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2,801,836

MECHANICAL MINER HAVING A COLLAPSIBLE MINING HEAD

Filed Sept. 20, 1954

4 Sheets-Sheet 1

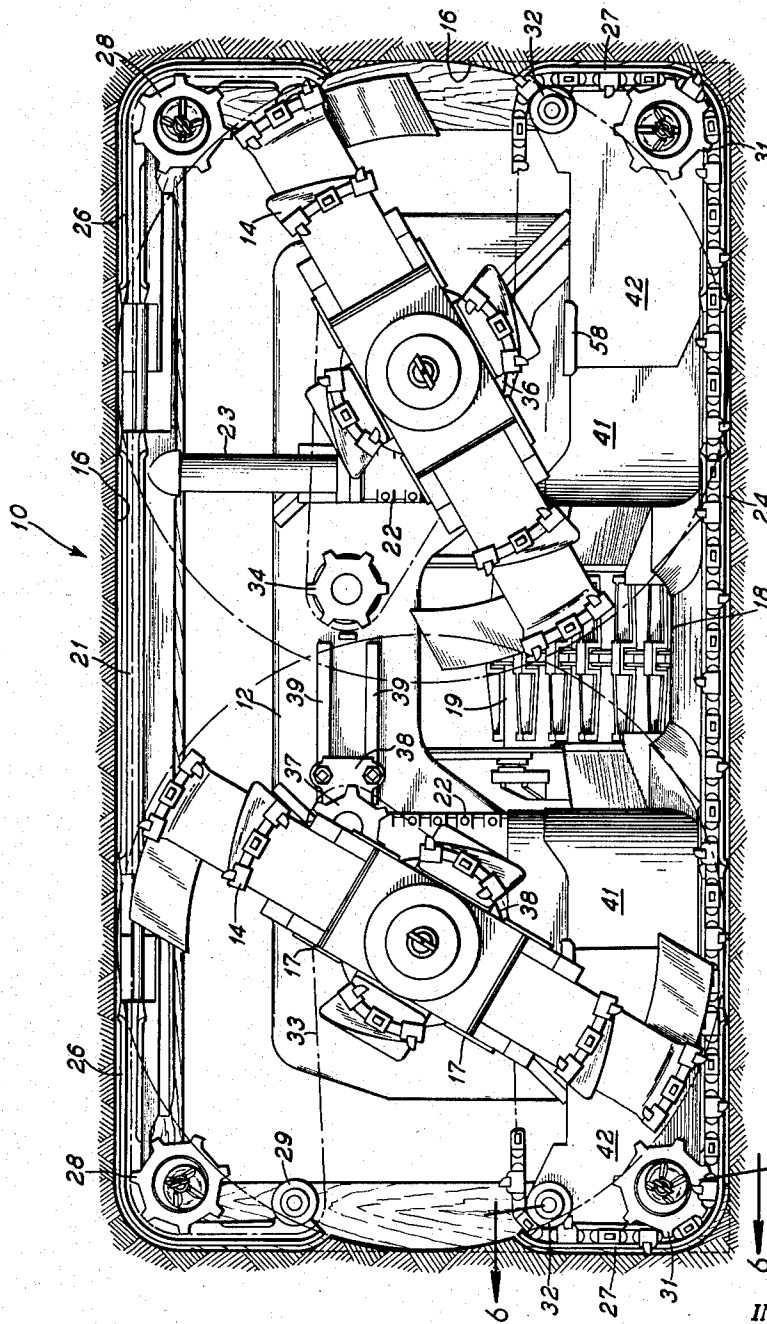


Fig. 1

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4 Sheets-Sheet 2

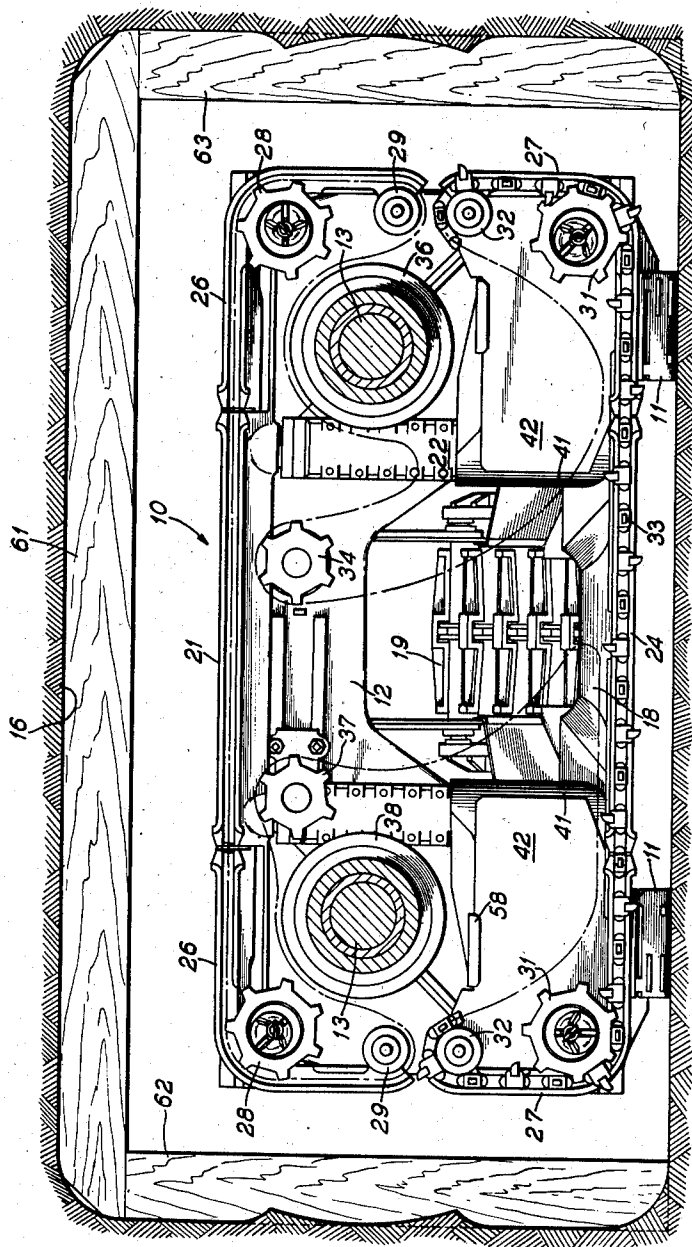


Fig. 2

