

[54] **RESILIENT CONNECTION FOR MINING PICK AND BUSHING**

[75] Inventors: **Lloyd B. Hansen; Charles S. Davis,**  
both of Bridgeport, W. Va.

[73] Assignee: **Carmet Company, Pittsburgh, Pa.**

[22] Filed: **Sept. 27, 1972**

[21] Appl. No.: **294,032**

[52] U.S. Cl. .... **299/86, 37/142 A, 85/8.3,**  
**299/92, 403/165, 403/378**

[51] Int. Cl. .... **E21c 25/46**

[58] Field of Search ..... **299/86, 92; 37/142 A;**  
**85/8.3**

[56] **References Cited**

**UNITED STATES PATENTS**

1,812,475	6/1931	Gildersleeve et al. ....	175/354 X
3,116,052	12/1963	Osgood .....	299/92

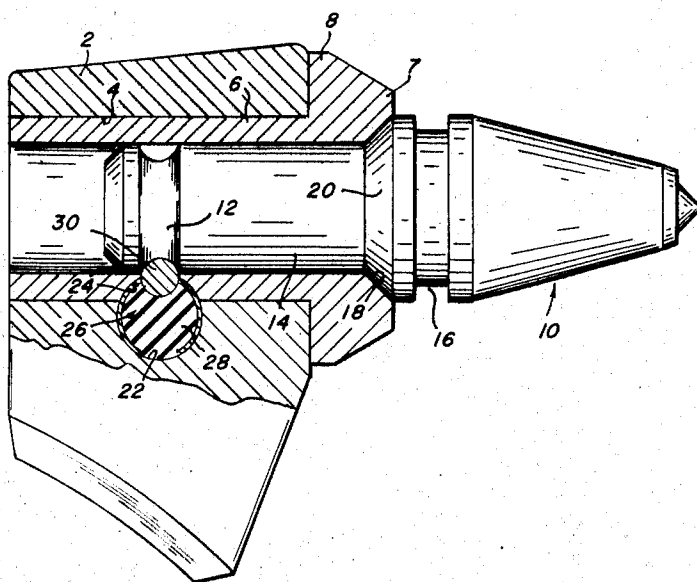
3,351,386 11/1967 Prox..... 299/92

*Primary Examiner—Ernest R. Purser*  
*Attorney, Agent, or Firm—Vincent G. Gioia*

[57] **ABSTRACT**

A mining bit with a cylindrical shank has a support block with a longitudinal bore therethrough for receiving a bushing of hard material. The shank is rotatably received in the bushing. The bit is held from axial movement and the bushing from axial and rotational movement by means of a single keeper. The keeper has a body portion which is received in a transverse bore in the block and a matching opening in the bushing. The keeper also has a protuberance which extends into a circumferential groove in the bit shank. The protuberance is depressible to move it out of the groove.

