May 8, 1951 H. J. WOOCK ET AL 2,551,862

SHOE MOUNTING FOR IMPACT CRUSHERS

Filed Sept. 28, 1948 2 Sheets-Sheet 1

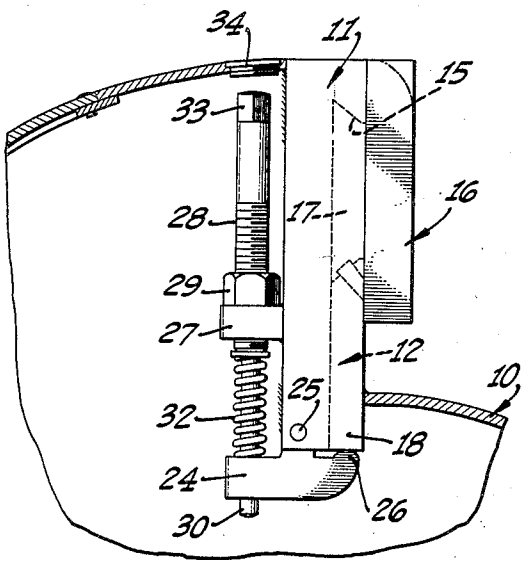


Fig. 1.

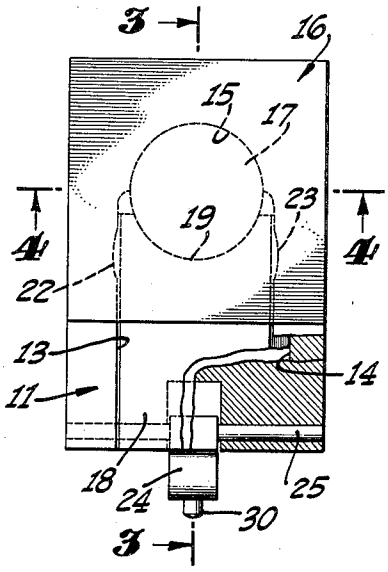


Fig. 2.

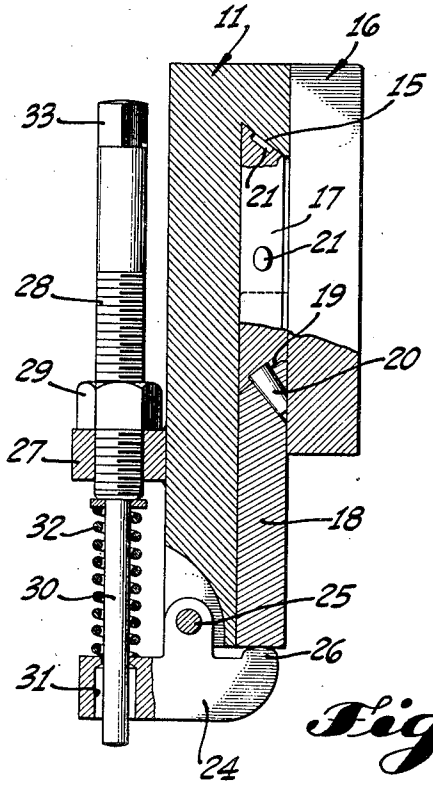


Fig. 3.

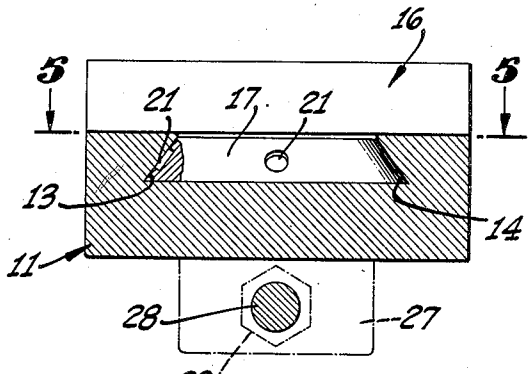


Fig. 4.

HERBERT J. WOOCK,
RALPH K. CADWELL,
INVENTORS.

