April 1, 1947. L. E. SIMMONS 2,418,199

KERF CUTTING MEANS

Filed Oct. 2, 1943 3 Sheets-Sheet 1

Fig. 1.

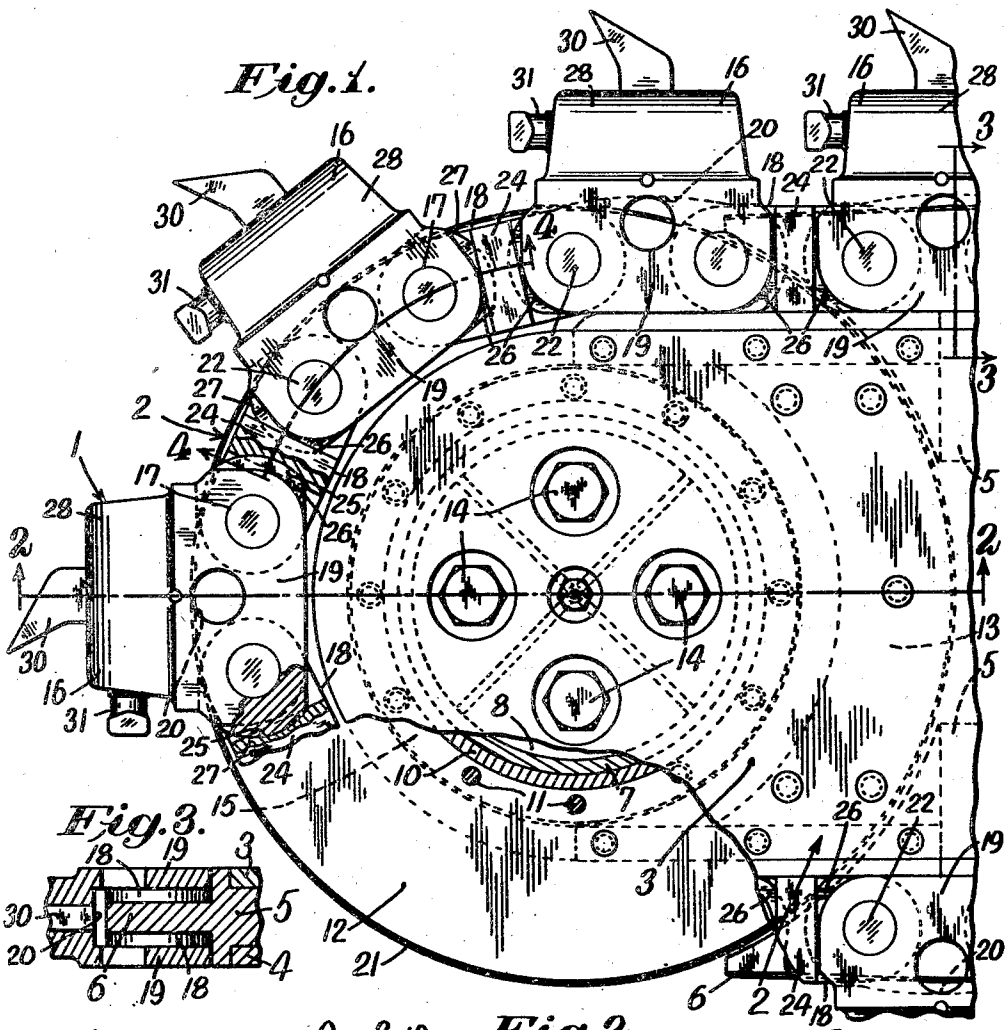


Fig. 3.

Fig. 2.

