June 13, 1939. C. A. HIRSCHBERG 2,162,553

PORTABLE DRILLING RIG

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Fig. 1

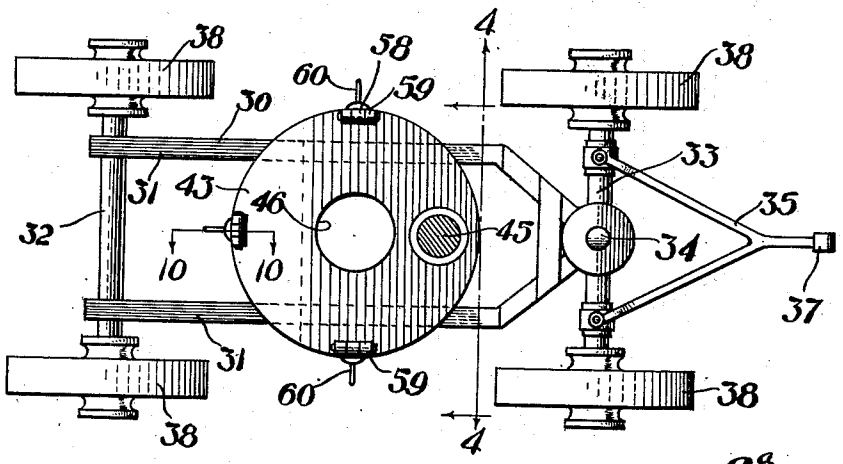


Fig. 2a.

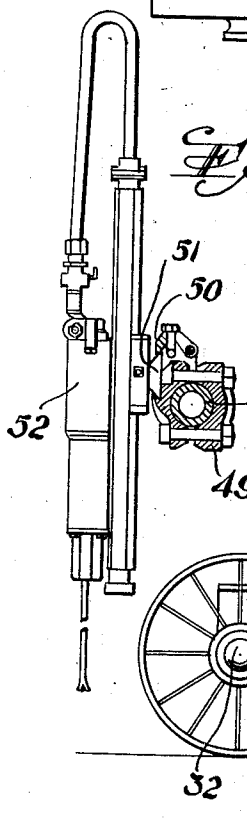
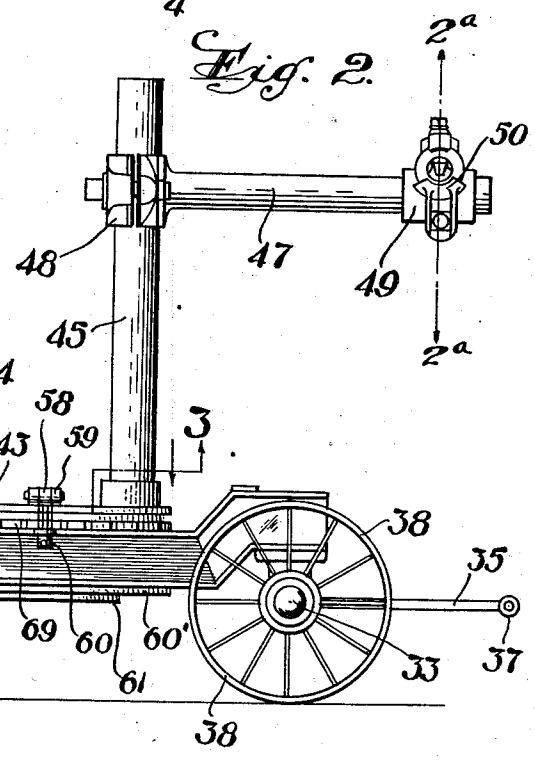


Fig. 2.



