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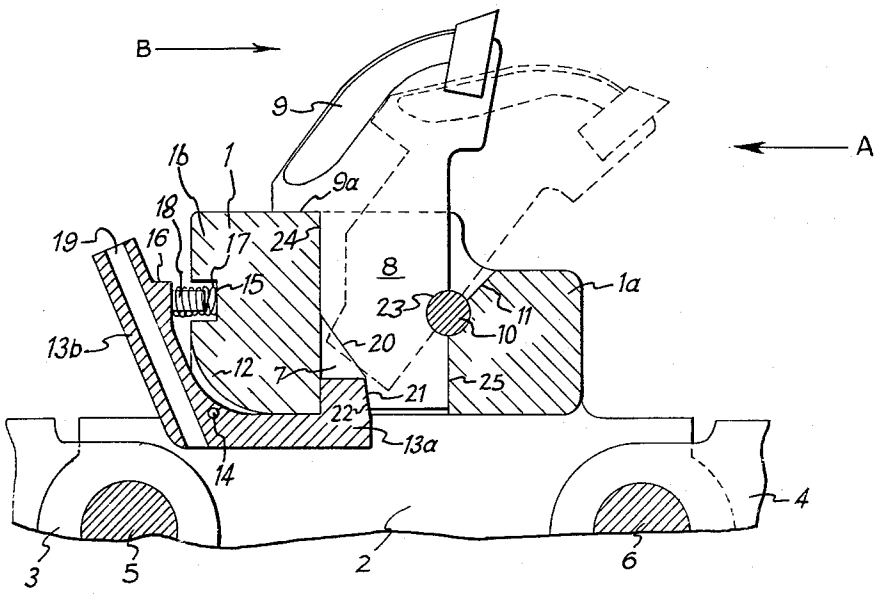


Fig. 1

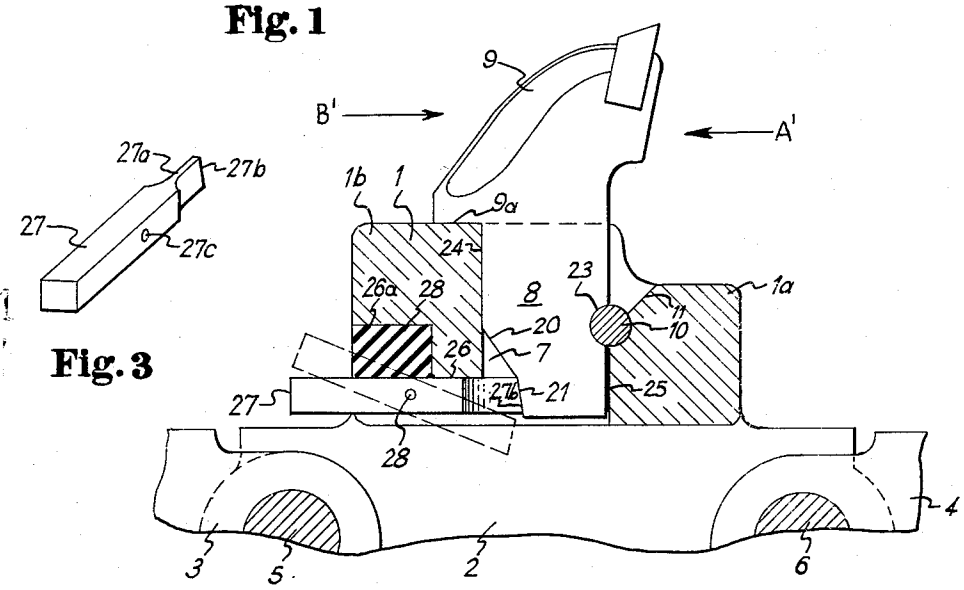


Fig. 3

Fig. 2

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MEANS FOR RETAINING TOOL SHANKS IN SOCKET MEMBERS

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The invention relates to the problem of retaining the shanks of cutting tools in the shank-receiving perforations of socket members and of releasing the shanks therefrom, in simple and rapid operations. For convenience, the invention will be described with reference to mining machinery.