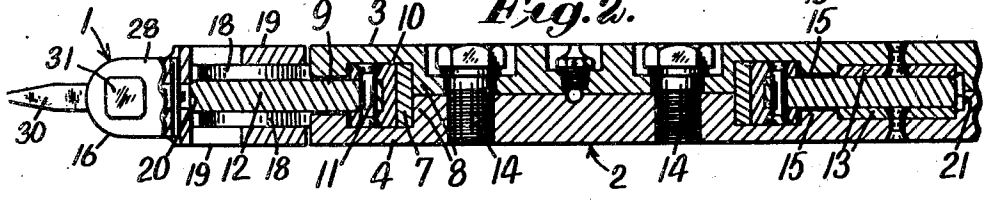
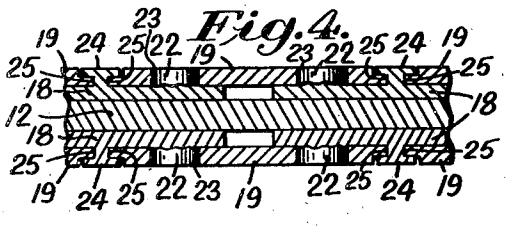


Fig. 4.



Inventor:
Leon E. Simmons.
by
Louis A. Marks,
Atty.

April 1, 1947. L. E. SIMMONS 2,418,199

KERF CUTTING MEANS

Filed Oct. 2, 1943 3 Sheets-Sheet 2

Fig. 5.

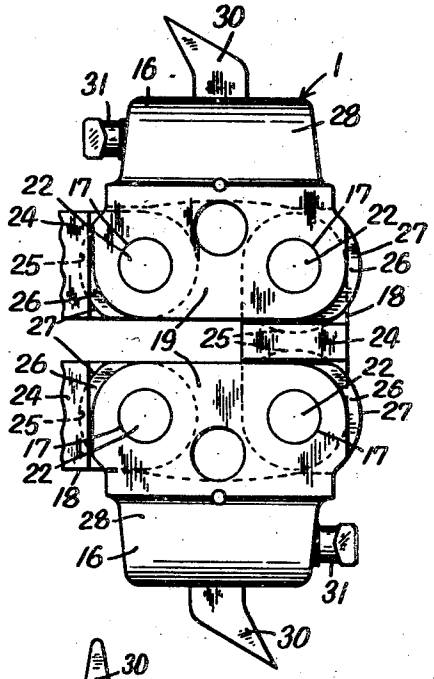


Fig. 6.

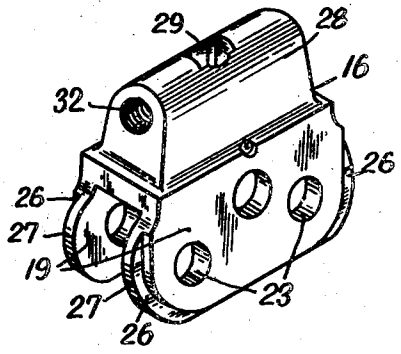


Fig. 7.

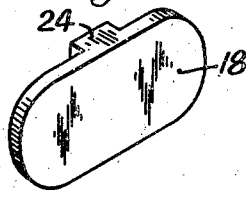


Fig. 8.

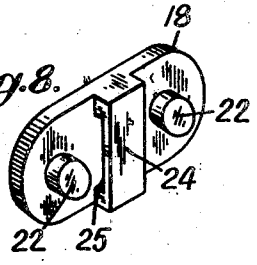


Fig. 9.

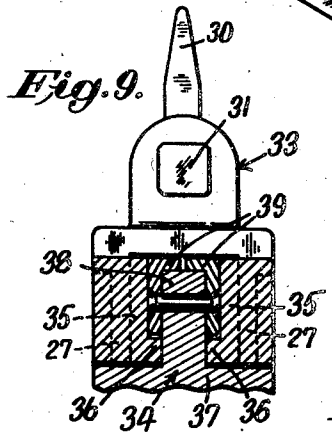
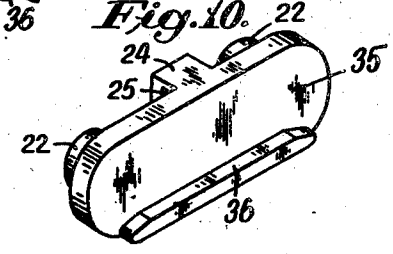


Fig. 10.



Inventor:
Leon E. Simmons.
by
Louis A. Maxson.
Atty.

April 1, 1947. L. E. SIMMONS 2,418,199

KERF CUTTING MEANS

Filed Oct. 2, 1943 3 Sheets-Sheet 3

Fig. 11.