BY Hazard & Miller

ATTORNEYS

May 8, 1951 H. J. WOOCK ET AL 2,551,862

SHOE MOUNTING FOR IMPACT CRUSHERS

Filed Sept. 28, 1948 2 Sheets-Sheet 2

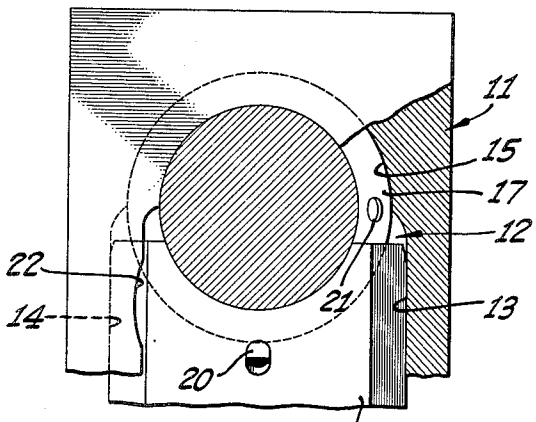


Fig. 5.

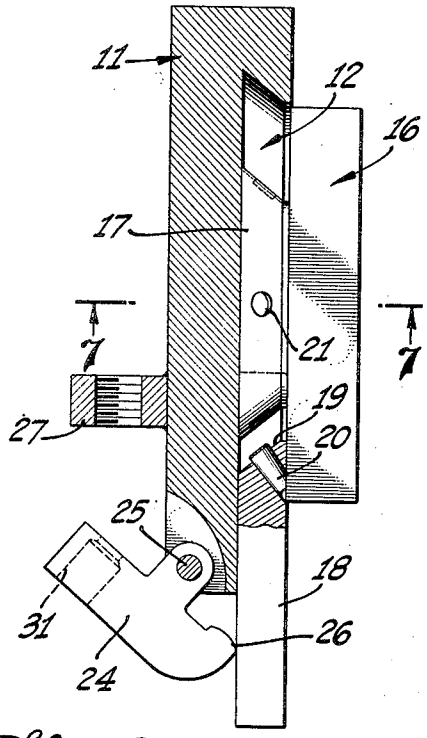


Fig. 6.

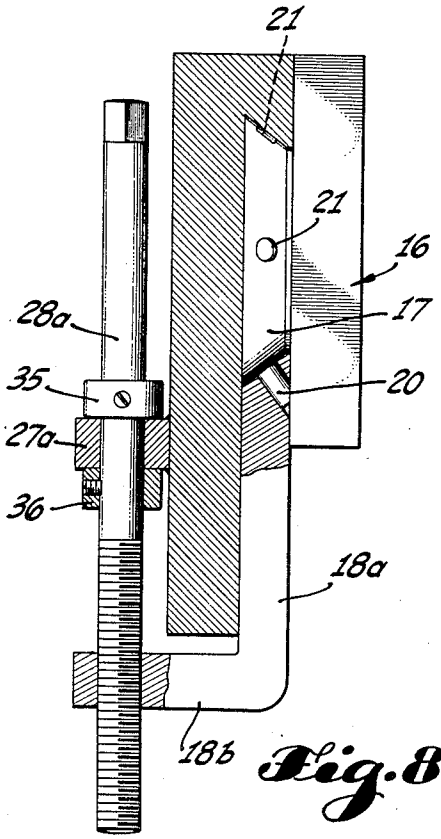


Fig. 8.

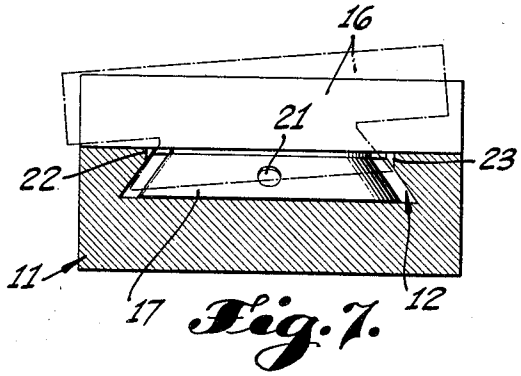


Fig. 7.

HERBERT J. WOOCK,
RALPH K. CADWELL,
INVENTORS.

BY Hazard & Miller

ATTORNEYS

Patented May 8, 1951

2,551,862

UNITED STATES PATENT OFFICE

2,551,862

SHOE MOUNTING FOR IMPACT CRUSHERS

Herbert J. Woock and Ralph K. Cadwell,
Alhambra, Calif.

