PIN LOCK FOR PIVOTED LINK CHAIN

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FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 7.

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PIN LOCK FOR PIVOTED LINK CHAIN

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This invention relates to pivoted link chains and more particularly to an improved locking means for the hinge pins of a mining machine cutter chain.

In mining machine cutter chains it is desirable to lock the hinge pins which pivotally connect the chain blocks and strap links together against rotation and axial displacement with respect to the relatively expensive chain blocks so that wear is concentrated on the relatively less costly parts. It is further desirable to enable assembly of the hinge pins at either side of the chain and to enable release and reassembly of the hinge pins without the need for replacement of relatively costly parts.

An object of the present invention will provide an improved locking means for a pivoted link chain. Another object is to provide improved locking means for the hinge pins of a pivoted link chain for locking the hinge pins against axial displacement with respect to the chain blocks and embodying locking elements of a simple and rugged design. Yet another object is to provide improved deformable locking elements which may be readily placed into locking relation effectively to lock the pins in position. Another object is to provide an improved convenient and reliable means for locking the hinge pins to the chain links. 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 which the invention may assume in practice.

In this drafting:

Fig. 1 is a side elevational view illustrating a portion of a mining machine cutter chain equipped with a preferred form of the improved hinge pin locking means.

Fig. 2 is an enlarged detail section taken on line 2—2 of Fig. 1, showing the deformable locking elements in position on the chain prior to the bending thereof into straightened locking position.

Fig. 3 is a view similar to Fig. 2 showing the locking elements in straightened locking position.

Fig. 4 is a detail transverse section taken on line 4—4 of Fig. 3.

Fig. 5 is a detail longitudinal section taken on line 5—5 of Fig. 3.

Fig. 6 is a perspective view of one of the deformable locking elements.

Fig. 7 is a perspective view, partially broken away in section, of a hinge pin.

In this illustrative construction, as shown in the drawings, the improved hinge pin lock is shown incorporated in a mining machine cutter chain of a conventional design including a chain block 1 pivotally connected by hinge pins 2 to strap links 3. The chain block has a lateral lug 4 formed with a usual socket for the reception of a cutter bit 5, the latter being secured on the block lug by a usual set screw 6. The block has lateral gibs 7 adapted for reception in the guideways of a conventional mining machine cutter bar, in a well-known manner. Pressed within openings formed in the strap links are wear bushings 8 and these bushings surround and pivotally engage the hinge pins in a conventional manner. Evidently the improved pin locking means may be associated with pivoted link chains of other types.

In accordance with the present invention, each chain block has its base formed with parallel side portions 9 provided with aligned bores 10 and the end portions of the hinge pins are received in these bores, as shown most clearly in Figs. 2 and 3. The hinge pins are of cylindrical shape and have flattened side surfaces 11 which engage plane side wall surfaces 12 of the bores 10 for maintaining the pins against rotation in the bores relative to the chain block. The pins may be inserted into assembled relation with respect to the block from either side of the chain and each has recesses or notches 13 near each end having inner plane walls 14 in parallelism with and spaced a slight distance inwardly from the plane end surfaces of the pins. Lateral openings or slots 15 extend the recesses 13 out through pin-ends and these slots or openings have beveled outwardly diverging walls 16. Formed in the side portions of the block are notchlike recesses or notches 17 having curved bottom walls 18 (Fig. 5) and opening into the bores 10 in registry with the recesses 13 in the pins, in the manner of the diverging walls 16 of the openings 15 connect with undercut notches of the pin-recesses and these notch portions provide shoulders 19 as for a purpose to be later referred to. Deformable locking elements 19 of bent metal strips are provided and each has a straight end portion 20 and an opposite bent portion 21 as shown in Fig. 6 and the end surfaces thereof are desirably curved as at 22 and 23 to fit against the curved bottom walls of the recesses or notches 13 and 17. These locking elements have their straight end portions 20 initially insertible in the notches 17, in the manner shown in Fig. 2, and when so positioned the locking elements may be hammered or pressed inwardly into straightened relation against the bottom walls 14 of the pin-recesses 13, in the manner shown in Fig. 3, and as the locking elements are straightened out, their opposite end portions move farther apart and the end portions 21 are projected into the recesses 13 so that the overlying shoulders 19 hold the locking elements against inadvertent outward release in the manner shown. Thus, the hinge pins are positively locked against rotation and axial displacement with respect to the chain block. The pins upon disassembly are driven axially from the block bores, shearing off the locking elements, in an obvious manner.

