Dec. 16, 1969 S. ROBERTS 3,483,705

MINE ROOF SUPPORTS

Filed April 19, 1967 5 Sheets-Sheet 1

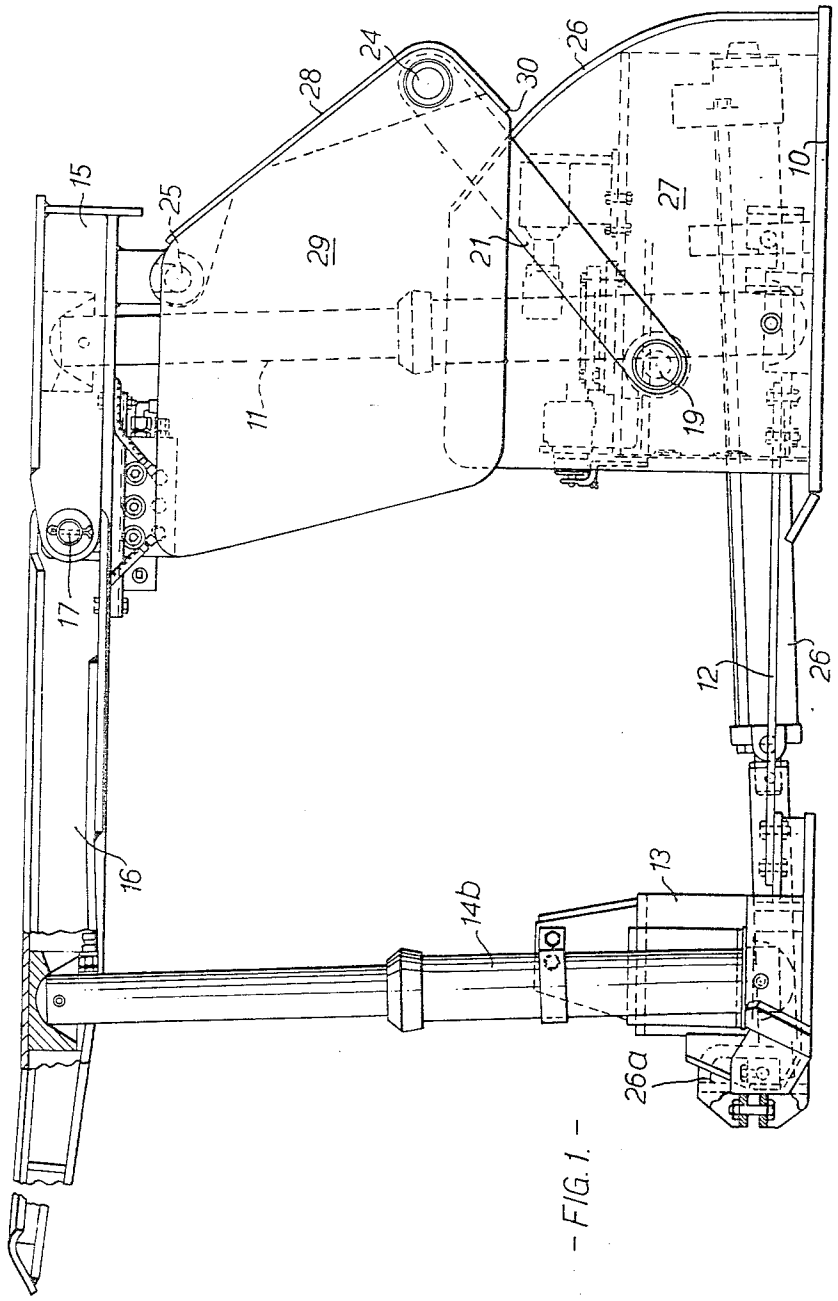


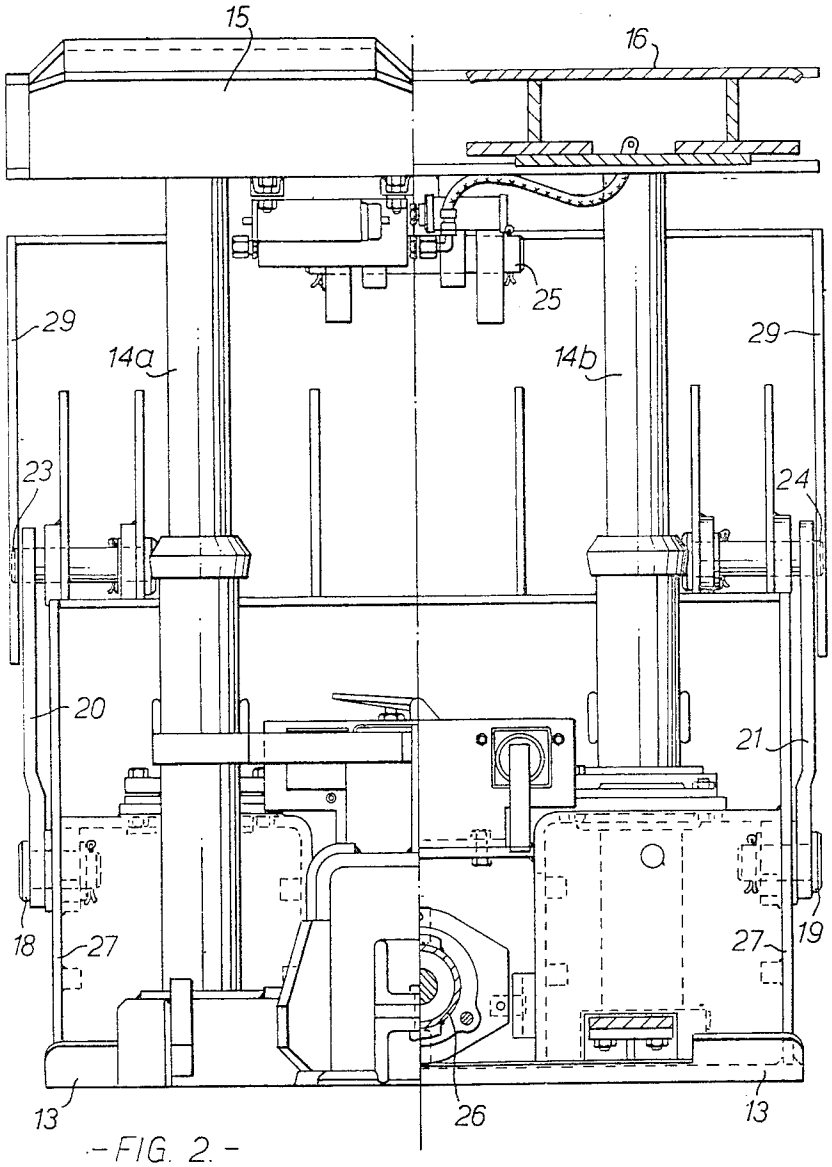
FIG. 1.

