Oct. 7, 1941. L. H. KESSLER 2,258,059

STONE CRUSHER

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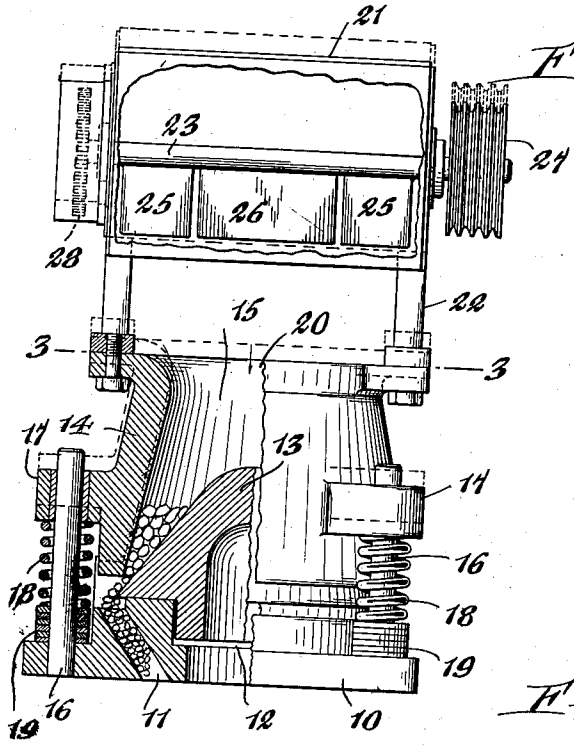


Fig. 1.

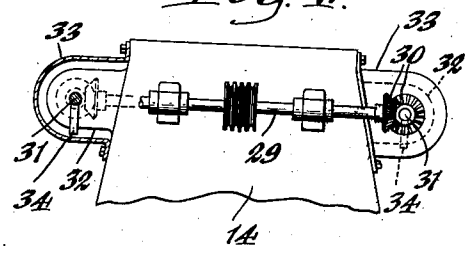


Fig. 4.

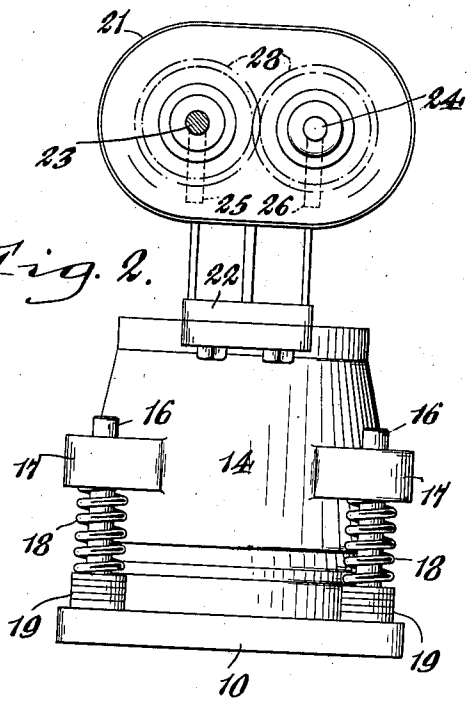


Fig. 2.

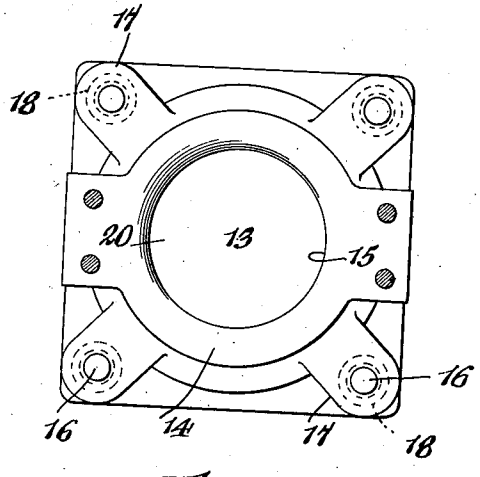


Fig. 3.

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STONE CRUSHER

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4 Claims. (Cl. 83—53)

This invention relates to certain useful improvements in ore crushers or pulverizing machines for use with stone, gravel, ore and like materials.

