Sept. 10, 1940. E. P. STENGER ET AL 2,214,644

MINE MACHINE

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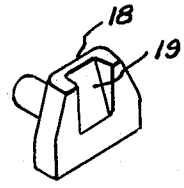


FIG. 6.

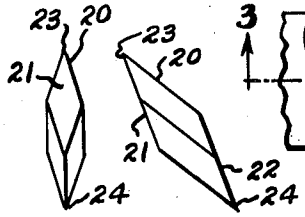


FIG. 4. FIG. 5.

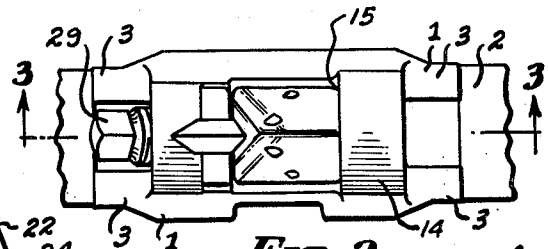


FIG. 2.



FIG. 10.

FIG. 1.

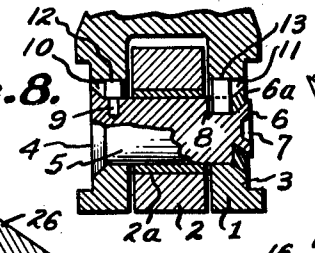


FIG. 8.

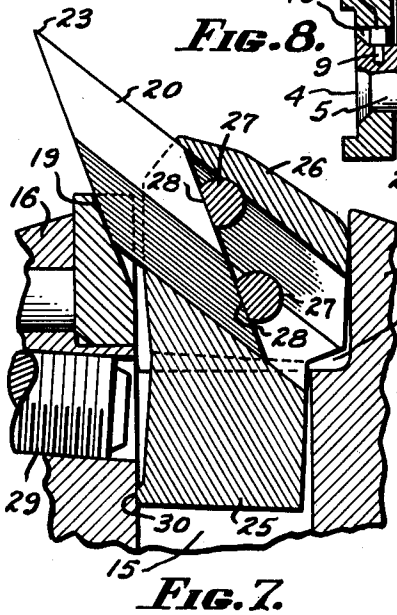


FIG. 7.

FIG. 3.

FIG. 9.

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MINE MACHINE

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Application January 28, 1938, Serial No. 187,507

4 Claims. (Cl. 74—251)

Our invention relates to improvements in the chain and cutter mechanism used in mining machines principally in the cutting of coal. Among our objects are the simplifying of the bit holding structures without sacrifice of great strength and resistance to displacement, and the provision of a readily removable link pivot or bearing pin for the chain links in which the bit holders are mounted, necessitating no bushings for support.

Among other things we propose to employ a parallelogram bit made of stock which is diamond shape in cross section cut with two parallel faces so that the bit is reversible. In such a bit all of the cuts which sever the bits from a length of diamond shaped stock can be parallel to each other.

The features of our structure will be illustrated in the accompanying drawings, and the illustrated structure will be described fully. We refer to the claims that follow for a statement of the inherent novelty in the examples selected. In the drawing Fig. 1 is a side elevation showing two forms of bit holder of our new design.

Fig. 2 is a top plan view of the right hand end of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 2 on a larger scale.

Figs. 4 and 5 are front and side elevations of the bit itself.

Fig. 6 is a perspective of the drop-in front abutment.

Fig. 7 is a section corresponding to Fig. 3 but showing the bit holder in unclamped position.

Fig. 8 is a detail section on the line 8—8 of Fig. 1.

Fig. 9 is a perspective of a pivot pin before same has been inserted and riveted in the chain.

Fig. 10 is a perspective of the collar or washer.

The bit holding links in the illustrated mining machine chain are formed with spaced depending portions 1 which are connected to companion bit holding links by means of intermediate links 2 which contain ring shaped bearings 3 at both ends which lie between the portions 1 of the bit holding links. Rivets are employed as bearing pins which pass through the portions 1 and through the bearings 3, and one of the features of our invention involves the structure of these rivets.

It is necessary to fasten the links together very firmly by these rivets and yet make it possible to remove the rivets by driving them out. Thus too heavy a riveted head is not desirable. Also it is desirable that the rivets do not turn in the bit holding links.

