

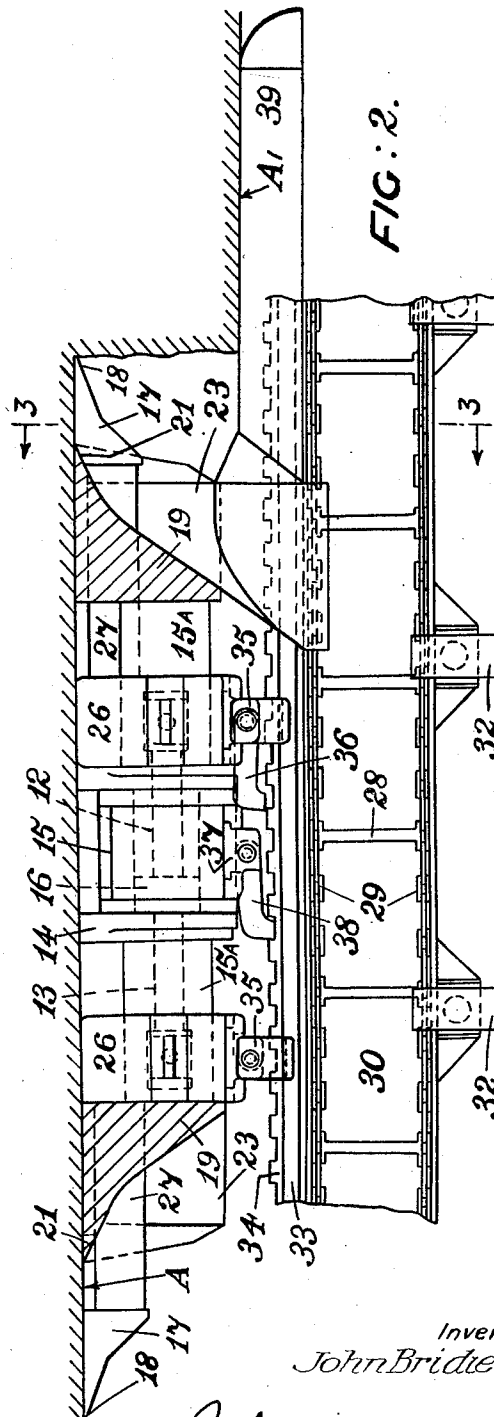
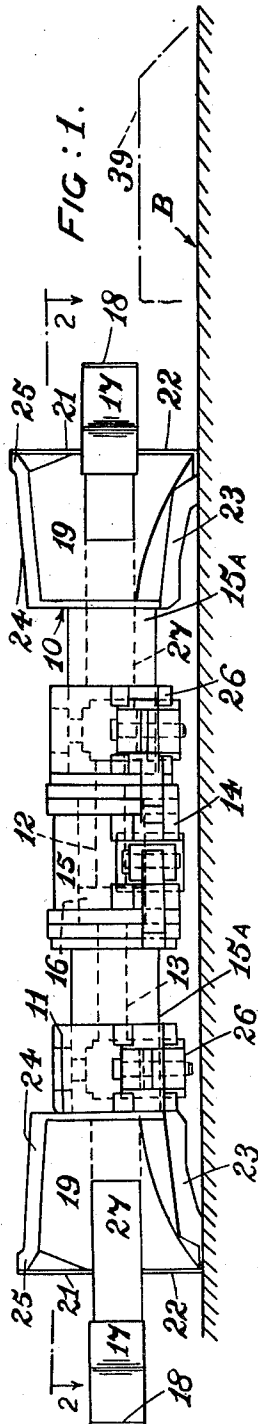
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J. B. MAVOR
MINING MACHINE

2,539,962

Filed Aug. 6, 1947

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

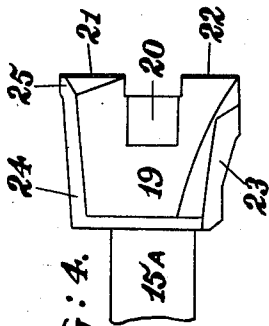


FIG. 4.

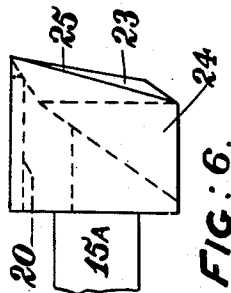


FIG. 6.

