

April 13, 1943.

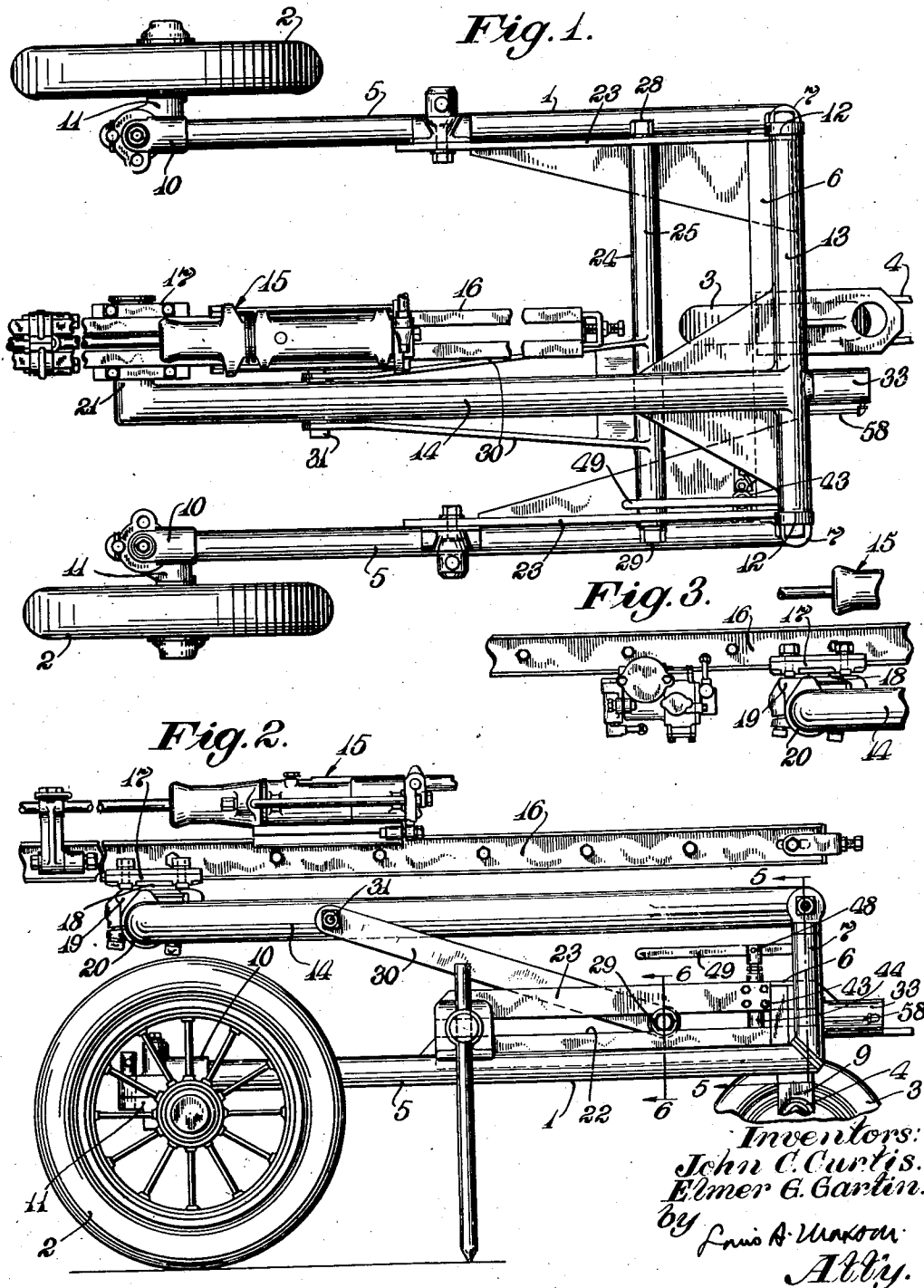
J. C. CURTIS ET AL

2,316,672

ROCK DRILL

Filed June 19, 1941

3 Sheets-Sheet 1



April 13, 1943.