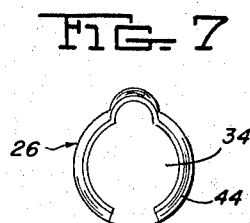
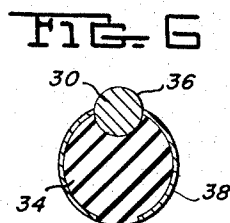
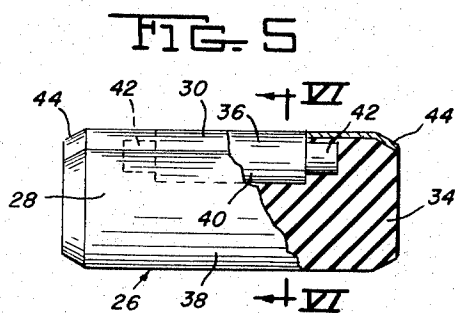
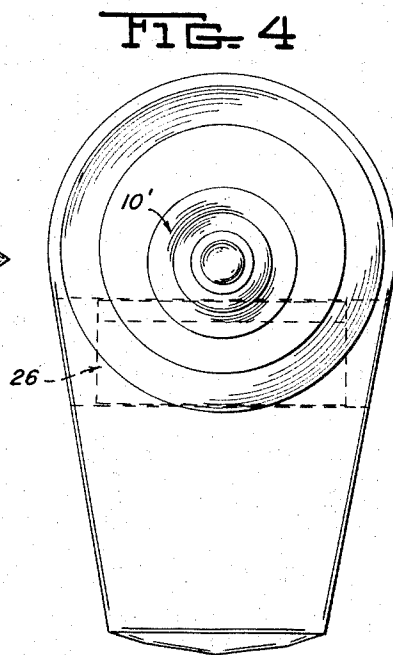
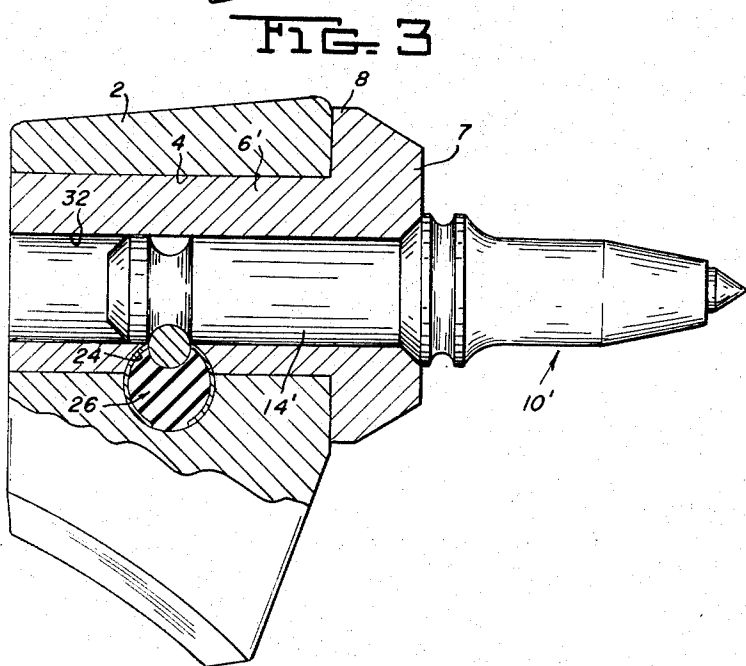
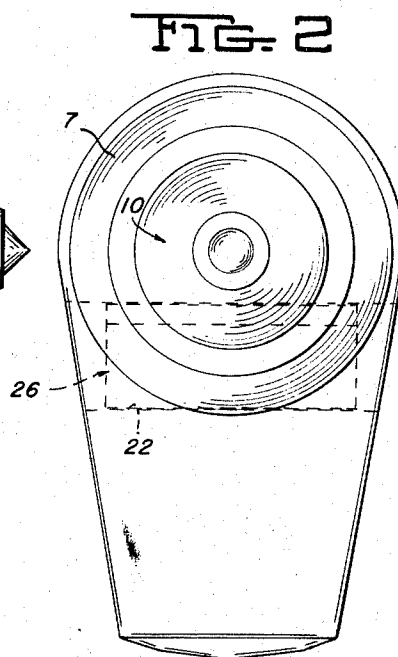
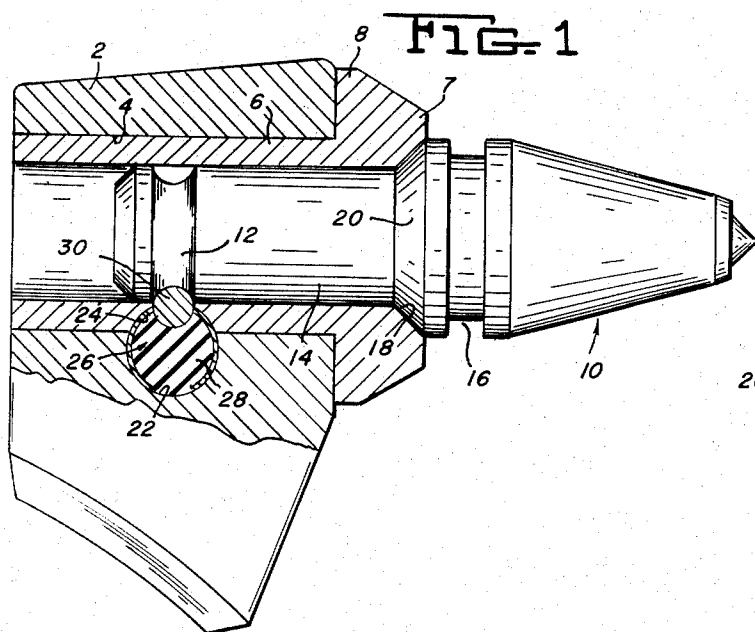
**11 Claims, 15 Drawing Figures**

