# United States Patent [19]

**Huttenbrauck et al.**

[11] **3,841,706**

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[54] **CONTROL ROD FOR LONGWALL MINING INSTALLATION**


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[52] **U.S. Cl.** ..... **299/34,** 299/43

[51] **Int. Cl.** ..... **E21c 27/35**

[58] **Field of Search** ..... 299/32, 33, 34, 43



[56] **References Cited**

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*Primary Examiner*—Ernest R. Purser

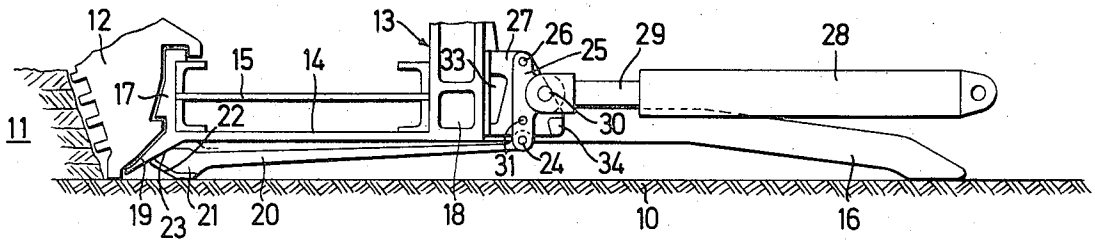
*Attorney, Agent, or Firm*—Sughrue, Rothwell, Mion, Zinn & Macpeak



[57] **ABSTRACT**

A mineral mining installation with a plough guided on a guide member at the mineral face side of a longwall conveyor. The guide member is part of a trough-like frame which receives the conveyor therein. A plurality of rods extend beneath the frame and conveyor. Each rod has a head slidably received between the floor of the working and a part of the guide member; the rods being used to vary the position of the guide member to control the cutting position of the plough. Each rod is pivotably connected to a lever which is in turn pivotably connected to a bracket at a goaf side wall of the frame. Each lever is connected to a shifting ram and the levers and brackets have bores for receiving locking pins. These pins can selectively clamp the levers whereby the rams can be used to shift the installation or displace the rods via the levers to effect the control of the plough.