As is well known to one skilled in the art, the typical mine machine is provided with one or more sprocket driven cutter chains or trimming chains, the links of which embody socket members suitable for retaining the shanks of cutter bits or cutter bit holders. Mining operations require the frequent replacement of cutter bits, which are subject to excessive wear, abrasion and vibration. In the recent past the cutter bit shanks were held in the socket members by various arrangements of one or more set screws which were not only subject to loosening due to the excessive vibration, but made the task of bit replacement laborious, time-consuming and costly.

It is a primary object of the invention to provide means for holding tool shanks in socket members which is positive in action even when the bit is subjected to forces applied in the cutting direction, and which will not loosen when subjected to excessive vibration.

It is an object of the invention to provide means for holding tool shanks in socket members which will facilitate replacement and renewal of the tools as hereinafter explained.

These and other objects of the invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, are accomplished by that construction and arrangement of parts of which exemplary embodiments will now be described. Reference is made to the accompanying drawings wherein:

FIG. 1 is a partial sectional view of a cutter chain including the socket member, cutter bit and holding means of one embodiment of the present invention.

FIG. 2 is a partial sectional view of a cutter chain including the socket member, cutter bit and holding means of a second embodiment of the present invention.

FIG. 3 is a perspective view of the locking means of FIG. 2.

While the cutter chain does not constitute a limitation on the invention, FIG. 1 illustrates a typical cutter chain with a socket member **1** formed integrally with the chain element or link having two cheeks in spaced relationship, one of the cheeks being shown at **2**. In a chain of this type, the double link elements are interconnected by single link elements, partially indicated at **3** and **4**. These single link elements are pivoted to the double link members by appropriate pintle means **5** and **6**.

The socket element **1** has a perforation **7** to receive the shank **8** of a cutter bit **9**. The term "cutter bit," as used herein, is intended to embrace both a unitary structure consisting of a head and a shank, with a cutting point on the head, and also bit holder structures as known in the art comprising a head and a shank, and wherein the head is arranged to accept and retain renewable cutter bit elements. For purposes of an exemplary showing the cutter bit **9** is of the unitary structure type.

It has hitherto been suggested, see Patent No. 2,747,852, to provide a socket and bit shank structure in which

a pin extends transversely of the socket member perforation at the forward side, this pin entering a correspondingly shaped notch in the forward side of the shank. The engagement of the shank in the perforation involves a partial rotation or tilting of the bit; but the structure is one in which both downward and upward forces are positively resisted, and the bit may be made relatively cheaply since additional gauging abutments need not necessarily be provided. The structures of this case are an improvement upon those shown in the patent.

The socket member **1** of the present invention (see FIG. 1) is provided at one side of its perforation **7** with a transversely extending pivoting element or pin **10**. This element is most conveniently provided by drilling an opening transversely of the socket member and inserting a hardened steel pin which is held against endwise movement by a press fit, by riveting, welding or in any suitable fashion. As illustrated, the pin **10** is so located that it is partially embedded in the socket element at the front or forward side of the perforation **7**, i.e. in the portion marked **1***a* of the socket element. This portion may conveniently be made lower than the opposite portion and lateral wall portions of the socket member, as shown. The upper part of the interior wall of the portion **1***a* is sloped where it meets the pin **10** as shown at **11**.

The rear portion (generally indicated at **1***b*) of the socket member has that part of its lower rear corner which lies between the cheeks of the double link relieved as at **12**. A locking means **13** is pivoted to the socket member by means of a pivot pin **14**. The pin **14** may be located in coaxial openings drilled transversely of the socket member and intersecting the space created by the relieved portion **12**. The pin may be held against endwise displacement by any suitable means such as a forced fit, welding, etc.