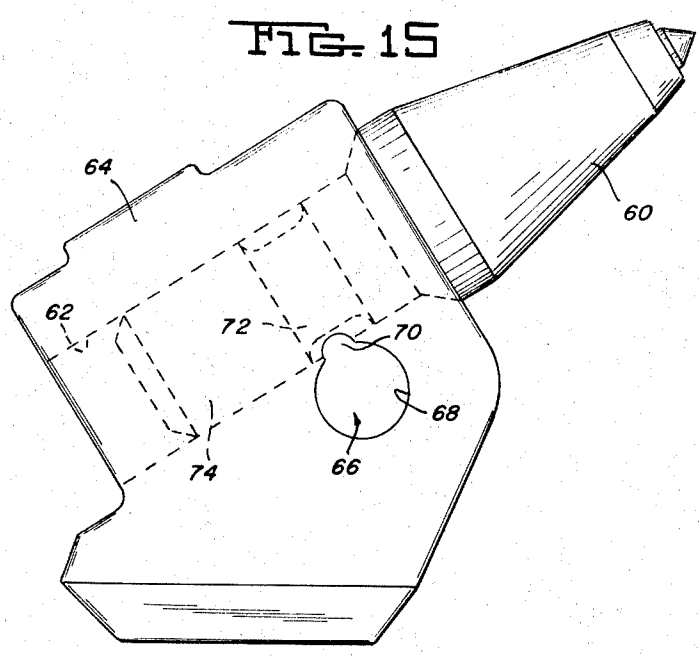
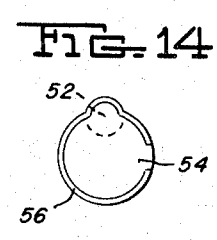
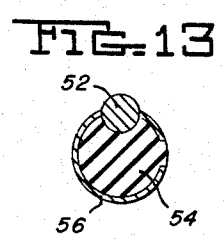
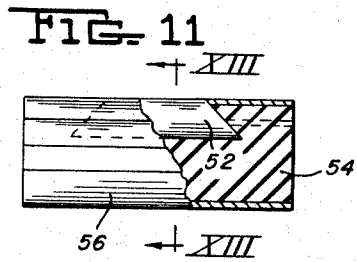
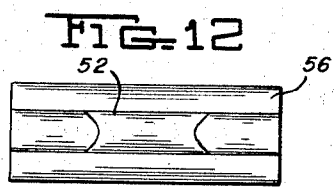
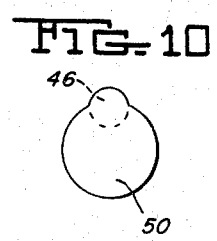
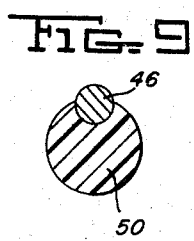
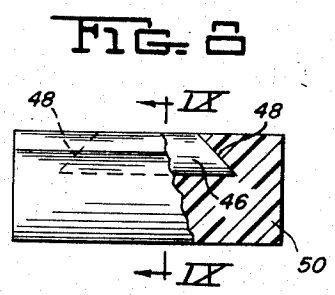


PATENTED MAR 12 1974

3,796,464

SHEET 1 OF 2





## RESILIENT CONNECTION FOR MINING PICK AND BUSHING

This invention relates to mining tools and more particularly to a tool assembly including a rotatable bit mounted in a removable bushing in a bit block. These tools are subject to rough usage and the bit block, particularly its forward face, becomes worn rather quickly. Also, because of danger of fires and explosions, the tools are not welded and repaired in the mines. In some tool assemblies different size bits cannot be used with the same bit block. Mining tools for this purpose are shown in Prox U.S. Pat. Nos. 3,275,376 and 3,351,386; Kniff U.S. Pat. Nos. 3,499,685 and 3,512,838; and Krekeler U.S. Pat. Nos. 2,965,365, 3,088,721, 3,342,531 and 3,397,012. However, all of these tool assemblies have one or more drawbacks.

It is accordingly an object of this invention to provide a mine tool and mine tool keeper means.

The foregoing and other objects of the invention will be best understood from the following description, reference being had to the accompanying drawings wherein:

FIG. 1 is a sectional view of one embodiment of the invention;

FIG. 2 is an end view of the tool assembly of FIG. 1;

FIG. 3 is a view, similar to FIG. 1, showing a second embodiment of the invention;

FIG. 4 is an end view of the tool assembly of FIG. 3;

FIG. 5 is a view, partly in section, showing the preferred embodiment of the keeper of the invention;

FIG. 6 is a view taken on line VI—VI of FIG. 5;

FIG. 7 is an end view of FIG. 5;

FIG. 8 is a view, similar to FIG. 5, showing another keeper of the invention;

FIG. 9 is a view taken on line IX—IX of FIG. 8;

FIG. 10 is an end view of FIG. 8;

FIG. 11 is a view, similar to FIG. 5, showing still another keeper of the invention;

FIG. 12 is a top plan view of FIG. 11;

FIG. 13 is a view taken on line XIII—XIII of FIG. 11;

FIG. 14 is an end view of FIG. 11; and

FIG. 15 is an elevation of a modified tool of our invention.

