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PLANER GUIDE ARRANGEMENT FOR EXTRACTION OF MINERAL IN LONGWALL MINING OPERATIONS

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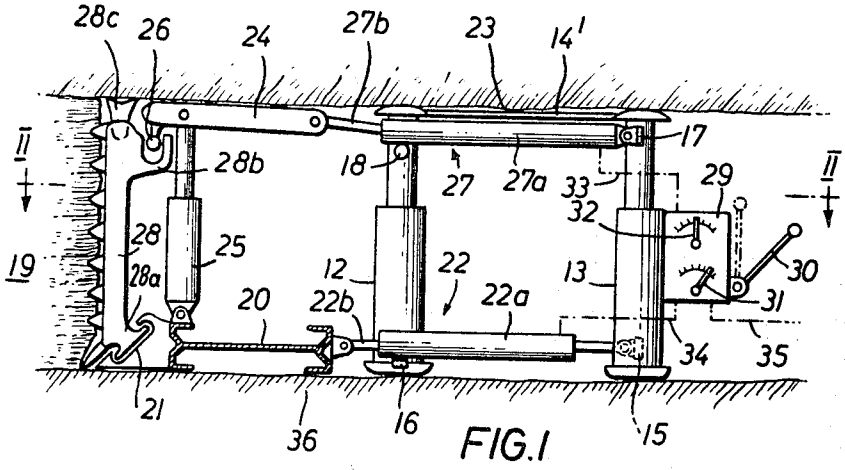


FIG.1

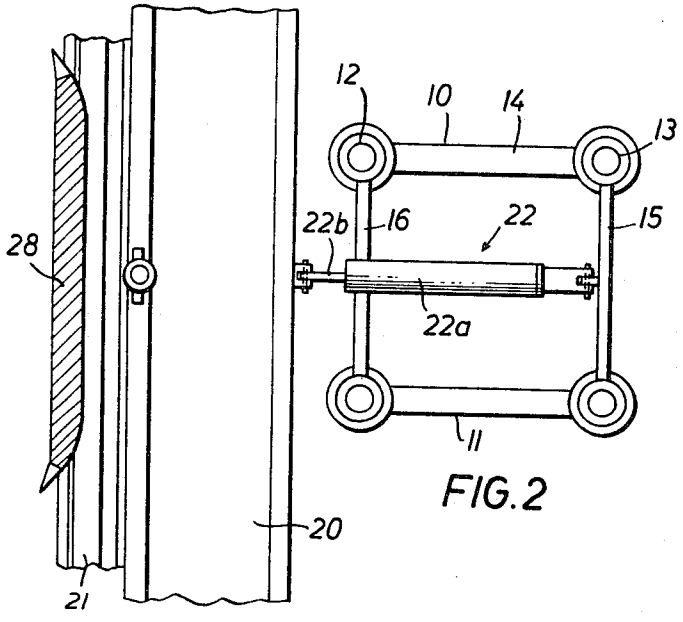


FIG.2

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PLANER GUIDE ARRANGEMENT FOR EXTRACTION OF MINERAL IN LONGWALL MINING OPERATIONS

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ABSTRACT OF THE DISCLOSURE

Planer guide arrangement for use in longwall mining operations in setting the angle of attack of a vertically extending mining machine, e.g. planer, at the mine face, including a main prop chock extensible for roof support and retractable for advancement which pivotally carries corresponding transverse upper and lower extensible and retractable linear urging means, e.g. double-acting piston-cylinder means, and vertically interconnected, e.g. via a pivotally positioned extensible and retractable vertical preliminary pit prop, longitudinal upper and lower guide tracks for the mining machine which are operatively interconnected correspondingly to the upper and lower urging means, whereby to urge via said urging means the upper and lower tracks toward the mine face alternately and/or simultaneously to adjust the angle of the mining machine with the mine face and/or advance the tracks as new layers of mineral, such as coal, are exposed at the mine face or to advance via said urging means the prop chock, with appropriate individual control of the preliminary prop and chock extension and retraction to effect such adjustment and/or advance.

