Feb. 13, 1940. E. P. STENGER ET AL 2,190,000

BIT BLOCK FOR CUTTER CHAINS

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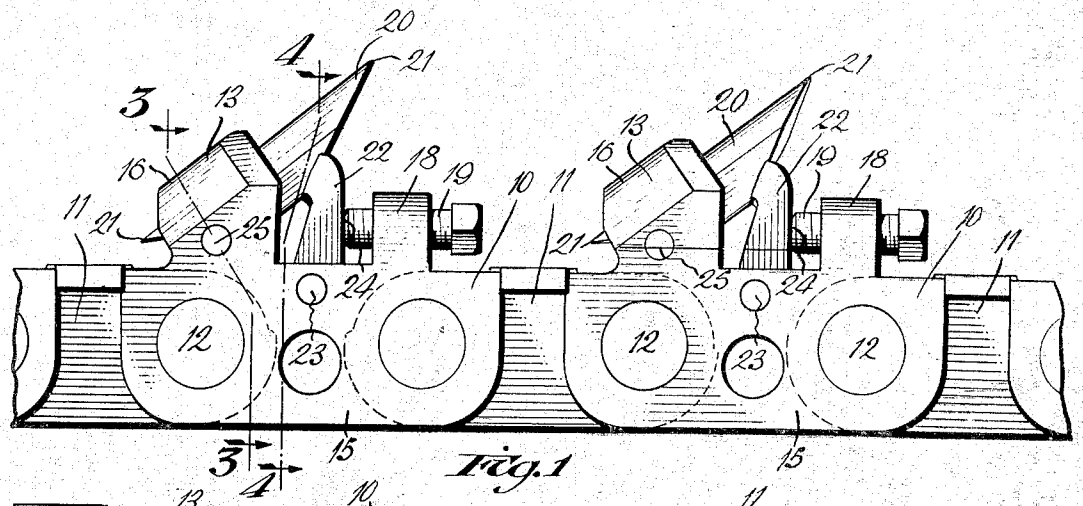


