

Jan. 4, 1938.

J. C. CURTIS

2,104,341

PORTABLE DRILLING RIG

Filed May 21, 1936

3 Sheets-Sheet 1

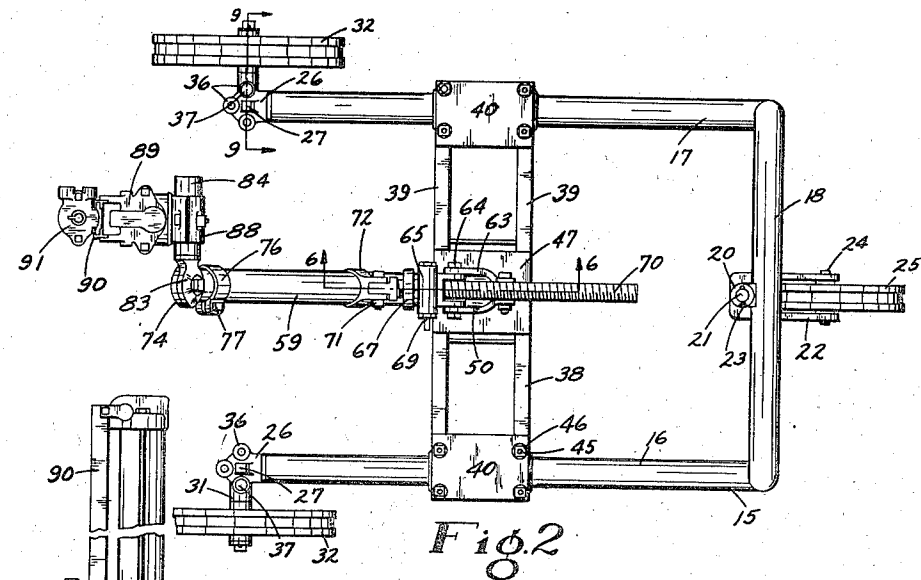


Fig. 2

