June 3, 1969 F. SCHUERMANN 3,447,328

MINE ROOF SUPPORTS

Filed April 10, 1967 Sheet 1 of 2

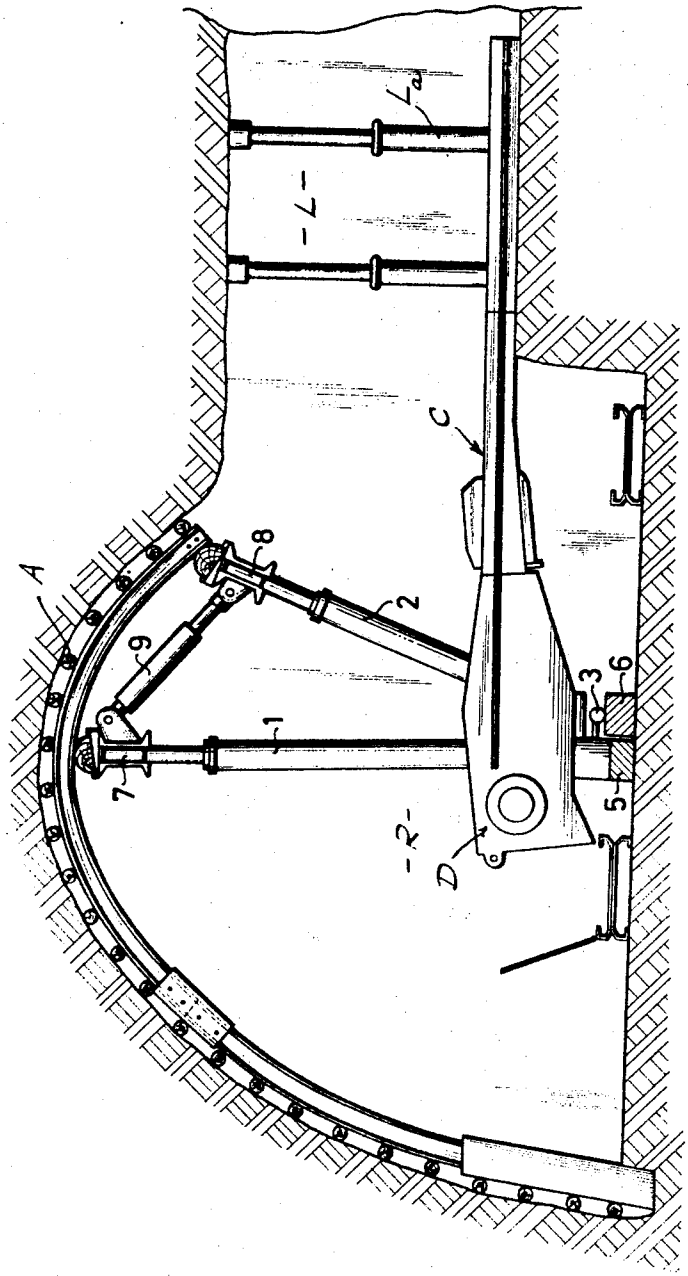


FIG. 1

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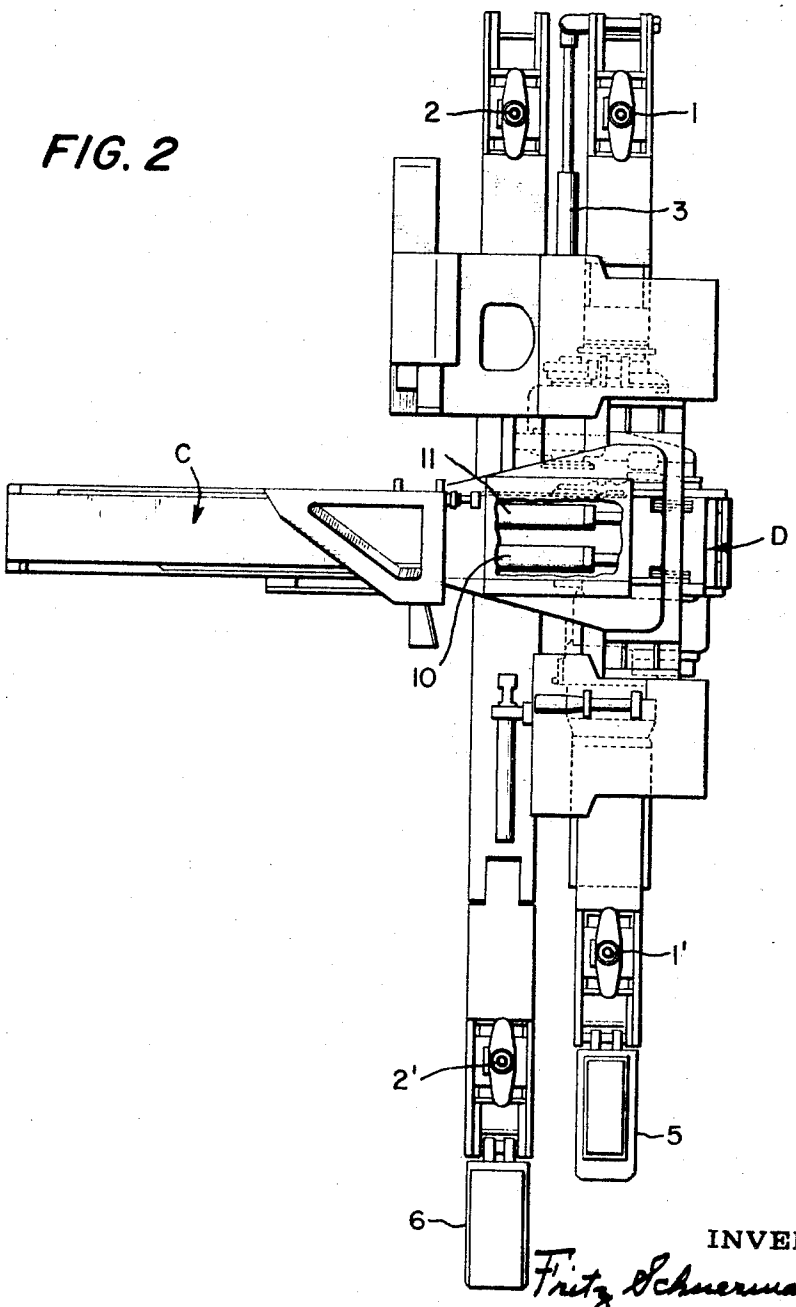
June 3, 1969 F. SCHUERMANN 3,447,328

