

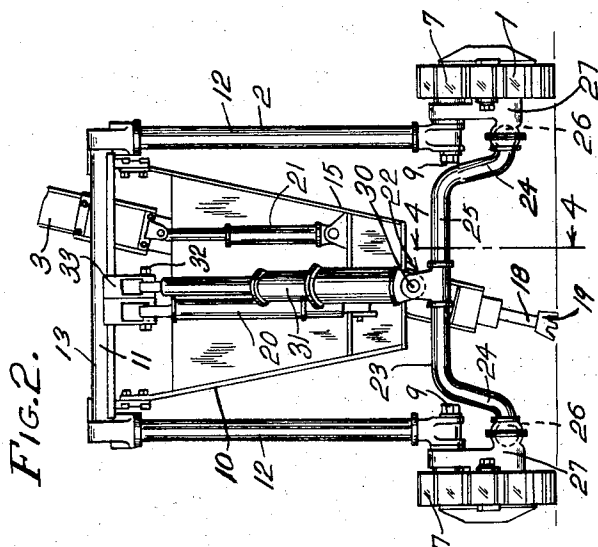
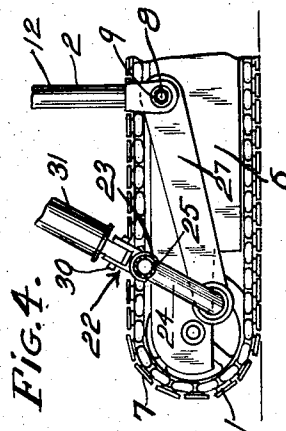
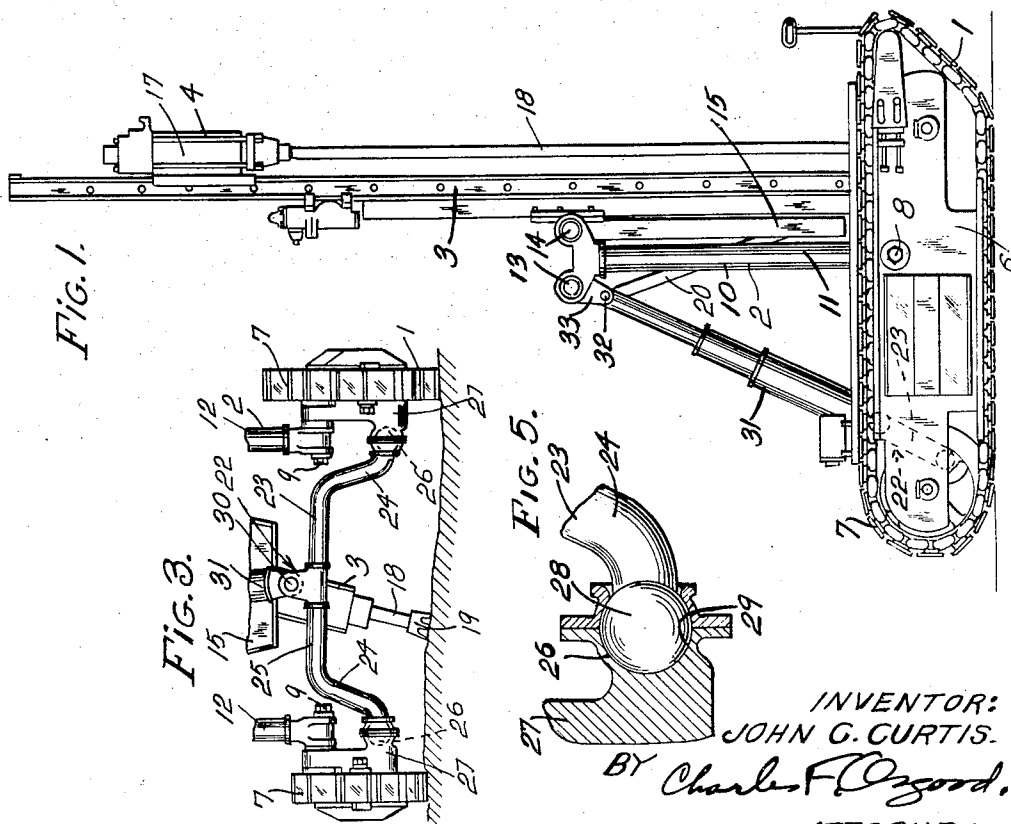
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MOBILE ROCK DRILL RIG

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MOBILE ROCK DRILL RIG

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This invention relates to rock drills and more particularly to a mobile rock drill rig having its drilling tool adjustably mounted on a mobile base and having novel supporting and adjusting means operatively connected with the base whereby the drilling tool may be adjusted into different elevated positions.

