Jan. 26, 1937. N. D. LEVIN 2,068,993

CUTTER CHAIN AND CUTTER BAR

Filed March 21, 1936

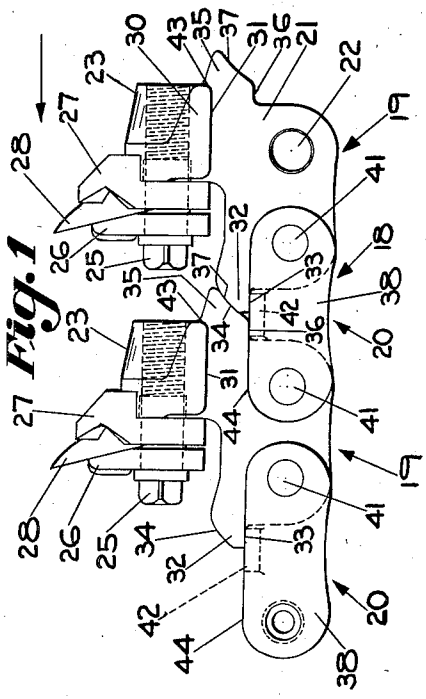

Fig. 1

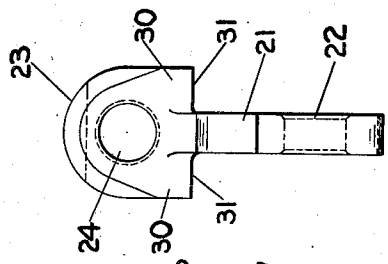

Fig. 4

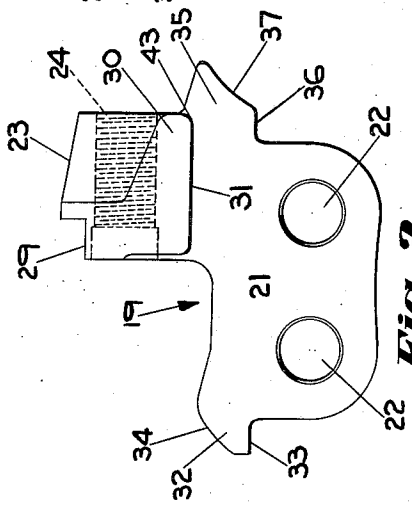

Fig. 3

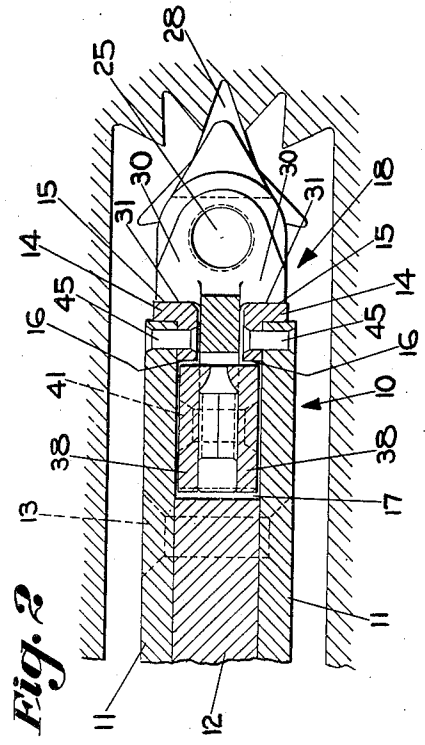

Fig. 2

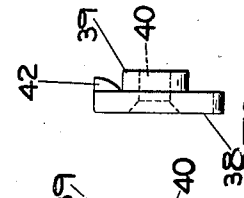

Fig. 6

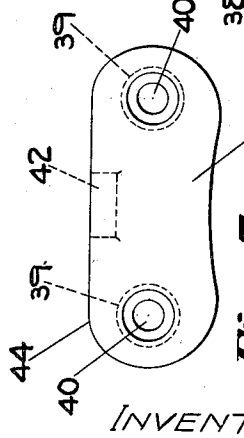

Fig. 5

INVENTOR:
NILS D. LEVIN,
BY
Chas. M. Nissen,
ATT'Y.

