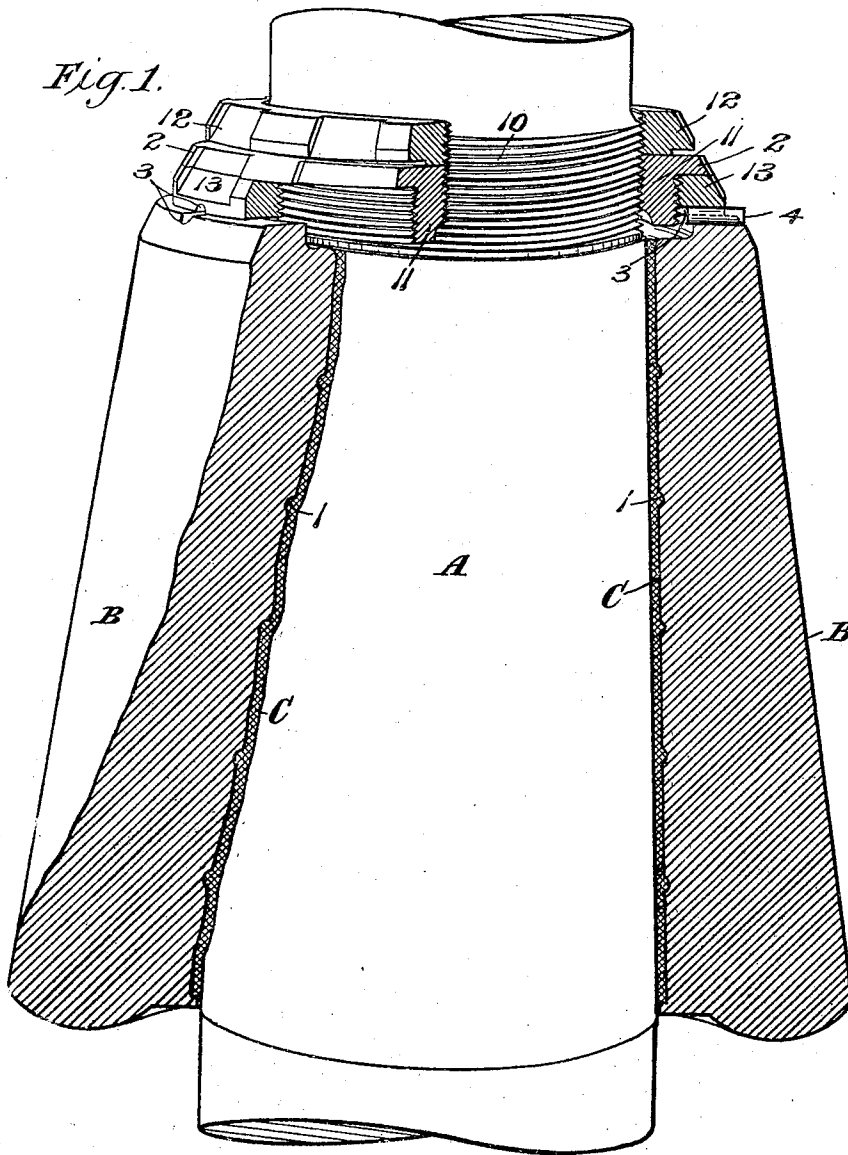


R. BERNHARD.
CRUSHER HEAD.
APPLICATION FILED APR. 28, 1908.

938,953.

Patented Nov. 2, 1909.
2 SHEETS—SHEET 1.



