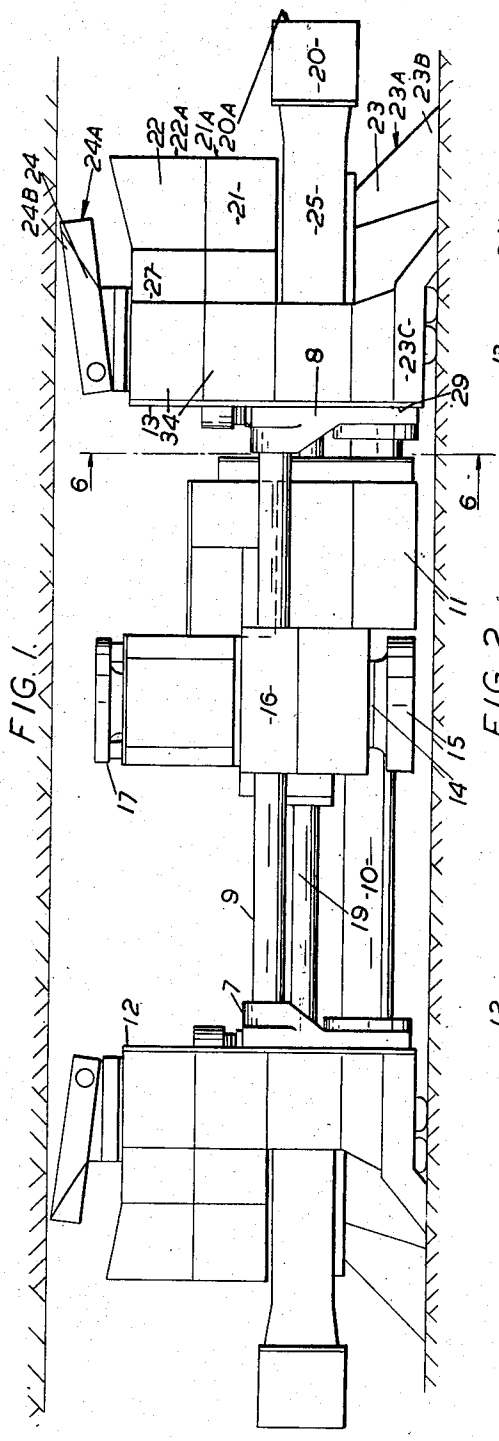
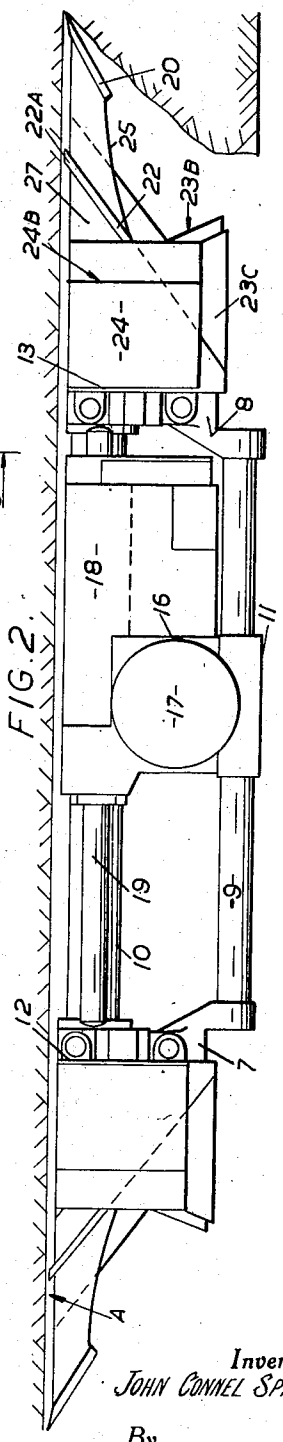
Jan. 19, 1954 J. C. SPROUL 2,666,629

ADJUSTABLE CUTTER FOR STRIP MINING MACHINES

Filed Feb. 25, 1950 3 Sheets-Sheet 1





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Filed Feb. 25, 1950 3 Sheets-Sheet 2