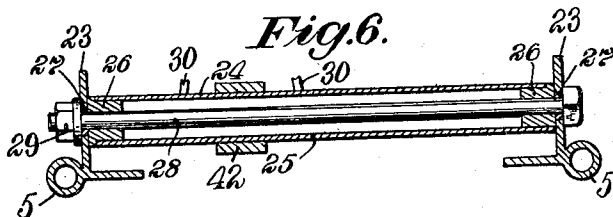
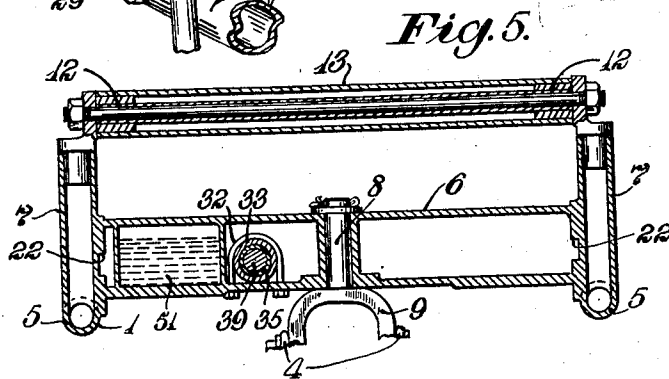
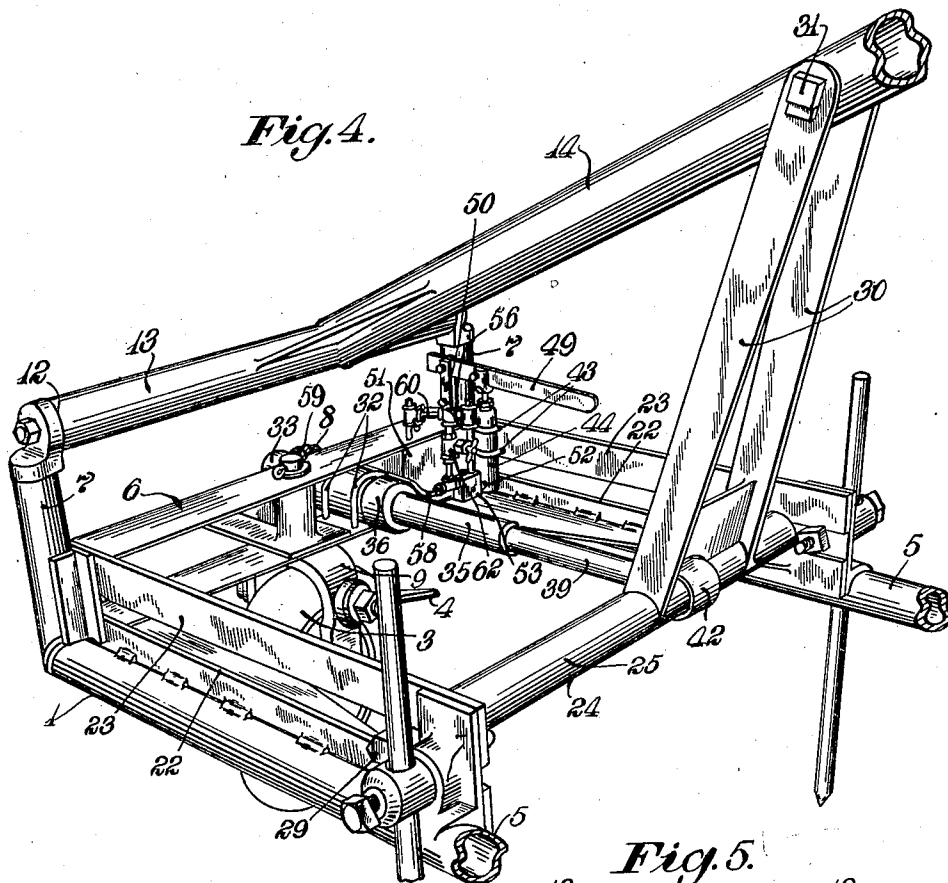
J. C. CURTIS ET AL

2,316,672

ROCK DRILL

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Inventors:
 John C. Curtis.
 Elmer G. Gartin.
 by
 Paul A. Maxson.
 Atty.

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J. C. CURTIS ET AL

2,316,672

ROCK DRILL

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3 Sheets-Sheet 3

Fig. 7.

