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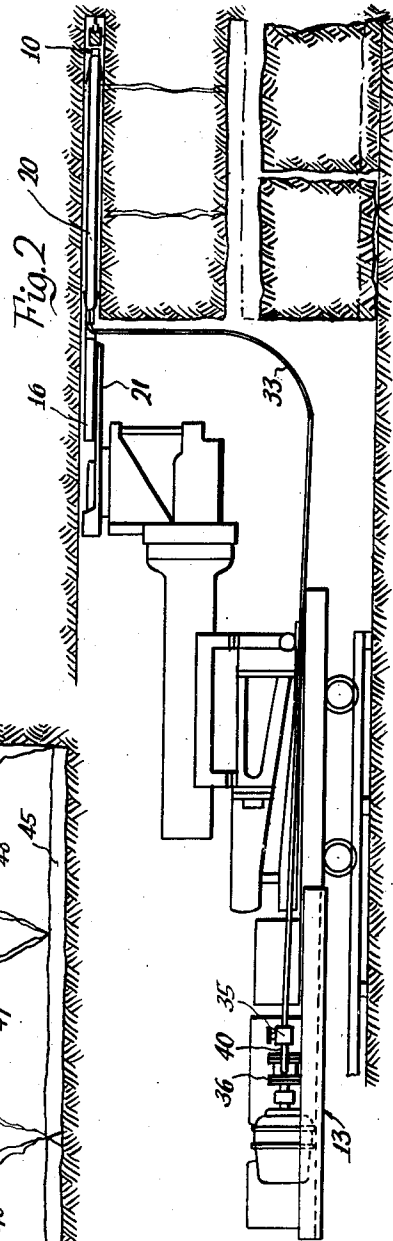
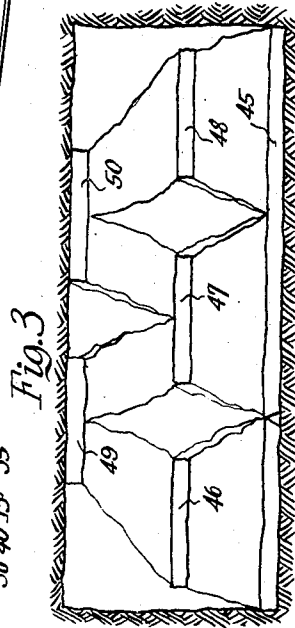
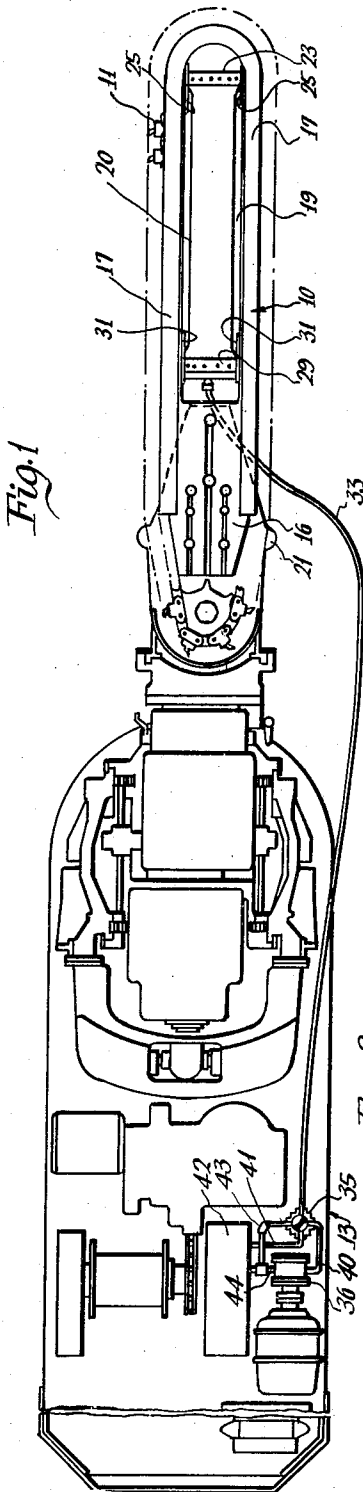
T. E. PRAY