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MINE ROOF SUPPORTS

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- FIG. 2. -

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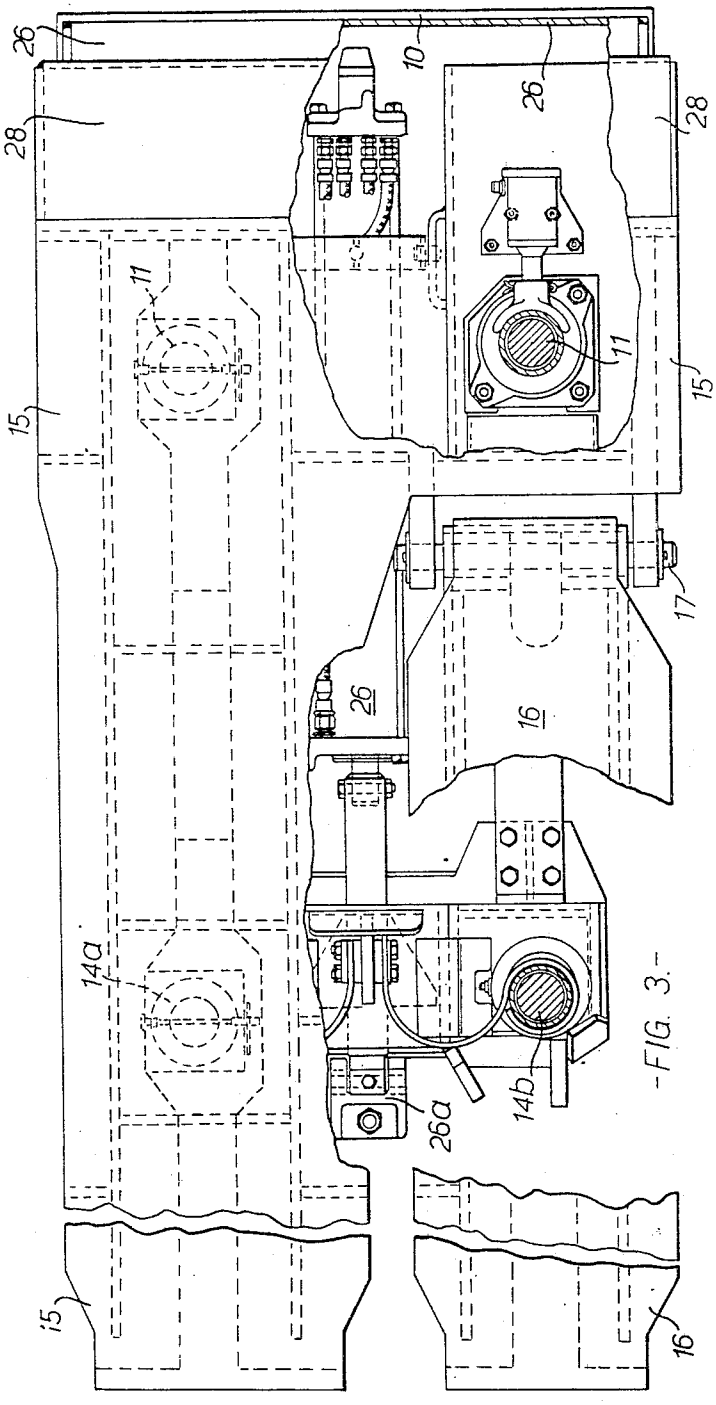


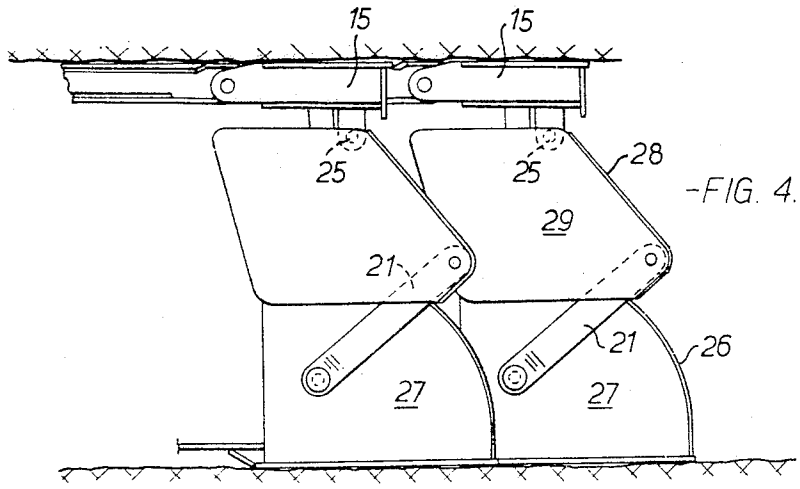
FIG. 3.