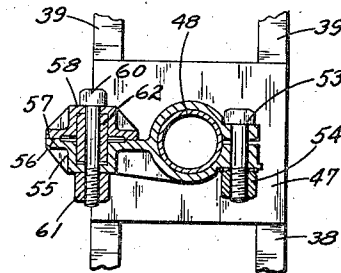


Fig. 3

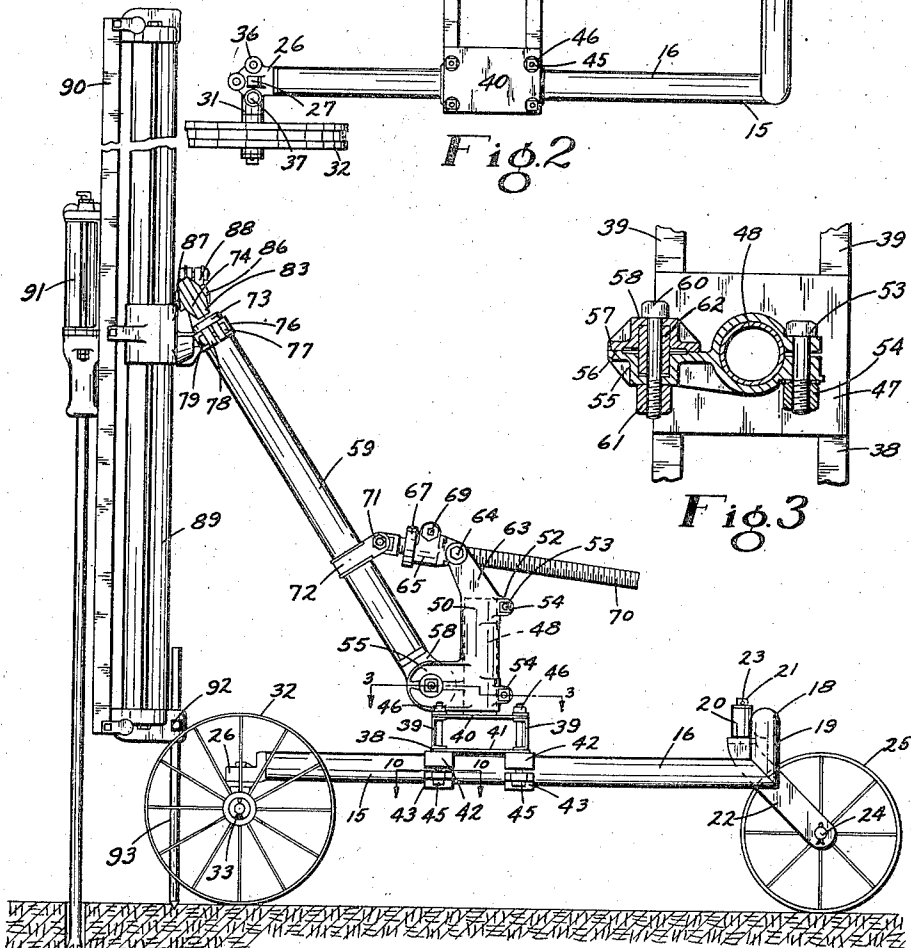


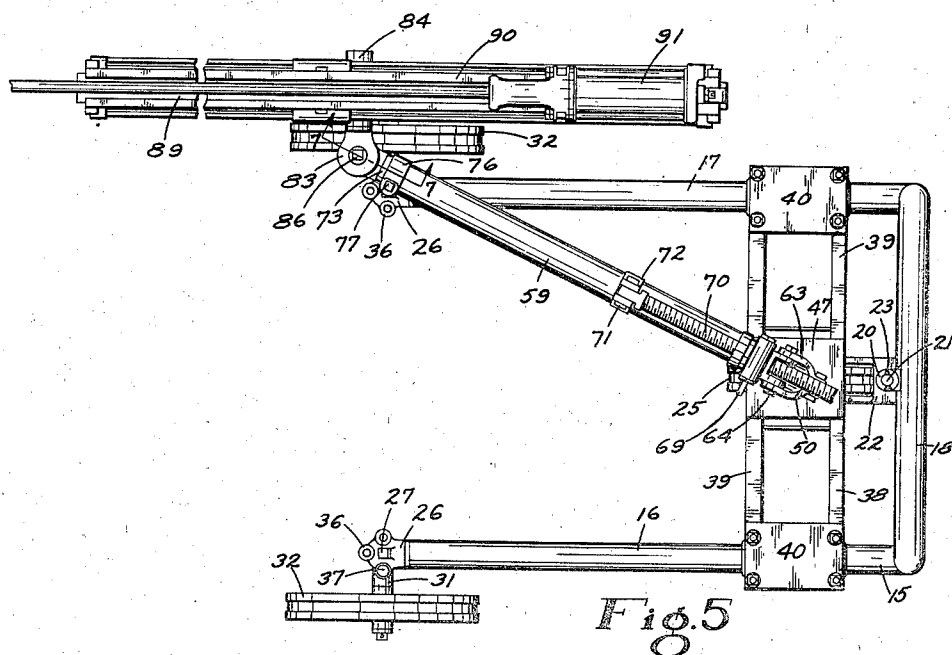
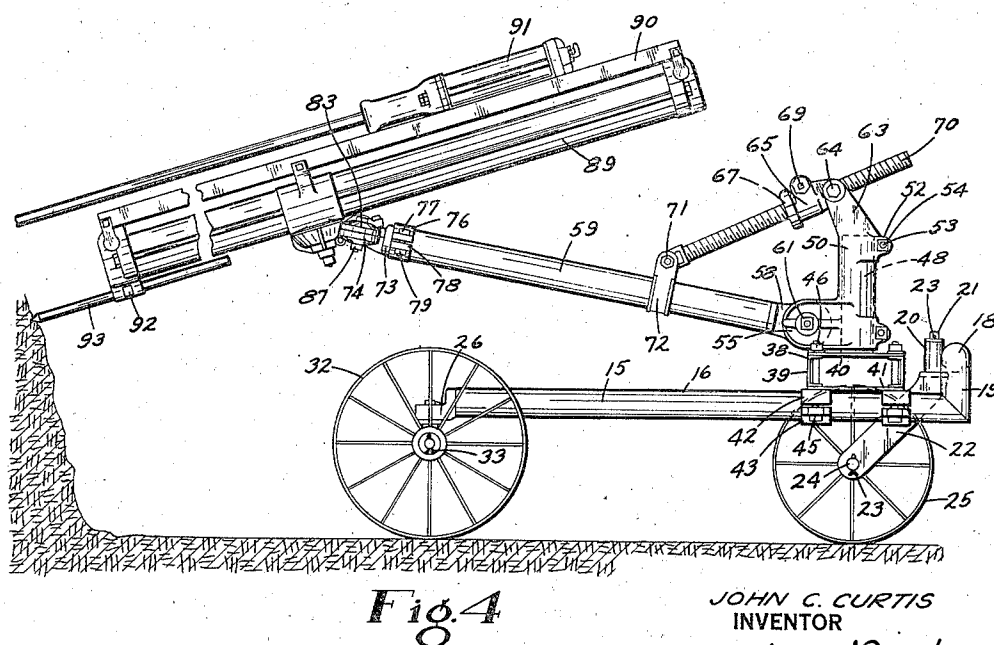
Fig. 1

