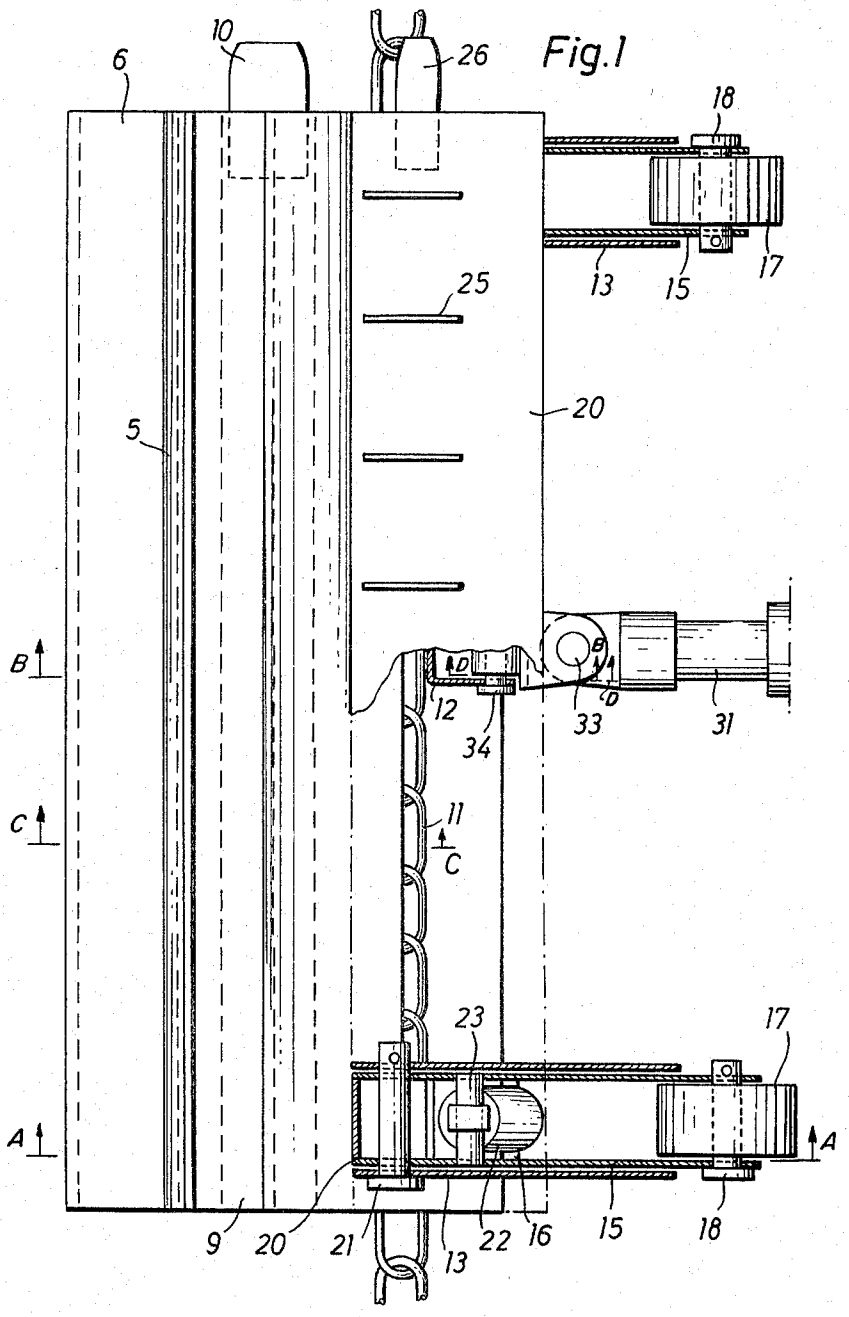
Nov. 8, 1966 J. BINAUT 3,284,138

PLANER MINING MACHINE WITH ADJUSTABLE TRIPOD GUIDE

Filed July 9, 1963 4 Sheets-Sheet 1

Fig. 1



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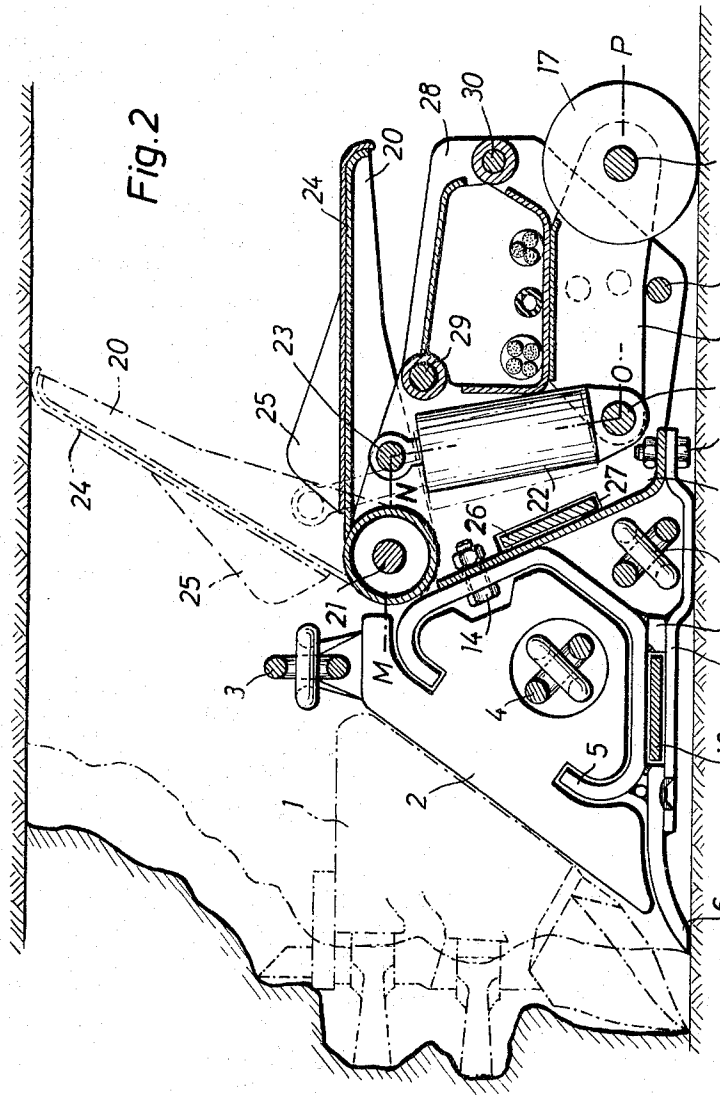