Charles A. Hirschberg
INVENTOR

BY Rob Dwyer

ATTORNEY

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Fig. 3

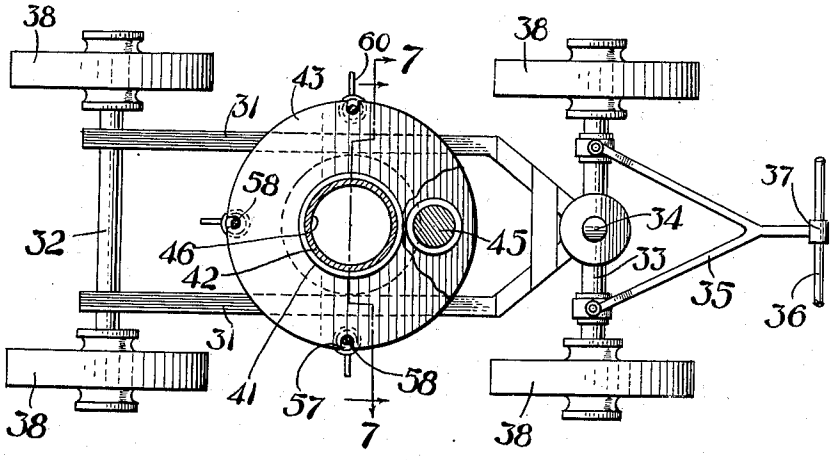


Fig. 4

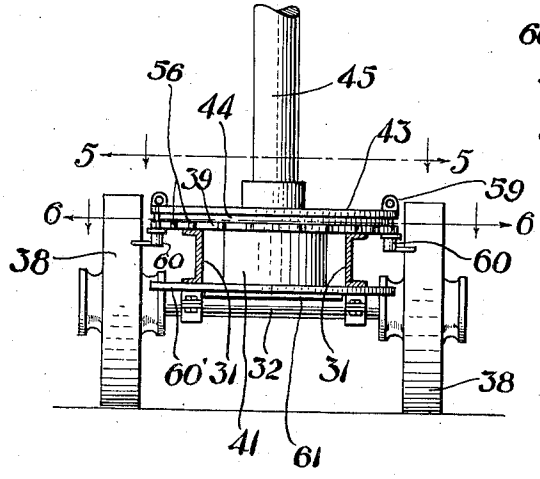
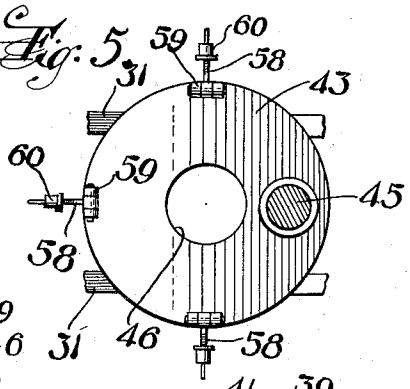


Fig. 5



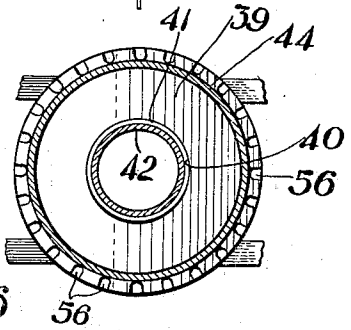


Fig. 6

Charles A. Hirschberg

INVENTOR

BY

ATTORNEY

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PORTABLE DRILLING RIG

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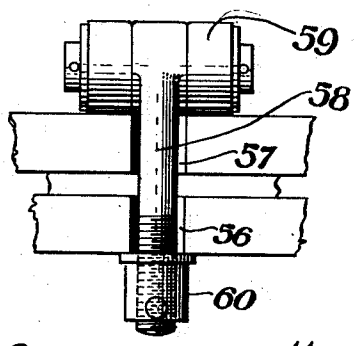


