June 10, 1952 J. F. JOY 2,599,837

REVERSIBLE MINING CHAIN

Filed Feb. 19, 1949

Fig. 1.

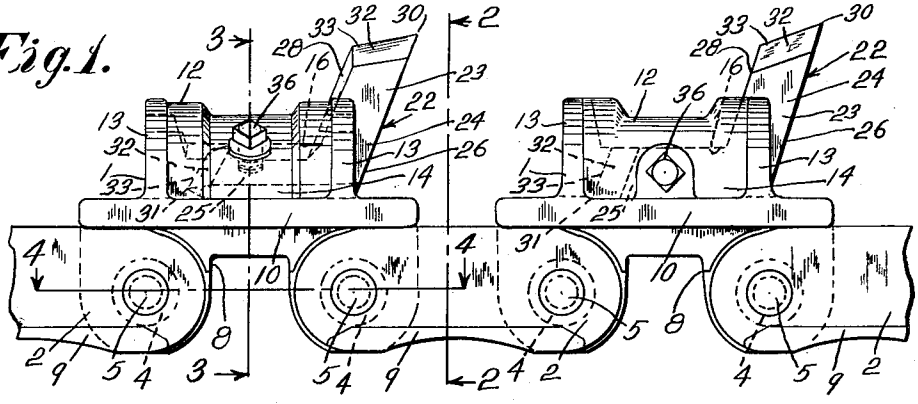


Fig. 2.

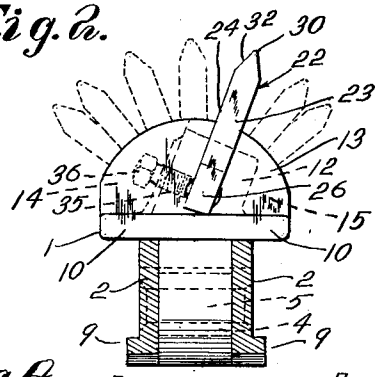


Fig. 3.

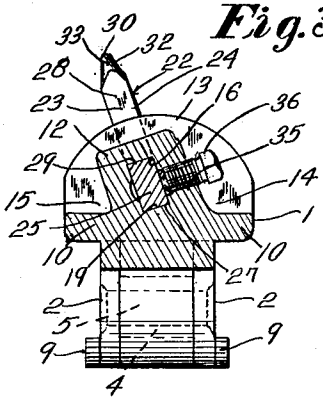


Fig. 4.

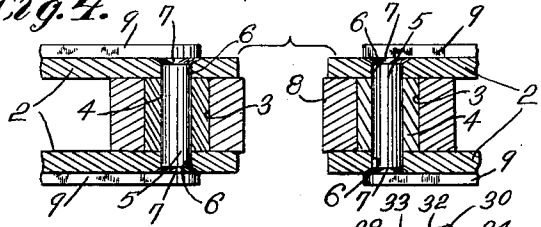


Fig. 5.

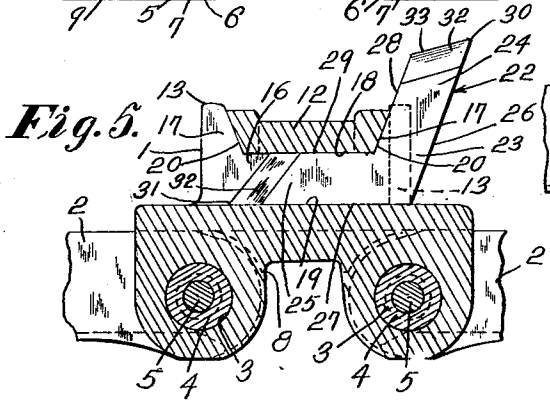
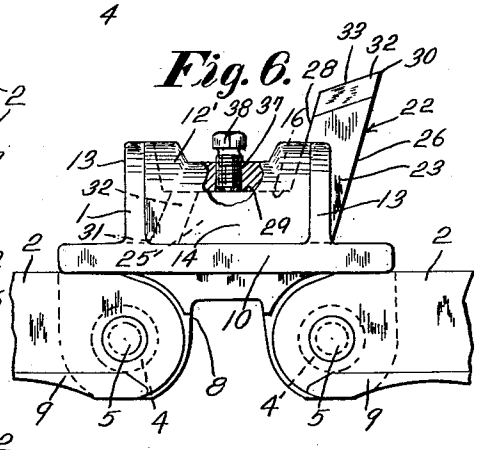


Fig. 6.



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REVERSIBLE MINING CHAIN

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Application February 19, 1949, Serial No. 77,417

1 Claim. (Cl. 262—33)

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This invention relates to mining chains and more particularly, but not exclusively, to a reversible cutter chain especially designed for use with the cutter bar of a coal cutting machine.

