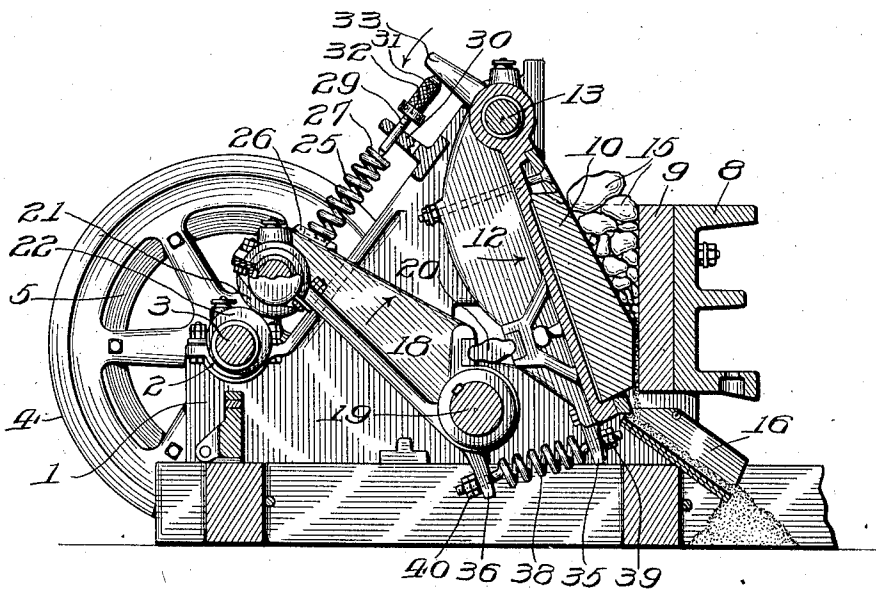


R. E. LEIGHTON.
 STONE CRUSHING OR PULVERIZING MACHINE.
 APPLICATION FILED JAN. 31, 1910.

1,016,340.

Patented Feb. 6, 1912.



WITNESSES

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ROBERT EUBANK LEIGHTON, OF KINGSTON, NEW YORK.

STONE CRUSHING OR PULVERIZING MACHINE.

1,016,340.

Specification of Letters Patent.

Patented Feb. 6, 1912.

Application filed January 31, 1910. Serial No. 540,978.

To all whom it may concern:

Be it known that I, ROBERT EUBANK LEIGHTON, a citizen of the United States, and a resident of the city of Kingston, in the county of Ulster and State of New York, have invented certain new and useful Improvements in Stone Crushing or Pulverizing Machines, whereof the following is a specification, reference being had to the accompanying drawings.

This invention particularly relates to ore crushing or stone breaking machines, or machines which comprise a plurality of swinging or reciprocating members between which the material to be crushed is introduced. Owing to the high speed at which such machines are operated and the heavy construction of the relatively movable working parts, it is desirable that means be provided for maintaining a continuous contact between the various moving parts, to prevent the usual shock or jar due to the lost motion or back lash effected by the quick reversal of motion of the members having considerable weight and momentum. The usual method of preventing the lost motion in machines of this class is to introduce tension or compression means consisting of some form of steel spring or other flexible or resilient medium, interposed between a movable member, and the main frame or some stationary part or fixture thereof.

The principal object of this invention is to provide counterbalancing means which will effectually maintain the working parts of the machine in relative contact, and thereby prevent lost motion or back lash, and the consequent shock or jar incident to lost motion, by providing resilient means interposed between the relatively movable members.

This invention as hereinafter described may be conveniently employed in connection with a stone breaking machine, wherein a crushing jaw is actuated by a swinging lever, oscillated by an eccentric upon which its free end rests, and provides a spring adjustably engaged between the free end of said lever and a lug carried by said jaw, or a spring adjustably interposed between the free end of said jaw and a lug carried

by said lever, or by the combination of both, whereby the free end of said lever is maintained in contact with said eccentric, and is prevented by said springs from being centrifugally separated therefrom.

In the accompanying drawing, the usual form of rock crusher is shown wherein the frame 1 provides the bearing 2, for the driving shaft 3, which carries a fly wheel 4, having secured thereto the band wheel 5, whereby said shaft is conveniently rotated. Said frame also provides a holder 8, for the stationary jaw plate 9, which is opposed to the jaw plate 10, carried by the movable jaw 12, which is mounted for oscillation on the shaft 13, suitably supported in the frame 1. The relative movement of the jaw plates 9 and 10 effects a crushing of the material 15, which is deposited between said plates, and which, after being crushed, drops into the chute and the crushed product is carried away from the machine and deposited as desired.

The oscillation of the jaw 12, is conveniently effected by the lever 18, which is mounted for oscillation on the shaft 19, supported in the frame 1, and said lever is conveniently connected with the jaw 12, by the connecting plate or link 20, which is seated in suitable opposed sockets in said jaw and said lever. The lever 18 is provided at its free end with the roller 21, peripherally engaged with the eccentric 22, carried by the driving shaft 3, whereby said lever is oscillated and imparts the oscillatory movement, to the jaw 12, through the connecting plate or link 20.