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Nov. 8, 1966 J. BINAUT 3,284,138

PLANER MINING MACHINE WITH ADJUSTABLE TRIPOD GUIDE

Filed July 9, 1963 4 Sheets-Sheet 2

Fig.2



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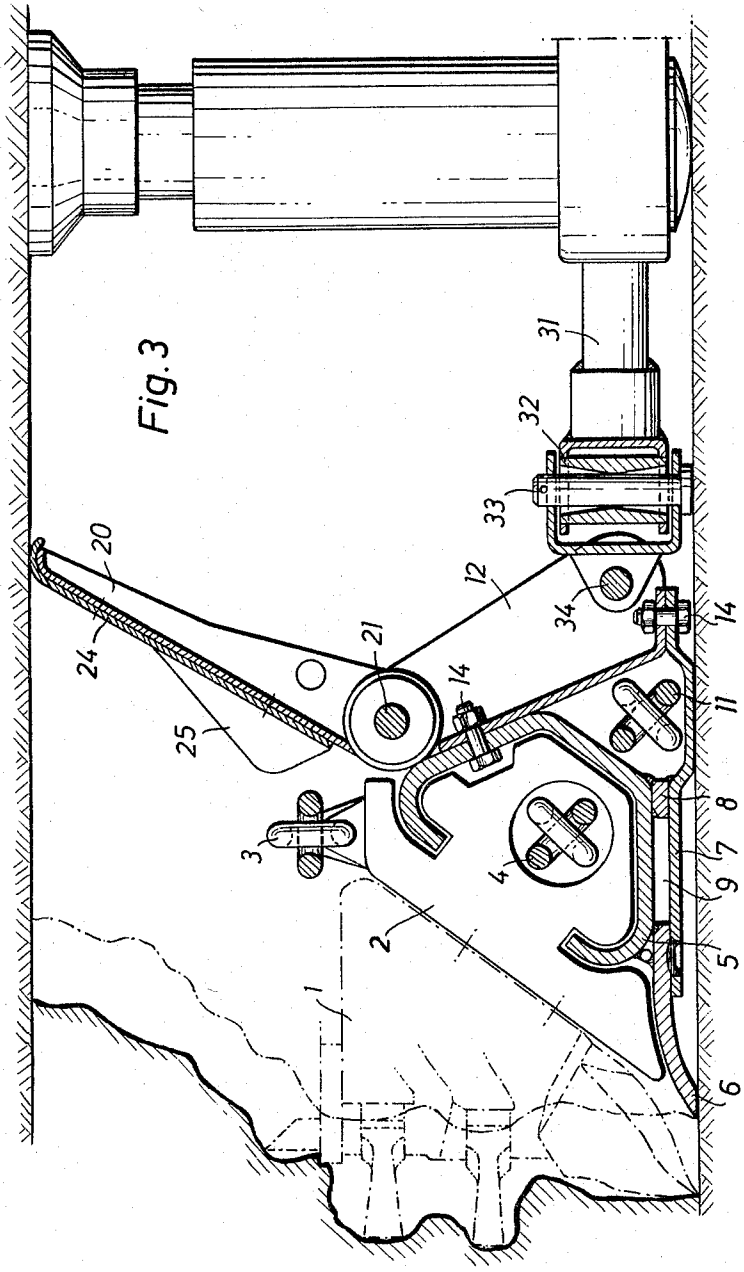
Burgess, Dinklage & Spring