The present invention relates to a planar guide arrangement for extracting mineral in longwall mining operations, and more particularly to such an arrangement including separate upper and lower guide means, such as rails, for a vertically extending mining machine, such as a planer, in which such rails are independently displaceable toward the mine face to vary the angle of attack of the mining machine, e.g. with respect to the vertical, with appropriate urging means to maintain the desired spatial disposition of the guide means and prevent as far as possible displacement from such disposition, e.g. due to the counterforces met by the mining machine at the mine face during passage back and forth along the guide means in extractive engagement with such mine face.

In undertaking the extraction of mineral such as coal with a mining machine, for example a mining planer, in longwall mining operations, there are great differences in the amount of power which must be expended, depending upon whether the breast or mine face breaks out easier, for example in the vicinity of the mine roof or in the vicinity of the mine floor. It is necessary to determine empirically in each case how to achieve the best results for the particular seam being worked. If the mining planer is constructed as a vertically extending planer such that it reaches more or less close to the mine roof, the mineral should be extracted more or less completely and evenly across the entire thickness or height of the seam. The advanceable mining prop system used in connection with the arrangement including guide means for the mining planer should be designed so that the arrangement can always be advanced automatically over the entire length of the longwall to a point close to the mine face, to avoid lagging of the arrangement at one point or another in an inefficient or non-uniform manner in cases where the roof

coal has not collapsed at the right time. Mining prop arrangements are known which can be adapted to some extent to provide support for the mine roof near the mine face being worked as well as support for the guide means used to urge the mining planer in extractive engagement with the mine face. Advanceable mining supports of this type are disclosed, for example, in U.S. Patent 3,192,722.

It is an object of the present invention to overcome prior art difficulties and to provide a planer guide arrangement for extracting mineral in longwall mining operations.

It is another object of the present invention to provide such an arrangement including separate upper and lower guide means, such as rails, for a vertically extending mining machine, such as a planer, in which such rails are independently displaceable toward the mine face to vary the angle of attack of the mining machine, e.g. with respect to the vertical, with appropriate urging means to maintain the desired spatial disposition of the guide means and prevent as far as possible displacement from such disposition, e.g. due to the counterforces met by the mining machine at the mine face during passage back and forth along the guide means in extractive engagement with such mine face.

It is still another object of the present invention to provide an arrangement of the foregoing type for the automatic extraction of mineral such as coal utilizing the simplest control means possible to achieve a maximum output with a minimum expenditure of power.

It is still another object of the present invention to provide an arrangement of the foregoing type which is simple and inexpensive to manufacture and durable in use.

It is a still further object of the present invention to provide such an arrangement in connection with a vertically extending mining machine so as to guide the mining machine during passage back and forth along the mine face throughout its vertical height while assuring as far as possible the automatic advancement of the system along the entire length of the longwall to a point constantly close to the mine face as new layers of mineral are extracted, in an efficient and uniform manner.

It is still another object of the present invention to provide an arrangement of the foregoing type that will ensure as far as possible the uniform extraction of mineral throughout the height of the vertically extending mining machine such that the mineral in the vicinity of the mine floor and the mineral in the vicinity of the mine roof will be readily removed during the passage of the mining machine sufficiently evenly to clear the space to be next occupied by the arrangement upon the next increment of advance of the arrangement, preferably with the use of independently actuatable self-propelled advancing mine roof and planer guide supporting means to urge the arrangement in the forward direction of advance.

It is a still further object of the present invention to provide an arrangement of the foregoing type which permits the upper and lower guide means for the vertically extending mining machine to be urged uniformly toward the mine face or at different degrees of urgence for versatile accommodation of the particular conditions met thereat during the mining operation and to achieve changes in the path of the mining machine with respect to the mine floor to cause either climbing or digging of the mining machine, if desired, in addition to normal horizontal movement.

It is a still further object of the present invention to provide an arrangement of the foregoing type in which the urging means used to vary the disposition of the guide means at the mine face and to advance the system in increments toward the mine face and to support the mine roof are controlled independently of one another and preferably from a central control point remote from the site of mining operations.

Other and further objects of the present invention will become apparent from a study of the within specification and accompanying drawing, in which:

FIG. 1 is a schematic vertical section through a stope or mineway being worked showing the disposition of advanceable prop means, upper and lower guide means, and a mining planer with respect to a longwall mine face being worked, and

FIG. 2 is a schematic top sectional view taken along the line II—II of FIG. 1.