**16 Claims, 5 Drawing Figures**



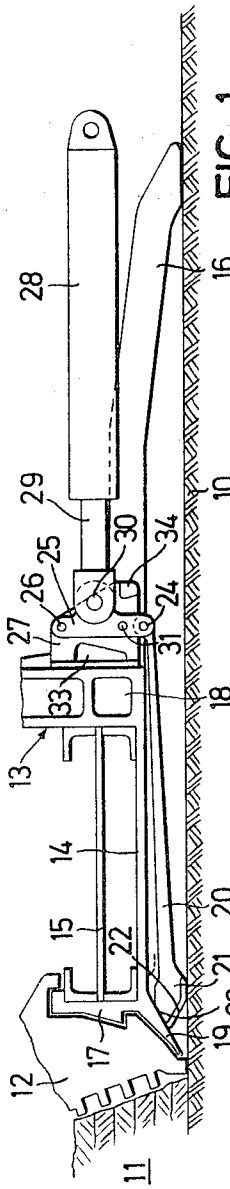


FIG. 1

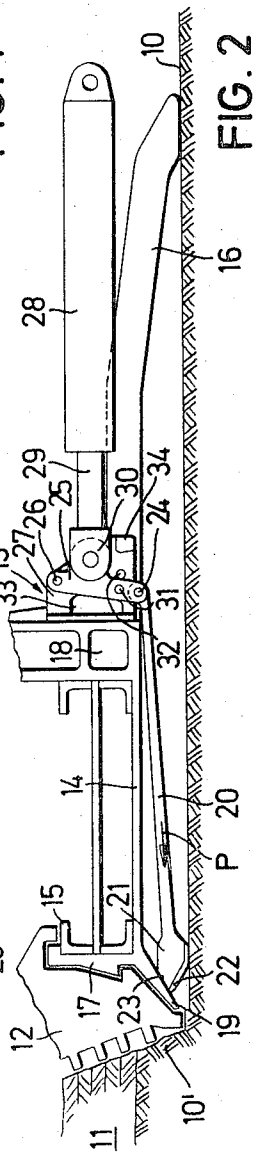


FIG. 2

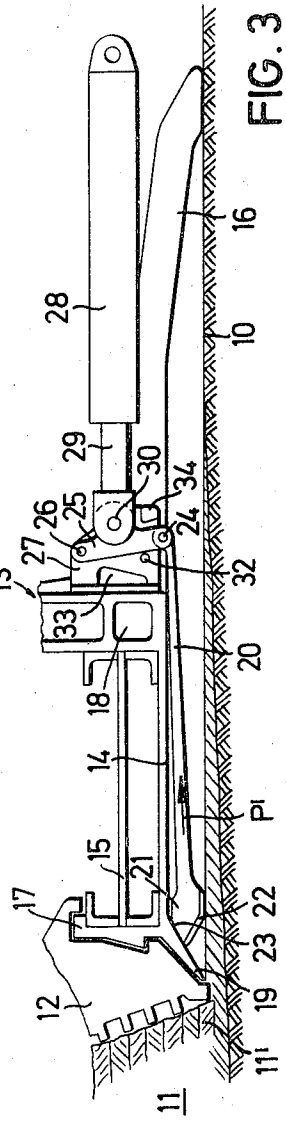


FIG. 3

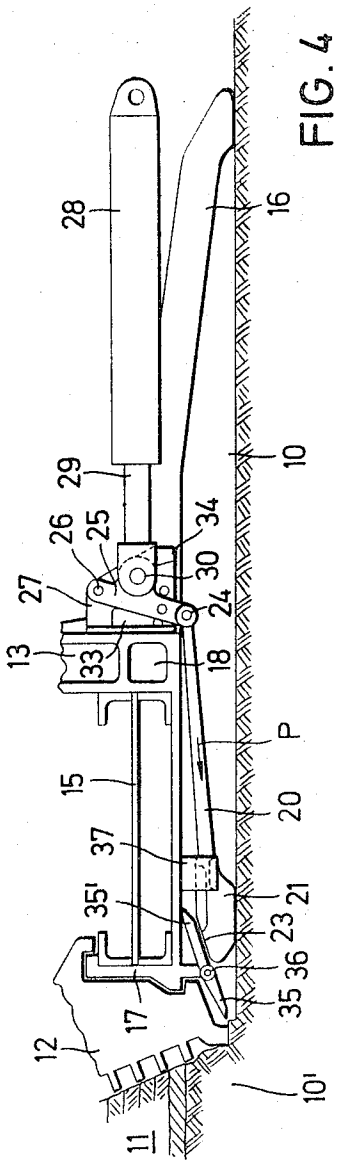

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FIG. 4

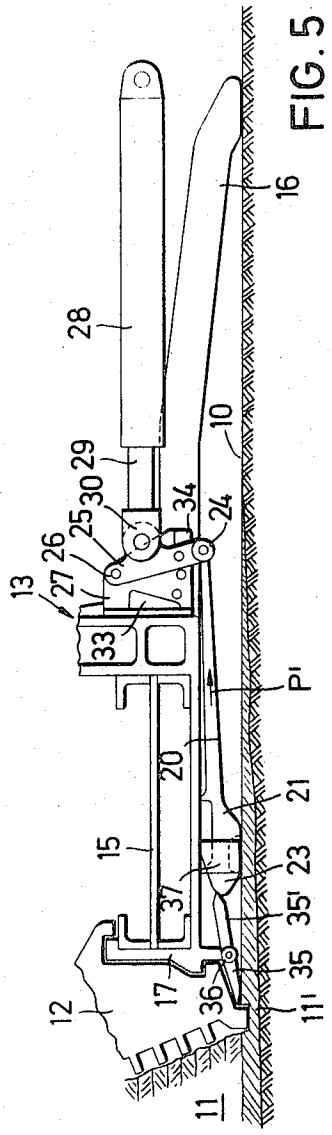
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FIG. 5

# CONTROL ROD FOR LONGWALL MINING INSTALLATION

## BACKGROUND OF THE INVENTION

The present invention relates to a mineral mining installation with a mineral mining machine guided for movement along a conveyor and more particularly to such an installation having a control device for adjusting the cutting position of the mining machine.