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Nov. 8, 1966 J. BINAUT 3,284,138

PLANER MINING MACHINE WITH ADJUSTABLE TRIPOD GUIDE

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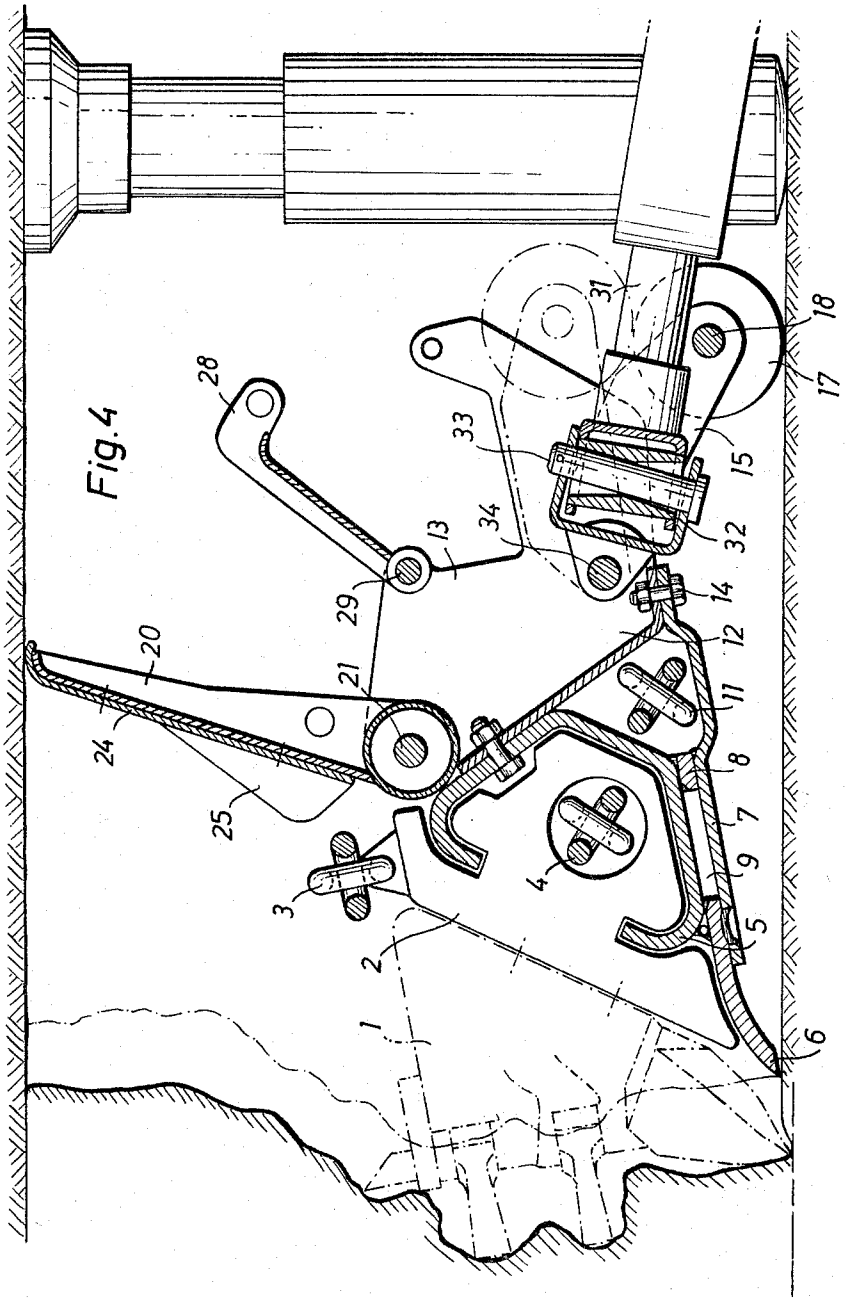


