Nov. 4, 1952 G. M. DICK 2,616,667

MOUNTING FOR ROCK DRILLS

Filed June 9, 1949 2 SHEETS—SHEET 1

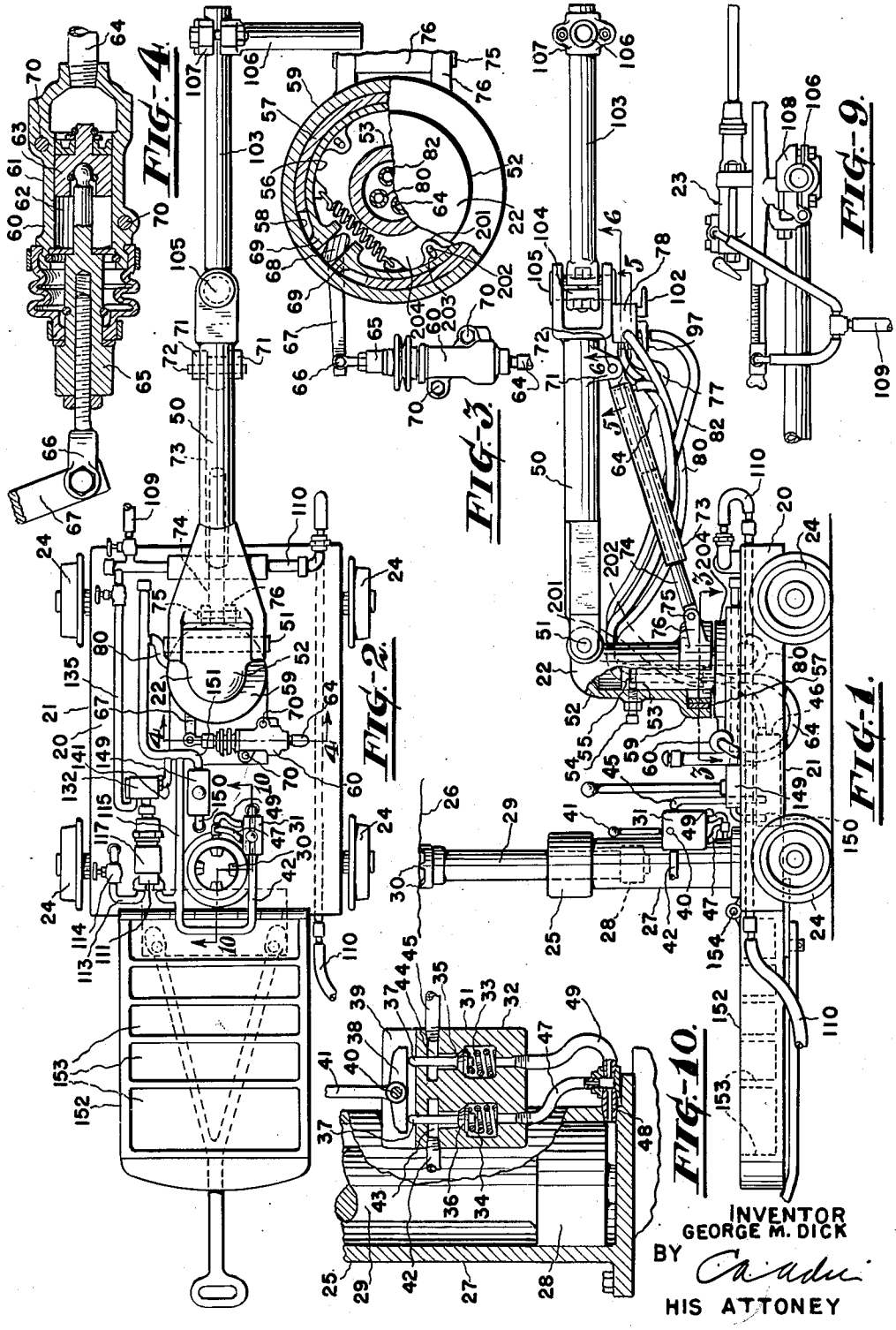


FIG.-4.

FIG.-3

FIG.-9.

FIG.-2.

FIG.-1.

FIG.-10.

