

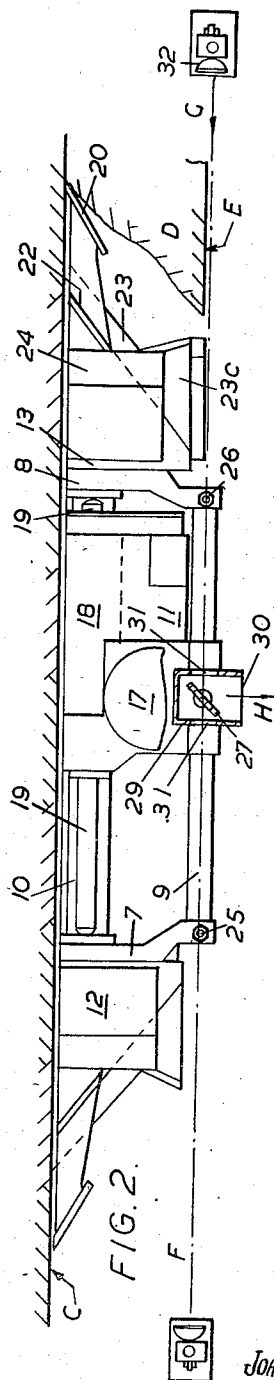
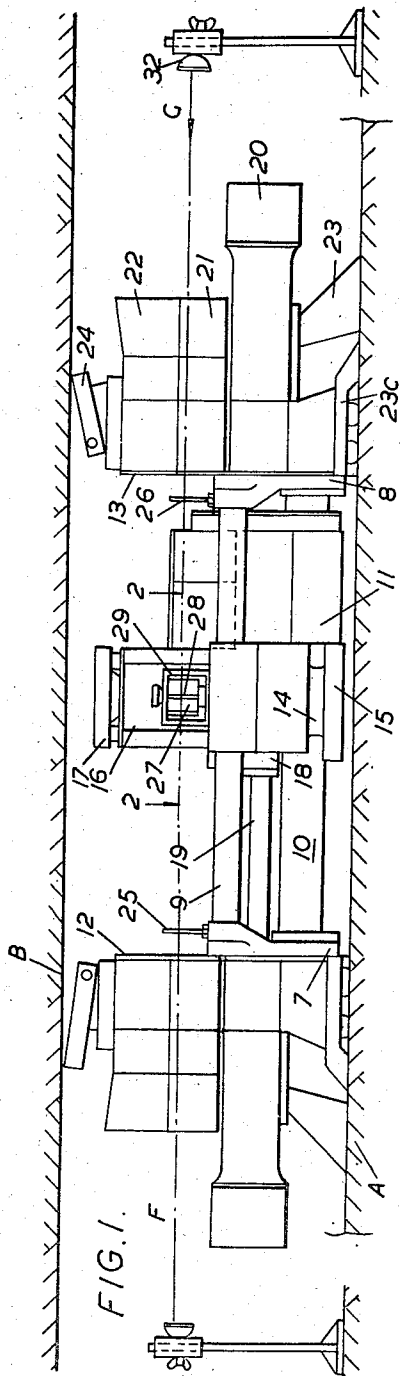
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STEERING INDICATOR FOR MINING MACHINES

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STEERING INDICATOR FOR MINING MACHINES

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This invention relates to mining machines belonging to a previously proposed type having a cutter head adapted to strip off coal or other mineral in the advance of the machine by wedging or splitting the mineral along a plane behind and approximately parallel to the face of the seam. Where, as is usually desirable, the machine is double-ended—that is to say, is designed to work in each of its two directions of travel—there are two such cutter heads.

The cutter head may incorporate two or more superposed wedge-like cutters arranged to strip off the mineral from the face at different levels, these cutters having edges which are co-planar, or approximately so, in order that the cutters act along a plane behind and roughly parallel to the face of the seam.

On account of serious difficulties to which such machines are subjected in working their way along the face of a seam, more especially on account of the varying nature of coal and other mineral seams, a machine tends to vary its line of travel in one or other direction from the true line parallel to the face of the seam. It is a practical impossibility for the man operating the machine to judge the true line of travel satisfactorily, for instance by keeping the machine steered alongside the usual conveyor between which and the face of the seam the machine travels. This impossibility is due to mining conditions in general and, more especially, to the large masses of mineral which, as the mineral is wedged off from the face by the advancing machine, accumulates upon and all around the conveyor and the front of the machine.