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PLANER MINING MACHINE WITH ADJUSTABLE TRIPOD GUIDE

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PLANER MINING MACHINE WITH ADJUSTABLE TRIPOD GUIDE

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Claims priority, application France, July 10, 1962, 904,278
12 Claims. (Cl. 299—34)

The invention relates to coal winning apparatus preferably for steep to semi-steep measures.

In face galleries in mines the winning machines generally run along conveyors e.g. known armoured conveyors, on which they are guided. When winning coal by means of coal ploughs, it is conventional to press the armoured conveyors continuously towards the coal face by means of shifting devices which are arranged in the direction of advance of the coal face. The shifting devices consist generally of pneumatic or hydraulic cylinders which are so constructed and arranged that the conveyor can "breathe" when the winning device passes along. The conveyor is arranged to yield slightly in the rearward direction as the plough passes and to move forward again automatically and immediately after the plough has passed.

The plough consists of an actual plough body on which cutter picks are arranged. These picks project so far beyond the plough body or cut-limiting means fixed on the said body as to correspond to the depth of slice which the plough is to obtain as it passes through the coal. In every case, when the plough passes, the conveyor yields by the actual width of the plough body. That is the extent to which the supporting skids bearing on the coal face project relatively to the plough guide carried by the armoured conveyor.

This yielding movement of the plough represents a detrimental factor in the work carried out at the coal face. It has always to be taken into account when setting the props which are arranged behind the conveyor. It is immaterial whether single mechanical props are used or whether roof support frames are used which are made to follow up the advance of the working face automatically. Finally, when the individual lengths of the conveyor move rearwards as the plough passes, temporary inflections are formed between the individual successive channel lengths. Frequently, very high loads per unit of surface area occur at the end surface of the channel lengths, which easily lead to damage being caused.

In order to obviate these disadvantages, in many cases the hydraulic or pneumatic pressure available is not fully applied. This, of course, reduces the power of the plough. At the same time the space in the face gallery which is not supported by props is increased since on the one hand the conveyor itself is held at a certain distance from the coal face and also a certain spacing must be kept free between the first row of props and the rear side of the conveyor.

In addition, when negotiating depressions in the seam the conveyor and therefore the plough guided on the conveyor does not extend along the floor in the trough region. The plough tends to climb into the trough. With known conveyors it is also difficult to hold them on the floor when passing over troughs which are not parallel to the floor.

Hitherto, although there have been many attempts to win coal by a stripping action by using ploughs in semi-steep to steep seams, this has not so far had any considerable practical significance. When a seam is fairly steeply inclined, it is possible to dispense with a conveyor since the detached coal rolls downwards automatically. With such inclination, the plough is guided not by the conveyor but by a guide structure i.e. an elongated beam. In seams having an undulatory floor a beam of this kind always tends

to take up the straightest possible position i.e. lifts off the floor in troughs. In order to avoid this, positive guidance from the roof is necessary. Only in this way, can the plough be forced to move along the floor even when negotiating depressions.

In seams which are inclined in a semi-steep to steep fashion, the detached coal has to be guided downwards along a duct which is as closed as possible, and at the same time it is expedient to subject the coal to some retarding action in order to prevent it from shooting downwards at too high a speed. The closed duct is at the same time intended to prevent the coal from passing over the guide beam for the plough into the space in which operators are working.

The object of the invention is to provide an apparatus for the automatic winning of coal by means of a plough in semi-steep to steep measures, which even when there is an undulatory floor guarantees that the plough will always move along the floor, and with which the space in which the detached coal shoots downwards is also satisfactorily delimited from the face gallery gangway.