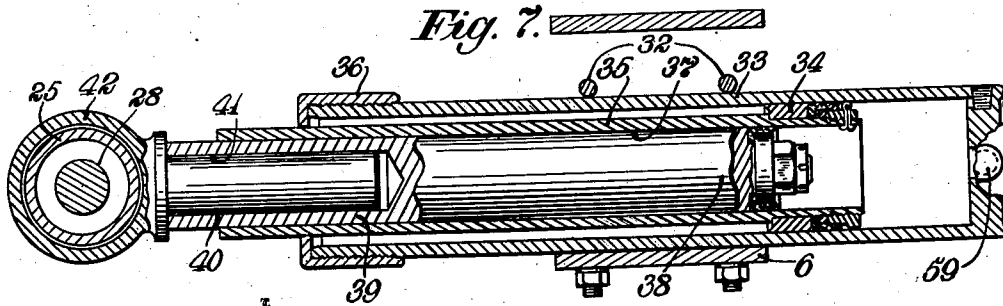


Fig. 8.

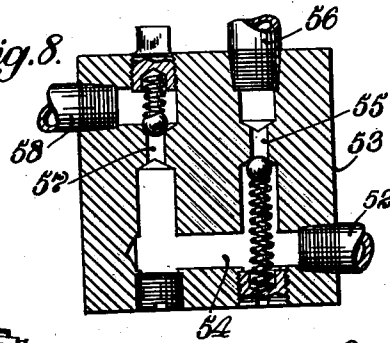


Fig. 9.

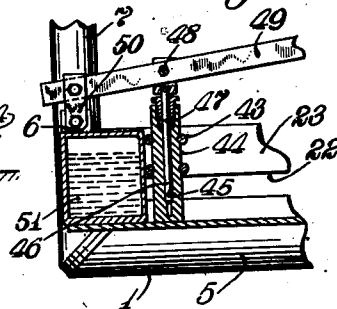


Fig. 10.

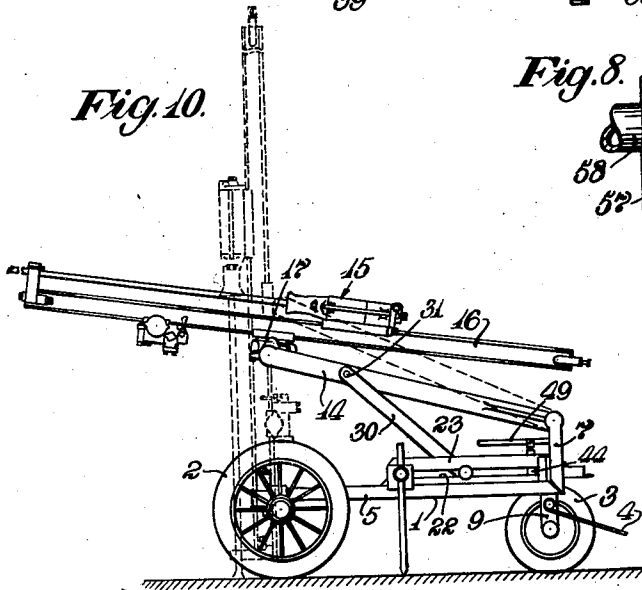
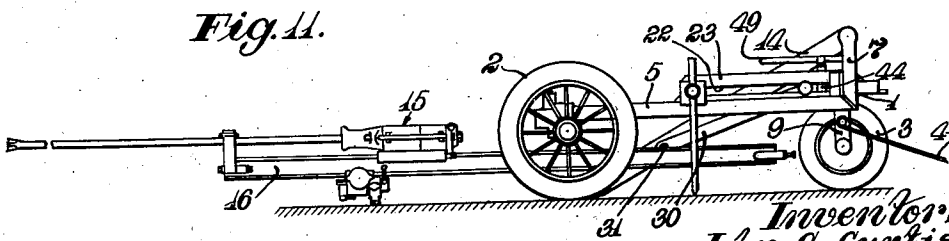


Fig. 11.



Inventors:
John C. Curtis
Elmer G. Garlin.
by
Louis A. Wakem.
Atty.

UNITED STATES PATENT OFFICE

2,316,672

ROCK DRILL

John C. Curtis and Elmer G. Gartin, Claremont,
N. H., assignors to Sullivan Machinery Com-
pany, a corporation of Massachusetts

Application June 19, 1941, Serial No. 398,805

15 Claims. (Cl. 255—51)

This invention relates to rock drills, and more particularly to an improved portable rock drill rig embodying adjustable supporting means for a drilling tool for adjusting the latter through a wide range of drilling positions, and which may be readily transported from place to place.