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Sheet 2 of 2

FIG. 2



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MINE ROOF SUPPORTS

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Int. Cl. E21d *11/16;* B65g *25/02, 27/08*
U.S. Cl. 61—45 2 Claims

ABSTRACT OF THE DISCLOSURE

The present invention consists of a roof support arrangement in a gate road leading to the working face of a longwall coal mine working, comprising; a pair of roof support frames of which each has, on the one hand, elongated roof and floor engaging means extending in the direction of the gate road, and on the other hand, a pair of rams extending from the elongated floor engaging means to the elongated roof engaging means for forcing them respectively against the floor and roof; means connected with the two frames and capable of causing relative movement between them in the direction of the gate road when the rams of one frame are depressurised to provide a self-advancing action of the frames, at least one of the frames being attached to traction means extending along the longwall coal face to anchor the traction means; and means for adjusting the distance between the two roof-engaging means in a direction perpendicular to them.

Summary

It is a generally known expedient in mining practice to use self-advancing roof support units, of the type used behind a longwall coal face, for supporting the gate roadway at the junction with the passage behind the coal face, so as to provide an effective means for reinforcing the supports already installed in the roadway. These units consist of two parallel frames each having at least two rams. However, since the distance between the two frames is the same at the floor and at the roof, the frames are substantally vertical and are not well suited to resisting forces acting at an angle to the vertical.

In accordance with a prior proposal, the driving and anchoring stations for longwall coal cutting machines and/or conveyors were to be mounted on self-advancing roof support frames which were not vertical. Frames so placed were not, however, found to be satisfactory in the prior proposal owing to the small amount of force they were able to provide for supporting the roof, though they resisted the traction forces acting in the direction of the coal face. Consequently additional means had to be provided to support the roof.

The usefulness and practicability of roof support arrangements of the type with which the invention is concerned depend largely on their ability to transmit traction forces occurring in the case of equipment at the end of a longwall coal face to the rock above and below the coal seam. That is to say, the roof support system serves not only for supporting the roof but also to a certain extent serves as a foundation for means driving the conveyor and/or coal cutting machine.

In this case the anchoring means in the air gate is subjected to a substantially higher load than that in the conveyor road. Satisfactory operation of the anchoring means for the conveyor is, it should be remarked in addition, also required when the conveyor is being advanced. The anchoring means itself has to be advanced after the

long-wall coal face has advanced a distance between 1 and 3 metres so that the conveyor can be moved in small steps within the anchoring means in accordance with the progress of the coal front. While with anchoring means in the air gate, more especially in the case of dipping seams, the means only have to take up forces directed towards the coal front, in the case of anchoring means in the conveyor roadway, forces directed in the opposite direction may have to be resisted, more especially, when the conveyor is curved before the beginning of cutting along the coal face and the conveyor has to be straightened by the coal cutting machine. Such forces also occur when the anchoring means in the air gate gives way, or when the roof support frames with their advancing cylinders are not perpendicular to the conveyor so that the latter is displaced towards the conveyor roadway or air gate.

The necessary anchoring forces, more especially in the conveyor roadway, vary considerably in magnitude and may change in direction. The highest forces which the anchoring means have to resist appear when the conveyor becomes blocked owing to debris obstructing the bottom run of the moving part of the conveyor, or when a plane-type coal cutting machine becomes jammed against a coal face. In the latter case traction forces to be resisted by the anchoring means may reach values of 100 to 200 tons. Since the rams of the anchoring means for resisting these forces are always set at an angle to the direction of the forces, the resultant forces appearing in the rams may be double the forces to be resisted.