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MINE ROOF SUPPORTS

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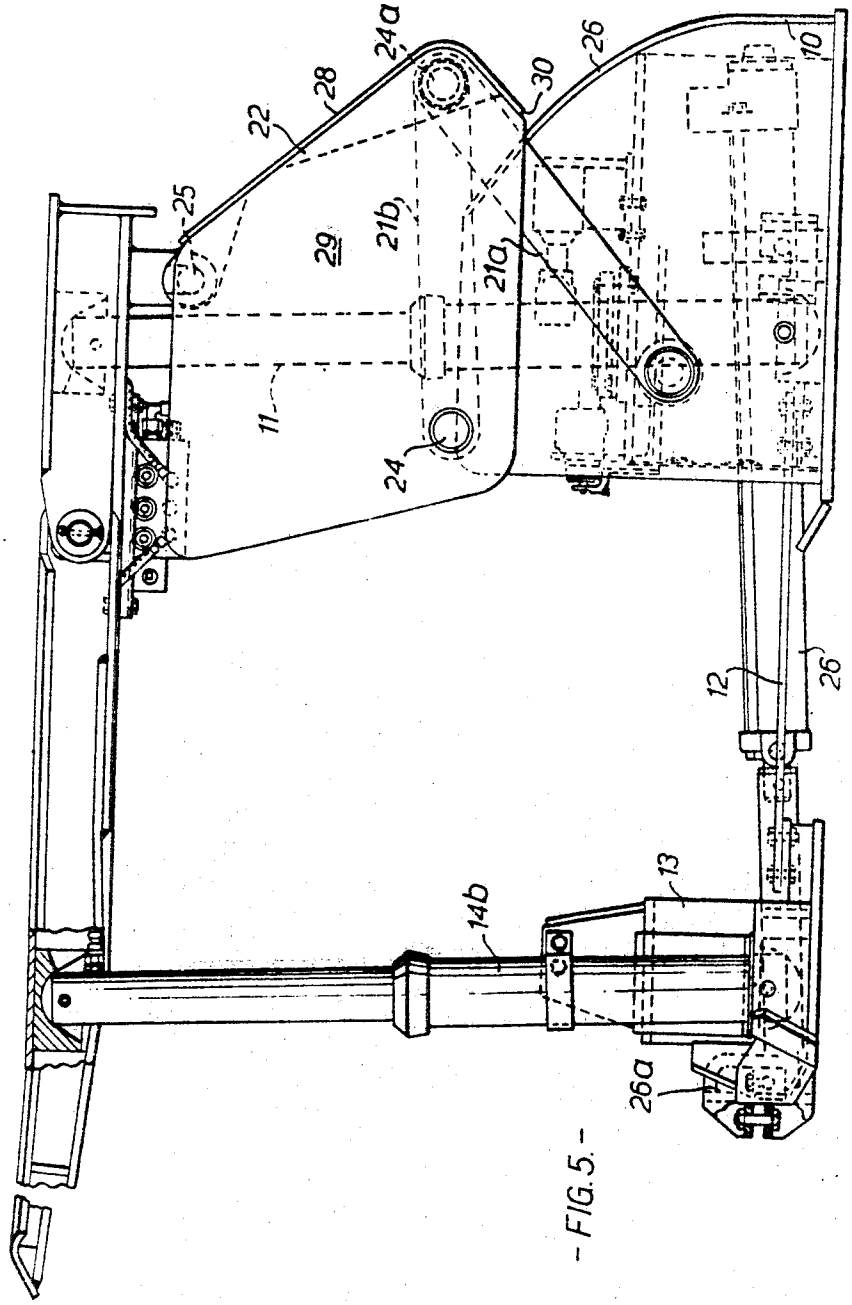
-FIG. 4.-