The object of the present invention is to provide a steering indicator which will be practicable for use under mining conditions.

The invention comprises a mining machine of the type stated having a forwardly facing mirror set at an inclination to the longitudinal axis of the machine so as to direct laterally outwards to the operator the reflections of an index and of an objective, which is located in the mine at a point ahead of the machine in the proper line of travel thereof, the arrangement being such that the two reflections register only when the machine is being steered along that line.

The machine may have an index arranged towards the leading end of the machine a forwardly facing mirror also on the machine but longitudinally rearwards of the index, so as to reflect the index laterally outwards to the operator, and a marker associated with the mirror, the arrangement being such that when the index is optically

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aligned with the marker and when also the machine is being steered along the proper line of travel the reflection of the index registers with the reflection of an objective arranged ahead of the machine.

The index may be a mask which, when the machine is being steered along the proper line of travel, masks from the operator the mirrored reflection of the objective, which may be a light signal.

One form which the invention may take is shown by way of example in the accompanying diagrammatic drawing in which Fig. 1 is an elevation of a coal-mining machine to which the invention is applied and Fig. 2 is a corresponding plan, with parts in section on the line 2—2 of Fig. 1.

The general arrangement of the mining machine, to which the invention is shown applied, is drawn in simple outline in Figs. 1 and 2, the construction and operation of the machine in general not being material to the present invention. In order that the relationship of the invention to the machine can be adequately understood, the following brief description of the machine is given.

The machine shown is double-ended, comprising mainly a framelike body 7, 8, 9 and 10, a carriage 11 and two cutter heads 12 and 13. The body consists of two transverse end walls 7 and 8, to which the heads are connected, and two longitudinal guide bars 9 and 10, on which the carriage is slidably mounted.

The carriage incorporates hydraulic propulsion apparatus. This apparatus includes a vertical hydraulic jack consisting of a cylinder 14 with a foot 15, the cylinder being vertically movable in a holder 16 incorporated in the carriage, and a piston-operated head 17 which normally rests upon the holder. The propulsion apparatus also includes a hydraulic ram unit consisting of a horizontal cylinder 18 and a ram 19 extending from both ends of the cylinder and engageable at its ends with the walls 7 and 8.

In order that the machine shall be propelled say from left to right (as viewed in Figs. 1 and 2) the jack is operated firstly to depress its foot 15 against the floor A of the mine and secondly to lift its head 17 against the mine roof B. The jack thus extended provides a securely anchored abutment. Next the ram unit is operated so that the ram 19 is forced to the right, the ram thus engaging the wall 8 and pushing the framelike body 7—10, with the head 13 leading, upon the mine floor towards the right,

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the guide bars 9, 10 sliding through the now stationary carriage 14. The head 13 now performs its cutting stroke. Thereafter the jack is operated so that its head is lowered and its foot raised, thus contracting the jack and freeing it from the roof and floor. Finally, the ram unit is operated so that the ram 19 is forced to the left, the ram thus engaging the rear wall 7 and pushing the carriage 11 so that it freely slides to the right hand end of the guide bars 9, 10 to take up a new position of anchorage for the next cutting stroke. This completes the cycle of operations.

In the example, each cutter head comprises a leading cutter 20 arranged at an intermediate level, two cutters 21 and 22 above the cutter 20, a floor cutter 23 and a roof cutter 24. The floor cutter is associated with a sloping ramp 23C for lifting the coal from the floor and deflecting it sidewise from the path of the machine for conveyance from the mine workings.

Seeing that the machine is double-ended, being designed for travel in both directions, it is provided with two indexes in the form of two short vertical posts 25, 26 fixed in longitudinal alignment one at each end of the machine, namely on the end walls 7 and 8 of the body of the machine, these posts constituting light masks. A mirror 27 is arranged on the carriage 11, being therefore about the middle of the machine's length. The mirror is pivotally mounted so that it can be set in either of two positions in which it is inclined at 45° to the longitudinal axis of the machine; for instance, the axis of the guide bar 9. Therefore, the mirror is set facing forwards so as to reflect the post 25 or 26 ahead of it laterally outwards to the eye of the operator, who occupies a stance in front of the carriage 11; that is, the outer side opposite the newly cut coal face C (Fig. 2). The mirror face is marked with a vertical strip 28 constituting a marker, and this strip lies in the vertical longitudinal plane of the posts 25, 26. The arrangement is such that when the operator is sighting during steering, he sees the reflection of the ahead post 25 or 26 in line with the marker 28.