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CUTTER CHAIN AND CUTTER BAR

Nils D. Levin, Columbus, Ohio, assignor to The Jeffrey Manufacturing Company, a corporation of Ohio

Application March 21, 1936, Serial No. 70,035

14 Claims. (Cl. 262—33)

This invention relates to a cutter bar and cutter chain for a mining machine.

An object of the invention is to provide an improved type of stiff-back cutter chain adapted to cooperate with a cutter bar having wear strips; said cutter bar being constructed to prevent its clamping the wear strips during operation and tearing them from the cutter bar.

Another object of the invention is to provide an improved cutter chain of the stiff-back type with means to prevent tilting of the forward portion of the bit carrying links thereof.

Still another object of the invention is to provide an improved type of bit carrying link for a cutter chain.

Other objects of the invention wil appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawing,

Fig. 1 is an elevational view of a section of a cutter chain comprising my invention;

Fig. 2 is a transverse sectional view of the cutter bar and cutter chain comprising my invention;

Fig. 3 is an elevational view of a bit carrying link of a cutter chain comprising my invention;

Fig. 4 is a rear end view of the link of Fig. 3;

Fig. 5 is an elevational view of one strap of the connecting link of the cutter chain; and

Fig. 6 is an end view of the strap of Fig. 5.

This invention comprises an improvement on the cutter chain and cutter bar, as well as on the bit carrying link, disclosed in my application, Serial No. 729,522 filed June 7, 1934, for a Cutter chain and cutter bar.

The invention herein disclosed is designed to overcome certain undesirable characteristics which have been found to be possessed by the invention of the above mentioned application, which will be set forth in detail hereinafter.

Referring particularly to Figs. 1 and 2 of the drawing, there is seen a cutter bar 10 formed by top and bottom plates 11 between which is positioned a central plate 12, said plates 11 and 12 being rigidly attached together as by rivets 13. Adjacent the outer ends of the top and bottom plates 11 are L-shaped wear strips 14 which have outer bearing surfaces 15 along which shoulders of the cutter chain, as hereinafter described, are adapted to ride and having inner bearing ledges 16 adapted to retain the cutter chain on the cutter bar. It will be seen that the plates 11 and 12 along with the wear strips 14 provide a longitudinally extending recess 17 adapted to receive a cutter chain 18. The cutter chain 18 is formed by alternate interconnected bit carrying links 19, and connecting links 20.

The bit carrying links 19 are formed by a central web or body portion 21 provided with a pair of spaced apertures 22, one at each end. Extending upwardly from the web 21 and above the rear aperture 22 is a bit carrying lug 23 having a screw threaded aperture 24 adapted to receive a screw 25 which clamps a pair of clamp plates 26 and 27 between which is clamped a cutter bit 28. The lug 23 is provided with a shoulder or flat transverse seat 29 which cooperates with clamp plate 27 to determine the inclination of the bit 28. The bit 28 may be a star-shaped bit whereby a plurality of working faces are provided which may be successively brought into operative position. In accordance with well known practice, adjacent bits 28 on the cutter chain will be inclined at different angles and preferably formed as a spiral progressively along the cutter chain, thereby to cut a kerf which has a width slightly greater than the thickness of the cutter bar.

The lug 23 also provides a pair of laterally extending shoulders 30 having bottom bearing surfaces 31, said surfaces 31 being adapted to ride upon the outer bearing surfaces 15 of the wear strips 14. Extending forwardly from the web 21 there is an abutment 32 having a bottom bearing surface 33 and an arcuate top or upper bearing surface 34. Adjacent the rear end of the bit carrying link 19 there is provided an abutment 35 having a horizontal bottom bearing surface 36 and an arcuate bottom or lower bearing surface 37. The functions of these bearing surfaces 33, 34, 36 and 37 will be described in detail hereinafter.