Fig. 9

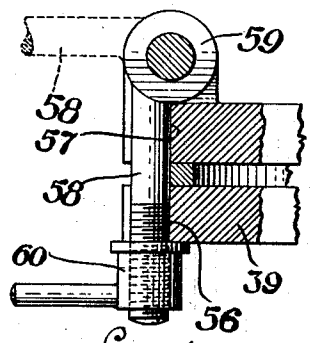


Fig. 10

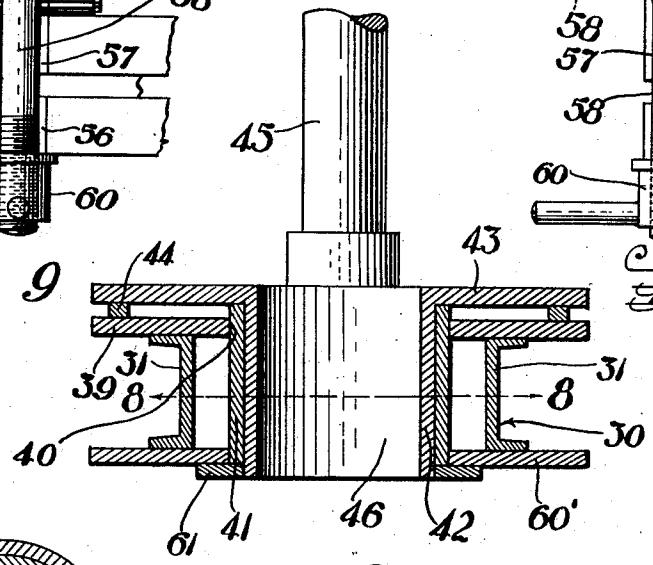


Fig. 7

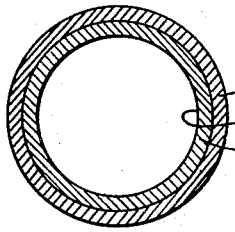


Fig. 8

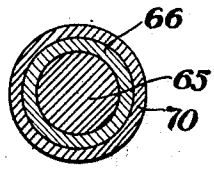


Fig. 14

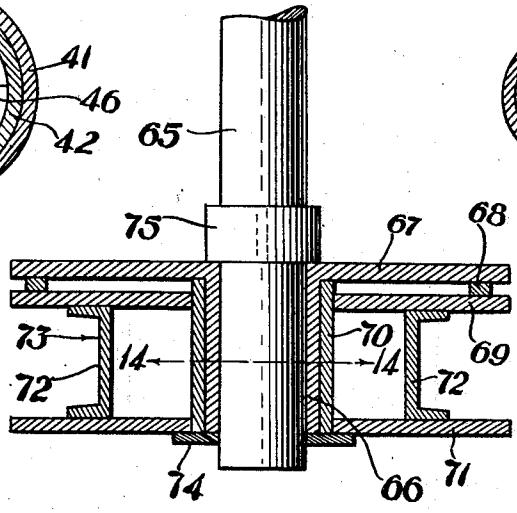


Fig. 13

Charles A. Hirschberg

INVENTOR

BY Robert Meyer

ATTORNEY

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PORTABLE DRILLING RIG

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Fig. 11

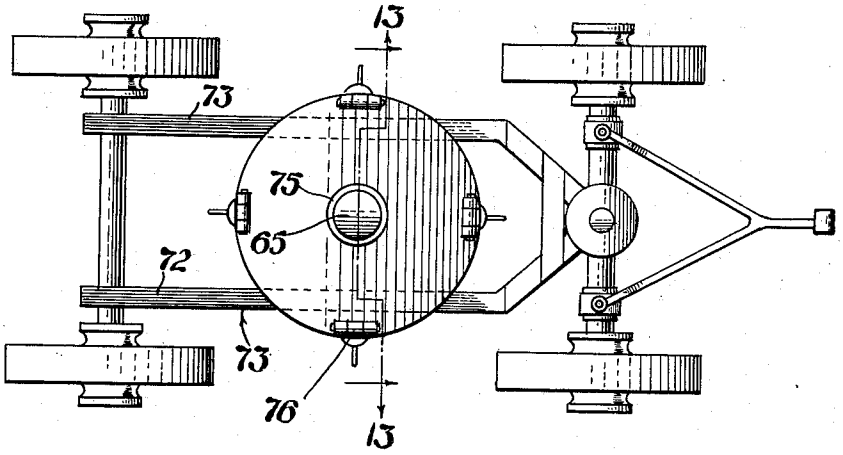
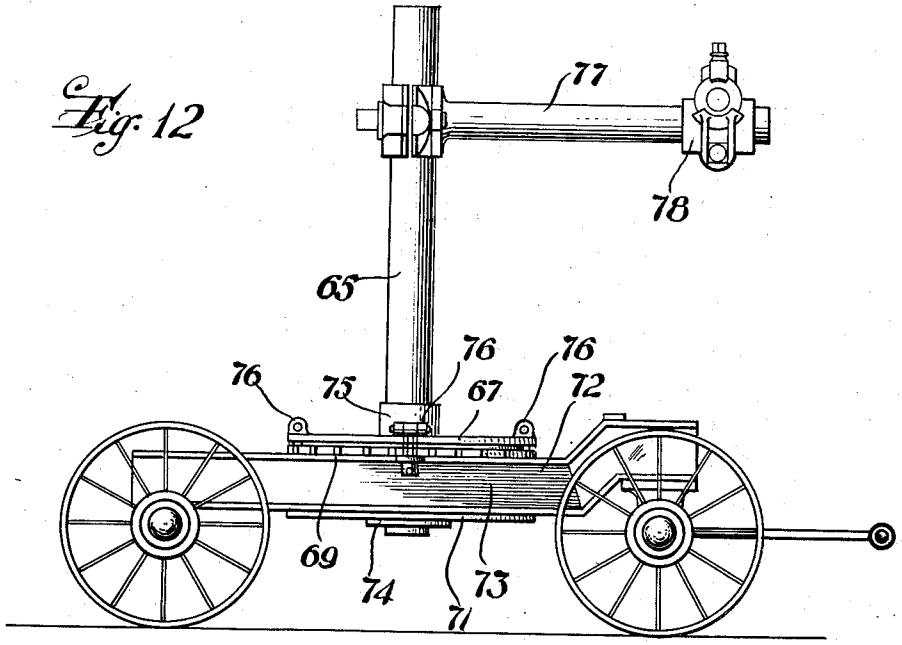