The present invention is designed for incorporation in a mobile rock drill rig, of the type disclosed in a copending application Serial No. 575,777, filed April 3, 1956, in which I am a coinventor, now Patent No. 2,845,251, dated July 29, 1958, and which is assigned to the same assignee as the present invention. In this copending application spaced crawler tread devices have independently pivoted tread frames and separate drill adjusting means operatively connected to each tread frame and the separate adjusting means are operable in unison for elevating the drilling tool. In the structure of the present invention but a single adjusting device has cooperation through improved connections with both tread frames for adjusting the elevation of the drilling tool. Therefore, the present invention contemplates improvements over the structure of the copending application in that the supporting and elevating structure for the drilling tool is simplified and is made relatively rugged, durable and less costly in design.

An object of the present invention is to provide an improved mobile rock drill. Another object is to provide an improved rock drill having improved supporting and propelling means and improved elevating means for the drilling tool operatively associated with the supporting and propelling means. A further object is to provide an improved mobile rock drill rig having crawler tread propelling and steering devices and an improved adjustable supporting structure for a drilling tool operatively connected with the crawler tread frames. A still further object is to provide an improved elevating device for the drilling tool embodying a cross connecting member extending between and universally pivotally connected to the tread frames and having a single elevating device operatively connected to the cross member for elevating the drilling tool. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

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

In these drawings:

Fig. 1 is a side elevational view of a mobile rock drill in which an illustrative embodiment of the invention is incorporated.

Fig. 2 is a rear end view of the drill shown in Fig. 1, with the upper portion of the drill guide frame broken away and showing a portion of the improved supporting and elevating means.

Fig. 3 is a fragmentary rear end view showing the crawler treads moving over uneven ground, with one tread raised higher than the other.

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Fig. 4 is a detail vertical section taken on line 4—4 of Fig. 2.

Fig. 5 is an enlarged detail section showing one of the universal pivotal connections.

The mobile rock drill rig in which the invention is incorporated generally comprises a mobile base 1 on which is adjustably mounted a supporting structure 2 for an elongated drill guide frame 3 along which a conventional hammer drilling tool 4 is guided for movement longitudinally therealong, all as is fully disclosed in the above mentioned copending application.

The mobile base 1 is desirably a crawler base adapted to travel over an uneven ground surface and comprising independently tiltable side frames 6 about which endless crawler treads 7 are guided for orbital circulation. Conventional fluid motors, not shown, carried by the tread frames as fully disclosed in the above mentioned copending application, are operatively connected through conventional speed reducers to the crawler treads for driving the latter to effect propulsion and steering of the base, and these motors are desirably reversible to provide for reverse drive. Pivotally mounted on horizontal transverse axes 8 on aligned pivot shafts 9 at the inner sides of the tread frames is the adjustable supporting structure 2 which for illustrative purposes is in the form of an articulated boom 10 comprising an inner boom frame 11 of inverted U-shape having side arms or legs 12 and an outer cross connecting portion or bar 13, and pivotally mounted on an axis 14 parallel to the longitudinal axis of the cross bar, on the outer portion of the inner boom frame, is an outer boom frame 15, the latter forming a continuation of the inner boom frame to provide an elongated boom structure, the outer end of which may be adjusted through a relatively wide range in vertical planes with respect to the base. As disclosed in the copending application above referred to, pivotally mounted near the outer portion of the outer boom frame 15, on an axis perpendicular to a line parallel with the boom frame axes 8 and 14, is the elongated guide frame 3 along which the drilling tool 4 is guided. The drilling tool has a conventional pressure fluid type hammer motor 17 for percussively actuating a drill steel 18 carrying a drill bit 19. Conventional fluid jacks 20 and 21 respectively serve to swing the outer boom frame 15 about its pivot relative to the inner boom frame and to tilt the guide frame 3 laterally about its pivot relative to the outer boom frame.

