May 7, 1968 H. KIEFER 3,382,005

RESILIENT RETAINING MEANS

Filed Sept. 15, 1966 2 Sheets-Sheet 1

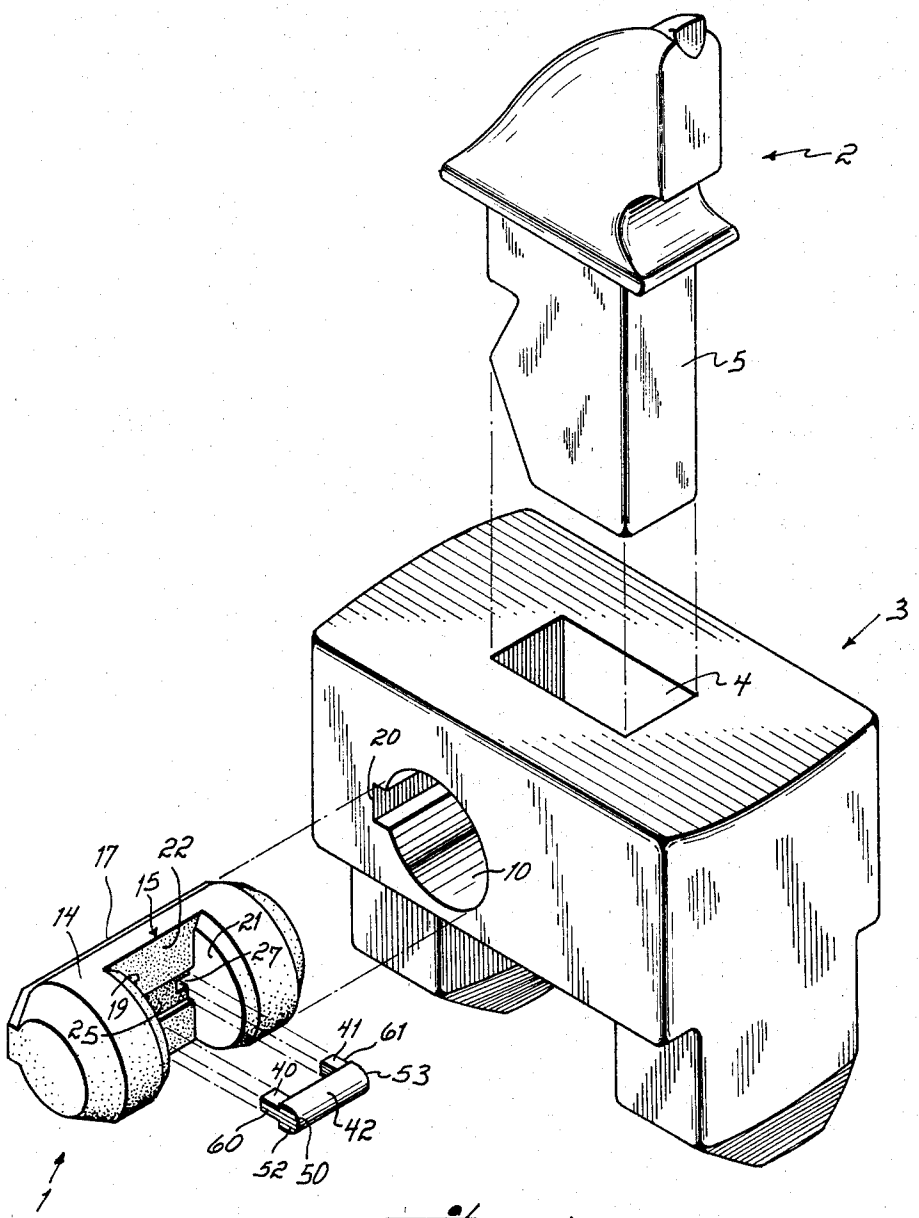


Fig. 1

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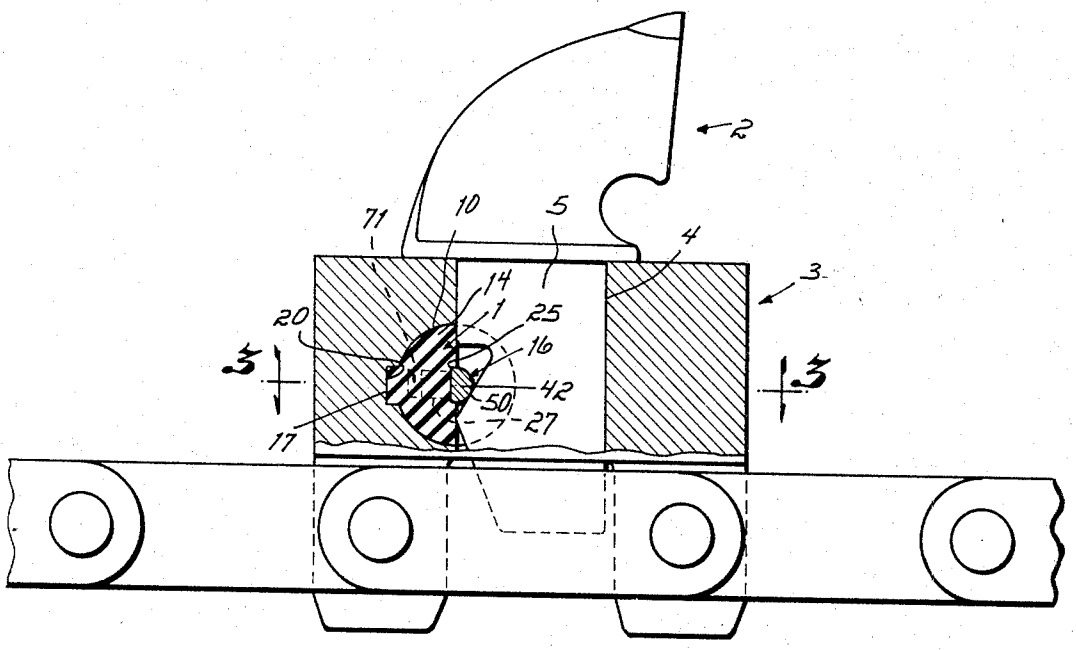


Fig. 2

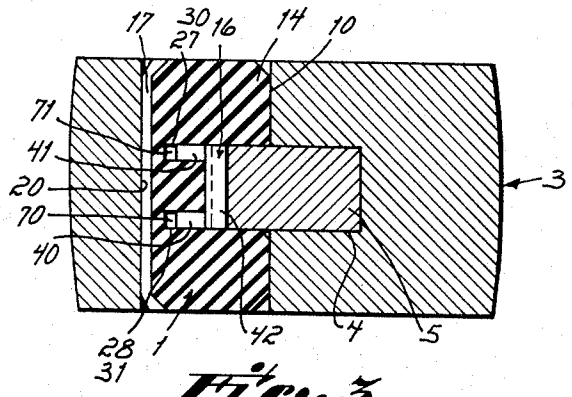


Fig. 3

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RESILIENT RETAINING MEANS

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8 Claims. (Cl. 299—92)

This invention relates to resilient retaining means. More particularly, this invention is directed to a resilient holder especially adapted for securing a mining bit in a power driven cutter, also permitting ready assembly and extraction of the bit in a cooperating socket member.

Bit holders are commonly used to provide a "snap in" type connection of the bit into the socket, in which the bit holder engages the bit in the manner of a spring loaded detent. The construction of such resilient holders for mining bits or tools presents a rather unique bundle of special considerations. The holders must be capable of securely retaining the mining bit against high frequency vibrations during mining operations. Yet, too much holding power prevents easy extraction of the bits which have to be replaced often because of wear or different cutting conditions. The resilient holder itself must be resistant to the abrasive action of coal or ore dusts, and should be easily insertable into the cooperating socket member with a minimum of effort and equipment; and, when necessary, readily removable.

Conventional bit holders generally employ a body of rubber in their structure to absorb or dilute the vibrational forces acting on the cutter bit. It has been previously determined, however, that such resilient material will deform or spread under the forces of operation and often does not provide sufficient bit holding power. Steel jackets and outer anti-spread members have been proposed to supply stiffness and outer support to the body of rubber.

The steel jacketed prior art bit holders have been found to be unwieldy, because the holder must be hammered into the bit socket member and a misdirected blow can distort the jacket and render the bit holder useless. Also, after continued use, the steel jacketed holder may become jammed in the socket member and considerable effort may be required to force it out when replacement becomes necessary.

Other bit holder designs have been proposed, in the hope of eliminating the need for a steel jacket, in which a body of rubber is molded about an elongated steel rod or pin. The pin projects into the end portions of the rubber body to provide support against spreading or deformation of the rubber upon bit insertion, and an opening in the body exposes the central part of the pin to the bit shank. Nonetheless, in practice even these constructions still usually require outer jackets for support and holding power, yet they provide only relatively low bit-holding force.