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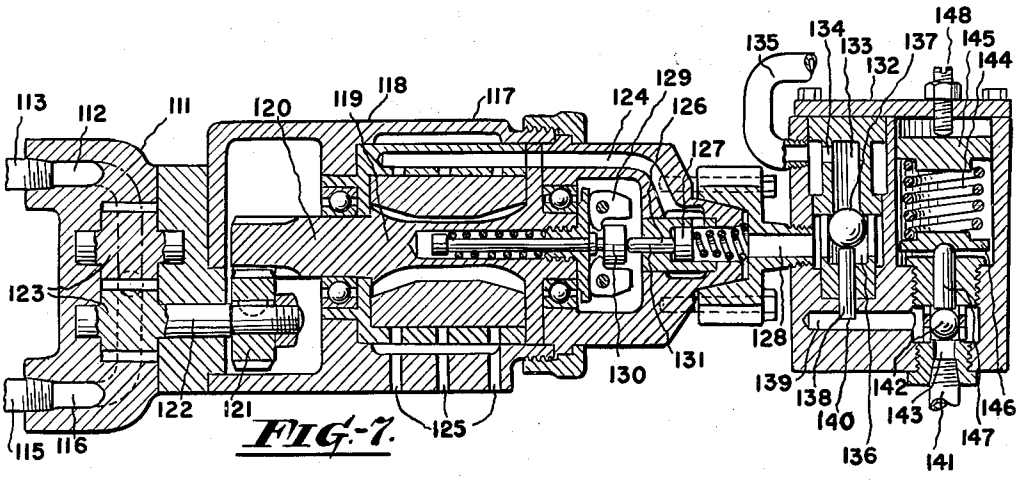


FIG-7.

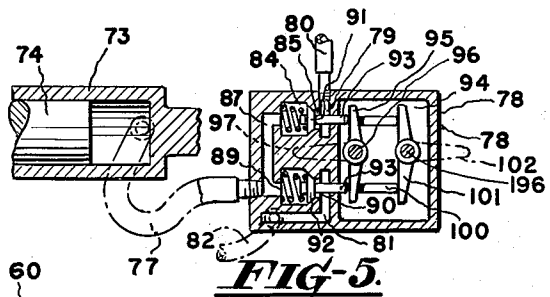


FIG-5.

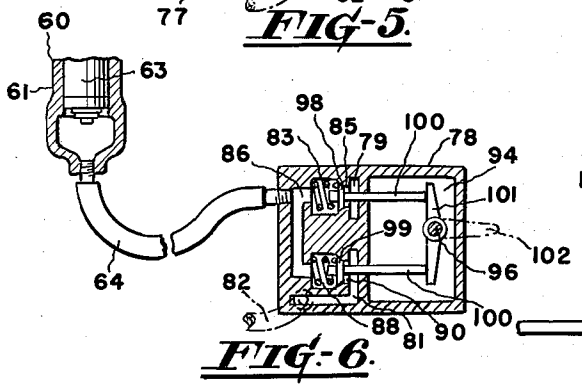


FIG-6.

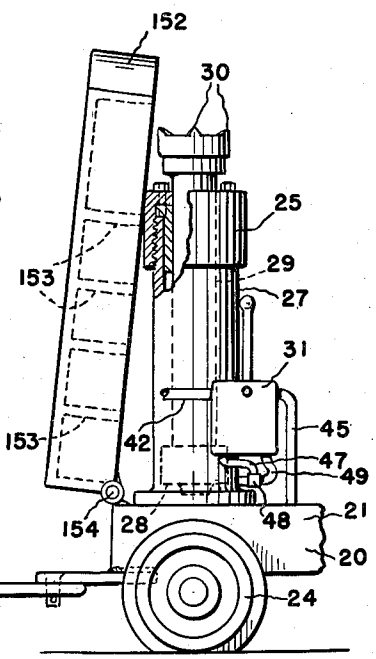


FIG-8.

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UNITED STATES PATENT OFFICE

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MOUNTING FOR ROCK DRILLS

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Application June 9, 1949, Serial No. 98,018

1 Claim. (Cl. 255—51)

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This invention relates to rock drilling mechanisms, and more particularly to a mounting for rock drilling tools of the drifter type commonly used for drilling holes in the vertical walls of tunnels and the like.