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PORTABLE DRILLING RIG

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PORTABLE DRILLING RIG

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3 Sheets-Sheet 3

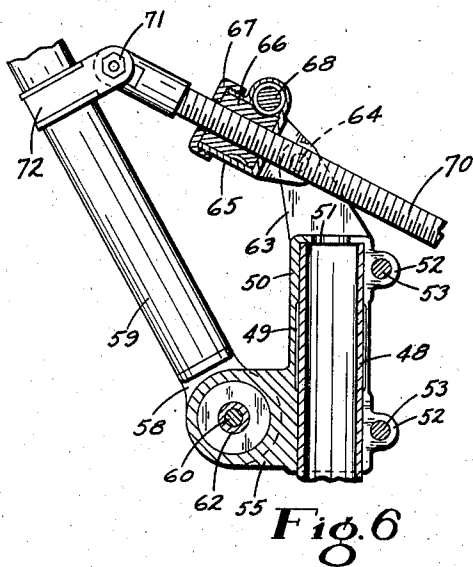


Fig. 6

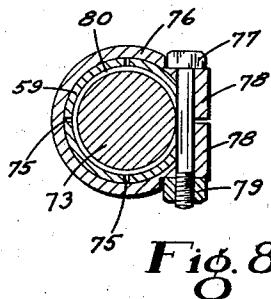


Fig. 8

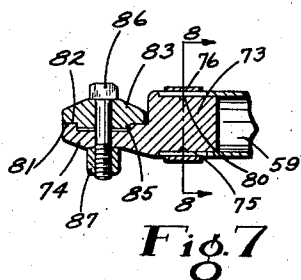


Fig. 7

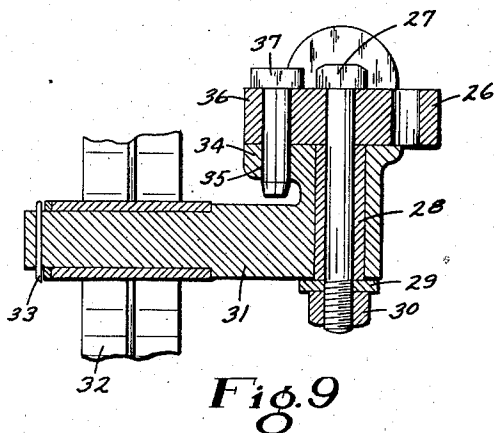


Fig. 9

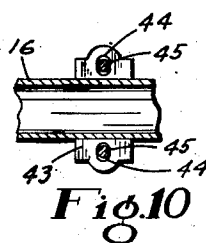


Fig. 10

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2,104,341

PORTABLE DRILLING RIG

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land, Ohio, a corporation of Ohio

