

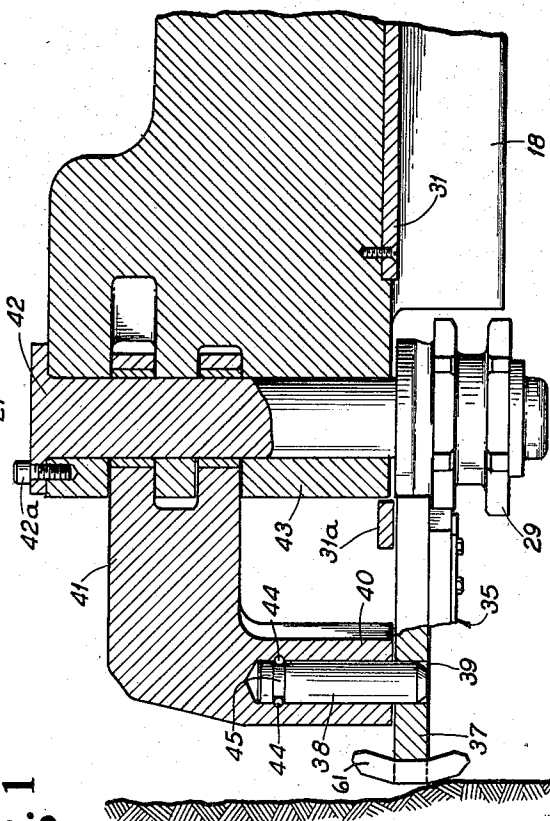
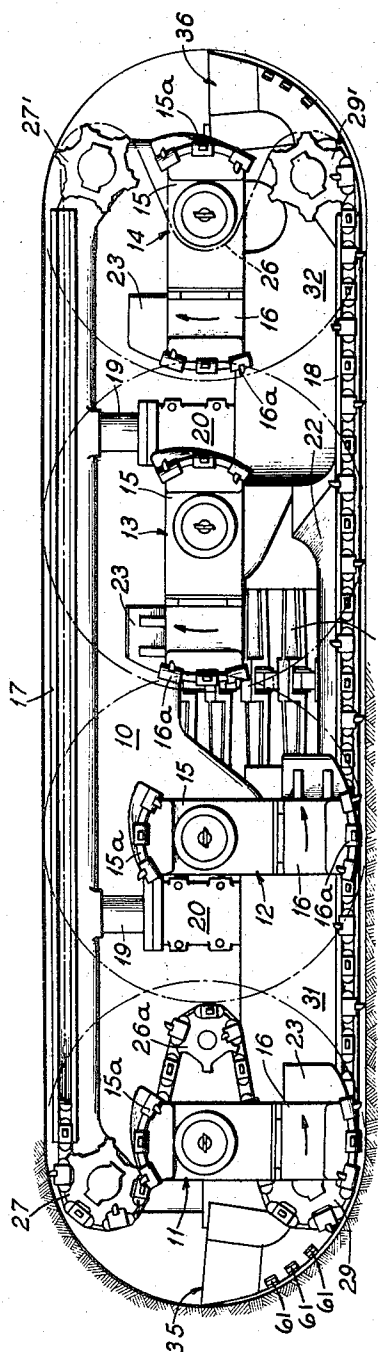
May 5, 1959