It has been found in accordance with the present invention that a planer guide arrangement may now be provided for a vertically extending mining machine, such as a planer, adapted to be conducted longitudinally back and forth along a mine face for the extraction of mineral therefrom, whereby to achieve efficient extraction of mineral with a maximum output and minimum expenditure of power. The arrangement may be controlled by simple means so as to achieve efficient automatic extraction of mineral.

Broadly, the arrangement comprises advanceable mine roof supporting main prop means extensible for roof support and retractable for advancement, transverse upper and lower extensible and retractable linear urging means connected to corresponding upper and lower portions of said main prop means and extending operatively outwardly therefrom, and vertically interconnected longitudinal upper and lower planer guide means adapted to extend along a mine face correspondingly adjacent the mine roof and mine floor to guide such mining planer along the mine face, said upper and lower linear urging means operatively interconnecting correspondingly said upper and lower planer guide means with said main prop means, whereby upon extension actuation of a corresponding said urging means when said main prop means are in extended roof supporting disposition the particular guide means interconnected therewith is urged transversely in the mine face direction to advance the appropriate guide means and to adjust the angle of attack of such mining planer at the mine face whereas upon corresponding retraction actuation when said main prop means are in retracted disposition the main prop means is urged transversely in the mine face direction to advance appropriately said main prop means.

By reason of the longitudinally extending planer guide means, which may be in the form of continuous rails at the mine floor and mine roof adjacent the mine face, upper and lower guidance for a tall mining planer or plow, i.e. vertically extending from the mine floor to the vicinity of the mine roof, may be achieved and after each passage along the mine face, the mining machine may be advanced by advancing the rails separately or simultaneously, for example using advancing cylinders, in steps which alternate with the advancing steps of the mine roof and guide prop supporting system associated with the arrangement as new layers of mineral are extracted.

The actuation of the upper and lower advancing cylinders for the guide means is controllable so that the pressure may either be the same at the upper and lower guide means, where uniform forward urging is desired, or the lower guide means may be urged more strongly in the forward direction than the upper guide means, or vice versa, whereby to achieve a tilting of the mining machine and in turn of the mine face after the mining machine has passed.

Where the lower guide means is urged more strongly so that the mine face will tilt upwardly and outwardly toward the arrangement after passage of the planer, the planer operation will be carried out such that the planer will tend to climb. On the other hand, if the pressure of the advancing cylinder for the upper guide means is greater than that of the advancing cylinder for the lower guide means, the planer will cut more deeply in the vicinity of the roof and will tend to drift toward the mine floor with the mine face tilting outwardly and downwardly toward the arrangement.

Thus, it is possible in accordance with the present invention by appropriate control of force with which the guide means such as rails are advanced at the top and bottom of the mine face, to steer or control the disposition of the mining machine in a predetermined manner during its travel along the mine face. Such steering is generally accomplished in direct dependence upon the control of pressure to the upper and lower advancing cylinders of the guide means.

As the artisan will appreciate, the control of pressure fluid to advancing cylinders of the type used in longwall mining operations may be carried out from a remote control position using a central control board which may be located in the gangway. Thus, such a remote control system for the hydraulic fluid, utilizing conventional valve systems, may be provided for the instant arrangement. Such remote control systems are preferably employed in conjunction with planer travel indicating systems, i.e. surveillance means such as remote control mechanical or electrical signal systems, which indicate the longitudinal point along the mine face where the mining machine is at any particular time.

It will be further realized that in connection with the urging of the advancing cylinders for the upper and lower guide means or rails at differential or equal forces with respect to each other, the control apparatus may determine directly the ratio between the cylinder extension for the guide means at the roof and at the floor, perhaps independently of the manner by which the prop support means are advanced.

Of course, as the artisan will appreciate, the advancing cylinders contemplated herein are typical systems including a cylinder carrying slidably therein a double-acting piston connected to a piston rod operatively outwardly extending through one cylinder head to provide a linear urging means changeable in operable length in dependence upon the fluid feed to the cylinder on one or the other side of the piston.

