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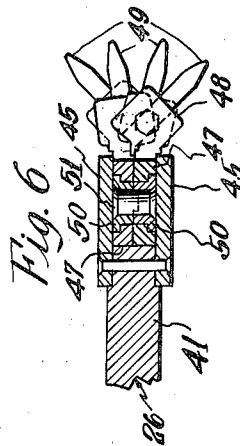
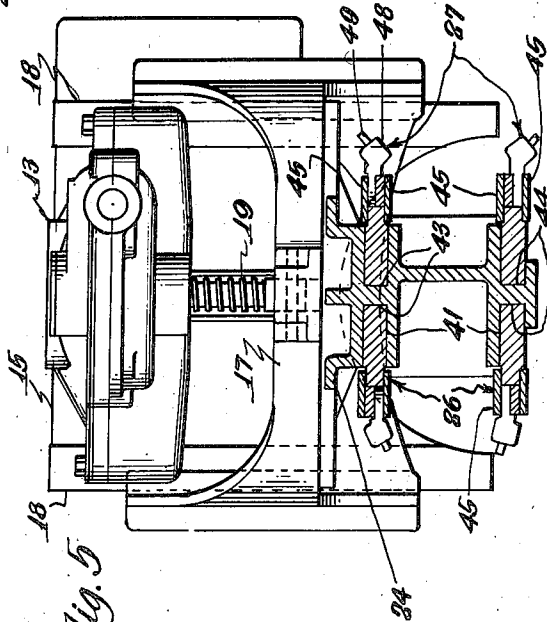
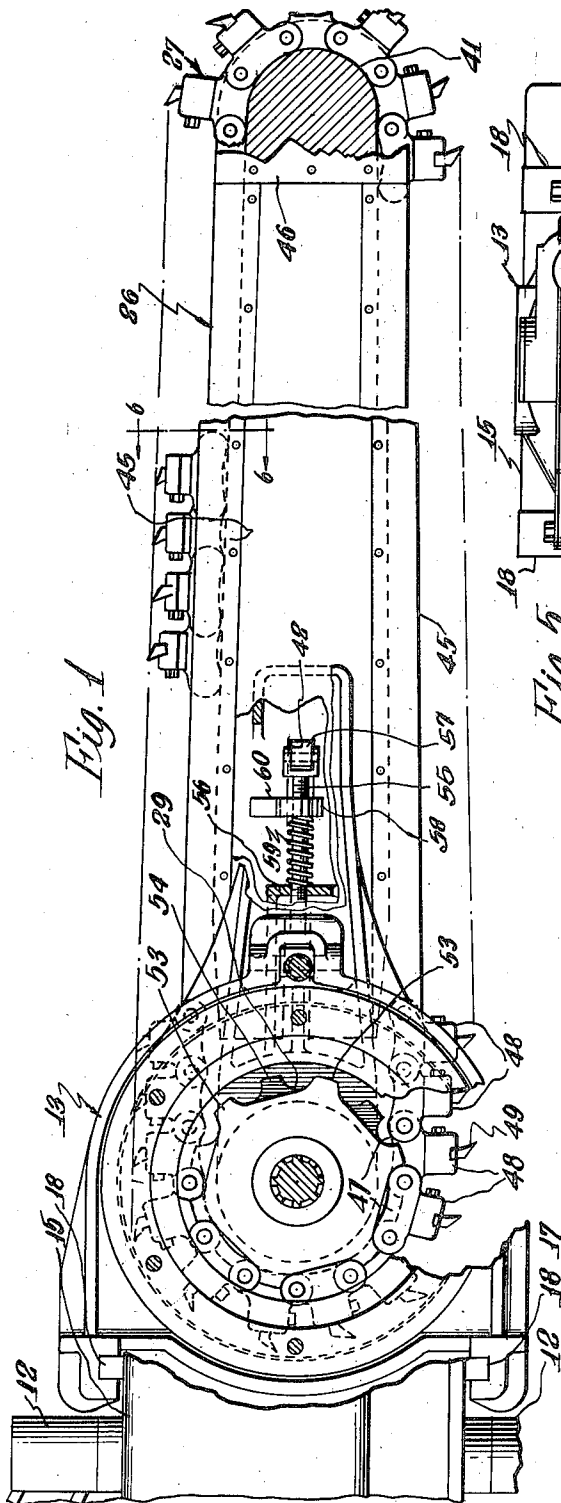
T. E. PRAY