Application September 28, 1948, Serial No. 51,504

8 Claims. (Cl. 241—197)

1

This invention relates to a shoe mounting for impact rock crushers and the like.

In rock crushers of this type there is a rotor which carries impact shoes which strike the rock to be crushed at a relatively high velocity. It is desirable in such constructions to so mount the shoes which take the wear occasioned by the rock crushers in such a manner that the shoes cannot let go or separate from the rotor. At the same time, inasmuch as these shoes do wear and must be replaced from time to time, it is desirable to so mount the shoes on the rotor that their removal and replacement can be easily accomplished.

In impact crushers of this type the wear on the shoes is usually uneven and consequently it is desirable to be able to rotate the shoes with relation to the rotor so that all four sides of the shoe may be completely worn away before the shoe is discarded.

It is another object of the invention to provide a mounting for shoes for impact rock crushers which is so designed as to facilitate the rigid mounting of the shoes on the rotor but which at the same time will enable removal and replacement of shoes and their rotation with relation to the rotor so as to secure as much wear as possible from each shoe.

A further object of the invention is to provide a construction having the above mentioned characteristics wherein the shoe-retaining means is operable or adjustable from the periphery of the rotor, thus avoiding any necessity of disassembling various parts of the rotor in order to rotate or remove shoes thereon.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 is a sectional view through a portion of a rotor of an impact rock crusher illustrating the shoe mounting embodying the present invention as having been incorporated therein;

Fig. 2 is a view in front elevation of the shoe and its mounting illustrated in Fig. 1;

Fig. 3 is a sectional view taken substantially upon the line 3—3 upon Fig. 2;

Fig. 4 is a horizontal section taken substantially upon the line 4—4 upon Fig. 2;

Fig. 5 is a sectional view taken substantially upon the line 5—5 upon Fig. 4;

Fig. 6 is a view similar to Fig. 3 but illustrating the manner in which the shoe may be either

2

rotatably adjusted or removed and replaced with relation to the rotor;

Fig. 7 is a sectional view taken substantially upon the line 7—7 upon Fig. 6; and

Fig. 8 is a view similar to Fig. 3 but illustrating an alternative form of construction.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, 10 indicates a rotor mounted for rotation about an axis (not shown) and which carries one or more radially disposed shoe holders generally indicated at 11. In the forward face of the shoe holder there is formed a dovetailed recess, generally indicated at 12, which has opposed parallel sides 13 and 14 which terminate short of the outer end of the shoe holder 11 and merge into a semicircular undercut 15. The shoe which is applicable to the shoe holder 11 is indicated at 16 and has on the back thereof a circular dovetail 17 which is of such size as to snugly fit between the opposed parallel sides 13 and 14. This dovetail is also designed to fit the undercut 15 at the top of the recess 12. The shoe 16 may be formed of any hard, tough and wear-resistant metal designed to effectively withstand the wear occasioned in impact rock crushing. In the lower end of the recess 12 there is disposed a dovetailed retainer 18 which is undercut as indicated at 19 at the top thereof to fit against the bottom of the circular dovetail 17. This retainer carries a dowel or pin 20 which is receivable in any one of four equally spaced holes or recesses 21 formed on the sides of the dovetail 17. Consequently, when the retainer 18 is engaging the dovetail 17, the shoe 16 will be held against rotation by reason of the pin 20 fitting one of the holes 21. However, on lowering the retainer 18 slightly so as to withdraw its pin from a hole 21, it is possible to rotate the shoe 16 into any one of four different positions so as to equalize the wear on the four sides of the shoe. In any one of these positions the shoe is held against rotation by returning the retainer 18 to a position wherein its dowel or pin 20 enters one of the holes 21.

As will be observed from Fig. 2, the parallel sides 13 and 14 are relieved as indicated at 22 and 23 some distance below the tops of the parallel sides. These relieved portions are sufficient so that if the retainer 18 is retracted to a considerable extent such as is illustrated in Fig. 6, the shoe can be allowed to descend in the recess 12 until the dovetail is opposite the relieved portions and the shoe can then be either tilted into or out of the groove as illustrated in Fig. 7. This

is done whenever removal and replacement of a given shoe is necessary.

