April 23, 1963 C. B. KREKELER 3,086,404

CUTTER CHAIN JOINT

Filed Dec. 30, 1958 2 Sheets-Sheet 1

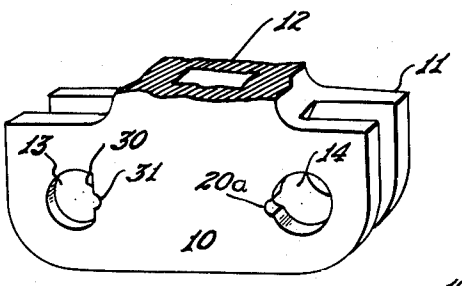


FIG. 1.

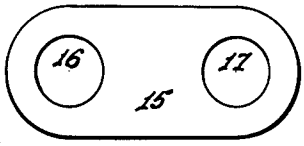


FIG. 2.

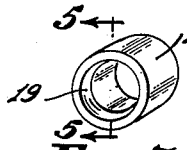


FIG. 3.

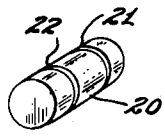


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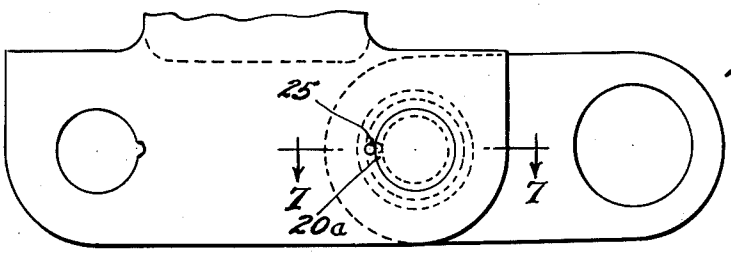


FIG. 6.

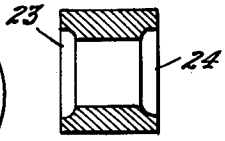


FIG. 5.

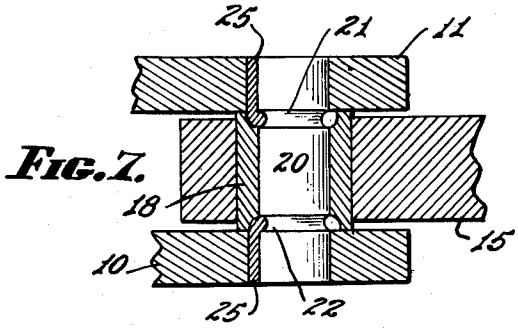


FIG. 7.

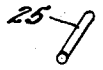


FIG. 8.

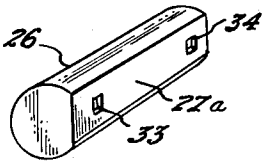


FIG. 9.

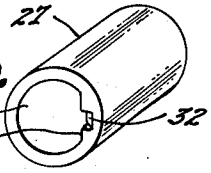


FIG. 10.

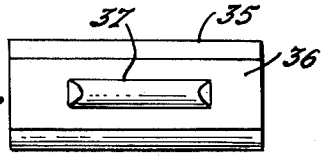


FIG. 13.

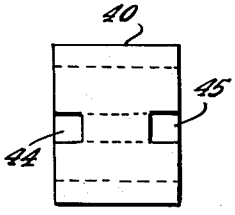


FIG. 11.

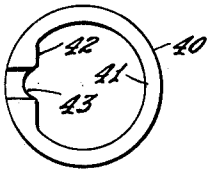


FIG. 12.

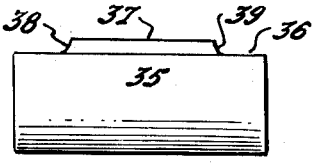


FIG. 14.