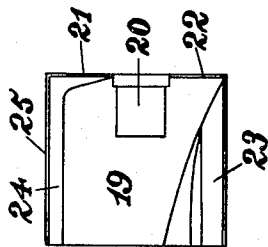


FIG. 5.

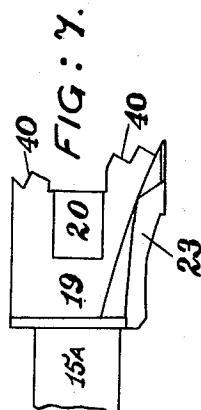


FIG. 7.

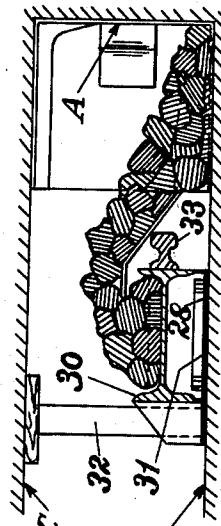


FIG. 3.

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UNITED STATES PATENT OFFICE

2,539,962

MINING MACHINE

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7 Claims. (Cl. 262—8)

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This invention relates to a machine for mining coal of a previously proposed type in use of which cutting of the coal at the coal face is effected by a direct shearing action applied horizontally to the back of the coal face to shear the coal away; and the invention relates also to a method in which a machine of the type stated can be used.

An object of the invention is to provide in a mining machine of the type stated separately movable coal-shearing components and to provide for driving forward, firstly, one of these components in advance of the other and next, the other of the components to overtake the already advanced component, and to anchor each of the components in turn whilst the other is being driven forward.

Another object of the invention is to provide a machine of the type stated for mining coal by shearing out from a coal face a strip of coal at an intermediate level and thereafter shearing off coal left outstanding above and below said level.

Another object of the invention is to provide in a mining machine of the type stated a double-acting hydraulic unit associated with the coal-shearing components, said unit to comprise a cylinder and a ram which are connected to said components respectively.

Another object of the invention is to combine the mining machine with a coal conveyor adapted to travel along a coal face in a coal mine, the stationary structure of the conveyor to have means for anchoring it to the mine floor and to have provision whereby the machine can anchor itself to the conveyor structure and work its way step-by-step along said structure as it operates upon the coal face.

The invention will now be described by way of example with reference to the accompanying drawings, which show a double-ended coal-mining machine of the type stated in which the reaction to the forward thrust is taken by a conveyor. In the drawings:

Figure 1 is a side elevation of the machine. Figure 2 is a section on the line 2—2 of Figure 1, and Figure 3 is a section on the line 3—3 of Figure 2. Figures 4, 5 and 6 are a side elevation, an end elevation and a plan, respectively, of a combined plough and shovel element incorporated in the coal-shearing head of the machine.

Figure 7 is a side elevation similar to Figure 4 but showing a modification.

The coal-mining machine shown, being double-ended, comprises mainly two oppositely directed heads denoted generally by 10 and 11 respectively, a double-acting hydraulic unit, one

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component of which is a ram incorporating piston rods 12 and 13 associated with the respective heads, and a body 14 comprising essentially a hydraulic cylinder 15, which is the other component of said unit and in which the piston 16 of the hydraulic ram works. The axis of the ram is horizontal and longitudinal. The piston rods 12 and 13 extend forwardly and rearwardly from the cylinder 15. At its outer end, each of the piston rods carries a more or less central wedge element 17, which has a cutting edge 18 and may have a depth or thickness, varying between the limits say four inches and twelve inches, the depth being designed in accordance with the height of the coal face to be cut by the machine. The depth of the central wedge element represents a fraction of the height of the coal face A. The cylinder 15 at each end is attached by an extension 15A to a plough and shovel element 19 which extends the full height of the face except that it has a gap 20 to accommodate the wedge element 17. This plough and shovel element has a substantially wedge-shaped plough presenting upper and lower edges 21 and 22 and extending upwards from the shovel 23, the edges of the plough being in the same vertical plane as the leading edge 18 of the central wedge. The wedge 17 and gap 20 are located more or less centrally in height and the wedge operates through the gap.

