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ADJUSTABLE FLOOR JACK FOR A CONTINUOUS MINING APPARATUS

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Fig. 1.

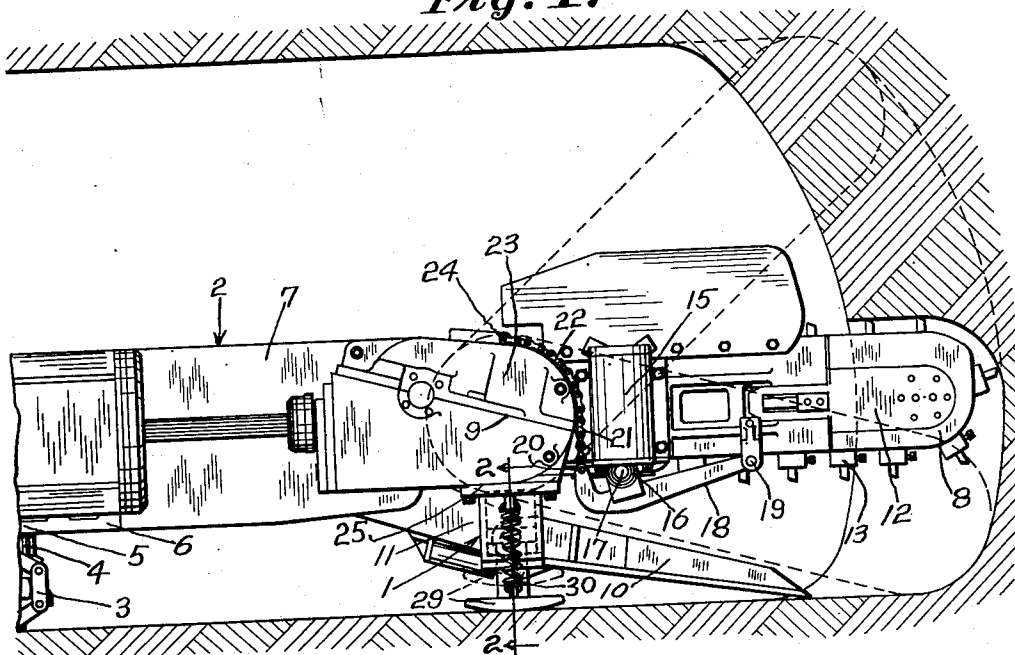


Fig. 2.

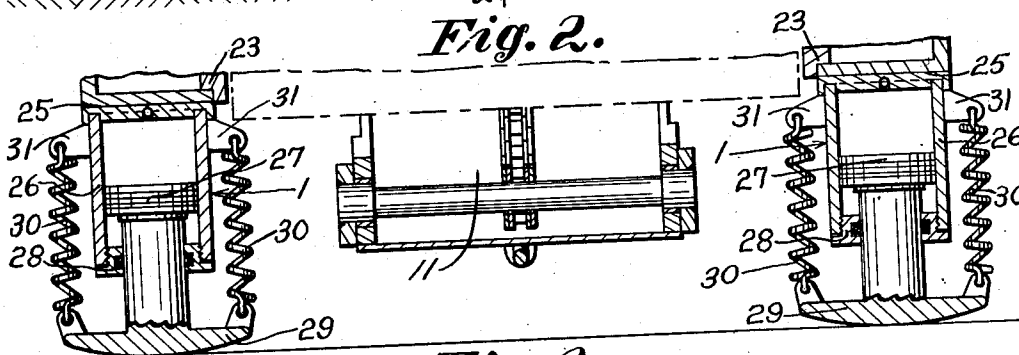
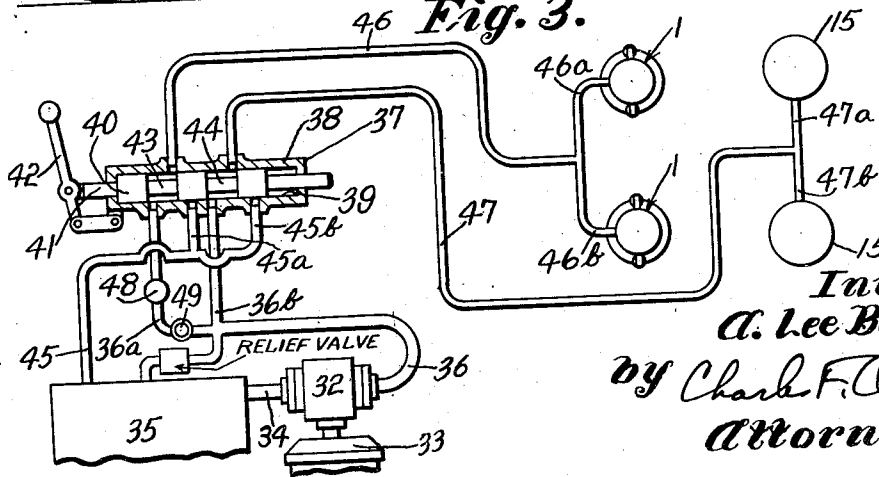