Fig. 12



Charles A. Hirschberg
INVENTOR

BY

ATTORNEY

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PORTABLE DRILLING RIG

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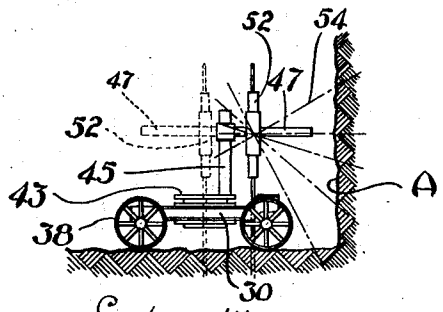


Fig. 15

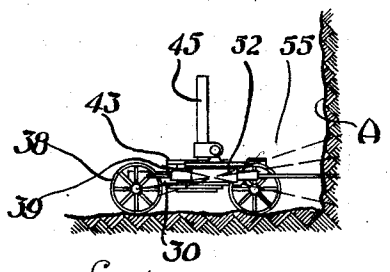


Fig. 16

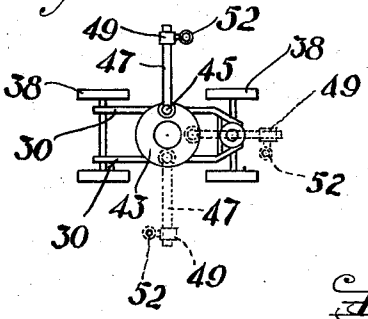


Fig. 17

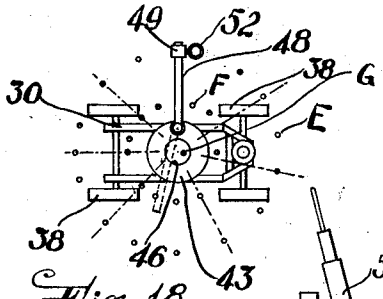


Fig. 18

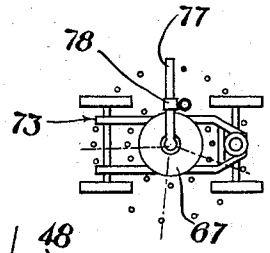


Fig. 20

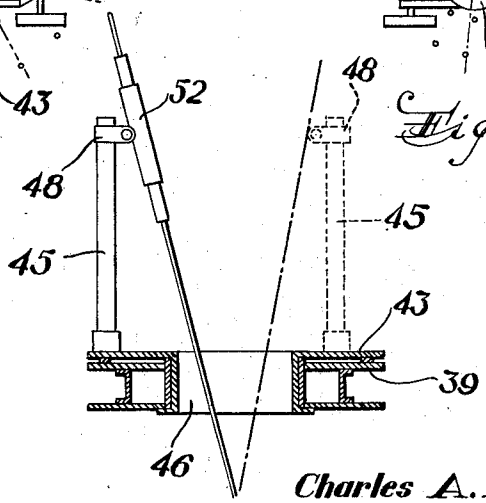


Fig. 19

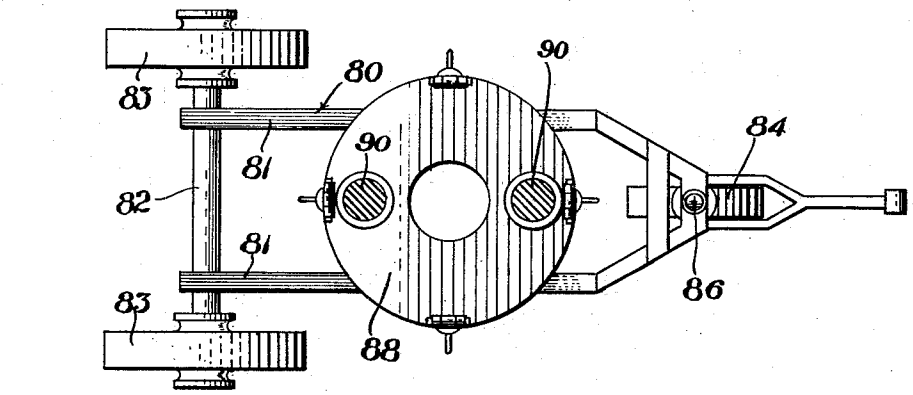
Charles A. Hirschberg
INVENTOR
BY
ATTORNEY

June 13, 1939. C. A. HIRSCHBERG 2,162,553

PORTABLE DRILLING RIG

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Fig. 21



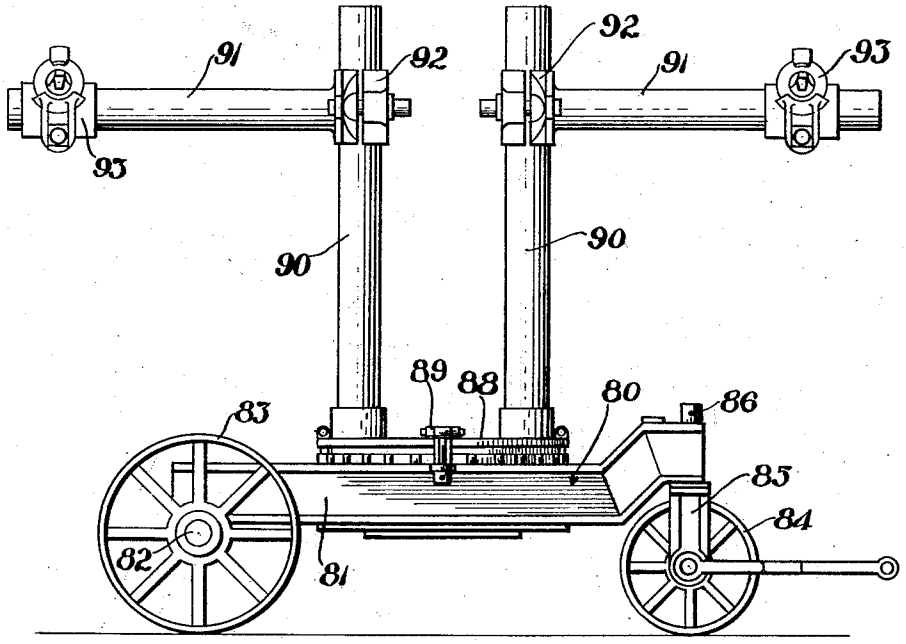


Fig. 22

Charles A. Hirschberg
INVENTOR

BY

ATTORNEY

Patented June 13, 1939 2,162,553

UNITED STATES PATENT OFFICE

2,162,553

PORTABLE DRILLING RIG

Charles A. Hirschberg, Mountain Lakes, N. J., assignor to Worthington Pump and Machinery Corporation, Harrison, N. J., a corporation of Delaware

Application November 13, 1937, Serial No. 174,449

8 Claims. (Cl. 255—51)

This invention relates to portable drilling rigs particularly designed for use in connection with percussive tools such as rock drills or the like and the primary object of the invention is to provide a rig which is mobile and may be moved from place to place with comparative ease, and one which will permit of a wide range of settings of a drill from one position of the rig.