Application May 21, 1936, Serial No. 81,050

8 Claims. (Cl. 255—51)

This invention relates broadly to rock drilling equipment, but more particularly to a portable rig for supporting and moving the drill.

One object of this invention is to produce an improved portable drilling rig of simple construction which is strong, durable and efficient.

Another object of this invention is to produce a portable drilling rig best suitable for drilling holes in connection with tunnelling work or the like, the rig being of a relatively low construction and being equipped with a swingable drill supporting element permitting the drill to be readily moved in any desired drilling position.

Other objects and advantages more or less ancillary to the foregoing, and the manner in which the various objects are attained, reside in the specific construction and aggroupment of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification, in the claims of which there are assembled certain specific combinations of parts and specific construction indicative of the scope and spirit of the invention.

In the drawings:

Fig. 1 is a side elevational view of the entire apparatus, the drill being shown in a position for drilling vertical holes.

Fig. 2 is a plan view of the apparatus shown as positioned in Fig. 1.

Fig. 3 is an enlarged cross sectional view taken in a plane indicated by line 3—3 in Fig. 1.

Fig. 4 is a view similar to Fig. 1 illustrating the drill and its guiding frame in another position.

Fig. 5 is a view similar to Fig. 2 illustrating the drill positioned outside of the carriage.

Fig. 6 is an enlarged sectional view taken in a plane indicated by line 6—6 in Fig. 2.

Fig. 7 is an enlarged sectional view taken in a plane indicated by line 7—7 in Fig. 5.

Fig. 8 is an enlarged cross sectional view taken in a plane indicated by line 8—8 in Fig. 7.

Fig. 9 is an enlarged cross sectional view taken in a plane indicated by line 9—9 in Fig. 2.

Fig. 10 is an enlarged cross sectional view taken in a plane indicated by line 10—10 in Fig. 1.

Referring to the drawings in which like symbols designate corresponding parts throughout the several views, there is shown a carrying frame 15, which for the purpose of illustration is shown to comprise two tubular side members 16 and 17. These two side members are united by an end cross member 18, which has its end portions 19 bent downwardly and its extreme ends welded to the adjacent end of the

side members to constitute a substantially U-shaped carrying frame formed with an open end. To the middle of the cross member 18, is welded a vertically disposed apertured boss 20, adapted to rotatably receive the shafted portion 21 of a fork 22, the latter being bent away from the center axis of the shaft 21. This shafted portion is retained within the boss 20 by a cotter pin 23 extending through the upper end thereof, while the fork 22 has a shaft 24 transversally therethrough on which is rotatably mounted a supporting wheel 25, the latter forming with the fork 23 a caster supporting one end of the frame 15.

Welded to each other end of the two side members, there is a relatively flat casting 26 having mounted through the center thereof a bolt 27. This bolt extends under the casting 26 to receive a sleeve or bushing 28 which is clamped against the casting 26 by a washer 29 and nut 30. Rotatably mounted on the bushing 28, there is a shaft 31 on which is rotatably mounted a frame supporting wheel 32, which is retained thereon by a pin 33. Adjacent the casting 26, the shaft 31 is formed with a laterally extending flange 34 having a bore 35 vertically therethrough and capable of registration with either of the apertured bosses 36 formed on the casting 26 and disposed at right angles from each other. Through either of these apertured bosses may be inserted a locating pin 37, which extends therefrom into the bore 35 of the flange 34 for locking the shaft 31 and wheel 32 in either of three operative positions.

