Aug. 2, 1938. J. F. JOY 2,125,296

CUTTER CHAIN

Filed June 21, 1934

Fig. 1.

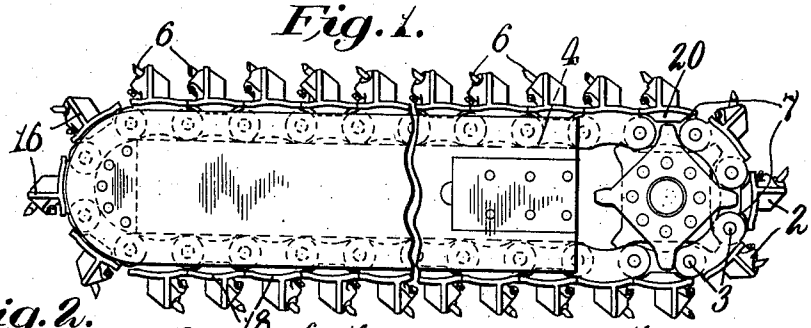


Fig. 2.

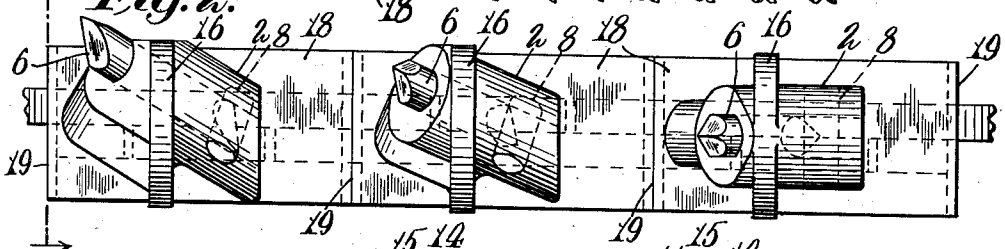


Fig. 3.

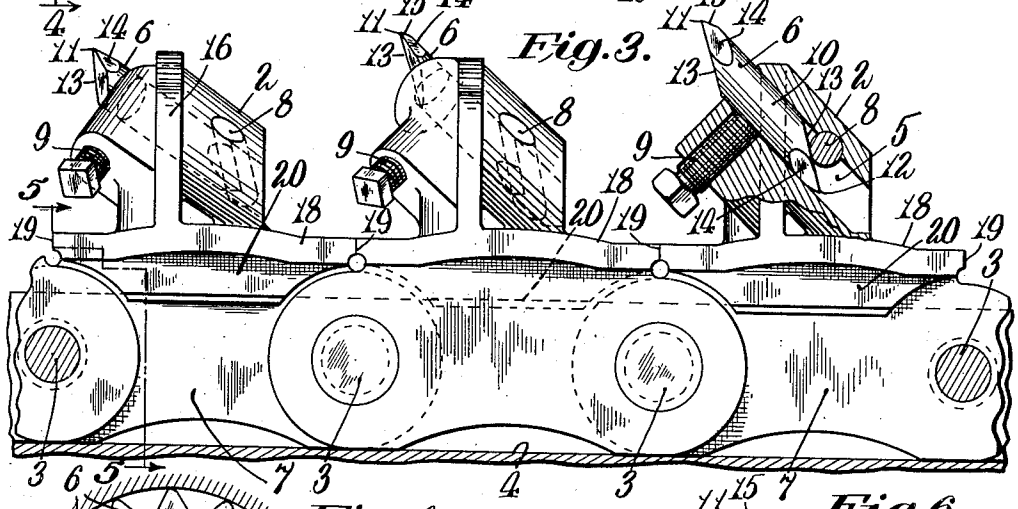


Fig. 4.

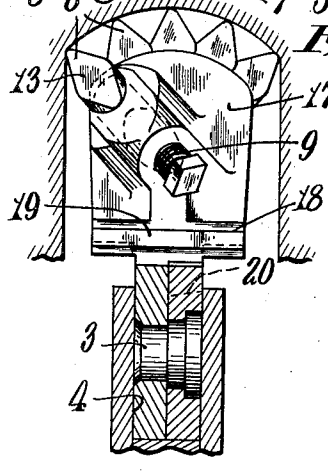


Fig. 5.