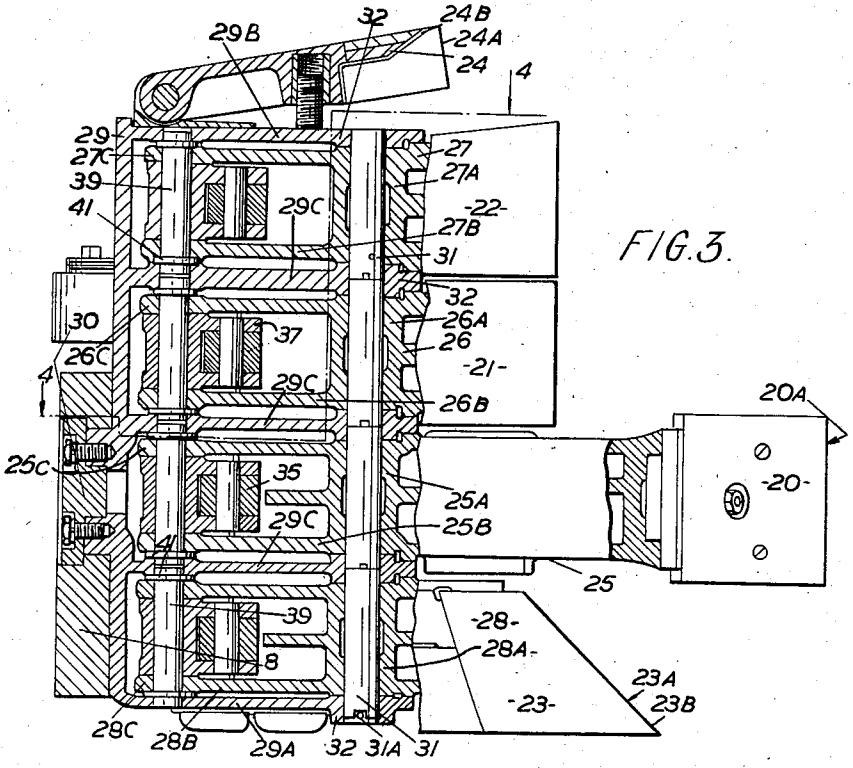


FIG. 3.

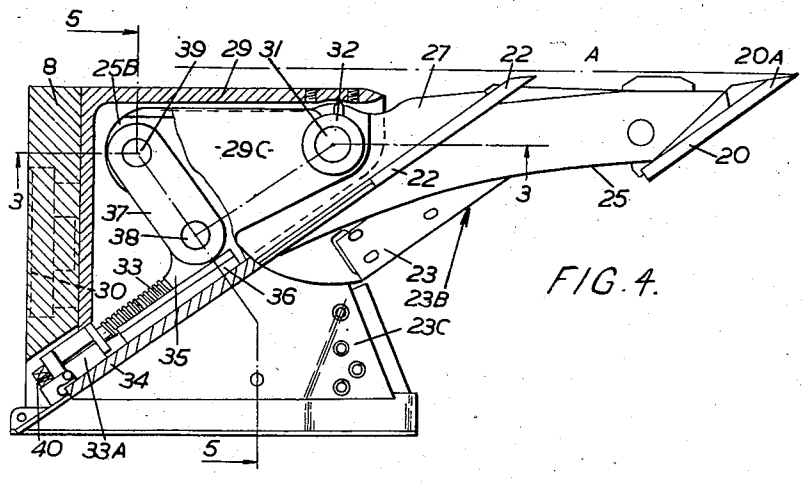


FIG. 4.

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Filed Feb. 25, 1950 3 Sheets-Sheet 3

FIG. 5.

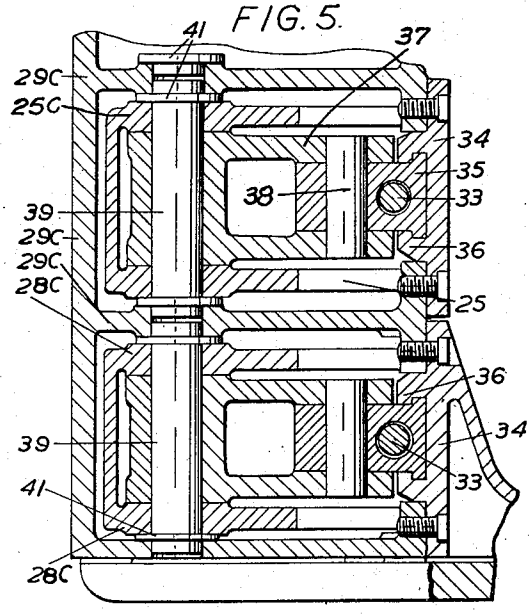
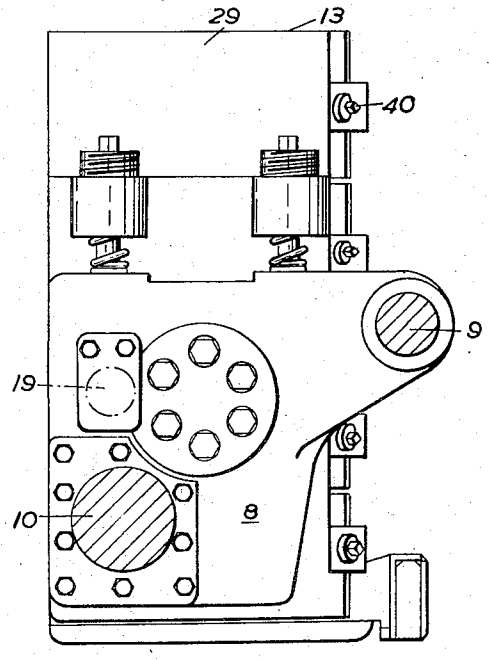


FIG. 6.