More particularly the present invention comprises a portable drilling rig as specified which is constructed to permit the drilling of a plurality of down holes or substantially vertical holes from one setting of the rig and drill, requiring adjustment only of the drill-carrying arm, to position the drill for properly locating the hole to be drilled.

Another object of the invention is to provide a portable drilling rig as specified which while it is particularly adapted to facilitate down-hole drilling whether the holes are perpendicular or at acute angles to the perpendicular, it is sufficiently flexible to permit and facilitate side-wall drilling, snake-hole drilling, and upward or stope drilling if desired.

A further object of the present invention is to provide a portable drilling rig which embodies positive setting means whereby regularity of setting or positioning of the drill may be carried out thereby permitting regularity in, or accurate series locating of a number of drill holes, and also one which is so designed that it will permit and facilitate cone drilling such as is employed in the sinking of shafts or substantially circular holes.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a portable drilling rig of the preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a top plan of the improved portable drilling rig.

Figure 2 is a side elevation of the improved drilling rig.

Figure 2*a* is a vertical section taken on the line 2*a*—2*a* of Figure 2 and showing a rock drill of the pneumatic feed type mounted on the rig.

Figure 3 is a horizontal section through the rig taken on the line 3—3 of Figure 2.

Figure 4 is a vertical section through the improved portable drilling rig taken on the line 4—4 of Figure 1.

Figure 5 is a fragmentary horizontal section through the drilling rig taken on the line 5—5 of Figure 4 and showing fastening means employed in the drilling rig in open position.

Figure 6 is a fragmentary horizontal section taken on the line 6—6 of Figure 4.

Figure 7 is a fragmentary vertical section taken on the line 7—7 of Figure 3.

Figure 8 is a horizontal section taken on the line 8—8 of Figure 7.

Figure 9 is a fragmentary side elevation of a locking means employed in the drilling rig.

Figure 10 is a detail section showing the locking means and taken substantially on line 10—10 of Figure 1.

Figure 11 is a top plan of a modified form of the drilling rig.

Figure 12 is a side elevation of the modified form of the drilling rig.

Figure 13 is a fragmentary vertical section through the modified form of drilling rig and taken on the line 13—13 of Figure 11.

Figure 14 is a horizontal section taken on the line 14—14 of Figure 13.

Figures 15, 16, 17, 18 and 19, are diagrammatic views of the preferred form of the drilling rig showing various positions of the drill and the drill-carrying arm.

Figure 20 is a diagrammatic view similar to Figure 18 showing certain degrees of flexibility of the modified form of the drilling rig.

Figure 21 is a top plan of another modified form of the invention.

Figure 22 is a side elevation of the modified form shown in Figure 21.

Referring more particularly to the drawings, the improved portable drilling rig comprises a substantially rectangular carrying frame 30 which is composed of side bars or channel irons 31 having a supporting axle 32 rigidly connected to their rear ends and a front support axle 33 swivelly connected thereto by a suitable king pin or fifth-wheel construction 34. A suitable pulling or connecting handle 35 is attached to the front axle 33, and if it is so desired it may have a hand bar 36 attached thereto or its eye 37 may be utilized for connecting the portable drilling rig to any suitable type of pulling means. The axles 32 and 33 have supporting wheels 38 thereon which of course may be of any suitable type such as those shown, rubber tired or flanged, without departing from the spirit of the present invention.

