Aug. 6, 1940.

R. BERNHARD

2,210,790

SWING JAW MOUNTING

Filed April 8, 1938

Fig. 1.

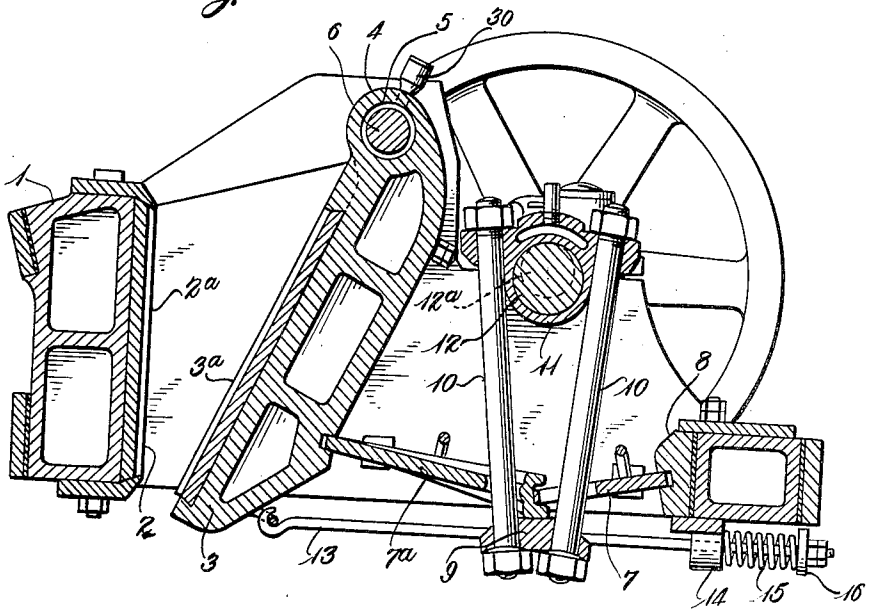


Fig. 2.

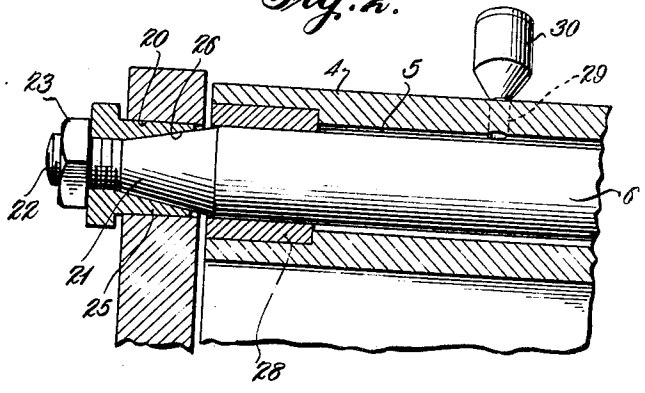
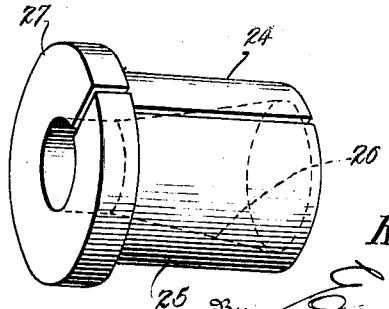


Fig. 3.



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SWING JAW MOUNTING

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Application April 8, 1938, Serial No. 201,003

1 Claim. (Cl. 83—53)

This invention relates to an improved mounting for the swing jaws of rock and ore crushers. In crushers of the general type, known as jaw crushers, a jaw, termed a swing jaw, is pivotally suspended within a crusher housing and arranged for swinging movement toward and from a fixed jaw mounted upon the inside of the housing. Means, such as a cam-operated toggle, are provided for oscillating the swing jaw so that lumps of rock, ore or other material fed downwardly between the pair of jaws are crushed between the jaws.