It has for one of its objects to provide a machine of this character which is so designed and constructed as to create and impose a wedging action or wedging blow or impact upon the material being treated with maximum force and with a minimum expenditure of power.

Another object of the invention is to provide a stone crusher and pulverizer which is constructed as to have a uniform crushing area per stroke of the machine to thereby increase its efficiency and capacity.

A further object is to provide a high speed machine of this character which is composed of a minimum number of parts, which is durable and inexpensive in construction, and which is provided with a constant power unit so designed that the centrifugal force created or developed by it is transmitted into a vibrating force for crushing or pulverizing the material by successive blows or impacts.

A still further object is to provide a stone crusher or pulverizer which is so designed as to be readily adjustable for sizing the material being crushed, and which can be readily dismembered to effect renewal or replacement of the crushing elements when desired.

In the accompanying drawing:

Figure 1 is a sectional front elevation of the stone crusher and pulverizer embodying my invention. Figure 2 is a side view thereof. Figure 3 is a horizontal section taken substantially in the plane of line 3—3, Figure 1. Figure 4 is a fragmentary sectional side elevation of a modified form of my invention.

Similar characters of reference indicate corresponding parts throughout the several views.

Referring now to Figures 1–3, inclusive, of the drawing, 10 indicates a fixed base adapted to be bolted or otherwise secured to a suitable foundation and having a discharge passage 11 therein through which the crushed or pulverized material passes into a bin, chute or receptacle provided for receiving it. Seated in a centrally-disposed socket or recess 12 formed in this base and rising above the same is a substantially conical mandrel or fixed jaw member 13, said mandrel being made of appropriate metal and heavy in design to effectually withstand the crushing blows or impacts during crushing of the material.

The movable jaws or reciprocating element of the crusher is cylindrical and preferably in the form of a resiliently-suspended sleeve or shell 14, which is disposed in floating fashion over and in encircling or concentric relation to the fixed jaw and adapted to be reciprocated in the direction of its axis by quick, snappy strokes toward and from the conical surface of such fixed jaw to effectually crush the material over the entire circumferential area of the contiguous crushing or working surfaces of the companion jaw members. By preference, the bore or operating surface of the reciprocating jaw is frusto-conical in shape, as indicated at 15, which, in relation to the conical shape of the fixed jaw, provides a crushing throat of acute angular shape in cross-section to insure maximum crushing efficiency and prevent plugging. The reciprocating jaw is likewise heavy in design and is guided in its movements on upright posts 16 rising from the base 10 and engaging openings formed in lugs 17 extending laterally from adjacent the lower end of such jaw. Applied to these guide-posts and interposed between the guide-lugs and base are springs 18 which serve to yieldingly support and urge the reciprocating jaw in the direction of its up-stroke and at the same time function as shock absorbers during the operation of the machine. For the purpose of readily adjusting the operative relationship of the companion jaw members for sizing purposes within certain limits, shims or spacers 19 may be applied to the lower ends of the posts 16 to thereby set the reciprocating jaw 14 at any desired elevation relative to the fixed jaw. For maximum adjustments, the fixed jaw or mandrel 13 is made in different sizes and readily substituted when desired. The upper end of the reciprocating shell-like jaw is open, as indicated at 20, for the introduction of the material into the crusher.

The resiliently-suspended jaw 14 is adapted to be reciprocated in the direction of its axis toward and from the fixed jaw 13 at a relatively high speed to transmit rapid and successive wedging blows or impacts to the material in the crushing throat formed by the jaw members. The preferred means for transmitting crushing or power strokes to the reciprocating jaw consists of a vibratory unit supported directly on such jaw and including a housing 21 attached to the latter by brackets 22, and parallel horizontal shafts 23, 24 journaled at their ends in the housing and having weights 25, 26, respectively, extending radially therefrom and concealed within the housing. The shafts are driven in opposite directions from a drive pulley 27 and intermeshing gears 28 and the weights on one shaft balance

those on the other with such weights so disposed as to move uniformly upwardly and away from each other from the positions shown in Figure 2 to impart an up-thrust to the jaw **14** and then to move downwardly and toward each other in out-of-balance relationship to impart a down-thrust or wedging stroke to such jaw to crush the material by sharp blows or impacts in direct axial paths.