In order to shield the mirror from reflecting outwards, towards the operator, the light of the usual miner's headlamp which the operator wears, the mirror 27 is mounted inside a box-like shield 29 which is open or windowed at its outer end 30 and at 31 in both sides.

In use of the machine any appropriate signal, preferably a coloured incandescent electric lamp 32, is provided as an objective to be sighted by the operator, being set at that end of the seam D towards which the machine has to work. The lamp is set at an appropriate level, and at such a distance from the face E to be cut into, that the lamp occupies what may be termed the sighting line F, which extends horizontally in the longitudinal plane along which the machine is to be steered. Thus, so long as the machine is working along the proper line of travel, represented by the line F, the ray of light G from the lamp 32 will be masked from the operator when he sights; that is, when he looks through the shield 29 into the mirror 27, keeping the reflection of the mask post 26 in register with the marker strip 28. If however the machine should deviate from the proper line F, the operator at once sees the reflection H of the light signal 32 and knows to steer the machine back to the proper line of travel.

In the machine shown as an example, no means is provided whereby the operator can steer it.

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Should therefore the machine work itself out of the proper line of travel along the sighting line F, the mine-workers can interpose one or more jacks between any appropriate part of the machine and the newly cut face C and by manipulating the jack or jacks they can slew the machine into the proper setting for working along, or for returning to, the proper line of travel. It is expedient for the operator to sight the steering indicator 26, 27, 28 and 32 at that time in the cycle of operations immediately after each working stroke of the head 13 is completed, the carriage 11 being then at the rear end, that is the left hand end, of the slideway 9, 10 and the jack components 14—17 being contracted free of the floor A and roof B. The mirror 27 is then at its maximum distance from the marker 26, which is the best condition for sighting, and the machine can then be slewed without obstruction from the jack components 14—17.

When the machine is operated to travel in the opposite direction, that is from right to left with the head 12 leading, the mirror 27 is angularly adjusted through 90° so that it faces the head 12 at an inclination of 45° to the longitudinal axis of the machine.

I claim:

1. For a mining machine of the type comprising a body with a cutter head for wedging off mineral from the face of a seam in a mine, means for propelling the machine along said face in a predetermined straight path of travel towards an objective and a carriage which carries said propelling means and which is guided to move relatively to said body in opposite directions along the body, a steering indicator comprising an index arranged at a forward location on the machine body and a mirror arranged on said carriage at a location longitudinally aligned with said index but spaced rearwardly therefrom to an extent which varies with the two-directional relative movements of the carriage, said mirror being set at an inclination so as to face partly forwards towards the index and laterally outwards towards an operator in order to reflect both the objective and the index to the operator when the machine is being steered along said path.

2. A steering indicator according to claim 1 including also a marker which is combined with the mirror to register with the reflection of the objective.

3. A steering indicator according to claim 1 including also a light shield in which the mirror is mounted and through which the operator sights during steering.

4. A steering indicator according to claim 1 in which the machine for which the indicator is suited is double-ended, having cutter heads at opposite ends, and in which the mirror is pivotally mounted on the carriage so as to be angularly adjustable between positions in each of which it faces ahead at an inclination.

5. For a mining machine of the type comprising a frame, a cutter head thereon for wedging off mineral from the face of a seam in a mine, a carriage guided for movement longitudinally of said frame, means on said carriage for temporarily anchoring it in the mine and means on said carriage co-operating with said frame for propelling the machine step-wise along said face in a predetermined straight path of travel towards an objective, a steering indicator comprising an index arranged at a forward location on said frame and a mirror arranged on said carriage at a location longitudinally aligned with

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said index but spaced rearwardly therefrom, said mirror being set at an inclination so as to face partly forwards towards the index and laterally outwards towards an operator in order to reflect both the objective and the index to the operator when the machine is being steered along said path.

6. A steering indicator according to claim 5 including also a marker which is combined with the mirror to register with the reflection of the objective.

7. A steering indicator according to claim 5 including also a light shield in which the mirror is mounted and through which the operator sights during steering.

8. A steering indicator according to claim 5 in which the machine for which the indicator is suited is double-ended, having cutter heads at opposite ends of the frame, and in which the

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mirror is pivotally mounted on the carriage so as to be angularly adjustable between positions in each of which it faces ahead at an inclination.

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