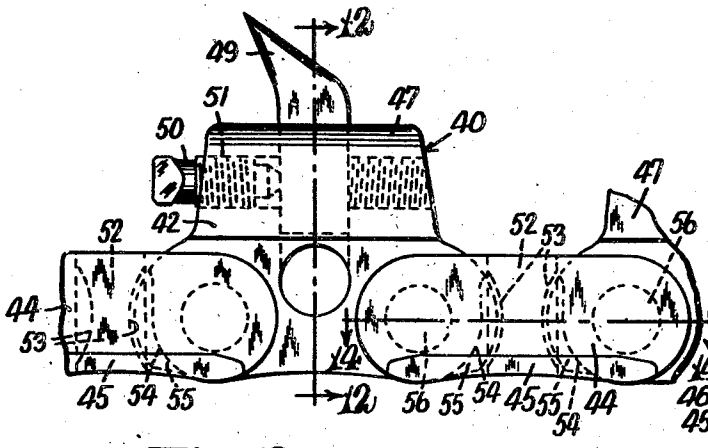


Fig. 12.

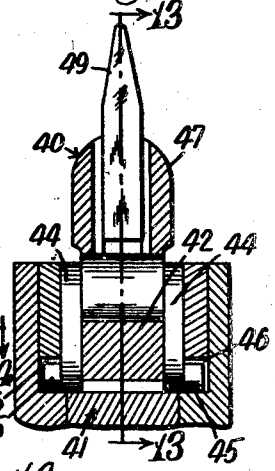


Fig. 13.

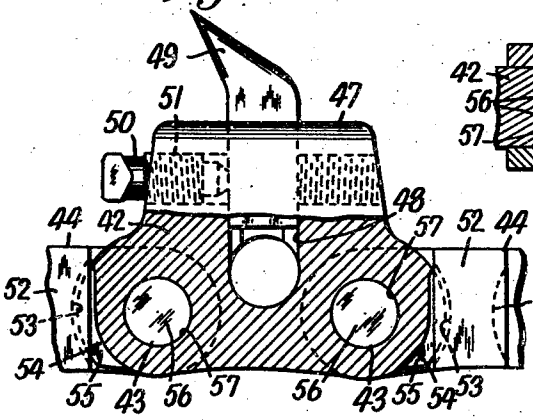


Fig. 14.

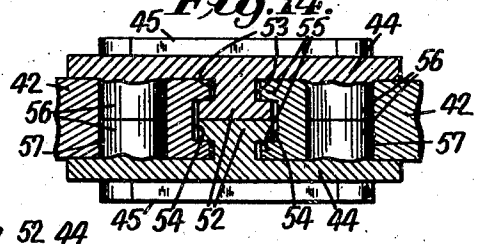


Fig. 16.

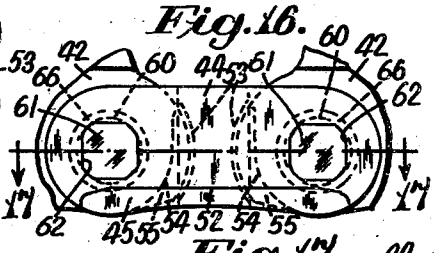


Fig. 15.

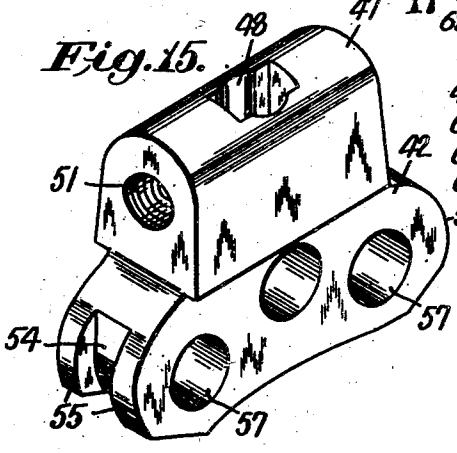
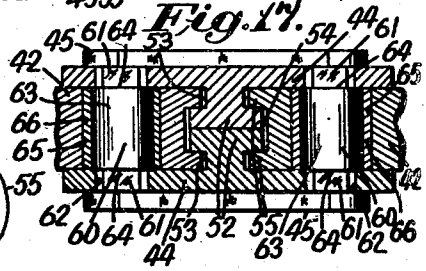


Fig. 17.