In our novel construction we provide rivets of large diameter which have chamfered heads 4, bearing portions or bodies 5, which will preferably be hardened and rivet heads 6. The rivet heads are of considerably smaller cross section than the bodies and will preferably be formed with recesses 7 therein. The rivets have grooves 8 extending into the bodies from the rivet head end, and holes 9 located in the bodies just inside of the chamfered heads. We preferably carburize the rivets or pins with a copper coating on the rivet heads, using low carbon steel which will thus harden where exposed but will remain soft at the rivet heads.

As shown in Fig. 8, the two portions 1 of the bit holding links have key-ways 10 and 11 projecting radially from the holes in which the bearing pins or rivets are mounted. At the large or chamfered head end, we provide for each rivet a stud or key 12 which closely fits the hole 9 of the rivet, and when the rivet is inserted in place will lie in the key-way 10. At the riveted head end a key 13 is used which is set in place to engage the groove 8 of the rivet and also the key-way 11.

When two links have been set together ready for insertion of the bearings pin, the stud or key 12 is forced in and the rivet thrust through the assembled parts. This brings the rivet head end into position at the opposite side from the chamfered head, and the key for that end of the rivet is thrust into place, since the diameter of the rivet head is small enough to permit this. The ring member 6a is then placed in position, and with a suitable tool the rivet end is then spread as illustrated in Fig. 8.

We have found that the rivet-like hinge pins so mounted will resist dislodging forces quite adequately, will not turn in the supporting link portions, and can be easily driven out with a punch and hammer when worn and requiring replacement even in low coal where the small head room limits the swing of a hammer.

The rivets are made quite large in cross section, and since their body portions can be hardened, the use of bushings in the link holes is not necessary. Were there not a special type of rivet head used, the result of peening over such a large rivet would make it impractical to drive it out especially in low coal. Hence our arrangement relieves us from using bushings and yet provides a readily removable hinge pin.

We have illustrated a bushing 2a in the bearing portion of the connecting link member in the showing in Fig. 8. This may be arranged in the bearing portion of the link, as desired, and serves the advantage that when the joint wears, the bushing and rivet can be replaced so as to bring it back into line. Since the pins or rivets are held against movement in the side plate 1 of the bit carrying links, there will be no such wear in the bearing pin mounting as may occur in the swivel connection of the connecting link members.

Another feature of our arrangement is this. The act of peening over the rivet head of the bearing pins would be likely to deflect the side plates toward each other, were it not for the shoulder formed by the reduced diameter of the rivet head. The act of peening over the rivet head forces the washer 6a against this shoulder, so that the shoulder functions as a spacer to prevent the inward deflection of the side plate at the rivet head side. It is obvious that where the side plates are deflected toward each other this is likely to bind the connecting links against movement, which is highly undesirable.

Also it is often the practice in mine operations to burn off the rivet heads on link bearing pins with an oxy-acetylene torch, and where this is done the metal of the side plates is likely to become damaged. The inserted washer 6a, acts as a spacer between the rivet head and the assembled parts and cuts down considerably the likelihood of damage resulting from this practice. As shown this washer has a conical seat for the rivet head when same is peened over.

It should be noted that it is not necessary to key the bearing pins at both ends, so that the inclusion of the double keying at both ends is a precautionary measure, although our novel structure lends itself readily to the double keying, which is not the case with any bearing rivet with which we are familiar.

The bit holding chain links have blocks 14 having a central vertical orifice 15 open at both ends, and upstanding spaced lugs 16 and 17. The forward lug 16 has a hole in it for a drop-in bit abutment piece 18, having a slanting base channel 19. The rear lug has a plain face which serves as a rear abutment for the bit holder.

The bits 20 are formed from diamond shaped stock, preferably, and thus are diamond shaped in cross section. They are cut with two opposed parallel cutting faces 21 and 22 resulting in cutting points 23 and 24. The cutting faces are at a slant to the diamond shaped cross section of the material resulting in a parallelogram structure. Such bits are reversible. They are not novel in and of themselves.