J. KARLOVSKY  
BORING TYPE MINING MACHINE HAVING PIVOTALLY  
MOUNTED PUSHER PLATE WINGS

**2,885,196**

Filed June 19, 1957

3 Sheets-Sheet 1



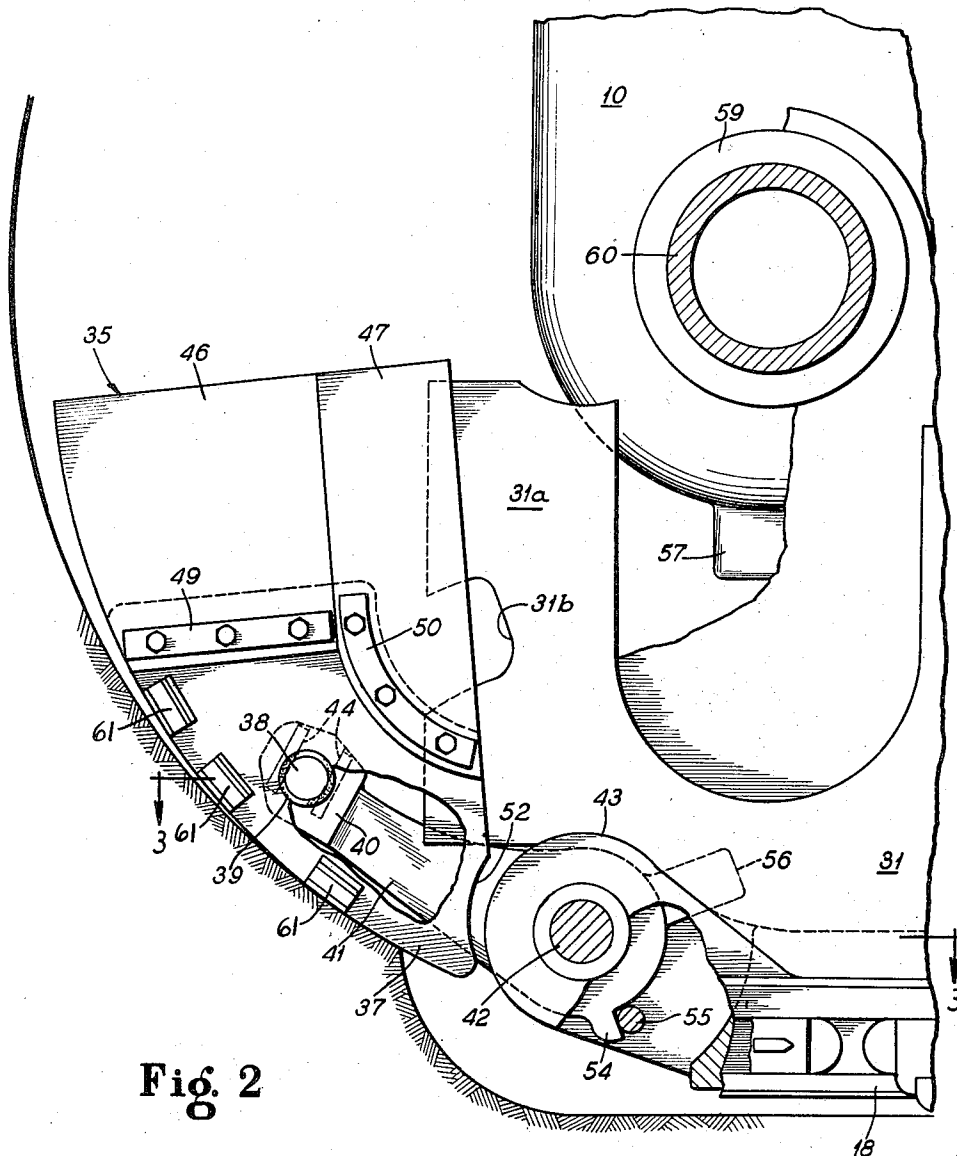
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INVENTOR.  
Jerry Karlovsky  
BY  
*Murray A. Gleason*  
ATTORNEY