Fig. 3.



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ADJUSTABLE FLOOR JACK FOR A CONTINUOUS MINING APPARATUS

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6 Claims. (Cl. 262—29)

This invention relates to mining apparatus and more particularly to a "continuous miner" having floor jack mechanism associated therewith whereby, when the disintegrating head of the "miner" is started to swing upwardly, the floor jack mechanism is moved into supporting position.

In a "continuous miner" of the type disclosed in the copending application to John R. Sibley, Serial No. 102,996, filed July 5, 1949, owned by applicant's assignee, a mobile base carries a turntable on which a horizontal guide frame is mounted, and a disintegrating head for dislodging mineral from a solid mine vein is carried by a sliding support which is mounted on the guide frame for guided movement relative to the base toward and from the work, and the disintegrating head is pivotally mounted on the sliding support to swing in a vertical plane. The guide frame on the turntable projects forwardly from the base a substantial distance so that there is substantial overhang and, under certain conditions, there is a substantial tendency of bodily tilting of the apparatus as the disintegrating head is swung upwardly to effect dislodgement and disintegration of a vertical segment of a solid mine vein. The present invention contemplates improvements over a "continuous miner" of the type referred to in that a floor jack mechanism is associated therewith for supporting the overhanging portion of the miner at points spaced forwardly of the base whenever the disintegrating head is swung upwardly about its pivot. In accordance with the present invention the floor jack mechanism is coordinated with the upswing mechanism for the disintegrating head so that whenever upswing is initiated the jack mechanism is moved into floor engaging, supporting position.

An object of the present invention is to provide an improved supporting means for a mining apparatus wherein the supporting means is moved into supporting position during certain of the operating functions of the apparatus. Another object is to provide an improved floor jack mechanism for a "continuous miner" whereby the pivoted disintegrating head of the "miner" is firmly supported on the mine floor during upswing of the head. A further object is to provide in a "continuous miner" of the kind having a mobile base carrying a sliding support on which a disintegrating head is pivotally mounted, with the sliding support overhanging the base a substantial distance and having an improved floor jack mechanism carried by the sliding support beneath the overhanging frame portion to hold the apparatus steady during operation of the disintegrating head. A still further object is to provide an improved floor jack mechanism especially designed for use with a "continuous miner" of the swinging-head type and having novel means for coordinating the jack mechanism with the upswing mechanism for the head whereby the latter is always firmly supported during its upswing movement. Yet another object is to provide a novel adjustable support for the overhanging frame of a mining apparatus whereby the frame is firmly supported against the floor at points spaced from its base during certain of the mining operations. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawing there is shown for purposes of illustration one form which the invention may assume in practice.

In this drawing:

Fig. 1 is a fragmentary side elevational view of a "continuous miner" with which an illustrative embodiment of

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the invention is associated, showing the improved floor jack mechanism in floor engaging, supporting position.

Fig. 2 is an enlarged fragmentary cross section taken substantially on line 2—2 of Fig. 1, illustrating details of the floor jack mechanism.

Fig. 3 is a diagrammatic view illustrating the hydraulic fluid system.