Witnesses.
W. H. Kennedy
J. A. Graves

Inventor.
Richard Bernhard
By Philip Lawrence Rice Kennedy
Attorneys

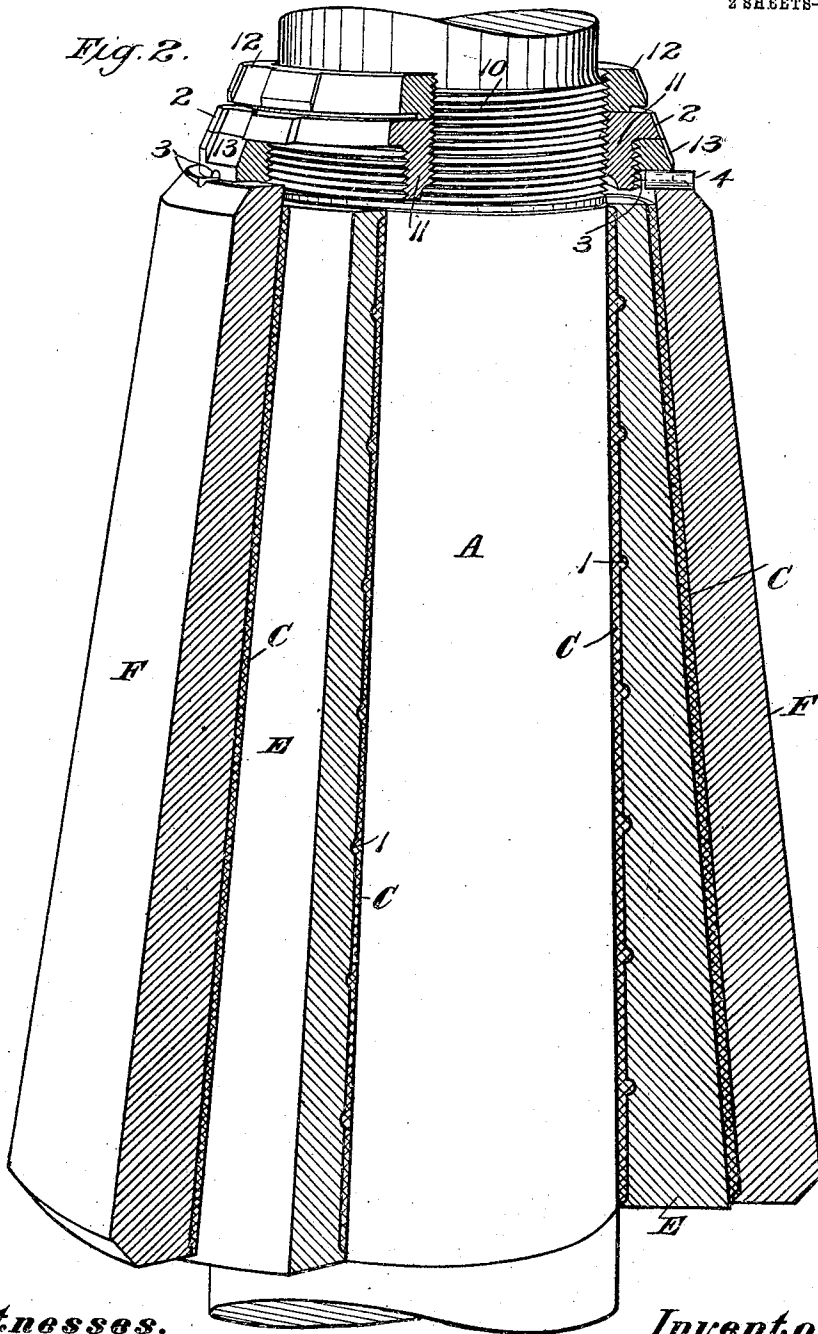
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UNITED STATES PATENT OFFICE.

RICHARD BERNHARD, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO POWER AND MINING MACHINERY COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CRUSHER-HEAD.

938,953.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed April 28, 1908. Serial No. 429,607.

To all whom it may concern:

Be it known that I, RICHARD BERNHARD, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented certain new and useful Improvements in Crusher-Heads, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates particularly to that class of crushers for stone, ore and the like, known as gyratory crushers, the especial object of the invention being to provide a fastening for the crushing head which shall
15 be self tightening so as to keep the head tight upon the shaft, whether the crusher be operated in one direction or the other.

In this class of crushers it is difficult to bore the heads so as to make a perfect fit.
20 It has been customary, therefore, to zinc the head on the shaft so as to fill up any spaces, but this leads to difficulty on account of the zinc shrinking in cooling, thus loosening the head. In the operation of these
25 gyratory crushers, also, there is liability of loosening the head on the shaft, whether the head is zinced on the shaft or not. In the case of heads made of two parts, moreover, that is, with an inner center or core and an
30 outer shell or mantle, as is usual in this class of crushers when very hard rock or ores are to be broken, so that the head may be made of a mantle of manganese steel over a cast iron core, additional difficulties and
35 tendency to loosening of the mantle arise from the peculiar characteristics of the manganese steel.

In many cases, especially where crushers are shipped to foreign countries or sold to
40 agents for resale, it is impossible to determine beforehand in which direction the crusher will be operated, and it is very important, therefore, to provide means by which the head may be kept tight on the
45 shaft whether the crusher be operated in one direction or the other.

The present invention provides means by which the head is forced onto the shaft taper automatically and the zinc, if the head be
50 zinced on, expanded into the bore of the head, in case the head becomes loose and rotates on the shaft in either direction, thus keeping the head tight upon the shaft, independently of the direction in which the

crusher is run. I secure this result in the 55 preferred form of my invention, by the use of reversely threaded nuts co-acting with corresponding screw threads and acting to force the head onto the shaft taper by the rotation of the head in either direction. 60

For a full understanding of the invention, a detailed description of a construction embodying all the features of the same in their preferred form will now be given in connection with the accompanying drawings, forming 65 part of this specification, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings:—Figure 1 is a sectional perspective of a portion of a crusher shaft 70 and solid head embodying the invention. Fig. 2 is a similar view showing a mantle head.

Referring now especially to Fig. 1, A is the gyratory shaft provided with the usual 75 tapered portion for receiving the crusher head B, and C the usual zinc or similar relatively soft metal filling, which is shown as kept in place by the series of grooves or dents 1 on the interior surface of the head. 80 Immediately above the tapered portion, the shaft A is formed with a screw thread 10, which may be either a right or left hand thread, the nuts being formed accordingly. As shown, the thread 10 is a right hand 85 thread, and the nuts are formed accordingly.

