Oct. 6, 1959 C. H. BROWN ET AL 2,907,559

SELF-GAUGING AND READILY REMOVABLE CUTTER BIT

Filed Dec. 20, 1955 3 Sheets-Sheet 1

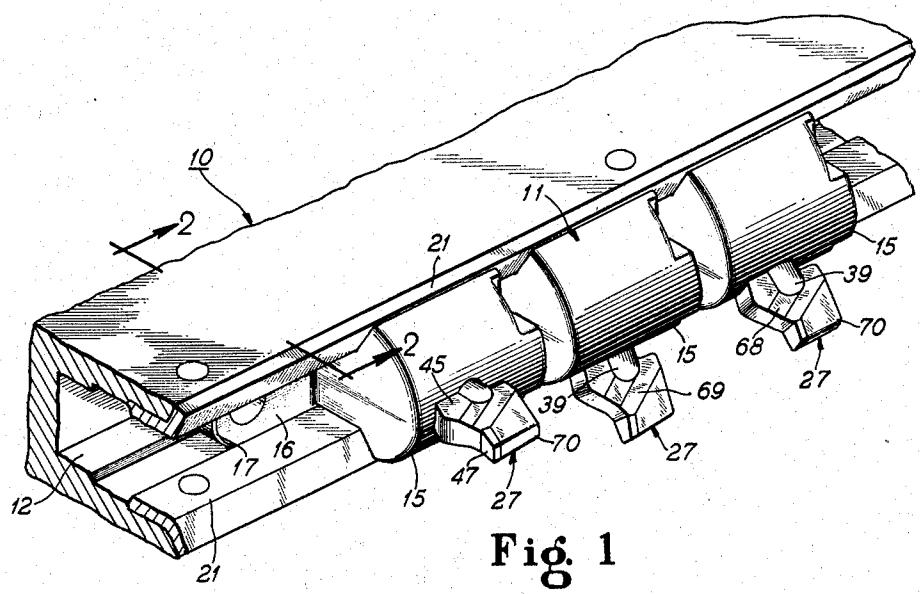


Fig. 1

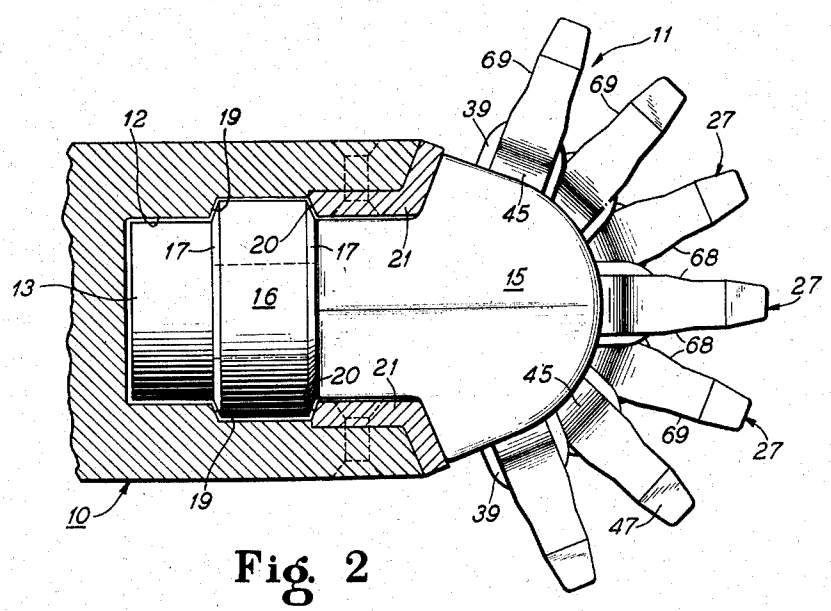


Fig. 2

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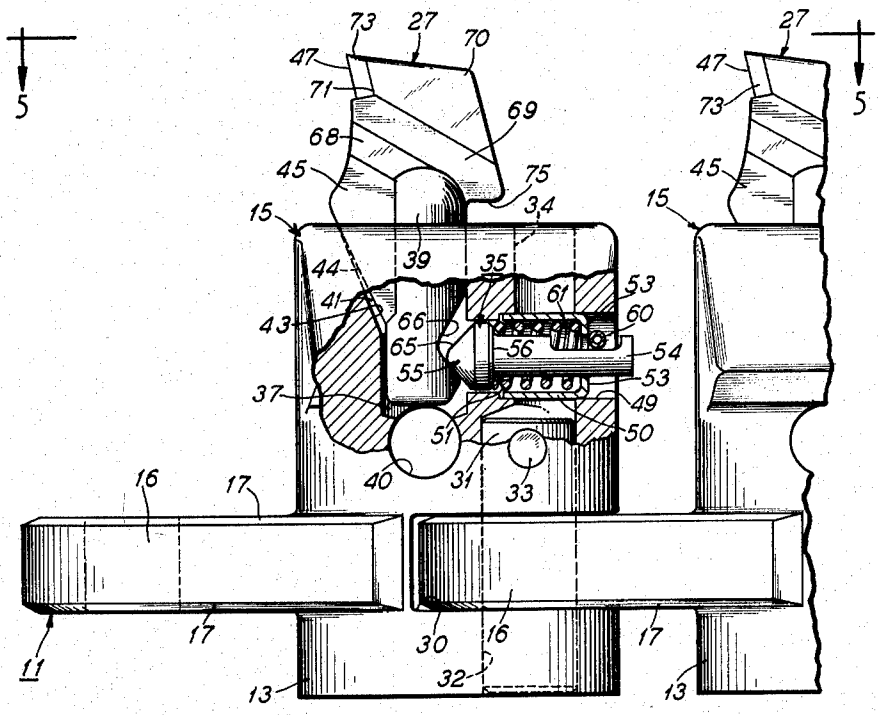


Fig. 3

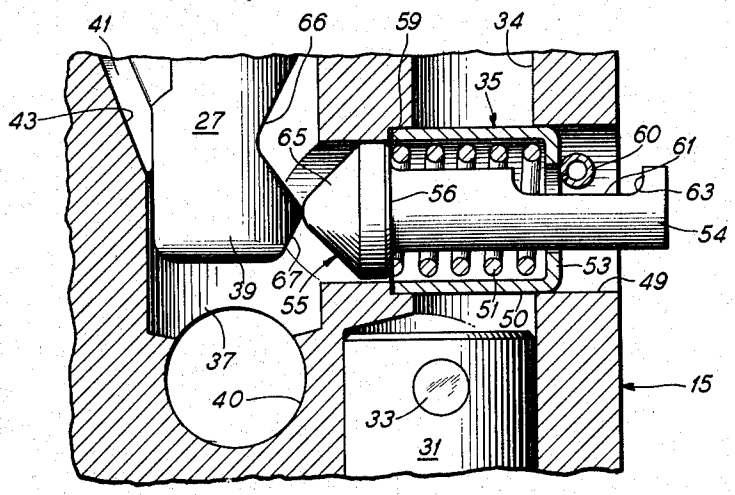


Fig. 4

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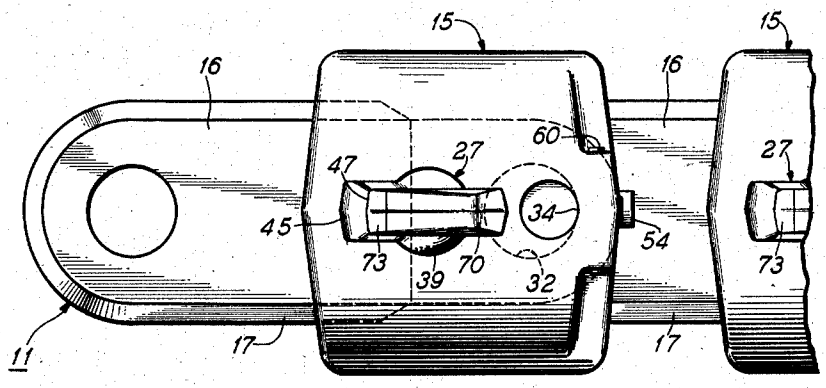


Fig. 5

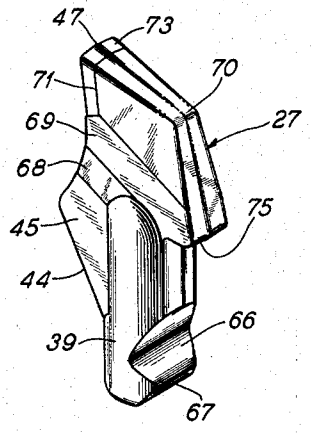


Fig. 6

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United States Patent Office 2,907,559 Patented Oct. 6, 1959

2,907,559

SELF-GAUGING AND READILY REMOVABLE CUTTER BIT

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Application December 20, 1955, Serial No. 554,249

2 Claims. (Cl. 262—33)

This invention relates to improvements in cutter bit carrying chains, and more particularly relates to such cutter bit carrying chains as are adapted for continuous mining machines.