Coal cutting machines for cutting kerfs in the coal of a coal seam usually have a cutter bar provided with a marginal guideway in which an endless cutter chain is guided for circulation about the bar, and a drive sprocket is usually arranged at one end of the cutter bar for engaging and driving the cutter chain. Such cutter chains are ofttimes reversible and have chain blocks provided with supporting means for receiving and supporting reversible cutter bits which may be reversibly positioned on the blocks and secured in place when cutting in reverse directions is desired. The present invention contemplates improvements over known types of reversible cutter chains in that the cutter bits may be reversibly positioned and supported on the chain blocks and secured in place in an improved manner. Also, the chain blocks of the present invention are of improved construction and the securing means for the cutter bits are arranged in a novel manner on the blocks whereby the cutter bits are supported and held in place in an extremely rigid manner, and the block lugs are formed with transverse portions or end enlargements which not only protect the bit securing means from the abrasive action of the coal during the cutting of a kerf but also serve to convey the cuttings created by the cutter bits during the kerf cutting operation, outwardly from the kerf.

An object of the present invention is to provide an improved mining chain. Another object is to provide an improved reversible cutter chain having improved chain block structures for receiving and supporting the cutter bits in reversed positions thereon. A further object is to provide an improved reversible cutter chain having an improved bit socket arrangement whereby the cutter bits may be firmly supported in cutting position on the blocks and readily reversed when desired. Yet another object is to provide an improved arrangement of the bit securing means for securing the bits in reversed positions on the chain blocks. A still further object is to provide an improved reversible cutter chain having a novel chain block structure for supporting the cutter bits in either of their reversed positions thereon, and adjustable devices, desirably set screws, arranged in a novel manner on the block lugs and engaging cutter bits whereby the bits may be firmly secured in

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position. Still another object is to provide an improved chain lug structure whereby the adjustable devices or set screws for securing the bits on the blocks are arranged in a novel manner so that the adjustable devices or set screws are protected against abrasive action as the result of contact with the coal during the kerf cutting operation. A still further object is to provide an improved chain block structure having bit receiving lugs of a novel design, including transverse portions or end enlargements which serve to convey the cuttings from the kerf in an improved manner. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there are shown for purposes of illustration two forms which the invention may assume in practice.

In this drawing:

Fig. 1 is a side elevational view of a portion of a cutter chain constructed in accordance with the preferred illustrative embodiment of the invention.

Fig. 2 is a cross-sectional view taken substantially on line 2—2 of Fig. 1 with the "lacing" of the cutter bits on the chain indicated in dotted lines.

Fig. 3 is a cross-sectional view taken substantially on line 3—3 of Fig. 1.

Fig. 4 is a horizontal sectional view taken substantially on line 4—4 of Fig. 1.

Fig. 5 is a central horizontal vertical sectional view taken through the chain block shown at the right in Fig. 1, illustrating details of the block structure.

Fig. 6 is a fragmentary side elevational view of the cutter chain, showing a modified embodiment of the invention.

In this illustrative construction, as shown in the drawing, the improved cutter chain is especially designed for use with a cutter bar of a coal cutting machine, but it will be evident that the particular manner of mounting the bit for operation in reverse directions may be employed with the disintegrating chains of the digging head of a continuous mining apparatus.

The chain disclosed herein comprises a series of chain blocks 1 pivotally connected by side strap links 2. Fitted in transverse bores 3 in the block-bases are bushings 4, and rivets 5 pass through these bushings and through alined bores 6 in the strap links and are headed over or peened at 7 at their ends for securing the parts against lateral displacement. The bases of the chain blocks are recessed at 8 to provide tooth-re-

ceiving-pockets for the teeth of a conventional chain drive sprocket. The strap links have outer gibs 9 at their bottoms and these gibs are engageable with the usual guideways of a conventional cutter bar about which the cutter chain may be circulated in an orbital path. The blocks have transverse shelf-like projections or ledges 10 which project laterally at the outer periphery of the cutter bar, outwardly of the chain guideway.

The improved chain blocks 1 have lateral lugs 12 formed with transverse end portions or end enlargements 13, 13 which extend laterally, in the manner shown, to the outer edges of the shelf-like projections 10 so that recesses or pockets 14 and 15 are provided at the sides of the lugs between the transverse end portions 13. The lugs 12 are relatively inclined at different angles on different blocks, and have longitudinal sockets or openings 16, desirably of rectangular cross section, extending from end to end through the lugs, and inclined slots or recesses 17 extend laterally and outwardly from the sockets 16 at the opposite ends of the lugs (see Fig. 5). The sockets 16 have parallel upper and lower walls 18 and 19 extending longitudinally of the blocks and the recesses 17 have oppositely inclined inner walls 20, as clearly shown in Fig. 5.

