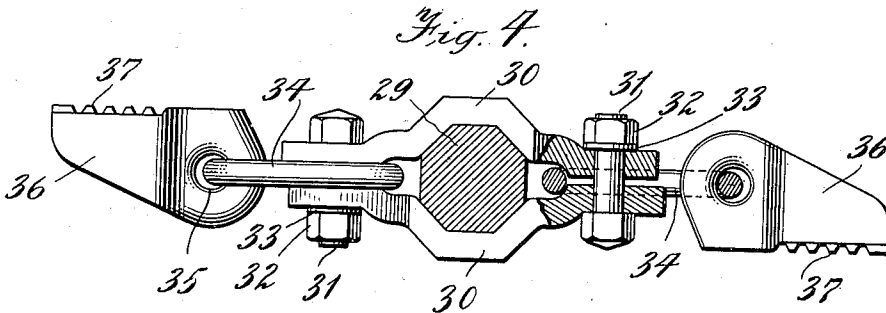
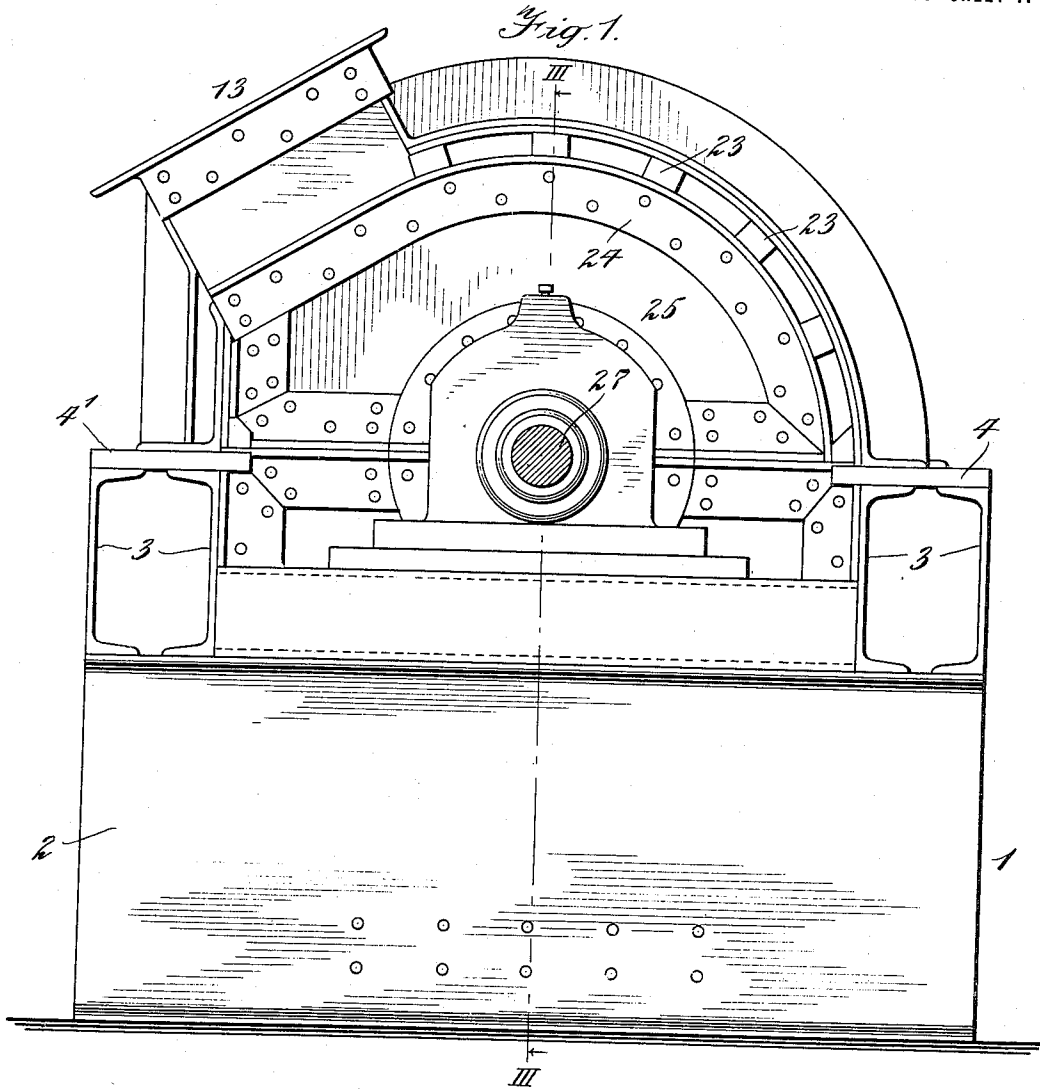


1,169,907.