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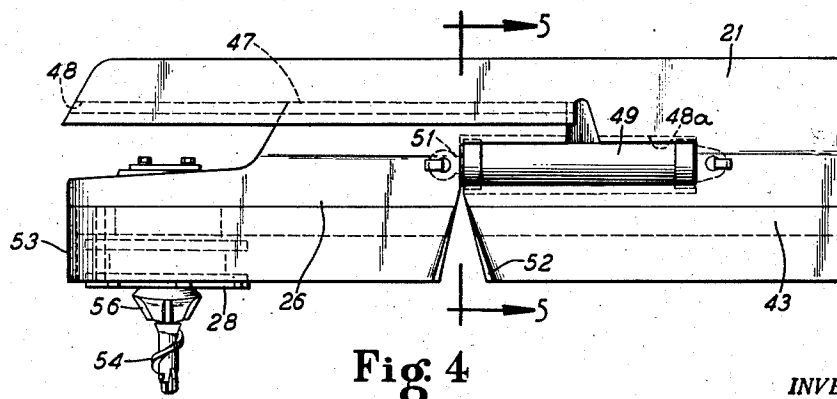
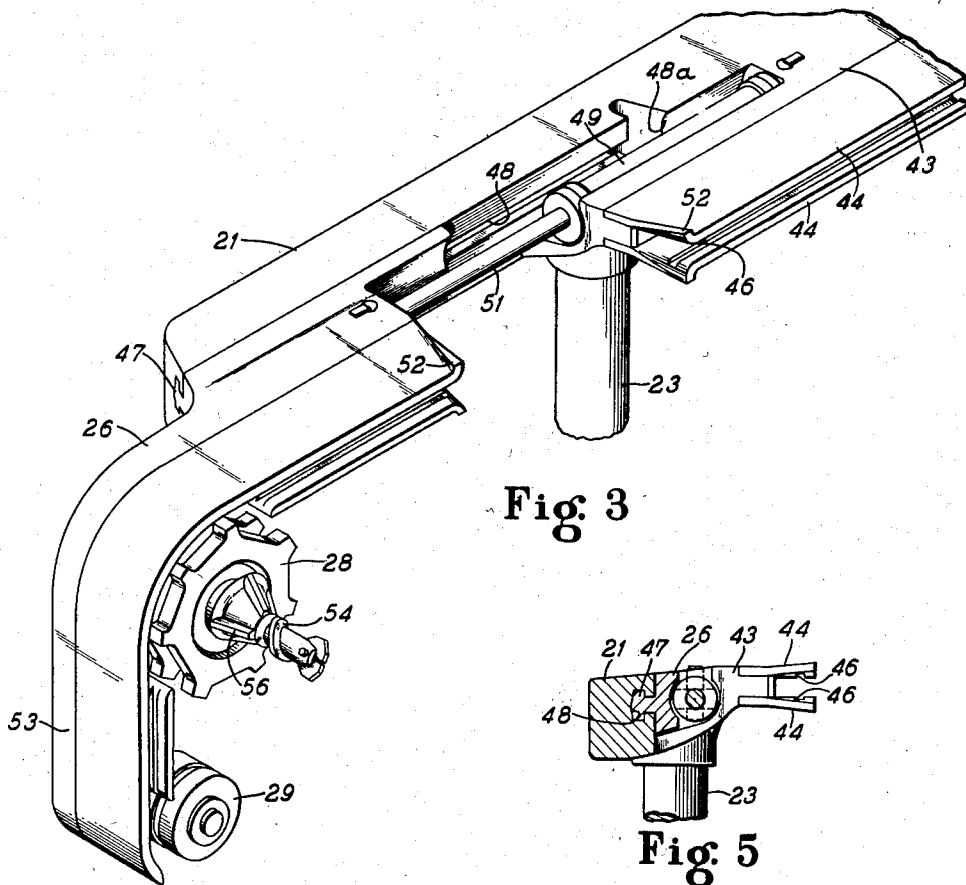


Fig. 4

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4 Sheets-Sheet 4

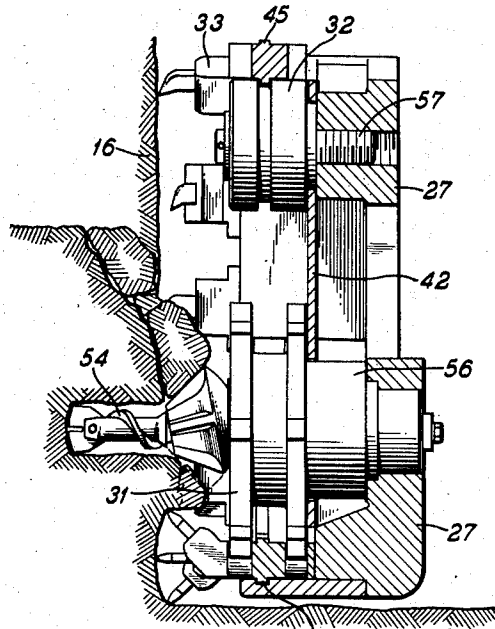


Fig. 6

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**MECHANICAL MINER HAVING A COLLAPSIBLE MINING HEAD**

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Application September 20, 1954, Serial No. 456,953

1 Claim. (Cl. 262—7)

This invention relates generally to mining machines of the type which cut contiguous bores in a seam of coal or the like, and more particularly to an improved machine of the general type whereby a substantially rectangular cross section may be cut in the seam.