A principal object of the invention is to provide a novel and improved form of cutter bit carrying chain arranged with a view toward simplicity, ruggedness and efficiency in construction and operation.

A still further object of the invention is to provide a cutter chain and cutter bit therefor so arranged as to eliminate the usual set screws to hold the bit in position in the chain and to take the reaction of cutting against the back side of the socket for the bit.

Still another object of the invention is to provide a cutter chain having a bit carrying socket therein with a simplified form of holding means at the back side of the socket enabling the bits to be inserted and removed from the chain without the use of the usual wrenches required for this purpose.

Still another object of the invention is to provide a novel and improved form of cutter bit having a hardened cutting surface and so formed as to enable the bit to be self-gauging and readily inserted or removed from its socket in the cutter chain.

Still another object of the invention is to provide a cutter chain block and bit in which the bit and socket are arranged to cooperate with each other to gauge the bit without the use of the usual tools and to maintain the bit in position in the chain by a spring pressed detent arrangement, positively holding the bit to the block when once inserted in the socket and enabling ready removal thereof.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a fragmentary perspective view of a cutter chain and bar with the bar shown in transverse section;

Figure 2 is a transverse sectional view taken substantially along line II—II of Figure 1;

Figure 3 is an enlarged fragmentary view of the cutter chain with parts of the cutter chain block broken away and shown in section;

Figure 4 is an enlarged fragmentary sectional view of the cutter chain block showing the cutter bit in the process of being inserted in the block;

Figure 5 is a fragmentary plan view of the cutter chain and its bits; and

Figure 6 is a perspective view of the cutter chain bit looking at the bit from the rear end portion thereof.

In the embodiment of the invention illustrated in the drawings, reference character **10** designates generally a cutter bar having a continuous cutter chain **11** guided for movement therealong and detachably carrying cutter bits **27**. The cutter bar **10** may be a horizontal cutter bar, such as, is used in a continuous mining machine of the rotary boring type (not shown). Such bars are usually positioned at the top and bottom of the machine and guide a continuous cutter chain to cut out the space left between the boring bars of the machine, to provide a clean roof and bottom. The links of the cutter chain are shown as pivoting about axes parallel to the plane of travel of the chain about the cutter bar to accommodate the chain to face the coal face and turn about idler sprockets (not shown) at each end of the cutter bar.

While the chain is herein shown as being of the type in which the links are connected together for pivotal movement about axes parallel to the plane of travel of the chain along the cutter bar, it should be understood that the chain may pivot about axes perpendicular to the plane of travel along the cutter bar, if desired, where it is required that the chain cut horizontal or vertical kerfs in a mine wall and travel along each side and around the end of the cutter bar.

The cutter bar **10** is shown as having a channeled guide **12** extending therealong and opening to the outside of the bar and forming a guide along which the cutter chain slidably moves. The cutter chain guide **11** is shown as being of a reduced cross-section adjacent its inner end, to receive and guide an inner end portion **13** of a block **15** of the cutter chain. As herein shown, the block **15** has a link portion **16** extending therefrom intermediate the ends thereof and wider than the inner end portion **13** of the block **15**. The link portion **16** has opposite beveled edges **17**, the inner edges of which ride along outwardly beveled edges **19** of the guide **12**, and the opposite edges of which ride along inner beveled edges **20** of liners **21** for the outer end portions of the channeled guide **12**.

The link portion **16** of one block is shown in Figure 3 as extending within a recess or slot **30** in the next adjacent block and as being pivotally connected to said block as by a pivot pin **31**, the axis of which is parallel to the plane of travel of the cutter chain along the cutter bar. The pivot pin **31** is shown as being carried in a hole **32** drilled from the inner end of the cutter chain block. A pin **33** is provided to secure the pin **31** to its respective block. A hole **34** of a lesser diameter than the hole **32**, forms a continuation of the hole **32** and opens to the outer side of the block, to afford access to the pin **31**, to enable the pin **31** to be readily driven from the block, when it is desired to dismantle the chain.