Patented Feb. 1, 1916.
3 SHEETS—SHEET 1.



Witnesses:
Charles H. ...
Chas. F. ...

Inventor
Oliver O. App.
By his Attorneys
Rosenbaum, Shookbridge

1,169,907.

Patented Feb. 1, 1916.
 3 SHEETS—SHEET 2.

Fig. 2.

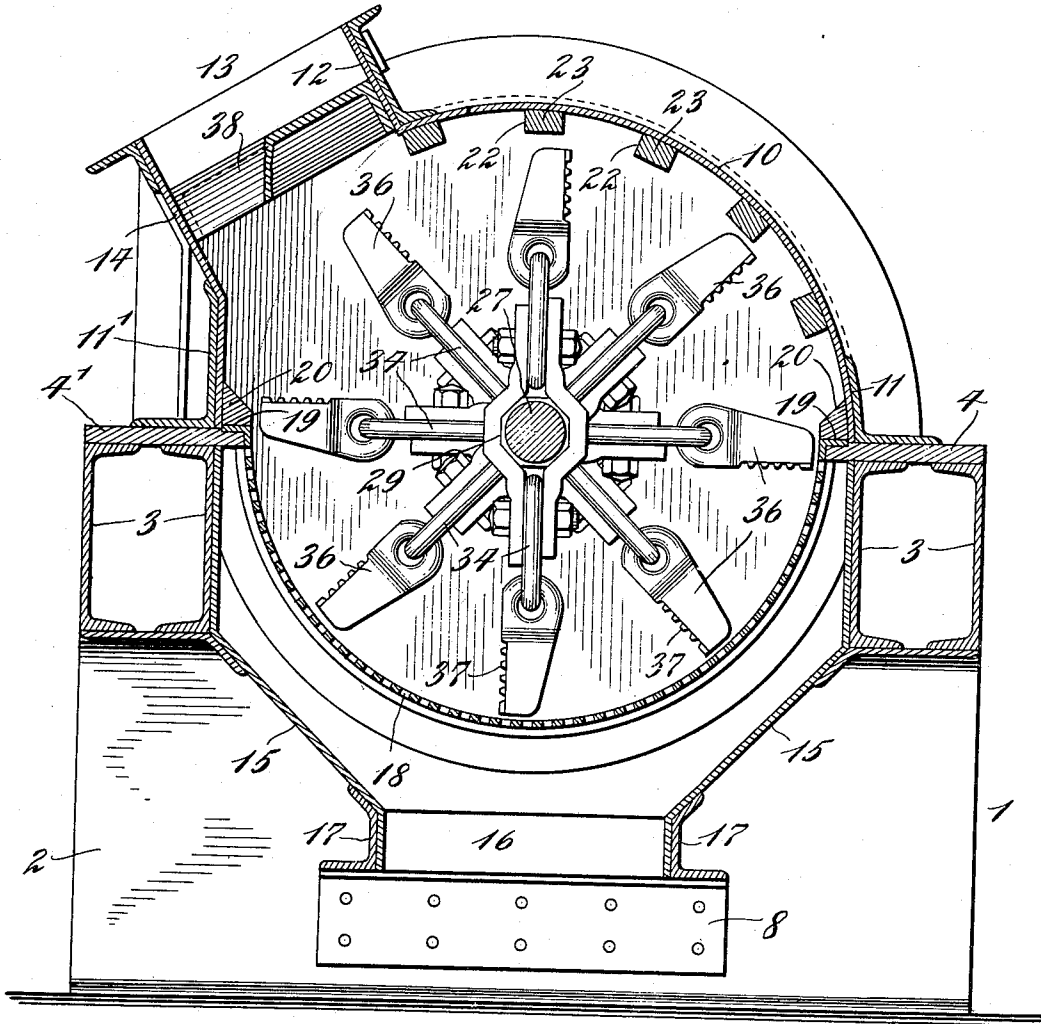
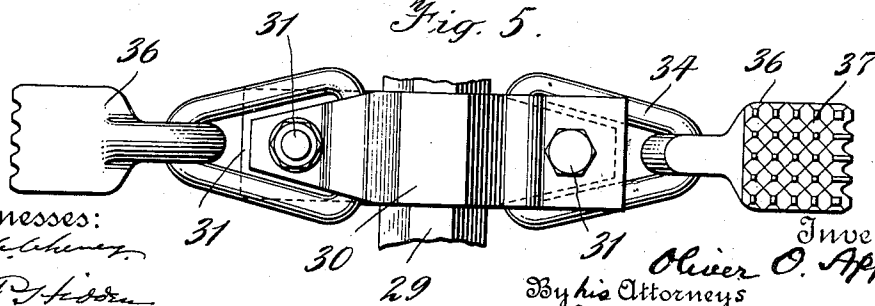