Fig. 1

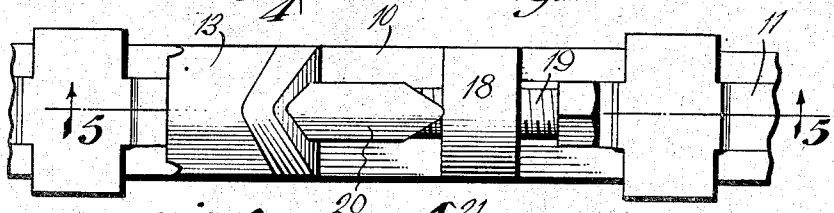


Fig. 2

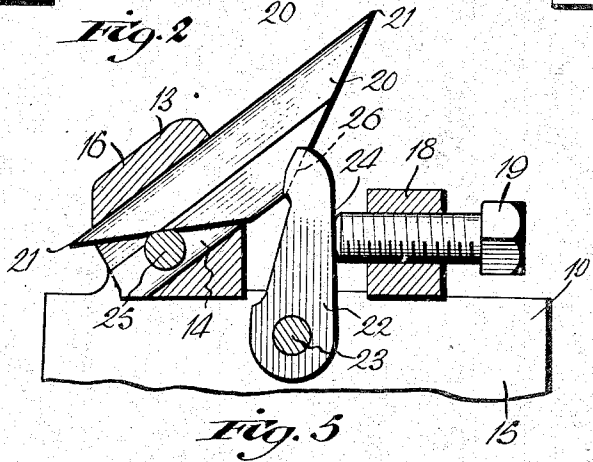


Fig. 5

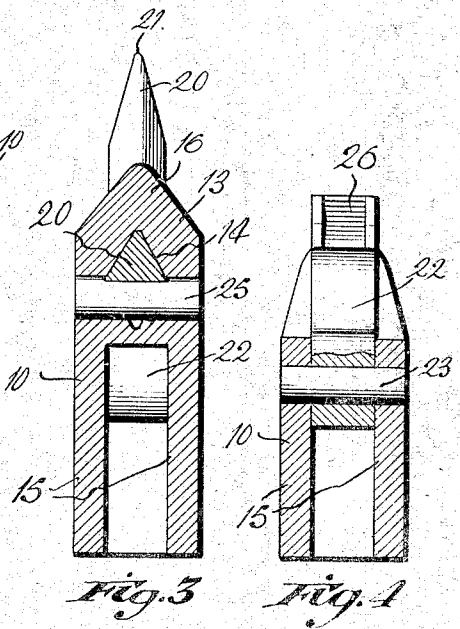


Fig. 3

Fig. 4

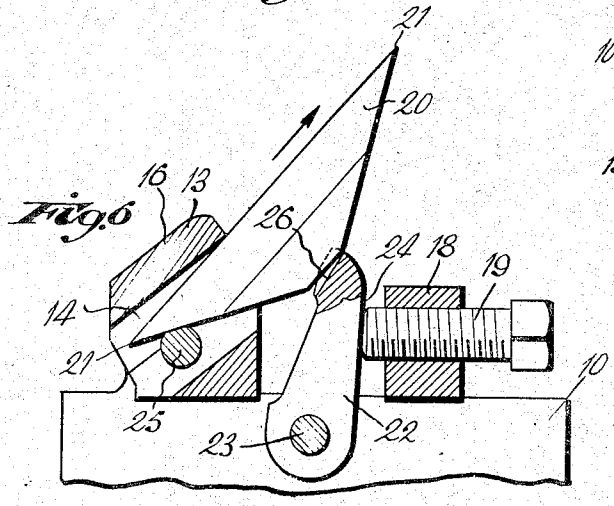


Fig. 6

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BIT BLOCK FOR CUTTER CHAINS

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1 Claim. (Cl. 262—33)

This invention relates to mining machinery and is particularly directed to improvements in mining machine chain, specifically the holders incorporated in the chain links or blocks for mounting cutter bits or teeth. Endless chains are employed carrying cutter teeth or bits in the respective chain blocks. These bits are angularly laterally disposed and forwardly projected for making a cut through coal. The angle of mounting of the teeth is varied in transverse planes, whereby the successive teeth make a cut which is of sufficient width to permit easy passage of the run of chain and the cutter bar through the cut. Inasmuch as the present invention is primarily directed to the construction of the holders incorporated in a chain, it is only necessary for the purpose of clearly describing and illustrating the same that reference be made to one block or link of the cutter chain.

The average cutter tooth or bit is subjected to extremely damaging usage and it is constantly necessary to replace the bits. Accordingly, it is an object of the present invention to provide an improved bit holder means incorporated in the chain block or box which is conveniently and quickly manipulated by the operator for removing the worn bit and inserting a new bit, or reversing the worn bit end for end in cases where a reversible bit is used, thereby reducing bit setting time to a minimum. The ability to quickly set the bit is a distinct time saving advantage since the average miner is required to set hundreds of bits per day.

Because of the varying character of material through which the bits are drawn for the purpose of making a cut, a great many bits are lost. This occurs because of chattering or vibration resulting from pounding, or may occur due to the fact that the bits are sprung from position due to the excessive pressure which develops as they are forced against materials of great hardness. It is accordingly a further object of the invention to provide an improved bit or tooth mounting as embodied in the structure of the holder or box which is of improved holding efficiency. This appreciably lowers the amount of loss of bits from coal cutting chains, thereby resulting in a great saving or economy in the operation of the mining machine.

Due to the excessively hard usage to which the bits are subjected, it is of course highly essential that the construction of the holder as incorporated in the chain link or box be extremely rugged and durable so that breakage rarely occurs. Therefore it is a still further object of this invention to provide an improved holder for the bit in which the heavy forces imposed thereon in cutting are absorbed and counteracted by the proper abutment and location of the bit in the holder, and by proper distribution of the mass of the holder.

In order to accomplish efficient coal cutting, it is also necessary that the bit have ample clearance or projection beyond the line of the lug or box and the holder means as incorporated therein. It is accordingly a further object of this invention to provide a bit holder or mounting in the box or block, which, because of the durability of the holder and the manner in which the forces acting on the bit are absorbed within the holder, permits ample extension of the cutting point of the bit without overloading the structure of the holder means or the box. Therefore it does not split or deform, breakage and distortion of the parts being reduced to a minimum. This structure or arrangement results in a good ratio between bit clearance and the length of the bit which is one of the features constantly sought after in this type of apparatus since it has a very important bearing on the cost of bits and the performance thereof.

Other objects and further advantages will be more fully apparent from a description of the accompanying drawing, in which:

Figure 1 is a side view of a length of mining machine chain, incorporating the improved cutter tooth mounting.

Figure 2 is a top plan view of a section of the chain, illustrating a lug of the chain run incorporating the present improvement.

Figure 3 is a sectional view taken on line 3—3, Fig. 1.

Figure 4 is a sectional view taken on line 4—4, Fig. 1, with the bit removed.

Figure 5 is a sectional view taken on line 5—5, Fig. 2, illustrating the internal construction of the lug and showing the bit held in position.

Figure 6 is a view taken similar to Fig. 5, but showing the holder means adjusted for removal of the bit.

In view of the fact that the present improvements relate only to the structure for mounting the bit as incorporated in one of the chain lugs, it has been considered sufficient illustration to show only a short length of mining machine chain.