It is an object of my invention to provide in jaw crushers of the above character an improved mounting for the swing jaw. More particularly the invention contemplates a construction in which the swing jaw, instead of being rigidly fastened to its suspension shaft, is arranged for oscillation about said shaft and the shaft is held against rotation by means of rigidly securing it to the side walls of the crusher housing. In the preferred form of the invention such binding means comprise split bushings encircling the ends of the shaft and screw threaded means for wedging the bushings into tight engagement with the shaft and with the inner surfaces of the openings through which the ends of the shafts extend.

Another object of my invention is to provide a swing jaw mounting in which the suspension shaft for the swing jaw is so arranged as to extend between and retain the side walls in rigid assembly.

A further object of my invention is to provide a swing jaw mounting which is of more simple, rigid and more efficient construction than those now commonly employed in jaw crushers, and which additionally affords improved means for lubricating the swing jaw bearings.

Other objects and advantages will be apparent from the following detailed description of a preferred embodiment of the invention, reference being had to the annexed drawing in which:

Figure 1 is a side cross-sectional view of a jaw crusher;

Figure 2 is a detail view of a portion of the upper end of the swing jaw of the crusher of Fig. 1, showing its mode of suspension from the swing jaw shaft and the means for rigidly securing the shaft to the side walls of the crusher housing; and

Figure 3 is a detail perspective view of the internally-tapered bushing employed for fastening the swing jaw shaft in the crusher housing.

Referring to the drawing, Fig. 1 shows in cross-section a common type of jaw crusher for crushing ore, stone, or like material. This crusher comprises generally a cast-metal housing 1 open at its top and bottom, a stationary jaw 2 within the housing and a movable or swing jaw 3 adapted to cooperate with the stationary jaw for the crushing of lumps of material therebetween. The stationary jaw is formed with a crushing face 2*a* while the swing jaw is provided with a substantially flat renewable crushing face 3*a*. Both crushing faces are serrated so as to define a series of ridges extending longitudinally thereof.

The upper end of the swing jaw 3 is provided with a cylindrical enlargement 4 extending thereacross, which enlargement is internally recessed to form a bore 5 within which is slidably received a shaft 6 extending between the side walls of the housing and providing suspension for the swing jaw. Movement is imparted to the swing jaw by a toggle mechanism comprising the two toggle arms 7 and 7*a*, one of which abuts an adjustable slide block 8 located between the side walls of the housing, and the other of which abuts the rear face of the swing jaw located a spaced distance from its lower end. A shoe 9 upon the lower ends of a pair of vertically disposed pitman rods 10 supports the opposed ends of the toggle arms and the upper ends of the pitman rods are fastened to a sleeve 11 encircling an eccentric 12 fixed upon an operating shaft 12*a*.

The arrangement is such that when the operating shaft is driven by suitable means, rotation of the eccentric 12 raises and lowers the pitman rods 10 to actuate the toggle constituted by the two toggle arms 7 and 7*a*. This, in turn, causes oscillation of the swing jaw 3 so that material fed downwardly into the gap between the jaws 2 and 3 is crushed between the jaws and passes out of the space between the lower ends of the jaws. A rod 13 connected to the rear face of the swing jaw and passing through an opening in an ear 14 projecting below the bottom of the housing is encircled by a coil spring 15 which exerts reaction against a nut 16 threaded upon the end of the rod and against the ear 14 so as to yieldingly retain the swing jaw 3 in engagement with the toggle arm 7*a*. This general type of crusher is well known in the crushing art.

According to the present invention, the suspension shaft 6 is rigidly secured to the walls of the housing in a manner such as to positively prevent rotation of the shaft, and the swing jaw 3 is arranged to rotate about the suspension shaft

as a pivot. To accomplish this purpose, there is provided through each of the parallel side walls of the housing 1 an opening 20 through which extends an end of the suspension shaft. The end of the suspension shaft for a portion of its length is tapered inwardly as indicated at 21 in a direction toward its extremity and terminates in a cylindrical stem 22 which is screw-threaded to receive a nut 23.