Carried by the side members of the carrying frame 15, there is a cross frame 38 comprising two channel bars 39 mounted in spaced relation and having their respective ends united by a top and bottom plate 40 and 41 welded thereto. Under each end of the channel bars 39 between the bottom plate 41 and the corresponding side member of the carrying frame 15, there is interposed a casting 42, the upper wall of which is flat to receive the bottom plate 41, while the lower wall of this casting is arcuated to fit over the corresponding side member of the frame 15. Under each casting 42, there is a companion cap 43 also formed with an arcuated wall to fit the under side of the corresponding side member of the frame 15. Each casting 42 and cap 43 is provided with two vertically disposed orifices 44, which are elongated in a transversal direction relative to the frame 15, and adapted to accommodate a bolt 45 which extends through the bottom plate 41, channel 39 and upper plate 40

to receive a nut 46, by which the cross frame 38 may be rigidly secured to the carrying frame 15.

To reinforce the cross frame 38, the latter is provided halfway between its ends with a box 5 like construction formed of boiler plates welded to the channel bars 39. These plates include top and bottom plates 47 having an enlarged opening formed therethrough in coaxial alignment, and adapted to receive a stanchion or shaft 48 which is welded to the plates. This stanchion extends vertically above the cross frame 38 within the bore 49 of a housing 50 which is rotatably mounted thereon. The bore 49 is terminated by a flat bottom 51 engaging the free end of the stanchion 48 for supporting the housing 50 thereon. To lock the housing 50 against rotation on the stanchion 48 the former is provided with two apertured bosses 52 having a bolt 53 therethrough adapted to receive a nut 54. These bosses, as well as the wall of the housing adjacent thereto, are split in the usual manner to effect an effective clamping action by means of the bolt and nut 53 and 54.

Extending laterally from the lower end of the housing 50, there is a protuberance 55 having a flat circular wall 56 radially disposed with respect to the stanchion 48. Engaging the wall 56, there is the similarly shaped wall 57 of a head 58 which is welded or otherwise rigidly secured to one end of a relatively long boom 59. The protuberance 55 and head 58 are apertured to receive a horizontal shaft in the form of a bolt 60 extending transversally therethrough. This bolt protrudes beyond the protuberance 55 to receive a nut 61 by which the two surfaces 56 and 57 may be clamped against each other. In a counterbore formed within the protuberance 55 and head 58 through which the bolt 60 passes, there is disposed a bushing 62 for maintaining the protuberance 55 and head 60 in coaxial alignment.

The upper end of the housing 50 is shaped like a fork 63, having pivotally secured to its side walls by cap screws 64 a worm gear housing 65. Rotatable within this last housing, there is a worm gear 66 retained therein by a cap 67. The housing 65 is shaped to accommodate a worm 68 meshing with the worm gear 66, and having one end 69 extending from the housing 65 to operatively receive a crank handle (not shown) through which the worm may be rotated. The worm gear 66 is internally threaded to receive a screw or brace 70 longitudinally movable therethrough and having one end pivotally connected by a bolt 71 to a bracket 72, the latter being welded to the boom 59 at a selected distance from the ends thereof.

Mounted within the upper end of the tubular boom 59, there is the cylindrical portion 73 of a bracket 74. To clamp this bracket against rotation, the end of the tube is slotted as at 75, and it has a split collar 76 mounted thereon with a bolt 77 extending through apertured lugs 78 to receive a nut 79. The cylindrical portion 73 within the end of the boom is provided with an annular groove 80 within which the bolt 77 projects to prevent axial movement of the bracket 74. Externally of the boom 59, the bracket 74 is formed with a flat annular wall 81 engageable with a similarly shaped wall 82 of another bracket 83 which is welded at one end of a relatively short pipe or arm 84. Raised from the wall 82, there is a cylindrical step 85 protruding into a corresponding counterbore formed into the bracket 74 for maintaining the two brackets in coaxial

alignment. Through these two brackets extends a bolt 86 having a nut 87 thereon, by which the brackets may be clamped against relative rotation.