In the winning of mineral, particularly coal, by longwall working it is generally desirable to control the cutting position of the machine or plough guided along the conveyor so as to ensure the machine cuts the mineral face accurately to the floor level of the working. From time to time the machine is apt to climb away from the floor or to cut into the floor and in these circumstances it is usual to apply some compensating control force to the guide means for the machine. Various forms of control devices have been proposed and it is known, for example, to use such a device composed of hydraulic lifting units attached to the goaf side of the conveyor which are used to tilt the conveyor to effect the desired control of the cutting position of the machine.

It is a general object of the invention to provide an improved form of control device.

## SUMMARY OF THE INVENTION

According to the invention there is provided a mineral mining installation comprising a conveyor, guide means for guiding a mineral winning machine for movement along the conveyor and at least one control device for controlling the position of the guide means, said control device having an elongate rod extending beneath the conveyor with a head for slidably moving between the floor of a working and the guide means and means for moving said rod axially to thereby effect raising or lowering of the guide means.

Preferably the conveyor is supported in a frame which has a floor for receiving the conveyor, a guide member at one side constituting said guide means and a side wall at the side of the frame remote from said guide member. This provides a comparatively simple yet robust construction.

Normally a plurality of control devices would be spaced apart longitudinally of the installation. It is particularly advantageous to utilize shifting rams used conventionally for shifting the installation in accordance with the mining progress to move the control rods of the devices. The piston rod of each ram may be pivoted to a generally upstanding lever which has one end pivoted to one of the control rods and the other end pivoted to a bracket on the side wall of the frame. The lever can then be locked to the bracket, for example by means of a pin inserted into a bore in the bracket or into bores in the bracket and in the lever so that the rams can be used to shift the entire installation.

By removing the locking pins however the rams can be used to move the associated rods and effect the control function. Preferably the bracket has stop members which limit its pivotal movement of the associated lever and the lever can be disposed between the locking pin and one of the stop members of the bracket. In this way shifting can occur with the rods disposed in one of two limiting control positions.

The guide member may have an inclined ramp portion at the mineral face and the head of each control rod may be wedge-shaped with faces slidably engageable with the floor of the working and the underside of said ramp portion.



Alternatively, a plate can be pivotably connected to the guide member to pivot about an axis extending parallel to the conveyor. The head of each control rod may then have faces slidably engageable with the floor of the working and the underside of a portion of said plate disposed inwardly towards the conveyor from the pivotal axis of the plate.

The invention may be understood more readily and various other features of the invention may become apparent from consideration of the following description.

## BRIEF DESCRIPTION OF DRAWINGS

Embodiments of the invention will now be described, by way of examples only, with reference to the accompanying drawings, wherein:

FIGS. 1 to 3 are corresponding end views of a mineral mining installation made in accordance with the invention showing the control device thereof in various operating positions; and

FIGS. 4 and 5 are corresponding end views of a further installation made in accordance with the invention and also showing the control device thereof in various operating positions.

## DESCRIPTION OF PREFERRED EMBODIMENTS

Referring initially to FIGS. 1 to 3, there is shown a mineral mining installation with a scraper chain conveyor 15 disposed alongside a longwall coal face 11. A winning machine, in the form of a plough 12, is moved back and forth along the conveyor 15 to cut the coal from the face 11; the coal being transported from the working by the conveyor 15, in known manner. A support frame, with a hollow upstanding side wall on the goaf side of the conveyor 15 supports the conveyor 15 and the plough 12. This frame has a support floor 14 extending beneath the conveyor 15 and the channel sections of the conveyor 15 rest on this floor 14. At the mineral face side, the floor 14 adjoins a guide member 17 which serves to support and guide the plough 12. The frame composed of the side wall 13, the floor 14 and the guide member 17 is thus in the form of a trough into which the conveyor 15 is received.

