SPROCKET 48 MOUNTED HERE

Fig. 2

Fig. 5

Fig. 6

Fig. 7

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This invention relates generally to mining machines of the type cutting a pair of overlapping contiguous bores in a seam of coal or the like, and more particularly to improvements in apparatus for deflecting cuttings into the conveyor of such machines.

According to the present invention the idler sprocket mounted at the ends of the lower chain guide are arranged to cooperate with pivotally mounted pusher plates which constantly urge the cuttings toward the working face of the seam, so that the endless conveyor of the machine will more efficiently remove the cuttings. The retractile movement of the idler sprocket causes movement of the pusher plates so that the machine may readily be removed from the room in which it is working.

It is a principal object of this invention to provide an improved construction for the pusher plates of a continental miner of the multi-bore type.

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 will become apparent to those having the benefit of the teachings herein, and it is therefore intended that the scope of the invention be not limited by the precise embodiment herein shown, such other embodiments being intended to be reserved especially as they fall within the scope of the claims appended.

In the drawings:

Fig. 1 is a front elevation view of the boring head of a continuous miner of the multi-bore type, said miner having embodied therein the improvements according to the present invention;

Fig. 2 is an exploded isometric view of a portion of the boring head of the machine shown in Fig. 1, showing details of a pusher plate and the operating mechanism therefor according to the present invention;

Fig. 3 is a front elevation view of the pusher plate and operating mechanism seen in Fig. 2, the pusher plate and the idler sprocket cooperating therewith being shown in the extended or working condition;

Fig. 4 is a view similar to Fig. 3 but showing the idler sprocket and pusher plate cooperating therewith in the retracted position;

Fig. 5 is an end view of the pusher plate mechanism shown in Fig. 3, said view being taken substantially along the line 5-5 of Fig. 3 and looking in the direction of the arrows;

Fig. 6 is a front elevation view of a link connecting the pusher plate with a member carried by the idler sprocket, showing details of a lost motion connection therebetween, said view being taken along the line 6-6 of Fig. 2 and looking in the direction of the arrows; and

Fig. 7 is a sectional view taken along the line 7-7 of Fig. 6 and looking in the direction of the arrows, showing further details of the lost motion connection.

Referring now to the drawings, there is shown a boring head of a continuous miner of the general type as is disclosed in an application of Jerome C. Salmons, Ser. No. 409,903, filed February 3, 1954, for Improvements in Mining Machines, owned by the assignee of the instant application. The boring head shown in Fig. 1 is referred to generally by the reference numeral 10, and includes a gear or drive housing 11 having extending therefrom hubs 12 enclosing shafts 13 to which are secured boring arms 14. The two boring arms 14 are arranged to rotate in opposite directions in timed relationship to cut a pair of overlapping contiguous bores in a seam of coal 16 or the like.

The action of the boring arms 14 is such as to leave behind upper and lower cuisp, not shown. In order to remove such cuisp endless cutter chains are arranged to move upon upper and lower guides having idler sprockets mounted at each end thereof, so that in addition to cutting the cuisp, the cutter chains cut a substantially rectangular bore in the room.

To this end the gear housing 11 has mounted on the forward face thereof a pair of hydraulic cylinders 17 having extending therefrom piston link 18. An upper chain guide 19 is mounted at the upper ends of the piston rods 18 and is arranged to guide an endless chain indicated by the reference numeral 21. The lower run of the chain 21 is guided along a lower chain guide 23 which is movable up and down in a vertical plane by means of cylinders 22 also mounted on the forward wall of the gear housing 11, see also Figs. 2, 3 and 4.

The lower chain guide 23 has movable therewith deflector plates 24 which move in telescoping relationship with fixed deflector plates 26 mounted on the gear housing 11. The deflector plates 24 are arranged to deflect cuttings into a throat 27, the cuttings being carried from the throat 27 by means of an endless flight conveyor 28 as seen in Fig. 1.

The endless cutter chain 21 is arranged to be driven by a sprocket 31 and tensioned by a sprocket 29, being mounted respectively on shafts 33 and 32 extending from a forward wall of the housing 11. The upper chain guide 19 has an idler sprocket 34 mounted at each end thereof, and each of said sprockets is supported upon an arm 36 arranged to pivot with respect to the upper chain guide 19 about a pin connection 37. The arm 36 is pivotally connected substantially midway of the length thereof to a link 38 in turn pivotally connected to a link 39 hingely anchored at 41 to a depending arm 50 carried by the upper guide. An actuating cylinder 42 for the sprockets 34 is pivotally connected at 43 to downward extending brackets 44 from the upper chain guide 19. Each of the cylinders 42 has a piston rod 46 which is pivotally connected at 47 to the link 39, and so arranged that when the piston rod 46 is withdrawn into the cylinder 42 the sprockets 34 will be rocked to a collapsed position.