One object of the invention is to enable the rock drilling tool to be conveniently and quickly placed in a desired drilling position.

Another object is to enable the rock drilling tool to be expeditiously placed in a variety of positions along a working surface from a given setting of the mounting and with a minimum of effort on the part of the operator.

A further object is to assure a rigid support for the rock drilling tool.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a side elevation, partly broken away, of a mounting constructed in accordance with the practice of the invention,

Figure 2 is a plan view of the mounting,

Figure 3 is a transverse view taken through Figure 1 on the line 3—3,

Figure 4 is a similar view taken on the line 4—4 through Figure 2 looking in the direction indicated by the arrows,

Figures 5 and 6 are transverse views taken through Figure 1 on the lines 5—5 and 6—6, respectively,

Figure 7 is a longitudinal view, in section, of the pumping mechanism serving to supply fluid to various fluid actuated parts of the mounting,

Figure 8 is an elevation, partly broken away, of the trailing end portion of the mounting,

Figure 9 is a side view of the free end portion of a tool-supporting arm or boom of the mounting showing a rock drilling tool mounted thereon, and

Figure 10 is an elevation, partly in section, of a detail taken through Figure 2 on the line 10—10.

Referring more particularly to the drawings, the mounting, designated in general by 20, comprises a main frame 21 and a supporting mechanism 22 mounted adjustably on the main frame to support a rock drill 23 and positioned correctly with respect to the working surface.

In order to render the mounting 20 readily portable the main frame 21 is provided with wheels 24 shown as being intended for use on a steel track. The wheels 24 are located near the ends of the main frame, and on the upper surface of the main frame and near one end thereof is a jack 25 for engagement with the surface 26

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overlying the mounting to prevent tilting thereof. The jack 25 comprises a cylinder 27 which rests upon the main frame 21 and contains a reciprocatory piston 28 a rod 29 of which extends through the upper end of the cylinder 27 and has teeth 30 for engagement with the surface 26.

The piston 28 is hydraulically actuated for pressing the teeth 30 against the surface 26 and the supply of fluid serving this purpose is controlled by a valve mechanism, designated in its entirety by 31, and conveniently located adjacent the jack 25. The valve mechanism 31 comprises a chest 32 having a pair of valve chambers 33 and 34 containing, respectively, spring-pressed poppet valves 35 and 36 the stems 37 of which project from the upper end of the chest 32 for engagement with the opposed ends of a rocker 38 arranged in a slot 39 in the valve chest 32. A pin 40 seated at its ends in the valve chest 32 and extending through the mid portion of the rocker 38 serves as a pivot therefor, and on the upper surface of the rocker, adjacent the pin 40, is a lever 41 for manually moving the rocker 38 to its different controlling positions.

The valve 36 serves to control the flow of pressure fluid into the lower end of the cylinder 27 and the valve 35 controls the exhaust of such fluid from the cylinder. The valve chest 32 is accordingly provided with a pressure fluid supply conduit 42 which communicates with the valve chamber 34 through a passage 43 a portion of which encircles the stem 37 of the valve 36. A passage 44, similarly arranged with respect to the stem 37 of the valve 35, conveys fluid from the valve chamber 33 to a discharge conduit 45 leading to a supply reservoir 46 located on the under-side of the main frame 21. The fluid admitted into the valve chamber 34 by the valve 36 passes into the lower end of the cylinder 27 through a conduit 47 and through a connection 48 attached to the lower end of the cylinder 27, and such fluid is exhausted from the cylinder into the valve chamber 33 through the connection 48 and a conduit 49.

Thus, as will be readily understood, whenever it is intended to extend the jack 25, for pressing the teeth 30 against the surface 26, the lever 41 is tilted to unseat the valve 36. Pressure fluid will then flow through the valve chamber 34, the conduit 47 and the connection 48 beneath the piston 28 and move the piston upwardly. And whenever it is intended to lower the piston 28 the lever is tilted in the opposite direction to unseat the valve 35. The pressure fluid beneath the piston 28 will then escape through the connection 48, conduit 49 and through the valve

chamber 33 and associated channels into the supply reservoir 46.