In the example according to Figures 1 to 6, the plough is formed on top with a transverse plate 24 presenting a horizontal edge 25 which works in co-operation with the upper vertical edge 21.

Each of the piston rods 12 and 13 has one of two crossheads 26, one at the forward end and one at the rear end of the cylinder body 14. Each crosshead 26 has a bar 27 which carries the associated central wedge 17.

The machine works in combination with a conveyor which, in the example shown is of the scraper type. As shown in Figures 2 and 3, the conveyor comprises an endless series of transverse scrapers 28 which are carried by endless chains 29. The scrapers of the upper run of the conveyor work along an upper trough 30, and the scrapers of the lower run return along a lower trough 31, these troughs being incorporated in the stationary structure of the conveyor. The conveyor structure is securely anchored in its location on the mine floor B by a series of props or jacks 32 jammed between the floor B and the roof C, these props or jacks being mounted on the troughing 30, 31 of the conveyor structure.

In order that the machine can work along the

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conveyor structure, the upper trough 30 has a longitudinal side bar 33 formed with rack-teeth 34. The crossheads 26 are adapted to engage firmly with the side of the conveyor structure, each having a fitting 35 to either of which can be pivotally attached a pawl 36 engaging with the teeth of the rack 34. The cylinder body 14 also has a fitting 37 for pivotal attachment of a pawl 38 also engaging with the rack-teeth on the side of the conveyor.

Assuming the wedge element 17 and the plough and shovel element 19 at the forward end of the machine (that is the right hand end when the machine is set as shown in Figures 1 and 2) to be initially together, oil under pressure is admitted to the rear of the ram cylinder 15. The cylinder body 14 is engaged by its pawl 38 with the conveyor rack 34 while the crossheads 26 become disengaged. As a result, the wedge element 17 is thrust forward and shears a central strip-like section, or furrow, out of the coal face A, loosening the coal above and below. Next, oil is admitted to the front of the cylinder 15. The crossheads 26 are then engaged by their pawl 36 with the conveyor rack 34 and the cylinder body 14 becomes disengaged, the cylinder body being thrust forward relative to the stationary piston 16, thus thrusting forward the plough and shovel element 19, which shears off and gathers up the broken coal and directs it laterally on to the conveyor, as Figure 3 shows. The cylinder body is next held in position by the pawl 38, the crossheads becoming freed, and the wedge element 17 driven forward so as to make another shearing stroke, which is followed by another gathering stroke, and so on.

In the example, as Figures 1 and 2 show, a part 39 is arranged for the time being to extend forward from the forward shovel 23, being adapted to bear against the old coal face A while the wedge element 17 is coming forward, so as to resist the tendency which there may be for the machine to diverge inwardly from the conveyor as a result of the action of the wedge element.

Therefore it will be manifest that the method performed by the machine consists in applying horizontal shearing by the cutter 17 in a vertical plane to the back of a coal face A at an intermediate level in order to shear out from the coal face a strip of coal, and thereafter applying horizontal shearing by the cutters 21, 22 to the back of the coal face in the same vertical plane but above and below said level in order to shear off coal left outstanding.

The machine shown and described is double-ended; so that, having cut along the coal face in one direction, it can cut back along the face in the opposite direction. In that event, the left hand end of the machine as viewed in Figures 1 and 2 becomes the forward end. The pawls 36 and 38 are detached, reversed and reattached to the respective fittings 35 and 37, the pawl 36 being attached to the fitting 35 on either of the two crossheads 26. Moreover, the extension 39 is transferred to the opposite end of the machine.

The plough according to Figures 1 to 6 has a continuous vertical edge 21, 22 interrupted only by the gap 20. In the modification according to Figure 7, the leading edge 40 of the plough is serrated and slightly inclined backwardly from bottom to top.

In the plough shown in the drawings, the cutter 24 is provided to assist in breaking down the

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coal above the wedge element 17. If desired, the cutter 24 may be omitted.

In the machine according to the drawings, the reaction to the forward thrust of the elements 17 and 19 is taken by the jacks 32 through the intermediary of the conveyor. If desired, the arrangement may be such that the reaction is taken by jacks direct, such jacks being applied to the cylinder body 14 and the crossheads 26 alternately.