A series of spaced apart shaped bracing beams 16 extend outwardly from the side 13 of the frame and engage on the floor 10 of the working to brace the frame and maintain the side 13 of the frame in an elevated position. These beams 16 may also serve in known manner to guide roof support assemblies not shown in the drawing, during shifting.

The plough 12 is driven along the face 11, i.e. along the guide member 17, by means of an endless chain guided in the side wall 13 of the frame. More particularly, the return run of the chain passes through a channel 18 in the wall 13 and the drive run of the chain is guided in a channel disposed above the channel 18. The plough 12 has an arm (not shown) which extends over the conveyor 15. This arm is guided on the wall 13 and drivably connects with the drive run of the chain.

The guide member 17 has a downwardly inclined ramp portion 19 and the cutting tools of the plough 12 only project by their cutting depth towards the face 11 beyond the end of the portion 19.

In order to adjust the position of the guide member 17 in relation to the floor 10 to thereby vary the cutting position of the plough 12 control devices are provided which are disposed at spaced intervals along the installation. Each device is composed of a rod 20 having a head 21 of wedge-shape with opposite faces 27, 23. The face 23 slidably engages on the underside of the inclined ramp portion 19 of the guide member 17 and part of the face 22 slidably engages on the floor 10 of the working. The head 21 thus supports the guide member 17 and the plough 12 on the face side. The rod 20 is pivotably connected at its end remote from the head 21 to one end of a lever 25 by means of a pin 30. The lever 25 is in turn pivotally connected at its other end with a pin 26 to a bracket 27 attached to the side wall 13 of the frame. The bracket 27 is formed with stop members 33, 34 which limit the pivotal movement of the lever 25. A shifting ram 28 has a piston rod which is pivotably connected to a pin 30 attached to the lever 25 and disposed between the pins 24, 26. The cylinder of the ram 28 would normally be connected to a roof support assembly. The bracket 27 and the lever 25 have bores 31, 32 which align with one another when the lever 25 is vertical to receive a locking pin.

The rams 28, which are spaced apart longitudinally of the installation, serve to shift the frame 13, 14, 17, the conveyor 15 and the plough 12 towards the face 11 and also to operate the control devices 25, 20. When it is desired to shift the installation bodily towards the face 11 the levers 25 are connected to the brackets 27 with the locking pins which may be inserted in the bores 31, 32 or in the bores 32, to lock the levers 25 to the brackets 27. Thereafter the piston rods 29 of the rams 28 are extended to effect the shifting. With the locking pins removed however extension or retraction of any of the piston rods 29 will pivot the associated lever 25 to cause the rod 20 connected therewith to move longitudinally towards or away from the face 11. Such movement of any of the rods 20 will in turn then cause the head 21 thereof to slide between the ramp portion 19 of the guide member 17 and the floor 10 to thereby raise or lower the guide member 17.

FIG. 1 depicts the situation where the guide member 17 is in the standard position where the end of the ramp portion 19 of the guide member 17 is just at floor level. In this position, the bores 31, 32 align to receive the locking pins if desired. If during operation the plough 12 tends to cut into the floor 10, as denoted by 10', in FIG. 2, then the plough 12 must be guided upwardly. The piston rods of the rams 28 are in this case extended to cause the rods 20 to move in the direction of arrow P in FIG. 2 to thereby raise the guide member 17. The movement of the levers 25 and the rods 20 are limited by the stop members 33 of the brackets 27. Conversely if during operation the plough 12 tends to cut too far above the floor level, as denoted by 11' in FIG. 3, then the plough 12 must be guided downwardly. The piston rods of the rams 28 are in this case retracted to cause the rods 20 to move in the direction of arrow P' in FIG. 3 to thereby lower the guide member 17. The movement of the levers 25 and the rods 20 are here limited by the stop member 34 of the brackets 27. When it is desired to shift the installation it is not necessary to adopt the standard position of FIG. 1 so that the locking pins are received in the bores 31, 32. Instead, the locking pins can be inserted in the bores 32 only, in the positions shown in FIGS. 2 and 3, so that each lever 25 is locked between the associated stop member 33 or 34 and the locking pin. Thereby shifting of the installation can take place by extending the piston rods 29 of the rams 28 with the guide member 17 set into a controlling position (FIG. 2 or 3) rather than the standard position (FIG. 1).