The lower cutter chain guide 23 has also mounted at each end thereof an idler sprocket 48 mounted on an arm 51 which is pivoted with respect to a pair of spaced arms 50 and 52 at each end of the lower guide 23 upon a pin 53, see also Fig. 5. Each of such sprockets 48 and their support arms 51 are arranged to be moved to a retracted position by means of an actuating cylinder 54 pivotally connected at 56 to a bracket 57 extending upward from the lower chain guide 23. The cylinder 54 has a piston rod 58 extending therefrom which is pivotally connected at 60 to a link 59 which is arranged to be pivoted upon a boss 61 extending from the support arm 50. The link 59 is also pivotally connected at 62 to a link 63 having a pivot connection at 64 at a point midway of the arm 51 and between the stub shaft 49 and the pin 53.

The arm 51 is arranged to cooperate with a pusher plate indicated generally by the reference numeral 66 and having a pivotal connection at 67 to the lower chain guide 23.
The pusher plate 65 has a cam follower surface 68 which cooperates with a cam surface 69 on the arm 51, so that as the arm is rocked to the position seen in Fig. 4 the pusher plate will be lifted therewith pivoting about the point 67. In such movement the plate 66 is guided between a flange 71 on the arm 51, and an auxiliary pusher plate 72 mounted from front side of the arm 51 and held fast thereto by means of a cap screw 70 and the head of a cap screw 75 threaded into the pin 53.

In order that the pusher plate 66 follows at all times the movement of the arm 51 when actuated by the cylinder 54, a drag link 73 is provided. Said link has a pivotal connection 4 at the pusher plate 66 and a similar pivotal connection upon the auxiliary pusher plate 72 as at 76.

It is believed apparent that the pusher plate 66 and the arm 51 cooperate together in the fashion of a cam and a cam follower, and in order that the surface 68 of the pusher plate 66 in cooperating with the surface 69 of the arm 51 need not be critical in dimension, the drag link 73 is made with a lost motion connection. Accordingly, the drag link 73 has an elongated hole 77 at its point of pivotal connection 74 and a similar elongated hole 78 at its point of pivotal connection 76. See Figs. 3 and 4.

As seen particularly in Figs. 3 and 4 the pusher plate 66 is contoured so as to follow the outline of the bore left by the action of the boring arms 14. To this end the pusher plate 66 has secured thereto a flat sheet of semi-rigid material 79 such as rubber belting or the like, having an edge 81 arranged to follow the contour of the bore made by the boring arms 14. The material 79 is held to the pusher plate 66 by means of an attaching plate 82 and bolts 83. The member 79 is also held between the pusher plate 66 by means of a keeper member 84 welded to the forward side of the pusher plate 66.

It is believed that from the foregoing description that a new and novel arrangement for mounting and for moving the pusher plate of a multibore type of miner has been provided. The drag link 73 cooperating with the pusher plate 66 insures at all times that the two surfaces 68 and 69 will be in an engagement, and that upon movement of the auxiliary pusher plate 72 to the extended position as seen in Fig. 1 the pusher plate 66 will at all times move therewith and will not be hung up upon the pivot point 67.

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

It is claimed as my invention:

1. In a mining machine of the type having a pair of boring arms arranged to cut overlapping contiguous bores in a seam of coal or the like, a boring head for supporting said boring arms, a guide for an endless cutter chain arranged to cut the cusp remaining from the action of said boring arms, an idler sprocket including an arm supporting said idler sprocket and pivoted to said guide, said arm being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate having a pivoted connection to said boring head, cooperating surfaces on said sprocket supporting arm and said pusher plate whereby said pusher plate is moved to retracted position when said sprocket supporting arm is pivoted to retracted position, an auxiliary pusher plate mounted for movement with said sprocket arm, a link pivottally connected to said auxiliary pusher plate and to said pusher plate to cause said pusher plate to move with said sprocket arm and said auxiliary pusher plate upon movement thereof to an extended position, and a lost motion connection at each end of said link whereby said cooperating surfaces are maintained in working contact throughout the range of movement of the sprocket arm and the pusher plate.