An object of the present invention is to provide an improved portable rock drill rig. Another object is to provide an improved rock drill rig embodying an adjustable supporting element for a drilling tool and having improved adjusting mechanism for the supporting element whereby the drilling tool may be readily adjusted into its different drilling positions. A further object is to provide a novel adjusting means for a rock drill rig whereby the drilling tool may be easily moved into its different positions of adjustment and so held, and embodying improved means whereby the drill may be quickly returned to its initial position. Yet another object is to provide an improved portable rock drill rig which is not only simple in design and light in weight, but is also extremely durable in construction. A still further object is to provide an improved portable rock drill rig for a hammer rock drilling tool wherein the drilling tool is supported by a vertically swingable boom structure and having novel swinging means for the boom structure whereby the drilling tool may be supported and adjusted in an improved manner. A further object is to provide improved fluid actuated means for elevating the boom structure and holding it in its different adjusted positions. Still another object is to provide an improved hydraulically operated boom swinging means and having associated therewith improved connections between the hydraulically operated element and the boom whereby a powerful swinging force may be applied to the boom. A still further object is to provide an improved hydraulic operating means having novel valve means embodied therein whereby the boom structure may not only be effectively swung upwardly about its pivot but may also be quickly lowered simply by by-passing the liquid. Yet another object is to provide an improved portable rock drill rig having novel combinations and arrangements of parts. How these and other objects are accomplished, and the advantageous features of the invention, will be best understood from the following detailed description wherein a preferred and illustrative embodiment is set forth, reference for the purpose had to the accompanying drawings, in which:

Fig. 1 is a plan view of a rock drill rig constructed in accordance with an illustrative em-

bodiment of the invention and showing a drilling tool mounted in drilling position thereon.

Fig. 2 is a side elevational view of the rock drill rig shown in Fig. 1.

Fig. 3 is a fragmentary side elevational view of a portion of the drilling tool and its guide frame.

Fig. 4 is a fragmentary perspective view illustrating the drill supporting boom and its associated adjusting means.

Fig. 5 is a detail cross sectional view taken substantially on line 5—5 of Fig. 2.

Fig. 6 is a detail cross sectional view taken substantially on line 6—6 of Fig. 2.

Fig. 7 is an enlarged detail sectional view showing the hydraulic jack.

Fig. 8 is a detail sectional view through a portion of the valve means.

Fig. 9 is a detail vertical sectional view through the pump and liquid tank.

Fig. 10 is a diagrammatic view showing the drilling tool in an elevated, substantially horizontal drilling position, the vertical drilling position of the tool being indicated in dotted lines.

Fig. 11 is a diagrammatic view showing the drilling tool in a position to drill a horizontal hole near the ground level.

In this illustrative embodiment of the invention there is shown a portable drill rig for a rock drilling tool, comprising a carriage frame 1 supported at one end by a pair of wheels 2 and at the other end by a swivelled caster wheel 3. The wheels 2 and 3 preferably have pneumatic tires and directly engage the ground surface, and attached to the caster wheel 3 is a conventional tow bar 4. The carriage frame has tubular side frame members 5, 5 united at one end by a transverse frame 6 and having upstanding side members 7, 7. The transverse end frame 6 provides a vertical bearing 8 for the swivel frame 9 of the caster wheel 3. The ends of these side frame members 5, 5 of the carriage frame, remote from the transverse end frame 6, have secured thereto brackets 10 having connected thereto axle frames 11 on which the wheels 2 are journaled. Pivotaly connected at 12 to the upper ends of the upstanding side members 7, 7 is a transverse bearing support 13 for an elongated boom 14. This boom is swingable in a vertical direction between the side frame members 5, 5 of the carriage frame and swivelly supports at its outer end a conventional hammer rock drilling tool, generally designated 15. This drilling tool may be similar to that disclosed in a copending application of John C. Curtis, Serial No. 321,348, filed February 28, 1940, and comprises an elongated guide frame 16

supported by a trunnion support 17 having a swivel plate 18 secured within a saddle member 19, the latter in turn being swivelled at 20 on a right angle portion 21 of the boom. The saddle has conventional clamps for securing the swivel plate to the saddle support and for clamping the saddle support to the boom. An independent feed motor is employed to feed the drilling tool back and forth along the guide frame, in the manner fully described in the copending application above referred to. As the structure of this drilling tool does not per se enter into the present invention, further description thereof is unnecessary.