2,068,070

MINING MACHINE

Filed Sept. 23, 1935

3 Sheets-Sheet 1



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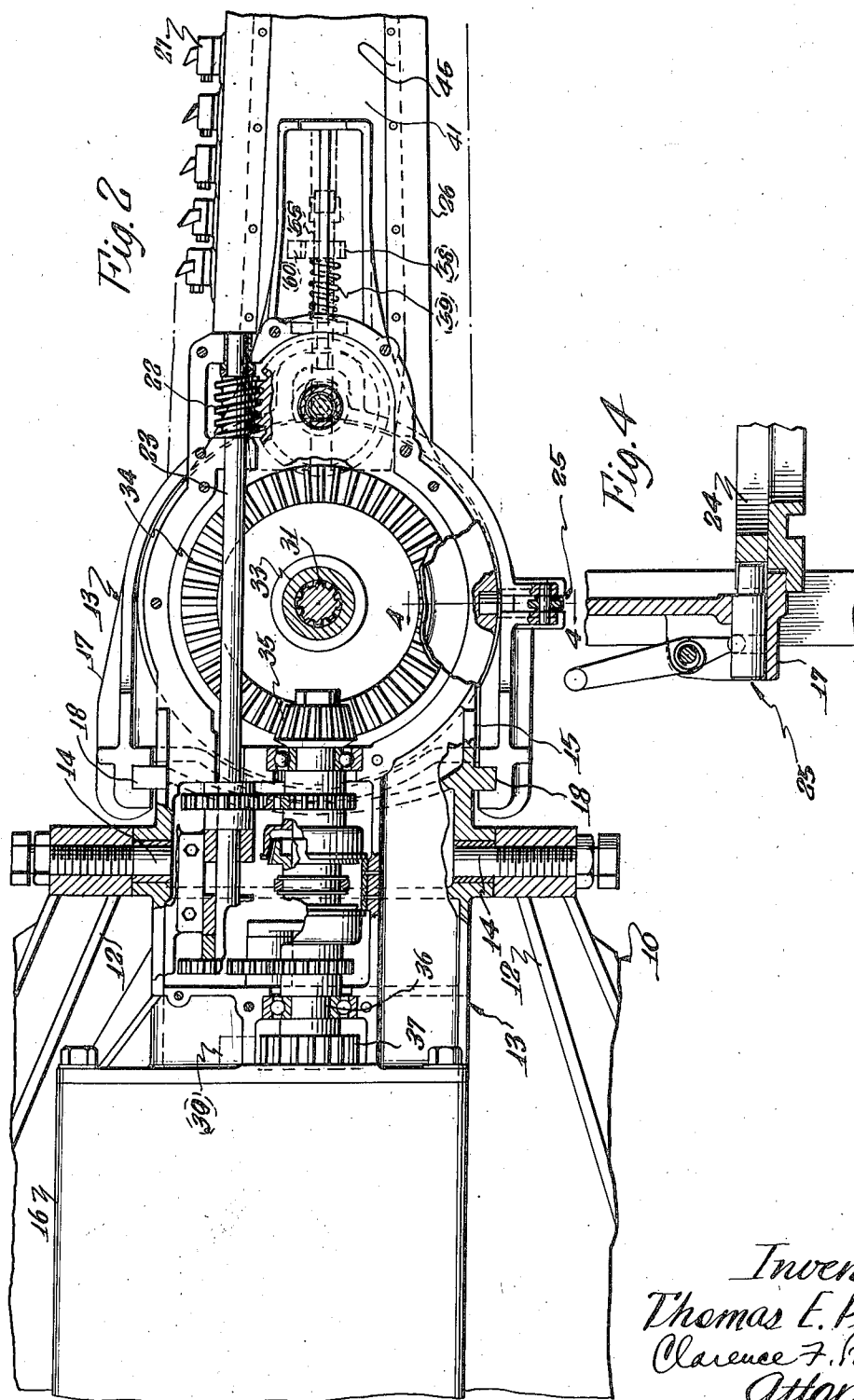