While the weights may be arranged in any suitable manner on the shafts **23**, **24**, they are preferably disposed as shown in Figure 1, the shaft **23** having two weights **25** adjacent its ends while the shaft **24** has a single weight **26** centrally thereof in clearance relation to and which equals the combined weights of those on the companion shaft. The crushing power created is directly proportional to the weight of the reciprocating jaw **14**, the vibration-creating weights **25**, **26** and the tension of the shock-absorbing springs **18**; and these may be varied in accordance with engineering design to produce the results desired.

For effecting adjustment of the machine for minimum changes in sizing of the crushed material, the spacers **19** may be varied accordingly and for maximum sizing changes a different-sized mandrel or fixed jaw **13** may be used.

Instead of mounting the vibratory unit in superposed relation over the top of the resiliently-supported jaw **14** as shown in Figures 1 and 2, it may be mounted at opposite sides of such jaw in the manner depicted in Figure 3, wherein **29** indicates the driven or pulley shaft connected at its ends by bevel gears **30** to the weight-bearing shafts **31** which are journaled at their ends in suitable bearing brackets **32** formed on the jaw. A suitable housing **33** may be provided for concealing the shaft-weights **34**.

I claim as my invention:

1. A machine of the character described, comprising a fixed, substantially conical jaw member, a sleeve-like jaw member disposed over and in coaxial relation with said conical jaw member and having a tapered impact surface forming a substantially V-shaped crushing throat with said conical jaw member, and rotatable means including weights thereon for imparting by centrifugal force a reciprocatory movement to said sleeve-like jaw member in the direction of its axis toward and from the fixed jaw member, said means being directly mounted on said sleeve-like jaw member to revolve about an axis substantially at right angles to the related axis of the jaw members.

2. A machine of the character described, comprising a fixed substantially conical jaw member, a sleeve-like jaw member disposed over and in coaxial relation with said conical jaw member and having a tapered impact surface forming a substantially V-shaped crushing throat with said conical jaw member, means engageable with said sleeve-like jaw for guiding it in axial paths toward and from said fixed jaw and including yieldable elements for restraining movement of the former toward the latter, and a vibratory unit applied to said sleeve-like jaw for transmitting vibratory crushing strokes thereto in the direction of its axis toward and from the fixed jaw, said vibratory unit including a pair of oppositely rotating parallel shafts disposed at right angles to the related axes of said jaw members and having symmetrically-balanced weights thereon.

3. A machine of the character described, comprising a base having an upwardly-opening recess therein and guide posts rising therefrom exteriorly of such recess, a fixed, substantially conical jaw member seated in said base-recess, a sleeve-like jaw member disposed over and in surrounding relation to said fixed jaw member and guided on said posts for axial displacement toward and from the fixed jaw, the sleeve-like jaw having a tapered impact surface forming a substantially V-shaped crushing throat with the fixed jaw member, springs applied to said posts for yieldingly supporting said sleeve-like jaw member in operative relation to the fixed jaw and for yieldingly restraining the movement of the former toward the latter, and means applied to and borne wholly by said sleeve-like jaw for transmitting by centrifugal force an axial vibratory movement thereto toward and from the companion jaw member, said means consisting of revolvable shafts mounted on said movable jaw member and having weights thereon disposed to impart successive up and down thrusts to such jaw member.

4. A machine of the character described, comprising superposed, relatively movable jaw members disposed in coaxial relation and having opposing impact walls forming a substantially V-shaped crushing throat between them, the lower jaw member being stationary and the upper jaw member being movable axially toward and from the lower jaw member, oppositely rotatable, pretimed centrifugal force creating means applied to and borne wholly by said movable jaw member for rotation about axes at right angles to the related axis of the jaw members for imparting an axial vibratory movement thereto toward and from the companion jaw member, and means for yieldingly supporting said movable jaw member in operative relation to the companion jaw member and yieldingly restraining its movement toward the latter.

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