Each cutter block **15** is provided with a bit carrying socket **37** for a cutter bit **27**. In Figures 3, 4 and 5 we have shown the socket **37** as being for a center bit **27** and as being formed within the block **15** to extend perpendicular to the face of the block and position the bit to cut along the center of the kerf. The bits of the next succeeding blocks may be positioned to the right or left of center as shown in Figure 2, to provide a cutting pattern to completely cut out the kerf and to avoid the leaving of an uncut core within the kerf. The extreme right and left or top and bottom bits are shown as being positioned to extend parallel to the faces **25** of the liners **21**.

Each socket **37** may be drilled within the block from the outer end thereof and may be of a slightly larger diameter than the diameter of a shank **39** of the cutter bit **27**. A cross drilled hole **40** intersects the bottom of the socket **37** to accommodate cleaning thereof. A slot **41** extends from the socket **37** toward the forward end of the block from a position disposed intermediate the ends of said socket. The slot **41** has an inclined face **43** cooperating with a gauging face **44** on the underside of a forwardly projecting keying portion **45** of the cutter chain bit **27**. The inclined gauging face **44** of the cutter chain bit **27** gauges a cutting face **47** of the bit with respect to the block **15**, and also cams the back of the shank **39** of the bit against the back of the socket **37**, to

resist the cutting loads against the back of the shank and socket. The keying portion 45 maintains the bit in centered relation with respect to its respective cutter chain block 15.

A bit holder 35 is shown as being carried within a socket 49 intersecting the hole 34 and extending longitudinally of the block 15 and opening into the socket 37. The bit holder 35 includes generally a cylindrical cage or seating member 50 for a spring 51, seated adjacent its outer end on an inwardly extending flange 53 of said cage. The spring 51 encircles a stem 54 of a detent 55 and abuts a shouldered portion 56 of the head of the detent to bias the detent within the socket 37. The cage 50 abuts a shouldered portion 59 of the socket 49 at its inner end and is maintained in position within the socket 49 by a suitable retaining means such as a roll pin 60, removably mounted in the block 15 and extending across the rear end portion of said socket 49. The roll pin 60 also extends within a recessed portion 61 of the stem 54 of the detent 55 and is adapted to abut an outer or rear face 63 of said recessed portion, to limit inward movement of the detent 55 within the socket 37.

The detent 55 has a generally conical engaging face 65 engageable within a generally V-shaped recess 66 formed in the back of the shank 39 of the cutter bit 27, to retain said cutter bit within the socket 37. The shank 39 has a rear beveled face 67 extending from the bottom thereof and engageable with the conical face of the detent 55 when the cutter chain bit 27 is forced within the socket 37, to depress the detent 55 and accommodate the bit to be forced within the socket 37 and then release the detent to follow the inclined face of the recess 66 and detachably hold the bit 27 within block 15.

The keying portion 45 of each cutter chain bit 27 is shown as terminating into transverse inclined faces 68 inclined outwardly with respect to the shank in the direction of cutting and merging into the shank 39. The faces 68 are also inclined to converge inwardly to parallel faces 69 defining the lower portion of a heel 70 of a reduced cross-sectional area from the cross-sectional area of the keying portion 45 of the bit. The heel 70 has a recess 71 formed in the forward end thereof for a hardened cutting insert 73, the forward face of which forms the cutting face 47.

The detent 55 thus tilts the inner end portion of the shank toward the forward end of the socket about the inclined bottom wall or gaging face 44 of the keying projection 45. The gaging face 44 thus cams the bit to take the cutting loads off of the detent and apply the cutting loads at the back outer end portion and front lower end portion of the shank and socket.

The insert 73 may be made from one of the alloys containing cobalt, chromium, tungsten and molybdenum such as stellite, or may be any other hard metal capable of taking the heavy cutting loads encountered in the continuous mining of coal. The insert 73 may be brazed in the recess 71 as by induction brazing, or where the insert is of a hardened material capable of being puddled, it may be puddled within said recess.