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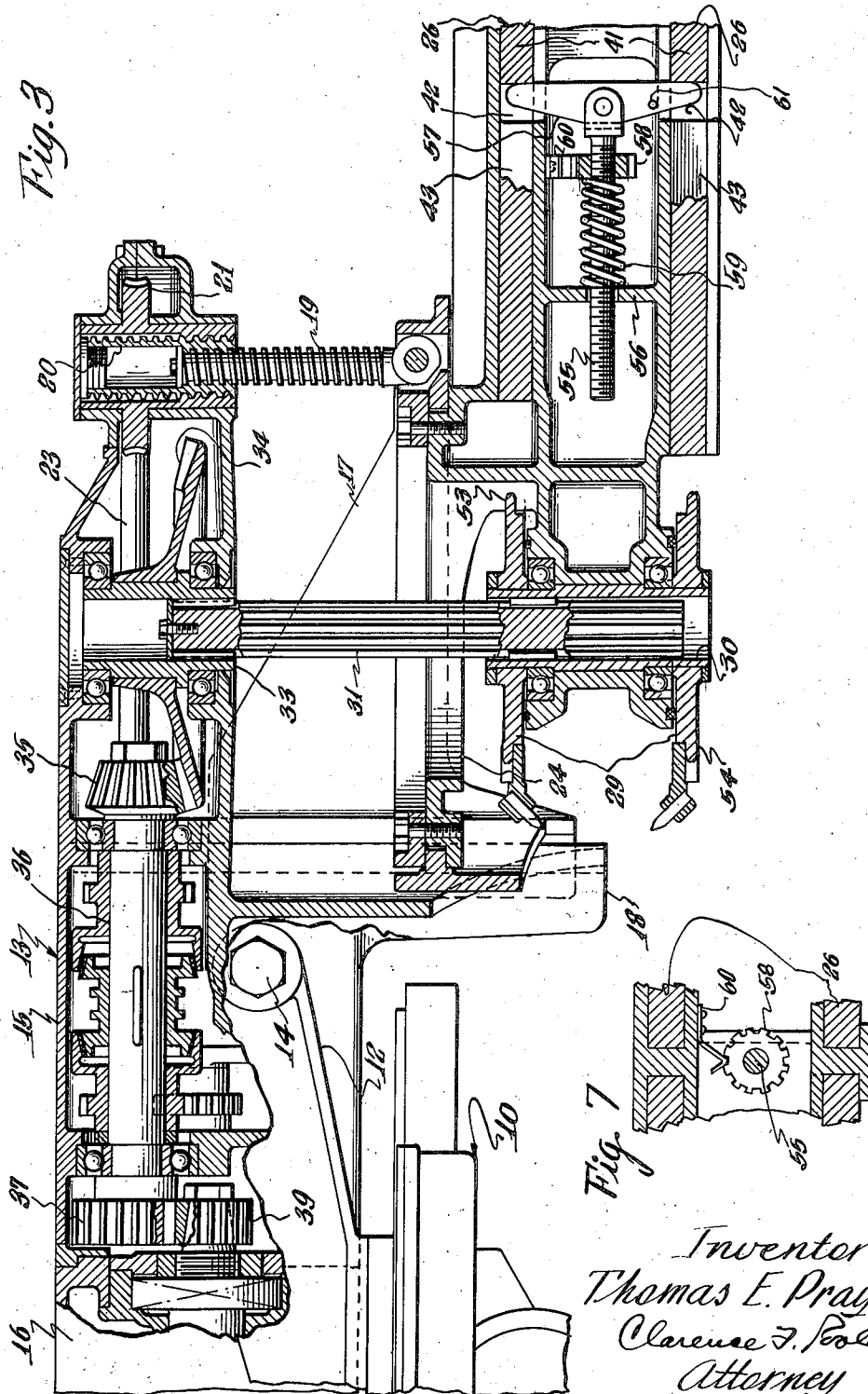
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,068,070