It has been an objective of this invention to provide improved resilient retaining means especially adapted for more adequately securing a mining bit in its socket against the vibrational forces occuring during mining operations.

It has been another objective of this invention to provide a mining bit holder which permits both assembly and extraction of the mining bit from its socket with a minimum of effort and equipment.

Iti s a further objective of this invention to provide a resilient bit holder which eliminates the need for any outer metal packet and the disadvantages associated with the use of such outer jackets.

Another objective of this invention is to provide a bit holder which can be replaced when necessary by merely exerting pressure with the thumb of a hand.

It is a further objective of this invention to provide a resilient bit holder with component parts which are readily assembled, as by hand, eliminating unnecessary equipment, procedures, and expense associated with present techniques of molding rubber about metal rods as in conventional holders.

In accomplishing the above objectives, in accordance with this invention, the mining bit holders are able to be constructed with a considerable reduction in overall weight and with great resistance to abrasion by utilizing certain novel features of construction and materials. Other objects and advantages of this invention will become apparent from the following description of the invention.

The present invention is predicated, in part, upon the concept of providing a mining bit holder in which a plug-in type metal detent member is mounted entirely within the axial limits of a slot in an elastomeric body.

A preferred form of this mining bit holder includes an elastomeric body which is in the general form of a cylinder having a transverse slot extending across its axis and an opposite external longitudinal rib. In the center of the slot base an axial recess is formed which extends only from side to side of the slot. Preferably two seats or cavities are formed in the body, which project perpendicularly from the axis toward the rib from the bottom of the recess between the slot sides. A generally C-shaped steel detent member resides entirely within a space bounded by the side surfaces of the body slot, and has a pair of parallel legs which project into the cavities of the holder and a rounded axial edge seated or cupped within the axial recess in the slot.

Referring to the drawings:

FIGURE 1 is an exploded view in perspective of a preferred form of the resilient retaining means according to this invention, also showing a typical mining bit and bit socket member.

FIGURE 2 is a side view of a mining machine cutter drive chan, partly broken away, showing in side elevation and in partial section the assembly of components of FIGURE 1 mounted on the cutter chain.

FIGURE 3 is a cross-sectional view of the bit assembly, taken along the line 3—3 of FIGURE 2.

As shown in the drawings, a mining bit holder **1** embodying a preferred form of this invention is employed with a typical mining bit **2** and a typical socket member **3** which has an opening or socket **4** for receiving the shank **5** of the mining bit. Socket member **3** also has a cross bore **10** which receives the resilient bit holder, the bore **10** intersecting socket **4** on one side thereof.

In FIGURE 1, the bit holder **1** is in the form of a generally cylindrical body **14** of elastomeric or resilient material having a central transverse slot **15** extending across its axis which receives a metal detent member **16**. A longitudinal rib **17** is formed on the external surface of body **14** on the side thereof opposite the transverse slot **15**.

The cylindrical body **14** has tapered end surfaces by which it can be pressed into and extracted from the bore **10** of the socket member **3**, as by applying pressure with the thumb. The rib **17** acts as a key which cooperates with an internal groove **20** of the bore **10** to prevent rotation of the cylindrical body **14** about its axis when inserted in the socket member **3**. The axial key or rib **17** also aids in the vertical alignment of the slot **15** with the socket opening **4**.

The slot **15** defines interior sides **19, 21** within the body and an interior base portion **22**. Slot sides **19, 21** are substantially perpendicular to the base portion **22**, the base portion preferably intersects the axis of the body (FIGURE 3). The axial dimension of slot **15** may be approximately equal to the width of socket **4**. In the interior base portion **22** of the body **14**, a longitudinal recess **25** is formed opposite the external rib **17** and extending perpendicularly to and between sides **19** and **21**. Formed in the end portions of the recess **25** are internal seats or

cavities **27**, **28** which perpendicularly extend toward the external rib **17** portion of the body **14**, as best seen in FIGURE 3. The cavities **27**, **28** have axially outermost side walls **30**, **31** which are coplanar with the respective slot side surfaces **19**, **21**.

The recess **25** and the cavities **27**, **28** formed in the interior base **22** portion of the transverse slot **15** of the cylindrical body **14**, mount the generally C-shaped metal detent **16**. The metal detent has a pair of substantially parallel legs **40**, **41**, each of squared cross-section and integrally joined to a wider central bridge or cap portion **42**. The bridge or cap **42** has rounded outer longitudinal edge **50** (FIGURE 2) opposite the detent legs **40**, **41**. The opposed end surfaces **52**, **53** of the bridge are continuations of the outer sides **60**, **61** of the integral detent legs **40**, **41**.