FIGS. 4 and 5 depict a further embodiment somewhat similar to that shown in FIGS. 1 to 3 and like reference numerals are therefore used to denote the same features. In this construction the integral ramp portion 19 of the guide member 17 is replaced by a plate 35 pivoted at about its longitudinal centre to a lower part of the guide member 17 by means of a spindle 36 extending parallel to the face 11. The plate 35 has a portion 35' which engages beneath the floor 14 of the frame and can swivel about the spindle 36 to raise or lower the cutting position of the plough 12. The portion 35' is slidably engageable with the upper face 23 of the head 21 of the control rod 20. The support floor 14 in this construction bears guide pieces 37 which slidably guide and support the rods 20.

In FIG. 3, the plough 12 is shown, as denoted 10', to be cutting into the floor 10 and in order to raise the plough 12 the rods 20 are displaced in the direction of arrow P. Conversely as depicted in FIG. 5, the plough 12 is shown to be cutting away from the floor 10 and in this case the rods 20 are displaced in the direction of arrow P' to allow the plough 12 to be lowered.

We claim:

1. In a mineral mining installation composed of a conveyor and guide means for guiding a mineral winning machine for movement along the conveyor; the improvement comprising at least one control device for controlling the position of the guide means, said control device having an elongate rod extending beneath the conveyor with a head for slidably engaging and moving between the floor of a working and the guide means, and means for moving said rod axially to thereby effect raising or lowering of the guide means.

2. An installation according to claim 1, wherein the conveyor is supported in a frame which has a floor for receiving the conveyor, a guide member at one side constituting said guide means and a side wall at the side of the frame remote from said guide member.

3. An installation according to claim 2, wherein the guide member has an inclined ramp portion extending towards the floor of the working and the head of said rod engages on said ramp portion.

4. An installation according to claim 3, wherein the head of the rod is of wedge-shaped construction with faces slidably engageable with the floor of the working and the underside of said ramp portion.

5. An installation according to claim 2, wherein a plate is pivotably connected to said guide member to pivot about an axis extending parallel to the longitudinal centre of the conveyor, the head of said rod engaging on said pivotable plate.

6. An installation according to claim 5, wherein the head of the rod has faces slidably engageable with the floor of the working and the underside of a portion of said plate disposed inwardly towards the conveyor from the pivotal axis of the plate.

7. An installation according to claim 5, wherein the underside of the floor of the support frame has a guide piece for slidably guiding and supporting the rod.

8. An installation according to claim 2, wherein there is provided a lever which is pivoted at one end to the rod and at the other end to the frame, the moving means acting upon said lever to effect movement of the rod.

9. An installation according to claim 8, wherein said other end of the lever is pivoted to a bracket on the side wall of the frame, said bracket having stop members for limiting the pivotal movement of the lever.

10. An installation according to claim 1, wherein the moving means is a shifting ram.

11. An installation according to claim 9, wherein the moving means is in the form of a shifting ram having its piston rod pivotably connected to the lever.

12. An installation according to claim 11, wherein there is provided means for selectively locking the lever whereby the ram can be used to shift the installation towards a mineral face.

13. An installation according to claim 12, wherein the locking means is in the form of a pin insertable into a bore in the bracket whereby the lever can be disposed between the pin and one of the stop members of the bracket.

14. An installation according to claim 13, wherein the lever has a bore alignable with the bore in the bracket.

15. An installation according to claim 2, wherein a series of beams spaced-apart longitudinally of the conveyor serve to brace the frame on the floor of the working.

16. An installation according to claim 1, wherein a plurality of control devices are provided which are spaced-apart longitudinally of the conveyor.

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