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CUTTER CHAIN JOINT

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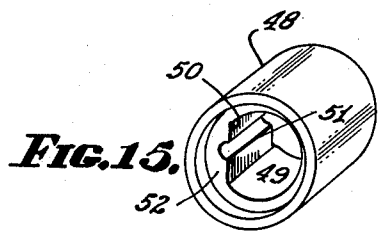


FIG. 15.

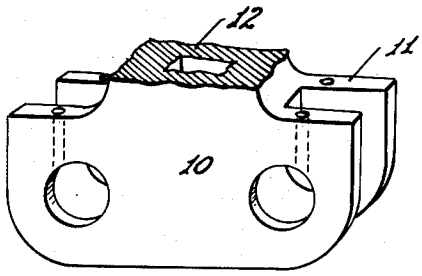


FIG. 17.

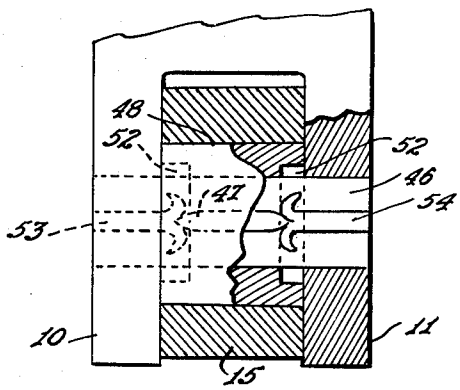


FIG. 16.

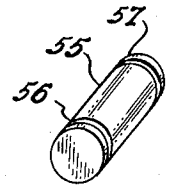


FIG. 18.

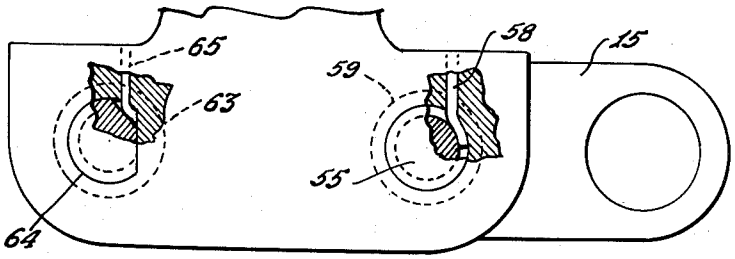


FIG. 19.

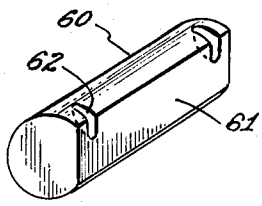


FIG. 20.

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3,086,404

CUTTER CHAIN JOINT

Claude B. Krekeler, Cincinnati, Ohio, assignor to The Cincinnati Mine Machinery Co., Cincinnati, Ohio, a corporation of Ohio

Filed Dec. 30, 1958, Ser. No. 783,823
12 Claims. (Cl. 74—254)

In cutter chains for mining machinery, as is well known, certain of the chain links at least carry blocks or socket members adapted to receive either one-piece cutter bits or the shank portions of cutter bit holders which, in turn, support replaceable cutter bits. In one form of construction, each chain element is bifurcated at one end so as to form spaced cheeks, and is so configured at the other end as to provide a single cheek. Such elements are then pivoted together by means of pintles or hinge pins. In a preferable construction, those chain elements which carry the blocks or socket members are provided with spaced cheeks; and these elements are interconnected by connector elements to which they are pivoted by means of pintles.

Since the pintle elements cannot normally extend beyond the outer faces of the outer cheeks of the chain elements, there has been a problem in the art of fastening the pintles against endwise movement, while permitting the pintles to be relatively easily removed, when it becomes necessary to demount the chain. It has been understood also that if it is preferable to fix the pintles against rotation with respect to the cheeks of the block elements, thus concentrating any wear on the connector elements which are relatively cheaply replaceable. This is usually accomplished by providing a flat on the pintle and configuring the perforation in at least one of the outer cheek elements to coact with the flat to prevent pintle rotation. Also, it has been found desirable to provide metallic sleeves or bushings surrounding the pintles in the connector elements, and to fix these bushings against rotation with respect to the pintles.

