Nov. 20, 1951 L. E. SIMMONS 2,575,980

CUTTER CHAIN

Filed March 17, 1948

Fig. 1.

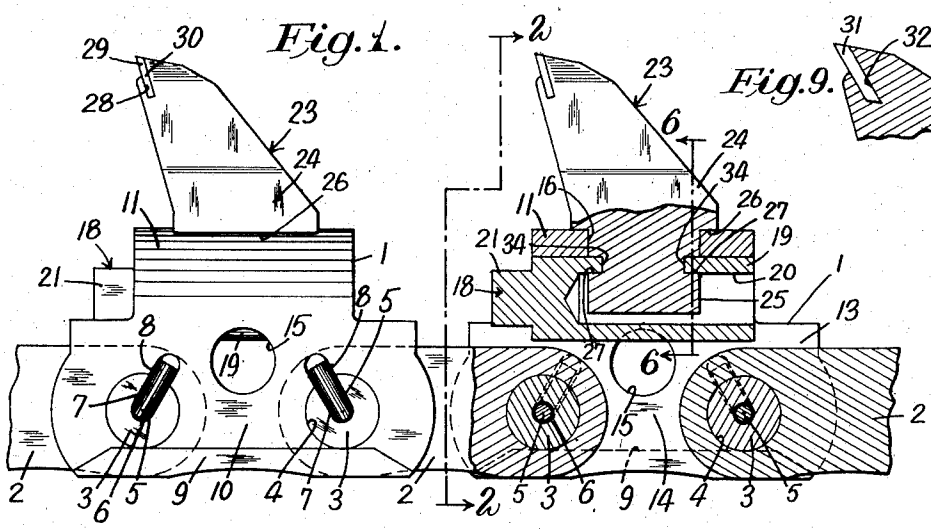


Fig. 9.

Fig. 2.

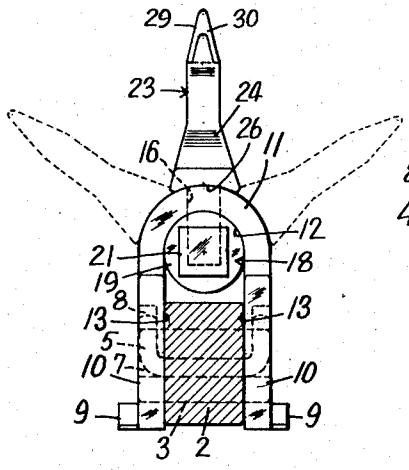


Fig. 3.

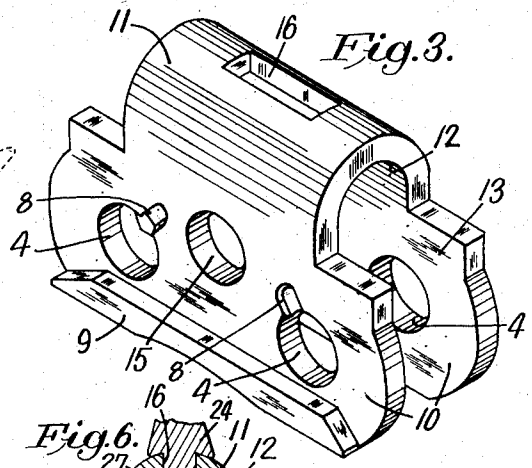


Fig. 6.

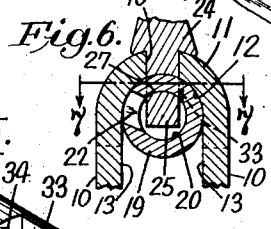


Fig. 7.

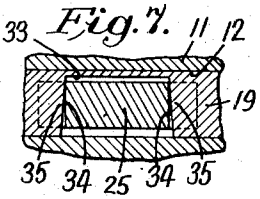


Fig. 5.

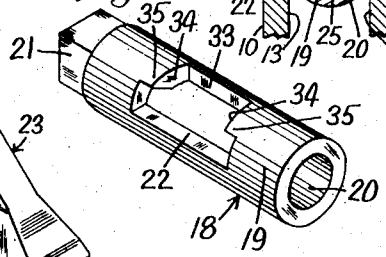


Fig. 4.

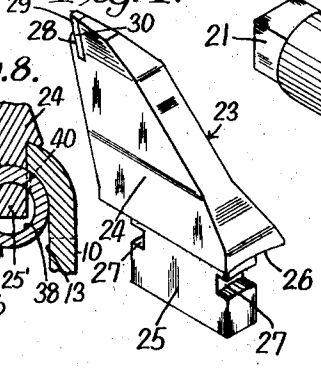
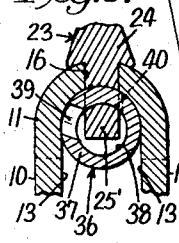


Fig. 8.



