Oct. 27, 1959 W. H. BARRETT 2,910,282

MINE ROOF SUPPORT DEVICES

Filed July 14, 1958 3 Sheets-Sheet 1

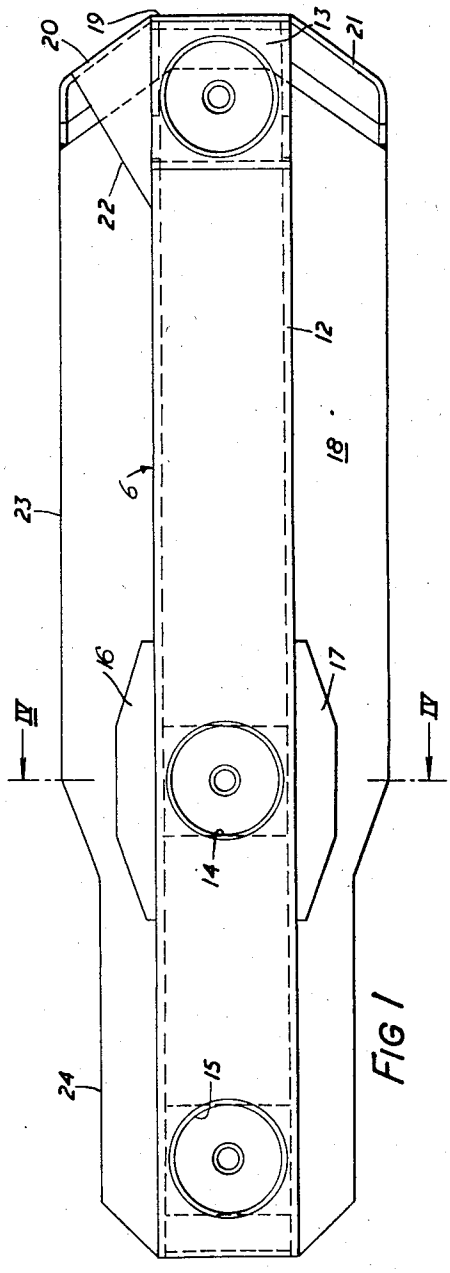


FIG 1

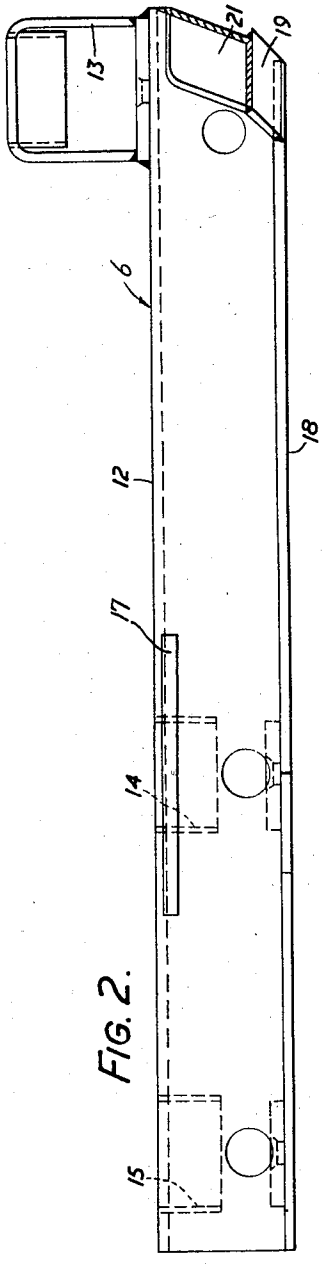


FIG. 2.

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MINE ROOF SUPPORT DEVICES

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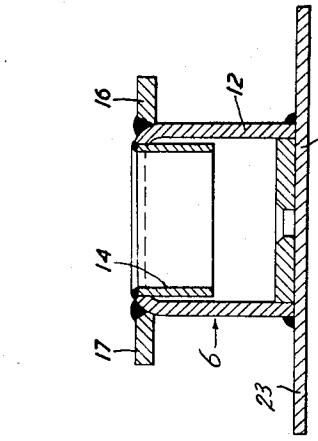


FIG. 4.

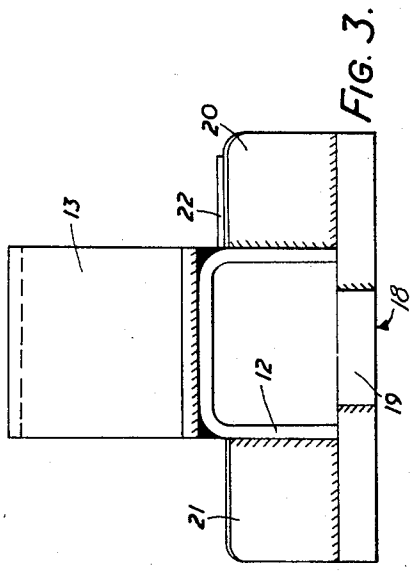


FIG. 3.