Referring to the drawing, FIG. 1 shows a mineway in which longwall mining operations may be conducted to extract mineral from the mine face **19** between the mine floor **36** and the mine roof **23**. A planer **28** carrying roof chisels **28***c* is conducted longitudinally back and forth by traction cable means (not shown) in extractive engagement with mine face **19** to win mineral therefrom. Planer **28** is provided with a lower lug **28***a* and an upper lug **28***b* which are appropriately mounted on the lower guide rail **21** and the upper guide rail **26** of the planer guiding arrangement of the invention. Lower guide rail **21**, in the embodiment shown, is attached to the forward side wall of a conventional conveyor **20**, such as a double chain scraper conveyor, while upper guide rail **26**, shown in the form of a bar or tube rail, is carried by the cantilevered preliminary rail supporting cap **24**. The preliminary prop **25** extends vertically between and is pivotally connected respectively to the front side wall of the conveyor **20** and the preliminary cap **24** so as to maintain the vertical disposition between the lower rail **21** and the upper rail **26** and at the same time provide preliminary support for the mine roof **23** above cap **24**.

A prop supporitng system for supporting the mine roof behind the conveyor and for supporting the guide rails **21** and **26** is provided in the form of a pair of frames **10** and **11** (see FIG. 2), each including a front prop **12** and a rear prop **13**, a floor skid **14**, preferably in the form of an elastic or resilient floor skid, and a roof cap **14'** (see FIG. 1), whereby to form a rectilinear upright frame. Each such frame is able to extend into mine roof supporting engagement and be retracted from such engagement by controlling the flow of fluid, such as hydraulic fluid, to the props **12** and **13**. Such props are conventional and may be designated as mining or pit props, hydraulic props or chocks, etc., as the artisan will ap-

preciate. The two frames **10** and **11** are longitudinally connected by the longitudinal lower cross bars **15** and **16** as well as the longitudinal upper crossbars **17** and **18** (see FIG. 1) of equal length to crossbars **15** and **16**, to form a structurally rigid prop supporting system which may be designated an advanceable roof supporting prop chock.

A chock and conveyor lower advancing piston-cylinder means **22**, including the cylinder **22***a* and the piston (not shown) connected to the piston rod **22***b* is provided, with cylinder **22***a* being pivotally connected to the rear lower cross bar **15** and with the piston rod **22***b* being pivotally connected to the rear side wall of the conveyor **20**. In this manner, the forward end of cylinder **22***a* rests loosely on the forward lower cross bar **16**.

In the same way, a chock advancing upper piston-cylinder means **27** including the cylinder **27***a* and the piston (not shown) connected to the piston rod **27***b* is provided with cylinder **27***a* being pivotally connected to the rear longitudinal upper cross bar **17** and with the piston rod **27***b* being pivotally connected to the rear end of the preliminary roof supporting cap **24**. In this manner the forward end of cylinder **27***a* rests loosely on the forward upper crossbar **18**.

There is thus provided a dual piston-cylinder arrangement whereby to urge separately or simultaneously and under the same or differing forces the lower guide means in the form of conveyor **20** and rail **21**, on the one hand, and the upper guide means in the form of the preliminary cap **24** and the rail **26** toward the mine face **19**, whereby not only to provide the desired cutting pressure of the planer **28** into mine face **19** but also the angle with respect to the vertical of planer **28**. Planer **28** may thereby extract mineral in such a manner as to maintain the face in vertical disposition or with a tilt outwardly and downwardly in the case where the greater force is exerted by the upper piston-cylinder means **27**, or with a tilt outwardly and upwardly in the case where the greater force is exerted by lower piston-cylinder means **22**. It will be realized, of course, that during this time the preliminary prop **25** will be released at least partially from its extended supporting position to enable the adjustment of the rails **21** and **26** in the desired manner and in turn the angle of attack with respect to the vertical of planer **28** carried thereby. Planer **28** in this regard may be provided with roof chisels **28***c* extending toward the roof yet adaptable automatically to variations in the seam thickness or height by the use of spring and/or hydraulic resilient vertical displacement mounting means of the conventional type.

In this way, the adhering mineral near roof **23** will be readily removed so as to ensure along with the disposition of planer **28** itself the even extraction of mineral throughout the area being worked so that the rails **21** and **26** and in turn the parts connected thereto may be advanced in the desired manner toward the newly exposed layers at the mine face.