With the shaft, thread 10 co-acts a nut 11 and a lock nut 12, the nut 11 being reversely threaded on its inner and outer sides; that 90 is, in the construction shown, having a right hand thread on the inside and a left hand thread on the outside. Upon the outer thread on nut 11 is nut 13, and nut 11 has a flange 2 extending over the nut 13. The 95 nut 13 is faced on the bottom to fit the top of the head B, and is shown as pinned to the head, the top of the head and the bottom of the nut being provided with semi-circular radial grooves 3 receiving the pin 4, these 100 grooves being sufficient in number and so arranged that, when the nut 13 is tightened on the shaft in setting up the machine, one pair of these grooves will come in line to receive the pin. 105

The operation of the device is as follows:—The gyratory movement of the shaft tends to rotate the head on the shaft, which

movement is prevented as long as the head is tight. If the head loosens and tends to rotate in either direction, the devices shown will force the head down on the taper and tighten the head on the shaft.

Assuming that the crusher is operated so that the tendency of the head is to rotate toward the left in the drawing, the outer nut 13 will turn toward the left with the head, and will screw up on the thread on the outside of nut 11, so as to engage the flange 2 and through this rotate the nut 11 to the left. As the nut 11 turns toward the left it is screwed downward on the right hand thread 10 on the shaft, thus carrying down the nut 13 and forcing the head B onto the taper so as to tighten the head.

Assuming that the crusher is run so that the tendency of the head is to rotate toward the right in the drawing, the outer nut 13 will turn toward the right, and, as the lower inner nut 11 is locked by the upper nut 12 and cannot turn, the nut 11 forms a stationary screw member and the outer nut 13 screws downward upon the left hand thread on the outside of nut 11 and forces the head down onto the taper to tighten the head. In this operation, the nut 11 obviously forms a second screw thread on the shaft, threaded reversely from the thread 10.

The construction and operation of the devices shown in Fig. 2 are exactly the same as shown in Fig. 1, except that the head is not solid but is formed of the inner center or core E and the outer shell or mantle F, the core being shown as zinced onto the shaft, and the mantle zinced onto the core. The core may be secured on the shaft in any common or suitable manner. The nut 13 is secured to and acts on the mantle, and the mantle is thus forced down by the nut 13, as previously described, so as to tighten the mantle on the taper core and at the same time tighten the core on the shaft, thus always maintaining the manganese steel mantle tight on the iron core and the iron core tight on the shaft.

It will be understood that the solid head, or either or both the core and mantle, may be formed in any manner desired, and that the invention is not limited to the use of the zinc or similar soft metal between the head and the shaft or between the mantle and the core, although this is preferable and will usually be employed. The taper or wedge surface onto which the head is forced to tighten it may be provided in any suitable manner.

Many other modifications may be made within the invention.

The invention is particularly applicable to gyratory crushers but may be applied to crushers of other classes and to other machines in which a head is liable to loosen and rotate on a shaft.

What I claim is:—

1. The combination with a shaft having a taper, of a head on the shaft, and devices acting by pressure against the end of the head and actuated by the rotation of the head on the shaft to force the head onto the taper and tighten the head on rotation of the head in either direction.

2. The combination with a shaft having a taper, of a head on the shaft, reverse screw threads and reversely threaded nuts between said head and shaft, and means for operating one or the other of said reversely threaded nuts by the rotation of the head on the shaft to force the head down on the taper and tighten the head on movement of the head in either direction.

3. The combination with a shaft having a taper and a screw thread, of a head on the shaft, a nut rotating with the head, and devices co-acting with said nut and shaft thread to force the head onto the taper and tighten the head on rotation of the nut in either direction.

4. The combination with a shaft having a taper and a screw thread, of a shaft not co-acting with the shaft thread and reversely threaded on the outside, a head on the shaft, a nut rotating with the head and co-acting with said outer screw thread on the shaft nut, and means for automatically locking the shaft nut to the head nut on rotation of the head in one direction and means for holding the shaft nut against movement on rotation of the head in the opposite direction.

5. The combination with a shaft having a taper and a screw thread, of a shaft nut co-acting with the shaft thread and reversely threaded on the outside, a head on the shaft, a nut rotating with the head, a flange on the shaft nut engaged by the head nut to carry the shaft nut with the head nut on movement in one direction, and means for locking the shaft nut against movement on the movement of the head nut in the opposite direction.

6. The combination with a shaft having a taper and a screw thread, of a shaft nut co-acting with the shaft thread and reversely threaded on the outside, a head on the shaft, a nut rotating with the head, a flange on the shaft nut engaged by the head nut to carry the shaft nut with the head nut on movement in one direction, and a lock nut to hold the shaft nut against movement on the movement of the head nut in the opposite direction.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

RICHARD BERNHARD.

Witnesses:

L. F. SNYDER
F. G. BECKER.