(12) UK Patent Application (19) GB (11) 2 201 713 (13) A

(43) Application published 7 Sep 1988

(21) Application No 8803275

(22) Date of filing 12 Feb 1988

(30) Priority data
(31) 8703496 (32) 14 Feb 1987 (33) GB

(71) Applicant
Dowty Mining Equipment Limited

(Incorporated in United Kingdom)

Ashchurch, Tewkesbury, Gloucestershire

(72) Inventor
Colin Raymond Walters

(74) Agent and/or Address for Service
R J Bousfield
Dowty Group Services Limited, Patents Dept,
Arle Court, Cheltenham, Glos, GL51 0TP

(51) INT CL⁴
E21D 23/00 // 23/03

(52) Domestic classification (Edition J):
E1P 2E5G

(56) Documents cited
GB A 2052615 **GB 1416211** **US 4449860**

(58) Field of search
E1P
Selected US specifications from IPC sub-class
E21D

(54) Mine roof support with face sprag

(57) A mine roof support which includes a canopy C having a sprag system 1 mounted thereon for support of a mine face. The sprag system comprises:

- a face engaging member 2 to engage and support a mine face;

and - first 3 and second 4 arm means.

The first and second arm means are pivotally connected (at 11) both to one another and to the canopy at 9 and 13. At least one of the pivotal connections being a slidable pivot connection (e.g. in trough 17).