Inventor:
Leon E. Simmons.
by
Louis A. Mason.
Atty.

Patented Apr. 1, 1947 2,418,199

UNITED STATES PATENT OFFICE

2,418,199

KERF CUTTING MEANS

Leon E. Simmons, Claremont, N. H., assignor to Joy Manufacturing Company, a corporation of Pennsylvania

Application October 2, 1943, Serial No. 504,660

15 Claims. (Cl. 74—250)

1

This invention relates to kerf cutting means and more particularly to an improved mining machine cutter bar and cutter chain construction, especially designed for use in the cutting of coal.

An object of the present invention is to provide an improved kerf cutting means of a novel construction. Another object is to provide a cutter chain of an improved design. A further object is to provide an improved cutter bar having novel guiding means for the cutter chain. Yet another object is to provide an improved cutter chain having improved interlocking connections between the chain blocks and the strap links for holding the same in operative assembled relation. A further object is to provide an improved chain block and strap link structure for a cutter chain. Other objects and advantages of the invention will, however, hereinafter more fully appear.

The application is a continuation-in-part of my copending application Serial No. 472,281, filed January 13, 1943, now matured into Patent No. 2,404,540, patented July 23, 1946.

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

In these drawings:

Fig. 1 is a fragmentary plan view of a cutter bar and cutter chain constructed in accordance with an illustrative embodiment of the invention.

Fig. 2 is a view in central longitudinal vertical section taken substantially on line 2—2 of Fig. 1.

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

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

Fig. 5 is a detail plan view illustrating the manner of detaching the strap links from two adjacent chain blocks.

Fig. 6 is a perspective view of the improved chain block.

Figs. 7 and 8 are perspective views respectively of a pair of cooperating strap links.

Fig. 9 is a cross sectional view illustrating another embodiment of the invention.

Fig. 10 is a perspective view of one of the strap links shown in Fig. 9.

Fig. 11 is a side elevational view of a section of a cutter chain constructed in accordance with another form of the invention.

Fig. 12 is a cross sectional view taken substantially on line 12—12 of Fig. 11.

Fig. 13 is a view in longitudinal vertical section, with parts in elevation, taken substantially on line 13—13 of Fig. 12.

2

Fig. 14 is a transverse sectional view taken substantially on line 14—14 of Fig. 11.

Fig. 15 is an enlarged perspective view of the chain block shown in Fig. 11.

Fig. 16 is a detail side view illustrating still another form of the invention.

Fig. 17 is a horizontal sectional view taken on line 17—17 of Fig. 16.

In the illustrative form of the invention shown in Figs. 1 to 8 inclusive, the improved cutter chain generally designated 1, which is of the "outside running" type, is guided for circulation about the margin of a cutter bar generally designated 2 of an improved design. The cutter bar comprises top and bottom plates 3 and 4 suitably secured together and having fixed therebetween along the parallel sides thereof plates 5 each provided with a relatively narrow outer guiding flange 6. Arranged between the plates 3 and 4 and journaled on a bearing sleeve 7 supported by cooperating inwardly directed, circular portions 8 on the plates is a roller guide member 9. This roller guide has an annular hub portion 10 which surrounds the bearing sleeve and to which is secured by rivets 11 a relatively narrow radial flange portion 12. The peripheral portion of the flange portion 12 of the roller guide is of the same cross sectional contour as the outer flange portions 6 of the plates 5 so that the cutter chain, as it is guided about the margin of the cutter bar, may move along the parallel sides and around the curved end of the bar. Wear plates 13 are secured to the inner sides of the plates 3 and 4, as shown in Fig. 2, to provide lateral bearing surfaces for the inner portion of the roller guide. The circular portions 8 of the bar plates 3 and 4 are rigidly secured in abutting relation by screws 14 and the plates have inwardly directed annular portions 15 which surround the outer portion of the roller hub 10 in close adjacency to the opposite side surfaces of the roller.