In the preferred form shown, the supporting mechanism 22 comprises a two-piece boom 50 that is pivoted at one end, for movement in a vertical plane, on a pin 51 in the upper end of a support member 52 encircling an upright cylindrical bearing member or post 53 seated upon the main frame 21. The bearing member 52 is freely rotatable about the post 53 and carries a key in the form of a screw 54 which projects into an annular groove 55 in the upper portion of the post 53 for retaining the support member upon the post.

In order to selectively arrest rotational movement of the support member 52 with respect to the post 53, said support member is provided with a braking device comprising a split brake band 56 which may be of conventional form and carries the usual brake shoes 57 for engagement with the inner surface 58 of a skirt 59 on the lower end of the support member 52. The brake band 56 thus encircles the post 53 and may be secured against rotary movement with respect thereto. To this end the brake band 56 is provided with a pair of lugs 201. Each lug is provided with an enlarged slot 203 which fits over a pin 202 secured to the base plate 204 of the post 53. The brake band is, therefore, free to move outwardly against the braking surface 58 but is secured against rotation by the pins within the slots of the lugs 201.

The application and the release of the brake to and from the surface 58 is effected by an actuator, designated in its entirety by 60, and actuated by pressure fluid. The actuator comprises a casing 61 (see Fig. 6) which is recessed to provide a piston chamber 62 for the accommodation of a reciprocatory piston 63 that is actuated by pressure fluid delivered to the piston chamber by a supply conduit 64. The piston 63 carries a rod 65 which as shown in Fig. 3 extends through the opposite end of the casing 61 and has threadedly connected thereto a clevis 66 which is pivotally connected to an end of a rocker 67 the opposite end of which carries a spreader 68 that lies between the opposed ends 69 of the brake band 56. The spreader 68 is of oval shape so that when it is rotated by the piston 63 it will roll over the opposed end surfaces of the brake band 56 and cause the brake shoes 57 to be pressed into frictional engagement with the surface 58. The actuator 60 is secured in the correct assembled relationship with respect to the rocker 67 by bolts 70 extending through the casing 61 for threaded engagement with the main frame 21.

The tilting of the boom 50 about the pivot 51 is also effected by pressure fluid and the boom 50 is accordingly provided, near its outer free end, with depending lugs 71 to support a pin 72 that serves as a pivot for an end of a cylinder 73 into which extends a plunger 74 pivoted upon a pin 75 seated in lugs 76 on the outer surface of the skirt 59. Pressure fluid is conveyed to and from the cylinder 73 by a conduit 77 leading from a casing 78 containing valve devices for controlling the flow of pressure fluid to and from both the actuator 60 and the cylinder 73.

The casing 78 is located at the free end of the boom 50 where it may be conveniently reached by the operator from his station adjacent the rock drill 23. The casing 78 may be secured to the boom 50 in any suitable manner and its interior is recessed to provide a supply chamber 79 into which fluid under pressure is conveyed, for distribution, by a supply conduit 80. The casing is, moreover, provided with a discharge chamber 81 that is in constant communication with the supply reservoir 46 through a conduit 82.

The fluid supplied to both the cylinder 73 and the actuator 60 passes through the supply chamber 79 and is discharged from these devices through the chamber 81. The casing is accordingly provided with a pair of inlet valve chambers 83 and 84 that communicate with the supply chamber through ports 85 and open, respectively, into passages 86 and 87 that communicate with the conduits 64 and 77, respectively. The casing 78 is further provided with discharge valve chambers 88 and 89 that also open into the passages 86 and 87, respectively, and communicate with the discharge chamber 81 through ports 90.

Communication between the supply chamber 79 and the inlet valve chambers 83—84 and between the discharge valve chambers 88—89 and the discharge chamber 81 is controlled by spring-pressed valves of the type controlling the supply of pressure fluid to the jack 25. Thus, a poppet valve 91 controls communication between the valve chamber 84 and the supply chamber 79, and a similar valve 92 controls communication between the valve chamber 89 and the discharge chamber 81. Both valves are spring-pressed for normally retaining them on their seats. Their stems 93 extend through the ports 85 into a recess 94 in the casing 78 for engagement with the end portions of a rocker 95 secured at its intermediate portion to a shaft 96 extending through the recess 94 to the exterior of the casing 78 for connection with a lever 97 whereby the rocker 95 may be manipulated for unseating the valves.

