

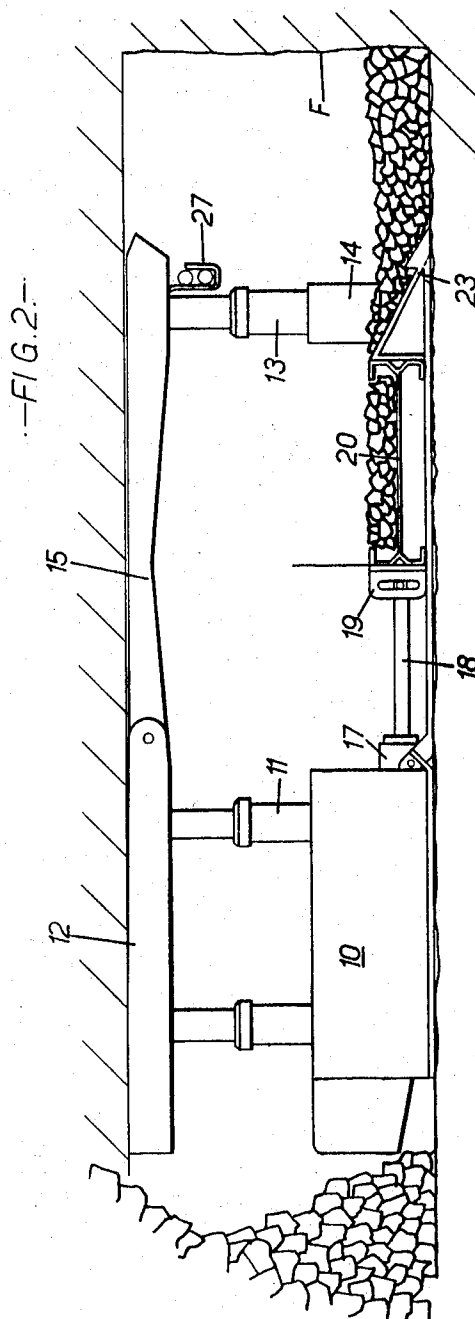
Nov. 28, 1967

J. W. SEDDON
MINE ROOF SUPPORTS AND CONVEYORS FOR USE
IN CONJUNCTION THEREWITH

3,355,213

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5 Sheets-Sheet 2



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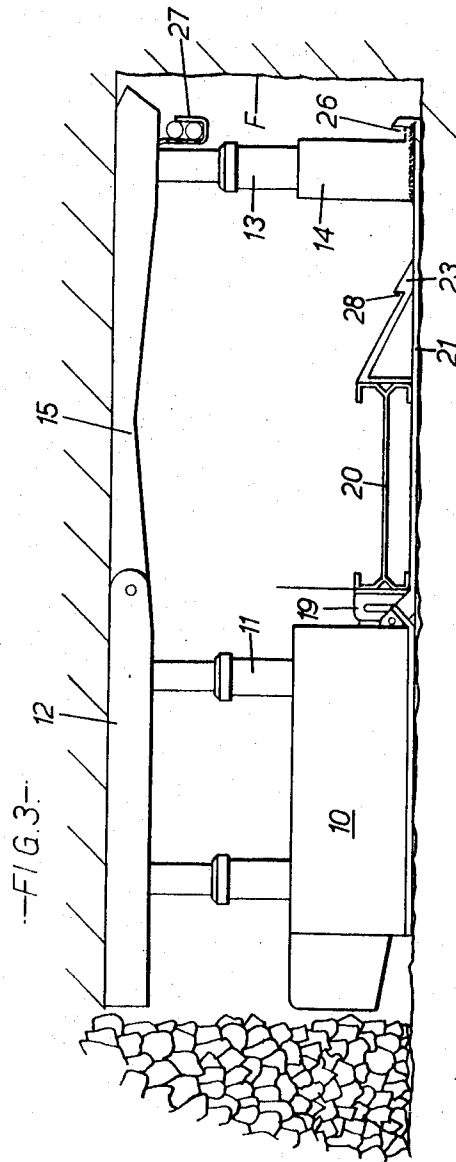
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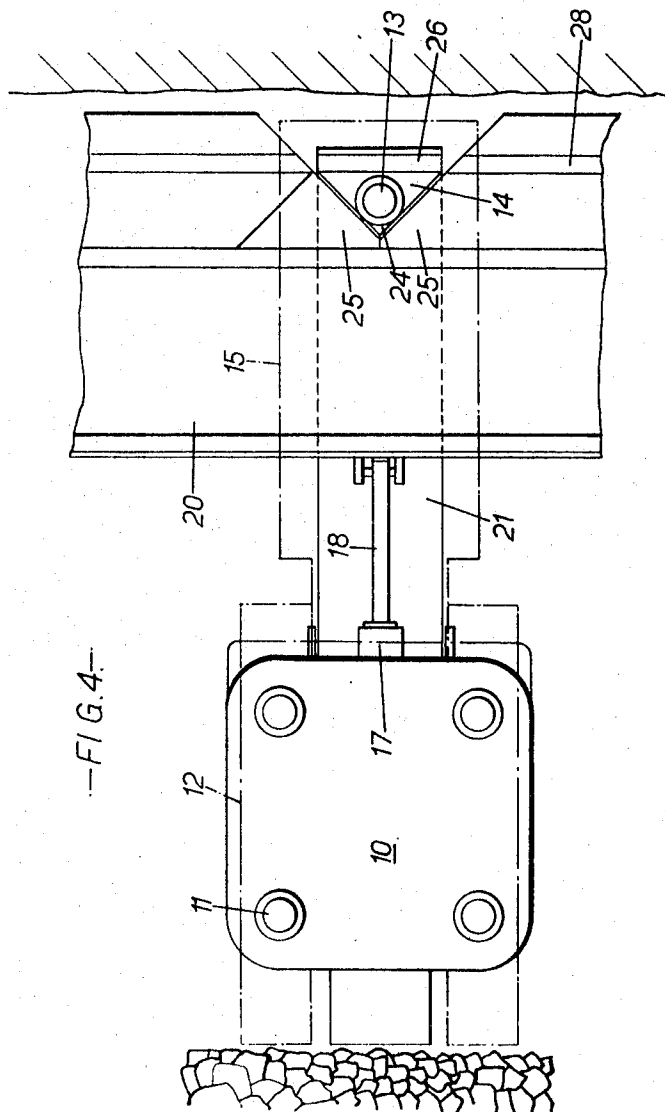
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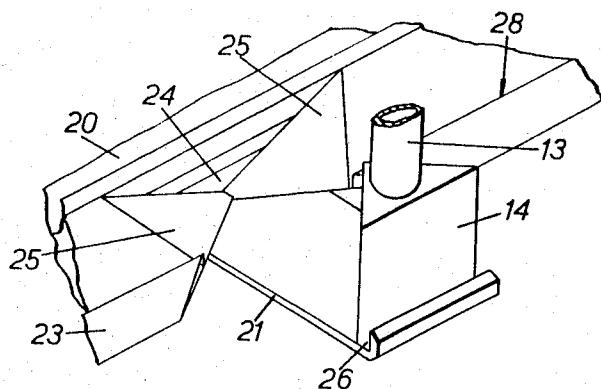
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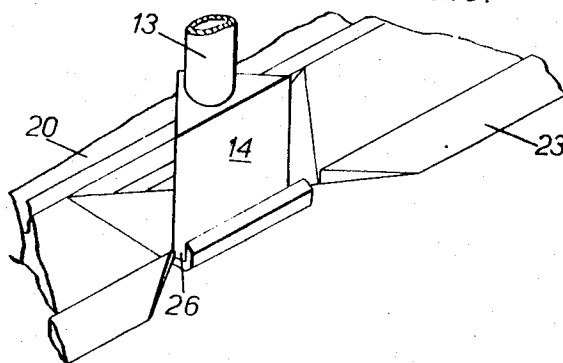
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—FIG. 5—



—FIG. 6—



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3,355,213

MINE ROOF SUPPORTS AND CONVEYORS FOR USE IN CONJUNCTION THEREWITH

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10 Claims. (Cl. 299—31)

ABSTRACT OF THE DISCLOSURE

A mine roof support, including spaced apart rearward and forward roof-supporting units with respect to a mineral face to be mined, is used in combination with a conveyor which passes between said rearward and forward units and is advanceable therebetween towards the mineral face. The support has pressure-fluid ram means operative, using the conveyor as a reaction means, to advance the support. The conveyor has, on its foremost side, collecting means which directs cut material on the mine floor adjacent the mineral face into the conveyor as the latter is advanced towards the mineral face.