As shown, the boxes or blocks supporting the teeth are alternate links in the chain. Upon reference to the drawing, the alternately disposed links, commonly known as boxes or blocks, will be found at 10 and the connecting links of the

chain at 11, the elements 10 and 11 of the chain being flexibly held together by means of pins 12 in the usual manner. Each bit carrying link or box has a bit supporting lug portion 13 extended from one side thereof.

A bit socket 14 is provided in the lug 13 of the block 10. This socket extends angularly forwardly from the box in relation to the length of chain. As shown in Figures 3 and 4, it intersects at an angle the space between the side plates 15, 15, constituting the link portion of the chain block. The rear wall 16 of the lug portion 13 is inclined at substantially the same angle as the socket. Forward of the heavier bit lug an auxiliary lug portion 18 is provided for receiving a clamping screw 19.

The bit 20 adapted for mounting in this holder socket is of diamond shaped cross section and has obliquely cut end surfaces appearing from the same side of the bit, these obliquely cut ends approaching each other at a longitudinal side edge of the bit and accordingly providing sharp points 21 at the opposite longitudinal side edge thereof. The socket 14 is diamond shaped in cross section to receive the bit 20.

A clamping arm or lever 22 is pivoted on a cross pin 23 extended between the side plates 15, 15, below the space between the two lugs 13 and 18. The pivot pin of the clamping arm therefore is located below the clamping screw 19. The forward surface 24 of the clamping arm or lever is engaged by the rounded contact end of the clamping screw.

Accordingly, operation of the screw in the proper direction swings the clamping arm toward the bit lying against the opposite wall of the socket. The bit is supported and limited in its inward movement by means of a cross pin 25 disposed in the lug transversely through the socket. The pin is flattened for increased contact with the oblique end face of the bit.

The upper or bit engaging face of the clamping arm is grooved as at 26, the flat bottom of the groove engaging the end face of the bit at the lower end thereof.

Now one of the decided advantages of this construction is that it requires only a fraction of a turn of the clamping screw to completely clear the clamping arm for removal of the bit. Inasmuch as these bits wear out very rapidly and considerable breakage may occur due to the fact that a rock strata is encountered, it is highly important that the operator be able to remove the bits with great rapidity. Also, it is of primary importance that he be able to manipulate the parts in a dark mine without difficulty and that it be impossible for him to lose any of the holder parts. Therefore, it is desirable to arrange the parts so that they do not become displaced entirely from the chain. Obviously since the clamping arm is pivoted it is a permanently fixed part of the chain lug and the only removable part in the present construction is the bit itself.

The accomplishment of easy and quick extraction is the result of a careful selection of the angular relation of the clamping arm relative to the set screw so that the pivotal movement tends to clear the end lug very rapidly and upon very little movement.

In order to provide great durability, the mass of the holder lug must be properly distributed. In the present mounting of the bit it has been provided that the heavy pressure exerted on the bit as it is cutting is active against the heavy mass of metal in back of the bit and is not in any way borne by the clamping arm. Moreover, there is no tendency for the bit to become outwardly displaced since the pressure tends to force it into the socket at all times.

In the distribution of the mass of the holder lug it must be remembered that adequate bit clearance is necessary for efficent use of the bits. In other words, the projection of the bit beyond the extreme outer end of the clamping arm and the lug must be substantial. Accordingly, the clamping arm or lever has been made relatively short and only extends a short distance in contact with the outer oblique end face of the bit. This leaves practically the entire cutting edge as represented by the side edges of the oblique forward face clear for cutting (see Figure 5). As stated this contact is sufficient since the greater percentage of the work thrust on the bit is carried by the holder lug.

A coil spring 42 under compression is provided, surrounding the screw, between the clamping plate 35 and the lug so as to press the clamping plate away from the bit when the adjusting screw is turned for releasing the bit.

Due to the angular relationship of the bit end surface and the engaging surface of the clamping arm relative to the longitudinal axis of the bit or bit socket and the relationship of the pivoted lower edge of the clamping surface, it is provided that very little turning of the screw is necessary to fully release the bit. At the same time the bit is firmly clamped in position for cutting operations under the most unfavorable working conditions.

Having described our invention, we claim:

In a mining machine chain, a link including a lug portion, said lug portion having a bit receiving bore extending completely therethrough, and an abutment within said bore forming an inclined rear wall, a bit positioned within said bit bore, said bit being trapezoidal in side elevation and having cutting points at the opposite ends thereof, a clamping arm pivotally mounted in the link and having its swinging end outwardly disposed and adapted to engage against the active cutting surface of the bit to obstruct outward movement of the bit and means for moving the arm towards the inclined rear wall.

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