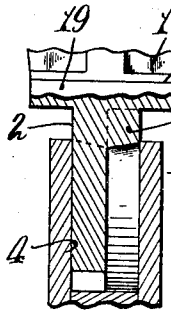


Fig. 6.

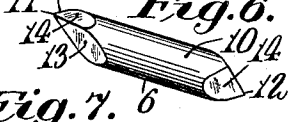


Fig. 7.

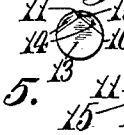
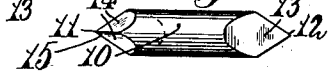


Fig. 8.



Inventor:
Joseph F. Joy.
by Louis A. Mason.
Atty.

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UNITED STATES PATENT OFFICE

2,125,296

CUTTER CHAIN

Joseph F. Joy, Claremont, N. H., assignor to Sullivan Machinery Company, a corporation of Massachusetts

Application June 21, 1934, Serial No. 731,712

17 Claims. (Cl. 262—33)

This invention relates to cutter chains adapted for kerf forming purposes and more particularly to improvements in the cutter bit mounting and cutter bit of a cutter chain for forming relatively narrow kerfs; and associated conveying means for clearing the cuttings from the kerf.

In kerf forming cutter chains and more particularly coal cutting chains for forming relatively narrow kerfs or slots in the coal vein, it has been found that there is a tendency for the cuttings, created by the cutter bits, to leave the path of travel of the cutter chain and pass out into the path in which the cutter bar moves, thereby binding the cutter bar in which the chain guides are embodied and causing considerable difficulty and undue resistance in moving the cutter bar through the kerf formed by the cutter chain. It has further been found that in such cutter chains the cutting points become dull with comparative rapidity.

An object of this invention is to provide an improved cutter chain adapted for kerf forming purposes. Another object is to provide an improved cutter chain having an improved mounting means for the cutter bits. Another object is to provide an improved means for quickly and conveniently attaching the cutter bits to a kerf forming chain, and particularly an improved bit attaching means for a coal cutting chain used in forming relatively narrow kerfs or slots. Another object is to provide improved means for locking the back of kerf cutting chains, particularly chains formed of single strand links. A further object is to provide an improved form of cutter bit. Still another object is to provide an improved cutter chain having associated therewith improved means for removing the cuttings from the kerf formed thereby. Yet another object is to provide an improved conveying means for conveying the cuttings created by the cutter bits from a kerf, thereby to overcome the tendency of the cuttings to leave the path of travel of the cutter chain and pass out into the space to which the cutter bar moves, and there bind the cutter bar in which the guides are embodied, causing difficulty and undue resistance as the cutter bar moves through the kerf. Still a further object is to provide an improved chain construction adapted to preclude access of cuttings to the guideways in which the chain moves. These and other objects 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 drawing—

Fig. 1 is a plan view of a cutter bar with which the illustrative form of the improved cutter chain is associated.

Fig. 2 is a side elevational view of a section of the improved cutter chain.

Fig. 3 is a plan view of the chain section shown in Fig. 2, with parts broken away in section to show structural details.

Fig. 4 is a detail sectional view taken substantially on line 4—4 of Fig. 2.

Fig. 5 is a detail sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is a perspective view of the improved cutter bit.

Fig. 7 is an end view of the cutter bit.

Fig. 8 is a top elevational view of the bit.

In this illustrative embodiment of the invention the improved cutter chain is shown associated with a plane cutter bar and is driven in a suitable manner by a suitable chain sprocket. As the cutter bar and the chain driving structure do not per se enter into this invention, description thereof is unnecessary other than to state that the cutter bar is provided with a marginal guideway within which the cutter chain travels.