Background of the invention

In recent years great advances in the efficiency of extracting coal and other minerals have been made by mechanising the longwall method of mining. This mechanisation has included the use of a snaking conveyor, running along the face, and a cutter-loader machine travelling along or guided by the conveyor. Because of obstruction to the travelling of the machine it has not, in general, been possible heretofore to set roof supports on the coal face side of the conveyor. This method of support, which has been called the "prop free front method," suffers from the disadvantage that there is no satisfactory support to the roof except from behind the conveyor.

Mechanisation has also taken place in the powering of the roof supports but this has accentuated the disadvantage of the prop free front method of working because powered supports cannot be operated as flexibly as manually set supports.

The full advantages of mechanisation have thus not been achievable because of the necessity to supplement the powered supports with hand set props. This involves the use of costly additional labour, and materials.

An object of the present invention is to allow the full use of a mechanised system of longwall mining and also give superior roof support by providing satisfactory support elements on the face side of the conveyor.

The invention is concerned with powered mine roof supports of the kind incorporating pressure-fluid ram means whereby the conveyor, which extends along the coal face and receives and carries away the coal as it is cut from the face by the cutter or plough, is pushed towards the coal face progressively as cutting of the coal proceeds after which, using the conveyor as an anchorage, the ram means is operated so as to advance the support up to the conveyor.

Prior to the use of powered supports it was the common practice to set a row of props between the coal face and the conveyor so as to obtain support to the newly exposed roof after passage of the cutting machine. This, although desirable, has not been achieved with powered roof supports of the kind described above, the roof between the conveyor and face being supported by cantilever roof-bars extending from props or chocks behind, i.e. on the waste side of the conveyor.

Often, it has been necessary to set props manually on the coal face side of the conveyor, thus limiting the advantages of mechanising the supports.

The difficulties, in providing powered supports with a prop or support element between the conveyor and the coal face, have been the guiding of the cutting machine, the fouling of cables or service pipes and the transfer of coal to the conveyor. Furthermore, even with manually set props, there has been a tendency for debris to collect in the space between the props adjacent the face and this debris can constitute an obstruction to the movement of the cutting machine and also create difficulty in moving the conveyor towards the face after the passing of the cutting machine.

A further object of the present invention is, therefore, to provide a mine roof support which provides for the location of a prop or support element between the conveyor and the coal face but which does not result in the just mentioned difficulties. A still further object of the invention is to provide a modified or improved form of conveyor particularly suited for use with such a support.

Summary of the invention

Briefly, the present invention provides the combination of a mine roof support, including spaced apart rearward and forward roof support units with respect to a mineral face to be mined, a conveyor passing between said rearward and forward support units and advanceable therebetween towards the mineral face, and pressure-fluid ram means operative, using the conveyor as a reaction means, to advance the support, said conveyor having on its foremost side collecting means which directs cut mineral on the mine floor adjacent the mineral face into the conveyor as the latter is advanced towards the mineral face.

The reference to "foremost side" of the conveyor is intended to mean the side which is nearest to the coal face.

In one preferred embodiment of the invention the rear and forward support units or elements are connected at their upper parts by a roof-bar and at their lower ends by a base-plate, the conveyor being movably (e.g. slidably) supported on this base-plate and the rear unit or element embodying a hydraulic ram which, after a cut of the coal face has been made, first advances the support, using the conveyor as an anchorage, and then advances the conveyor up to the forward support unit or element.

Conveniently the means on the foremost side of the conveyor for directing material into it is a ramp or plough-like member and is hereinafter referred to as such. This ramp or plough-like member facilitates advance of the conveyor, where the floor exposed by the cutting of a strip of coal from the face is rough, as well as serving, during such advance, to direct or load the cut coal onto the conveyor.

Preferably the ramp or plough-like member on the conveyor is interrupted at intervals along its length to permit it to be advanced beyond the forward support unit or element, i.e. beyond the forward prop line and right up to the mineral face so as to load the mineral onto the conveyor.

A secondary ramp or plough-like member may be provided on the conveyor, at said interruptions, to clear any obstruction between the conveyor and the forward prop or support unit during conveyor advance.