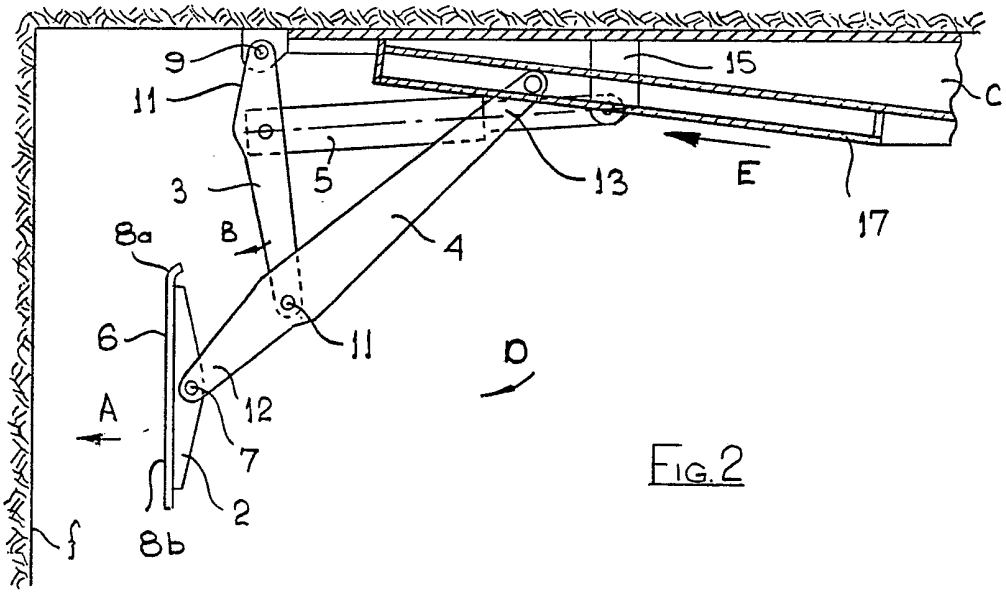

FIG. 2

GB 2 201 713 A

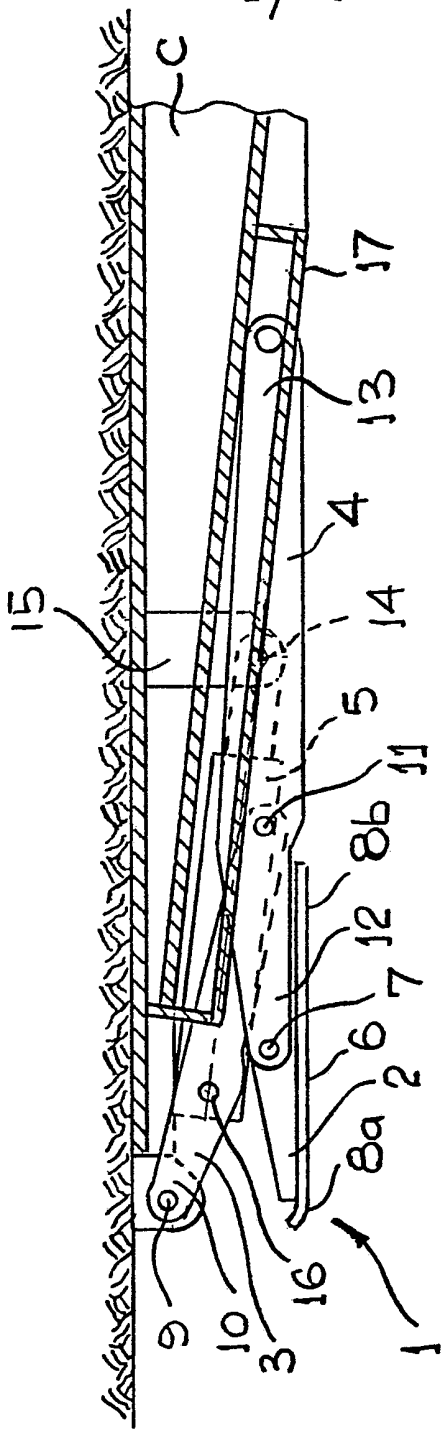

FIG.1

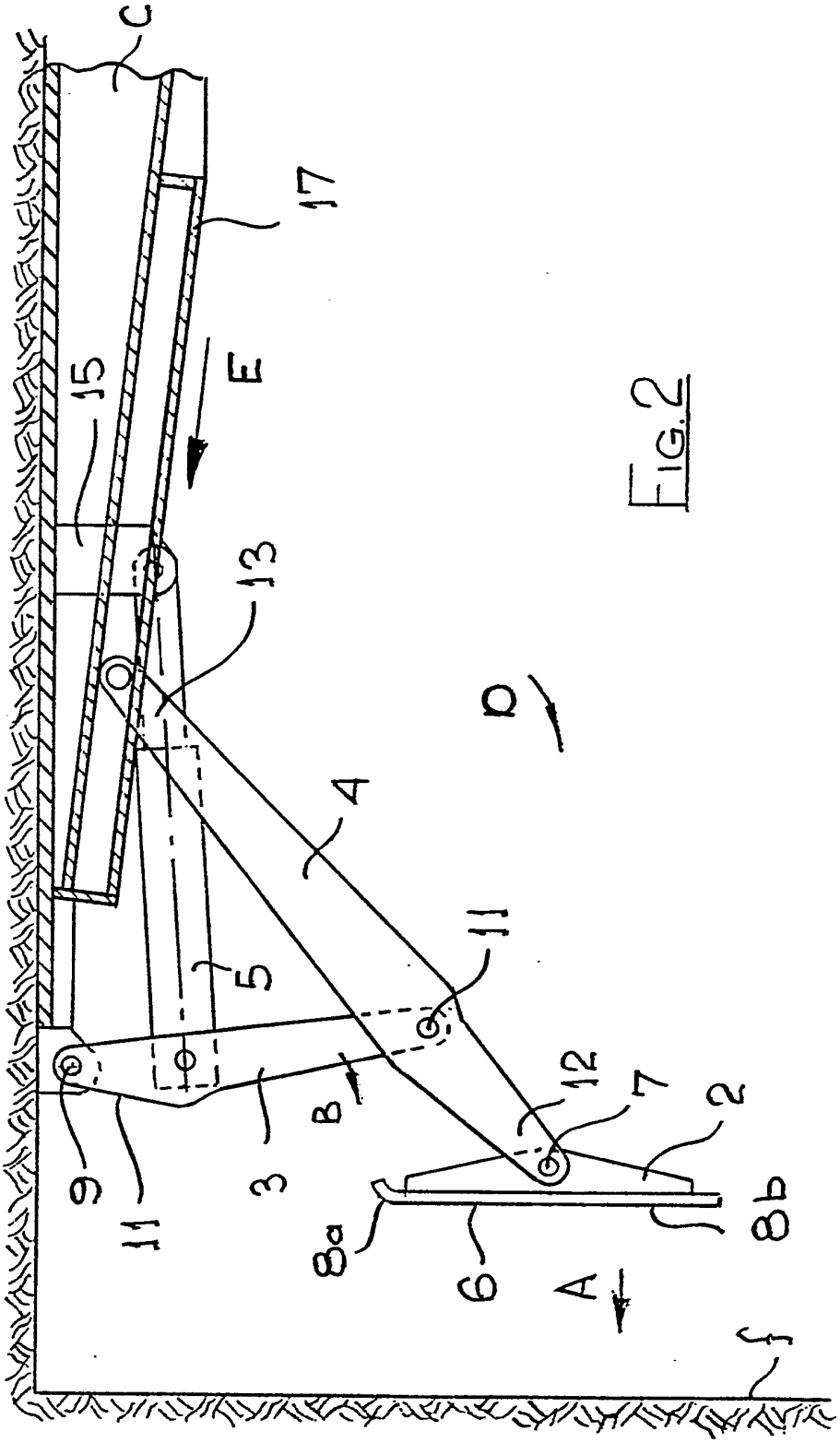

FIG.2

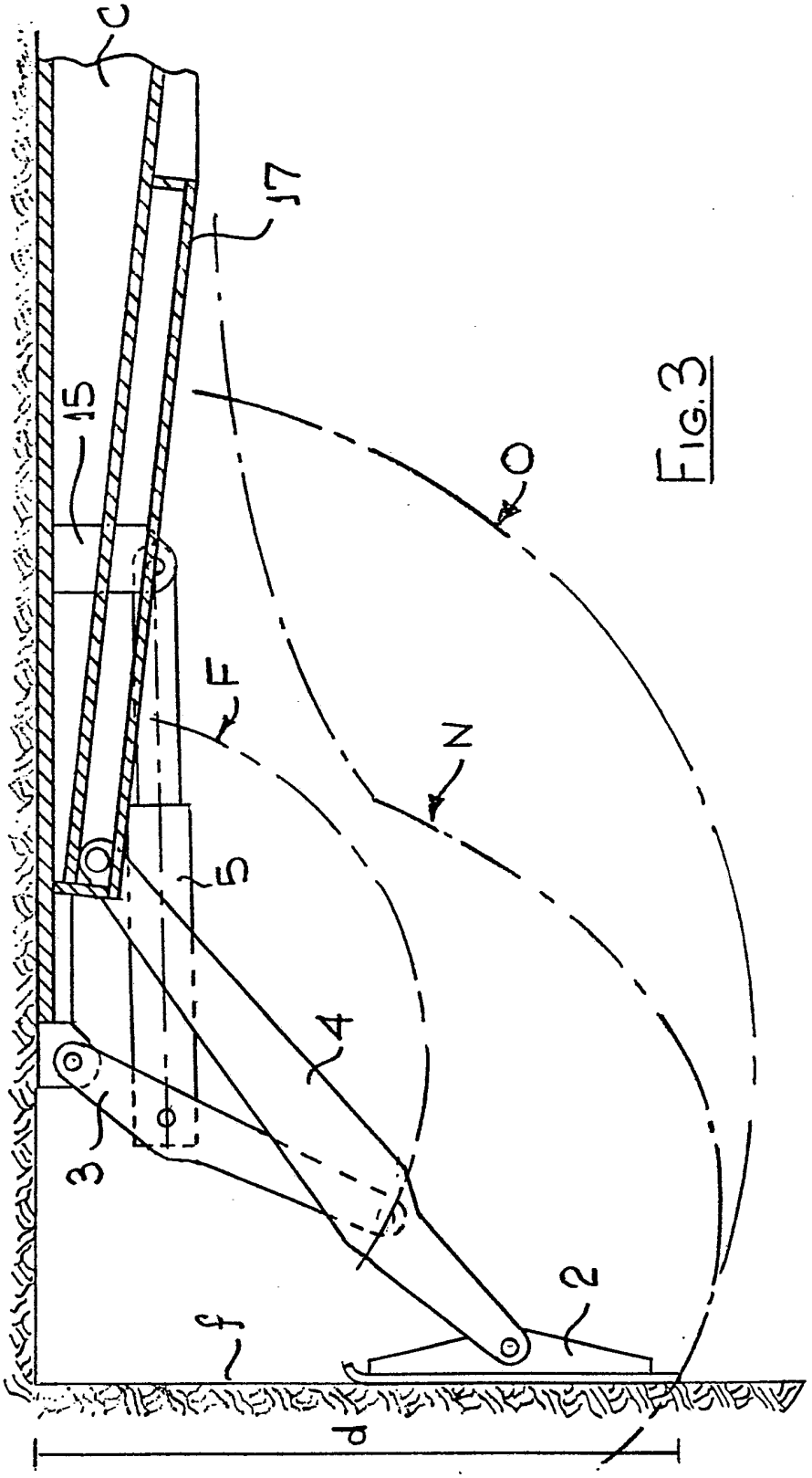

FIG.3

MINE ROOF SUPPORT

This invention relates to mine roof supports and, in particular, to roof supports which incorporate a sprag system for support of a mine face.

Previously used sprag systems have fallen into one of two basic types that is either a sliding sprag system or a swinging sprag system.

In the sliding sprag system the sprag, which has a face plate, is slidably mounted onto the roof support, for example, slung underneath the canopy. With this type of sprag system the face plate of the sprag is positioned very close to the canopy roof, and when it is caused to operate on a mine face, will act on the mine face in the area only immediately adjacent to the mine roof.

Generally, the support of the mine face by the sprag system is too high up on the face to provide support thereof in the optimum position, and most effective position. Therefore in order to ensure support at the optimum position the face plate of the system would have to be made sufficiently large to cover the appropriate area of the face. In which case there is a very large probability that the sprag system would foul any equipment moving underneath the canopy e.g. the mine cutting

tool, and prevent adequate working of the face.