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CUTTER CHAIN

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5 Claims. (Cl. 262—33)

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This invention relates to cutter chains and more particularly to an improved cutter bit supporting and securing means for a mining machine cutter chain.

In cutter chains used for mining purposes, for cutting coal or other minerals, the cutter bits or the bit holders, when small reversible cutter bits are employed, are received in sockets in the blocks of the cutter chain, and the cutter bits or bit holders are secured in the block-sockets by set screws threaded in the blocks and engaging the bits or holders. The set screws often become loosened during operation of the cutter chain, and it is necessary to so tighten the set screws that they bite into the metal of the shanks of the bits or holders, ofttimes damaging the bits or holders as a result of repeated loosening and tightening of the screws. It has also been found that when cutter bits or bit holders have shanks of relatively hard metal, the set screws do not adequately grip the shanks so that frequent release of the bits or holders occurs. It is within the contemplation of the present invention, from a broad aspect, to provide improved bit supporting and securing means for a mining machine cutter chain wherein the cutter bits or bit holders are positively locked in position on the chain blocks by interengagement with releasable locking means which may be repeatedly locked and unlocked without damaging the shanks of the cutter bits or bit holders.

An object of the present invention is to provide an improved cutter chain. Another object is to provide improved supporting and securing means for the cutting elements of a mining machine cutter chain. A further object is to provide an improved rotary lock arranged longitudinally of a chain block for locking a cutter bit or bit holder in position on the block lug. Yet another object is to provide an improved rotary lock of the bayonet-type for positively locking a cutter bit or bit-holder in position on a chain block. Another object is to provide an improved rotary securing element of the eccentric type engageable with the shank of a cutter bit or bit holder for imparting an inward thrust to the bit or holder to clamp the latter in position on a chain block with a camming action. Yet another object is to provide an improved rotary lock which not only grips the shank of the cutter bit or bit holder at longitudinally spaced points but also imparts a thrust in an inward direction to the bit or holder to clamp the latter firmly in position on the block. A further object is to provide improved rotary lock of the wedge type for

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a cutter bit or bit holder. A still further object is to provide a rotary lock arranged longitudinally of a chain block for imparting with a camming action an inward thrust or clamping pressure to the bit or bit holder. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there is shown for purposes of illustration one form and two modifications which the invention may assume in practice.

In this drawing:

Fig. 1 is a fragmentary view, partially in side elevation and partially in central longitudinal vertical section, taken through a cutter chain constructed in accordance with a preferred illustrative embodiment of the invention.

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1, with the outermost cutter bits or bit holders shown in dotted lines.

Fig. 3 is an enlarged perspective view of the chain block.

Fig. 4 is an enlarged perspective view of the cutter bit or bit holder.

Fig. 5 is an enlarged perspective view of the improved rotary locking element.

Fig. 6 is a fragmentary cross-sectional view taken on line 6—6 of Fig. 1, showing the bit or holder locked in position on the chain block lug.

Fig. 7 is an enlarged horizontal sectional view taken on line 7—7 of Fig. 6, showing the wedge lock.

Fig. 8 is a sectional view similar to Fig. 6, showing a modified form of rotary lock.

Fig. 9 is a fragmentary sectional view of another modified construction, showing a small reversible, double pointed cutter bit mounted in the bit holder.

In this illustrative construction, as disclosed in the drawing, Fig. 1 shows a fragment of a cutter chain which includes chain blocks 1 pivotally connected to strap links 2 by hinge pins 3. The hinge pins are arranged in transverse bores 4 in the blocks and strap links and are positively locked to the blocks by bent wire locking elements 5 passing through axial openings 6 in the pins and having their bent ends engaged in slots 7 and 8 respectively in the pins and blocks. The blocks have, at their bases, usual lateral gibs 9 adapted to run in the guideways of a conventional mining machine cutter bar.

The chain blocks 1 are preferably in the form of flat stampings which are suitably heated and bent over a suitable form into the desired shape, and each has parallel side portions 10, 10 which

carry the gibs 9 and a semi-circular outer lug portion 11. The semi-circular lug portion has a semi-circular inner surface 12, and the parallel side portions 10 have plane inner surfaces 13, 13 which join with the surface 12 in the manner shown. The strap links 2 extend between the side portions 10 of the blocks, and spaces 14 are provided within the blocks between the adjacent ends of the strap links, and these spaces are adapted to receive the sprocket teeth of a usual chain drive sprocket. Extending laterally through the sides 10 of the blocks and communicating with the tooth-receiving spaces 14 are openings 15 for discharging dirt or coal dust from the tooth-receiving spaces. The curved outer lugs 11 of the blocks have longitudinal slotlike openings 16.