Conveniently the above-mentioned ramp or plough-like member incorporates guide means which, when the conveyor and support have been advanced ready for a further cut of the coal face to be made, align with guide means on the forward support unit or prop so as to provide a guide for the cutting machine.

Means may also be provided on the support (e.g. on the forward end of a roof-bar carried by the forward support unit) for the carrying or suspension of power

cables, hose and the like which have to extend along the face.

One particular embodiment of the invention will now be described, by way of example, with reference to the accompanying semi-diagrammatic drawings. In the drawings:

FIGURE 1 is a side elevation of the support and an end view of the conveyor and shows the support and conveyor in the position they occupy immediately prior to a cut being made on the coal face,

FIGURE 2 is a view similar to FIGURE 1 but shows the position of the support and conveyor in relation to the coal face after the cut has been made,

FIGURE 3 is also a view similar to FIGURE 1 and shows the relative positions of the support, conveyor and coal face after the support has been advanced but prior to advance of the conveyor,

FIGURE 4 is a plan view of FIGURE 1 but with the roof-bar structure or canopy of the support removed, and

FIGURES 5 and 6 are detail fragmentary perspective views of the lower part of the forward support unit or prop and the adjacent portion of the conveyor.

Referring to the drawings, the support comprises a rear support unit, having a base 10, hydraulically-extensible telescopic legs 11 mounted in said base and a roof-bar structure or canopy 12, and a forward unit having a single hydraulically-extensible telescopic leg or prop 13 mounted in a base 14. A roof-bar 15 is pivotally connected to the canopy 12 at 16 and rests on the forward support unit 13.

The cylinder 17 of a double-acting hydraulic ram is secured (e.g. by means of laterally extending trunnions or other suitable means not shown) in the base 10 of the rear unit, the piston rod or ram proper 18 of said ram being adapted for attachment, by means of a clevis 19 to the conveyor 20.

The props or legs 11 and 13 may be free to tilt or rock to a limited extent in the usual way in their base members 10 and 14 and the canopy 12 and roof-bar 15 may be mounted on the upper parts of said legs or props by means of concave/convex seatings (not shown) which is also the usual practice so as to permit the base members, hydraulic legs and roof members to accommodate themselves to any roughness or unevenness in the floor and roof.

The rear unit 10, 11, 12 and the forward unit 13, 14, 15 are connected together by a connecting-plate or base-plate 21 pivotally or hingedly attached to the base 10 as indicated at 22 and welded to the base 14.

The lower part of the base 14 of the forward unit is provided on its front side with a guide element 26 (see FIGURE 3) for a purpose hereinafter to be described.

It will be noted that the conveyor 20 is accommodated between the rear and forward support units and is slidably mounted on the bottom connecting-plate or base-plate 21.

The conveyor 20 is provided on its side nearest the coal face F with a floor-engaging ramp or plough-like member 23 which extends longitudinally of the conveyor but is interrupted or set back at intervals, as indicated at 24 (see FIGURES 4, 5 and 6) so as to accommodate the base 14 of the forward support unit and allow the forward end of the ramp or plough 23 to project beyond the forward prop line. It will be noted from FIGURE 6 that the base 14 of the forward support leg 13 is of triangular form in plan so as to enter neatly into the interruptions or recesses 24 in the ramp or plough 23.

A secondary ramp means 25 is provided on the ramp or plough 23, in the vicinity of the interruptions or recesses 24, to clear any obstruction between the conveyor and prop during conveyor advance.

At its forward part the ramp or plough 23 is provided with guide means 28 which, when the support and conveyor have been advanced up to the coal face, as shown in FIGURE 1, align with the guide means 26 to form a guide along the coal face for the plough or other cutting

machine P which may conveniently be of the kind which cuts when it moves in one direction along the face and ploughs the coal onto the conveyor 20 when it moves in the opposite direction.

The roof-bar 15 carries a cable hanger 27 for supporting cables or service pipes which have to be carried along the coal face for the supply of electricity to the cutting machine and pressure-fluid to the supports and/or for other purposes.

With the support and conveyor in the position shown in FIGURE 1 a cut is made along the coal face F, the cutter-loader P operating forwardly of the roof bar 15, the forward base 14 and ramp 23, and the position of the support and conveyor in relation to the coal face is then as shown in FIGURE 2. During the cutting operation the cutting machine also loads coal onto the conveyor.