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3 Sheets-Sheet 3

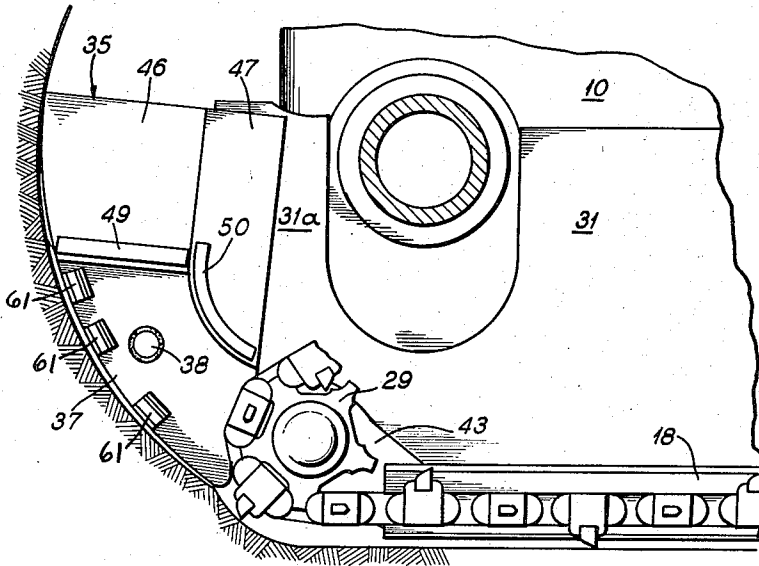


Fig. 4

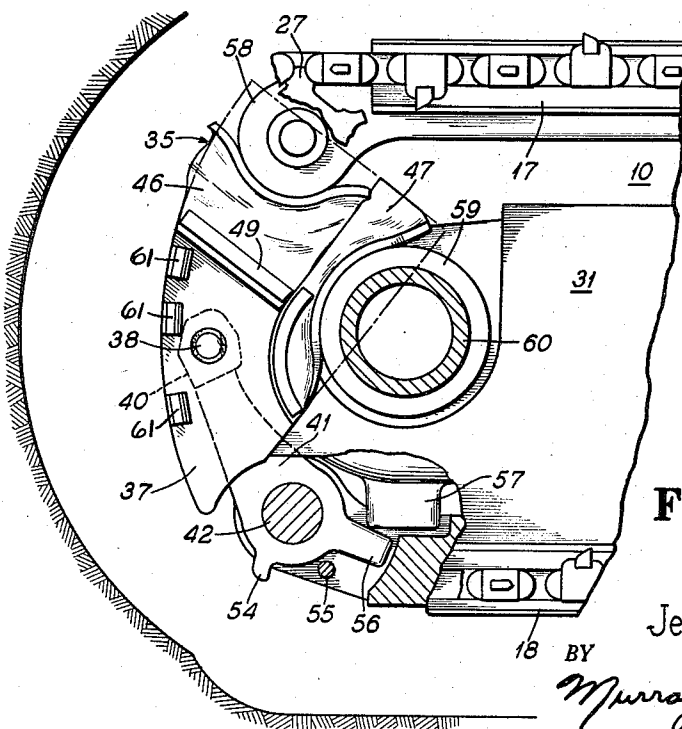


Fig. 5

INVENTOR.  
Jerry Karlovsky

BY  
*Murray A. Gleason*  
ATTORNEY

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## BORING TYPE MINING MACHINE HAVING PIVOTALLY MOUNTED PUSHER PLATE WINGS

Jerry Karlovsky, Cicero, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

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6 Claims. (Cl. 262—7)

This invention relates to improvements in multiple boring head mining machines and more particularly to pusher plates especially adapted for use with variable height mining machines of the character described.

As heretofore constructed, mining machines of the boring type have commonly been provided with means for varying the cutting height by adjusting the cutting diameters of the several boring heads, and also adjusting the vertical positions of the upper and lower trimmer bars which cut off the depending and upstanding cusps left between adjacent boring heads. In addition, such machines have usually been provided with power operated, laterally extensible and retractible pusher plate wings at opposite ends of the lower cutter bar, to keep loose materials from escaping rearwardly along opposite sides of the machine.

The principal object of the present invention is to provide an improved and simplified form of laterally extensible pusher plate wings, which automatically adjust themselves by gravity to various cutting heights to which the boring head and trimmer bars may be adjusted.

A further object is to provide pusher plate wings of the character described, which are capable of being collapsed to an especially compact, out-of-the-way position to facilitate tramming movement of the machine in the mine.

Other objects and advantages of the invention will appear as the following description proceeds.

The invention may best be understood by reference to the accompanying drawings, in which:

Figure 1 is a front face view of a mining machine constructed in accordance with the invention, as it would be seen in a mine, and with the boring heads and trimmer bars adjusted for cutting at a minimum height;

Figure 2 is an enlarged fragmentary front view of the lower left hand end of the machine, with parts broken away, and showing the lower trimmer bar adjusted for cutting at a maximum height;

Figure 3 is a detail section taken generally on line 3—3 of Figure 2;

Figure 4 is a fragmentary view similar to Figure 2, but drawn at a smaller scale, and showing the lower trimmer bar adjusted for cutting at minimum height as seen in Figure 1; and

Figure 5 is a view similar to Figure 4, but showing both the upper and lower trimmer bars moved to fully collapsed position, as for tramming the machine from place to place in the mine.

Referring now to details of the embodiment of the invention illustrated in the drawings, the improvement is shown as applied to a mining machine having a frame 10 with four boring heads 11, 12, 13 and 14, arranged for rotation on parallel axes and in side-by-side relation to each other for cutting contiguous bores in advance of the machine.

In the 4-head type shown, each boring head has a short arm 15 with cutter supports 15a at its outer end, and a long arm 16 with cutter supports 16a at its outer

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end. The longer arms have any well known means for endwise telescopic adjustment, so as to vary the cutting diameters of the boring heads.

Upper and lower trimmer or cutter bars 17 and 18 are mounted on the frame 10, immediately to the rear of the paths of rotation of the boring heads, and in generally tangential relation thereto, so as to cut off the depending and upstanding cusps, respectively, left between adjacent boring heads. The upper trimmer bar 17 is arranged for vertical adjustment, as usual, by means of pistons 19, 19, in hydraulic cylinders 20, 20 mounted on the frame 10. The lower trimmer bar 18 is vertically adjustable by similar hydraulic cylinder means (not shown).