Referring more particularly to FIGS. 1 and 2 of the drawings, reference numeral 2 indicates a bit block having an axial bore 4 therethrough. A bushing 6 is removably received in the bore 4 and has an outwardly extending flange 7 forming a shoulder 8 at its forward end which bears against and protects the forward end face of block 2. A cutter bit 10 is removably received in the bushing 6. The bit 10 has a circumferential groove 12 in its shank 14 and a pull out groove 16 in that portion of the bit extending outwardly beyond the bushing 6. The bushing 6 has an outwardly flaring bevelled portion 18 at the forward end of its bore for receiving a mating bevelled portion 20 on the bit 10.

A transverse opening 22 is provided in the block 2 and is open to the bore 4. As shown the cross-section of the opening 22 at its longitudinal center is slightly greater than a semi-circle. As clearly shown in FIGS. 1 and 2 the opening 22 is tangential to bore 4 and extends into the block 2 on two sides of bore 4. The bushing 6 has a transverse opening 24 therein which mates with opening 22 when shoulder 8 abuts the end face of block

2. Opening 24 is also positioned to mate with groove 12 when bevelled portions 18 and 20 are in engagement. A keeper 26 has a body portion 28 which is closely received in openings 22 and 24 and a protuberance 30 which is received in groove 12. The keeper 26 is preferably made of compressible material; e.g., rubber or plastic, or otherwise constructed so that the protuberance 30 can be depressed from groove 12. The bushing 6 is preferably made of an abrasion resistant material; e.g., cemented metal carbides or hardened steel.

In operation, the bushing 6 is inserted into the bore 4, until shoulder 8 contacts the forward end face of block 2 and the opening 24 is positioned to mate with opening 22. The keeper 26 is then positioned in openings 22 and 24 and the bit 10 inserted into the bushing 6 with the protuberance 30 in groove 12. To remove the bit 10 a tool (not shown) is received in groove 16 and the bit 10 is pulled outwardly with the protuberance being depressed by the outer periphery of shank 14. It will be seen that the keeper 26 prevents the bushing 6 from rotating and from moving axially. However, the bushing 6 may be easily removed and replaced. The keeper 26 also holds the bit 10 in axial position while permitting it to rotate.

The embodiment of our invention shown in FIGS. 3 and 4 is very similar to that shown in FIGS. 1 and 2. The block 2 and keeper 26 are identical. However, bushing 6 has an eccentric opening 32 rather than a concentric opening. The purpose of this construction is to permit, in the same block, the use of bits 10' having shanks 14' of various diameters. In all cases the bushing 6' will have a wall thickness at one position around its periphery equal to the wall thickness of bushing 6 and the opening 24 will be located at that position. Thus, there will be provided a bit-bushing set for each size of bit shank and the selected set will be placed in position and removed as in the first embodiment.

FIGS. 5, 6 and 7 show the preferred embodiment of the keeper of the invention. It includes a generally cylindrical body portion 34, a protuberance 30 extending from the body portion, a metal pin 36 of less length than the protuberance having its axis parallel to the axis of the body portion and embedded in the protuberance and body portion with its ends covered with compressible material, and metal casing 38; e.g., steel, covering a major part of the periphery of the body portion. The body portion and the protuberance are of a compressible material, and in this case rubber, which is firmly adhered to the casing and substantially all of the pin. The pin has a main cylindrical body portion 40 with a reduced diameter portion 42 at each end. For ease of insertion the ends of the keeper are tapered at 44.

The embodiment of the keeper shown in FIGS. 8, 9 and 10 includes a cylindrical metal pin 46 having bevelled ends 48 embedded in a compressible body portion 50. This embodiment is similar to that shown in FIGS. 5, 6 and 7, and basically differs only in the shape of the pin and in that there is no metal casing. In embodiments such as this where there is no metal casing, it is preferable to use a compressible plastic rather than rubber. Plastics are more suitable for use without metallic casings as they can generally withstand more abuse than rubber.

FIGS. 11 through 14 show the embodiment of FIGS. 8, 9 and 10 with rubber and a metal casing 56. Pin 52 therein is of the same shape as is pin 46 (FIG. 9), as are

3

plastic body portion 50 (FIG. 9) and rubber body portion 54.