Inter-connecting adjacent bit carrying links 19 are the connecting links 20 formed by a pair of side straps 38, each of which has an inwardly projecting integral lug 39 at each end thereof adapted to be received by an aperture 22 of a bit carrying link. The lugs 39 are provided with apertures 40 adapted to receive a rivet 41 to form a complete connecting link 20 and attach it for pivotal movement with respect to a bit carrying link 19. Also adjacent the top and midway between the lugs 39 each of said side straps 38 is provided with an inwardly extending abutment lug 42.

In the assembled cutter chain the bottom bearing surfaces 33 and 36 of the bit carrying links 19 are adapted to overlap and ride on the inwardly extending abutment lugs 42 of the connecting links 20. This construction would alone

provide a stiff-back type of chain. It has been found, however, if no further provision is made for a stiff-back type of chain of the general construction herein disclosed, that when in operation there is a tendency for the bit carrying link 19 to tilt about a fulcrum formed by the rear portions 43 of the laterally extending shoulders 30, which ride upon the bearing surfaces 15 of the wear strips 14. As a consequence of this tilting about the rear portions 43 as a fulcrum, the forward portion 44 of the connecting links 20 will be lifted to make contact with the inner bearing ledges 16 of the wear strips 14. It is thus evident that the wear strips 14 will be clamped between the portions 43 of the shoulders 30, and the portions 44 of the connecting links 20. This clamping or gripping action will be generally after the fashion of a clutch and will cause a very serious frictional rubbing between the clamping surfaces and may even result in the tearing of the wear strips 14 from the cutter bar to which they are normally held as by rivets 45. In order, therefore, to prolong the life of the wearing strips 14 as well as the life of the cutter chain and to avoid the tearing loose of the wearing strips 14, I provide the cooperating overlapping abutments 34 and 35 on adjacent bit carrying links 19. As clearly seen in Fig. 1 of the drawing, the abutment 32 has a top or upper bearing surface 34 adapted to be contacted by the bottom or lower bearing surface 37 on abutment 35 of the preceding bit carrying link. As a consequence, it would be impossible for any bit carrying link to tilt about the fulcrum formed by rear portions 43 of shoulders 30', thus the above mentioned clutching or clamping action is avoided. This is, of course, due to the fact that any tendency for the forward portion of a bit carrying link to pivot or tilt about the rear portions 43 of the shoulders 30 is effectively resisted by a downward force applied thereto by the preceding bit carrying link by virtue of the overlapping relation of the rear abutment 35 of a preceding bit carrying link with the forward abutment 32 of a following bit carrying link, the forces being transmitted through the bearing surfaces 34 and 37. As a consequence, I have provided a stiff-back type of chain which is entirely free to articulate in one direction, but which is prevented from articulating in an opposite direction; that is, the chain may freely form a concave curve, but not a convex curve.

Furthermore, the tilting of any individual bit carrying link, which, in cooperation with a connecting link might effect a clamping or grabbing action on a wear strip, is effectively eliminated.

It is also to be noted that the tilting action of any bit carrying link 19 about the portions 43 as a fulcrum is effectively resisted not only by all subsequent links which is characteristic of the stiff-back type of chain, but any tilting is also resisted by a preceding bit carrying link due to the contacting between abutments 32 and 35 along bearing surfaces 34 and 37.

Furthermore, should the bearing surfaces 31 become worn to allow the bottoms of links 19 and 20 to ride on plate 12 then the thrust on any bit carrying link 19 would be distributed over the bottom bearing area of all adjacent bit carrying links 19 and connecting links 20, by virtue of the abutment between bearing surfaces 33 and 36 and abutments 42. This would equalize, and thereby reduce, the wear on the bottoms of all links of the chain, both bit carrying and connecting links.

It is also to be noted that the outer surfaces of the side straps 38 forming the connecting links 20 have a large bearing area to slide along the interior surfaces of plates 11 adjacent recess 17, thereby to prevent excess wear on said links or cutter bar 10 due to any tendency for the chain to rotate or twist about a longitudinal axis thereof under the influence of bit 28. This influence is accentrated by those bits which extend at wide angles to the plane of the cutter bar 10 to cut the top and bottom portions of the kerf above and below the central portion thereof. This twisting may also be resisted by contact between a bearing surface 31 on shoulder 30 and a bearing surface 15 on one wear strip 14, and by contact between the top of one side strap 38 and an inner bearing ledge 16 on the other wear strip 14.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I therefore wish not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

1. A cutter chain comprising bit carrying links and connecting links, means for connecting said links, contacting abutment means carried by the two types of links providing a stiff-back chain, adjacent bit carrying links having overlapping normally contacting abutments.