The improved rotary lock is generally designated 18 and, when in operative position on the chain block, is arranged lengthwise of the chain block, as shown in Fig. 1. The rotary lock has a cylindric body 19 fitting up against the curved inner surface 12 of the block lug and formed with an axial bore 20 throughout the major portion of its length. The solid front portion of the lock body has a polygonal portion 21 adapted for engagement by a suitable turning instrument, such as a wrench. The hollow portion of the lock body has a longitudinal slotlike opening 22 corresponding in size and shape to the opening 16 in the chain block lug, and when the openings 16 and 22 are in registry, the shank or inner portion of a cutting element, herein a cutter bit or bit holder, generally designated 23, may be inserted through the openings, with the inner shank portion projecting within the bore 20 of the lock body.

Now referring to the improved cutter bit or bit holder 23, it will be noted that the holder has a body 24 formed with an inner shank portion 25 of rectangular cross section, and the inner surface of the shank body, at its juncture with the shank portion 25, is curved at 26 to fit against the curved outer surface of the chain block lug 11, as shown in Fig. 2. The opposite ends of the rectangular shank portion 25 are arcuately cut away or slotted at 27 on arcs struck on radii substantially corresponding to the radii of curvature of the inner and outer cylindrical surfaces of the lock body 19 but providing slight clearances. The body of the cutter bit or bit holder is formed, at its outer tip portion, with a socket 28 for receiving a cutting element 29, which may be either in the form of a hard metal insert or a small, detachable, double pointed cutter bit, in a well known manner. In this instance, the socket 28 is in the form of a transverse slot in the outer tip end of the holder body, and permanently secured in the slot, as by brazing, is a hard metal insert 30, herein preferably of tungsten carbide. In Fig. 9, a small, reversible, double pointed cutter bit 31 is shown seated in a socket 32 in the holder. When the cutter bit or bit holder is placed in position on the block lug, the inner shank portion 25 is inserted through the registering openings 16 and 22 in the block lug and rotary lock, and the latter is formed with a lateral recess 33 communicating with the opening 22, in the manner shown most clearly in Fig. 5, for receiving the shank portion 25 when the rotary lock is turned about its longitudinal axis. The end walls 34 of the recess 33 are inclined inwardly or tapered, in the manner shown, so that when the shank portion of the bit or holder is in position in the block lug, and the rotary lock is turned to bring the opening 22 out of registry with the lug opening 16 with the shank portion received in the recess 33, and with the end portions 35 of the lock received in the slots 27 in the holder shank in the manner shown in Fig. 6, and as the rotary lock is turned tightly into position, the inclined or tapered sides 34 grip the shank portion 25 at the bottoms of the slots 27, firmly to secure the bit or holder portion in position in the block lug with a wedging action, in the manner shown most clearly in Fig. 7.

The slotlike openings 16 in the block lugs 11 may be arranged in different angularly related positions on different blocks, thereby to locate the cutter bits or bit holders in relatively inclined positions to provide for proper "lacing" of the bits in a well known manner. The two outermost bit positions are indicated in dotted lines in Fig. 2, and it will be understood that there are intermediate positions of the bits between the central full line position in Fig. 2 and these outermost dotted line positions.

In Fig. 8, a modified form of rotary lock is disclosed having an eccentric camming action which may supplant or supplement the wedging action of the rotary lock of the preferred embodiment. In this construction, a rotary lock, generally designated 36, is arranged with respect to the block lug in the same manner as the rotary lock above described. In this instance, however, the body 37 of the rotary lock is formed with a longitudinal bore 38 which has its axis eccentrically disposed with respect to the longitudinal axis of the rotary lock. The hollow portion of the lock body has a longitudinal slotlike opening 39 corresponding in shape and size to the opening 16 on the block lug and a communicating lateral recess 40 corresponding to the recess 33, and, in this construction, the inclined or tapered end walls of the lateral locking recess of the preferred embodiment may be omitted, if desired. When the cutter bit or bit holder 23 is placed against the block lug, in the position shown in Fig. 8, with the rectangular shank portion 25' inserted through the registering openings 16 and 39, the rotary lock may be turned about its longitudinal axis to move the opening 39 out of registry with the locking opening 16, with the shank portion received in the recess 40, and to move the walls of the eccentric bore 38 into engagement with the inner or lower walls of the slots 27, thereby to impart an inward thrust or clamping pressure to the bit or holder to clamp the latter firmly against the block lug.