It should be noted that the keepers may vary in shape from that shown. For best operation the protuberance should deflect, in the area of shank groove 12, from one-eighth to three-sixteenths inch when a radial force of 30 lb. is applied to the top of the protuberance.

While the keeper is of greatest benefit in the combinations of FIGS. 1 to 4 it may also be used without a bushing as shown in FIG. 15. In this embodiment a bit 60 is mounted directly in bore 62 of a bit block 64. A keeper 66 is mounted in a transverse opening 68 of block 64 with its protuberance 70 extending into a circumferential groove 72 in shank 74 of bit 60.

While it is preferred that the keeper be compressible to permit ready insertion and removal of the bit, certain advantages of our invention may be obtained even when the keeper is not. In such a case the bushing and bit must be inserted into the bit block before the keeper is put in place and the keeper removed before the bit and/or bushing are removed.

It will be apparent to those skilled in the art that the novel principles of the invention disclosed herein in connection with specific examples thereof will suggest various other modifications and applications of the same. It is accordingly desired that in construing the breadth of the appended claims they shall not be limited to the specific examples of the invention described herein.

We claim:

1. In combination, a bit block having an axial bore therethrough, a bushing mounted in said block, said bushing having a wall forming a longitudinal opening, a bit having a shank received in said longitudinal opening, a circumferential groove in said shank, said bit block having a transverse opening therein open to and tangential to said bore, said transverse opening extending into said bit block on two sides of said bore, said bushing having an opening through its wall mating with said circumferential groove and said transverse opening, a keeper, said keeper having a body portion closely received in said transverse opening on both sides of said bore and in said bushing wall opening and a protuberance extending into said circumferential groove whereby said bushing is held from rotation and axial movement and whereby said bit is held from axial movement but not from rotation thereof.

2. The combination of claim 1 in which said bushing has an outwardly extending flange at its forward end forming a shoulder bearing against the forward end face of said block.

3. The combination of claim 1 in which the axis of said longitudinal opening is offset with respect to the outside diameter of said bushing so that the wall thickness varies around the periphery of said bushing, said bushing wall opening being in the wall portion having the minimum thickness.

4. The combination of claim 3 in which said bushing has an outwardly extending flange at its forward end forming a shoulder bearing against the forward end face of said block.

5. The combination of claim 1 in which said keeper

4

is depressible an amount sufficient to permit said protuberance to be displaced from said groove.

6. The combination of claim 5 in which said keeper has a metal pin embedded in said protuberance and in which a substantial part of said protuberance and said body portion is of a compressible material, said pin extending only a portion of the length of said protuberance and having compressible material surrounding substantially all of its peripheral surface and ends.

7. The combination of claim 6 in which a substantial part of said protuberance and body portion is rubber, and said keeper includes a metal casing covering a part of the periphery of said body portion, and in which said pin and said casing are firmly adhered to said rubber.

8. The combination of claim 5 in which said transverse opening is cylindrical in shape with its axis parallel to a tangent of said bore, and said bushing wall opening has cylindrical surfaces having a radius equal to the radius of said transverse opening, and said body portion of said keeper has a cylindrical shape similar to said transverse opening.

9. In combination, a bit block having an axial bore therethrough, a bit having a shank received in said bore, a groove in said shank, said block having a transverse opening therein open to and tangential to said bore and extending into said bit block on two sides of said bore, said opening mating with said groove, a keeper, said keeper having a body portion closely received in said transverse opening and a protuberance extending into said groove whereby said bit is held from axial movement thereof, a substantial part of said body portion and said protuberance being of a compressible material, said protuberance having a metal pin of less length than said protuberance embedded therein in the area in which said protuberance extends into said groove, said pin having its axis parallel to the axis of said body portion, said pin being substantially completely surrounded by and firmly adhered to said compressible material, said pin being depressible from said groove.

10. The combination of claim 9 in which a substantial part of said protuberance and body portion is rubber, and said keeper includes a metal casing covering a part of the periphery of said body portion, and in which said pin and said casing are firmly adhered to said rubber.

11. A keeper comprising a generally cylindrical body portion, a substantial part of said body portion being of a compressible material, a protuberance extending from said body portion, a substantial part of said protuberance being of a compressible material, a metal pin of less length than said protuberance with compressible material bonded to each end of said pin and substantially all of its periphery embedded in said protuberance and in said body portion, said metal pin having its axis parallel to the axis of said body portion, a metal casing covering a part of the periphery of said body portion, said pin and said casing being firmly adhered to said compressible material.

\* \* \* \* \*