Now referring to the improved boom swinging structure, it will be noted that guided in longitudinal slots or guideways 22 in vertical plates 23 secured to the side frame members of the carriage frame is a transverse support or crosshead 24. As shown in Fig. 6, this support or crosshead comprises a tubular member 25 having fixed thereto end members 26, and the crosshead is mounted on supporting rollers 27 received within the guideways 22. Extending centrally through the tubular member 25 is a transverse supporting and clamping bolt 28 having a tightening nut 29, and this bolt, when tightened, is adapted to clamp the sliding support in its different adjusted positions along the guideways. The rollers 27 are journaled on the end portions of the bolt 28, and the crosshead is supported by the bolt. Formed integral with the tubular member 25 are projecting arms 30 pivotally connected at 31 to the boom 14. Secured, as by U-bolts 32, to the transverse end frame 6 is a hydraulic double telescopic jack comprising a hydraulic cylinder 33 containing a reciprocable piston 34. The piston 34 has a tubular piston rod 35 extending forwardly through the front head 36 of the cylinder and is formed with a bore 37 containing a reciprocable inner piston 38. The piston 38 has its piston rod 39 extending forwardly through the forward end of the piston 34, in the manner shown in Fig. 7. Fixed at 40 within a bore 41 in the piston rod 39 is an annular member 42 engaging the transverse support 24 intermediate the arms 30, in the manner shown. Secured by U-bolts 43 to one of the vertical side plates 23 is a pump cylinder 44 having a vertical bore 45 containing a reciprocable pump plunger 46. This pump plunger has its piston rod 47 pivotally connected at 48 to a manual operating lever 49, the latter in turn being pivotally connected through links 50 to the top of the transverse end frame 6 of the carriage. Formed within this transverse end frame is a tank 51 adapted to contain a liquid. The lower end of the pump cylinder, beneath the pump plunger, is connected through a conduit 52 to a valve box 53, this conduit communicating with a passage 54 in the valve box which is connected through a check-valve-controlled passage 55 and conduit 56 to the tank 51. The passage 54 is also connected through a check-valve-controlled passage 57 and conduit 58 to a passage 59 (see Fig. 7) communicating with the rear end of the bore of the cylinder 33 at the rear side of the piston 34. Liquid flow is permitted by the check valve through the passage 55 to the pump cylinder, while flow through the passage 57 past the check valve is towards the cylinder 33. The conduit 58 is connected through a conduit 60 to the tank 51 and is provided with a manually operable by-pass valve 62. The hydraulic cylinders and their cooperating pistons, as above mentioned, provide a double telescopic hydraulic jack, and when the pump plunger is operated by the

hand lever 49, liquid under pressure may be forced into this jack to effect forward sliding movement of the transverse support or crosshead 24 along its guideways 22 relative to the carriage frame, and as a result, the boom 14 is swung upwardly through the arms 30, thereby to elevate the drilling tool 15. When the liquid is trapped within this hydraulic jack, the boom and drilling tool are held in their adjusted position. When it is desired to lower the drilling tool, that is, to permit downward swinging of the boom, this may be accomplished simply by opening the by-pass valve 62 so that the liquid is by-passed from the hydraulic jack back to the tank 51.

The rock drill rig may be towed from one working place to another by the tow bar 4, the wheel-supported carriage frame providing a mobile base whereby the rock drill rig may be readily moved over the ground surface. When it is desired to drill horizontal or substantially horizontal holes in the working face, the drill rig may be positioned in the manner shown in Fig. 10, with the boom 14 swung upwardly to support the drilling tool 15 in a relatively high drilling position, as indicated in full lines in Fig. 10. The boom 14 may be swung in a vertical direction about its pivotal mounting simply by operating the hand pump to operate the hydraulic jack to effect upward swinging of the boom, and the boom may be quickly lowered simply by opening the by-pass valve 62. When it is desired to drill vertical holes in the floor, the drill guide frame 16 may be swung relative to the boom into the vertical position indicated in dotted lines in Fig. 10, in an obvious manner. When a horizontal hole is desired to be drilled in the working face near the ground surface, the boom may be swung downwardly into the position shown in Fig. 11, with the drill guiding frame disposed between the side frame members of the carriage near the ground surface as indicated. It is evident that during adjustment of the boom, the clamping bolt 28 is loosened and thereafter tightened to clamp the parts in adjusted position, and similar clamping bolts disposed at the boom pivot and the point of pivotal connection of the arms 30 with the boom may be tightened to hold the boom firmly in its adjusted position. By adjusting the clamps for the swivel plate and saddle mounting, the guide frame 16 of the drilling tool may be adjusted into various positions with respect to the boom, so that holes may be drilled in practically any desired location, in an obvious manner.