Detachably secured on the arm 84 by a clamp 88, there is a drilling mechanism, which is shown for purpose of illustration to comprise an elongated frame 89, having guiding elements 90 secured thereto and on which the drilling motor 91 is free to slide. To the lower end of the frame 89 is adjustably secured by a cap screw 92, a peg 93, the purpose of which will be explained later.

In practice, it will be understood that since the carrying frame 15 is supported by wheels 32 and the caster wheel 25, the entire drilling rig may be moved about the work without difficulty. When it is desired to move the rig longitudinally with respect to the carrying frame, the wheels 32 may be positioned longitudinally of the frame either outside or inside of the latter, by simply removing the pin 37 and swinging the wheels 180°. When it is desired to move the rig transversally of the frame 15, the wheels 32 may be positioned at right angles with the side members of the frame.

Referring now more particularly to the construction supported by the stanchion 48, it will be seen that the housing 50 and boom 59 constitutes a derrick like assembly wherein the boom 59 is capable of pivotal movement on a horizontal axis or bolt 60, and capable of completely revolving around a vertical axis or stanchion 48. By rotating the worm 68 it is evident that rotation is transmitted to the worm gear 66, thus causing the longitudinal movement of the brace or screw 70 through the worm gear 66, and the consequential raising or lowering movement of the boom 59. When the boom 59 has been moved in the desired height, the nut 61 may be tightened to rigidly clamp the wall 57 of the head 58 against the wall 56 of the protuberance 55, thus locking the boom 59 and housing 50 against relative rotation.

The boom 59 may also be locked against rotation relative to the stanchion 48 by tightening the nuts 54, which will cause the clamping action of the housing 50 on the stanchion 48.

Due to the swivel connection between the arm 84 and the boom 59, it will also be understood that the former may be moved laterally of the boom in any desired position within an arc of substantially 180°, and may be locked against movement relative to the bracket 74 by tightening the nut 87. The bracket 74 being rotatably mounted within the end of the boom 59, permits further adjustment of the arm 84. When the arm is rotated in the desired position, the nut 79 may be tightened, thus locking the bracket 74 and boom 59 against relative movement.

By loosening the nut 46 which normally secures the cross frame 38 on the carrying frame 15, it will be understood that the entire cross frame and derrick like mechanism carried thereby may be slid relative to the carrying frame for adjusting the drill guiding frame 89 longitudinally of the carrying frame through the open end thereof. Due to the elongated shape of the openings 44 through which extend the bolts 45, the cross frame 38 will be free to slide on the carrying frame 15 irrespective of a slight divergence between the side members 16 and 17. When the cross frame 38 is slid or positioned toward the open end of the carrying frame, it is advisable to drive the peg 93, which is carried by the drill guiding frame 89, into the rock to be drilled, thus

preventing the weight of the drilling mechanism to cause the tilting of the drilling rig, and also assisting in securing the drilling mechanism against movement relative to the rock.

5 From the foregoing, it will be seen that the drill guiding frame 89 may be moved in drilling position outside of the marginal edge of the carrying frame 15 as shown in Fig. 5. It may also be positioned above or below the carrying frame due to the pivotal movement of the boom 59 through the open end of the carrying frame, and may be revolved 360° around the stanchion 48, permitting thereby the drill guiding frame 89 to be moved in innumerable drilling positions relative to the carrying frame 15.

10 Although the foregoing description is necessarily of a detailed character, in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining and it is to be further understood that various rearrangements of parts and modification of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In a portable drilling rig, the combination of a carrying frame, supporting means for said frame, a boom carried by said frame, means pivotally connecting one end of said boom to said frame for pivotal movement on a horizontal and on a vertical axis relative to said frame, a brace associated with said boom adjustable in length for effecting the pivotal movement of the boom on said horizontal axis, a drill guiding frame carried by the other end of said boom, and clamping means forming a part of said pivotally connecting means for establishing a rigid connection between said frames in any position assumed by said drill guiding frame due to the pivotal movements of said boom.