MINING MACHINE

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9 Claims. (Cl. 262—28)

This invention relates to improvements in mining machines and more particularly to an improved kerf cutting mechanism for a mining machine adapted to cut thin kerfs in the coal adjacent the top and the bottom of a dirt band in the coal face.

Dirt bands frequently occur in coal seams which are of a hard, bony substance and cannot be cut efficiently with the ordinary chain type mining machine. It has been the practice to cut one kerf in the coal face at the bottom of the dirt seam and another kerf at the top of the dirt seam and load this dirt band out by hand before breaking down the coal. It is, accordingly, desirable that the kerf cut in the coal seam be as thin as possible in order to keep down slack and avoid wastage of coal.

The cutter bars and cutter chains which have heretofore been utilized in cutting thin kerfs have usually been made without the usual gibs for holding the chain in the bar as it moves thereabout and are known as chains of the gibless type. The purpose of this construction has been to maintain a cross-section sufficient to withstand the heavy stresses imposed during cutting and still retain a minimum thickness of the bar and chain. As so constructed, the cutter chain frequently jumps the guides in the cutter bar, and when the cutter bar is adjusted an amount sufficient to prevent the chain jumping the guides when the machine is cold, the chain will frequently tighten to such an extent during running as to retard the efficiency of the machine and stall the drive motor at times.

My invention has as its general objects to obviate these difficulties and provide a new and improved cutting mechanism adapted to simultaneously cut kerfs of a minimum practical thickness adjacent the top and bottom of a dirt band in a coal seam. Another object of my invention is to provide a new and improved cutter bar and chain therefor for cutting such kerfs, together with a new and improved drive sprocket for the cutter chain. Another object of my invention is to so arrange the cutter bar that it may yield upon a predetermined tension in the chain and also maintain said chain at the proper degree of tautness during cutting. Still another object of my invention is to provide a plurality of parallel spaced cutter bars which will yield independently upon a predetermined tension of either of the cutter chains movable about said cutter bars.

Other objects of my invention will appear from

time to time as the following specification proceeds.

My invention may best be understood with reference to the accompanying drawings wherein:

Figure 1 is a fragmentary top plan view of the forward portion of one form of mining machine which may embody my invention with parts broken away and in section;

Figure 2 is a fragmentary plan view of the same type of mining machine shown in Figure 1, showing more or the mining machine than in Figure 1, and with parts broken away and in section to more clearly illustrate the drive to the cutting mechanism;

Figure 3 is a substantially longitudinal sectional view of the machine shown in Figure 2;

Figure 4 is a sectional view taken substantially along line 4—4 of Figure 2;

Figure 5 is a fragmentary front end view of the mining machine shown in Figures 1 and 2, with the cutting mechanism and support therefor shown in transverse vertical section;

Figure 6 is a partial fragmentary vertical sectional view taken through one of the cutter bars and cutter chains, illustrating certain details of construction of the cutter chain; and

Figure 7 is a detail view illustrating certain details of the locking means for the cutter bar adjusting mechanism.

Like reference characters refer to like parts throughout the various figures.

In the drawings the embodiment of my invention illustrated is shown as applied to a mining machine of the track-mounted type which is adapted to cut a kerf from the track in front of and to each side of the track. Said machine may be of an ordinary construction well known to those skilled in the art and, as herein shown, includes a track mounted truck, generally indicated by reference character 10, and not shown in detail since it is no part of my present invention. Said truck has a turntable (not shown) mounted thereon having a pair of trunnion support members 12, 12 extending forwardly therefrom. Said trunnion support members are adapted to form a transverse pivotal support for a cutting element, generally indicated by reference character 13, which is pivotally mounted thereon by means of pivotal pins 14, 14 in a usual manner.

The cutting element 13 includes generally a frame 15 projecting forwardly of the turntable and pivotally mounted on the pins 14, 14. Said frame has a motor 16 secured thereto and ex-

tending rearwardly therefrom for driving the operative parts of said cutting element. Said frame may have the cutting mechanism directly connected thereto, but as herein shown has a cutter frame 17 mounted for slidable movement with respect thereto in a pair of parallel-spaced guides, generally indicated by reference character 18, in a well-known manner. Said cutter frame is moved towards or away from the frame 15 by means of a threaded shaft 19 pivotally mounted in the forward end of said frame and threaded within a threaded sleeve 20. Said sleeve in turn is threaded within a threaded hub of a worm gear 21 which is journaled in the frame 15 adjacent the forward end thereof. Said worm gear is driven from a worm 22 on the forward end of a longitudinally extending shaft 23 which shaft is reversely driven from the motor 16 by means of suitable reverse gearing in a manner which will not herein be described since it is no portion of my present invention.