The major disadvantage with this type of sprag system is therefore, the inadequacy of the system to sufficiently support the mine face, and therefore sufficiently protect any miner working on or around the mine face.

In the alternative swinging sprag system, a sprag face plate is pivotally mounted near to the front of the roof support canopy and when required is swung down into position against a mine face. The face plate of such a system in swinging down into position will define an arcuate path, and cut out an area in which its path could easily be fouled.

Due to the design associated with roof supports having this sprag system, this area will greatly impinge on the working area under the canopy for the miners and it is highly conceivable that fatalities could result.

The problems outlined above have been appreciated in the industry for several years and it is the object of the present invention to eliminate, or at least, drastically reduce the effect of these problems.

In accordance with the present invention a mine

roof support includes a canopy having mounted thereon a sprag system for supporting a mine face, and means to operate the sprag system wherein the system comprises a face engaging member which is engageable with the mine face, and first and second arm means which are pivotally connected both to one another and to the canopy: at least one of the pivotal connections being a slidable pivot.

The provision of a two arm means arrangement with a sliding pivot connection, in this type of application provides the sprag system with all the benefits associated with the sliding sprag system i.e. neatness, compactness, and non interference with the working space underneath the canopy, as well as the benefit of the swinging sprag system namely the provision of support at the optimum position on the mine face.

The slidable pivot may be provided between the first and second arm means, but is preferably provided between at least one of the first and second arm means and the canopy.

The first and second arm means are mounted on the canopy so that the connection between the first arm means and the canopy is adjacent to or near to the mine face when the roof support is in use.

This connection is, preferably, a fixed pivot type connection.

The first arm means may be any form of adjustable arm means such as telescopic co-operating members, for example an hydraulic ram, but is, preferably, of a fixed length. The length of this arm means determines the height at which the face engaging member acts against the mine face.

Therefore, the provision of adjustable arm means enables the depth of this engagement on the mine face to be altered and or adjusted.

The second arm means is connected to the canopy at a point rearward of the first arm means connection. The connection between the canopy and the second arm means is preferably a sliding pivot connection.