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ADJUSTABLE CUTTER FOR STRIP MINING MACHINES

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2 Claims. (Cl. 262—8)

1

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 wedge-wise along a plane 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 chisel-like cutters arranged to strip off the mineral 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.

It is desirable that the cutter or cutters shall be laterally adjustable in order that the chisel-like action can be regulated to suit conditions imposed by any particular coal seam or by the operations of the machine.

It has been ascertained that, for a lateral adjustment to be fully effective, it is desirable that the lateral motion of a cutter shall be accompanied by a corresponding angular correction. That is to say, if a cutter is advanced laterally to cut deeper, it is desirable that the angle of the cutter to the face of the seam shall be greater; conversely, if the cutter is withdrawn laterally, its angle to the face should be correspondingly decreased.

The object of the present invention is to provide improved means by virtue of which the operator will be enabled to adjust the lateral and angular setting of the cutter or cutters conveniently, positively and accurately.

According to the invention, in a mining machine of the type stated, a cutter is pivotally mounted on a support and is connected thereto so as to be adjustable both angularly and laterally about the pivot by a toggle link under the control of a screw.

The screw may be journalled on the support and threaded through a nut slidable on the support and connected by the toggle link to the cutter.

A machine of the before-mentioned type, designed for mining coal, is shown by way of example in the accompanying drawings to illustrate the invention. In the drawings, Figs. 1 and 2 are a diagrammatic side elevation and a plan of the machine. Fig. 3 is a side elevation of the cutter head, drawn to a larger scale, the view being partly in section approximately on the line

2

3—3 of Fig. 4. Fig. 4 is a corresponding plan of the cutter head, this view being partly in section on the line 4 of Fig. 3. Fig. 5 is a fragmentary section drawn to a still larger scale approximately on the line 5—5 of Fig. 4. Fig. 6 is a sectional elevation corresponding to Fig. 5, the section being on the line 6—6 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 of the mine and secondly to lift its head 17 against the mine roof. 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, the guide bars 9, 10 sliding through the now stationary carriage 11. Thus, the head 13 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 an-

chorage for the next cutting stroke. This completes the cycle of operations.

Both cutter heads 12 and 13 are of similar construction. Therefore only one of the heads, namely the right hand head 13, is hereinafter described.

In the example, the cutter head comprises a leading cutter 20 at an intermediate level, two cutters 21 and 22 above the cutter 20, a floor cutter 23 and a roof cutter 24. The cutters 20—24 have edges 20A—24A all nearly in the same vertical plane A, Figs. 2 and 4. The floor and roof cutters also have horizontal edges 23B, 24B. 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.

Referring also to Figs. 3 to 6, each of the main cutters 20, 21, 22 and 23 is an edged plate that is attached to an approximately wedge-like body, the bodies being indicated by 25, 26, 27 and 28 respectively. It will be noted that the body 25 of the intermediate cutter 20 is considerably longer than the bodies 26, 27 and 28, so that the cutter 20 projects well in front of the others. The cutter head includes a heavy casing 29 in which the bodies 25—28 are all pivotally mounted. The casing 29 is formed with a base shelf 29A, a top shelf 29B and intermediate shelves 29C, which divide the casing interior into compartments each accommodating one of the cutter bodies. The casing 29 is attached by a connector 30 to the adjacent end wall 6 of the frame-like body 7—10 of the machine.

Each of the four cutter bodies is in the nature of a lever with a central bearing boss, the several bosses being indicated by 25A, 26A, 27A and 28A respectively. From each boss there extends an arm 25B, 26B, 27B or 28B of the lever concerned. Each of these arms is in the form of an interconnected pair of upper and lower cheeks, and all of these cheeks have terminal eyepieces 25C—28C, which bear against vertical-thrust plugs 41 fitted into the shelves 29A—29C. These plugs 41, as Figs. 3 and 5 show, each consist of a cylindrical body, which fits firmly into a hole in the shelf above or below the plug, and of a flange which serves as a slide-bearing surface for the associated cutter-lever boss 25C, 26C, 27C or 28C. The fulcrum of the four lever-like bodies 25—28 is a four-part pivot pin 31, the parts of which fit slidably through the bosses 25A to 28A and also through co-axial bearings 32 in the casing shelves 29A—29C. The lowermost part of the pin 31 is supported by a cross-pin 31A.