Fig. 5.



Witnesses:
J. G. ...
Chas. P. ...

Inventor
 Oliver O. App.
 By his Attorneys
Rosenthal & Stockbridge

O. O. APP.
 ROCK BREAKER.
 APPLICATION FILED APR. 3, 1911.

1,169,907.

Patented Feb. 1, 1916.

3 SHEETS—SHEET 3.

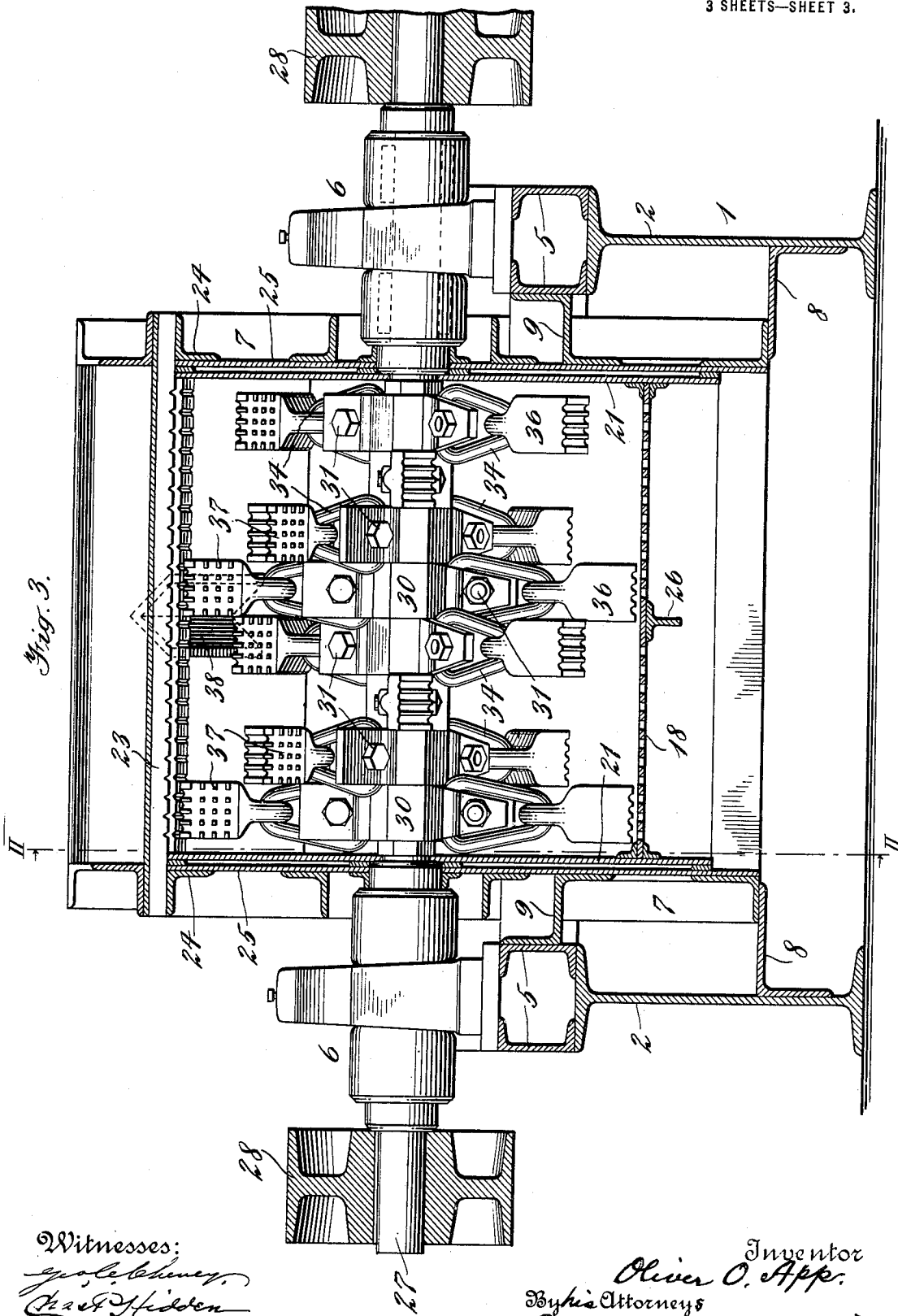


Fig. 3.

Witnesses:
Goldschlager
Carl H. Hadden

Inventor
Oliver O. App.
 By *his Attorneys*
Rosenbaum & Stockbridge

UNITED STATES PATENT OFFICE.

OLIVER O. APP, OF NEW YORK, N. Y.

ROCK-BREAKER.

1,169,907.

Specification of Letters Patent.

Patented Feb. 1, 1916.

Application filed April 3, 1911. Serial No. 618,544.

To all whom it may concern:

Be it known that I, OLIVER O. APP, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Rock-Breakers, of which the following is a full, clear, and exact description.

This invention relates to disintegrating apparatus, and more particularly to a centrifugally acting mechanism especially adapted for disrupting and breaking up rock, and the like.

I am aware that there have been some attempts heretofore to produce rock breakers in which revolving parts were provided, some of which were adapted to impinge against rock injected into the apparatus, but to the best of my knowledge, these appliances have not been wholly successful, by reason, I believe, of faulty and weak construction. I describe herein a practical mechanism of the type in question which has been found to be very efficient and economical in operation, and I am aware that various modifications may be made in the several parts thereof, which properly come within the purview of my invention, and hence I desire to be limited only by the scope of the appended claims.

Various novel features of construction will be hereinafter set forth and more particularly pointed out in the said claims.

In the drawings which form a part hereof and in which like reference characters designate like parts throughout the several views: Figure 1 is a side elevation of one embodiment of my apparatus. Fig. 2 is a section of the same taken on the line II—II of Fig. 3, and viewed in the direction of the arrows. Fig. 3 is a vertical longitudinal section of said apparatus taken substantially on the axis of the revolving elements thereof. Fig. 4 is a detail of the novel striking block and link connection employed in this, my preferred form of device. Fig. 5 is a view of the parts shown in Fig. 4, said parts being viewed from above.

Referring to Figs. 1, 2 and 3, a base broadly designated 1, is provided, of any suitable construction, the particular desideratum being however, in any case, that extreme rigidity be attained. In my preferred form of apparatus said base consists of two I-beam sections 2, which are tied together preferably by means of pairs of channels 3,