In the cases where the second arm means is not slidably connected to the canopy it is beneficial to provide a pressure exerting means which acts against the face engaging member so as to exert the necessary pressure to support the mine face. This may be achieved by making the pressure exerting means the or part of the second arm means.

It is, however, possible that both the connections with the canopy will be sliding pivot connections and in this case the extent of slide of the second arm means will be greater than that of the first arm means.

Each of the arm means can be made with any suitable construction and this, for example, may be of either a plate like construction or a strut like construction.

The or each slidable pivot is generally formed by the action of a bar or rod extending through the relative arm means and engaging with the sides of a trough formed in or on the canopy.

The trough may be formed so as to define an upside down L or T shaped space.

The face engaging member, preferably, has a face plate which is pivotally connected to one of the arm means, most preferably, the second arm means. This face plate is connected to the second arm means at the end thereof remote from the canopy.

The face engaging member is, preferably, balanced in such a manner that it will co-operate with the mine face so as to facilitate the positioning and operation of the sprag system with the mine face.

The face engaging member may be so shaped that when the sprag system is retracted it tucks away beneath the canopy. The face engaging member can interact with other component parts of the sprag system or the canopy so as to enable the system to be stored with the face plate substantially parallel to the longitudinally extending axis of the canopy.

Alternatively a hydraulic ram or other suitable means may be provided to fulfil this function.

The means to operate the sprag system is, preferably, an hydraulic ram.

The ram may be positioned so as to act between the canopy and the sprag system at any suitable point on the system, however, the ram is, preferably, positioned so that it acts between the first arm means and the roof canopy.

Alternatively, the hydraulic ram may be positioned so as to act between the second arm means and the roof canopy, and is housed within the trough provided for the slidable pivot of the arm means.

In both of these arrangements the force applied by the means to operate to the mine face is transferred thereto by the arm means and the face

engaging member.

In an alternative, it is envisaged that the force applied may be transmitted directly through the face engaging member. In this case the hydraulic ram is positioned and arranged so as to act between the face engaging member and the canopy.

The arrangement of the sprag system is, preferably such that the system may be retracted and tucked away into a very small space underneath the canopy, when required. This means that the canopy generally will not foul any equipment passing along the work space defined under the canopy.

Further, because of the arrangement used the pivot of the two arm means with one another is normally drawn into a position between the pivots of the individual arm means with the canopy. This means that the space taken up by the sprag system when it is not in use is reduced to a minimum.

The sprag system of the present invention may be used with any form of roof support, and may be mounted on a fixed type canopy or on an extensive and or settable portion of a roof support canopy.

The invention will now be described, by way of example, with reference to the accompanying

drawings, in which;

Figure 1 shows a schematic diagram of part of the canopy with the sprag system in a retracted (tucked away) position;

Figure 2 shows a schematic diagram of the system in Figures One with the system in a position between the retracted and fully operational; and

Figure 3 shows a schematic diagram of the system in both Figure One and Two with the system in an operational position.

Referring to the drawings, a sprag system 1 for use with a roof support (not shown) having a canopy C comprises a face engaging member 2, a first arm means 3, a second arm means 4 and an hydraulic ram 5.

The face engaging member 2 is provided with a face plate 6, which is shaped so as to enhance the interaction of the member 2 with a mine face being supported and is pivotally connected to the second arm means 4 at a fulcrum 7. Further, the member 2 is balanced so as to facilitate the positioning

and operation of the sprag system 1 with the mine face.

In order to achieve this the face plate 6 is provided with a curved section 8a and balanced to ensure the section 8a or main section 8b of the plate 6 will engage the mine face. If the section 8a of the face plate 6 engages the mine face the curvature thereof will cause the face plate 6 to rotate and act against the mine face as shown in Figure 3.

The first arm means 3 is pivoted at a fixed fulcrum 9 adjacent to the tip of the canopy C at an end 10 thereof, and is pivoted about a fulcrum 11 relative to the second arm means 4 at the other end.

The second arm means 4, has the face engaging member 2 pivotally connected thereto by means of a fulcrum 7 near to end 12 thereof and is slidably pivoted from the canopy C at the other end 13; the end 13 being slidably mounted in a trough 17.