2. A cutter chain comprising bit carrying links, means connecting said links, and overlapping normally contacting abutment means on adjacent bit carrying links.

3. A cutter chain comprising bit carrying links and connecting links, means connecting said links, contacting abutment means carried by said two types of links, and overlapping normally contacting abutment means on adjacent bit carrying links both of which contact said connecting link abutment means.

4. A cutter chain comprising bit carrying links and connecting links, means connecting said links, bits on said bit carrying links having a cutting edge requiring the chain to move in one direction, and abutment means on adjacent bit carrying links so constructed and arranged that the abutment on the forward end of a trailing bit carrying link is overlapped and normally contacted by an abutment on the rear end of a leading bit carrying link, both of said abutments abutting said connecting link.

5. A cutter chain comprising bit carrying links, means connecting said links, bits on said bit carrying links having a cutting edge requiring the chain to move in one direction, and abutment means on adjacent bit carrying links so constructed and arranged that the abutment on the forward end of a trailing bit carrying link is overlapped and normally engaged by an abutment on the rear end of a leading bit carrying link.

6. A cutter chain comprising interconnected bit carrying links and connecting links, abutment means on two bit carrying links contacting abutment means on an intermediate connecting link providing a stiff-back chain, said abutment means on said bit carrying links being in overlapping and normally engaging relation, with that on the foremost on top.

7. A cutter chain comprising interconnected bit carrying links and connecting links, abutment means on two bit carrying links contacting

abutment means on an intermediate connecting link providing a stiff-back chain, said abutment means on said bit carrying links being in overlapping and normally engaging relation.

8. A cutter chain comprising interconnected bit carrying links and connecting links, said bit carrying links having a central web positioned between spaced side straps of said connecting links, inwardly extending abutment means carried by the side straps of said connecting links, outwardly extending shoulders on said bit carrying links overhanging said connecting links, and overlapping normally engaging abutment means on said bit carrying links at least one of which abuts the abutments on said connecting links thereby providing a stiff-back chain.

9. A cutter chain comprising interconnected bit carrying links and connecting links, said bit carrying links having a central web positioned between spaced side straps of said connecting links, inwardly extending abutment means carried by the side straps of said connecting links, and overlapping normally engaging abutment means on said bit carrying links at least one of which abuts the abutments on said connecting links thereby providing a stiff-back chain.

10. A cutter chain comprising interconnected bit carrying links and connecting links, said bit carrying links having a central web positioned between spaced side straps of said connecting links, inwardly extending abutment means carried by the side straps of said connecting links, outwardly extending shoulders on said bit carrying links, and overlapping normally engaging abutment means on said bit carrying links at least one of which abuts the abutments on said connecting links thereby providing a stiff-back chain.

11. A bit carrying link for a mining machine cutter chain comprising a central web, a bit carrying lug extending therefrom, cutter bar engaging shoulders on said lug, and abutments extending forward and rearwardly of said web, said forward abutment having a top bearing surface and said rearward abutment having a bottom bearing surface.

12. A bit carrying link for a mining machine cutter chain comprising a central body, a bit carrying lug extending therefrom, cutter bar engaging shoulders on said body, and abutments extending forward and rearwardly of said body, said forward abutment having a top bearing surface and said rearward abutment having a bottom bearing surface.

13. A bit carrying link for a mining machine comprising a body, an abutment extending forwardly therefrom, an abutment extending rearwardly therefrom, said forward abutment having an upper bearing surface and said rear abutment having a lower bearing surface.

14. A bit carrying link for a mining machine comprising a body, an abutment extending forwardly therefrom, an abutment extending rearwardly therefrom, one of said abutments having an upwardly exposed bearing surface and the other a downwardly exposed bearing surface.

NILS D. LEVIN.