As shown in the drawing, the improved floor jack mechanism, generally designated 1, is shown associated with a "continuous miner" generally designated 2 of the type disclosed in the Sibley application, Serial No. 102,996, above referred to. Evidently, features of the invention may be associated with other types of mining equipment.

The "continuous miner" 2 generally comprises a mobile base 3, desirably a crawler base, having a frame 4 on which a turntable 5 is swivelly mounted on an upright axis. Carried by the turntable is a horizontal guide frame 6 which projects forwardly from the base a substantial distance in advance of the latter and has slidably guided thereon a support 7 on which a disintegrating head 8 is pivotally mounted at 9 to swing in a vertical plane with respect to the sliding support. The turntable may be rotated to locate the disintegrating head and its guide frame in different angular horizontal positions about the turntable axis with respect to the base. The guide frame and the sliding head-support overhang the base a substantial distance as shown in Fig. 1, and projecting forwardly and downwardly from the sliding support beneath the disintegrating head is a floor clean-up device or shovel 10 for gathering loose material on the mine floor in the zone of action of the disintegrating head and to direct a portion of the material onto the conveying means 11 of the apparatus, in the manner fully disclosed in the above mentioned Sibley application. The swingable disintegrating head includes a bar structure 12 having a series of parallel disintegrating chains 13 guided for circulation in vertical orbits thereabout and these disintegrating chains as the head is moved attack and dislodge the solid mineral of a mine vein and move the dislodged mineral rearwardly from the face of the mine vein onto the conveying means 11 of the apparatus. When the disintegrating head 8 is swung downwardly near the level of the mine floor the sliding support 7 may be moved forwardly by power devices to sump the outer portions of the disintegrating chains 13 into the solid mine vein and thereafter the disintegrating head may be swung upwardly about its pivot to tear out and disintegrate a wide vertical segment of the mine vein between the floor and the mine roof. The mechanism for effecting upswing may be similar to that disclosed in a copending application to John D. Russell, Serial No. 139,631, filed January 20, 1950, also owned by applicant's assignee, and comprises upright fluid cylinders 15 secured to the sides of the bar structure 12 and containing pistons having the lower ends of their piston rods 16 pivotally connected at 17 to lever arms 18. These lever arms are pivotally connected at their front ends at 19 to the bar structure and at their rear ends are fastened at 20 to one end of flexible chain sections 21 which pass upwardly and rearwardly around a curved surface 22 of side frame portions 23 of the sliding support 7 and on which the disintegrating head is pivotally mounted. The opposite ends of the chain sections are fastened at 24 to the tops of the frame portions 23. When fluid under pressure is supplied to the upper ends of the cylinders 15 the latter are raised upwardly with respect to the pistons while concurrently the lever arms are swung upwardly about their pivots to elevate the pistons thereby to swing the disintegrating head upwardly about its pivot, and when fluid is vented from these cylinders the disintegrating head may swing downwardly under the influence of gravity at a controlled rate.

Now referring to the improved floor jack mechanism 1 it will be noted that rigidly secured at 25 to the bottoms of the side frames 23 are vertical fluid cylinders 26 containing reciprocable pistons 27 extending downwardly through the bottom packed cylinder heads 28. The piston rods have curved floor engaging feet or shoes 29 at their lower ends, and coil springs 30 are connected between the opposite sides of these feet and projecting lugs 31 at the sides of the cylinders, for constantly urging the pistons 27 toward their raised positions with the

feet elevated above the mine floor. The feet 29 are shaped to slide freely over the mine floor in the event the base is advanced. These floor jacks are arranged at opposite sides of the floor clean-up device or shovel 10 at the sides of the front receiving end of the conveying means 11 as shown in Fig. 2, and the jacks are located immediately below the head pivot 9, so that a stable bottom support may be provided for the disintegrating head during upswing.