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MINE ROOF SUPPORTS

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- FIG. 5 -

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MINE ROOF SUPPORTS

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Int. Cl. E21d *23/20, 11/00;* E21c *41/00*
U.S. Cl. 61—45 5 Claims

ABSTRACT OF THE DISCLOSURE

A mine roof support has hydraulic prop or leg means mounted on a base of the support and supporting a roof-engaging structure. At or towards the rear of the support a shield is provided which extends between the base and roof-engaging structure and serves to prevent material in the waste of the mine working falling into the support and blocking the travelling way therethrough for operatives. The shield comprises an upper part which is suspended from the canopy or roof-engaging structure by pivot means which allow for a limited amount of free movement in the vertical direction and a lower part mounted on the base of the support. The two parts of the shield are connected together by a link means which serves, when the support is lowered, to ensure that the upper shield part is kept close to the lower shield part to form an effective shield but without materially restricting the relative movement between the two shield parts.

This invention is for improvements in or relating to self-advancing mine roof supports or chocks. Such supports are used extensively in longwall systems of mining, a plurality of the supports extending in side-by-side relationship along the mineral face.

Each chock or support may comprise one or more legs or props, adapted to be extended by pressure-fluid and a pressure-fluid ram device for advancing the chock towards the mineral face after its props or legs have been temporarily released from between floor and roof. The ram devices of the supports, or some of them, may also be arranged to push or "snake" a mineral conveyor towards the face. The ram devices, which are anchored to the conveyor, are then retracted so as to draw the supports up to the conveyor. Following this the supports are again reset so as to support the roof.

After the removal of the coal or other mineral (e.g. by a coal cutting machine) and the advance of the supports towards the newly exposed face and the re-setting thereof, the roof is allowed to collapse into the waste or goaf at the rear of the supports. In so doing, the roof material has a tendency to flush or enter into or between the chocks or supports and, particularly where the distance between the travelling track (i.e. working area) and waste or goaf is relatively small, interfere with movement along the travelling track as well as constituting a hazard to the mine workers.

It is known that the closer the waste edge is to the mineral-bearing face, the less tendency there is for the roof to break up and the better the mining conditions. To achieve this the roof supports may be designed so that there is only a single row of legs or props between the travelling track and the waste. Having regard to the resultant closeness of the travelling track to the waste, however, it is necessary to provide an effective guard system to prevent the aforementioned tendency of material to flush into or enter the travelling track or working area.

Known guarding means for this purpose include wire mesh nets, steel bars running parallel to the waste edge and mounted on suspended chains and steel plates mounted on the canopies or roof-engaging structures of the supports and resting on the bases thereof. In the case of the flexible type structures such as wire mesh nets there is a tendency for such structures to "balloon" or sag into the supports and thus eventually restrict the retraction or lowering of the supports as is necessary prior to their being advanced. Where rigid type guards are attached to the roof-engaging structures or canopies of the supports, lowering of such canopies is often restricted by material which has fallen from the roof after the previous advance of the supports and is resting against the latter.

One object of the present invention is to provide an effective guard or shield arrangement for preventing ingress of material from the waste or goaf into the supports and which will not interfere with the proper operation of the supports.

According to the present invention there is provided a mine roof support having hydraulic prop or leg means mounted on a base of the support and supporting a roof-engaging structure and at or towards its rear a shield which extends between the base and roof-engaging structure, said shield being in at least two relatively movable parts to permit the support to be extended and contracted and mechanism acting on at least one of said shield parts to maintain it close to the other part so as to form an effective shield during said relative movement but without materially restricting said movement.

According to a further feature of the invention there is provided a mine roof support having hydraulic leg or prop means and at or towards its rear a shield which extends between the relatively movable base and roof-engaging structure of the support, said shield being in at least two relatively movable parts to permit the support to be extended and contracted, wherein the two parts are connected together by mechanism which constrains them to remain close together to form an effective shield during said relative movement but with sufficient clearance to avoid obstruction to said movement. Conveniently said mechanism comprises a link or links having one end pivotally connected to one part of the shield and the other end pivotally connected to another part of the shield or to the base of the support.