An object of the present invention is to provide a self-advancing roof support arrangement capable of resisting not only pressure exerted by the roof but also traction forces in the direction of the coal front, the arrangement being such that such traction forces are transmitted to the coal or other rock forming either the roof or side of the roadway.

Brief description of the drawings

FIGURE 1 is a diagrammatic view showing in section a conveyor roadway and a passage behind a longwall coal face, a conveyor being shown in elevation extending into the passage with its driving and anchoring station disposed in the roadway, and a supporting device for the arched gateway being shown in elevation; and

FIGURE 2 is a top plan view of the machine showing the two frames with the associated conveyor and ram means for affording advancing movement to the assembly, as well as the ram means associated with the conveyor.

The drawing is a section through the junction of the passage behind a longwall coal face L showing usual vertical props L*a* therein, and a conveyor roadway R. The driving and anchoring station D at the end of the conveyor C running along the coal face is placed in the roadway. The roof and sides of the latter are supported by steel arches A of the type widely used in coal mines. In order to enable the conveyor C to be extended into the roadway, parts of the arches adjacent to the passage behind the coal face are temporarily removed.

In order to support the roof of the roadway R and the junction between it and the passage L behind the coal face, and also to provide anchoring means for the drive D at the end of the conveyor C, use is made of a roof support arrangement which comprises two roof support frames. The support frame farther from the coal face comprises an elongated roof-engaging means **7** which is carried by at least two support rams **1** and **1'** articulated at their lower ends. The support frame nearer the coal face comprises a further elongated roof-engaging means **8** which is carried by at least two support rams **2** and **2'** articulated at their lower ends. The planes containing

the axes of the two groups of rams and the axes of the elongated means **7** and **8** are at an angle to each other. The support frame comprising the rams **1** and **1'** and the roof engaging means **7** has an elongated floor engaging means **5**, while the frame comprising the rams **2** and **2'** and the roof engaging means **8** comprises elongated floor engaging means **6**. The means **5** and **6** are provided with means in the form of a hydraulic ram **3** for causing relative movement between the two frames in the direction of the gate roadway R when the support rams of one frame are depressurised, thus providing for a self-advancing action of the two frames.

The two elongated roof-engaging means **7** and **8** are connected by several oblique rams **9** which are used to alter the distance between the two means **7** and **8** and thus change the angle between the two frames.

The rams **9** are operated in order to enable the support frames to suit varying conditions in the roadway, or to suit other roadways having different wall and roof cross-sections. In the arrangement shown the rams **2** and **2'** are arranged to take up all the non-vertical forces from the roof of the roadway and also the traction forces exerted by the conveyor C, while the group of rams **1** and **1'** serve for taking up vertical forces from the roof.

In the arrangement shown the support frame **6**, **2**, and **8** is arranged to anchor the drive means of the conveyor C so as to resist traction forces extending in the direction of the coal face. Double acting hydraulic rams **10** and **11** can be provided for moving the end of the conveyor C not only in the plane of the support frame **8**, **2**, and **6** but also in a direction parallel to the length of the conveyor, i.e., perpendicular to the plane of the support frame.

Owing to the self-advancing action of the two support frames, the arrangement is fully mechanised.

The arrangement enables the support arches to be effectively carried before their parts adjacent to the end of the coal face are removed, and also at the same time additional forces can be taken up by adjacent support arches.

A particular advantage of the support arrangement is its applicability in the case of arched roadway supports since the latter are so widely used.

I claim:

1. A roof support for a gate road having a passage leading to the working face of a longwall coal mine working, comprising:

a conveyor device adapted to extend into such passage and having a driving and anchoring station disposed in the gate road,

a pair of frames in the gate road for supporting the roof thereof,

a support on one frame for the driving and anchoring station of said conveyor,

each frame having elongated roof and floor engaging means respectively, extending in the direction of the gate road,

a ram for each frame between the respective floor and roof engaging means,

a second ram for each frame angularly disposed relative to said first ram and interposed between the respective floor and roof engaging means,

obliquely arranged rams connecting said elongated roof engaging means for altering the distance therebetween and thereby changing the angle between said frames, and

a ram connecting said frames for imparting relative movement therebetween in the direction of the gate road, so that upon depressurising the rams of one frame, advancing action can be imparted to the other frame.

2. A roof support as claimed in claim **1**, comprising means for moving the end of the conveyor in the plane of the respective support frame and in a direction perpendicular thereto.

References Cited

FOREIGN PATENTS

999,943 7/1965 Great Britain.

OTHER REFERENCES

German printed application to Dommann 1,162,793, February 1964,

JACOB SHAPIRO, *Primary Examiner.*

U.S. Cl. X.R.

198—1