As shown diagrammatically in Fig. 3, a pump 32 is driven by a motor 33 and has its suction side connected by a conduit 34 to a liquid tank 35 and the discharge side of the pump is connected by a conduit 36 and branch conduits 36a and 36b to a manually operable control valve device 37. This valve device has a casing 38 provided with a bore 39 in which a conventional spool type slide valve 40 is reciprocally mounted. This valve has a stem 41 pivotally connected to a suitable hand lever 42. The valve has three axially spaced heads separated by reduced portions or grooves 43 and 44. The conduits 36a and 36b communicate with the bore 39, and also communicating with this bore at opposite sides of the conduit 36b are conduits 45a and 45b of a conduit 45 which leads back to the tank 35. A conduit 46 having branches 46a and 46b connects the casing bore 39 with the upper ends of the jack cylinders 26, and a conduit 47 communicates with the casing bore 39 and has branches 47a and 47b which are connected to the upper ends of the upswing cylinders 15. The conduit 36a has a conventional check valve 48 therein for permitting fluid flow toward the jack cylinders but preventing return flow when the jacks are connected to the pump discharge. A relief valve device or pressure regulator 49 is connected in the conduit 36 for regulating the maximum pressure in the fluid system. When the disintegrating head 8 is in its lowered position and has been sumped into the mine vein as described in the above mentioned Sibley application, the valve 40 may be slid into the position shown in Fig. 3, to effect fluid supply through conduits 36, 36a, past the check valve 48, through the valve-groove 43, and through conduits 46, 46a and 46b to the jack cylinders 26 to lower the jack pistons 27 to bring the feet 29 into supporting engagement with the mine floor. Concurrently, fluid under pressure may flow through conduits 36b, valve-groove 44, and conduits 47, 47a and 47b to the upswing cylinders 15 to effect upward swing of the disintegrating head 8 about its pivot 9 to effect the dislodging and disintegrating operation. Thus, the floor jack cylinders are so coordinated with the upswing cylinders that the jacks are held in supporting position whenever the disintegrating head swings upwardly about its pivot, and the jacks are maintained in supporting position during the full distance of upward travel of the head. Due to the fact that there is less resistance to movement of the jack mechanism than of the head swinging means resulting from the greater weight of the head mechanism, the jack mechanism is first lowered into contact with the mine floor and thereafter the head mechanism is swung upwardly about its pivot. When the disintegrating head reaches the roof level the valve 40 may be shifted to connect the conduits 46 and 47 through the valve-grooves 43 and 44 and conduits 45a, 45b and 45 to the tank 35, and the jacks are then retracted by the coil springs 30, and the disintegrating head may swing downwardly under the influence of gravity at a controlled rate. The check valve 48 prevents release of the floor jacks until the jack cylinders are purposely vented and the regulator valve 49 prevents the building up of excessive pressures in the fluid system so that lifting of the apparatus by the floor jacks is prohibited.

As a result of this invention an improved jack structure is provided which affords a stable bottom support for the disintegrating head of a "Continuous Miner" during the upswing operation. By coordinating the jack cylinders with the upswing cylinders the floor jacks are always lowered into supporting position whenever the disintegrating head starts to swing upwardly. By the novel arrangement of the jack mechanism simplicity and compactness as well as a firm bottom support are attained. These and other advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the

same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a mining apparatus, the combination comprising a mobile base adapted to travel over the floor of a mine, a frame carried by said base and projecting horizontally therefrom in a forward direction and spaced above the bottom of said base, the forward end portion of said projecting frame overhanging the front end of said base above the mine floor, a disintegrating head pivotally mounted on the forward overhanging end portion of said frame to swing in vertical planes for dislodging and disintegrating the mineral of a solid mine vein, power operated means for swinging said head upwardly about its pivot, an extendable floor-engaging support carried by said frame on said overhanging frame portion beneath the head pivot to provide a stable bottom support spaced from said base during upswing of said head thereby to prevent tilting of said frame, and means operatively associated with said swinging means for extending said support and for holding it extended including an expansible chamber device connected to said support, increases in the volume of which extend said support, means for supplying fluid to said expansible chamber device and for trapping fluid therein when extended, including a source of fluid under pressure, a conduit for connecting said source to said expansible chamber device, and means in said conduit for limiting the pressure of the fluid transmitted to said expansible chamber device to a value below that which would be effective to increase the distance between said projecting portion of said frame and the mine floor and for preventing the escape of fluid through said conduit from said extended expansible chamber device.