Now referring to the improved supporting and adjusting structure, generally designated 22, between the tread frames and the inner boom frame, it will be noted that extending transversely between the tread frames near one end thereof is a cross connecting frame 23 herein desirably of tubular construction and bent or otherwise formed upwardly to provide side arm portions 24 supporting a raised cross portion 25 thereby to provide a frame of inverted U-shape. These side arm portions have universal pivotal connections at 26 with brackets 27 suitably secured to or formed at the inner sides of the tread frames, and these universal pivotal connections are desirably in the form of conventional ball and socket pivots each comprising a ball portion 28 fitted in a spherical socket 29 in the associated bracket. As is well known in the art there is sufficient inherent looseness in the pivotal joints between the several frame parts of a rock drill of the character disclosed to allow for limited relative tilting movement of the tread frames up and down and relative tilt of the transverse frame as the drill rig traverses rough or uneven terrain without undue binding. When one tread frame swings about its pivot in a vertical plane the point of pivotal connection of the cross member with the tread frame will swing in an arc about the point of pivotal con-

nection thereof with the other tread frame, so that the arc of movement between the parts is relatively slight thereby enabling such inherent looseness at the pivots to compensate therefor. Pivotally connected at 30 on an axis fixed with respect to the cross member midway between the ends thereof is a power elevating device 31 herein desirably in the form of a conventional double telescopic fluid jack. The pivot 30 allows the fluid jack to swing laterally. This fluid jack is pivotally connected at 32 at its upper end to brackets 33 secured to the cross portion 13 of the inner boom frame 11.

The cross connection not only provide a universal pivotal mounting for the centrally located elevating jack but also serves to tie the tread frames together at points remote from the boom frame pivots 8 so that all of the torsion load is not carried by the inner U-shaped boom frame. Further, by employing the cross connecting frame and the single centrally located jack any need for a bypass connection for equalizing fluid pressures in the cylinders, such as is disclosed in the copending application above referred to, is avoided.

As a result of this invention an improved supporting and adjusting structure is provided for a rock drilling tool whereby the latter may be readily adjusted through a wide range of drilling positions. By the provision of the cross connection between the tread frames the base may travel over an uneven surface without undue distortion. By universally pivotally connecting the cross connecting frame with the tread frames and extending the single centrally located jack between this cross connection and the adjustable boom mounting for the drilling tool the elevating structure for the tool is not only substantially simplified but is also made more rugged and durable in design.

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 drilling apparatus, a mobile base having spaced apart side frames carrying ground engaging means and mounted for independent tilting movement in upright planes to permit said ground engaging means to travel over an uneven ground surface and adjustable drill supporting structure, means for mounting said side frames for independent tilting movements and said drill supporting structure for adjusting movement in vertical planes, a cross connecting frame extending between said side frames at a point spaced longitudinally of said base from said mounting means, means for universally pivotally connecting said cross connecting frame at its ends to said side frames whereby the latter may tilt while connected transversely by said cross connecting frame, and an elevating device connected to said cross connecting frame and to said adjustable supporting structure for adjusting the latter on its mounting means on said base thereby to vary the elevation of a drill supported thereby.

2. In a drilling apparatus, a mobile base having spaced apart side frames carrying ground engaging means and mounted for independent tilting movement in upright planes to permit said ground engaging means to travel over an uneven ground surface, a swingable drill supporting structure, means for pivotally mounting said side frames for independent tilting movements and said drill supporting structure for swinging movement, a cross connecting frame extending between said side frames at a point spaced longitudinally of said base from said pivotal mounting means for connecting transversely said side frames, means for universally pivotally connecting said cross connecting frame at its ends to said side frames for permitting tilting of the latter while transversely connecting said side frames together, a single elevating de-

vice, and means for connecting said elevating device to said cross connecting frame and to said swingable supporting structure for swinging the latter on its pivotal mounting on said base thereby to vary the elevation of a drill supported thereby.

3. A drilling apparatus as set forth in claim 2 wherein said cross connecting frame provides a transverse tie connection between said side frames irrespective of the relative tilted positions thereof, and said means for pivotally connecting said elevating device to said cross connecting frame engages the latter midway between the ends of said connecting frame.

4. A drilling apparatus comprising a mobile base having propelling and steering means including spaced apart side frames having independent relative movement in vertical planes to permit said propelling and steering means to travel over an uneven ground surface, a swingable boom structure for supporting a drilling tool and having spaced side portions, means for pivotally mounting said side frames for independent tilting movements and said side portions of said drill supporting boom structure for pivotal movement on said side frames whereby said boom structure may swing in vertical planes with respect to said side frames, a cross connecting frame extending between said side frames at a point spaced longitudinally of the base from said mounting means for transversely connecting said side frames, means for universally pivotally connecting said cross connecting frame at its ends with said side frames to permit tilting of the latter while connected transversely by said cross connecting frame, an extensible power device extending between said cross connecting frame and said boom structure, and means for connecting said power device to said cross connecting frame of said boom structure for swinging the latter in vertical planes on its pivotal mounting on said base thereby to vary the elevation of a drill supported thereby.