Closing the space between the inner circumference of the opening 20 and the tapered end 21 of the suspension shaft 6 is a split bushing 24 made of spring steel. As best shown in Figs. 2 and 3, this bushing has a cylindrical circumference 25 adapted to snugly fit within the wall opening and is interiorly tapered, as indicated at 26, in a direction and at an inclination complementary to the taper 21 on the end of the suspension shaft. The outwardly disposed end of the bushing is enlarged to form a head 27 which may be of any desired shape designed to afford means for the ready removal of the bushing from the opening.

The bushing terminates somewhat short of the end of the opening, as shown in Fig. 2. It will be apparent that when the bushing is passed over the end of the suspension shaft and loosely inserted in the opening, the latter may be expanded in the opening by screwing up on the nut 23 on the stem 22 and tightening it against the head of the bushing. Coaction of the tapered end of the shaft with the inner tapered surface of the bushing causes a tight frictional fit therebetween while the outer circumference of the bushing is expanded into binding engagement with the inner circumference of the opening. The pressure exerted by the nut 23 is largely transmitted in a radial direction against the inner surface of the opening 20 instead of against the outer face of the wall.

In order to insure proper lubrication for the swing jaw bearing, the bore 5 is made slightly oversize with respect to the circumference of the suspension shaft 6. Adjacent each of its ends, the bore is of enlarged diameter, and drive-fitted within such enlarged section is a sleeve 28 of soft metal forming a bearing for the suspension shaft. The clearance space between the suspension shaft and the bore 5 provides a recess for the reception of lubricant and this recess is closed at its opposite ends by the sleeves 28. The purpose of this recess is to retain a supply of grease or oil introduced through a channel 29 communicating with the recess and leading to a grease or oil cup 30 mounted upon the exterior of the swing jaw.

From the above description it will be apparent that by my improved form of swing jaw mounting the suspension shaft about which the swing jaw rotates is positively and non-rotatably secured within the side walls of the crusher housing and serves as a reinforcing tie rod to hold these walls together. Any excessive stresses transmitted to the suspension shaft, as by reason of the resistance offered by lumps of material being crushed between the extreme lower ends of the jaws, is resisted by rigid anchorage of the shaft in the side walls of the crusher housing. Furthermore, it will be apparent that lubrication of the swing shaft is satisfactorily provided for by the store of grease or oil contained in the oversize bore of the swing shaft.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics of the invention, and the present embodiment is therefore to be considered as illustrative and not restrictive, and all changes which come within the meaning and range of equivalency of the claim are therefore intended to be embraced therein.

I claim:

The combination with a jaw crusher of the type having a heavy, metal housing provided with upright side walls, a stationary jaw and a swing jaw, a suspension shaft extending between said side walls and received within openings provided in said walls, said swing jaw being oscillatable about said suspension shaft and means for oscillating said swing jaw toward and from the stationary jaw, of means for solidly and non-rotatably securing the ends of said suspension shaft within said side walls for transmitting shocks and vibrations from the suspension shaft thereto, said securing means comprising a one-piece annular, longitudinally-split contractible bushing surrounding an end of the shaft and disposed within an opening in a side wall, said bushing being split along a single line throughout its length and having a smooth cylindrical outer circumference and a smooth tapered inner circumference, the end of said suspension shaft being correspondingly tapered so as to cooperate with the tapered inner circumference of the bushing and said suspension shaft having a cylindrical threaded portion extended beyond said tapered portion the outer end of the bushing being enlarged, a nut rotatable upon the threaded portion and adapted to be screwed against the enlarged outer end of the bushing for forcing said bushing along the tapered portion of the shaft into expanded engagement with the opening, whereby the end of the shaft is solidly bonded to the side wall throughout an area corresponding approximately to the inner circumferential area of the opening so as to effectively transmit shocks and vibrations from the suspension shaft to the housing.

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