The cutter bodies are made like levers in order that they can be pivotally adjusted so as to vary not only the lateral setting, which determines the cutting depth of a cutter, but also the angular setting of the cutters 20—24 individually in relation to the supporting casing 29. Therefore each cutter body has adjustment means for adjusting it laterally and angularly. In the example, the means provided for each body comprises the following components:

A turnable screw 33 which is journalled in a bracket 33A on one of four covers 34 that are bolted to the casing 29 and form a closure to the front side of the compartments thereof;

A nut 35 which is slidable along a horizontal inner slideway 36 in the associated cover and through which ordinarily the screw 33 is threaded;

A link 37 pivotally connected at its opposite ends by a pin 38 to the associated nut 35 and

by a pin 39 to the eye-piece of the associated lever arm 25B, 26B, 27B or 28B.

In order to adjust any of the cutters laterally and angularly, the associated screw 33 is turned appropriately, say by means of a ratchet-lever, or a spanner, engageable with a square head 40 on the screw, this head extending from the casing 29. Such turning of the screw causes the nut 35 to move along its slideway 36 and the link 37 to move angularly in the manner of a toggle-link, so that the cutter is forced with the power that is a characteristic of toggle action to change its angular relationship to the casing 29. It will be apparent that the force transmitted to the cutter is in the nature of a powerful thrust or pull through the link 37. The reaction to this thrust or pull is derived mainly from the slideway 36, the stress taken by the screw-and-nut pair 33, 35 being purely axial. Thus, distortion and wear and slack are reduced to the minimum.

In order to interchange any two of the cutter bodies 25, 26 and 27, the pivot pin 31 is withdrawn upwards part-by-part so far as necessary. The appropriate two screws 33 are unscrewed from their nuts 35 and these nuts are slid from their slideways 36. The two associated covers 34 are unbolted and removed, together with their screws 33. Thus, in each of the two compartments whose covers have been removed, the following components lie exposed, namely the nut 35, its link 37 and the cutter-lever arm 25B or 26B or 27B or 28B, as the case may be, all of said components being freely withdrawable as an assembly from their compartments. Accordingly, each of the two cutter bodies to be interchanged and the associated assembly of components 35, 37, 38 and 39 are removed from the cutter head. During removal, the pins 39 concerned each slide freely between and away from the vertical-thrust plugs 41 fitted in the shelves above and below, each of said pins remaining as the pivotal connection between its link 37 and cutter-lever arm.

Patent application No. 146,181 of the same date as the present application shows and describes a mining machine the same as is shown and described in the present application but claims an invention that is different from the invention hereinafter claimed.

I claim:

1. A mining machine of the type stated having a cutter head, a casing incorporated in the cutter head, a detachable cover on said casing, a lever which is fulcrumed inside said casing so as to be angularly movable in relation thereto, a cutter carried by said lever so as to project both laterally and angularly forwards outside said casing, a turnable cutter-adjusting screw journalled on said cover to have a stationary location inside said casing, a nut through which said screw is threaded, the nut being movable along the screw, a link pivotally connected to said nut and to said lever in the manner of a toggle so as to force the lever powerfully into a setting giving a required extent of projection and degree of angularity to the cutter in relation to the casing whenever the screw is rotated, and a guideway provided on the inner side of said cover, said guideway being stationarily located inside said casing and said nut being slidable along the guideway on rotation of said screw so that said guideway provides the reaction to the powerful thrust and pull of said link and confines said nut and screw to purely axial stress despite the angular movements of said lever and link.

2. A mining machine of the type stated having a cutter head formed with a compartment, a detachable cover on said head closing said compartment, a lever which is fulcrumed on said head so as to be angularly movable thereon, a cutter carried by said lever so as to project forwards and laterally from said head, a cutter-adjusting screw turnably mounted on said cover in a stationary location, a nut through which said screw is threaded, the nut being movable along the screw, a link pivotally connected to said nut and to said lever in the manner of a toggle so as to force the lever powerfully into a setting giving a required extent of projection and degree of angularity to the cutter in relation to the head whenever the screw is rotated, and a guideway stationarily located on said cover along which guideway said nut is slidable on rotation of said screw, said screw, nut, link and a portion of the

cutter lever being all housed in the covered compartment and said guideway providing the reaction to the powerful thrust and pull of said link and confining said nut and screw to purely axial stress despite the angular movements of said lever and link.

JOHN CONNEL SPROUL.

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