This winning apparatus has a supporting frame which is pressed substantially rigidly against the coal face. This supporting frame bearing with its front edge against the coal face forms at the same time the guide for the coal. The detaching tools of the plough project beyond the said frame only by the extent of the proposed depth of cut. The novelty consists in that the supporting frame itself comprises three arms two of which bear on the floor and one on the roof, at least one of the arms being angularly movable in order to clamp the supporting frame between floor and roof. The arm at the coal face side forms the guide rail for the plough. This arm forms at the same time, and jointly with the arm directed against the roof, the conveying space in which the material detached by the plough slides downwards.

One embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a view partly in plan and partly in section taken on the line M, N, O, P of FIGURE 2,

FIGURE 2 is a cross-section taken on the line A—A of FIGURE 1,

FIGURE 3 is a cross-section taken on the line B—B of FIGURE 1 with the guide raised at the goaf side, and

FIGURE 4 is a sectional view taken on the line C—C—D—D of FIGURE 1.

The coal plough consists of a cutter carrier 1 on which the cutting tools for detaching the coal from the seam are arranged. This cutter carrier 1 is pivotally mounted on the body 2. Depending on the direction of movement of the plough, it takes up a variable position relatively to the body 2. The plough body 2 is drawn along the coal face by a chain 3. The idle run 4 of this chain extends through a longitudinal duct in the plough body 2.

The guide beam of the plough body 2 is adapted in its cross-section to a claw-shaped section member 5. The guide section or elongated angularly adjustable tripod guide means consists of a plurality of individual lengths assuming the configuration of ramps of triangular cross-section laid along the coal face and each of which is provided with base leg means shown in the form of a curved plate 6. The lower forward portion or free edge of the downwardly curved plate 6 bears on the floor and against the coal face. The detaching tools of the plough detach the coal from the seam over a certain width in front of the free edge of the plate 6. The guide channel 5 with the plate 6, therefore, does not yield rearwardly when the plough passes. Accordingly, the lower portion of the base leg means including channel 5 and plate 6 form elongated track means for the plough body or planer 1 or similar mining machine, having a center track with the

side edges thereof inwardly and medially directed to form parallel track rims together with the central track, whereby to provide a retaining groove for the correspondingly profiled portion of the mining machine.

In the illustrated embodiment, the plate **6** is welded to the guide section **5**. The specially shaped plate **7**, which is also connected to the guide rail **5** further to the rear through the agency of the intermediate element **8**, is welded to the underside of the plate **6**. In this way, each individual length of the guide rail **5** comprises at one end a pocket **9** into which a tongue **10** of the next length engages.

The plate **7** is bent downwards at its rear end. This provides a free space for accommodating a chain **11** which extends over the entire length of the guide rail and on which the winning apparatus as a whole is suspended. The upper end of the chain **11** is anchored in the upper road into which the face gallery opens. There, it can be fixed to the driving apparatus. The lower end of the chain **11** is connected to the channel at the foot of the face gallery. The protective duct for the chain **11** is closed at the rear side by the plates **12** and **13** which are substantially U-shaped as seen in plan view. These plates are connected by bolts **14** on the one hand to the guide section **5** and on the other hand to the floor bar **7**.

The U-shaped plates **12** (FIGURES 1 and 3) are used for the connection of the pressure application device and the U-shaped plates **13** (FIGURES 1 and 2) for the connection of the jacking and supporting device.

The jacking device for the channel line consists of rearwardly extending reinforcement leg means having a support leg in the form of a lever **15** which is pivotably connected at one end by means of a pin **16** to the U-shaped plate **13**. A supporting wheel **17** is mounted on the other end of the lever **15** by means of a pivot **18**. The U-shaped plates **13** are provided one above the other with adjustable attachment means such as a series of transverse holes into which a pin **19** can be inserted which secures the supporting lever **15** with a wheel **17** in one of the various possible supporting positions. FIGURE 4 of the drawings shows in full lines and in dot-dash lines two different setting heights for the supporting wheel **17**. If FIGURE 4 is compared with FIGURE 2 it will be apparent that by lifting or lowering the entire guide linkage at the goaf side the inclination of the plate **6** and of the guide rail **5** and therefore the inclination of the plough **1, 2** can be varied within wide limits. With the setting shown in FIGURE 2, the floor cutter of the plough runs immediately along the floor, whereas with the dot-dash setting shown in FIGURE 4, the floor is even cut into. In the latter case, coal is detached reliably and under all circumstances directly at the floor level. This is also true of cases where the seam is undulatory in form and the plough has to negotiate a depression.