which are mounted upon the respective ends of the said beams, and fastened thereto in any suitable manner. These channels are covered by plates 4—4' and have positioned therebetween upon the respective sides of the apparatus, and on top of the I-beams, sets of smaller or narrower channels 5—5', which latter provide supports for suitable bearings 6, which latter serve to carry the revoluble parts of the apparatus. A stationary casing, broadly designated 7, is fixedly secured to the base or frame aforesaid by means of supporting angle irons 8, and Z-bars 9. This casing is preferably approximately cylindrical, the upper portion thereof consisting of a curved plate 10, which latter is secured at one end to one of the plates 4, above referred to, by means of an angle iron 11. The other end of plate 10 may be upwardly or outwardly bent as at 12, to form one side of the mouth 13 of the casing; the other side of said mouth being formed by the plate 14; which is secured to a plate 4', opposite that above referred to, by means of an angle iron 11'. The lower part of the casing has substantially the form, in cross-section, of a semi-octagon, the respective sides of which are formed by plates 15 which are secured to the backs of the innermost channels 3, and which are bent in the manner shown in Fig. 2, in effect thereby constituting a hopper, the mouth 16 of which opens downwardly, and which is suitably stiffened as by means of the bent plates 17, which extend along the respective sides thereof. A semi-circular screen 18 of suitable mesh, or which is provided with perforations of proper size, is disposed within the casing and is supported therein, preferably, by bending the edges of said screen as at 19, said edges bearing against inwardly projecting portions of the plates 4—4' and being clamped thereagainst by means of bars 20, or the like. The side walls of the casing may be formed of metal sheets 21 which are apertured as at 22 for the reception of breaker bars 23. These latter are preferably serrated as best shown in Fig. 3, so as to, in effect, provide them with a series of blunt teeth. They are firmly held in place against the plate 10 by means of arcuate angle irons 24, which are in turn riveted or otherwise suitably secured to outside plates 25 which are preferably spaced from the said metal plates 21; plates 21 and 25 hence providing double walls at the respective

ends of the casing. Other stiffeners which need not be referred to in detail, are provided, such for example, as an arcuate T-bar 26 which is disposed around the screen 5 18, substantially at the center thereof. Within the casing are mounted a plurality of rotatable elements carried upon a shaft 27 which is journaled in the bearings 6, above referred to, this shaft being driven, 10 if so desired, by two pulleys 28, one of which is preferably disposed upon either extremity of said shaft. The central portion 29 of the shaft may be made polygonal, and this portion carries a series of sets of clamping elements or straps 30, the bodies of which are 15 bent to conform to the said polygonal portion of the shaft; pairs of these straps being secured together by means of bolts 31. In practice I find it advantageous to cone the heads of the bolts 31 as shown in Fig. 4, and the nuts 32 of the said bolts are firmly locked thereupon by lock washers 33, or the like. The clamping elements 30 are bent to provide openings therebetween adapted for the 25 reception of links 34, these links being preferably substantially triangular and being in linked engagement with the eyes 35 which are provided in the striking blocks 36. These blocks and the means of mounting the same constitute very essential features of my invention, the said blocks being relatively quite heavy and being very solidly constructed so as to be adapted to withstand heavy impacts. The striking faces of said 35 blocks are preferably serrated or toothed as at 37 in order to better adapt them to break up the material against which they impinge. The clamping elements with their respective links and striking blocks are spaced around the polygonal shaft so that successive faces of said shaft are engaged by adjoining clamps. In the machine illustrated, the shaft is octagonal, and there are preferably four sets of striking blocks upon each 45 side of the machine, so that the blocks may be defined as being in staggered relationship. A separator 38, the function of which will be hereinafter referred to, is disposed across and substantially midway the length of the mouth 13 of the casing; this separator being preferably angular in cross-section, as indicated by the dotted outline thereof shown in Fig. 3.

The operation of the mechanism is as follows: The shaft 27 is rotated at a high rate of speed, preferably many hundred revolutions per minute, by means of the pulleys 28, and by reason of the action of centrifugal force, the striking blocks normally extending quite rigidly outward, radially of the shaft, substantially as shown in Fig. 4; the links 34 being under considerable tension. Owing to the staggered arrangement of the clamping straps 30, these blocks will rotate 55 in the staggered relationship above referred

to, and in such manner as to successively impinge against material in the casing, which will be battered, so to speak, by the striking blocks, and will be thereby hurled against the breaker bars 22, from whence it rebounds 70 or drops back into the paths of the said blocks. The material to be disintegrated is introduced through the casing mouth 13 and the separator 38 serves to divide this material into two streams which are respectively directed toward the ends of the casing. Owing to the tremendous rate of speed at which the striking blocks are being rotated, the tendency for the said blocks to maintain their fixed relationship is very considerable, and they hence impinge against the incoming streams of material with tremendous force, breaking up the same and smashing the rock, or other substance, of which the said streams may be composed, 85 into fragments, these fragments being hurled back and forth between the blocks and the breaker bars, and receiving thereby an immense number of powerful blows in very rapid succession. As a result of this action, the rocks are speedily reduced to small pieces which are whirled around until they have become sufficiently reduced in size to pass through the apertures in the screen 18, through which they are almost immediately ejected when they have become so reduced, passing thence into the hopper formed by plates 15, and out through the mouth 16 thereof into the space below the casing, from which they may be collected or removed in any suitable manner. 100