Some work has been done on the use of pintle fastening means which are metallic deformable elements capable of being driven in from the outside of the chain, so that an inner end portion of the fastening means becomes deformed and engages behind some portion of the outer cheeks of the chain and also engages some abutment on the pintle to prevent longitudinal displacement. Such fasteners are relatively quick and easy to use; and in most instances when it becomes necessary to remove a pintle, the pintle may simply be driven out of position, the deformed portions of the fastening means being sheared off in the process.

The structures hitherto employed, however, have not facilitated the use of the sleeves or bushings aforesaid; and it is a principal object of this invention to provide cutter chain joint structures in which a pintle may be held against endwise displacement by means of a deformable fastener driven in from the outside, in which a sleeve may be employed with the pintle, and in which the pintle may be held against rotation with respect to the outer cheek elements of the chain and the sleeve or bushing held against rotation with respect to the pintle where this is desired.

These and other objects of the invention, which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, are accomplished by that construction and arrangement of parts of which certain exemplary embodiments will now be described. Reference is made to the accompanying drawings wherein:

FIG. 1 is a partial perspective view of a double cheek chain element.

FIG. 2 is an elevational view of a connector element.

FIG. 3 is a perspective view of a sleeve or bushing.

FIG. 4 is a perspective view of one form of pintle.

FIG. 5 is a sectional view through the sleeve of FIG. 3 taken along the section line 5—5 of that figure.

FIG. 6 is a partial elevational view of a double cheek chain element and a connector in assembly.

FIG. 7 is a partial sectional view hrough the assembly taken along the section line 7—7 of FIG. 6.

FIG. 8 is a perspective view of a fastening pin.

FIG. 9 is a perspective view of another form of pintle.

FIG. 10 is a perspective view of another form of sleeve.

FIG. 11 is a side elevational view of a modified sleeve.

FIG. 12 is an end elevational view thereof.

FIGS. 13 and 14 are respectively side views of a modified pintle construction.

FIG. 15 is a perspective view of another type of sleeve.

FIG. 16 is a partial end elevation showing a chain assembly involving the sleeve of FIG. 15.

FIG. 17 is a partial perspective view of a modified double cheek chain element.

FIG. 18 is a perspective view of a pintle which may be used therewith.

FIG. 19 is a partial elevational view of a double cheek element and a connector element in assembly.

FIG. 20 is a perspective view of yet another form of pintle.

In FIG. 1 there is shown a chain element having a pair of spaced cheeks **10** and **11**. The block or socket portion of the chain element is partially shown at **12** and may have any configuration found desirable for mounting a cutter bit or cutter bit holder. The cheeks of the chain element are provided with perforations **13** and **14** through which the hinge pin or pintle may be passed. A connector element is shown at **15** in FIG. 2 as having perforations **16** and **17** which are larger than the perforations **13** and **14** and are adapted to hold sleeves or bushings **18** (FIG. 3). These sleeves have a length substantially equivalent to the width of the connector member **15**, and are insertable in the holes **16** and **17** of the connector member before the connector member is assembled with the structure of FIG. 1. The outer cheeks **10** and **11** of the chain element, of course, prevent endwise displacement of the sleeves or bushings in the assembled structure.

It is possible to employ a sleeve **18** having a cylindrical bore **19** together with a cylindrical pintle **20** (FIG. 4). In this event the perforations **14** in the outer cheeks of the block chain element can be circular as shown excepting for an outwardly extending groove **20***a* for the passage of a deformable fastening means or pin.

The pintle may have a pair of peripheral grooves **21** and **22** so located as to fall slightly inside the inner surfaces of the cheeks **10** and **11**. The sleeve **18** may be machined or counterbored as most clearly shown at **23** and **24** in FIG. 5. The inner curved surfaces of these counterbores constitute deforming means as hereinafter explained.