The guide frame is adapted to bear on the roof by upwardly extending reinforcement leg means in the form of plate trough means, such as hump-backed levers **20**. At each length of the guide rail **5**, several such levers can be pivotably mounted by pins **21**. In the illustrated embodiment, one such lever **20** is pivotably mounted on each U-shaped plate **12** or **13**. There is also pivotably mounted between the limbs of the U-shaped plates **13**, on the same pivot pin **16** with which one lever **15** is pivotably mounted, a pressure cylinder **22** whose piston rod is connected to a lever **20** by means of a pivot pin **23**.

The various levers **20** of a length of guide rail **5** are connected to one another by a plate **24**. Some or each of the plates **24** can be provided with an angular transverse projection or part **25** directed towards the coal face.

Finally, the U-shaped plates **13** are provided at one end of a length with a coupling tongue **26** and at the other end with a corresponding recess **27**. Therefore, by means of the coupling elements **10** and **26** the successive lengths of the supporting frame can be connected to one another end to end.

The levers **20** with the plates **24** are pressed with a more or less considerable pressure against the roof by positive force urging means such as piston-cylinder means shown here as the pressure cylinders **22**. Thus at the same time, by reaction, the plate **6** and supporting wheels **17** are pressed against the floor. Thus by pressing the levers **20** upwards the supporting frame is clamped fast in its entirety between roof and floor. At the same time, in this way the plate **6**, guide rail **5** and plate **24** in front of the coal face form the conveying space in which the detached coal can run downwards. The angular parts **25** of the plates **24** are used as baffle plates for preventing the downwardly running coal from reaching too high a speed and also to stiffen or reinforce said levers **20**.

The U-shaped plates **13** are troughed at their upper sides. These troughs form a duct for the insertion of cables, hoses and the like. The duct can be closed at the top by covers **28** which are pivotably mounted at **29** and can be secured in their closed position by pins **30**. The advance of the supporting frame as the working face is advanced is carried out by reinforcedly mounted rearwardly unyielding and relatively transversely disposed auxiliary advance urging means such as shifting cylinders **31**, or some other type of shifting devices, rearwardly connected to an upright prop means (see FIGS. 3 and 4), and whose piston rod is articulatedly connected through the agency of a universal joint **32** by means of a releasable pin **33** to a U-shaped intermediate element which itself is pivotably connected by a horizontal pin **34** to the U-shaped plate **12**.

As may be seen from the illustrated embodiment of FIGS. 1–4, representing, of course, only one particular form of execution of the present invention, it will be seen that the mining arrangement in question which is provided herein comprises elongated angularly adjustable tripod guide means adapted to be positioned adjacent a mine face in substantially rigid clamping engagement with both the mine floor and mine roof thereat for guiding a mining machine back and forth therealong in relatively stable operative engagement with the mine face for extracting mineral therefrom, including forwardly extending base leg means for disposition adjacent the mine face and having a lower forward portion extending for supporting contact with the mine face and mine floor thereat, upwardly extending roof leg means for supporting contact with the mine roof thereat, and rearwardly extending reinforcement leg means for supporting contact with the mine floor thereat at a point spaced rearwardly from the point at which said base leg means is disposed for such supporting contact with the mine floor, at least one of said leg means being angularly adjustably mounted with respect to said tripod guide means and provided with positive force urging means operatively interconnecting such angularly adjustable leg with said tripod guide means for achieving such substantially rigid clamping engagement with both said mine roof and mine floor of said leg means under the clamping force of said urging means.

The lower portion of the base leg means may include elongated track means adapted to receive for travel therealong such mining machine for guiding such machine in operative engagement with the mine face. Also, the roof leg means may include elongated plate trough means, such that the area defined between said elongated track means and said plate trough means extending towards the adjacent mine face delimits the conveying space for the mineral extracted by the mining machine. The trough plate means may be pivotally connected along one elongated side portion to the tripod guide means and adapted to contact clampingly the mine roof thereat along the other elongated side portion remote from the one side portion. The urging means may be a piston-cylinder means which operatively interconnects the tripod guide means and the trough plate means at a point spaced from the point of pivotal connection of the trough plate means

to the guide means. In the same way, the reinforcement leg means may include a support leg extending transversely with respect to the elongated tripod guide means and which is pivotally connected at one end portion to the tripod guide means and which is adapted to contact the mine floor at the other end portion remote from the one end portion. Adjustable attachment means may be provided operatively interconnecting the particular support leg to the tripod guide means at a point spaced from the point of pivotal connection of the support leg to the tripod guide means to adjust the angular disposition of the support leg with respect to the tripod guide means and in turn change the angular position of the track means with respect to the mine face and mine floor.