The cutting machine then ploughs back to the stable and loads coal which has fallen onto the floor, during the cutting operation, into the conveyor 20.

Using the conveyor 20 as an anchorage and first lowering the roof structures 12, 15, the piston 18 of the ram 17 is then retracted so as to draw the support 10, 11, 12 and 13, 14, 15, forward and towards the coal face as shown in FIGURE 3.

After elevating the roof structures 12, 15, the piston 18 of the ram 17 is then advanced to push the conveyor 20 forwardly. The relative positions are then again as shown in FIGURE 1 and a further cut may be made at the coal face.

During advance of the conveyor the ramps 23 and 25 scrape the floor and base-plate 21 and assist in overcoming any obstruction and serve to guide or scoop material into the conveyor.

In a modification of the above-described arrangement the ram 17, 18 is a single-acting ram and serves only for the purpose of advancing the support, the conveyor being advanced by double-acting ram means provided on other supports in the system, which latter supports may be as described above with reference to the accompanying drawings. Alternatively, of course, the conveyor could be advanced by other types of advancing devices, for example, a device consisting merely of a single-acting ram and a steel prop which, when secured between floor and roof, forms the reaction member against which the ram acts when advancing the conveyor.

There will, of course, be many supports spaced along the length of the conveyor in the usual way with the long-wall system of mining.

It will be appreciated that the invention can provide, inter alia:

(a) A support system which gives substantially even loading on floor and roof from coal face to waste edge.

(b) Free passageway for the cutting machine and machine services.

(c) Means for transferring to the conveyor any coal which has not been ploughed into the conveyor as the cutting machine ploughs back to the stable.

(d) Means ensuring full advance of the support and the conveyor.

(e) A support suitable for all or at least most roof conditions, particularly where backslip may be encountered.

I claim:

1. In a mine roof support, including spaced apart rearward and forward roof support units with respect to a mineral face to be mined, a conveyor passing between said rearward and forward support units and advanceable therebetween towards the mineral face, and pressure-fluid ram means operative to advance the support, the improvement comprising collecting means on the foremost side of said conveyor for directing cut material on the mine floor adjacent the mineral face into said conveyor as the latter is advanced towards the mineral face.

2. The combination according to claim 1 wherein said pressure-fluid ram means comprises a piston and cylinder

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one of which is connected to the roof support and the other to the conveyor whereby the ram is operative, using the conveyor as a reaction means, to advance the support and, using the support as a reaction means, to advance the conveyor.

3. The combination claimed in claim 1 wherein said rearward and forward roof support units are connected together at their lower parts by a member on which the conveyor is movably mounted, means rigidly connecting one end portion of said member to one said roof support unit, and means connecting the other end portion of said member to said other support unit for articulation about a horizontal axis.

4. The combination claimed in claim 1 wherein said means on the foremost side of the conveyor for directing material into it is a plough-like member.

5. The combination claimed in claim 1 wherein said means on the foremost side of the conveyor for directing material has an interruption recess in alignment with a prop of the forward support unit so that said means can be advanced beyond said prop to the mineral face.

6. The combination claimed in claim 5 wherein said interruption recess is of triangular form and said prop of the forward unit has a base of triangular form in plan so that it will enter neatly into said interruption recess.

7. The combination claimed in claim 5 wherein a plough-like member is provided on the foremost side of the conveyor in said interruption recess to clear obstruction between the conveyor and the forward support unit during advance of the conveyor towards the mineral face.

8. The combination of claim 5 wherein said recess conforms to the configuration of said forward support unit to preclude accumulation of material therebetween.

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9. In a mine roof support, including spaced apart rearward and forward support units with respect to a mineral face to be mined, a conveyor passing between said rearward and forward support units and advanceable therebetween towards the mineral face, and pressure-fluid ram means operative to advance the support, the improvement comprising collecting means on the foremost side of said conveyor for directing cut material on the mine floor adjacent the mineral face into said conveyor as the latter is advanced towards the mineral face, said forward support unit and the foremost side of the conveyor each being provided with guide means for a mineral cutting machine, said guide means being brought into vertical alignment with one another when the support and conveyor have been advanced in turn towards the mineral face.

10. The combination claimed in claim 9 wherein said guide means on the foremost side of the conveyor is incorporated in the means for directing material into the conveyor.

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