The improved cutter chain 1 includes chain blocks 16 pivotally connected at 17 to strap links 18. The strap links are of the "gibless" type and engage at their inner sides the outer sides of the bar flanges 6 and the roller flange 12. The chain blocks have parallel side portions 19, 19 which straddle the strap links, and the blocks are formed with inner arcuate guide surfaces 20 engageable with the peripheral edge 21 of the guide roll as the chain passes around the curved end of the cutter bar. The strap links have outwardly directed trunnions 22 which project within transverse bores 23 in the parallel side portions 19, 19 of the chain blocks. The strap

links have outwardly directed, rectangular projections 24 midway between their ends and at their outer sides, which are arranged between adjacent chain blocks and which are arcuately notched or grooved at 25 at their opposite sides. The ends of the side portions 19, 19 of the chain blocks are cut away at 26 to provide relatively narrow arcuate flanges 27 which project within the slots 25 in the strap link projections in the manner clearly shown in Fig. 4, when the strap links and blocks are in operative assembled relation. When the chain blocks are swung into a predetermined relation, as shown in Fig. 5, the flanges 27 on the side portions of the chain blocks move out of interlocking relation with the projection-slots 25 so that the link trunnions 22 may be moved inwardly out of the block bores, thereby to enable ready detachment of the links from the blocks. Each chain block has a lateral lug 28 provided with a right angle socket 29 for receiving the shank of a conventional cutter bit 30. A set screw 31 threaded within an opening 32 at the forward side of the chain block lug engages the bit shank for holding the bit in cutting position on the block.

In the modified embodiment shown in Figs. 9 and 10, the improved cutter chain generally designated 33 is likewise of the so-called "outside running" type and is guided for circulation about the margin of a cutter bar generally designated 34. The chain blocks and strap links of the cutter chain are essentially the same as those described above and similarly have a releasable interlocking connection 25, 27 between the strap links and the blocks. In this modified construction the strap links are designated 35 and have inwardly directed gibs 36 receivable in the external guideways of the cutter bar. The cutter bar includes a bar member 37 having a relatively narrow marginal flange 38 to which suitable wear plates 39 are secured. These wear plates provide guiding surfaces for the cutter chain externally of the cutter bar. Otherwise this embodiment of the invention is similar to that above described.

In the modified embodiment shown in Figs. 11 to 15 inclusive, the improved cutter chain generally designated 40 is of the so-called "inside running" type and is guided for circulation about the margin of a cutter bar generally designated 41 (Fig. 12) of a conventional design. The cutter chain includes a series of chain blocks 42 pivotally connected at 43 to strap links 44. The strap links have lateral gibs 45 receivable in the internal cutter bar guideways 46 in a conventional manner. Each chain block has a lateral lug 47 provided with a right angle socket 48 for receiving the shank of a conventional cutter bit 49. A set screw 50 threaded within an opening 51 at the forward side of the chain block lug engages the bit shank for holding the bit in cutting position on the block. The strap links 44 have midway between their ends inwardly directed rectangular projections 52 arranged between adjacent chain blocks and these projections are arcuately slotted or notched at 53 at their opposite sides. The ends of the base portions of the chain blocks are centrally cut away at 54 to provide spaced arcuate side flanges 55 received in the projection-slots when the blocks and strap links are in assembled relation. The strap links have inwardly directed trunnions 56 received in transverse bores 57 in the chain block; and the interlocking connections provided by the flanges 55 and projection-slots 53 serve to hold the trunnions in position. As in the embodiment above described, the adjacent chain blocks may be swung into a predetermined relation relative to the connecting strap links to bring the flanges 55 out of interlocking relation with the projection-slots 53 to enable release of the strap links from the blocks. When the parts are thus positioned the trunnions 56 may be readily removed laterally from the lug bores 57.