One end **13***a* of the locking means **13** extends into the perforation **7**. The other end **13***b* of the locking means extends upwardly beyond the outside rear surface of the portion **1***b* of the socket member **1**. The portion **1***b* of the socket member has a depression **15** therein. The end **13***b* of the locking means has an integral abutment **16**. A compression spring **17** extends between the rear face of the depression **15** and the abutment **16**. A pin **18** may be mounted on the abutment **16** to extend within the coils of the spring **17** and hold it in place. The spring **17** urges the end **13***b* of the locking means **13** away from the outside surface of the portion **1***b* of the socket member, thereby maintaining the end **13***a* of the locking means within the perforation **7**.

If the end **13***b* of the locking means is urged toward the socket member against the force of the spring **17**, the end **13***a* will be withdrawn from the perforation **7** as the locking means **13** pivots about the pin **14** in a clockwise direction (as seen in FIG. 1). The end **13***b* of the locking means may be otherwise configured for tool engagement, or as illustrated provided with a perforation **19** for the insertion of a tool to act as a lever to aid in urging the end **13***b* toward the socket member, against the force of the spring **17** and any other factors tending to oppose movement of the locking means.

The shank **8** of the cutter bit or cutting element has its lower rear edge slanted inwardly and downwardly as at **20** and **21**. The slanted portion **21** lies at a lesser angle to the axis of the shank than does the slanted portion **20**. The portion **13***a* of the locking means is turned upwardly as shown, and its front edge may be relieved as at **22** so as to abut the surface **21** on the lower rear edge of the shank **8**. The front edge of the shank **8** is provided with a recess **23** to accept the pin **10**.

In inserting the shank **8** of the bit into the socket member, the initial position of the shank is substantially that illustrated in FIG. **1** in dotted lines, the shank being in-

serted with a downward slantwise motion (as permitted by the beveled face **11** at the front side of the socket member opening) until the recess **23** of the shank can be engaged with the pivoting element **10**. The locking means **13** may then be pivoted in a clockwise direction to bring its end **13***a* out of the perforation **7**, and the cutter bit rocked about the pin **10** to the position shown in solid lines in FIG. 1. When the locking means is released, its end will re-enter the perforation **7**, and the abutment of its surface **22** against the surface **21** of the shank will prevent the cutter bit from rocking forwardly about the pin **10**. It will also be understood by one skilled in the art, that if the bit were placed in the position shown in dotted lines, the application of a sufficient force to the bit to rock it in the direction of the arrow A would cause the bit shank to depress the end **13***a* of the locking means to permit the bit to seat as shown in solid lines in FIG. 1, after which the locking means would engage the surface **21**. The application of such a force can be easily accomplished as by striking the bit with a hammer, maul or the like, or by means of a tool which, engaged with the bit, will provide a sufficiently extended lever arm to rock it into position against the resilient reaction of the locking means.

Once the bit is seated in the socket member, the pin **10** will prevent upward movement. While in use, the greatest forces acting upon the cutter bit are directed downwardly, and opposite the cutting direction (i.e. from right to left in FIG. 1). Downward movement of the bit is prevented by the coaction of the pin **10** and the recess **23**. However, if desired an abutment surface **9***a* may be provided on the bit head to engage the top of the socket member. The forces exerted on the bit in a direction opposite the cutting direction are sustained by the interaction of the upper rear edge of the shank **8** and the rear face of the socket member perforation in the area designated at **24**, and the interaction of the front edge of the shank and the pin **10**. Depending upon the fit of the parts there may be also be interengagement in the area **25**.

The coaction of the end **13***a* of the locking means **13** and the surface **21** of the shank **8** insure that the bit will not rock forwardly and be dislodged from the socket member even in the event of a force acting on the cutter bit **9** in the direction of the arrow B.

The removal of the cutter bit from the socket member is accomplished by causing the locking means **13** to pivot in a clockwise direction thereby removing the end **13***a* from the perforation **7** and from engagement with the cutter bit shank **8**. This is most easily accomplished by insertion of a tool (presenting a sufficiently extended lever arm) into the perforation **19** and applying force therewith in the direction of the arrow B. Once the end **13***a* has been removed from the perforation **7**, the bit may be rocked forwardly about the pin **10** and withdrawn upwardly by hand.