Now referring to the improved cutter chain, it will be noted that the same comprises bit blocks or lugs 2 which are in the form of single strand links pivotally connected together by pivot pins or rivets 3. The guideway about the margin of the cutter bar is indicated at 4, and the adjacent ends of the bit lugs are arranged in direct overlapping relation and connected together by the pivot pins in the manner clearly shown in Fig. 4. The cutter chain comprises a single series of links with which the bit lugs are integrally formed, and is arranged with the ends of adjacent links in the overlapping contiguous relation above described and pivoted together to provide sprocket teeth receiving spaces between the adjacent ends of co-planar links. Each of the bit lugs is provided with a bit socket 5 for receiving a cutter bit 6 of an improved design. The cutter bit sockets are arranged with their axes forwardly inclined, and some have their axes in the central plane of the chain orbit, while others have their axes not only inclined forwardly but at different angles to the said central plane and at the opposite sides thereof to provide the necessary clearance when cutting a kerf or slot. By means of the particular arrangement of the strap links in overlapping contiguous relation so that alternate links are arranged in one plane and the

remaining links disposed in another plane, a simple construction is produced which is both thin and light in weight so that it may be economically produced to provide a means for cutting a very narrow slot involving the production of a minimum amount of fine coal and dust. It will further be noted that the adjacent ends of the co-planar links are spaced apart as at 7 to receive the teeth of the chain sprocket in the manner clearly described in my application above mentioned.

Now referring to the improved bit mounting and cutter bit, it will be noted that secured within the lug and traversing the bit socket 5 is a pin 8 with which the inner end of the bit engages, and that the bit is held in engagement with this pin by a screw 9 threaded within the lug and engageable with the bit. The cutter bit 6 is of an improved design and comprises a cylindrical body 10 having formed thereon at its opposite ends cutting points 11 and 12. This cutter bit is preferably formed of cylindrical bar stock cut diagonally to form parallel inclined cutting faces 13 at the opposite ends of the bit body. These would be elliptical in shape were it not that the sides of the points are slabbed off at 14, as by grinding, to form inclined surfaces intersecting the cutting faces, thereby providing a cutting point having a sharp receding edge at 15 extending in a direction longitudinal of the bit in the median plane of the latter. The slabbed off surfaces of the bit point are oppositely inclined and converge along the receding edge 15, thereby forming a cutting point of greatly increased strength. The cutting faces are approximately half-elliptical and half-triangular, the working end being at the apex of the triangle, and the base of the triangle coinciding with the line bisecting the ellipse, of which over half remains. Obviously the relative proportions of the parts of the face may be varied as desired. It will be noted that the bit comprises a body providing opposite cutting ends with parallel cutting faces extending obliquely relative to the length of the bit body at opposite ends of the latter, and that the cutting ends are further bounded by plane surfaces intersecting in a line lying in a plane perpendicular to and bisecting the cutting face, said line intersecting the cutting face at a point inside the space inclosed within the walls of the bit body extended. As previously mentioned, the bit sockets are relatively inclined in the bit lugs; that is, the bits are set within the lugs at various angles so as to locate the bits to cut away the entire face of the narrow kerf or slot.

The improved means for conveying the cuttings created by the cutter chain, from the kerf or slot, comprises fins 16 on each bit lug extending transversely of the latter and at right angles to the direction of travel of the cutter chain; and these fins provide cuttings-engaging surfaces 17 for conveying the cuttings from the kerfs. These fins project upward from shelf-like portions 18 at the base of the lugs and extend in planes along the top of the links proper, to prevent the cuttings from the bits from moving out of the path of travel of the chain. These shelves are provided with surfaces 19 which are adapted to abut corresponding surfaces on the adjacent lugs. The end abutting engagement between the adjacent chain blocks prevents backward buckling of the chain and provides solidity of the chain during cutting. It will further be noted that there is provided respectively on the opposite sides of successive links enlarged portions 20 which project inward within the chain slot in the bar in the manner shown in Fig. 5, to close the opening in the chain guideway which would be present at 7 between the adjacent links if the portions 20 were not present; and these portions substantially prevent access of the cuttings within the guideway. It will be noted that each link carries such a portion at its side which does not run in substantially full surface contact with the guiding wall of the slot or groove 4.