2. In a mining machine of the type having a pair of boring arms arranged to cut overlapping contiguous bores in a seam of coal or the like, a boring head for supporting said boring arms, a guide for an endless cutter chain arranged to cut the cusp remaining from the action of said boring arms, an idler sprocket including an arm supporting said idler sprocket and pivoted to said guide, said arm being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate having a pivoted connection to said boring head, cooperating surfaces on said sprocket supporting arm and said pusher plate whereby said pusher plate is moved to retracted position when said sprocket supporting arm is pivoted to retracted position, a link pivottally connected to said auxiliary pusher plate and to said pusher plate to cause the pusher plate to move with said sprocket arm upon movement thereof to an extended position, and a lost motion connection at each end of said link whereby said cooperating surfaces are maintained in working contact throughout the range of movement of the sprocket arm and the pusher plate.

3. In a mining machine of the type having a pair of boring arms arranged to cut overlapping contiguous bores in a seam of coal or the like, a boring head for supporting said boring arms, a guide for an endless cutter chain arranged to cut the cusp remaining from the action of said boring arms, an idler sprocket including an arm supporting said idler sprocket and pivoted to said guide, said arm being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate having a pivoted connection to said boring head, cooperating surfaces on said sprocket supporting arm and said pusher plate whereby said pusher plate is moved to retracted position when said sprocket supporting arm is pivoted to retracted position, a link pivottally connected to said auxiliary pusher plate and to said pusher plate to cause the pusher plate to move with said sprocket arm upon movement thereof to an extended position.

4. In a mining machine of the type having a pair of boring arms arranged to cut overlapping contiguous bores in a seam of coal or the like, a boring head for supporting said boring arms, a guide for an endless cutter chain arranged to cut the cusp remaining from the action of said boring arms, an idler sprocket including an arm supporting said idler sprocket and pivoted to said guide, said arm being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate having a pivoted connection to said boring head, cooperating surfaces on said sprocket supporting arm and said pusher plate whereby said pusher plate is moved to retracted position when said sprocket supporting arm is pivoted to retracted position, an auxiliary pusher plate mounted for movement with said sprocket arm, and a link pivottally connected to said auxiliary pusher plate to cause the pusher plate to move with said sprocket arm upon movement thereof to an extended position.

5. In a mining machine of the type having a pair of boring arms arranged to cut overlapping contiguous bores in a seam of coal or the like, a boring head for supporting said boring arms, a guide for an endless cutter chain arranged to cut the cusp remaining from the action of said boring arms, an idler sprocket including an arm supporting said idler sprocket and pivoted to said guide, said arm being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate having a pivoted connection to said boring head, cooperating surfaces on said sprocket supporting arm and said pusher plate whereby said pusher plate is moved to retracted position when said sprocket supporting arm is pivoted to retracted position, and a link pivottally connected to said auxiliary pusher plate to cause the pusher plate to move with said sprocket arm upon movement thereof to an extended position.
movement thereof to an extended position, and a lost motion connection at each end of said link whereby said cooperating surfaces are maintained in working contact throughout the range of movement of the sprocket arm and the pusher plate.

6. In a mining machine of the type having a pair of boring arms arranged to cut overlapping contiguous bores in a seam of coal or the like, a boring head for supporting said boring arms, a guide for an endless cutter chain arranged to cut the cusp remaining from the action of said boring arms, an idler sprocket including an arm supporting said idler sprocket and pivoted to said guide, said arm being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate having a pivoted connection to said boring head, cooperating surfaces on said sprocket supporting arm and on an edge of said sprocket supporting arm and on an edge of said pusher plate whereby said pusher plate is moved to retracted position when sprocket supporting arm is pivoted to retracted position, a link pivotally connected to said pusher plate and to said sprocket arm to cause the pusher plate to move with said sprocket arm upon movement thereof to extended position, and a lost motion connection at each end of said link whereby said cooperating surfaces are maintained in working contact throughout the range of movement of the sprocket arm and the pusher plate.

7. In a mining machine of the type having a pair of boring arms arranged to cut overlapping contiguous bores in a seam of coal or the like, a boring head for supporting said boring arms, a guide for an endless cutter chain arranged to cut the cusp remaining from the action of said boring arms, an idler sprocket including an arm supporting said idler sprocket and pivoted to said guide, said arm being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate being movable with said sprocket to a position whereby said cutter chain augments the cutting incident to the action of the boring arms alone, a pusher plate having a pivoted connection to said boring head, cooperating surfaces on said sprocket supporting arm and on an edge of said pusher plate whereby said pusher plate is moved to retracted position when sprocket supporting arm is pivoted to retracted position, and a link pivotally connected to said pusher plate and to said sprocket arm to cause the pusher plate to move with said sprocket arm upon movement thereof to the extended position.

No references cited.