Similarly, communication between the supply chamber 79 and the valve chamber 83 and between the valve chamber 88 and the discharge chamber 81 is controlled by spring-pressed poppet valves 98 and 99, respectively. The stems 100 of the valves 98—99 extend through the adjacent ports 85 and 90 into the recess 94 for engagement with the end portions of a rocker 101 having its shaft 196 extending exteriorly of the casing 78 for the reception of a lever 102 whereby the rocker 101 may be manipulated.

As will be readily understood from the foregoing description, by thus grouping the control valves for the braking device and the cylinder 73 and positioning them at the end of the boom 50 they will be within easy reach from the position which an operator must normally occupy for manipulating the power controlling elements of the rock drill 23. From this position it will, therefore, be possible for one attendant to conveniently control the operation of the rock drill, to retard or arrest rotative movement of the boom about the axis of the post 53 and to readily effect the raising and the lowering of the boom for positioning the rock drill 23 at desired points along a working surface.

To the end that the rock drill 23 may be conveniently positioned for drilling a series of holes in a horizontal plane, the boom is provided with a support arm 103 which has a clamp 104 at one end to grip a vertical, fixed pin 105 in the free end of the boom 50. Thus, by releasing the clamp 104, whenever required, the support arm 103 may be turned about the pin 105 to swing the rock drill 23 through a horizontal plane along a rock surface. In order to further facilitate the positioning of the rock drill with respect to the work a bar 106 is attached to the free end of the arm 103 for supporting the rock drill 23. The bar is

attached to the arm 103 by means of a clamp 107 of a well known type permitting the bar to be swung about the support arm, and the rock drill 23 is secured to the bar 106 by a clamping device 108. The pressure fluid supply, compressed air for example, serving to operate the rock drill is conveyed thereto by a conduit 109 attached to a supply line 110 leading from a suitable source of supply (not shown).

The pressure fluid serving to operate the various fluid actuated devices thus far described, other than the rock drill 23, preferably consists of a liquid under pressure, as for example oil, and is supplied to such devices by a pump 111 mounted upon the main frame 21. The pump 111 is shown as being of the gear type and has its inlet opening 112 in communication with the reservoir 46 through a conduit 113 having a valve 114 interposed therein for selectively cutting off communication between the reservoir and the pump. A discharge conduit 115 connected to the discharge opening 116 of the pump 111 is in constant communication with the conduit 42 and with the supply conduit 80 leading to the supply chamber 79 of the control valve mechanism on the boom 50.

The driver for the pump preferably consists of a pressure fluid actuated motor 117, the casing 118 of which may be connected directly to the pump 111 in any well known manner. The motor 117 is of the slidable vane type, and its rotor 119 has an axial extension 120 in toothed engagement with a pinion 121 keyed to a shaft 122 on one of the gears 123 of the pump 111. The motor 117 has the usual inlet and exhaust passages 124 and 125 and is equipped with a suitable governing device 126 for controlling its speed.

The governing device 126 comprises a spring-opposed reciprocatory valve 127 for controlling the flow of pressure fluid from a supply port 128, in the end of the motor casing 118, to the inlet passage 124 and in the end of the rotor 119, adjacent the valve 127, is a governor 129 having a weight-actuated, spring-opposed plunger element 130 to engage a stem 131 on the valve 127 for shifting said valve to its controlling positions.

Additional means are provided for controlling the operation of the motor, more particularly to cut off the power supply to the motor when the pressure required for operating the various hydraulically actuated devices reaches a predetermined maximum value and to again cause operation of the motor 117 when the hydraulic pressure falls to a predetermined minimum value. To this end, a valve mechanism 132 is threadedly connected to the portion of the motor casing 118 defining the supply passage 128, and within said casing is a supply chamber 133 that communicates through a port, or ports, 134 with a conduit 135 leading from the supply line 110.