The bit holders have posts 25 which are of a somewhat less cross section than the orifices 15 in the chain blocks. They have slanting orificed heads 26, having one or more pins 27 set into place so as to extend across the orifices (in Fig. 1 is shown a single pin and a double pin arrangement as alternative structures). As indicated, these pins have planar faces 28 which serve as bit abutments. The slant to the channel in the drop-in front abutment is such as to correspond to the slant of the cutting face of a bit set into the orifice in the bit holder head when the device is clamped up firmly.

Reference to Figs. 3 and 7 will illustrate the mode of clamping up the bit holding assembly. A heavy set screw 29 passes through the front lug on the chain block at somewhat of a slant, and engages the post on the bit holder. When the bit holder is dropped into place, the engagement of the bit with the drop-in front bit abutment will tilt the bit holder somewhat as indicated in Fig. 7. When the set screw is turned in tightly, this pushes the bit holder post into a more vertical position, rocks the holder on the point of engagement of its rear upper corner with the face of the rear chain block lug, and forces the bit itself firmly into place against the channel in the drop-in front abutment.

The arrangement when clamped up is exceedingly rigid and resists all shocks normally encountered in coal cutting. In order to avoid holders coming out, the posts may have ribs 30 on their lower end to engage the set screws as abutments.

When bits are sharpened, thus cutting down their size, this may require the use of a drop-in front abutment which will take up the difference in size over the original size of the bit.

The base 31 of the orifice in the bit holder head is formed in a V shape and at a slant which will engage fully the lower side of a bit which is inserted into it and brought into position with its idle cutting face engaging the abutment pin or pins. As a result, when the structure is clamped up the bit is gripped between the front drop-in abutment, the abutment pins and the slanting V in the holder head, and will remain gripped between the opposing forces so set up as described. There is but one adjustable member used in the clamping, to wit, the bit block set screw, which is large, can be turned down powerfully, and is located in a readily available position.

The forces which act on the bit in cutting of coal will tend to tip the bit holder away from its position, a movement which will not result, because the direct force of the set screw opposes it.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a mining machine chain, a link pivot structure comprising a pair of pivot pin receiving portions on one chain link, a pivot pin receiving portion on a link which lies between the said pair, and a pivot pin device keyed at one end at least against revolution in the pair of receiving portions, and passing through all receiving portions, said device having a head at one end and a rivet head at the other, said rivet head being of reduced diameter relative to the pin proper and lying when peened over entirely within the receiving portion of said first mentioned chain link.

2. In a mining machine chain, a link pivot structure comprising a pair of pivot pin receiving portions on one chain link, a pivot pin receiving portion on a link which lies between the said pair, and a pivot pin device keyed at one end at least against revolution in the pair of receiving portions, and passing through all receiving portions, said device having a head at one end and a rivet head at the other, said rivet head being of reduced diameter relative to the pin proper and a washer mounted over the rivet head and engaging the shoulder of the pin adjacent thereto, both the washer and rivet head lying within the confines of the receiving portion of said first mentioned chain link.

3. In a mining machine chain, a link pivot structure comprising a pair of pivot pin receiving portions on one chain link, a pivot pin receiving

portion on a link which lies between the said pair, and a pivot pin device passing through all receiving portions, said device having a head at one end and a rivet head at the other, said rivet head being of reduced diameter relative to the pin proper, a key way in the pivot pin and in the pin receiving portion at the rivet head end, said key way in the pivot pin being located in the shoulder of the pin which extends beyond the rivet head, whereby a key may be inserted prior to riveting over the said rivet head, and a washer mounted over the rivet head and engaging said shoulder.

4. In a mining machine chain, a link pivot structure comprising a pair of pivot pin receiving portions on one chain link, a pivot pin receiving portion on a link which lies between the said pair, and a pivot pin device passing through all receiving portions, said device having a head at one end and a rivet head at the other, said rivet head being of reduced diameter relative to the pin proper, a key way in the pivot pin and in the pin receiving portion at the rivet head end, said key way in the pivot pin being located in that portion of the pin which extends beyond the rivet head, whereby a key may be inserted prior to riveting over the said rivet head, a key way in the other pin receiving portion of said first mentioned chain link, and a drop in key in the pivot pin located near the head of said pin.

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