2,253,941

MINING APPARATUS

Filed March 18, 1940

2 Sheets-Sheet 1



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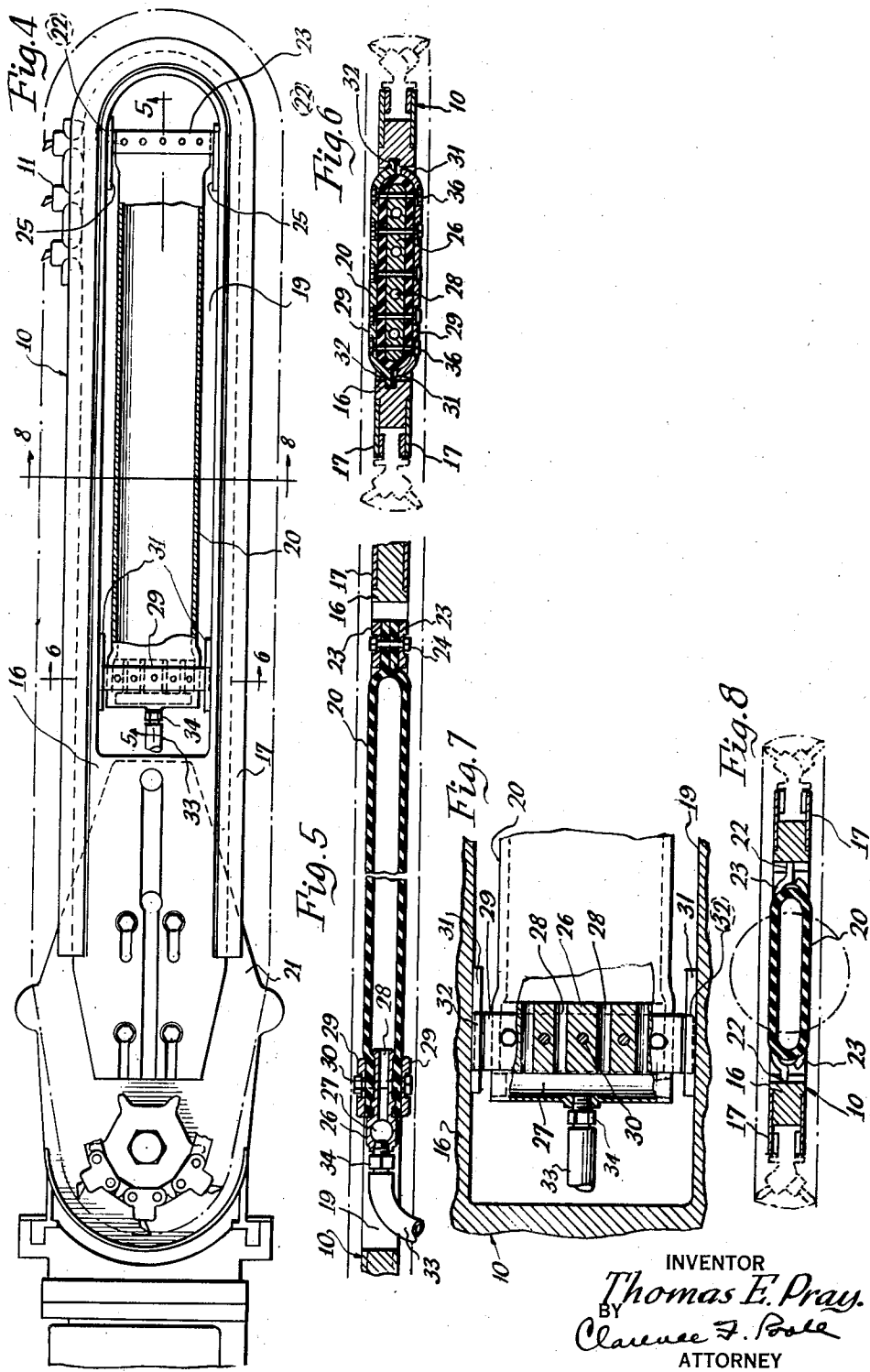
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MINING APPARATUS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,253,941

MINING APPARATUS

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4 Claims. (Cl. 262—28)

This invention relates to improvements in mining apparatus, and more particularly to an apparatus for mining coal.

The present trend in mining coal is to load the coal mechanically by one means or another, and to operate in a concentrated area in order to have better control of the mining conditions. In concentrated mining it is desirable to undercut and shoot the coal, to break it down, and then load the coal, these operations being repeatedly performed during the working shift. The mining laws in many States, however, prohibit shooting during the shift with the result that some safe form of mechanical means, for breaking down the coal during the shift, must be resorted to.

Heretofore, fluid pressure breaking devices have been used with some degree of success, but with these breaking devices the coal face must be drilled to receive the breaking device. This drilling operation is slow and consumes much valuable time for the reason that the present day drill must necessarily be light in order to be readily moved about the mine, which results in insufficient power to drill at the required speed. Also, it is not possible to drill a hole adjacent the roof with the present form of electric coal drill having sufficient power to drill a hole of the size required to receive a mechanical coal breaking member.

It is well known that a cutter bar may be sumped endwise into a coal seam to its full cutting depth in a few seconds, while it takes a number of minutes to drill a hole of sufficient size and depth to receive a hydraulic cartridge. My invention takes advantage of this fact and has for its principal objects to remedy the aforementioned difficulties by providing a new and improved mining system wherein a cutter bar of a kerf cutting machine makes a number of endwise sumping cuts or rectangular holes in the coal face at predetermined locations, and wherein a mechanical coal breaking member is inserted in each of these rectangular holes to break down the coal after each cutting operation.