The cutter frame 17 is of an annular formation and has a cutter bar support member 24 mounted thereon for pivotal movement with respect thereto in a plane parallel to the cutting plane of the machine in a manner which will not herein be described in detail since it is no portion of my present invention. Said cutter bar support member may be locked in various fixed positions of adjustment with respect to said cutter frame by means of a pin and aperture lock, generally indicated by reference character 25, and illustrated in detail in Figure 4.

The cutter bar support frame forms a support means for a pair of parallel-spaced cutter bars 26, 26 in a manner which will hereinafter more clearly appear as this specification proceeds. Said cutter bars each have a cutter chain 27 movable thereabout in a closed orbital path. Said cutter chains are driven from coaxial parallel-spaced cutter chain drive sprockets 29, 29 which are mounted on a sleeve 30 journaled in said cutter bar support member on suitable ball bearings in a manner which is best shown in Figure 3.

The sleeve 30 is internally splined and is driven by means of a splined shaft 31 which shaft is driven from a splined hub 33 of a bevel gear 34. Said bevel gear, in turn, is driven from the motor 16 by means of a bevel pinion 35, longitudinal shaft 36 and spur gear 37 meshed with and driven by a motor pinion 39.

Referring now particularly to several of the novel features of my invention which include the details of the cutter bars 26, 26 and cutter chains 27, 27 movable thereabout; the novel arrangement of sprockets 29, 29 for driving said cutter chains about said cutter bars; and the yieldable supporting and adjusting means for said cutter bars and chains; each of said cutter bars, as herein shown, includes a relatively flat plate 41 having a forward end of an arcuate formation and having a slot 42 extending longitudinally along the central portion thereof for a portion of its length. The rearward portion of the plate 41 of the upper cutter bar is adapted to be slidably mounted in a pair of oppositely extending channeled guides 43, 43 formed in the forward projection of the cutter bar support member 24 and extending outwardly from the center of said support member as is best illustrated in Figures 3 and 5. The lower cutter bar is likewise slidably supported in oppositely extending channeled guides 44, 44 formed in the bottom portion of said cutter bar support member.

Suitable guide strips 45, 45 are secured to the top and bottom surfaces of the plate 41 and ex-

tend outwardly beyond the sides thereof and form a channeled guide along opposite sides of said plate. In a like manner, the forward end of said plate has a pair of oppositely disposed guide plates 46, 46 secured to the upper and lower surfaces thereof, which form a channeled guide around the forward end of said cutter bar which communicates with the guides formed by the guide strips 45, 45. Thus, a continuous gibless guide is formed along each side and the forward end of said cutter bar for guiding the cutter chain 27 thereabout.

The cutter chain 27, as herein shown, comprises a plurality of links 47, 47 pivotally connected together adjacent their ends and having bit receiving blocks 48, 48 extending therefrom. Said blocks form a support means for projecting cutter bits 49, 49 in a usual manner. As illustrated in Figure 3, it may be seen that the bits 49, 49 are disposed in varying angular relations with respect to each other so that certain bits extend outwardly beyond the upper and lower surfaces of the guide strips 45, 45 for cutting a kerf of greater thickness than said cutter chain and cutter bar.

As a novel feature of my invention, said cutter chain is shown as being so formed that the links 47, 47 are pivotally connected together in offset or staggered relation with respect to each other; that is, when the chain is arranged to cut in a horizontal plane, one link has two other links abutting its upper surface and pivotally connected to opposite ends thereof. Said links are pivotally connected together by means of suitable bushings 50, 50 and rivets 51, 51 extending therethrough in a suitable manner (see Figure 6). These adjoining links in a like manner have their under surfaces abutted by corresponding chain links.

Thus, the arrangement is such that a chain having bits disposed in various positions may be obtained with a minimum number of bit-carrying blocks. As herein shown, a chain having bits extending in four angular positions with respect to the cutter bar may be obtained with two blocks having bits disposed at varying angular relationships with respect to a plane extending through the center of said chain. These positions are obtained by arranging said blocks so that one block when in one position may have its bit extending angularly upwardly from the center of the chain and when inverted may have its bit extending angularly downwardly from the center of the chain.