It will thus be seen that in both embodiments the shank of the cutting element, such as the cutter bit or bit holder, may be inserted through the registering openings in the block lug and rotary lock, and by a simple rotation of the rotary locking element about its longitudinal axis, the bit or holder shank may be positively interlocked with the rotary lock, firmly to secure the bit or holder in cutting position on the block. Also, likewise by a simple rotary motion, the locking element may be turned to bring the opening therein back into registry with the lug opening to permit release of the bit or holder from the block lug. In the embodiments disclosed, the cutter bit or bit holder may be positively locked in position on the block lug either with a rotary wedging action or a rotary camming action and, if desired, the rotary camming action may supplement the rotary wedging action. The improved rotary lock may be readily turned into either its locking or released positions by a conventional set screw wrench. For reverse cutting,

the locking elements and cutting elements may be readily reversed with respect to the chain blocks, which are of a symmetrical design.

While there are in this application specifically described one form and two modifications thereof which the invention may assume in practice, it will be understood that this form and modifications of the same are shown for purposes of illustration and that the invention may be further modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a cutter chain, the combination comprising a chain block having a lateral lug formed with an opening, a cutting element having a shank receivable in said lug-opening, said shank having an enlargement at its inner end providing an outwardly facing surface, and a rotary cam lock mounted on said block, said lock having a cylindrical tubular portion one wall of which is slotted longitudinally to provide an opening whereby said shank enlargement may be inserted into the bore of said tubular portion, and said lock having a cam surface engaging said outwardly facing surface of said shank enlargement for forcing said shank inwardly in said lug-opening to clamp said cutting element against said block-lug.

2. In a cutter chain, the combination comprising a chain block having a lateral lug formed with an opening, a cutting element having a shank receivable in said lug-opening, said shank having transverse recesses at its opposite end surfaces with the inner walls of said recesses facing outwardly, and a rotary cam lock mounted on said block and having a cylindrical tubular portion, one wall of said tubular portion having a longitudinal slot whereby the inner portion of said shank may be inserted into the bore of said tubular portion, said tubular portion having a lateral recess communicating with said slot for receiving an inner portion of said shank when said cam lock is rotated, and said cam lock having cam surfaces at the ends of said lateral recess engaging said outwardly facing walls for forcing said shank inwardly in said lug-opening when said lock is rotated to clamp said cutting element inwardly against said block-lug.

3. In a cutter chain, the combination comprising a chain block having a lateral lug formed with a socket at right angles to the longitudinal axis of the block, a cutter support having a shoulder engageable with the outer surface of said lug and a shank receivable in said socket, said lug having a longitudinal bore traversing said socket, said shank having notches in its end surfaces near the inner end of said shank, and a rotary lock mounted in said longitudinal lug bore and provided with a tubular portion having a longitudinal slot in one wall thereof and a lateral communicating recess, said tube-slot receiving the inner end of said shank and said lock being rotatable about its longitudinal axis in said lug-bore to bring portions of said tubular portion at the ends of said recess into said shank-notches to lock said shank on the block with said shoulder resting against said block-lug, and said lateral recess receiving an inner portion of said shank when said lock is so rotated.

4. In a cutter chain, the combination comprising a chain block having a lateral lug formed with a socket at right angles to the longitudinal axis of the block, a cutter support having a shoulder engageable with the outer surface of said lug and a shank receivable in said socket, said lug having a longitudinal bore traversing said socket, said shank having notches in its end surfaces near the inner end of said shank, and a rotary lock mounted in said longitudinal lug bore and provided with a tubular portion having a longitudinal slot in one wall thereof and a lateral communicating recess, said tube-slot receiving the inner end of said shank and said lock being rotatable about its longitudinal axis in said bore to bring portions of said tubular portion at the ends of said recess into said shank-notches to lock said shank on the block, said lateral recess receiving an inner portion of said shank when said lock is so rotated, and said lock at the ends of said recess having cam surfaces engaging the inner walls of said notches for forcing said shank inwardly in said socket to clamp said shoulder against the outer surface of said lug.

5. In a cutter chain, the combination comprising a chain block having a lateral lug formed with an opening, a cutting element having a shank receivable in said lug opening, said shank having a portion at its inner end providing an outwardly facing surface, and a rotary cam lock mounted on said block and having a cylindrical tubular portion provided with a bore having a surface formed eccentrically with respect to the longitudinal axis of said lock, the inner portion of said shank being receivable in said lock-bore and said eccentric surface, upon rotation of said lock, engaging said outwardly facing shank surface to apply an inward thrust to said shank to clamp said cutting element against said lug.

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