Understandably, reinforcedly mounted rearwardly unyieldingly and relatively transversely disposed auxiliary advance urging means may be provided which are articulatedly connected to the tripod guide means at the portion thereof remote from the track means to urge advancedly under auxiliary positive force the lower forward portion of the base leg means into supporting contact with said mine face and mine floor and said other elongated side portion of the trough plate of said roof leg into supporting contact with said mine roof while said other end portion of the support leg of said reinforcement leg means remains disposed in supporting contact with said mine floor remote from said mine face.

Generally, the reinforcement leg means will include at least two such support legs spaced longitudinally from one another along the extent of the elongated tripod guide means and the track means extends forwardly and downwardly at a sloping angle toward the mine floor. The auxiliary urging means may be particularly in the form of an auxiliary piston-cylinder means connected to the tripod guide means at a longitudinal point intermediate the support legs and extending transversely with respect to the tripod guide means rearwardly to an upright prop means reinforcingly abuttingly connected thereto to prevent rearward displacement of such auxiliary piston-cylinder means during operative forward positive urging of the tripod guide means thereby.

Specifically, the tripod guide means may be in the form of a ramp of triangular cross-section, with the track means extending along the portion thereof between the lower forward portion of the base leg means which thereby defines the forward apex of the ramp, and the roof leg means which thereby defines the roof apex of the ramp, whereby to occupy the particular triangular side of the ramp adjacent the mine face. The track means may include specifically a center track having the longitudinal side edges thereof inwardly and medially directed to form parallel track rims which together with the center track define a retaining groove for a correspondingly profiled portion of a planer in connection with which the tripod guide means may be used for accurate guiding thereof along the mine face.

The remaining two triangular sides of the ramp extending from the forward apex and the roof apex to the reinforcement leg means thereby define the rearward apex of the ramp at such reinforcement leg means. A protective duct is provided within the rearward apex for receiving a supporting chain connected to the guide means and used to suspend the same in any position of longitudinal slope thereof along the mine face.

Particularly, the point at which the piston-cylinder means for the trough plate means is connected to the tripod guide means coincides with the point of pivotal connection of a particular support leg of the reinforcement leg means and in turn the longitudinal point at which the auxiliary urging piston-cylinder means is connected to the tripod guide means coincides with the axis passing through such point of pivotal connection.

Also, the surface of the trough plate means adjacent the mine face is provided with longitudinally spaced apart angular transverse projections for stiffening the trough plate means and retarding the flow of extracted mineral passing therealong within the conveying space. Furthermore, between the roof leg means and the reinforcement leg means, the tripod guide means is provided with a longitudinally extending trough for receiving therein cables, hoses, and the like, indigenous to the mining operation, such trough preferably being provided with removable cover means for closing off the interior of such trough as desired.

It should be remarked particularly that the invention is not intended to be limited by the arrangements illustrated here. If necessary, the elements which are intended to prevent the supporting frame from yielding as the plough passes can be modified in constructional respects or otherwise. The same is true of the means for lifting the supporting frame at the goaf side and the means for lining the space in which the detached coal is to flow downwards.

Finally, it should also be mentioned that the curved plates **6** may, if necessary, also be arranged on a conventional conveyor and the lifting device can be arranged at the goaf side. The levers **15** do not necessarily have to be provided with supporting wheels **17**. Instead of wheels, skids could also be provided. Moreover, it would be possible for the pistons of the shifting cylinders to be arranged slightly higher up e.g. at the lower end of the arms **20**. The effect would be substantially the same as that obtained in the case of the illustrated embodiment.

I claim:

1. Mining arrangement which comprises elongated angularly adjustable tripod guide means adapted to be positioned adjacent a mine face in substantially rigid clamping engagement with both the mine floor and mine roof thereat for guiding a mining machine back and forth therealong in relatively stable operative engagement with the mine face for extracting mineral therefrom, including forwardly extending base leg means for disposition adjacent the mine face and having a lower forward portion extending for supporting contact with the mine face and mine floor thereat, upwardly extending roof leg means for supporting contact with the mine roof thereat, and rearwardly extending reinforcement leg means for supporting contact with the mine floor thereat at a point spaced rearwardly from the point at which said base leg means is disposed for such supporting contact with the mine floor, at least one of said leg means being angularly adjustably mounted with respect to said tripod guide means and provided with positive force urging means operatively interconnecting such angularly adjustable leg with said tripod guide means for achieving such substantially rigid clamping engagement with both said mine roof and mine floor of said leg means under the clamping force of said urging means.