As a particular construction of the cutter chain is clearly described above, further description of the mode of operation is deemed unnecessary, other than to state that as the cutter bar is moved edgewise a narrow kerf or slot is cut by the cutter chain and the cuttings so formed are conveyed out of the kerf by the conveying means on the bit lugs. As will be noted in Fig. 3, the cutting faces, so to speak, of the bits which are not moving in the central plane of the chain orbit are faced in such a direction that the cuttings are directed towards the central plane of the kerf so that the fins 16 readily engage the cuttings and tend to sweep them out of the kerf. The portions 20 not only tend to minimize entry of cuttings into the slot (as do also the portions 18, of course), but also, if made of appropriate depth, may measurably guide the chain and cause the same to move more smoothly in its guideway; and by the provision of the end abutting engagement between the portions 18 of the chain blocks any tendency of the blocks buckling backwards is prevented. By the provision of the renewable bits the cutting points may be quickly and conveniently renewed. These and other advantages of the improved cutter chain 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 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 pivotally connected chain blocks each having a lateral lug carrying a cutter bit, and conveying means carried by the chain for conveying the cuttings created by the cutter bits and including shelf-like conveyor elements one integral with each chain block for preventing the cuttings moving inwardly, and transverse conveyor elements one integral with each chain block and projecting laterally from the lugs of the chain blocks, said transverse conveyor elements cooperating with said shelf-like conveyor elements in the conveying of the cuttings.

2. In a cutter chain, a series of pivotally connected chain blocks each having a single integral lateral lug carrying a cutter bit, and conveying means carried by the chain for conveying the cuttings created by the cutter bits including conveyor elements formed on each chain block, said conveyor elements formed integral with and projecting laterally from the lugs of the blocks and located on the blocks at the rear of the cutting portions of the cutter bits, and a shelf-like conveyor element on each block cooperating with similar conveyor elements on the

adjacent blocks in the conveying of the cuttings.

3. In a cutter chain, a series of pivotally connected chain blocks each having a lateral lug carrying a cutter bit, and conveying means carried by the chain for conveying the cuttings created by the cutter bits comprising transverse conveyor elements one integral with each chain block and projecting laterally from the lugs on the blocks, and cooperating shelf-like conveyor elements, one integral with each chain block and from which said first mentioned conveyor elements extend transversely, said shelf-like conveyor elements on said chain blocks having portions projecting forwardly and rearwardly with respect to said transverse conveyor elements, and said shelf-like conveyor elements on each block cooperating with the shelf-like elements on the adjacent blocks in the conveying of the cuttings.

4. In a cutter chain, a series of laterally staggered bit blocks pivotally connected together and adapted to travel in a guideway about the marginal edge of a cutter bar, and each carrying a cutting element, and enlarged portions on the bit blocks projecting inwardly into the bar guideway for filling the spaces between the bit blocks.

5. In a cutter chain, a series of laterally staggered bit blocks pivotally connected together and adapted to travel in a guideway about the marginal edge of a cutter bar, and each carrying a cutting element, and enlarged portions on the bit block projecting inwardly into the bar guideway for filling the spaces between the bit blocks and arranged alternately at opposite sides of different bit blocks.

6. In a cutter chain, a series of pivotally connected chain elements each having a single lateral lug, each lug having an obliquely extending socket opening through its front and rear faces for receiving a cutter bit, and lateral cuttings-conveying fins formed integral with each of said lugs on each chain element and projecting laterally from the sides of said lugs between the opposite lug faces.

7. In a cutter chain, a series of pivotally connected chain elements each having a single lateral lug formed with an obliquely extending socket opening through its opposite end faces and adapted to receive a cutter bit, longitudinally extending cuttings-conveying ledges of substantial width formed integral with the lug bases, one ledge integral with each chain element and the ledge on each chain element cooperating with the ledges on the adjacent chain element, and lateral cuttings-conveying fins formed integral with said lugs and ledges and projecting laterally from the sides of each of said lugs on each chain element between the opposite end lug faces.

8. In a cutter chain, a series of articulated chain blocks each having a lateral lug for receiving a cutter bit, shelves integral with said lugs for preventing inward movement of the cuttings created by the cutter bits, said shelves having end-abutting surfaces, and transverse cuttings-conveying fins integral with said lugs and shelves and the end surfaces on each shelf abutting the corresponding end surfaces on the adjacent shelves.

9. In a cutter chain, a series of laterally staggered bit blocks pivotally connected together and adapted to travel in a guideway about the marginal edge of a cutter bar, and each carrying a cutting element, and projecting portions on the bit blocks extending inwardly into the bar guideway for filling the spaces between the bit blocks.

10. In a cutter chain, a series of laterally staggered bit blocks pivotally connected together and adapted to travel in a guideway about the marginal edge of a cutter bar, and each carrying a cutting element, and projecting portions on the bit blocks extending inwardly into the bar guideway for filling the spaces between the bit blocks and arranged alternately at opposite sides of different bit blocks.