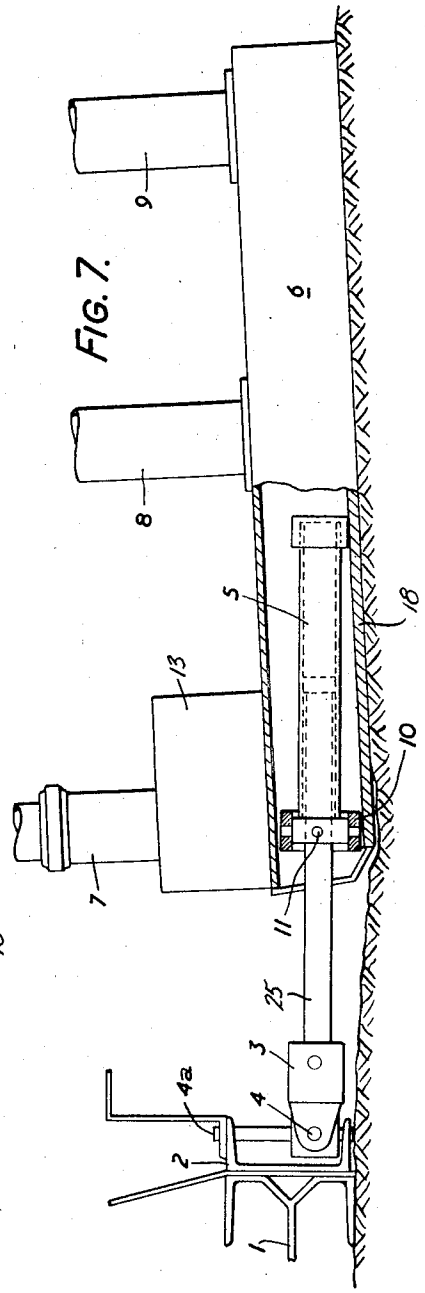


FIG. 7.

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MINE ROOF SUPPORT DEVICES

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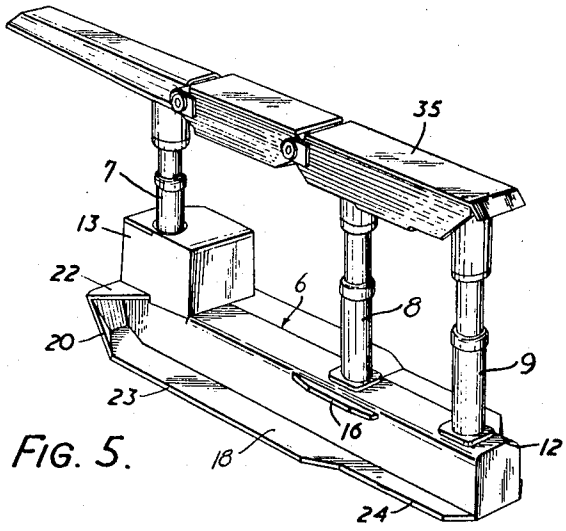
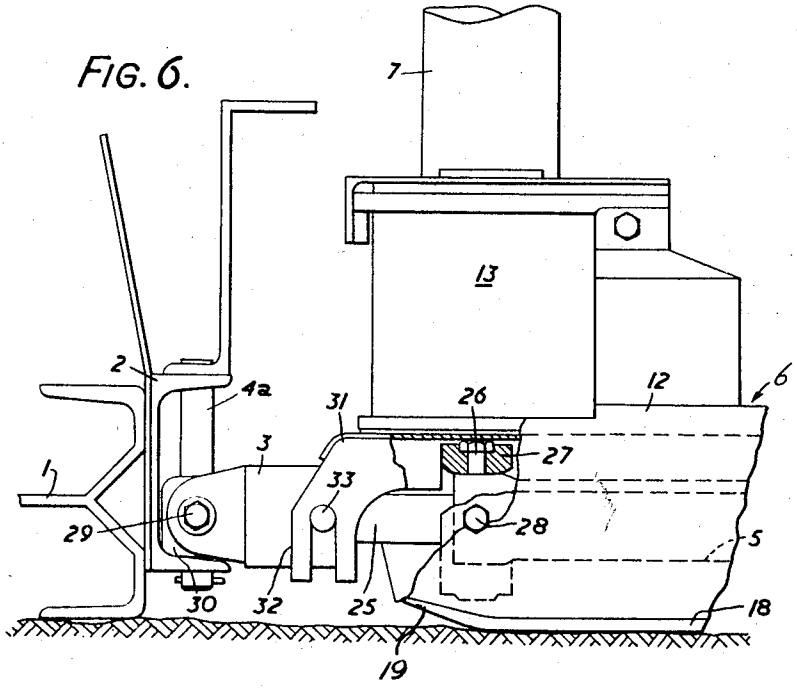


FIG. 5.