In order to prevent the roller 21 from being thrown centrifugally from the periphery of the eccentric 22, a spring 25 is provided, which is seated at one end, in a suitable socket 26 in the free end of the lever 18, and provided with a cap 27 at the other end, said cap being conveniently engaged by the adjustable stem 29, which slidably extends through the guide bracket 30, and is provided with an adjustable sleeve 31, which is locked in threaded engagement with said stem by the jam nut 32, and is arranged to bear against the lug 33, extending radially from the axis of the jaw

12. As may be seen, the movement of the lever 18 in the direction indicated by the arrow thereon, shifts the jaw 12, in the direction of the arrow indicated on said jaw, and consequently shifts the lug 33 toward the free end of said lever 18, in opposition to its movement, and by the adjustment of the sleeve 32 on the stem 29, the tension of said spring 25 may be conveniently varied.

As an alternative arrangement, or in combination with the above, the free end of the jaw 12 may be provided with a lug 35, arranged to move in opposition to the lug 36, extending substantially radially from the axis of the lever 18, said lugs being resiliently connected by the spring 38, whose opposite ends extend through suitable apertures in said lugs, 35 and 36, and provided with nuts 39 and 40 in threaded engagement with the ends of said spring, whereby the tension of said spring may be varied.

It may be here noted that by so disposing the springs as herein shown and described, all of the relatively movable members are maintained in contact with adjacent members; for instance, the roller 21 carried by the free end of the lever 18, is retained in peripheral contact with the eccentric 22, the jaw 12, and the lever 18 are maintained in contact with their bearings, which prevents jar or rattling and the connecting plate or link 20 is held tightly in its respective sockets. Furthermore, the machine may be adjusted to vary the size of the crushed product without disturbing said springs, or in any way affecting their tension.

It is not desired to limit this application to the precise details of construction and arrangement hereinafter more definitely specified, as it is obvious that various modifications may be made therein, without departing from its essential features, as defined in the appended claims.

Having thus described my invention, I claim:

1. In a machine of the class described, the combination with a pivoted crushing member, of a pivoted lever, means to oscillate said lever, means connecting said lever to actuate said crushing member when oscillated, separate means each carried by said lever and crushing member tending to separate the free end of said lever and the pivoted end of said crushing member, and to draw together the free end of said crushing member and pivoted end of said lever.

2. In a machine of the class described, the combination with a pivoted lever fulcrumed intermediate of its ends, of a crushing member pivoted intermediate of its ends, means connecting one end of the crushing member and the adjacent end of said lever, and tending to separate them, and separate means tending to draw the respective opposite ends of said member and lever together.

3. In a machine of the class described, the combination with a pivoted lever fulcrumed intermediate of its ends, of a crushing member pivoted intermediate of its ends, a spring disposed between one end of said crushing member and one end of said lever tending to separate said ends, and a spring disposed between the opposite ends of said member and lever tending to draw said ends together.

4. A machine of the class described, comprising a crushing member pivoted intermediate its ends, of a lever operative to actuate said crushing member, means connecting said crushing member and lever to effect the actuation of said crushing member, said crushing member and said lever being each pivoted intermediate of their ends, a compression spring interposed between one end of said lever and one end of said crushing member, means operative to vary the pressure of said spring, a spring interposed between the other ends of said member and lever tending to draw said ends together, and means arranged to vary the tension of said spring.

5. In a machine of the class described, the combination with a movable crushing member and a lever of the second class for imparting motion to said crushing member, of means arranged to actuate said lever, and means arranged to prevent lost motion comprising resilient means interposed between, and connecting said movable member and said lever.

6. In a machine of the class described, the combination with a movable member, of an oscillatory lever of the second class arranged to actuate said movable member, means arranged to oscillate said oscillatory lever, and a resilient member interposed between, and connecting said movable member and said lever, to maintain said oscillatory member in engagement with said oscillating means.

7. In a machine of the class described, the combination with a movable jaw, of a lever connected to move said jaw, means arranged to oscillate said lever, and means arranged to maintain said lever in contact with said oscillating means, comprising resilient means interposed between said lever and said jaw, and connected with each.

8. In a machine of the class described, the combination with a frame, of a movable jaw pivoted in said frame, a lever arranged to move said jaw, means connecting said lever and jaw, means engaging the free end of said lever to actuate said lever and jaw, and a spring connecting the free end of said lever and said jaw, coöperative with said actuating means to maintain said parts in engagement with each other.

9. In a machine of the class described, the combination with a frame, of a movable jaw pivoted in said frame, a lever mounted to

oscillate in said frame and connected with said jaw, means arranged to engage the free end of said lever to oscillate said lever and jaw, and resilient means interposed between the free end of said lever and the pivoted end of said jaw, arranged to maintain said lever in contact with the actuating means, and said jaw engaged with said lever.