As a result of this invention, it will be noted that an improved rock drill rig is provided having improved supporting and adjusting means for the drilling tool whereby the latter may be expeditiously adjusted. It will further be evident that by the provision of the improved fluid actuated means for swinging the boom upwardly about its pivot, the drilling tool may be easily adjusted into the desired drilling position, and by the provision of the by-pass means, the boom may be quickly lowered. It will further be evident that by the provision of a rock drill rig having the novel combinations and arrangements of parts described, the drill rig is not only made simple in design and light in weight but is also extremely rugged in construction. Other uses and advantages of the improved rock drill rig 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 we claim as new and desire to secure by Letters Patent is:

1. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom pivotally mounted on said carriage to swing in a vertical direction relative thereto, said boom adapted to support a drilling tool, and fluid actuated means for swinging said boom about its pivot comprising a fluid actuated jack mounted on said carriage, a member guided on said carriage to move longitudinally relative thereto and operatively connected to said boom, said jack being operatively connected to said guided member for actuating the latter, and a pump mounted on said carriage for supplying fluid under pressure to said jack.
2. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom pivotally mounted on said carriage to swing in a vertical direction relative thereto, said boom adapted to support a drilling tool, and fluid actuated means for swinging said boom about its pivot comprising a fluid actuated jack mounted on said carriage, a member guided on said carriage to move longitudinally relative thereto, an arm secured to said guided member and operatively connected to said boom, said jack being operatively connected to said guided member for moving the latter along its guideways, and a pump mounted on said carriage for supplying fluid under pressure to said jack.
3. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom pivotally mounted on said carriage to swing in a vertical direction relative thereto, said boom adapted to support a drilling tool, and fluid actuated means for swinging said boom about its pivot comprising a fluid actuated jack mounted on said carriage, a member guided on said carriage to move longitudinally relative thereto and operatively connected to said boom, said jack being operatively connected to said guided member for moving the latter along its guideways, a pump mounted on said carriage for supplying fluid under pressure to said jack, and manually operable valve means for by-passing the fluid from said jack independently of said pump for quickly lowering said boom.
4. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom pivotally mounted on said carriage at one end of the latter to swing in a vertical direction relative thereto and overlying said carriage with its free end disposed near the opposite end of said carriage, said boom adapted to support at its free end a drilling tool, means providing longitudinal guideways on said carriage beneath said boom, a transverse member guided for movement along said guideways, an arm connection between said transverse member and said boom, and an extensible power device extending longitudinally of said carriage and operatively connected to said transverse member to move the latter along said guideways, thereby to effect swinging of said boom about its pivot.
5. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom pivotally mounted on said carriage to swing in a vertical direction relative thereto, said boom adapted to support a drilling tool, means providing longitudinal guideways on said carriage, a transverse member guided for movement along said guideways, an arm connection between said transverse member and said boom, a hydraulic jack mounted on said carriage and operatively connected to said transverse member, and a manually operated pump mounted on said carriage for supplying liquid under pressure to said jack to effect movement of said transverse member along said guideways, thereby to effect swinging of said boom about its pivot.
6. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom pivotally mounted on said carriage at one end of the latter to swing in a vertical direction relative thereto and overlying said carriage with its free end disposed near the opposite end of said carriage, said boom adapted to support at its free end a drilling tool, and means for swinging said boom about its pivot comprising a crosshead member guided for movement longitudinally relative to said carriage and operatively connected to said boom, and an extensible power device mounted on said carriage for moving said crosshead along its guideways.
7. A rock drill rig comprising, in combination, a carriage, a boom pivotally mounted on said carriage and adapted to support a drilling tool, and means for swinging said boom about its pivot comprising a hydraulic jack operatively connected to said boom, and a manually operable pump mounted on said carriage for supplying liquid under pressure to said jack.
8. A rock drill rig comprising, in combination, a carriage, a boom pivotally mounted on said carriage and adapted to support a drilling tool, and means for swinging said boom about its pivot comprising a hydraulic jack operatively connected to said boom, a manually operable pump mounted on said carriage for supplying liquid under pressure to said jack, and a manually operated by-pass for effecting rapid lowering of said boom independently of said pump.
9. A rock drill rig comprising, in combination, a carriage, a boom pivotally mounted on said carriage at one end of the latter with its free end disposed near the opposite end of said carriage, said boom adapted to support at its free end a drilling tool, a crosshead guided on said carriage beneath said boom and operatively connected to said boom, an extensible power device on said carriage for moving said crosshead along its guideways, and a clamping device associated with said crosshead for clamping the latter against movement along its guideways.
10. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom pivotally mounted on said carriage at one end thereof and extending longitudinally over the top of said carriage, the free end of said boom being disposed near the opposite end of said carriage remote from the boom pivot, said boom being adapted to support at its free end a drilling tool, and means for swinging said boom in a vertical direction about its pivot relative to said carriage including a member guided on said carriage beneath said boom for movement longitudinally with respect to said carriage and disposed on said carriage nearer to the end thereof to which said boom is pivoted than to the opposite end thereof, an arm pivotally connecting said guided member to said boom nearer to the free end of the latter than to the pivoted end thereof, and extensible adjusting means extending longitudinally of said carriage beneath said boom for moving said guided mem-