When the parts are in assembly as shown, if a deformable pin **25** (FIG. 8) is driven into the groove **20***a*, its end will be deflected inwardly by the surface of the counterbore **23** so as to enter the groove **22** in the pintle. A similar action will result at the other end of the pintle when a pin is driven in there, as will be evident from FIG. 7. In the resultant structure the deformed portions of the pins **25** serve to hold the pintle **20** against longitudinal movement with respect to the sleeve **18**, the sleeve, in turn, being held between the cheeks **10** and **11**. Thus, the pintle is effectively held against endwise movement with respect to the cheeks of the chain element.

Instead of employing a full round pintle, as illustrated in FIG. 4, a pintle 26 having a flat 27a may be employed, as in FIG. 9. In this instance the sleeve 27 may have a perforation 28 characterized by a flat 29, as shown in FIG. 10. Thus, the sleeve 27 will be non-rotatable with respect to the pintle 26. Likewise, one or both of the perforations 13 in the cheeks 10 and 11 may be characterized by a flat 30, so that the pintle becomes non-rotatable with respect to the cheeks. The perforation 13 will have an outwardly extending groove 31 to accept the deformable pin of FIG. 8. It is not necessary to counterbore the sleeve of FIG. 10. A milled surface indicated at 32 may be employed as the deflecting abutment. Neither is it necessary to groove the pintle peripherally, as illustrated in FIG. 4. Instead, the pintle may be provided with recesses indicated at 33 and 34 in FIG. 9. While these recesses and the milled surface 32 and the groove 31 have all been indicated as occurring on the flats of the respective parts, it will be evident that the several configurations could occur at any point on the peripheries of the parts since alignment is assured, the parts being non-rotative with respect to each other. The action which occurs when the pins 25 are driven in is that illustrated in FIG. 7, the deformed parts of the pins serving to fix the pintle against longitudinal motion with respect to the sleeve, the sleeve being retained between the cheeks.

Another form of structure is illustrated in FIGS. 11 to 14 inclusive. Here the pintle 35 is illustrated as having a flat 36. Centrally of the flat there is a ridge member 37 which may be narrower than the flat, its ends terminating short of the ends of the pintle so that the terminations lie slightly inwardly of the cheeks of the chain element. The ridge 37 normally will be half round in configuration, although other cross-sectional shapes may as easily be employed. The end portions of the ridge member are tapered as shown concavely so as to provide deflecting surfaces 38 and 39, which surfaces lie within the length of the sleeve next to be described. The ridge member is preferably confined within a projection of the cylindrical surface of the pintle 35.

The sleeve member 40 is cylindrical in outer configuration so that it may be accepted in the perforation 16 or 17 of the connector. It has a central perforation 41 characterized by a flat 42 coacting with the flat 36 of the pintle, and by an outwardly extending groove 43 to accept the ridge member 37 of the pintle. At the ends of the groove 43, the sleeve member is recessed inwardly as indicated at 44 and 45. It will be understood that the perforations in the cheek members of the chain element will have the same shape as the perforation 41 in the sleeve member so that the pintle will be held non-rotatively with respect to the chain element and the sleeve will be held non-rotatively with respect to the pintle.

The manner of use of the structures of FIGS. 11 to 14 inclusive will be clear from what has been described above. A pin will be driven inwardly through the groove in the perforation of the cheek of the chain element. The end of this pin will be deformed outwardly by the surface 38 and will be projected into the notch or recess 44 of the sleeve. The deformed end of this pin will lie behind the inner surface of the cheek element. A similar action will occur at the opposite end of the pintle, a deformable pin being deflected by the surface 39 into the notch or recess 45 of the sleeve.

Various modifications are possible in connection with the structure of FIGS. 11 to 14. It will be evident that if the deformable pin is driven into the structure through a groove in the cheek elements and engages in one of the notches 44 or 45, the deformed end of the pin will itself prevent rotation of the sleeve with respect to the cheeks of the chain element. At the same time the ridge 37 will prevent rotation of the pintle with respect to the sleeve. The pintle in the structures of FIGS. 11 to 14 is held from endwise withdrawal by the engagement of the deformed ends of the pins with the surfaces 38 and 39, the deformed ends of the pins also engaging, as has been pointed out, against the edges at least of the inner surfaces of the cheeks of the chain element.