With reference now in particular to the novel arrangement of the drive sprocket 29 for driving said cutter chain about said cutter bar, said sprocket as shown in Figures 1 and 3 includes a plurality of spaced upper teeth 53, 53 arranged alternately with spaced lower teeth 54, 54 (see Figure 1). Said upper teeth are adapted to engage the upper surface of the lower links 47, 47 and the ends of the upper links 47, 47, and said lower teeth are adapted to engage the lower surface of said upper links and the ends of said lower links. Thus, the cutter chain may be efficiently driven and the minimum dimensions of said cutter chain may be retained, without unduly decreasing the cross section of the chain, by eliminating the recesses within the links or blocks which are ordinarily provided for engagement with the teeth of the cutter chain drive sprocket.

The yieldable means for adjusting the tension of the cutter chains and relieving excessive tension of either of said chains during running of the machine, as herein shown, comprises a threaded member 55 extending through a bored

portion of a web 56 disposed between the supports for said cutter bars and extending transversely thereof, as is best shown in Figure 3. Said threaded member has a bifurcated forward end to which is pivoted an engaging member 57 intermediate its ends. Said engaging member is so arranged that its ends may extend within the slots 42, 42 of the cutter bars 26, 26 for engaging the forward extremity of said slots. A threaded adjusting collar 58 is threaded on the threaded shaft 55 and is abutted by a compression spring 59 encircling said threaded shaft and abutting the forward face of the web 56 and tending to react against said cutter chains for maintaining tension of said chains and relieving excessive tension thereof. Said threaded collar is provided with a plurality of notches in the outer face thereof adapted to be engaged by a suitable wrench for turning said collar and adjusting the tension of said cutter chains. Said notches are also adapted to be engaged by a spring locking member 60 of a usual construction for locking said collar from turning movement with respect to said threaded member. A pin 61 extends through the engaging member 57 beyond opposite sides thereof in the lower half thereof. Said pin rests on the upper surface of the lower cutter bar support member for positioning said engaging member to equally engage each of the cutter bars.

Thus, when the cutter chains have been adjusted to the required tension, and the tension of one or both chains increases beyond a certain predetermined value, said tension will be relieved by the compression spring 59 which reacts against said cutter chains. It will be seen that the arrangement is such that when the tension of one chain only is excessive, the bar associated with said chain will cause the engaging member 57 to pivot about its axis of pivotal connection to the threaded member 55 against the other bar and compress said spring and that when the tension of both of said cutter bars is excessive, they will both compress said spring through the engaging member 57 and threaded member 55.

While I have herein shown and described one form of my invention, I do not wish to be limited to the precise details of construction or arrangement of parts herein shown and described, excepting as specifically limited in the appended claims.

I claim as my invention:

1. In an apparatus of the class described, a cutter bar having guides formed in the outer periphery thereof, a cutter chain movable about said guides in a closed orbital path, a sprocket for driving said cutter chain about said cutter bar, a support member forming a means for supporting said cutter bar for longitudinal sliding movement, and means permitting said cutter bar to yield upon a predetermined tension on said cutter chain comprising a member guided in said support member for yieldable movement with respect thereto, and an engaging member pivotally connected to said member intermediate its ends, said engaging member being adapted to engage an abutment at one of its ends and said cutter bar at its opposite end.

2. In an apparatus of the class described, a cutter bar having guides formed in the outer periphery thereof, a cutter chain movable about said guides in a closed orbital path, a sprocket for driving said cutter chain about said cutter bar, a support member forming a means for

supporting said cutter bar for slidable movement with respect thereto, and means permitting said cutter bar to yield upon a predetermined tension on said cutter chain comprising a member guided in said support member for yieldable movement with respect thereto, an engaging member pivotally connected to said member intermediate its ends and engaging an abutment at one of its ends and said cutter bar at its opposite end, and a compression spring encircling said first-mentioned member and yieldably engaging an end of said engaging member with said cutter bar.

3. In an apparatus of the class described, a cutter bar having guides formed in the outer periphery thereof, a cutter chain movable about said guides in a closed orbital path, a sprocket for driving said cutter chain about said cutter bar, a support member forming a means for supporting said cutter bar for slidable movement with respect thereto, and means permitting said cutter bar to yield upon a predetermined tension on said cutter chain comprising a threaded member guided in said support member for yieldable movement with respect thereto, an engaging member pivotally connected to said threaded member intermediate its ends and engaging an abutment at one of its ends and said cutter bar at its opposite end, an adjusting collar threaded on said threaded member, and a compression spring encircling said first-mentioned member and yieldably engaging an end of said engaging member with said cutter bar.