2. In a portable drilling rig, the combination of a carrying frame, supporting means for said frame, a shaft carried by said frame in perpendicular relation therewith, a housing rotatably carried by said shaft, a boom like member having the lower end thereof connected to said housing for rotation therewith around the center axis of said shaft and for pivotal movement on an axis perpendicular thereto, a drill guiding frame carried by the other end of said boom, and means for establishing a rigid connection between said frames in any position assumed by said drill guiding frame due to the rotation and pivotal movement of said boom.

3. In a portable drilling rig, the combination of a carrying frame, supporting means for said frame, a shaft carried by said frame in perpendicular relation therewith, a derrick carried by said shaft including a boom capable of swinging movement around the center axis of said shaft and on an axis perpendicular thereto, a brace carried by said shaft associated with said boom for swinging movement therewith on the center axis aforesaid, said brace being adjustable in length for effecting the swinging movement of said boom on said perpendicular axis, a drill guiding frame carried by the other end of said boom adjustable in various drilling positions relative to said carrying frame due to the swinging movement of said boom, and means for locking said frames against relative movement.

4. In a portable drilling rig, the combination of a carrying frame, supporting means for said frame, a boom carried by said frame, means pivotally connecting one end of said boom to said carrying frame in a manner whereby said boom is capable of swinging movement in a vertical and in a horizontal plane, an arm pivotally connected to the other end of said boom for swinging movement laterally of said boom, a drill guiding frame carried by said arm, and means for establishing a rigid connection between said frames in any position assumed by said drill guiding frame due to the swinging movements of said arm and boom.

5. In a portable drilling rig, the combination of a carrying frame, supporting means for said frame, a boom carried by said frame, means pivotally connecting one end of said boom to said carrying frame above the latter in a manner whereby said boom is capable of swinging movement in a vertical and horizontal plane, an arm connected to the other end of said boom for swinging movement laterally of said boom, a drill guiding frame pivotally carried by said arm, and means for establishing a rigid connection between said frames in any position assumed by said drill guiding frame due to the pivotal movement of said last frame and the swinging movements of said arm and boom.

6. In a portable drilling rig, the combination of a substantially U-shaped carrying frame formed with an open end, a substantially flat cross-frame longitudinally slidable on said carrying frame, an upright rigidly secured to said cross-frame, a housing rotatably carried by said upright, a boom carried by said housing for rotation therewith and for swinging movement in a plane perpendicular to said carrying frame, a drill guiding frame carried by said boom for longitudinal movement through the open end of the carrying frame due to the slidable movement of said cross frame, said drill guiding frame being adjustable in height through the open end aforesaid due to the swinging movement of said boom and adjustable laterally of said carrying frame due to the rotation of said housing, and means for locking said drill guiding frame against movement relative to said carrying frame.

7. In a portable drilling rig, the combination of a carrying frame, a boom having a drill guiding frame carried thereby, connecting means between said boom and carrying frame including means for adjusting said boom and drill guiding frame vertically and laterally of said carrying frame, a mechanism associated with said boom for effecting the vertical adjustment thereof and movable therewith transversally of said carrying frame, connecting means between said drill guiding frame and boom for moving the entire drill guiding frame from one to the other side of said boom, and means for locking said frames against relative movement.

8. In a portable drilling rig, the combination of a carrying frame, a boom, a drill guiding frame carried by one end of said boom, movable connecting means between said boom and carrying frame whereby said boom and drill guiding frame are adjustable vertically and laterally of said carrying frame, a mechanism associated with said boom for effecting the vertical adjustment thereof and movable therewith transversally of said carrying frame, means swingingly connecting said drill guiding frame to the aforesaid end of said boom, and means for locking said frames against relative movement.