2. Arrangement according to claim **1** wherein said lower portion of the base leg means includes elongated track means adapted to receive for travel therealong such mining machine for guiding such machine in operative engagement with the mine face, and wherein said roof leg means includes elongated plate trough means, such that the area defined between said elongated track means and said plate trough means extending toward the adjacent mine face delimits the conveying space for the mineral extracted by the mining machine.

3. Arrangement according to claim **2** wherein said plate trough means is pivotally connected along one elongated side portion to said tripod guide means and adapted to contact clampingly the mine roof thereat along the other elongated side portion remote from said one side portion, and wherein said urging means is a piston-cylinder means which operatively interconnects said tripod guide means and said plate trough means at a point spaced from the point of pivotal connection of said trough plate means to said guide means.

4. Arrangement according to claim **3** wherein said reinforcement leg means includes a support leg extending transversely with respect to said elongated tripod guide means and which is pivotally connected at one end portion to

said tripod guide means and adapted to contact the mine floor at the other end portion remote from said one end portion, and wherein adjustable attachment means are provided operatively interconnecting said support leg to said tripod guide means at a point spaced from the point of pivotal connection of said support leg to said tripod guide means for adjusting the angular disposition of said support leg with respect to said tripod guide means and in turn changing the angular position of said track means with respect to said mine face and mine floor.

5. Arrangement according to claim 4 wherein reinforcedly mounted rearwardly unyieldingly and relatively transversely disposed auxiliary advance urging means are provided which are articulatedly connected to said tripod guide means at the portion thereof remote from said track means to urge advancedly under auxiliary positive force said lower forward portion of the base leg means into supporting contact with said mine face and mine floor and said other elongated side portion of the plate trough of said roof leg into supporting contact with said mine roof while said other end portion of the support leg of said reinforcement leg means remains disposed in supporting contact with said mine floor remote from said mine face.

6. Arrangement according to claim 5 wherein said reinforcement leg means includes two said support legs spaced longitudinally from one another along the extent of said elongated tripod guide means, said track means extends forwardly and downwardly at a sloping angle toward the mine floor, and said auxiliary urging means is an auxiliary urging piston-cylinder means connected to said tripod guide means at a longitudinal point intermediate said support legs and extending transversely with respect to said tripod guide means rearwardly to an upright prop means reinforcedly abuttingly connected thereto to prevent rearward displacement of said auxiliary piston-cylinder means during operative forward positive urging of said tripod guide means thereby.

7. Arrangement according to claim 6 wherein said tripod guide means is in the form of a ramp of triangular cross-section, with said track means extending along the portion thereof between said lower forward portion of the base leg means, which thereby defines the forward apex of said ramp, and said roof leg means, which thereby defines the roof apex of said ramp, whereby to occupy the particular triangular side of said ramp adjacent the mine face, said track means including a center track having the longitudinal side edges thereof inwardly and medially directed to form parallel track rims which together with said center track define a retaining groove for a correspondingly profiled portion of a planer in connection with which said tripod guide means may be used for accurate guiding thereof along the mine face.

8. Arrangement according to claim 7 wherein the remaining two triangular sides of said ramp extending from the forward apex and the roof apex to the reinforcement leg means thereby define the rearward apex of said ramp at said reinforcement leg means, a protective duct being provided within said rearward apex for receiving a supporting chain connected to said guide means and used to suspend the same in any position of longitudinal slope thereof along the mine face.

9. Arrangement according to claim 6 wherein the point at which said piston-cylinder means for said plate trough means is connected to said tripod guide means coincides with the point of pivotal connection of a particular support leg of said reinforcement leg means, and wherein the longitudinal point at which said auxiliary urging piston-cylinder means is connected to said tripod guide means coincides with the axis passing through said point of pivotal connection.

10. Arrangement according to claim 9 wherein the surface of said plate trough means adjacent said mine face is provided with longitudinally spaced apart angular transverse projections for stiffening said plate trough means and retarding the flow of extracted mineral passing therealong within said conveying space.

11. Arrangement according to claim 6 wherein between said roof leg means and said reinforcement leg means said tripod guide means is provided with a longitudinally extending trough for receiving therein cables, hoses, and the like.

12. Arrangement according to claim 11 wherein said trough is provided with removable cover means for closing off the interior of said trough.

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