4. In a mining machine of the class described, cutting mechanism therefor including a pair of parallel spaced cutter bars having a channeled guide formed along the outer periphery thereof, cutter chains movable about said guides in closed orbital paths, and a pair of sprockets for driving said cutter chains about said cutter bars, means for supporting said cutter bars for longitudinal slidable movement with respect to said sprockets comprising a support member, and yieldable means interposed between said support member and cutter bars for maintaining tension of said cutter chains independently of each other during the cutting operation and relieving excessive tension of either of said cutter chains.

5. In a mining machine of the class described, cutting mechanism therefor including a pair of parallel spaced cutter bars having a channeled guide formed along the outer periphery thereof, cutter chains movable about said guides in closed orbital paths, and a pair of sprockets for driving said cutter chains about said cutter bars, means for supporting said cutter bars for longitudinal slidable movement with respect to said sprockets comprising a support member, yieldable means interposed between said support member and cutter bars for maintaining tension of said cutter chains independently of each other during the cutting operation and relieving excessive tension of either of said cutter chains comprising a yieldable member, and means pivotally connected to said yieldable member intermediate its ends and engaging each of said cutter bars.

6. In a mining machine of the class described, cutting mechanism therefor including a pair of parallel spaced cutter bars having a channeled guide formed along the outer periphery thereof, cutter chains movable about said guides in closed orbital paths and a pair of sprockets for driving said cutter chains about said cutter bars, means for supporting said cutter bars for longitudinal slidable movement with respect to said sprockets

including a support member, and means interposed between said support member and cutter bars for independently maintaining tension of said cutter chains during the cutting operation and relieving excessive tension of either of said cutter chains comprising a member guided in said support member for yieldable movement with respect thereto, yieldable means interposed between said member and support member, and an engaging member pivotally connected to said last-named member intermediate its ends and having engagement with each of said cutter bars.

7. In a mining machine of the class described, cutting mechanism therefor including a pair of parallel spaced cutter bars, each of said cutter bars having a channeled guide formed along the outer periphery thereof and having a cutter chain movable thereabout in a closed orbital path, a pair of sprockets for driving said cutter chains about said cutter bars, means for supporting said cutter bars for independent longitudinal slidable movement with respect to said sprockets comprising a support member, and yieldable means interposed between said support member and cutter bars for independently maintaining tension of said cutter chains during the cutting operation and relieving excessive tension of either of said cutter chains comprising a member guided in said support member for yieldable movement with respect thereto, means pivotally connected to said member intermediate its ends and engaging each of said cutter bars, and a compression spring interposed between said member and said support frame.

8. In a mining machine of the class described, cutting mechanism therefor including a pair of parallel spaced cutter bars, each of said cutter bars having a channeled guide formed along the outer periphery thereof and having a cutter chain movable thereabout in closed orbital paths, a pair of sprockets for driving said cutter chains about said cutter bars, means for supporting said

cutter bars for slidable movement with respect thereto comprising a support member, and yieldable means interposed between said support member and cutter bars for independently maintaining tension of said cutter chains during the cutting operation and relieving excessive tension of either of said cutter chains comprising a threaded member guided in said support member for yieldable movement with respect thereto, a member pivotally connected to an end of said threaded member intermediate its ends and having engagement with said cutter bars adjacent its ends, and a compression spring encircling said threaded member and yieldably engaging the ends of said last-named member with said cutter bars.

9. In a mining machine of the class described, cutting mechanism therefor including a pair of parallel-spaced cutter bars, each of said cutter bars having a channeled guide formed along the outer periphery thereof and having a cutter chain movable thereabout in closed orbital paths, a pair of sprockets for driving said cutter chains about said cutter bars, means for supporting said cutter bars for slidable movement with respect thereto comprising a support member, and yieldable means interposed between said support member and cutter bars for independently maintaining tension of said cutter chains during the cutting operation and relieving excessive tension of either of said cutter chains comprising a threaded member guided in said support member for yieldable movement with respect thereto, a member pivotally connected to an end of said threaded member intermediate its ends and having engagement with said cutter bars at its ends, an adjusting collar threaded on said threaded member, and a compression spring encircling said threaded member and interposed between said support member and collar for yieldably engaging said last-named member with said cutter bars.

THOMAS E. PRAY.