FIG. 6.



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MINE ROOF SUPPORT DEVICES

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Application July 14, 1958, Serial No. 748,461

Claims priority, application Great Britain July 15, 1957

4 Claims. (Cl. 262—1)

This invention relates to mine roof supporting devices of the kind comprising a base member with two or more upstanding props supporting a roof. According to a known mining system, a number of such devices are spaced along the coal face substantially perpendicular to and connected with a coal conveyor by means of a horizontal jack extending between each support device and the conveyor.

Due to the load conditions on the support frame and the unavoidable irregularities of floor and roof in the mine, difficulties are encountered in maintaining the best positional relationship between the supporting frame, the connecting jack and the conveyor and these difficulties are most pronounced when the support frame performs a forward pitching movement in the vertical plane with respect to the conveyor. For example, if, as may often occur due to floor irregularities, the front end of the frame pitches downwardly with respect to the rear end when the frame is being advanced, or when the frame is pushing the conveyor forward, the jack rod or its connections with the support frame may be damaged.

The object of the present invention is to avoid these disadvantages, and according to this invention, the base of the support frame where it makes contact with the mine floor is so designed having regard to the roof load on the props of the frame that pitching downwardly of the forward end of the frame is precluded.

More specifically, according to this invention a mine roof support device having a floor-engaging skid plate with an upturned end at the front, is characterized in that the front portion of the skid plate is made wider than the rear portion whereby the pressure per unit area at the front of the skid plate is substantially less than the pressure per unit area at the rear.

A construction of roof support frame according to the invention will now be described in more detail with reference to the accompanying drawings, wherein

Figure 1 is a simplified plan view of the base member of a 3-prop roof support frame, the roof bar and the props which complete the roof supporting device being omitted;

Figure 2 is a side elevation of the base member illustrated in Figure 1;

Figure 3 is a front view of the base member of Figure 2;

Figure 4 is a cross-section on the line IV—IV of Figure 1;

Figure 5 is a perspective view of a support frame complete with roof bar on a smaller scale;

Figure 6 is an enlarged view illustrating the jack mounting and its connection to the conveyor; and

Figure 7 is an elevation partly in cross-section illustrating the support frame and jack in a known form and arrangement, in a dangerous position in relation to the conveyor.

The principle of the invention may be best understood by referring first of all to Figure 7 where 1 indicates the

conveyor carrying a known type of adaptor channel plate 2. The head of the jack rod 3 is linked in accordance with the invention to the adaptor channel by a universal joint 4, the jack cylinder 5 lying within the base frame 6 of the roof support unit having props indicated by 7, 8 and 9 respectively. The jack cylinder is in this construction shown as anchored to the base frame by a coupling 10 or gimbal mount allowing for pivoting movement both in a vertical and a horizontal plane through the point 11.

In mechanized mining practice the conveyor 1 is usually a flexible armoured conveyor which rests directly on the mine floor and can only have a limited vertical height. Also the load vertically downward on the conveyor is small compared with the load on the roof supporting frame when the latter is supporting the mine roof, and so the conveyor is unlikely to sink into the floor with respect to the support frame. The connection of the head 3 of the jack to the conveyor must, therefore, be very close to floor level, as indicated in Figure 7, in order that the jack may apply the thrust on the conveyor and the pull on the frame most efficiently. It will be seen from this diagram that although the joint 4 connecting the jack head 3 to the conveyor allows the jack head to have upward movement in a vertical plane upon the pin 4*a* and angular movement in a horizontal plane, the jack head can have no vertical downward movement or at most only a very limited downward movement with respect to the conveyor. The result of this arrangement is that, due to the load conditions on the frame and the irregularities of the floor and roof, downward pitching of the front end of the frame will impose dangerous stresses upon the jack and its connections.

This is avoided in the construction according to this invention, now to be described, by so designing the base member of the support unit having regard to the roof load on the respective props and having regard to the connection of the jack to the conveyor, and the amount of clearance of the jack inside the base frame that excessive pitching of the frame relative to the conveyor is prevented, and damage to the jack connections is avoided. The construction may be arranged so that under normal conditions substantially no downward movement of the base frame takes place and the latter will move either on an even keel or will even tend to ride upwards towards the conveyor, which latter movement is provided for by the mode of coupling the jack to the conveyor.