2. A mining apparatus as set forth in claim 1 wherein the pressure is limited by a fluid actuated pressure reducing valve associated with said fluid supplying means and subjected to the fluid pressure in said conduit, and wherein escape of fluid is prevented by a check valve for preventing undesired reverse flow in said conduit in a direction from said expansible chamber device toward said fluid source.

3. In a mining apparatus, the combination comprising a mobile base adapted to travel over the floor of a mine, a frame on said base having an outwardly projecting frame portion spaced vertically from the bottom of said base, said frame portion overhanging said base above the mine floor, a mine vein disintegrating head pivotally mounted on said overhanging frame portion to swing in vertical planes, fluid operated swinging mechanism for said head for swinging the latter upwardly about its pivot, an adjustable fluid operated floor-engaging mechanism carried by said overhanging frame portion beneath the head pivot for supporting said head on the mine floor as said head swings upwardly during the disintegration of the mineral of a solid mine vein, a source of fluid under pressure, means for supplying fluid under pressure from said source to said swinging mechanism and to said floor-engaging mechanism for moving the latter into engagement with the mine floor whenever said swinging mechanism is operated to effect upswing of said head, a check valve in said fluid supplying means for preventing flow of fluid from said floor-engaging mechanism toward said fluid source, and an operator controllable valve device for controlling flow of fluid to said supplying means and positionable to connect said supplying means to exhaust, said check valve preventing reverse flow of fluid from said floor-engaging mechanism to avoid undesired release of said jack mechanism as said head swings upwardly.

4. In a mining apparatus, the combination comprising a mobile base adapted to travel over the floor of a mine, a frame on said base having an outwardly projecting frame portion spaced vertically from the bottom of said base, said frame portion overhanging said base above the mine floor, a mine vein disintegrating head pivotally mounted on said overhanging frame portion to swing in vertical planes, fluid operated motor means for swinging said head upwardly about its pivot, an adjustable floor-engaging jack carried by said frame portion beneath the head pivot for supporting said head on the mine floor as said head swings upwardly during the disintegration of the

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mineral of a solid mine vein, fluid operated motor means for operating said jack to effect lowering of the latter, a source of fluid under pressure, means for supplying fluid under pressure to both of said motor means, operator controllable valve means for effecting simultaneous fluid supply to said supplying means to effect lowering of said jack whenever upswing of said head is initiated, a check valve in said fluid supply means for said jack motor means for preventing reverse flow from said jack motor means to avoid undesired release of said jack, and a fluid discharge, said valve means being positionable to connect said jack motor means to said fluid discharge independently of said check valve.

5. A mining apparatus as set forth in claim 4 wherein a fluid operated valve device is provided in said fluid supply for said jack motor means between the fluid source and said check valve for limiting the pressure of the fluid transmitted to said jack motor means to prevent undesired tilting of the frame of the apparatus by said jack.

6. In a mining apparatus, the combination comprising a mobile base adapted to travel over the floor of a mine, a frame on said base having an outwardly projecting frame portion spaced vertically above the bottom of said base, said frame portion overhanging said base above the mine floor, a mine vein disintegrating head pivotally mounted on said overhanging frame portion to swing in vertical planes, fluid operated swinging mechanism for said head for swinging the latter upwardly about its pivot, an adjustable fluid operated floor-engaging jack mechanism carried by said overhanging frame portion

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beneath the head pivot for supporting said head on the mine floor as said head swings upwardly during the disintegration of the mineral of a solid mine vein, said jack mechanism comprising a jack cylinder containing a fluid actuated piston, a source of fluid under pressure, and means operatively associated with said swinging mechanism for effecting fluid supply from said source to said cylinder of said jack mechanism to move said piston into floor-engaging, supporting position whenever said swinging mechanism is rendered operative to initiate upswing of said head, said means for effecting fluid supply to said jack mechanism being provided with a check valve for preventing reverse flow of fluid to preclude the possibility of inadvertent release of said jack mechanism in the event of failure of the fluid supply.

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