As a result of this invention improved hinge pin locking means is provided which is relatively simple and rugged in design, well adapted to withstand the severe operating conditions such as are encountered in the mining of coal. By the provision of the registering notches or recesses in the hinge pins and block bases and the deformable locking elements having their ends projected into the recesses when hammered into straightened position, a lock which is relatively positive and reliable is afforded. The deformable locking elements when hammered or pressed into straightened locking position against the plane inner walls of the recesses formed in the end portions of the hinge pins, not only provides a positive lock but also one which has little tendency toward accidental release. The improved locking means enables the hinge pins to be readily assembled at either side of the chain in a convenient manner. Other uses and advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be patentable for other forms not described herein.
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 pivoted link chain, pivotally connected chain links and a hinge pin pivotally connecting said links together, one of said chain links having a transverse bore for receiving said hinge pin, and means for locking said hinge pin against axial displacement from said bore comprising a notch in said one of said chain links and opening into said bore and a registering notch in an end portion of said pin, said pin having an opening connecting said pin-notch out toward the end of the pin, and a deformable locking element having a portion insertible in said notch in said one of said chain links and a portion adapted to be hammered or pressed inwardly into straightened relation with respect to said first portion against the inner wall of said pin-opening to bring an opposite portion of said chain link into locking engagement with said pin-notch, said opening having outwardly diverging walls which serve to direct the deformable portion of said locking element inwardly into said pin-notch.

2. In a pivoted link chain, pivotally connected chain links and a hinge pin pivotally connecting said chain links together, one of said links having a transverse bore for receiving said hinge pin, and means for locking said hinge pin against axial displacement from said bore comprising registering notches in said one of said chain links and said pin, and an initially bent, deformable, locking element movable into straightened position with its ends projecting into said notches, said notch in said pin having an undercut shoulder overlying the outer surface of said locking element when the latter is in straightened locking position to hold said locking element against inadvertent outward release.

3. In a pivoted link chain, cooperating chain parts pivotally connected by a hinge pin, and means for locking said hinge pin against axial displacement from its associated chain part comprising a notch in said associated chain part, a recess in one end of said pin and providing an undercut portion at one wall facing toward said notch, and a relatively short deformable locking element having an end portion insertible in said notch, said element bendable inwardly into said end-recess to bring the opposite end portion thereof into said undercut portion of said recess in said pin, said locking element when in locking position within said recess having its major portion lying within said recess.

4. A pivoted link chain as set forth in claim 3 wherein said locking element is deformable inwardly into straightened position and said opposite end moving away from said one end portion as said element is straightened to move said opposite end into said undercut portion of said pin-recess, said one end portion of said locking element reacting against the bottom of said notch when said locking element is straightened into locking position as aforesaid.

5. A pivoted link chain as set forth in claim 3 wherein notches, recesses, undercut portions, and deformable locking elements are arranged at both ends of said pin for locking the latter against axial displacement in opposite directions.

6. In a pivoted link chain, pivotally connected chain links and a hinge pin pivotally connecting said links together, said chain links having transverse bores for receiving said hinge pin, and means for locking said hinge pin against axial displacement from said bores comprising a notch in one of said chain links and opening into one of said bores and a recess in an end portion of said pin, said recess providing an undercut notchlike portion in registry with said first mentioned notch, and a deformable locking element having a portion insertible in and seated against the bottom of said notch in said chain link and having a deformed portion adapted to be hammered or pressed inwardly into straightened relation against the inner wall of said recess to bring the opposite end portion of said element into locking engagement with said undercut notchlike portion of said pin-recess, said locking element as it is straightened out into locking position as aforesaid reacting at its end in said link-notch against the bottom of said latter notch.

7. In a pivoted link chain, pivotally connected chain links and a hinge pin for pivotally connecting said chain links together, said links having transverse bores for receiving said hinge pin, and means for locking said hinge pin against axial displacement from said bore comprising registering notches in one of said chain links and said pin, said hinge pin having a recess in an end thereof, the inner end of said recess being undercut to provide said pin-notch, and an initially bent, deformable, locking element movable into straightened position with its ends respectively projecting into said notches, one end of said locking element seated against the bottom of its notch, the ends of said locking element moving apart as said element is straightened against the bottom of said recess to bring an end of said element into said undercut notch portion, said locking element at one end seated against the bottom of one of said notches and reacting against said notch-bottom as it is straightened into locking position as aforesaid.