At a point between the two ends 12, 13, nearer to the end 12, the second arm means 4 is pivotally connected to the first arm means 3.

The hydraulic ram 5 is mounted so as to pivot about a fulcrum 14 on a member 15, and through the member 15 acts against the canopy C. The ram 5 will act therefore between the canopy C and the first arm means 3 to which it is pivotally mounted at a point 16.

The force exerted by the ram is therefore transmitted to the mine face which is being supported via the second arm means 4 and the face engaging member 2.

In operation, starting from the position shown in Figure 1, the hydraulic ram 5 is caused to act against the arm means 2. This results in disengagement of the sprag system from the tucked up position shown in Figure One, and in particular the rotation of the face engaging member 2 in a direction A, the movement of arm means 3 in a direction B, and the movement of arm means 4 in a direction D with end 13 moving in a direction E. The relative positions of the component parts of the system in a position between the tucked up position and the operative position are shown in Figure 2.

The fulcrum 11 will accordingly travel along a path indicated by the line F shown in Figure 2.

Eventually, the sprag system 1 will rest in the position relative to the mine face as shown in Figure 3, whereupon the force imparted to the sprag system will be transmitted to the mine face over the area of contact between the face plate 6 and the mine face. In normal operating conditions this force will be in the region of 3 tons, and the sprag system can resist a mine face pressure of 6 tons as a result thereof.

Further, in operation the interaction of the component parts of the system is such as to significantly reduce the space through which the components parts will travel. The effect of this interaction is further enhanced by the compactness of the sprag system relative to the roof support.

Figure 3 also shows the loci of points for the lowest component of two comparative sprag systems: namely a sprag system according to the specific embodiment of the present invention and a swinging sprag system. The loci for the present invention is shown by the line N, and the loci for a swinging sprag system acting against the mine face f to an equal depth d from the roof is shown by the line O. From this it is clearly apparent that the sprag system according to the new invention is safer.

CLAIMS

1. A mine roof support includes a canopy having mounted thereon a sprag system for supporting a mine face, and means to operate the sprag system and is characterised in that the system comprises a face engaging member which is engageable with the mine face, and first and second arm means which are pivotally connected both to one another and to the canopy: at least one of the pivotal connections being a slidable pivot.

2. A mine roof support as claimed in claim 1, wherein the slidable pivot is provided between the first and second arm means.

3. A mine roof support as claimed in claim 1, wherein the slidable pivot is provided between at least one of the first and second arm means and the canopy.

4. A mine roof support as claimed in claim 1, 2 or 3, in which the pivot between the first arm means and the canopy in near the mine face and is a fixed pivot type connection.

5. A mine roof support as claimed in any one of the preceding claims, in which the face engaging

member has a face plate which is pivotally connected to one of the arm means.

6. A mine roof support as claimed in claim 5 in which the face plate is pivotally connected to the second arm means.

7. A mine roof support as claimed in any one of the preceding claims in which the face engaging member is balanced in such a manner that it will co-operate with the mine face so as to facilitate the positioning and operation of the sprag system with the mine face.

8. A mine roof support as claimed in any one of the preceding claims, in which, the face engaging member is shaped so that when the sprag system is retracted so as to tuck away beneath the canopy, the face engaging member interacts with other component parts of the system or the canopy to enable the system to be stored with the face plate substantially parallel to the axis of the canopy.

9. A mine roof support as claimed in any one of the preceding claims, in which, the sprag system is operated by means of an hydraulic ram.

10. A mine roof support as claimed in claim 9, in

which the ram is positioned so as to act between the canopy and the first arm means.

11. A mine roof support as claimed in claim 9, in which the hydraulic ram is positioned so as to act between the second arm means and the roof canopy, and is housed within the trough provided for the slidable pivot of the arm means.

12. A mine roof support substantially as hereinbefore described with reference to the drawings.

Published 1988 at The Patent Office, State House, 66/71 High Holborn, London WC1R 4TP. Further copies may be obtained from The Patent Office, Sales Branch, St Mary Cray, Orpington, Kent BR5 3RD. Printed by Multiplex techniques ltd, St Mary Cray, Kent. Con. 1/87.