A second embodiment of the present invention is illustrated in FIG. **2** wherein elements identical to those in FIG. 1 have been given like index numerals. This second embodiment differs from that of FIG. 1 only with respect to the locking means. The lower part of the rear portion **1***b* of the socket member **1** contains a recess (generally indicated at **26**) extending between the cheeks of the double link and into the perforation **7**. The recess **26** has an enlarged portion generally indicated at **26***a*. A locking means **27** is pivoted in the recess **26** by means of the pin **28**. The pin **28** is located in coaxial holes in the portion **16** of the socket member on either side of the recess **26**. The pin may be held in place in the same manner as the pin **14** of FIG. 1.

The locking means is shown in FIG. 3. It is of generally rectangular cross-section, which cross-section may be reduced at the forward end as at **27***a*. This reduction of cross-section at the end **27***a* tends to prevent packing of cuttings and foreign material about that portion of the locking means which extends within the perforation **7**.

The front end of the locking means is slanted as at **27***b* to allow abutment thereof against the slanted surface **21** of the shank **8** when the cutter bit is seated in the perforation **7**. A hole **27***c* extends through the locking means transversely of its axis for receipt of the pivot pin **28**.

The enlarged portion **26***a* of the recess **26** contains a block of resilient material **28**, such as natural or synthetic rubber, chloroprene, or mixtures thereof. This resilient block serves to hold the locking means **27** in place, i.e. in the position shown in solid lines in FIG. 2. It also serves to prevent packing of cuttings, etc. between the locking means and the portion **1***b* of the socket member **1**.

In this embodiment, insertion of the cutter bit is much the same as shown in FIG. 1. If the locking means is pivoted in a clockwise direction (against the force of the resilient block **28**) to the position shown in dotted lines, the reduced end **27***a* is depressed in the perforation **7**, and the cutter bit may be rocked in place as described above. Rotation of the locking means may be accomplished by prying upwardly with a suitable tool that part of the locking means which extends outside the socket member or by engaging the extending end with a socketed tool and lifting.

The bit may also be locked in place by applying a suitable force in the direction of the arrow A' in the manner described above. Such a force will depress the end **27***a* of the locking means to permit the cutter bit to seat properly. Once in place, the locking means will prevent displacement of the bit when force is applied thereto in the direction of the arrow B'. Other forces acting on the bit are counteracted in the same manner as described above. Removal of the bit may be accomplished by releasing the locking means, rocking the bit forwardly about the pin **10**, and withdrawing the bit upwardly.

Modifications may be made in the structure of this invention without departing from the spirit of it. The invention having been described in certain exemplary embodiments, what is claimed as new and desired to be secured by Letters Patent is:

1. In a socket member and cutter bit arrangement of the type comprising a socket member having an elongated, substantially rectangular socket forming perforation therein, a cutting member having an elongated, substantially rectangular shank, a fixedly secured pivoting element located in the perforation of said socket forming element intermediate the length thereof and projecting into said perforation, said pivoting element being engageable in a depression in the forward edge of said shank, said socket forming member being cut away forwardly above said pivoting element, and the rear lower portion of said shank being chamfered, whereby said shank can pivot forwardly in said socket member on said pivoting element and can be rocked rearwardly therein to a position in which the rear face of said shank above said chamfered portion can abut a rear face of said socket forming perforation to resist cutting strains imposed on the cutting member, the chamfered portion of said shank, when said shank is in its rearward position, lying in spaced relation to the rear face of said socket forming perforation to define a space therebetween, the improvement which comprises a recess in the lower rear portion of said socket member, and a releasable locking means pivotally mounted on said socket member and movable in said recess whereby said locking means may be moved into a locking position wherein a portion of said locking means within said perforation can move upwardly to a position behind the chamfered portion of said shank, in which position it engages and holds said shank in its rearward position thereby preventing said cutting member from rocking forwardly on said pivoting element, and means accessible from the outside of said socket member for releasing said locking means by bringing said portion downwardly until it clears said shank.