To achieve such advance, the piston-cylinder means **22** and **27** are operated conveniently when the chock props of the frames **10** and **11** are in extended position supporting the mine roof. When the chock containing frames **10** and **11** is so disposed, rearward displacement thereof is prevented, whereby the actuation of piston-cylinder means **22** and **27** separately or simultaneously and under the same or different forces, as desired, so as to extend the piston rods **22***b* and **27***b*, will cause the preliminary cap **24** carrying rail **26**, on the one hand, and conveyor **20** affixed to rail **21**, on the other hand, to be urged toward the mine face. Understandably, during the displacement of rails **21** and **26** toward the mine face, preliminary prop **25** will be at least slightly relaxed from engagement with the mine roof to achieve the advance of this portion of the arrangement without frictional hindrance at the mine roof.

Once such advance has been achieved, preliminary prop **25** may be extended into propping engagement once more, whereupon the props of frames **10** and **11** of the chock may be retracted sufficiently to permit the chock to be advanced toward the mine face by the reverse actuation of piston-cylinder means **22** and **27** so as to cause the cylinders **22***a* and **27***a* to come forward in greater telescoping relation with the piston rods **22***b* and **27***b*. When the advance of the chock has thus been achieved, the frame prope **12**, **13** are again extended into supporting engagement with the mine roof to continue the operation. It will be realized that when the chock is in supporting engagement with the mine roof, the piston-cylinder means **22** and **27** may be acted separately or simultaneously to change the disposition of rails **21** and **26** with respect to one another and to some extent the angular disposition of the preliminary prop **25** with respect to the vertical due to the pivotal connections between the various parts in question, either by extending or retracting the appropriate piston rod from the corresponding piston cylinder therefor, while relaxing somewhat the preliminary prop **25** from extended roof supporting disposition.

As may be appreciated from FIG. 1, the cantilevered preliminary cap **24** due to the presence of preliminary prop **25** is able to support at least about one-half of the transverse width of mine roof **23** overlying guide rail **21** and conveyor **20**.

It is of particular importance that the guide rails **21** and **26** provided for planer **28** be able to be advanced separately from one another as well as simultaneously. In this way it is possible to extract more mineral from the lower portion of the mine face than from the upper portion, and vice versa, depending upon the mine face conditions and in turn which portion of the stratum in question yields the mineral, such as coal, more easily and with the least consumption of power.

Because of the versatility in actuating separately or simultaneously piston-cylinder means **22** and **27**, preliminary prop **25** and the main roof supporting props **12** and **13** of the chock, the arrangement in question may be adapted to whatever mining conditions may exist, with adjustments in dependence upon changes in such conditions. The advance of the rails **21** and **26** normally takes place alternately with the advance of the chock such that during the advance of the chock, the main props of the frames will be relaxed from roof supporting engagement while the preliminary prop will be maintained in such engagement, whereas during the advance of the guide rails, the preliminary prop will be relaxed from roof supporting engagement while the main props of the chock will be maintained in such engagement. Between periods of such advance of the guide rails **21** and **26**, on the one hand, and the chock, on the other hand, the main props of the chock and the preliminary prop will all be conveniently maintained in extended position to support the roof and prevent undesired rearward displacement of the rails **21** and **26** from the intended position due to counterforces which might be met by planer **28** at the mine face during passage back and forth therealong. Nevertheless, apart from the ordinal increments of the alternate advance of the guide rails **21** and **26**, on the one hand, and the chock, on the other hand, the piston-cylinder means **22** and **27** may also be actuated to adjust the disposition of the rails **21** and **26** and in turn preliminary prop **25** (maintained in relaxed state during such time) with respect to the normal vertical alignment of such parts at the mine face.

To achieve the actuation of the piston-cylinder means **22** and **27**, and for that matter the actuation of preliminary prop **25** and the main props of the chock in conjunction with one another, a control valve **29** (see FIG. 1) may be provided having the gauges **31** and **32** and the control lever **30**. Control lever **30** may be used to open and close

the valve and determine the flow through the valve to the various parts. For example, lever **30** may be used to control the flow of hydraulic fluid from a source line, shown schematically at **35**, through the conduit shown schematically at **33**, to the upper piston-cylinder means **27** or to the lower piston-cylinder means **22** via the conduit shown schematically at **34**. Gauge **32** indicates the disposition of the flow through the conduit **33** while gauge **31** indicates the disposition of the flow through the conduit **34**. Valve **29** may contain appropriate flow passages to control the flow of fluid to the main props of the chock and to the preliminary prop, and while these flow passages are not shown they contemplate conventional means well known to the artisan. The significant point is that control valve means, such as valve **29**, may be used to control the flow of all of the hydraulically operated parts so that such parts may be actuated individually or separately as well as simultaneously.