Another object of my invention is to provide a cutter bar of a novel construction with a mounting for detachably supporting a coal breaking member therein in such a manner that the cutter bar may insert the coal breaking member into the kerf, for the breaking operation.

Other objects of my invention will appear from time to time as the following specification pro-

ceeds and with reference to the accompanying drawings wherein:

Figure 1 is a plan view of a mining machine having a cutter bar and coal breaking device constructed in accordance with my invention associated therewith;

Figure 2 is a view in side elevation of the mining machine shown in Figure 1, showing the cutter bar sumped in a coal face, with parts of the cutter bar broken away in order to show the coal breaking member;

Figure 3 is a diagrammatic end view of a coal face, showing one way in which the face may be cut, for breaking down the coal mechanically;

Figure 4 is an enlarged detail plan view of a mining machine cutter bar having a coal breaking device mounted therein, with certain parts of the coal breaking device broken away and shown in horizontal section;

Figure 5 is an enlarged fragmentary longitudinal sectional view taken substantially along line 5—5 of Figure 4;

Figure 6 is an enlarged transverse sectional view taken substantially along line 6—6 of Figure 4;

Figure 7 is an enlarged detail plan view of the rear end of the coal breaking device shown in Figure 5, with certain parts broken away and certain other parts shown in section, in order to illustrate the means for admitting fluid under pressure to said coal breaking member; and

Figure 8 is an enlarged transverse sectional view taken substantially along line 8—8 of Figure 4.

With reference now in particular to the embodiment of my invention illustrated in the drawings, a cutter bar 10 having a cutter chain 11 movable thereabout is herein shown as projecting forwardly from a mining machine 13 of the track mounted type. Said mining machine may be of any well known construction arranged to cut a plurality of parallel kerfs between the roof and floor of a mine, and is no part of my present invention, so will not herein be shown or described in detail.

The cutter bar 10, as herein shown, consists of a frame member 16 having gibbed top and bottom plates 17, 17, secured to the upper and lower outer sides thereof, to form a gibbed channelled guide for the cutter chain 11. Said frame member or plate has an elongated open central portion 19, into which open portion an elongated coal breaking member 20 is adapted to be detachably mounted. Said frame member or plate is

secured at its rear end to a cutter bar support member 21, projecting from said mining machine.

The coal breaking member 20, as herein shown, is made from a hollow tube which is relatively flat when deflated and which may be expanded to a substantially cylindrical formation upon the admission of fluid under pressure thereto. Said tube is preferably made from a flat hose or tube of a rubber and fabric material such as is commonly used in heavy duty hoses of various types.

The forward end of the coal breaking tube 20 is closed by a clamping device, which includes a pair of clamping members 23, 23 engaging opposite sides of said tube and held in engagement therewith by means of nuts and bolts 24, 24. Said upper clamping member is provided with projecting ends 22, 22 which are adapted to have slidable engagement with channelled supporting guides 25, 25, extending along opposite sides of the inside of the forward end of the open portion 19 of the cutter frame member 16 (see Figures 4 and 8).

The rear end of the tube 20 fits over and engages opposite sides of a manifold 26, which is provided with a passageway 27 extending transversely of said tube and opening into a plurality of spaced longitudinally extending ports 28, 28 leading to the inside of said tube. Said tube is engaged with said manifold by means of clamping members 29, 29, held in engagement therewith by nuts and bolts 30, 30 extending through said clamping members and manifold (see Figures 5, 6 and 7). Said upper clamping member is provided with laterally projecting ends 32, 32, which slidably engage channelled supporting guides 31, 31, formed in the inside of the open central portion of the frame member 16, adjacent the rear end thereof, to form a detachable supporting connection for the rear end of said coal breaking member.

Fluid under pressure is admitted to the coal breaking member 20 by means of a flexible conduit 33, detachably connected to the member 26 by means of a fitting 34, in a suitable manner. Said fitting communicates with the passageway 27 and is so arranged that said conduit may readily be removed when the bar is positioned for cutting in various planes, or during the cutting operation, if desired. Said conduit leads from a valve 35 on the rear end of the cutting machine, which valve is herein preferably shown as being a four-way valve. A pipe 40 connects the pressure side of a fluid pressure pump 36 with said valve. A pipe 41 connects an exhaust port of said valve with a fluid storage tank 42. A branch pipe 43 leads from said valve to an intake pipe 44 connected between said tank and pump, so that when said valve is in the position shown diagrammatically in Figure 1, fluid may circulate between said pump and storage tank and said pump may positively withdraw fluid from said coal breaking member through the pipe 43. Any suitable fluid medium may be used for expanding said coal breaking member.