2. The structure claimed in claim **1** wherein means are provided to urge said releasable locking means to its lock-

ing position, the pivotal mounting of said locking means being such that insertion of the bit shank in the perforation and the rocking of the bit shank to its final position will depress the said portion of the locking means and then allow the said portion to come into locking position behind the said shank.

3. The structure claimed in claim 1 wherein said chamfered portion of said shank comprises two adjacent downwardly and inwardly slanting surfaces, one above the other, on the lower rear edge of said shank, the lower of said slanting surfaces lying at a lesser angle to the axis of said shank than said other surface, the said portion of said locking means having a forward face with an angularity similar to the angularity of the lower one of said slanting surfaces, the said angularity being such that forces tending to move the lower end of said shank rearwardly will not displace said locking means.

4. The structure claimed in claim 3 wherein said recess is located in the lower rear edge of said socket member and wherein said locking means is generally L shaped with a portion pivoted in said recess, one end of said means extending outside said socket member, the other end, when said locking means is in locking position, extending upwardly within said space defined by said rear surface of said perforation and said chamfered portion of said shank, said last mentioned end having a slanted surface which abuts and engages said lowermost slanted surface on said shank, thereby preventing said cutting member from rocking forwardly on said pivoting element.

5. The structure claimed in claim 4 wherein said portion of said locking means which extends outside of said socket member is provided with a hole for receipt of a suitable tool to aid in moving said locking means.

6. The structure claimed in claim 4 wherein means are provided to urge said locking means toward the locking position.

7. The structure claimed in claim 4 wherein means are provided to urge said locking means toward the locking position, said means comprising an abutment means facing said socket member on said portion of said locking means which extends outside the socket member, a recess in said socket member opposite said abutment, a pin mounted on said abutment and extending part way into said recess, and a compression spring loosely mounted over said pin and extending from said abutment into said recess.

8. The structure claimed in claim 3 wherein said recess extends through the lower rear portion of said socket member into said socket forming perforation and wherein said locking means comprises a bar of generally rectangular cross section pivoted within said recess, one end of said locking means extending outside of said socket member, the other end of said locking means, when said locking means is in locking position, extending within said socket forming perforation, said last mentioned end having a slanted surface which abuts and engages said lowermost slanted surface on said shank thereby preventing said cutting member from rocking forwardly on said pivoting element.

9. The structure claimed in claim 8 wherein the end of said locking means extending into said socket forming perforation is of reduced cross section.

10. The structure claimed in claim 8 wherein means are provided to urge said locking means to its locking position.

11. The structure claimed in claim 8 wherein said recess has an upward enlargement extending to the rear of the pivot point, and a body of resilient substance located in said enlargement and contacting said locking means to urge said means into locking position.

12. In a socket member and cutter bit arrangement of the type comprising a socket member having an elongated, substantially rectangular socket forming perforation therein, a cutting member having an elongated substantially rectangular shank, a fixedly secured pivoting element located in the perforation of said socket forming element intermediate the length thereof and projecting into said perforation, said pivoting element being engageable in a depression in the forward edge of said shank, said socket forming member being cut away forwardly above said pivoting element, and the rear lower portion of said shank being chamfered, whereby said shank can pivot forwardly in said socket member on said pivoting element and can be rocked rearwardly therein to a position in which the rear face of said shank above said chamfered portion can abut a rear face of said socket forming perforation to resist cutting strains imposed on the cutting member, the chamfered portion of said shank, when said shank is in its rearward position, lying in spaced relation to the rear face of said socket forming perforation to define a space therebetween, the improvement which comprises releasable locking means pivoted with respect to said socket member, having a portion extending into the said perforation and having an up and down movement therein, so located that the said end of the releasable locking means can be depressed by the end of the shank of the cutter bit as the cutter bit is swung into final cutting position, whereupon the end of said releasable locking means can move upwardly in said perforation engaging behind the chamfered portion of the shank of the cutter bit to inhibit tilting of the cutter bit out of cutting position, and means for resiliently biasing said locking means into locking position.

References Cited by the Examiner

UNITED STATES PATENTS

1,375,638	4/21	Kienzle.
2,747,852	5/56	Krekeler.

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