Referring now to Figures 1 to 6, the base frame of the support unit is of welded construction and comprises a main member 12 of hollow channel section carrying at its forward end a box 13 or like receptacle to receive the front prop 7 and having sockets 14 and 15 to receive the middle and rear props 8 and 9, respectively. An articulated roof bar 35 is carried by the upper ends of these props. The channel section member is provided with welded-on reinforcing webs 16 and 17 in the region of the middle prop. The base member carries a skid plate indicated by the general reference 18 having an upturned forward end 19 and swept-back wings 20 and 21, the wings being connected at the top edges to the channel section member by means of welded webs 22. The portion 23 of the skid plate between the front and middle props is made substantially wider than the tail portion 24 between the middle and rear props. The relative areas of these portions of the skid plate are such that assuming an equal roof load, of say twenty tons, on the head of each prop, the narrower rear end 24 of the skid plate will tend to sink into the floor whilst the forward end 23 will tend to ride up rather than to plough into the floor. In practice, the roof load increases in a direction from the face towards the waste end so that when the support frame is pulled forward and set against

the roof there will normally be a higher load on the rear prop at 15 than the front prop. Consequently, the tendency of the front end of the support unit to pitch into the floor is still further minimized and the support frame will tend to assume an attitude which will be at least horizontal rather than forwardly pitching.

Figure 6 shows in rather more detail the manner of anchoring the jack cylinder to the base frame 12.

The mounting 13 for the forward prop 7 is arranged above the base member to allow the installation of the feed jack within the cavity in the forward part of the box-section base frame 12. This feed jack is double-acting and comprises a cylinder 5 whose forward end is held by vertical pivots 26 in a gimbal ring 27, the gimbal ring being supported in turn by transverse pivots 28 which project through opposite sides of the box-section base member 12. The piston rod 25 extending from the cylinder 5 has a forked head 3 secured by a transverse pivot 29 on a block 30 which is in turn pivoted on and slidable vertically upon the pin 4*a* mounted vertically in the adaptor channel plate 2. The cylinder 5 and piston rod 25 are thus connected by universal joints to the base member 12 and conveyor 1 respectively which allow for a limited degree of angular misalignment. For example, the jack cylinder clearance in the base frame 12 allows only for a swing of three degrees about the joints 26, 27, 28. The length of the pin 4*a* exceeds the height of the block 30 to allow for an upward change in level between the support frame and the conveyor, but allows substantially no relative downward motion of the jack head 3. The piston rod 25 is substantially protected by means of an extensible shield 31 comprising an inverted channel-shaped plate guided in the base frame 12 and having slotted ears 32 engaged by a transverse pin 33 in the head 3 of the piston rod. The shield slides with the piston rod 25 in the open forward end of the base frame 12 and at all times protects the piston rod 25 from above.

Although the supporting frame shown in Figure 5 carries an articulated roof bar 35, it will be understood that the invention is also applicable to supporting units having rigid roof bars or even those units where the heads of the props have no common roof bar but are of extended area to give direct support to the roof.

I claim as my invention:

1. A device of the character described comprising a floor-mounted, hollow-section base member to be directed in use towards and from a conveyor at the working face, a plurality of prop-supporting means spaced along said base member, an extensible and contractible jack pivotally anchored to said base member for limited tilting within its hollow section, and arranged for like connection at its own forward end to the conveyor, a floor-engaging skid plate formed as part of said base member, the front portion of said skid plate being wider than its rear portion, whereby to lessen the unit area loading on such front portion with relation to the loading on the rear portion, when generally uniform loads are applied to the respective props.

2. A device of the character described comprising a floor-mounted base member to be directed in use towards and from a conveyor at the working face, a plurality of prop-supporting means spaced along said base member, an extensible and contractible jack pivotally anchored in the forward end of the base member for limited tilting in a vertical plane with respect to the base member, and for connection at its own forward end to such a conveyor, a floor-engaging skid plate formed as part of said base member, the front portion of said skid plate being wider than its rear portion, to support the base member against downward pitching of its front end relative to its rear end and tilting of the jack relative to the base member in excess of such limits, when the base member is subjected to roof loading of generally equal value through the respective props.

3. A mine roof supporting frame according to claim 2, including a universal joint for coupling the head of the jack to the conveyor, said universal joint being formed and arranged to allow angular movement of the jack about the coupling point and rising movement of the head of the jack with respect to the conveyor when the front end of the supporting frame rises or pitches upwardly.

4. A mine roof supporting frame according to claim 3 including means to prevent substantial downward movement of the jack head relative to the conveyor beyond the horizontal.

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