The arrangements according to the invention provide a substantial guarding or shielding system which will or can be collapsed when the canopy or roof-engaging structure is released from its roof-supporting condition, for the advance of the support, and which becomes a comprehensive and effective guard system upon re-setting the support in its roof-supporting condition.

Preferably one shield part is suspended from the canopy or roof-engaging structure and is attached to said canopy or roof-engaging structure by pivot means which allow for a limited amount of free movement in the vertical direction and thereby provides for considerable misalignment between the canopy or roof-engaging structure and the base member of the support.

In preferred embodiments of the invention the part of the shield which is suspended from the canopy of the support is arranged to accommodate telescopically a shield part which projects up from the base of the support. Thus, the two shield parts are telescoped together when the canopy is lowered for advancement of the support towards the mineral face.

Conveniently the shield parts take the form of vertical channels or have large side walls or wings. This ensures that when one support is advanced relatively to its neighbor, the space between the rear portion of the shields is effectively "blanked off" or closed by such side walls or wings.

A particular embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a side view of a mine roof support as viewed along the coal face,

FIGURE 2 is a front view, partly in section, of the support shown in FIGURE 1 as viewed from the coal face,

FIGURE 3 is a plan view of the support shown in FIGURES 1 and 2,

FIGURE 4 is a view similar to FIGURE 1 but showing the relationship betwen adjacent supports during their advance sequence, and

FIGURE 5 shows a modification of the support illustrated in FIGURES 1 to 4.

The support shown on the drawings comprises a rear unit having a base **10** and a pair of telescopic hydraulically extensible legs or props **11** pivotally mounted on said base in the usual way. The support also comprises a forward unit having a base **13** and telescopic hydraulically extensible legs **14***a* and **14***b* pivotally mounted on said base. The base **10** and the base **13** are connected together by tie-bars **12** which may be of flexible material, e.g. spring steel.

Mounted by means of concave seatings on the convex upper ends of the legs **11** and the leg **14***a* is an L-shaped canopy or roof-engaging structure **15**. Set into the L-shaped canopy, so as to be parallel with the longer limb thereof, is an articulated cantilever roof-bar **16** which is pivotally connected at **17** to the shorter limb of the L-shaped canopy and supported by the prop or leg **14***b*. The cantilever roof-bar **16** projects well beyond the leg **14***b* in the direction of the coal face.

Rigidly attached to the base **10** and projecting up therefrom is a shield part having a curved rear wall **26**, which is presented to the waste edge, and side members **27**.

Pivotally attached at **25** to the canopy **15** is a shield part having a rear wall **28**, side walls **29** and a sealing edge **30**. The pivot **25** incorporates a vertically elongated slot for the pivot pin so as to allow limited vertical movement of the shield part **28**, **29** as well as angular movement of said shield part about the pivot pin **25**.

Pivotally attached to the base **10** at **18** and **19** are links **20** and **21**, said links also being pivotally connected at **23** and **24** to the shield part **28**, **29**.

Pivotally anchored in the base **10** is a double-acting hydraulic ram **26***b*, the piston rod of which is adapted for connection by means of a clevis **26***a* to the coal face conveyor so that the ram can be used, in the usual way, first to advance the conveyor towards the coal face and then advance the support up to the conveyor. The piston rod, of the ram **26***b*, or an extension thereof passes through an arch in the base **13** of the forward support unit.

In the normal set or roof-supporting condition of the support of the upper shield part **28**, **29** is supported by the links **20** and **21** and by its pivotal attachment **25** to the canopy **15**. Sufficient free movement is provided in the pivotal attachment **25** to accommodate normal roof convergence under loaded conditions.

Upon release of the support from its roof-supporting condition, the canopy **15** is lowered, allowing the links **20** and **21** to pivot about the points **18** and **19** as the shield part **28**, **29** is also lowered.