A structure operating similarly to the structure described and claimed in the copending application of Cartlidge and Krekeler, Serial No. 569,461, filed March 5, 1956, now Patent No. 2,826,085, is illustrated at 10 and 11, and the connector element at 15. The pintle 46 has a flat provided with a ridge 47, and the sleeve 48 is provided with a central opening 49 characterized by a flat 50 and groove 51. The cheeks 10 and 11 are provided with similarly shaped openings. The ends of the ridge 47 are wedge shaped as shown. The sleeve is counterbored as at 52. When slit, pointed pins 53 and 54 are driven in from either side of the cheeks 10 and 11, as shown in FIG. 16, the ends of these pins are deflected outwardly within the counterbores 52 of the sleeve. Thus, the pins cannot be withdrawn through the grooves of the perforations of the cheek members; and they retain the pintle in place by engagement with the ends of the ridge 47.

Additional structures are shown in FIGS. 17 to 20 inclusive. Here the cheeks of the chain element are again indicated at 10 and 11. In one form of the structure a cylindrical pintle 55 (FIG. 18) is used and is provided with peripheral grooves 56 and 57. These peripheral grooves are located so close to the ends of the pintle that they will lie within the thickness of the cheeks 10 and 11, and these cheeks are perforated as at 58 to accept driven pins. The ends of the pins will enter the grooves 56 and 57 and be deflected thereby so that the pins cannot be withdrawn through the bores 58. The pins will hold the pintle 55 against endwise displacement. A sleeve 59 may readily be employed with the pintle 55. Furthermore, the pintle may be provided either with a flat or with an upstanding ridge, or both, so that the pintle will not rotate with respect to the cheeks 10 and 11. If the sleeve has a similarly shaped perforation engaging the pintle, the sleeve will be held against rotation with respect to the pintle.

In the event the parts are so held against rotation, alignment is assured and the grooves 56 and 57 need not then be complete peripheral grooves, but may be grooves of limited extend located at the point of use. By way of example, the pintle 60 of FIG. 20 may have a flat 61. Adjacent the end of the pintle there may be a milled groove 62. The sleeve 63 and the perforation 64 in the cheek members may be configured to accept the pintle with the flat. A deformable pin may be driven downwardly through a bore 65 in the cheek, which bore connects with the groove 62 in the pintle, the groove acting to deflect the end of the pin so that it cannot be withdrawn. The pintle will be retained against endwise movement with respect to the cheeks by the respective pins. The cheeks will also prevent rotation of the pintle with respect to the cheeks. The pintle will, in turn, prevent rotation of the sleeve with respect to itself.

In the structures of FIGS. 17 to 20, as well as in the structures of the other figures of this case, the pintle may be removed when desired by simply driving it out of the chain elements, the deformed portions of the pins being sheared off by this operation.

Modifications may be made in the invention without departing from the spirit of it. The invention having been described in certain exemplary embodiments, what is claimed as new and desired to be secured by Letters Patent is:

1. In a cutter chain, a first link element having spaced cheeks, a second link element having a single cheek adapted to be received between said spaced cheeks, a

pintle for hinging said elements together, said spaced cheeks having perforations to receive said pintle, a sleeve surrounding said pintle in the space between the cheeks of said first mentioned link element, said second mentioned link element having a perforation to receive said sleeve, and means to prevent endwise displacement of said pintle, said means comprising a deformable member adapted to be driven in from the outside of said cutter chain in a direction substantially parallel to the axis of said pintle through an opening wholly in a cheek of said first mentioned link element, one at least of said pintle and said sleeve providing a means for deforming an end of said deformable member as it is driven in, and one at least of said pintle and said sleeve having a recess to accept the deformed end of said deformable member.