It will be realized by the artisan that the control valve **29** may be provided at a point remote from the particular chock in question and that a common master control valve **29** may be used to control the flow of a pressure medium to a plurality of separately situated arrangements of the type in question spaced apart along the mineway for simultaneous or separate actuation of various parts in each of the arrangements. Because of the nature of the common actuation of such parts disposed along the mineway in spaced apart relation, the artisan will readily appreciate the concept in question without the need for precise diagrams in the drawing.

In the event it is desired to control the mining operation from a remote point, a common valve **29** may be provided in a gangway remote from the site of operations with appropriate connections to each of the piston-cylinder means or prop means in question for individual or simultaneous actuation of some or all of the parts in each of the arrangements or in all of the arrangements, preferably in dependence upon information which may be provided by a mechanical or electrical automatic planer travel indicator system which signals the exact position of the mining machine along the longitudinal path of travel at the mine face so as to enable the operator to actuate the control valve **29** to advance the guide rails **21** and **26** just after the mining machine has passed a particular point and thereafter advance the chock in turn associated therewith and, if necessary, adjust the angular disposition of the rails at that point and of the associated preliminary prop with respect to the vertical, especially if a deviation from the vertical is desired to tilt the mining machine operatively so that it will climb toward the mine roof or drift toward the floor during the next passage thereof. While only one prop chock and upper and lower transverse urging and guide means system is shown, as the artisan will appreciate, a plurality of such systems in spaced apart longitudinal disposition may be provided, and especially where the mine face may not be absolutely straight in the longitudinal direction, the conveyor **20** may be provided in comparatively short articulatedly interconnected sections to accommodate unevenness in the mine floor and deviations from the normal longitudinal direction as may occur where it is desired to urge the conveyor and thus the lower rail **21** closer to the mine face than the subsequent portion of the conveyor along which the planer has not yet passed. In this regard, the lower guide rail **21** will often also be in the form of short articulatedly interconnected sections, each of which is affixed to the appropriate conveyor section to achieve undulating variations during the advanement of the guide means. The upper guide rail **26** may also be provided in such articulatedly interconnected short sections or may be provided in a generally flexible condition which is able to accommodate undulations at various points along the entirety thereof under the conditions of operation. To some extent this will be necessary where a given preliminary prop is released from preliminary roof supporting engagement to displace downwardly the appropriate portion of rail **26** compared to adjacent portions carried by the adjacent preliminary props in the adjacent arrangements. This is also necessary to some extent in connection with the forward advance of that portion of rail **26** with respect to the portions which may not as yet have been advanced or which have already been advanced.

It is preferred to provide the piston-cylinder means **22** and **27** in superimposed stacked relation with respect to one another, i.e. in a common vertical plane, so that the urging of the guide rails **21** and **26** as well as the urging of the preliminary cap **24** and conveyor portion **20** may be undertaken with a minimum of stress on the parts in question and, therefore, with a minimum chance of damage. The regulation of the pressure and/or length of stroke of the piston-cylinder means **22** and **27** will determine the disposition of the rails **21** and **26** and in turn of the planer **28** at the mine face so as to attain by the simplest possible means a maximum output with a minimum expenditure of power.

Thus, in accordance with the present invention, main prop means, transverse upper and lower extensible and retractable linear urging means and vertically interconnected longitudinal upper and lower planer guide means are provided, such that the linear urging means, e.g. piston-cylinder means, interconnect the guide means, e.g. the upper and lower guide rails, with the main prop means, e.g. the chock, whereby one or both of the guide means or the chock may be advanced in the desired manner and so that the angle of attack of the mining planer may be adjusted in dependence upon the pressure and/or length of stroke of the linear urging means.

Preferably, the upper and lower guide means are provided correspondingly with roof and floor engaging support means to which said upper and lower linear urging means are connected correspondingly, as well as an extensible and retractable vertical preliminary roof supporting prop linkably interconnecting said upper and lower guide means by connection between said roof and floor engaging support means for extension into preliminary roof supporting engagement via the roof engaging support means when said main prop means are advanced and when the mining planer is conducted along the guide means and for retraction when the appropriate guide means is advanced and when the planer angle of attack is adjusted.