From the foregoing it may be seen that the coal breaking member may readily be mounted in the cutter bar 10 and inserted in the coal with the cutter bar, as it is sumped into the coal face, and may break down the coal without removing the cutter bar therefrom, by the inflation of said coal breaking member, controlled by the valve 35.

Referring now in particular to the use and operation of my invention and the method of

breaking down the coal, a kerf 45 is first undercut in the coal face by the cutter bar 10 in the usual manner, preferably with the coal breaking member 20 removed from the cutter bar. After the undercutting operation, the coal breaking member may be inserted in the cutter bar and an endwise cut 46 may be made into the coal face intermediate the roof and bottom, adjacent one rib, by movement of the mining machine along the track. The conduit 33 may then be connected to said coal breaking member and fluid under pressure may be admitted thereto by the valve 35, to expand said coal breaking member and break down the coal in the immediate vicinity of said cut. After expansion of said breaking member, the valve 35 is turned to the position shown in Figure 1, to permit the pump 36 to expel fluid from said coal breaking member and to rapidly deflate said breaking member to a relatively flat condition. The cutter bar is then sumped endwise into the coal face intermediate the two ribs to form a rectangular hole 47, and the coal is broken down by said breaking member after this sumping cut, in the manner previously described. A third cut 48 is then made adjacent the opposite rib and the coal is broken down by said coal breaking member. After these cutting and breaking operations, the cutter bar is positioned to cut along the roof and is sumped endwise into the coal face along the roof to cut a hole 49 intermediate the first two cuts made between the roof and bottom. The coal is broken down by the coal breaking member 20 after this cut, in the manner previously described. Still another cut 50 is then made adjacent the roof between the second and third intermediate cuts and the coal is broken down by the coal breaking member 20 in the hereinbefore described manner, it being understood that the width of the face and kind of coal determines the number of endwise cuts and breaking operations which must be made.

The coal face may thus be entirely broken down without the use of powder, in a simple and expeditious manner, with the cutter bar serving as a drill to cut a rectangular hole for the insertion of the coal breaking member, and also serving to insert this breaking member into the hole either during or after the coal breaking operation.

While the coal breaking member is here shown as being mounted on the cutter bar, it should be understood that if desired, said coal breaking member may be mounted on a support separate from the cutter bar and inserted in the coal face, for breaking down the coal after the cutting operation, or the cut may be made with the coal breaking member removed from the cutter bar during cutting, and the cutter bar may be used for inserting the coal breaking member into the kerf in a separate operation, if desired.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting my invention to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In an apparatus for cutting and breaking down coal, a cutter chain carrying cutter bar mounted for cutting along the mine floor or roof or at various intermediate positions with respect

thereto, a relatively flat hollow expansible fluid operated coal breaking member, and guide means on said cutter bar within the outer boundaries thereof, forming a detachable supporting connection for said coal breaking member in said cutter bar, to permit said cutter bar to insert said coal breaking member into a kerf cut thereby and break down the coal by expansion beyond the upper and lower boundaries of said cutter bar.

2. In an apparatus for cutting and breaking down coal, a cutter chain carrying cutter bar having a longitudinally extending open portion, open to the top and bottom of said cutter bar, a relatively long mechanical coal breaking member, and a detachable supporting connection between said cutter bar and said coal breaking member for supporting said coal breaking member in said open portion, in longitudinally extended relation with respect thereto.

3. An apparatus for cutting and breaking down coal including a cutter bar having a cutter chain movable thereabout and having a longitudinally extending open portion, open to the top and bottom of said cutter bar, a fluid operated mechanical coal breaking member comprising a relatively long expansible tube mounted in said open portion of said cutter bar, said expansible tube being relatively flat when in a deflated condition, closure means for closing the forward end of said

tube, other closure means for closing the opposite end of said tube and permitting the admission of fluid under pressure therein, and detachable supporting connections between said closure means and the inside of said open portion of said cutter bar.

4. In an apparatus for cutting and breaking down coal, a cutter chain carrying cutter bar having a portion open to the top and bottom of said cutter bar and extending longitudinally therealong from the forward to the rearward end thereof, a fluid operated mechanical coal breaking member adapted to be mounted in said open portion of said cutter bar and extend longitudinally therealong, said coal breaking member including an expansible hollow tube which is relatively flat when in a deflated condition, closure means for closing the forward end of said tube, a member forming a fluid opening at the opposite end of said tube, to permit the admission of fluid under pressure thereto, and closure means for holding said tube in engagement with said member, channelled supporting guides extending along the inside of said open portion of said cutter bar adjacent the forward and rear ends thereof, and slidable guiding connections between said closure means, for detachably supporting said tube in said cutter bar.

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