The insert 73 and cutting face 47 thereof are pitched in the direction of travel of the bit and said insert and the heel 70 are shown as being inclined inwardly from the upper margins of the parallel faces 69 and as being tapered from the forward to rear end thereof to provide clearance for the bit during cutting. The heel 70 extends rearwardly of the shank 39 and terminates at its lower or inner end in spaced relation with respect to the outer surface of the block 15 when the bit is in position in the block, and forms a shoulder 75 to facilitate the insertion of a pry bar between the block 15 and said shoulder, to accommodate ready removal of the bit from the block. The outer surface of the heel 70 is relatively flat, being inclined downwardly from the cutting face of the insert 73 toward the rear end of the bit and providing a flat surface capable of being struck by a hammer, mallet or the like to enable the bit to be driven within the socket 37 with sufficient force to depress the detent 55 to come into engagement with the V-shaped recess 66 and hold the bit in place in said socket.

It may be seen from the foregoing that a rugged simple and efficient cutter bit has been provided which is self-gauging and that the inclined gauging face thereof not only gauges the bit to the correct cutting depth, but also cams the back of the shank of the bit against the back of the socket to resist the loads encountered during cutting and relieves the detent 55 from the cutting loads, enabling said detent to serve only as a means for retaining the bit within its socket.

It may further be seen that the bit is so arranged as to be readily inserted or removed from its socket without the use of the usual wrenches, thus avoiding the troubles incurred with the freezing of the set screws heretofore used, and making it unnecessary to tap the socket or hole for the set screw, and simplifying the insertion and removal of the bit from its block.

While we have herein shown and described one form in which our invention may be embodied, it should be understood that various modifications and variations of our invention may be effected without departing from the spirit and scope of the novel concepts thereof.

We claim as our invention:

1. In a cutter chain, a cutter bit, a cutter block forming a mounting for said bit, a self-centering gauging retaining connection between said block and bit retaining said bit to said block by driving said bit within said block including a socket in said block opening to an outer face thereof and having a slot extending forwardly from said socket having centering side walls and a gauging face inclined outwardly from said socket and facing toward the outside of said socket, said cutter bit having a cutter portion and a shank portion extending therefrom insertable within said socket, said shank portion having a keying projection projecting forwardly therefrom for registry with said slot and having generally parallel centering walls cooperating with the walls of said slot and a gauging and camming face connecting said walls together and inclined outwardly from said shank portion for cooperation with said inclined face of said slot and gauging the bit to the proper cutting depth, and means for retaining said cutter bit in said socket comprising detent bit retaining means held in said block and biased to intersect said socket through the trailing wall thereof, a recessed portion on the trailing side of said shank portion adapted to be engaged by said detent retaining means upon the driving of said cutter bit within said socket, said shank portion being of a lesser cross-sectional area than the cross-sectional area of said socket and said gauging and camming face camming said bit to take the cutting loads at the back of said shank and socket and off of said detent retaining means, whereby said detent retaining means serves only to retain said cutter bit within its socket and accommodates removal of said bit from said socket by prying.

2. In a cutter chain, a cutter block having a socket therein opening to the outer face thereof and having a slot extending from said socket toward the forward end of said block having generally parallel side walls and an inclined gauging face connecting said side walls together, inclined forwardly of said socket and facing toward the outside of said socket and block, a cutter bit for insertion within said socket having a cutter portion and having a shank portion extending inwardly from said cutter portion for insertion within said socket and of a lesser cross-sectional area than the cross-sectional area of said socket, said shank having a recess on the trailing side thereof, a detent member biased to engage said recess to retain said shank within said socket, said shank having a keying projection projecting forward therefrom for registry with said slot and having generally parallel side walls and an inclined bottom wall in-

clined forwardly of said shank and connecting said side walls together, said inclined bottom wall being engageable with the forwardly inclined wall of said socket and gauging the bit to the required cutting depth, said detent tilting the inner end portion of said shank toward the forward end of said socket about said inclined bottom wall of said keying projection, whereby said keying projection cams the bit to take the cutting loads off of said detent and apply the cutting loads at the back outer end portion and front lower end portion of said shank and socket.

References Cited in the file of this patent

UNITED STATES PATENTS

1,908,161	Meutsch	May 9, 1933
2,434,256	Bowman	Jan. 13, 1948
2,483,220	Morrow	Sept. 27, 1949
2,561,657	Fulke	July 24, 1951
2,720,392	Cartlidge	Oct. 11, 1955
2,766,029	Bruestle	Oct. 9, 1956

FOREIGN PATENTS

550,924	Germany	May 21, 1932
393,773	Great Britain	May 25, 1933