In the form shown in Figs. 16 and 17, a modified pivot structure between the strap links and blocks is provided. The interlocking connections between the blocks and strap links are the same as those shown in Fig. 14. In this modified construction the inwardly directed trunnions on the strap links are omitted and in their places are provided separate hinge pins 60 formed with polygonal shaped reduced end portions 61 fitting in correspondingly shaped openings 62 in the strap links. The hinge pins have enlarged cylindric portions 63 intermediate the reduced end portions, and the portions 63 provide shoulders 64 engaging the inner surfaces of the strap links for precluding unintentional endwise displacement of the pins. Surrounding the portions 63 and fitted in bores 65 in the blocks are wear bushings 66. The polygonal portions 61 fitted in the polygonal openings in the strap links prevent rotation of the hinge pins with respect to the links. As in the embodiments above described, when the blocks are swung into a predetermined relation with respect to the strap links the interlocking connections between the blocks and links are released, thereby to enable lateral withdrawal of the links from the hinge pins. Otherwise this form of the invention is similar to those above described.

As a result of this invention, it will be noted that an improved kerf cutting means is provided having an improved cutter chain and cutter bar structure. It will further be noted that by the provision of the improved chain block and strap link structure having improved interlocking connections between the links and blocks the same are positively locked together when in operative assembled relation, and may be readily disassembled simply by swinging the chain blocks into a predetermined relation relative to the strap links. Also by the provision of the improved roller guide structure of the cutter bar, the cutter chain is guided about the outer curved end of the cutter bar in an improved manner. Other uses and advantages of the invention will be clearly apparent to those skilled in the art.

While there are in this application specifically described several 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 further 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 cutter chain, a series of chain blocks pivotally connected by strap links, said strap links having projecting trunnions received in transverse bores in the blocks, and means for detachably interlocking said blocks and strap links to hold said trunnions in said block bores comprising lateral projections on said strap links arranged between adjacent chain blocks between the lateral limits of the latter, said projections being arcuately slotted at their opposite sides, and said blocks having arcuate end flanges spaced

inwardly from their outer sides and received in the projection-slots.

2. In a cutter chain, a series of chain blocks pivotally connected by strap links, said strap links having outwardly projecting trunnions received in transverse bores in the blocks, and means for detachably interlocking said blocks and strap links to hold said trunnions in said block bores comprising outwardly directed lateral projections on said strap links arranged between adjacent chain blocks, said projections being arcuately slotted at their opposite sides, and said blocks having arcuate end flanges received in the projection-slots.

3. In a cutter chain, a series of chain blocks pivotally connected by strap links, said strap links having inwardly projecting trunnions received in transverse bores in the blocks, and means for detachably interlocking said blocks and strap links to hold said trunnions in said block bores comprising inwardly directed lateral projections on said strap links arranged between adjacent chain blocks, said projections being arcuately slotted at their opposite sides, and said blocks having arcuate end flanges received in the projection-slots.

4. In a cutter chain, a series of chain blocks pivotally connected by strap links, said chain blocks having parallel side portions between which said strap links project, said links having outwardly directed trunnions received in transverse bores in said side portions of said chain blocks, and means for interlocking said chain blocks and strap links to hold said trunnions in said bores comprising lateral projections on said strap links arranged between adjacent chain blocks, said projections being arcuately slotted at their opposite sides, and said chain blocks having arcuate end flanges received in the projection-slots.

5. In a cutter chain, a series of chain blocks pivotally connected by strap links, said strap links being disposed at the outer sides of said chain blocks, said links having inwardly directed trunnions received in transverse bores in the chain blocks, and means for interlocking said chain blocks and strap links to hold said trunnions in said bores comprising inwardly directed lateral projections on said links arranged between adjacent chain blocks, said projections being arcuately slotted at their opposite sides and the ends of said chain blocks being centrally cut away to provide relatively narrow side flanges received in the projection-slots.

6. In a cutter chain, a series of chain blocks pivotally connected by strap links, said blocks having plane inner surfaces and said strap links having projecting trunnions received in transverse bores in the blocks, and means for detachably interlocking said blocks and strap links to hold said trunnions in said block bores comprising lateral projections on said strap links arranged between adjacent chain blocks, said projections having straight parallel sides and being arcuately slotted at their opposite sides, and said blocks having arcuate end flanges received in said projection-slots, two adjacent blocks being swingable into a predetermined relation relative to their connecting strap links to move said arcuate flanges out of the projection-slots and to bring the plane surfaces of said blocks into parallelism with the straight sides of said projections thereby to enable release of the link trunnions from the block bores.