More specifically, the roof engaging support means is in the form of a transverse preliminary roof cap cantilevered on said vertical preliminary prop and the floor engaging support means is in the form of a longitudinal mining conveyor, with said vertical preliminary prop being pivotally connected about corresponding substantially longitudinal guide axes of pivot to said preliminary cap and conveyor and with said upper and lower linear urging means in turn being pivotally connected about corresponding substantially longitudinal urging axes of pivot to said preliminary cap and conveyor, said urging axes of pivot being spaced correspondingly from said guide axes of pivot in a transverse direction away from the mine face direction. In this regard, the corresponding points of connection of the vertical preliminary prop and linear urging means to the preliminary cap and conveyor are disposed substantially in a common vertical plane extending crosswise of the guide and urging axes of pivot. Moreover, the linear urging means are pivotally connected about corresponding substantially longitudinal main prop axes of pivot to said main prop means, said main prop axes of pivot being spaced correspondingly from said urging axes of pivot in said transverse direction away from the mine face direction. In this regard, the corresponding points of connection of the urging means to the main prop means are suitably disposed substantially in the common vertical plane.

In accordance with one particular feature, the upper

guide means includes a longitudinal upper track connected to the forward portion of said preliminary cap on the side of the corresponding guide pivot axis remote from the corresponding urging pivot axis, while said lower guide means includes a longitudinal lower track connected to the forward portion of said conveyor on the side of the corresponding guide pivot axis remote from the corresponding urging piston axis, for guidingly accommodating correspondingly profiled upper and lower portions of the planer in connection with which the arrangement is adapted to be used.

Therefore, it is possible to provide a plurality of longitudinally spaced apart sets of corresponding main prop means, urging means, preliminary caps and vertical props such that the lower urging means and vertical props of each set are connected to a common longitudinal conveyor provided with a common lower guide track while the preliminary caps connected to such vertical props in turn are connected to and carry a common upper guide track, and wherein each said main prop means is in the form of a rectangular prop chock including a pair of longitudinally spaced apart transversely situated prop frames, in which each frame contains a front prop adjacent said guide means and a rear prop remote from said guide means interconnected by a common transverse floor skid and a common transverse roof cap and in which both front props and both rear props are interconnected correspondingly by a common longitudinal lower cross bar and a common longitudinal upper cross bar to form such rectangular prop chock, the upper and lower piston-cylinder means being pivotally connected to the corresponding upper and lower rear cross bars interconnecting said rear props such that the piston-cylinder means extend toward said guide means in normal resting contact on the corresponding upper and lower front cross bars interconnecting said front props.

To achieve the foregoing, a vertically extending mining planer may be provided which has upper and lower track profile portions corresponding to the track profiles of the upper and lower guide means, the planer being in slidable guiding contact with the upper and lower longitudinal tracks for passage back and forth therealong in extractive engagement with the mine face at an angle of attack determined by the relative positions of said tracks with respect to each other and in turn with respect to the mine face.

What is claimed is:

1. Planer guide arrangement for a vertically extending mining planer adapted to be conducted longitudinally back and forth along a mine face for the extraction of mineral therefrom, which comprises advanceable mine roof supporting main prop means extensible for roof support and retractable for advancement, transverse upper and lower extensible and retractable linear urging means connected to corresponding upper and lower portions of said main prop means and extending operatively outwardly therefrom, and vertically interconnected longitudinal upper and lower planer guide means adapted to extend along a mine face correspondingly adjacent the mine roof and mine floor to guide such mining planer along the mine face, said upper and lower linear urging means operatively interconnecting correspondingly said upper and lower planer guide means with said main prop means, whereby upon extension actuation of a corresponding said urging means when said main prop means are in extended roof supporting disposition the particular guide means interconnected therewith is urged transversely in the mine face direction to advance the appropriate guide means and to adjust the angle of attack of such mining planer at the mine face whereas upon corresponding retraction actuation when said main prop means are in retracted disposition the main prop means is urged transversely in the mine face direction to advance appropriately said main prop means.