A longitudinally disposed conveyor 21 is mounted as usual along the frame 10, with its front end opening into a centrally disposed throat 22 for receiving cuttings as they are dislodged by the boring heads.

With the 4-head type of machine shown, the two heads 11 and 12 at the left side of Figure 1 rotate in counterclockwise direction; and the other heads 13 and 14 at the right side of this figure rotate in clockwise direction, to progress the cuttings along the floor toward the conveyor throat 22 by means of scoops or paddles 23 on the ends of the larger arms.

The upper and lower trimmer bars 17 and 18 are designed as usual to guide a bit carrying cutter chain driven from a drive sprocket 26 on the frame 10 passing over idler sprockets 27 and 27' at opposite ends of the upper trimmer bar 17, and other idler sprockets 29 and 29' at opposite ends of the lower trimmer bar 18. Tensioning means for the cutter chain may consist of a sprocket 26a laterally adjustable on the frame 10 by any well known means (not shown).

A pair of upright pusher plates 31 and 32 are mounted on the lower trimmer bar 18, and are movable vertically therewith on opposite sides of the central conveyor throat 22, so as to direct the cuttings toward said conveyor throat.

With mining machines of the boring type described herein, it has heretofore been common practice to provide collapsible wings or extensions at the outer ends of the pusher plates 31 and 32, which are collapsible upwardly and inwardly toward the main frame 10, when it is desired to facilitate tramming of the mining machine in the mine. It has also been common practice to mount idler sprockets corresponding to the sprockets 29 and 29' shown in Figure 1, on movable members which are collapsible with the wings.

Referring now more particularly to the novel features which form the subject matter of the present invention, collapsible extension wings 35 and 36 are mounted on opposite ends of the lower trimmer bar 18 in a novel manner, so as to accommodate themselves to various cutting heights to which the boring heads and the upper and lower trimmer bars may be adjusted from time to time, and also to be adjusted to a more fully collapsed, tramming position to which the upper and lower trimmer bars are capable of adjustment. The construction and arrangement of the two extensions or wings 35 and 36 are identical, so that a description of one of said wings, such as the left hand wing 35 will suffice for an understanding of both.

Referring now to Figures 2 and 3 of the drawings, the wing 35 consists essentially of an upright metallic plate 37 which has a rearwardly extending pivot pin 38 fixed thereto as by welding at 39. Said pivot pin is supported in a forwardly projected end 40 of a rocking arm 41, and is retained therein by a pair of through pins 44, engaging a circumferential groove 45 in said pin.

The inner end of the rocking arm 41 is pivoted on a shaft 42 mounted in a projection 43 on the outer end

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of the trimmer bar 18. In the form shown, said shaft 42 extends forwardly through and is suitably held in the extension 43 of the trimmer bar 18, as by a screw 42a. The shaft 42 extends forwardly from the trimmer bar 18, and provides a bearing support for the idler sprocket 29. In this instance, therefore, the idler sprocket 29 is held in fixed relation to the lower trimmer bar 18, instead of being collapsible relative thereto, as has previously been common practice in machines of this type.

The metallic plate 37 has two flat, flexible rubber extensions 46 and 47 bolted thereto beneath steel retaining stops 49 and 50. In effect, the rubber extensions 46 and 47 together comprise a coplanar upwardly projecting extension of the plate 37, but with the two parts 46 and 47 separate along an upright line, so that the two rubber extensions 46 and 47 are free to bend in different directions, as will hereinafter be more fully described.

The metallic plate 37 has a plurality of separate forwardly and rearwardly extending runner-like elements 61 spaced along its curved outer edge, as shown in Figures 2 and 3, which are engageable with the adjacent side wall or rib of the mine to facilitate forward or rearward movement of the machine.

As will be seen by comparison between Figures 2 and 4, the outer edge of the collapsible wing 35 (formed by metal plate 37 and the outer rubber extension 46) has a common arcuate periphery drawn on a common radius, which is preferably selected as a compromise between the cutting diameter of the longer boring head arms 16 at their maximum cutting height, and the cutting diameter of said arms at their minimum cutting height. In other words, the radius of the outer edge of the wing 35 shown in the drawings is that which would approximate an intermediate cutting height adjustment of the boring heads.

Thus, when the machine is adjusted for cutting at maximum height, as shown in Figure 2, the upper edge of the wing 35 will be spaced slightly from the side rib, whereas, in the minimum cutting height position of the machine shown in Figure 4, there will be a slight spacing between the side wall and the outer edge of the wing between its upper and lower limits. In any case, the wing serves effectually to keep any substantial amount of loose material from escaping rearwardly along the rib. Outward pivotal or swinging movement of the plate 37, relative to the pusher plate portion 31a is limited by engagement of a curved surface or stop means 52 with the adjacent bearing extension 43 on the lower trimmer bar 18. Thus it will be seen that the arcuate edge surface of each bearing extension 43 functions as a stop means co-acting with the stop surface 52.