11. In a cutter chain, a series of pivotally connected chain blocks each carrying a cutter bit, and cuttings-conveying means carried by the chain for conveying the cuttings created by the cutter bits including shelf-like conveyor elements one integral with each chain block and having end abutting surfaces so that the shelf-like end surfaces of each conveyor element on each chain block abut the corresponding end surfaces on the next adjacent shelf-like elements, and cuttings-conveying fins cooperating with said shelf-like conveyor elements, one integral with each chain block, said fins extending at right angles to said shelf-like elements.

12. In a cutter chain, a single row of pivotally connected chain blocks each having a lug carrying a cutter bit, the lugs on different blocks angled laterally at different inclinations, and transverse cuttings-conveying fins projecting laterally in opposite directions from the lugs of different blocks, certain centrally located bit lugs having cuttings-conveying fins projecting laterally from their opposite sides.

13. In a cutter chain, a single row of pivotally connected chain blocks each having a lug carrying a cutter bit, the lugs on different blocks angled laterally at different inclinations, cuttings-conveying fins projecting laterally in opposite directions from the lugs of different blocks transversely of the latter, certain centrally located bit lugs having cuttings-conveying fins projecting laterally from their opposite sides, and shelf-like conveyor portions, one integral with each chain block longitudinally thereof and each having end surfaces abutting the corresponding end surfaces of the shelf-like portions of adjacent chain blocks, said shelf-like portions cooperating with said transverse cuttings-conveying fins to provide a cuttings-conveying means.

14. In a cutter chain, a single row of pivotally connected chain blocks each carrying a cutter bit, each chain block having an integral shelf-like conveyor portion having end surfaces abutting corresponding end surfaces on adjacent chain blocks, and cuttings-conveying fins integral with said chain blocks at right angles to said shelf-like portions and cooperating with said shelf-like portions in the conveying of the cuttings created by the cutter bits.

15. In a cutter chain, a series of articulated chain blocks each carrying a cutter bit, and cuttings conveying means carried by the chain for conveying the cuttings created by the cutter bits including on each block a longitudinally extending transverse conveyor element integral with the block and lying in planes parallel to a plane including the chain block pivot axes, said conveyor element being of a width substantially equal to the width of the block and having end abument surfaces so that the end surfaces of each conveyor element on each block abut the corresponding end abutment surfaces on the next adjacent conveyor elements.

16. In a cutter chain, a series of articulated chain blocks each having a lateral lug for carrying a cutter bit, and conveying means carried by the chain for conveying the cuttings created

by the cutter bits, including on each block a longitudinally extending transverse conveyor portion integral with the block and lying in planes parallel to a plane including the block pivot axes for preventing the cuttings moving inwardly with respect to the path of travel of the chain, and transverse conveyor portions integral with the block and projecting outwardly at right angles to said longitudinal conveyor portions and projecting laterally from the chain block lug, said right angle conveyor element portions cooperating with said longitudinal conveyor element portions in the conveying of the cuttings.

17. In a cutter chain, a series of articulated chain blocks each having a lateral lug for carrying a cutter bit, and conveying means carried by the chain for conveying the cuttings created by the cutter bits, including on each block a longitudinally extending transverse conveyor portion integral with the block and lying in planes parallel to a plane including the block pivot axes for preventing the cuttings moving inwardly with respect to the path of travel of the chain, and transverse conveyor portions integral with the block and projecting outwardly at right angles to said longitudinal conveyor portions and projecting laterally from the chain block lug, said right angle conveyor element portions cooperating with said longitudinal conveyor element portions in the conveying of the cuttings and said longitudinal conveyor element portions having end abutment surfaces so that the end surfaces of the longitudinal conveyor portions of each block abut the corresponding end surfaces of the next adjacent longitudinal conveyor portions.

JOSEPH F. JOY.

CERTIFICATE OF CORRECTION.

Patent No. 2,125,296. August 2, 1938.

JOSEPH F. JOY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, lines 65, 66 and 67, claim 8, strike out the words "and the end surfaces on each shelf abutting the corresponding end surfaces on the adjacent shelves" and insert the same after "surfaces" and before the comma in line 63, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of September, A. D. 1938.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.