In certain improved machines of the general type referred to, upper and lower cutter chains have been provided to cut the upper and lower cusps remaining from the action the boring arms, and in addition thereto, the ends of the guides for such chains have supported sprockets which move into position with the guides to augment the action of the boring arms.

The structure according to the present invention constitutes an improvement over that described in that the cutter chain guides are arranged to have a retractile movement in a lengthwise direction, while at the same time having their normal raising and lowering movement for retraction. The lower chain guides support main pusher plates movable laterally therewith, and also auxiliary pusher plates movable relative thereto, each such auxiliary pusher plate supporting an idler sprocket at the corner thereof in alignment with the guide, and an idler shoe disposed laterally of the guide, so that the cutter chain can, together with the operation of the boring arms, cut substantially a rectangular bore in the seam.

With the foregoing considerations in mind it is a principal object of the invention to provide an improved mining machine of the multi-bore type capable of cutting a rectangular bore in a seam of coal or the like.

Other objects and important features of the invention will be apparent from a study of the specification following, taken with the drawings, which together show a preferred embodiment of the invention and what is now considered to be the best mode of practicing the principles thereof. Other embodiments of the invention may be suggested to those having the benefit of the teachings herein, and it is therefore intended that the scope of the invention not be limited by the precise embodiment herein shown, such other embodiments being intended to be reserved especially as they fall within the purview of the claim subjoined.

In the drawings:

Fig. 1 is a front view of a preferred form of a boring type miner having the improvements according to the present invention embodied therein;

Fig. 2 is a view similar to Fig. 1, but showing the boring head of the mining machine in a retracted position to enable it to back out of a room which has been timbered;

Fig. 3 is a fragmentary perspective view of an upper chain guide for the cutter chain employed with the boring head of the mining machine shown in Figs. 1 and 2;

Fig. 4 is a plan view of the chain guide shown in Fig. 3, said view showing the guide in its retracted or telescoped position;

Fig. 5 is a sectional view taken along the line 5—5 of Fig. 4 looking in the direction of the arrows, and

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showing details of the arrangement whereby the chain guide may be retracted or telescoped; and

Fig. 6 is an enlarged detail sectional view, certain parts being shown in elevation, taken along the line 6—6 of Fig. 1 and looking in the direction of the arrows.

Referring now particularly to Figs. 1 and 2 of the drawings the improvements according to the present invention are embodied in a multi-bore type of miner indicated generally by the reference numeral 10. Such a mine includes a main frame, not shown arranged to be moved upon crawler treads 11 as seen in Fig. 2 and includes a drive housing 12 mounted upon such main frame. The drive housing 12 affords a support for a pair of rotating shafts 13 displaced from each other as seen in Fig. 2, each supporting a boring arm 14, the two boring arms being arranged to rotate in timed relationship with respect to each other so as to cut a pair of contiguous bores in a seam of coal 16 or the like.

The precise form of the boring arms forms no part of the present invention, but may be of the type as shown in an application, owned by the assignee of the present invention, of Frank Cartledge, Serial No. 431,454, filed May 21, 1954, for Improvements in Boring Head for Mining Machines, now Patent No. 2,750,176. The boring arms as disclosed in the aforesaid Cartledge application are arranged to be pivoted upon a pair of lines 17, 17 whereby the machine may be retracted from a room in which it operates.

The two boring arms 14 rotate in opposite directions in timed relationship to each other and their action is such as to dislodge material from the solid seam 16 and to direct the material into a throat 18 of the machine 10 whence the material is moved longitudinally of the machine by means of an endless conveyor 19.

The operation of the boring arms 14 is such as to leave behind a cusp depending from the roof of the seam 16 and a lower cusp extending upward from the mine floor. In order to remove such cusps, the machines of the prior art have been provided with upper and lower chain guides for an orbitally movable cutter chain which moves in a plane immediately to the rear of the plane of the boring arms.

The machine according to the present invention is provided with an upper chain guide 21 which is raised and lowered in a vertical plane by means of spaced lifting cylinders 22 mounted on the front wall of the drive housing 12, and having extending therefrom piston rods 23 which are connected to the underside of the chain guide 21.