It will be observed that the construction herein described is one in which all of the parts have a maximum of strength, while the requisite degree of flexibility is provided 105 whereby upon the striking blocks impinging against a rock of such character as not to be rapidly broken, the said blocks may yield, against of course the action of centrifugal force. It is for this reason that the said blocks are pivotally connected, or linked to the links 34 in the manner shown, while correspondingly the links in turn may pivot about their connections with the clamping straps so that any block and the link thereof may be forced around through a considerable angle and thereby permit the same to clear the obstructing rock. However, even when the hammers are so forced 120 to yield, their successive impacts will serve in a very short time to reduce the relatively refractory substance to fragments. The action of the staggered striking blocks is such that although the material to be broken up is delivered toward the sides of the casing, initially, it speedily finds its way toward the center. The advantage of dividing the material as it is fed into the casing, into two streams, resides in the fact that by thus dividing the incoming stream, the larger frag- 125 130

ments thereof may be more readily handled and broken up by the apparatus than if the stream were not so divided. It is obvious that if, let us say, six large masses of stone
 5 were to enter the center of the machine together, the striking blocks at such point would for a time be more clogged or choked in their action than if two, three or four
 10 only of these fragments or masses were to enter together. The separator 38 therefore tends to distribute the incoming mass in such manner as to enable the blocks and bars to perform their function efficiently. The casing as a whole is extremely solid, substantial and rigid, and its supporting frame
 15 or base is adapted to withstand the tremendous vibration to which the entire mechanism is subjected when in action.

In order to secure a maximum of efficiency in the machine, the bearings 6 are preferably roller bearings, those shown in the accompanying drawings being of a well known type. This type of bearing is preferable to the babbitted type not alone on account of reduced friction but further on account of the tremendous vibration above referred to, to which the mechanism is subjected when in operation. This vibration and jarring speedily deteriorates a babbitted
 20 bearing but does not affect bearings of the roller type; so that there is a peculiar co-action between such bearings and the other parts of the mechanism. Finally, I wish to call attention to the ease with which any part
 25 of the mechanism which may become broken or worn while in use may be replaced, the parts all being relatively inexpensive. The breaker bars 23 may be withdrawn endwise through the sides of the casing and replaced
 30 by fresh bars, while any one of the striking blocks with its link may be readily removed

by slackening the nuts 32 of the bolts 31. Thus each one of the breaking devices may be regarded as separate and distinct from the others, although co-acting therewith
 45 when in operation.

Having thus described my invention, I claim:

1. A rock breaker, a casing, a revolubly mounted shaft therein adapted to be driven
 50 at high speed, a member rigidly attached to said shaft, a striking block and a universal joint connection between said striking block and said member, said connection having means for resisting lateral movement when
 55 said shaft is rotating, the inner wall of said casing being arranged outside of but adjacent to the path of said striking block and a breaker bar arranged on the inner wall of said casing.
 60

2. A striking block for a rock breaker having an enlarged outer end, one of the faces of said end being provided with teeth and an integral flattened inner end perforated to constitute a projecting eye.
 65

3. In a rock breaker, a polygonal rotatable shaft, a striking block having an eye in the inner end thereof, a triangular-shaped link passing through said eye, said block being mounted in one of the apices of the triangular-shaped link, a clamping strap carried by said shaft, said link being connected to said strap to pivot on the side of the triangular link opposite the apex to
 70 which the striking block is connected.
 75

In witness whereof, I subscribe my signature, in the presence of two witnesses.

OLIVER O. APP.

Witnesses:

WALDO M. CHAPIN,
 JAMES B. ANTONIO.