5. A drilling apparatus as set forth in claim 4 wherein said means for connecting said power device to said cross connecting frame is pivotally connected to the latter at a point located midway between the universal pivotal connections with said side frames.

6. A drilling apparatus comprising a pair of spaced apart crawler tread devices each having a frame tiltable in upright planes relative to the other to permit said crawler tread devices to travel over an uneven ground surface, an elongated boom structure for supporting a drilling tool comprising an inverted U-shaped boom frame, means for pivotally mounting said boom frame at its lower portion at the inner sides of said tread frames of said crawler tread devices, a cross connecting frame structure for transversely connecting said tread frames, means providing universal pivotal connections between said cross connecting frame structure and said frames of said crawler tread devices at points spaced longitudinally of said devices with respect to the pivotal mountings of said boom frame on said frames of said crawler tread devices, and adjustable power means connected to said cross connecting frame structure and to said boom frame for swinging the latter in vertical planes about its pivot to vary the elevation of the drilling tool supported thereby.

7. In a drilling apparatus, a mobile base having spaced apart side frames carrying ground engaging means and mounted for independent tilting movement in upright planes to permit said ground engaging means to travel over an uneven ground surface, a swingable drill supporting structure, means for pivotally mounting said drill supporting structure on said side frames with the pivotal axis thereof coincident with the pivotal axes of tilt of said side frames, said pivotal mounting means also providing the pivotal mounting for said side frames, a cross connecting frame extending between said side frames at points spaced longitudinally of said side frames from the pivotal mounting for said supporting structure for tying said side frames together, means for universally pivotally connecting said cross connecting frame to said side

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frames to permit tilting of either side frame with respect to the other while said side frames are tied together transversely by said cross connecting frame, and elevating means for said drill supporting structure connected to said cross connecting frame and to said supporting structure for swinging the latter on its pivotal mounting to vary the elevation of a drill supported thereby.

8. A drilling apparatus as set forth in claim 7 wherein said cross connecting frame is of inverted U-shape to provide increased clearance between the upper cross portion thereof and the ground surface.

9. A drilling apparatus comprising a pair of spaced apart crawler tread devices each having a frame tiltable in upright planes relative to the other to permit said crawler tread devices to travel over an uneven ground surface, an elongated boom structure, means for pivotally mounting said boom structure on said tread frames to swing in vertical planes relative thereto, said pivotal mounting also providing the pivots for said tread frames, a cross connecting frame structure extending between said tread frames for transversely tying the latter together, means for universally pivotally connecting said cross connecting frame structure at its ends with said tread frames at points spaced longitudinally of said tread devices with respect to the pivotal mounting of said boom frame on said tread frames, said cross connecting frame structure tying said tread frames together while permitting independent tilting movement thereof, an extensible power operated means, and means for connecting said power operated means to said cross connecting frame structure and to said boom structure for swinging the latter in vertical planes about its pivot to vary the elevation of a drill supported by said boom structure.

10. A drilling apparatus as set forth in claim 9 wherein said cross connecting frame structure has an elevated transverse upper portion to which said extensible power operated means is connected to provide increased ground clearance, said elevated transverse portion being disposed a substantial distance above the pivotal connections of said cross connecting frame structure with said tread frames.

11. In a drilling apparatus, a mobile base having spaced apart side frames and ground engaging means carried

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thereby, said frames having independent relative tilting movement in upright planes, an elongated boom pivotally mounted on said base and carrying a drill at its outer portion, said boom comprising a boom frame of inverted U-shape having its legs spaced apart and extending down along the inner sides of said side frames, means for pivotally mounting said legs to the inner sides of said side frames whereby said boom frame may swing in upright planes about a horizontal transverse axis to locate the drill in drilling positions at different elevations, said side frames being tiltable as aforesaid about said pivotal connection of said U-shaped boom frame therewith, a rigid cross bar pivotally connected to said side frames and providing a transverse connection therebetween at a point spaced longitudinally of said base from said boom frame pivot while permitting such relative tilting of said side frames, and an extensible power device connected between said cross bar and the outer portion of said U-shaped boom frame for swinging the latter about its pivot.

12. In a drilling apparatus, a mobile base having a pair of ground engaging traction devices, a drill support pivotally mounted on said traction devices to swing in vertical planes relative thereto about a transverse axis, said traction devices swingable up and down in spaced vertical planes about said transverse axis, a rigid cross bar pivotally connected to said traction devices for connecting the same together while permitting up and down swinging movement thereof, said cross bar spaced longitudinally of said base from said transverse axis, and an extensible power device connected to said cross bar and to said drill support for swinging the latter about its pivot.

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