2. Arrangement according to claim 1 wherein said upper and lower guide means are provided correspondingly with roof and floor engaging support means to which said upper and lower linear urging means are connected correspondingly, as well as an extensible and retractable vertical preliminary roof supporting prop linkably interconnecting said upper and lower guide means by connection between said roof and floor engaging support means for extension into preliminary roof supporting engagement via the roof engaging support means when said main prop means are advanced and when the mining planer is conducted along the guide means and for retraction when the appropriate guide means is advanced and when the planer angle of attack is adjusted.

3. Arrangement according to claim 2 wherein the roof engaging support means is in the form of a transverse preliminary roof cap cantilevered on said vertical preliminary prop and the floor engaging support means is in the form of a longitudinal mining conveyor, with said vertical preliminary prop being pivotally connected about corresponding substantially longitudinal guide axes of pivot to said preliminary cap and conveyor and with said upper and lower linear urging means in turn being pivotally connected about corresponding substantially longitudinal urging axes of pivot to said preliminary cap and conveyor, said urging axes of pivot being spaced correspondingly from said guide axes of pivot in a transverse direction away from the mine face direction.

4. Arrangement according to claim 3 wherein the corresponding points of connection of said vertical preliminary prop and said linear urging means to said preliminary cap and conveyor are disposed substantially in a common vertical plane extending crosswise of said guide and urging axes of pivot.

5. Arrangement according to claim 4 wherein said linear urging means are pivotally connected about corresponding substantially longitudinal main prop axes of pivot to said main prop means, said main prop axes of pivot being spaced correspondingly from said urging axes of pivot in said transverse direction away from the mine face direction.

6. Arrangement according to claim 5 wherein the corresponding points of connection of said urging means to said main prop means are disposed substantially in said common vertical plane.

7. Arrangement according to claim 6 wherein said upper guide means includes a longitudinal upper track connected to the forward portion of said preliminary cap on the side of the corresponding guide pivot axis remote from the corresponding urging pivot axis, while said lower guide means includes a longitudinal lower track connected to the forward portion of said conveyor on the side of the corresponding guide pivot axis remote from the corresponding urging piston axis, for guidingly accommodating correspondingly profiled upper and lower portions of the planer in connection with which the arrangement is adapted to be used.

8. Arrangement according to claim 7 wherein said urging means are in the form of corresponding pressure fluid actuated upper and lower double-acting piston-cylinder means while said vertical preliminary prop and main prop means are in the form of corresponding pressure fluid actuated preliminary and main pit props, and wherein valve control means are provided to control the individual flow of pressure fluid to each of said piston-cylinder means and to each of said preliminary and main pit props, whereby to actuate said piston-cylinder means for extension and retraction alternately as well as simultaneously with respect to each other and with respect to the extension and retraction actuation of said pit props and to actuate said preliminary and main pit props for extension and retraction alternately, while regulating the pressure and stroke length of each such actuation in dependence upon the fluid flow control of such valve control means.

9. Arrangement according to claim 8 wherein a plu-

rality of longitudinally spaced apart sets of corresponding main prop means, urging means, preliminary caps and vertical props are provided such that the lower urging means and vertical props of each set are connected to a common longitudinal conveyor provided with a common lower guide track while the preliminary caps connected to such vertical props in turn are connected to and carry a common upper guide track, and wherein each said main prop means is in the form of a rectangular prop chock including a pair of longitudinally spaced apart transversely situated prop frames, in which each frame contains a front prop adjacent said guide means and a rear prop remote from said guide means interconnected by a common transverse floor skid and a common transverse roof cap and in which both front props and both rear props are interconnected correspondingly by a common longitudinal lower cross bar and a common longitudinal upper cross bar to form such rectangular prop chock, the upper and lower piston-cylinder means being pivotally connected to the corresponding upper and lower rear cross bars interconnecting said rear props such that the piston-cylinder means extend toward said guide means in normal resting contact on the corresponding

upper and lower front cross bars interconnecting said front props.

10. Arrangement according to claim **9** wherein a vertically extending mining planer provided with upper and lower track profile portions corresponding to the track profiles of said upper and lower guide means is positioned in slidable guiding contact with said upper and lower longitudinal tracks for passage back and forth therealong in extractive engagement with the mine face at an angle of attack determined by the relative positions of said tracks with respect to each other and in turn with respect to the mine face.

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