The supply chamber 133 opens into a valve chamber 136 that communicates with the supply passage 128, and communication between the chambers 133 and 136 is controlled by a ball valve 137. The force serving to move the valve 137 to and hold it in its closed position is transmitted to the valve by a plunger 138 which abuts at one end against the valve 137 and extends into a chamber 139 in the valve mechanism 132 so that its end surface 140 will be subjected to the pressure of the fluid within the chamber 139, such fluid being conveyed to the valve mechanism by a branch 141 leading from the discharge conduit 115 of the pump 111.

The admission of pressure fluid into the chamber 139 is controlled by a ball valve 142 that controls the port 143 into which the conduit 141 opens. The valve 142 is unseated by the pressure of the fluid in the port 143 and the value of the pressure at which the valve 142 is unseated is controlled by a spring 144 seating at one end against an adjustable spring seat 145 and at its other end against a spring seat 146 resting upon a rod 147 that seats upon the ball 142.

Adjustment of the spring seat 145 is effected by a screw 148 extending through an outer wall of the valve mechanism 132 to bear against the spring seat 145, and the position to which the spring seat 145 is adjusted by the screw 148 determines the force of the spring 144 and, therefore, the pressure value of the fluid required within the port 143 for unseating the valve 142.

In normal practice, the spring seat 145 is so adjusted that the spring 144 will exert a force against the valve 142 capable of holding said valve in its closed position until the pressure within the discharge conduit 115 and associated conduits reaches the predetermined maximum value. When the discharge pressure of the pump reaches this value the spring 144 will yield to its pressure and permit the valve 142 to move to its open position. Pressure fluid will then flow from the port 143 into the chamber 139 against the surface 140 of the plunger 138 and move the valve 137 against the outlet end of the chamber 133, thereby cutting off the flow of compressed air to the motor 117.

When the pressure within the discharge conduit 115 and the associated conduits again drops to a predetermined minimum value the pressure of the spring 144 will restore the valve 142 to its closed position and the pressure of the fluid within the chamber 133 acting against the ball valve 137 will unseat said valve to again admit pressure fluid to the motor 117 for operating the pump 111 to again build up the hydraulic pressure for the braking and other hydraulically actuated devices to the predetermined maximum value.

As may be readily appreciated, it may be desirable at times to utilize the hydraulically actuated devices under circumstances when it is inconvenient to operate the pump 111 and before connections are completed between the motor 117 and the source of pressure fluid supply depended upon for operating it. One such example would be the application of the braking device for preventing rotative movement of the supporting member 52 relatively to the post 53 during the transportation of the mounting from one drilling site to another. To this end a hand-operated pump 149, and which may be of any well known type, is installed on the main frame with its inlet conduit 150 extending into the reservoir 46 and its discharge conduit 151 opening into the conduit 115 of the pump 111. Owing to this arrangement, pressure fluid may be conveniently supplied to the several hydraulically actuated devices of the mounting by manual operation of the pump 149 even though pressure fluid suitable for operation of the motor 117 is unavailable.

As a preferred arrangement, the mounting is provided at one end with an extension 152 which is divided interiorly into compartments 153 for tools and supplies. The extension 152 is hinged on a pin 154 on the upper surface of the main frame 21 so that it may be raised to an upright position for transportation. By thus arranging the extension 152 the shipping space required for the mounitng need be only slightly greater than that required for the main frame. The mounting

may be further compacted for transportation or shipment by swinging the support arm **103** along the side of the boom **50** and then turning the entire boom assembly about the post **53** to a position wherein it overlies the main frame.

I claim:

A mounting for rock drills, comprising a portable frame, a pressure fluid operated jack on an end portion of the frame, a rotatable support member on the opposite end portion of the portable frame, a pressure fluid operated brake on the frame for controlling the rotation of the support member, a boom pivotally connected to the support member for movement in a vertical plane, a support arm pivotally connected to the boom for transverse swinging movement, pressure fluid operated means connected to the support member and the boom for effecting pivotal movement of the boom, a pump on the frame for pumping pressure fluid to the fluid operated means, a pneumatically driven motor on the frame for driving the pump, control means on the boom located adjacent the free end thereof for controlling the flow of pressure fluid to the brake and the boom actuating means, and means

for stopping the motor when the discharge pressure of the pump exceeds a predetermined order.

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