Fig. 1, tapers from its bottom upwardly and has its lower end normally disposed below the edges 4 in the crusher box. In Fig. 1 the crusher is raised to its maximum height where it crushes the stone as small as possible. The trunnion bearings 7, as shown in Fig. 1, give the crusher an axis point slightly above the transverse horizontal central plane through the crusher box. Each side face of the crusher is provided with a detachable ground crusher plate 9 of hard metal and each side wall 2 of the crusher box is faced by a similar detachable ground plate 10. The plates 9 extend to the top of the box. The top 11 of the crusher 6 is arched so that when the rock and material to be crushed is dumped into the box 3 it will strike this curved top surface 11 and be deflected on both sides of the crusher.

The bed plate 1 is provided with end flanges 12 to which flanges 13 on end plates 14 are suitably bolted. These end plates are disposed on the inside of the two arms 8 of the breaker shaft and at their rear ends support each a bearing 15 which projects outwardly and supports an arm 16, which, at its lower end, is pivotally connected to a link 17 that is reciprocated by the power mechanism 18. A link 19 pivotally connects the upper end of each bar 16 to the top of the adjacent arm 8 of the breaker shaft.

In order to make the crusher adjustable so as to crush the stone and rock to different degrees of fineness, each trunnion 7 rests upon an adjustable pillow block 20 which is dropped down into a grooved slot 21 formed

in each end wall of the crusher box. An adjusting screw 22 is screwed up through the bottom of each slot 21 in the end walls of the box and engages a pillow block 20 to hold the same in adjusted position, the nuts 23 acting to lock the screw in adjusted position. A top bearing cap 24 drops down over each trunnion 7.

In operation, the power machinery as shown acts preferably through the multiplication of leverage to impart a powerful oscillating movement to the breaker shaft, which movement however is comparatively slight. The rock is dumped into the box 3 and as the breaker shaft moves to the right from its neutral position in Fig. 1, the upper edge of the right hand plate 9 will engage and crush the largest stones between it and the top of the right hand plate 10, while the bottom edge of the left hand plate 9 will crush the smallest stones between it and the bottom edge of the left hand plate 10, and vice versa, when the breaker shaft is oscillated to the left of the neutral position shown. The shaft in this way crushes simultaneously on both sides of its trunnion, one side crushing the large stone and the opposite side crushing the small stone, thus compounding the action, increasing the capacity of the machine and relieving its bearings of crushing strain which is taken up between the stone crushed by the one lower edge and the stone crushed by the diametrically opposite upper edge of the breaker shaft. The pivot point is so positioned as to give the breaker shaft, at its top, the shortest and most powerful stroke to crush the big rocks, and at its bottom the greater but less powerful stroke to complete the finest crushing and to enable it to clear itself and give a free discharge of the crushed rock. Preferably the pivot is spaced from the top about one-third of the distance from the top to the bottom of the crushing faces. The inclined position of the straight crushing plates 10 and the rocking movement of straight angularly disposed crushing faces of the tapering crusher 9 about its trunnions will give at all points an effective crushing and downwardly feeding action on the rock and prevent congestion at any point in the crusher box. The rocking movements of the breaker shaft will continuously urge the rocks past the points opposite its axis of movement. As the faces 9 and 10 are straight and angularly disposed there will be at all times relative movement of opposite portions thereof toward and from each other as the crusher shaft 9 oscillates. The manner of connecting the arms 8 by links with the arms 16 permits the breaker shaft to be vertically adjusted, and the wedge shaped character of the crushing portion 6 thereof will vary the clearance between it and the edges 4 as the shaft is raised or lowered, thus regulating the size to which the rock or stone will be crushed.

What I claim as new and desire to secure by Letters Patent, is:—

1. The combination with a pair of straight inclined fixed crushing jaws, of an interposed oscillatory crushing element having straight reversely inclined crushing faces which coöperate with said fixed jaws, means to oscillate said element, and pivoted supports therefor disposed between the top and a transverse central plane through its crushing faces substantially as described.

2. A stone crusher comprising a crushing box having downwardly converging straight side walls which act as crushing faces, in combination with an interposed oscillatory breaker shaft having opposite straight crushing faces which coöperate with said first mentioned crushing faces and which is adapted to oscillate about a center disposed between the top and bottom edges of its crushing faces to give each part of said faces relative movements toward and from the opposed crushing face of the box as the breaker shaft is oscillated and vary the clearance between said faces, substantially as described.

3. A stone crusher comprising a crushing box having downwardly converging substantially straight side walls which act as crushing faces, in combination with an interposed oscillatory wedge-shaped breaker shaft having substantially straight crushing faces which converge upwardly and coöperate with said first mentioned crushing faces and which is adapted to oscillate about a center disposed between the top and bottom edges of its crushing faces to give constantly varying clearances between the coacting crushing faces as the breaker shaft is oscillated and means to vertically adjust said breaker shaft in the crushing box, as and for the purposes described.

4. In a stone crusher, a solid metal bed formed with a crusher box having straight inclined crushing faces which are cut away near their bottom edges, slots formed in the end walls of the crusher box, an integral breaker shaft having trunnions which enter said end slots, adjustable bearing means in said slots to support said trunnions, the breaker portion of the shaft consisting of a wedge-shaped metal body having an arched top edge and downwardly flaring straight crushing sides projecting normally to or below the bottom edges of the crushing faces of said crusher box, the bottom of the shaft below its crushing faces being adapted to swing between said cut away bottom portions of the crusher box so as to leave wide bottom clearances below the crushing faces and power means to oscillate said breaker shaft substantially as described.

5. In a stone crusher, a solid metal bed

formed with a crusher box having converging side faces, crusher plates detachably mounted on said faces which are cut away near their bottom edges, slots formed in the end walls of the crusher box, an integral breaker shaft having trunnions which enter said end slots, adjustable bearing means in said slots to support said trunnions, the breaker portion of the shaft consisting of a wedge-shaped metal body having side walls reversely inclined to the crushing plates in said box, detachable crusher plates mounted on said sides and terminating at a point opposite the bottom edges of the crusher plates in the box, power means to oscillate said breaker shaft, substantially as described.

6. In a stone crusher, a solid metal bed formed with a crusher box having downwardly converging uncurved side faces, a crusher plate mounted on each of said faces which are cut abruptly away near their bottom edges, slots formed in the end walls of the crusher box, an integral breaker shaft having trunnions which enter said end slots, said trunnions being disposed from the top about one-third the distance from top to bottom of the shaft, adjustable bearing means in said slots to support said trunnions, the breaker portion of the shaft consisting of a wedge-shaped metal body having an arched top edge and downwardly flaring uncurved sides, detachable crusher plates mounted on said sides and projecting normally to or below said cut away edges of the crusher box, power means to oscillate said breaker shaft, a crank arm integral with each trunnion, pivoted links connected to the end of said arms, pivoted rocker arms to which said links are connected near the pivot point of said arms, and power means to oscillate said arms, as and for the purposes described.

7. A wedge-shaped crusher having substantially straight crushing faces on opposite sides thereof, means to pivot said crusher between its center line and top, and a crushing box having two crushing faces to co-act with the crushing faces of said crusher, said box faces starting at an overhanging shoulder near the bottom of each side of the box and continuing upwardly in straight diverging lines to points opposite the top of the crusher, the diverging straight co-acting crushing faces on the box and crusher having relative movement which gives varying clearances throughout between said faces while the crusher is operating, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN M. LANDRUM.

Witnesses:
ANNIE L. PEACE,
NOMIE WELSH.