As seen in Fig. 2, the machine 10 is also provided with a lower chain guide 24 which is raised in position from the mine floor by means of cylinders similar in construction to cylinders 22, and not shown in these views.

According to the present invention, and in order to effect a larger amount of retractile movement of the cutter chain guides and the corner sprockets for ready removability of the machine from the seam after it has been timbered, the upper and lower chain guides are each provided with extensions or auxiliary guides each capable of telescoping with respect to the main cutter chain guide.

The upper chain guide 21 has an extension or auxiliary guide 26 at each end thereof, while the lower chain guide 24 has a similar extension or auxiliary guide 27 at each end thereof. Each auxiliary guide 26 supports an idler sprocket 28 near the end thereof, and an idler shoe 29 disposed laterally of the auxiliary guide 26 and in the same plane with the sprocket 28. The lower auxiliary chain guide 27 also affords a support for an idler sprocket 31 and an idler shoe 32 disposed laterally of the auxiliary chain guide 27.

As seen in Figs. 1 and 2 the upper chain guide 21 and its auxiliary guides 26 together with the sprockets 28 and

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idler shoes 29, and the lower guide chain 24 together with its auxiliary chain guides 27 and the idler sprockets 31 and the idler shoes 32 affords a means of guiding an endless cutter chain 33. Such a cutter chain is driven by a sprocket 34 extending from the forward wall of the drive housing 12, and the chain is additionally guided about a hub 36 for the right hand boring arm 14, and also about an idler sprocket 37 and a similar hub 38 on the other boring arm 14.

As seen in Fig. 1 the idler sprocket 37 is mounted upon a support 38 which is shiftable into position upon a pair of spaced rails 39, so that the tension in the cutter chain 33 may be suitably adjusted as desired.

The lower chain guide 24 has movable therewith a pair of pusher plates 41, each of which is disposed to one side of the throat 18. The auxiliary lower chain guide 27 also carries therewith an auxiliary pusher plate 42 and movable with respect to pusher plate 41 upon conditions as will be described as this specification proceeds.

Referring now to Figs. 3 to 5 of the drawings, details of the upper chain guide 21 and the auxiliary chain guide 26 will now be described. Each guide includes an essentially U-shaped guide 43, the open throat of the U extending in a horizontal plane and the upper and lower limbs 44 of the U each having a guide 46 on the inner face thereof for guiding lugs 45 on the cutter chain 33, see also Fig. 6, so as to prevent same from falling out of the guide 43.

The auxiliary guide 26 is movable lengthwise with respect to the main guide 21, and is held thereto for sliding movement in a direction lengthwise of the guide 21 by means of a T-shaped rail 47 extending from the back edge of the auxiliary guide 26 and riding in a mating groove 48 in the main chain guide 21.

Means are provided for moving the auxiliary guide 26 with respect to the main guide 21 and to this end the main guide 21 has a longitudinally extending recess 48a in which is supported an hydraulic cylinder 49 having a piston rod 51 connected to the auxiliary guide 26. Admission of pressure fluid to the cylinder 49 will cause its piston rod 51 to move the auxiliary guide 26 in an extensible or retractile direction as desired.

In the extended position of the auxiliary guide 26 with respect to the main guide 21, the cutter chain 33, not shown in this view, is unsupported. In order to accommodate the possible whipping movement of the cutter chain 33 because of its unsupported length the proximate ends of the main cutter chain guide 21 and the auxiliary guide 26 are flared as at 52, so that the chain will smoothly enter the U-shaped guide 43.

It will be understood that the structure shown in Fig. 3 is symmetrical about the center line of the machine and that such flaring of the ends 52 will accommodate the chain irrespective of its direction.

Referring again to Fig. 3, the auxiliary guide 26 has a limb 53 extending laterally of the main axis of the main chain guide 21, and the lateral extension 53 affords a means of support for the idler shoe 29.