A reversible double ended cutter bit generally designated 22, similar to that disclosed in my copending application Ser. No. 57,047, filed October 28, 1948, has a body 23 comprising relatively inclined cutting portions or arms 24 and 25 disposed at an obtuse angle. The cutter bit may desirably be of rectangular cross section, and the body-arms have plane outer surfaces 26 and 27 and parallel inner surfaces 28 and 29, the outer and inner surfaces intersecting along straight lines lying in a plane bisecting the bit body at the apex of the angle. The outer surfaces 26 and 27 alternatively provide the working faces of the bit and terminate in cutting points 30 and 31 at the opposite extremities of the bit. The side surfaces 32 of each cutting point are relatively inclined and intersect substantially along a receding rear edge 33, and are so arranged as to provide adequate clearance for the front surfaces of the points. Thus a symmetrical double pointed bit is provided which may be reversed end for end to present either cutting point to the work.

The cutter bits are reversible in the block lugs, with the active cutting portions of the bits lying with their inner ends in the front recesses 17 and the rear surface 28 of the bit abutting the inner walls 20, and with the inactive cutting portions received in the longitudinal sockets 16 with the outer bit surfaces 27 resting against the bottom socket walls 19. When the cutter bits are properly positioned in the lug sockets and recesses, the front active cutting faces project outwardly and forwardly from the front end surfaces of the block lugs, in the manner shown in Fig. 1.

In the preferred embodiment of the invention shown in Figs. 1 to 5 inclusive, the block lugs are formed at their sides with threaded openings 35 which enter the sides of the longitudinal sockets 16 midway between the ends of the block lugs, and these openings receive relatively small set screws 36 which, when threaded inwardly in the openings, engage the adjacent sides of the inactive portions of the bits for rigidly securing the bits in cutting position on the blocks. These set screws are of a conventional design and have

square heads which are arranged in the pockets 14 at the sides of the lugs between the transverse rib-portions 13, so that the set screw heads are protected from the abrasive action of the coal during the kerf cutting operation. The transverse end portions 13 provide conveyor vanes or ribs which serve to convey the cuttings created by the cutter bits during the cutting operation, outwardly from the kerf.

In the modified embodiment shown in Fig. 6 the chain block and strap link structures are similar to those above described and, in this instance, the block lugs 12' have threaded openings 37 at their tops and these openings enter the socket 16 at their tops, and threaded in these openings are small set screws 38 which, when threaded inwardly in the openings, engage the top surfaces 29 of the inactive portions of the cutter bits to secure the cutter bits firmly in position on the chain blocks. The heads of these set screws are, in this instance, located on the lugs rearwardly of the active portions of the cutter bits so that they are to a large extent protected from the abrasive action of the coal.

In both embodiments, the sockets and recesses for receiving the cutter bits are symmetrically arranged on the block lugs so that the cutter bits may be reversed end for end with respect to the block lugs thereby to enable the cutter chain to cut in either direction. The set screws, due to their central location on the block lugs, may secure the bits in position in either reversed position of the bits. The sockets and recesses in the relatively inclined lugs on the different chain blocks enable positioning of the bits at relatively different angles, as shown in dotted lines at Fig. 2, to provide for proper "lacing" of the bits on the chain. The cutter bits by the provision of two cutting points may be reversed end for end with respect to the block lugs irrespective of the direction of cutting so that sharp cutting points may be presented to the work when the other points become dull.

As a result of this invention an improved reversible cutter chain is provided wherein the cutter bits may be firmly supported and secured in cutting position on the chain blocks and may be readily reversed with respect to the chain blocks, without rearrangement of the securing means on the blocks. The novel block lug structures by the provision of the end transverse portions may serve as cuttings conveyors and the intermediate pockets at the sides of the lugs enables location of the set screws within the pockets to protect the set screw heads from the abrasive action of the coal. The novel arrangement of the lug sockets and communicating recesses provides extremely stable supports for the cutter bits in either of their reversed positions on the block lugs. The mining chain is relatively simple and rugged in design well adapted to meet the severe demands of service encountered in the mining of coal. Other advantages of the invention will be clearly apparent to those skilled in the art.

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

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

In a reversible cutter chain, a reversible

chain block of symmetrical shape having a base and a lateral lug, said lateral lug having end enlargements providing a depression centrally between the ends of said lug, said enlargements having bit receiving sockets opening longitudinally therethrough for selectively receiving a cutter bit in either of the reversed positions of the bit with respect to said lug, a cutter bit receivagle selectively in said sockets of said lug enlargements and projecting forwardly and outwardly from the front end of said lug in either reversed position of the bit, and an adjustable securing element adjustably mounted on the central portion of said lug midway between the ends of the latter and engageable with said bit in either reversed position of the latter for securing said bit in cutting position on the block, said lug having a longitudinal opening within its central portion for joining said sockets and said bit having a portion receivable in said longitudinal opening in either position of said bit and engageable by said securing element, said securing element having its outer portion lying within said depression between said lug enlargements whereby said adjustable element is protected by said lug enlargements against abrasion due to contact with the material

being cut by the cutter chain irrespective of the direction of operation of the chain, said end enlargements of said lug having transverse portions of substantial lateral extent projecting laterally beyond the sides of said block-base and providing cuttings conveyor vanes which selectively serve to convey the cuttings created by the cutter bit during either direction of operation of the chain.

JOSEPH F. JOY.

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