2. The structure claimed in claim 1 wherein said pintle, said sleeve, and a perforation in a cheek of said first mentioned link movement have coacting non-circular configurations whereby said elements are rendered non-rotative with respect to each other.

3. In a cutter chain, a first link element having spaced cheeks, a second link element having a single cheek adapted to be received between said spaced cheeks, a pintle for hinging said elements together, said spaced cheeks having perforations to receive said pintle, a sleeve surrounding said pintle in the space between the cheeks of said first mentioned link element, said second mentioned link element having a perforation to receive said sleeve, and means to prevent endwise displacement of said pintle, said means comprising a deformable member adapted to be driven in from the outside of said cutter chain in a direction substantially parallel to the axis of said pintle through an opening wholly in a cheek of said first mentioned link element, one at least of said pintle and said sleeve providing a means for deforming an end of said deformable member as it is driven in, and one at least of said pintle and said sleeve having a recess to accept the deformed end of said deformable member, and wherein said sleeve has a configuration acting to turn the end of said deformable member inwardly toward the axis of the pintle and wherein said pintle has a recess for receiving the inturned end of said deformable member.

4. The structure claimed in claim 3 wherein said sleeve is counterbored at an end to provide a deforming surface and wherein said pintle has a groove to accept the deformed end of said deformable member.

5. The structure claimed in claim 3 wherein said pintle, said sleeve, and a perforation in a cheek of said first mentioned link element have non-circular configurations acting to hold said parts against relative rotation.

6. The structure claimed in claim 3 wherein said pintle has a flat, wherein a perforation in a cheek of said first mentioned link element is configured to coact with said flat to prevent rotation of the pintle therein, wherein said sleeve has a flat coacting with the flat of said pintle to prevent relative rotation of said sleeve and said pintle, wherein said cheek of said first mentioned link element has a groove extending outwardly from its perforation to

accept said deformable member, wherein said sleeve provides a deflecting surface at the inner end of said groove, and wherein said pintle has a recess positioned adjacent said deflecting surface.

7. The structure claimed in claim 1 in which said pintle has a flat and a ridge formed on said flat of lesser length than said pintle, wherein the perforation in said first mentioned link element has a flat coacting with the flat of said pintle to prevent rotation and a groove extending outwardly from said flat to pass said ridge, wherein the ends of said ridge on said pintle are shaped to deflect the said deformable member outwardly, wherein the said sleeve has a perforation shaped substantially to conform to the central periphery of said pintle whereby to prevent rotation and wherein said sleeve is recessed to accept the deflected portion of said deformable member in a position behind a portion of the said cheek of said first mentioned link element.

8. The structure claimed in claim 1 wherein said pintle has a flat with a ridge thereon shaped to deform an end of said deformable member, wherein a cheek of said first mentioned link element has a perforation with a corresponding flat and a groove extending outwardly from said flat to pass said ridge, wherein said sleeve has a perforation corresponding to the outer central periphery of said pintle, and wherein said sleeve has a recess formed therein to accept an end portion of said deformable member driven inwardly through said groove in said cheek in a position such that the deformed end of said member lies behind a portion of said cheek.

9. The structure claimed in claim 1 wherein said sleeve has a surface acting to deflect an end of said deformable member and said pintle has a recess to receive said deflected end.

10. The structure claimed in claim 1 wherein said deformable member acts to prevent endwise movement of said pintle with respect to said sleeve in one direction, said sleeve being engaged between the cheeks of said first mentioned link element.

11. The structure claimed in claim 1 wherein said pintle acts to deform an end of said deformable member into a recess formed in said sleeve.

12. The structure claimed in claim 1 wherein said deformable member fixes the longitudinal position of said pintle with respect to a cheek of said first mentioned link element and wherein said pintle is held against rotation with respect to said cheek and said sleeve is held against rotation with respect to said pintle by mating non-circular configurations on said parts.

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