As a means for retaining the retainer 18 in position and providing a constant take-up to keep the shoe tight on its holder 11, a lever 24 is pivoted, as at 25, on the bottom of the shoe holder. This lever carries a finger 26 engageable with the bottom of the retainer 18. On the back of the shoe holder 11 there is a boss 27 that is internally threaded to receive a screw 28 that can be adjusted upwardly or downwardly with relation to the shoe holder 11 on loosening the jamb nut 29. This screw carries a pin 30 that loosely extends through one arm of the lever 24, as indicated at 31, and a compression spring 32 is compressed between the lever 24 and the shoulder formed between the juncture of the pin 30 and the threaded portion of the screw 28. A washer may be interposed between the compression spring and the shoulder if desired.

The top of the screw is flatted, as indicated at 33, for the application of a socket wrench or other turning tool which is receivable through the walls of the rotor on removal of a plug or cap 34. In this manner rotation of the screw 28 can be accomplished from the periphery of the rotor, making it highly convenient to tighten or loosen the retainer 18 when it is desired to rotate the shoe 16 or to remove or replace it. The screw normally is adjusted to create a considerable compression on the spring 32 so that the retainer 18 is urged upwardly against the bottom of the dovetail 17 with considerable force. During rotation of the rotor which usually takes place at a relatively high speed, the shoe is urged outwardly with considerable centrifugal force. The retainer 18 is also urged outwardly under centrifugal force and its outward pressure is somewhat supplemented by the effect of the compression spring 32. As the shoe's dovetail cannot escape from the outer end of the recess but is urged outwardly by centrifugal forces acting as above described together with the effect of the spring pressure, the shoe will not loosen under the high impacts imparting vibration thereto.

In the alternative form of construction illustrated in Fig. 8, the retainer 18*a* has a rearwardly extending arm 18*b* which is internally threaded to receive the threaded portion of the screw 18*a*. This screw carries a pair of collars 35 and 36 disposed on opposite sides of the boss 27*a* through which the screw extends. In other respects the form of construction illustrated in this figure is substantially identical with that form of construction previously described.

In both forms of construction, as the dovetailed recess 12 terminates below the top of the shoe holder 11, the dovetailed connection between the shoe and the shoe holder effectively prevents the shoe from letting go or separating from the shoe holder even under the greatest centrifugal action occasioned by the highest speeds. Consequently the danger occasioned by a shoe separating from its shoe holder on the rotor is effectively prevented. Whenever a side of the shoe becomes severely worn it is merely necessary to rotate the screw 28 or 28*a*, as the case may be, to allow the retainer 18 to descend a sufficient distance to withdraw its pin 20 from a hole 21. The shoe can then be rotated ninety degrees and the retainer 18 returned to its locking position, locking the shoe against rotation with relation to the holder 11. When all four sides of the shoe have become so severely worn that the shoe should be removed and replaced, the retainer 18 is lowered into a position such as is illustrated in Fig. 6. The shoe may then be lowered into a position wherein its dovetail 17 is disposed between the relieved portions 22 and 23 of the sides 13 and 14 of the recess 12. While in this position the shoe may be tilted out of the groove in a manner as illustrated in Fig. 7 and a replacing shoe may be substituted therefor in the reverse manner. The retainer 18 is then returned to its uppermost position, retaining the shoe at the top of the groove 12 and locking it against rotation. Loosening of the shoe, either for rotation purposes or for replacement purposes, can at all times be accomplished from the periphery of the rotor so that it is unnecessary to disassemble part of the rotor for either of these purposes.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. In an impact crusher wherein there is a rotor having a radially extending shoe holder thereon, a shoe having a circular dovetail on the back thereof, the shoe holder having a dovetailed recess formed therein extending outwardly from its inner end and terminating short of the outer end thereof and serving to accommodate the circular dovetail on the shoe, and means on the shoe holder for crowding the shoe and its dovetail toward the outer end of the recess whereby upon loosening said means the shoe may be rotatably adjusted relatively to the shoe holder.