The idler sprocket 28 seen in Fig. 3 is also supported upon the auxiliary chain guide 26 substantially at the point of intersection of the lateral extension 53 and the auxiliary chain guide 26. The idler sprocket 28 may be provided with a pilot cutting edge 54 and tapered cutting edges 56 to provide clearance for the sprocket 28 and also the idler shoe 29 as seen in Fig. 6. Details of construction of the pilot cutter 54 and the cutters 56 are described in an application, owned by the assignee of the present invention, of Benjamin F. Tracy, Ser. No. 459,126, filed September 29, 1954, for improvements in Burster Cone Assembly for Boring Type Miner Head, now Patent No. 2,783,038.

The upper chain guide 21 and its auxiliary chain guide 26 is substantially identical to the lower main chain guide 24 and its auxiliary chain guides 27 seen in Figs. 1 and 2. However, the lower auxiliary chain guide 27 is arranged

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to support the auxiliary pusher plate 42, and as seen in Fig. 6, the auxiliary chain guide 27 has its sprocket 31 mounted upon a stub shaft 56. The auxiliary chain guide 27 has a similar extension to that shown at 53 in Fig. 3 to support the idler shoe 32 which is mounted upon a pin 57 threaded into the auxiliary chain guide 27.

As seen in Fig. 2 particularly, the auxiliary pusher plate 42 is guided for movement with respect to the main pusher plate 41 by means of a guide flange 58 extending from the main pusher plate 41 and overlapping the auxiliary pusher plate 42.

As with the upper guide 21 and its auxiliary guide 26, the lower auxiliary guide 27 is movable with respect to the lower main guide 24 by means of a piston and cylinder construction similar to that shown in Fig. 3. The auxiliary pusher plate 42 is of course supported by the auxiliary chain guide 27 and moves with respect to the main pusher plate 41 upon movement of the auxiliary guide 27 in both a retracting and extending direction. When the lower chain guide 24 is lifted by its lifting cylinders, not shown, the auxiliary pusher plate 42 moves with the main pusher plate 41.

The machine embodying the improvements according to the present invention may thus be retracted as seen in Fig. 2 so that it may move out of the machine in the room in which it operates.

When the auxiliary chain guides are moved to their extended position, as seen in Fig. 3 the unsupported length between the auxiliary chain guides and the main chain guide is not required to provide any cutting action. As is well known, a cutter chain is ordinarily not effective for cutting action unless it bears against some form of support. However, the peripheral limit of cutting of the boring arms 14 is made tangent to the unsupported length of the cutter chain but in a plane forward thereof, so that the boring arms alone do the cutting at these places. This construction enables the cutter guide to have the telescoping action previously described which enables the machine to have greater latitude of operation than has been possible heretofore.

As seen in Figs. 1 and 2 the machine cuts a substantially rectangular shaped room and the room may be timbered as seen in Fig. 2 by roof timbers 61 supported at each side of the room by props 62 and 63. When the machine is operated to its retracted position as seen in Fig. 2 it may readily be removed from the room without effecting the placement of the props 62 and 63. Also, the machine according to the present invention enables the cut to be a great deal larger than the overall dimension of the machine, and the room may thereby be adequately supported in accordance with the advance of the machine.

While the invention has been described by the terms of a preferred embodiment, its scope is intended to be limited only by the terms of the claim here appended.

I claim as my invention:

In a mining machine of the type having a pair of boring arms arranged to cut a pair of contiguous bores in a seam of coal or the like, a cutter chain for cutting a cusp remaining from the action of said boring arms including a longitudinally extending guide for said cutter chain, said cutter chain guide comprising a fixed portion and a portion movable relative thereto along the longitudinal axis of said fixed portion whereby said cutter chain augments the action of said boring arms, means for moving said portions relative to each other, said movable portion being extended to a position whereby said chain guide is discontinuous and said cutter chain is unsupported between said relatively movable portions, said discontinuity of said guide being tangent to the circle described by a boring arm, and whereby the cutting action of said boring arm alone is effective at said discontinuity.

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