7. In a cutter chain, a series of chain blocks

pivotally connected by strap links disposed at the outer sides of the blocks, said strap links having inwardly directed trunnions received in transverse bores in the blocks, and means for interlocking said blocks and links together to hold said trunnions in said bores comprising inwardly directed projections on said links disposed in abutting relation and arranged between adjacent blocks, said projections being arcuately slotted at their opposite sides, and said chain blocks being centrally cut away to provide relatively narrow side flanges received in the projection-slots.

8. In a cutter chain, a series of chain blocks pivotally connected by strap links, and means for detachably securing said blocks and links in operative assembled relation including slotted projections on said links within the lateral limits of said blocks, and arcuate flanges on said blocks spaced inwardly of their outer sides and received in the projection-slots.

9. In a cutter chain, a series of chain blocks pivotally connected by strap links, said links having projecting trunnions received in transverse bores in the blocks, said blocks having parallel side portions located at the outer sides of said strap links for holding said links against lateral separation, and means for interlockingly connecting said blocks and links to hold said trunnions in said bores including slotted projections on said strap links and arcuate flanges on said blocks received in the projection-slots.

10. In a cutter chain, a series of chain blocks pivotally connected by strap links, said blocks having plane inner surfaces and said links having projecting trunnions received in transverse bores in the blocks, and means for interlockingly connecting said blocks and links to hold said trunnions in said bores including slotted projections on said strap links and arcuate flanges on said blocks received in the projection-slots, said projections having straight parallel sides and said blocks being swingable into a predetermined relation with respect to the links to bring the arcuate flanges out of the projection-slots and to bring said plane surfaces of the blocks into parallelism with the straight sides of said projections thereby to enable removal of the link trunnions from the block bores.

11. In a cutter chain, a series of chain blocks pivotally connected by strap links, said links being arranged at the outer sides of said blocks, and means for interlockingly connecting said blocks and links including overlapping interlocking portions on said blocks and links within the lateral limits of said blocks with said portions of said blocks spaced inwardly from their outer sides.

12. In a cutter chain, a series of chain blocks pivotally connected by strap links, said links being arranged at the outer sides of said blocks, and means for interlockingly connecting said blocks and links including overlapping interlocking portions on said blocks and links respectively adjacent the ends of said blocks and adjacent the longitudinal centers of said links, said blocks being swingable into a predetermined relation with respect to said links to move said overlapping portions out of interlocking relation.

13. In a cutter chain, a series of chain block elements pivotally connected by strap link elements, and hinge connections between said elements each including a hinge pin having a cylindric portion extending through an opening in one of said elements and having reduced polygonal shaped end portions fitted in correspondingly shaped openings in said other element.

14. In a cutter chain, a series of chain block elements pivotally connected by strap link elements, hinge connections between said elements each including a hinge pin having a cylindric portion extending through an opening in one of said elements and having reduced polygonal shaped end portions fitted in correspondingly shaped openings in said other element, and interlocking connections between said elements for holding said reduced end portions in their openings.

15. In a cutter chain, a series of chain blocks pivotally connected by strap links and each including a bit-supporting portion, and means for detachably securing said blocks and links in operative assembled relation including slotted projections on said links and arcuate flanges on said blocks received in the slots in said projections, said projections disposed between the lateral limits of said chain blocks, and said flanges and said slotted projections each having a surface thereon parallel to and coacting with an opposed surface on the other in holding said projections and flanges from separation, all of said surfaces disposed between the lateral limits of said chain blocks.

LEON E. SIMMONS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,204,344	Doberstein	June 11, 1940
2,214,644	Stenger et al.	Sept. 10, 1940
1,932,187	Radius	Oct. 24, 1933
2,304,505	Morrow	Dec. 8, 1942
1,808,236	Lerner	June 2, 1931
762,335	Morris	June 14, 1904
2,324,033	Simmons	July 13, 1943
1,023,549	Buttner et al.	Apr. 16, 1912
1,508,854	Nicholson	Sept. 16, 1924