The rocker arm 41 has a stop projection 54 near its inner end adapted to engage a pin 55 on the trimmer bar 18, so as to limit downward movement of the outer end of the said rocker arm at the maximum cutting height position of adjustment shown in Figure 2. Said rocking arm also has a second stop member 56, spaced circumferentially from the first named stop member 54, in position to be engaged by a projection 57 fixed on frame 10, when the two trimmer bars 17 and 18 are adjusted to their maximum collapsed, out-of-the-way position, as shown in Figure 5.

The use and operation is as follows:

During cutting operations of the machine, at any permissible cutting height, the wings 35 and 36 and their pivotal pins 42, are free to swing downwardly by gravity, so that the outer edges of said wings engage the adjacent side walls or ribs of the mine. Said wings are thus maintained in floating engagement against the ribs at all times, and adjust themselves to any cutting height position, excepting when it is desired to retract the upper and lower trimmer bars 17 and 18 to a complete out-of-the-way position for tramming, as shown in Figure 5.

In the position of Figure 5, the upper end of the outer

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rubber extension 46 of wing 35 will engage and become bent forwardly by contact by the adjacent end portion 58 of the upper trimmer bar 17. Also the inner rubber extension 47 will engage and be bent forwardly along the journal bearing 59 which forms a part of the frame 10, and rotatively supports the drive shaft 60 of cutter head 11.

When in any of its laterally extended positions, the wing 35 overlaps the front face of the adjacent end portion 31a of the pusher plate 31, as indicated in Figures 2 and 4, excepting that the end portion 31a of the pusher plate has a small recess 31b, formed along its outer edge, to accommodate the outer end of the rocker arm 41, when the latter is in fully collapsed position as shown in Figure 5.

From the above description, it will now be understood that the two collapsible extension wings 35 and 36 are capable of adjusting themselves automatically to varying cutting conditions, without the use of auxiliary power means, and control means therefore, such as have been heretofore commonly employed for extending or retracting such extension wings.

The construction is further simplified by rotatably mounting the idler sprockets 29 and 30 on fixed bearing means at the ends of the lower trimmer bar 18, instead of providing special means for extending or retracting these idler sprockets and their bearing means together with the adjacent extension wings.

Although I have shown and described certain embodiments of my invention, it will be understood that I do not wish to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In a mining machine of the boring type, a frame, a plurality of boring heads rotatable on parallel axes to cut contiguous bores in advance of said frame, a horizontally disposed cutter-chain carrying trimmer bar mounted on said frame to the rear of said boring heads and generally tangential to the patterns formed by said boring heads to cut off the upstanding cusps left between said heads, means for varying the cutting diameters of said boring heads, and other means for adjusting the trimmer bar vertically of said frame, upstanding pusher plate means mounted on said trimmer bar and adjustable vertically therewith, and extension wings pivotally mounted on opposite ends of said trimmer bar, each in lapping relation with the adjacent ends of said pusher plate means, each of said extension wings having an arcuate outer edge adapted to engage the adjacent rib of the mine along the bore pattern formed by said boring heads, said extensions being free for gravitational movement upwardly and downwardly relative to the adjacent ends of the trimmer bars.

2. The structure in accordance with claim 1, wherein each of said wings is pivotally mounted on the outer end of a rocking arm, which rocker arm is pivotally mounted at its inner end to the adjacent end of the trimmer bar.

3. The structure in accordance with claim 1, wherein each of the wings has two contiguous but independent upright flexible extensions connected to their upper edges and free for flexing in different directions with respect to each other.

4. The structure in accordance with claim 1, wherein each of said wings has a plurality of forwardly and rearwardly extending sled-like runners fixed in spaced relation along its arcuate outer edge for engagement with the rib of the mine.

5. The structure in accordance with claim 2, wherein the rocker arm has stop means adapted for engagement with coating stop means on the trimmer bar for limiting outward swinging movement of said rocker arm.

6. The structure in accordance with claim 5, wherein each of said wings has stop means engageable with co-

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acting stop means carried by the trimmer bar for limiting downward swinging movement of said wing, and the rocker arm also has an inwardly extending arm arranged to be engaged with means fixed on the frame when the trimmer bar is adjusted upwardly to a fully collapsed posi- 5

**6**

tion, so as to cause the arm and the adjacent wing to swing upwardly and inwardly toward the frame due to movement of said trimmer bar.

No references cited.