I claim:

1. A mining machine for cutting coal from a coal face in a coal mine and comprising two coal-cutting elements, one of which presents upper and lower coal-shearing parts and the other of which presents an intermediate coal-shearing wedge, a double-acting hydraulic unit associated with said elements for propelling the machine along the coal face, said unit comprising a cylinder component and a ram component which components are alternately advanced in the operation of the unit, being connected to said elements respectively, and means for anchoring said components alternately, the arrangement being such that when said unit is operated, the first of said components being anchored, the second of said components is advanced and the wedge element is thrust forwards so as to shear out an intermediate strip of coal from the coal face and, the second of said components being anchored, the first of said components is advanced so that said other element is forced to follow the wedge element and shear off the upper and lower coal left outstanding on the coal face.

2. A mining machine for cutting coal from a coal face in a coal mine, said machine comprising separately movable coal-shearing elements, namely a main element with upper and lower cutters and an intermediate element, a double-acting hydraulic unit for propelling the machine along the coal face, said unit including a ram component for advancing said intermediate element so that said intermediate element shears out at an intermediate level from the coal face a strip of coal and a cylinder component for advancing said main element so that coal left outstanding above and below said level is sheared off by said upper and lower cutters, and means for anchoring each of said components whilst the other of said components is advancing.

3. A mining machine for cutting coal from a coal face in a coal mine, said machine comprising separately movable coal-shearing elements respectively arranged at different levels, a double-acting hydraulic unit for propelling the machine along the coal face, said unit having a cylinder component and a ram component and being arranged to advance said components alternately each in relation to the other, a connection between one of said components and one of said elements, a connection between the other of said components and the other of said elements, and means for anchoring each of said components in its turn whilst the other of said components is advanced with that coal-shearing element which is connected to it.

4. For use in combination with a coal conveyor which is adapted to work along a coal face in a coal mine and which has a structure with means for anchoring the structure to the coal mine, a mining machine for cutting coal from the coal face and comprising separately movable coal-shearing elements, a double-acting hydraulic unit for propelling the machine along the conveyor, said unit having a cylinder component

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and a ram component and being arranged to advance said components alternately each in relation to the other, a connection between one of said components and one of said elements, a connection between the other of said components and the other of said elements, and means for locking each of said components in its turn to said conveyor structure whilst the other of said components is advanced with that coal-shearing element which is connected to it.

5. For use in combination with a coal conveyor which is adapted to work along a coal face in a coal mine and which has a stationary structure, a mining machine comprising two alternately advancing components, cutting elements provided on the respective components, said elements including one adapted to project a substantial extent in advance of another, means for advancing said components alternately in order to propel the machine along the conveyor and in order also to force said elements alternately into the back of a coal face so that said projecting element shears out therefrom a strip of coal and said other element thereafter shears off coal left outstanding, and means for locking each of said components in its turn to said conveyor structure while the other of said components is advancing.

6. For use in combination with a coal conveyor which is adapted to work along a coal face in a coal mine and which has a structure with means for anchoring the structure to the coal mine and with a longitudinal rack, a mining machine for cutting coal from the coal face and comprising coal-cutting elements, a double-acting hydraulic unit for propelling the machine along the conveyor, said unit comprising a cylinder component and a ramp component which components are applicable to said elements respectively and which components advance alternately in the operation of said unit, and pawls on said components co-operating with said rack to lock each of

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said components in its turn to said conveyor structure while the other of said units is being advanced to force its coal-cutting element into the coal face.

7. For use in combination with a coal conveyor which is adapted to work along a coal face in a coal mine and which has a stationary structure, a mining machine for cutting coal from the coal face and comprising separately movable coal-shearing elements, namely a main element with upper and lower cutters and an intermediate element, a double-acting hydraulic unit for propelling the machine along the coal face, said unit including a ram component for advancing said intermediate element so that said intermediate element shears out at an intermediate level from the coal face a strip of coal and a cylinder unit for advancing said main element so that coal left outstanding above and below said level is sheared off by said upper and lower cutters, and means for locking each of said components to said conveyor structure whilst the other of said components is advancing.

JOHN BRIDIE MAVOR.

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