As the links describe an arc about their pivots **18** and **19** the sealing edge **30** of the upper shield part **28**, **29** under the influence of the pivotal attachment **25**, describes an arc about the pivot points **23** and **24**. This action maintains a gap between the shield **26** and the edge **30** of the upper shield part and thereby reduces the risk of material from the waste or goaf jamming the shield parts.

As can clearly be seen from FIGURE 4, cover between neighbouring chocks during an advance movement is afforded by the side members **27** and **29** of the shields.

Although the invention has been described more particularly as applied to a shield comprising two parts said shield may comprise more than two parts arranged, for example, as a multiple telescopic structure.

The arrangement above described with reference to FIGURES 1 to 4 of the drawings is satisfactory where the material in the waste is relatively easily compressed so that the shield in the vicinity of the pivot pin **24** can be forced back into it by the weight of the superstructure **15**, **16**.

Where the material is not so easily compressed the hydraulic legs or props **11** may be double-acting (i.e. extended and contracted by hydraulic pressure) so as positively to force the pin **24** rearwardly when the support is lowered.

In still more difficult cases (i.e. with very hard material in the waste) a modified linkage arrangement may be adopted, as shown in FIGURE 5, in which the pivot pin **24** is not rearwardly and may be forwardly moving, on lowering of the superstructure **15**, **16**, the single link **21** being replaced by two pivotally connected links **21***a* and **21***b*. The link **21***b* is pivotally connected to the shield part **28**, **29** at **24** and is pivotally connected to the link **21***a* at **24***a*.

The pivot **19** is on a fixed centre on the lower shield part **27** and it will be appreciated that the points **24**, **25** and **30** are in fixed relationship to each other but are capable of vertical movement relatively to the pivot **19**. The pivot **24***a* is capable of annular movement relatively to the pivot **19**. When the legs **11** are extended they act upon the pin **25** which in turn raises the shield part **28**, **29** and the pivot **24** bringing the edge **30** into contact with the link **21***a* and raising said link about the centre **19**.

Since the distance between the points **25** and **24***a* is variable movement may take place between **25** and **19** without point **24***a* being moved towards the waste.

I claim:

1. A mine roof support comprising a floor-engaging member, hydraulic prop means mounted on said floor-engaging member, a roof-engaging member mounted on said prop means for application thereby to a roof and defining a working area between it and said floor-engaging member, and a shield at the rear of the support and including at least two relatively movable vertical superimposed shield members and protecting the working area at least at the rear thereof, a lower part of said shield members being mounted on and secured to said floor-engaging member and an upper of said shield members being pivotally attached to said roof-engaging member, both of said shield members having rear plate portions extending across the rear of the support, and link means pivotally interconnecting the shield members one to the other thereby to maintain the upper shield member close to, but freely movable in relation to the lower shield member during the lowering of the roof-engaging member.

2. A mine roof support as claimed in claim **1** wherein the rear plate portion of the upper shield member has a lower rear edge and the rear plate portion of the lower shield member is of arcuate form close to which said lower rear edge of the upper shield member is maintained by the link means during lowering of the roof-engaging member.

3. A mine roof support as claimed in claim **1** wherein the link means comprises two links pivoted together scissors-fashion at neighboring ends and having their other ends pivotally connected respectively one to one shield member and one to the other shield member whereby the upper shield member moves forwardly as the roof-engaging member is lowered.

4. A mine roof support as claimed in claim **1** wherein the upper shield member is suspended from the roof-engaging member by a pivot means which allows for a limited amount of free movement in the vertical direction

of said upper shield member with respect to the roof-engaging member.

5. A mine roof support as claimed in claim 1 wherein the shield members have rear and side walls and are telescopically arranged one within the other.

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JACOB SHAPIRO, Primary Examiner

U.S. Cl. X.R.

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