10. In a machine of the class described, the combination with a frame, of a movable jaw pivoted in said frame, a lever mounted to oscillate in said frame and connected with said jaw, means arranged to engage the free end of said lever to actuate said lever and said jaw, a spring interposed between the free end of said lever and the pivoted end of said jaw, arranged to maintain said lever engaged with said actuating means, and said jaw connected with said lever, and means arranged to vary the tension of said spring.

11. In a machine of the class described, the combination of a movable crushing jaw pivoted intermediate of its ends, but adjacent to one end, of an actuating lever loosely connected with said jaw and pivoted intermediate of its ends, but adjacent one end, the short end of said lever being resiliently connected with the long end of said jaw, and the short end of said jaw being resiliently connected with the long end of said lever co-operative to maintain the respective parts in operative relation, and means arranged to actuate said lever.

12. In a machine of the class described, the combination with a frame, of a movable jaw pivoted in said frame, a lever mounted to oscillate in said frame, connecting means arranged to space said lever and jaw, means arranged to engage the free end of said lever to oscillate said lever, and actuate said jaw, a spring interposed between the free end of said lever and said jaw, co-operative with said oscillating means to force the movable parts together, and means arranged to vary the tension of said spring to determine the force with which the movable parts may be held in engagement with each other.

13. In a machine of the class described, the combination with a frame, of a movable jaw pivoted therein, a lever mounted to oscillate in said frame, a spacing connector between said lever and jaw, a cam arranged to shift the free end of said lever to actuate said jaw, and a spring interposed between the free end of said lever, and a portion of said jaw movable with respect to said lever, to maintain the movable parts in contact.

14. In a machine of the class described, the combination with a frame, of a movable jaw pivotally mounted in said frame, a lever mounted for oscillation in said frame, a spacing connector interposed between said jaw and lever, an eccentric arranged to oscillate said lever by engagement with its free end, and thereby actuate said jaw, a

lug on said jaw arranged to be shifted in opposition to the movement of said lever, by said lever, and a spring interposed between said lever and said lug to maintain the movable parts in contact.

15. In a machine of the class described, the combination with a frame, of a movable jaw pivoted in said frame, a lever arranged to move said jaw, means connecting said lever and jaw, means engaging the free end of said lever to actuate said lever and jaw, a spring interposed between the free end of said lever and said jaw, connected with each, and arranged to maintain said parts co-operatively engaged, means to vary the tension of said spring, and means to lock said tension varying means in an adjusted position.

16. In a machine of the class described, the combination with a frame, of a movable jaw pivoted in said frame, a lever mounted to oscillate in said frame and connected with said jaw, means arranged to engage the free end of said lever to oscillate said lever and jaw, a spring interposed between the free end of said lever and the pivoted end of said jaw, arranged to maintain said lever in contact with the actuating means, and said jaw engaged with said lever, a longitudinally expandable member co-operative with said spring to vary the tension, and means to lock said member in adjusted position.

17. In a machine of the class described, the combination with a frame, of a movable jaw pivoted in said frame, a lever mounted to oscillate in said frame and connected with said jaw, means arranged to engage the free end of said lever to actuate said lever and said jaw, a spring interposed between the free end of said lever and the pivoted end of said jaw, to maintain said lever in engagement with said actuating means, and said jaw connected with said lever, means comprising a threaded stem and a sleeve engaged therewith arranged to vary the tension of said spring, and a jam nut on said stem arranged to lock said sleeve in adjusted position on said stem.

18. The combination with a frame, of a movable jaw pivoted in said frame, of a lever mounted to oscillate in said frame, and connected to actuate said jaw, an eccentric, a roller carried by the free end of said lever arranged to peripherally engage said eccentric, a lug on said jaw arranged to move in opposition to the movement of said lever, a spring interposed between the free end of said lever and said lug, a lug on said lever arranged to move in opposition to the movement of the free end of said jaw, and a spring interposed between said lug and the free end of said jaw.

19. The combination with a frame, of a movable jaw pivoted in said frame, of a lever mounted to oscillate in said frame and connected to actuate said jaw, an eccentric, a

roller carried by the free end of said lever
arranged to peripherally engage said eccen-
tric, a lug on said jaw arranged to move in
opposition to the movement of said lever, a
5 spring interposed between the free end of
said lever and said lug, a lug on said lever
arranged to move in opposition to the move-
ment of the free end of said jaw, and a
spring interposed between said lug and the

free end of said jaw, and means arranged 10
to vary the tension of said spring.

In witness whereof, I have hereunto set
my hand this 26th day of January, A. D.
1910.

ROBERT EUBANK LEIGHTON.

Witnesses:

S. D. HORNBECK,
LOUIS W. FERRIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

Corrections in Letters Patent No. 1,016,340.

It is hereby certified that in Letters Patent No. 1,016,340, granted February 6, 1912, upon the application of Robert Eubank Leighton, of Kingston, New York, for an improvement in "Stone Crushing or Pulverizing Machines," errors appear in the printed specification requiring correction as follows: Page 1, line 73, after the word "chute" insert the reference-numeral 16; page 2, line 78, before the word "its" insert the word *of*, and same line after the word "ends" strike out the word "of"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of March, A. D., 1912.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.