The C-shaped detent **16** is dimensioned just to fit between the sides **19**, **21** of the transverse slot **15** in holder **1**, with the detent legs **40**, **41** received or press fitted, in the body cavities **27**, **28**. This assembly eliminates the conventional process of molding the rubber in situ about a metal insert. The base of the detent bridge portion **42** is seated in body recess **25**, so that the rounded axial edge **50** of the bridge **42** is exposed in slot **15** for gripping the bit (FIGURE 2). To this end the depth of recess **25** is preferably about ⅓ the height of bridge portion **42**.

As best shown in FIGURE 3, the depth of the interior cavities **27**, **28** formed in retainer **1** is such that when the detent legs **40**, **41** are inserted and the cap **42** is seated in the recess **25**, conforming gaps **70**, **71** are formed between the ends of the detent legs and the inner ends of the cavities. These gaps **70**, **71** permit resilient movement of the C-shaped detent **16** toward the opposite external longitudinal rib **17** by compression of the body **14** of the bit holder **1** when a cutter bit shank **5** is driven into the socket opening **4**. This avoids the end spreading which has plagued previous resilient bit holders. Thus, cutter bit **2** is secured against vibratory forces for normal operations of the mining bit assembly (FIGURE 2). Yet, when the cutter bit **2** is to be replaced, a minimum of effort is required to remove it by prying it from the socket member.

It is to be noted in FIGURES 2 and 3 that the inner chambers or gaps **70**, **71** are in effect sealed off by the detent legs **40**, **41** and the cap **42** which is seated in recess **25** of slot **15**. This construction serves to guard against or minimize the entrance of coal or ore dust and corrosive water into the inner chambers which provide the "snap-action" of the metal detent **16** under compression.

The bit holder of this invention can suitably be made of polyurethane or other elastomeric material providing high compression modulus, high resilience and resistance to abrasion. I prefer to use a polyether polyurethane having a durometer "D" hardness of about 50.

Having described my invention, I claim:

1. A resilient retaining means comprising:

a body of elastomeric material having a slot formed in a side of said body, said slot defining interior sides and an interior base, said interior base having a cavity formed therein extending toward the side of the body opposite the interior base, and

a rigid metal detent having a cap portion with opposed ends and a leg portion integrally joined to said cap portion at a point between said opposed ends, said detent mounted in said slot with said detent leg lying in said interior base cavity, and said detent cap seated on said interior base with said detent cap ends lying within the sides of said slot, the end of said detent leg lying away from the end of base cavity thereby providing an inner gap.

2. The retaining means of claim **1** in which said body comprises a cylinder with said slot transversely across its axis and an external longitudinal rib formed on the side of said cylinder opposite the slot.

3. The retaining means of claim **1** in which said detent has two spaced parallel leg portions both joined by said cap portion.

4. A bit holder comprising,

a generally C-shaped metal detent having a central bridge portion and a pair of legs projecting at right angles from said bridge portion adjacent the ends thereof,

and a body of resilient material in the general shape of a bar having a transverse slot defining an interior base and opposed interior side walls, a longitudinal recess formed in said body in said interior base and terminating in the planes of said side walls, and a pair of openings projecting into said body from said recess,

a part of the height of said bridge portion of said detent being seated in said recess, said bridge portion having an exposed surface thereon extending into said slot for engaging a bit, said legs closing and being gripped within the openings of said body, said legs terminating short of the ends of said openings.

5. The bit holder of claim **4** wherein the axially outermost surfaces of said legs are coplanar with the ends of said bridge portion of said detent.

6. The bit holder of claim **4** wherein said body is in the form of a cylinder having tapered ends and a longitudinal rib on the side thereof opposite said slot.

7. The bit holder of claim **4** wherein said body is made of a polyether polyurethane.

8. A resilient retaining means comprising,

a body of elastomeric material having a transverse slot formed in a side of said body, said slot defining interior sides and an interior base and

a rigid member having a central bearing portion with opposed ends and at least one leg portion integrally joined to said central portion between said opposed ends, said rigid member mounted in said slot with said leg portion gripped by said body within said interior base and said central portion seated on said interior base with said opposed ends lying within the sides of said transverse slot.

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