ber along its guideway relative to said carriage to effect actuation of said arm.

11. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom overlying said carriage and pivotally mounted thereon to swing in a vertical direction relative thereto, said boom adapted to support a drilling tool, and power operated means for swinging said boom about its pivot comprising an extensible jack device mounted on said carriage, a member guided on said carriage for movement longitudinally relative thereto and operatively connected to said boom, said jack device being operatively connected to said guided member for actuating the latter, and means on said carriage for energizing said jack device.

12. A rock drill rig comprising, in combination, a wheel-supported carriage, a boom overlying said carriage and pivotally mounted thereon at one end of the carriage to swing in a vertical direction relative thereto, said boom being adapted to support at its free end a drilling tool, an arm having at one end a movable pivotal connection with said carriage at a point spaced longitudinally of the carriage with respect to the boom pivot axis and pivotally connected to said boom at a point between said point of movable pivotal connection with said carriage and the free end of said boom, an extensible jack device extending lengthwise of said carriage for moving said point of pivotal connection of said arm with said carriage longitudinally relative to said carriage to actuate said arm to effect swinging of said boom about its pivot, and means on said carriage for energizing said jack device.

13. A rock drill rig comprising, in combination, a wheel-supported carriage having spaced side frame members providing an open end, a boom

overlying said carriage and pivotally mounted thereon to swing in a vertical direction relative thereto, said boom adapted to support a drilling tool and swingable about its pivot between the side members of said carriage through said open end to position the drilling tool below the top of said carriage, an extensible jack device mounted on said carriage and extending lengthwise thereof and operatively connected to said boom for swinging the latter, and means on said carriage for energizing said jack device.

14. A rock drilling rig comprising, in combination, a carriage, a boom pivotally mounted on said carriage at one end of the latter and disposed with its free end near the opposite end of said carriage, said boom adapted to support at its free end a drilling tool, a member guided on said carriage beneath said boom for movement longitudinally with respect to said carriage, an arm connecting said member to said boom, means for moving said member longitudinally relative to said carriage, and a clamping device associated with said member for clamping the latter against movement with respect to said carriage to lock said boom in adjusted position.

15. A rock drill rig comprising, in combination, a carriage, a boom pivotally mounted on said carriage and adapted to support a drilling tool, a crosshead guided on said carriage and operatively connected to said boom, a hydraulic jack on said carriage for moving said crosshead along its guideways, and a clamping device associated with said crosshead for clamping the latter against movement along its guideways to lock said boom in its adjusted position.

JOHN C. CURTIS.
ELMER G. GARTIN.