8. In a pivoted link chain, a chain link comprising a base portion having parallel sides formed with aligned bores, a hinge pin fitted in said bores, a connecting link pivotally engaging said hinge pin intermediate said parallel sides of said base portion, and means for locking said pin against axial displacement from said bores comprising a relatively shallow notch in a side portion of said base portion and a recess in an end portion of said pin and communicating with said notch, said recess opening outwardly through the end of said pin, said recess having an undercut notchlike portion at the end thereof remote from said first mentioned notch, and an initially bent, deformable, relatively short, locking element of substantially less length than the pin-diameter and having an end insertible in the notch in said base portion and bendable inwardly into straightened position against the bottom wall of said recess to bring the other end of said locking element into said undercut notchlike portion of said pin-recess, a major portion of said locking element lying within said recess when said locking element is in its straightened locking position.

9. In a pivoted link chain, cooperating chain parts pivotally connected by a hinge pin, locking said hinge pin against axial displacement from its associated chain part comprising a notch in said associated chain part, a recess in one end of said pin and having an undercut notchlike portion at one wall facing toward said notch, and a deformable locking element having an end portion insertible in said first mentioned notch, said element bendable inwardly into said end-recess to bring the opposite end portion thereof into said undercut notchlike portion of said pin-recess, said recess in the pin-end having outwardly diverging walls at the outer side of said undercut portion which serve to direct the opposite end portion of said deformable element inwardly toward said undercut portion as said element is bent inwardly as aforesaid.

10. In a pivoted link chain, cooperating chain parts pivotally connected by a hinge pin, and means for locking said hinge pin against axial displacement from its associated chain part comprising a notch in said associated chain part, a recess in one end of said pin and communicating with said notch, said recess having an undercut notchlike portion at one wall facing toward said notch, and a relatively short deformable locking element having an end portion insertible in said first mentioned notch, and a deformable locking element having an end portion insertible in and seated against the bottom of said notch when said locking element is straightened into locking position as aforesaid.
inwardly as aforesaid reacting at said one end thereof against said notch-bottom, said recess in the pin-end having outwardly diverging walls at the outer side of said undercut portion which serve to direct the opposite end portion of said deformable element inwardly toward said undercut portion as said element is bent inwardly as aforesaid.

11. A pivoted link chain as set forth in claim 10 wherein said locking element is of a length substantially less than the diameter of said hinge pin, a major portion of said locking element lying within said pin-recess when said element is in locking position.

12. In a pivoted link chain, pivotedally connected chain links and a hinge pin for pivotingally connecting said links together, one of said links having a transverse bore for receiving said hinge pin, and means for locking said hinge pin against axial displacement from said bore comprising a notchlike recess in said one of said links and an opposed communicating recess in said pin, said recesses opening toward one another, and an initially bent locking element having one end inserted in said link-recess and provided with a bent portion bendable into straightened position to bring the opposite end of said element into said pin-recess, said pin-recess providing an inwardly facing shoulder overlying the outer surface of said opposite end of said element when the latter is in straightened position to hold said element against inadvertent outward release from said pin-recess.

13. A pivoted link chain as set forth in claim 12 wherein said pin-recess has a plane bottom surface with which the inner surface of said locking element engages when said bent portion is in its straightened position as aforesaid.

14. A pivoted link chain as set forth in claim 12 wherein said pin-recess has a wall thereof formed to direct said opposite end of said locking element beneath said shoulder of said pin-recess as said bent portion is bent inwardly toward its straightened position.

15. In a pivoted link chain, pivotedally connected chain links and a hinge pin for pivotingally connecting said links together, one of said links having a transverse bore for receiving said hinge pin, and means for locking said hinge pin against axial displacement from said bore comprising a notchlike recess in one of said links and an opposed communicating recess in said pin, said recesses disposed end to end and opening toward one another, and an initially bent locking element having one end inserted in said link-recess and provided with a bent portion bendable into straightened position to bring the opposite end of said element into said pin-recess, said recesses in said link and said pin at their remote ends providing inwardly facing shoulders overlying the outer surfaces of the opposite ends of said locking element when the latter is in straightened position to hold said element against inadvertent outward release from said recesses.

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