2. In an impact crusher wherein there is a rotor having a radially extending shoe holder thereon, a shoe having a circular dovetail on the back thereof, the shoe holder having a dovetailed recess formed therein extending outwardly from its inner end and terminating short of the outer end thereof and serving to accommodate the circular dovetail on the shoe, and means on the shoe holder for crowding the shoe and its dovetail toward the outer end of the recess and locking the dovetail against rotation in the recess whereby upon loosening said means the shoe may be rotatably adjusted relatively to the shoe holder.

3. In an impact crusher, a rotor having a radially extending shoe holder thereon having an outwardly extending dovetailed recess on the face thereof terminating short of the outer end of the shoe holder, a shoe having a dovetail slidable in the recess toward the outer end thereof, a retainer also slidable in the recess, means for causing the retainer to engage the dovetail on the shoe and crowd it outwardly against the outer end of the recess, and a removable plug in the walls of the rotor allowing access to the last-named means from the exterior of the rotor.

4. In an impact crusher, a rotor having a radially extending shoe holder thereon having an outwardly extending dovetailed recess on the face thereof terminating short of the outer end of the shoe holder, a shoe having a dovetail slidable in the recess toward the outer end thereof, a retainer also slidable in the recess, and means for causing the retainer to engage the dovetail on the shoe and crowd it outwardly against the outer end of the recess, said recess being widened inwardly of the outer end thereof so that the dovetail on the shoe may be inserted and withdrawn through the widened portion.

5. In an impact crusher, a rotor having a radially extending shoe holder thereon having an outwardly extending dovetailed recess on the face thereof terminating short of the outer end

of the shoe holder, a shoe having a dovetail slidable in the recess toward the outer end thereof, a retainer also slidable in the recess, means for causing the retainer to engage the dovetail on the shoe and crowd it outwardly against the outer end of the recess, said dovetail being circular in form enabling the shoe to be rotatably adjusted, and means on the retainer and dovetail adapted to mutually engage to lock the shoe against rotation relative to the shoe holder.

6. In an impact crusher, a rotor having a radially extending shoe holder thereon having an outward extending dovetailed recess on the face thereof terminating short of the outer end of the shoe holder, a shoe having a dovetail slidable in the recess toward the outer end thereof, a retainer also slidable in the recess, a screw mounted on the back of the shoe holder extending outwardly parallel to said recess having its outer end accessible from the exterior of the rotor, and means operable by rotation of the screw for forcing the retainer outwardly relative to the shoe holder.

7. In an impact crusher, a rotor having a radially extending shoe holder thereon having an outwardly extending dovetailed recess on the face thereof terminating short of the outer end of the shoe holder, a shoe having a dovetail slidable in the recess toward the outer end thereof, a retainer also slidable in the recess, an outwardly extending screw supported by the shoe holder and having its outer end accessible from the exterior of the rotor, and means operable by rotation of the screw for forcing the retainer outwardly relatively to the shoe holder.

8. In an impact crusher, a rotor having a radially extending shoe holder thereon having an outwardly extending dovetailed recess on the face thereof terminating short of the outer end of the shoe holder, a shoe having a dovetail slidable in the recess toward the outer end thereof, a retainer also slidable in the recess, and means for causing the retainer to engage the dovetail on the shoe and crowded outwardly against the outer end of the recess, said dovetail being circular in form enabling the shoe to be rotatably adjusted, the dovetail having spaced bores thereabout and the retainer having a locking pin receivable in the bores to lock the shoe in adjusted positions.

HERBERT J. WOOCK.
RALPH K. CADWELL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
144,330	Gardner	Nov. 4, 1873
993,783	Mason	May 30, 1911
1,205,474	Newhouse	Nov. 21, 1916
1,380,146	Hiller	May 31, 1921
1,618,826	Hiller	Feb. 22, 1927
1,630,021	Lucas	May 24, 1927
1,798,000	Schultz	Mar. 24, 1931
1,944,928	Davis	Jan. 30, 1934
1,997,553	Taylor et al.	Apr. 9, 1935
2,086,383	Gruender	July 6, 1937
2,310,758	Werner	Feb. 9, 1943

FOREIGN PATENTS

Number	Country	Date
231,016	Great Britain	Mar. 26, 1925
373,289	Great Britain	May 26, 1932