Midway between the front and rear axles 33 and 32 is a circular plate 39 which is attached in any suitable manner to a supporting frame 30, and it is provided with a central opening 40 through which a sleeve 41 extends. The sleeve 41 rotatably receives the supporting sleeve 42 of the rotatable disc or turn-table 43. The rotatable disc or turn-table 43 has a circular supporting track 44 on its undersurface near its periphery which engages the stationary rigid disc 39 for supporting the rotatable disc 43. The sleeve 41 projects above the stationary disc 39 a distance equal to the width of the track 44 and it forms a supporting track for the rotatable disc or turn-table 43 inwardly towards the axis of the disc from the supporting track 44.

The rotatable disc or turn-table 43 carries a standard 45 which in the preferred form of the invention is shown positioned at one side of the central opening 46 through the sleeve 42.

The standard 45 has a drill-carrying arm 47 adjustably mounted thereon and held in adjusted position by a suitable clamping structure 48 so that the drill-carrying arm 47 may be moved vertically along the standard 45 and it may be swung about the standard in a rotary manner.

A drill-attaching and supporting saddle 49 of approved construction is mounted on the arm 47 for movement longitudinally along the arm and for rotary movement around the arm. The saddle structure 49 comprises suitable clamping means 50 for engagement with the cone 51 of a rock drill of any suitable type as shown at 52. By means of the clamping structure 50 the rock drill may be pivotally swung on an axis intermediate its ends relative to the saddle 49. Thus it will be seen that a multitude of positions of the rock drill 52 is permissible from a single setting or positioning of the portable drilling rig. The arm 47 may be positioned in a multitude of vertical positions along the standard 45, within the limits of the height of the standard, in a multitude of positions about the axis of the standard, while the saddles 49 may be moved or adjusted through a large number of positions along the length of the arm 47 and in a rotary manner about the arm, while the drill itself may be pivotally adjusted through the medium of the saddle 49 and the cone 51 into numerous pivotal positions as desired.

A few of the various positions obtainable for the drill 52 are illustrated in Figures 15 to 19 inclusive, which will give an idea of the flexibility of the drilling rig to meet various demands in different types of drilling.

In Figure 15 the portable drilling rig is shown in a position as may be found in quarry drilling or in any one of a number of conditions where either down-hole or side-wall drilling is desired. In this figure the arm 47 is shown in a horizontal position near the top of the standard 45, with the drill 52 positioned for straight down-drilling through the supporting frame 30, or in other words between the side bars 31 forwardly of the turn-table 43. The dot-and-dash lines 54 indicate a few of the various pivotal adjustments of the drill 52. In dotted lines the arm 47 is shown swung to the rear with the drill 52 drilling downwardly through the central opening 46 in the turn-table structure.

In Figure 16 the drilling rig is shown positioned for snake-hole drilling or for drilling at the side of the carrying frame 30. In this view the standard 45 is swung to the side with the supporting arm 47 lowered to its lower end and extending laterally of the carrying frame 30. The drill 52 is shown as adjusted at an angle to the supporting arm 47 and the dot-and-dash lines 55 show only a few of the many pivotal positions of the drill, that are possible. With the present drilling rig it will be readily apparent from these Figures 15 and 16 as well as from Figures 17 and 18, that holes may be drilled quite close to a vertical or almost vertical wall as for instance with the arm 47 in either of the positions shown in Figures 15 or 16 and the rig moved closer to the substantially vertical wall as shown at A, the saddle 49 may be moved out to the end of the arm 47 and a hole or a series of holes drilled almost flush with the vertical wall A.

Means are provided for holding the rotary disc or turn-table in any one of a plurality of predetermined positions or settings and for securely locking it against accidental rotary movement during drilling operation. This means includes a plurality of circumferentially spaced notches or cut-out portions 56 in the perimeter of the stationary disc 39. The rotary disc 43 has a predetermined number of notches or slots 57 cut therein at spaced points about its periphery. Swinging locking bolts 58 are swingably carried by suitable supports 59 and are swung into registering notches 56 and 57 and are locked therein by suitable locking nuts 60 which tightly clamp against the undersurface of the stationary disc 39. Thus the standard 45 may be swung about the axis of the turn-table structure which comprises the rotary disc 43 and the stationary disc 39, and securely locked in any one of a number of predetermined positions or settings depending upon the number of notches or slots 56 which are provided in the stationary disc 39.

Figures 17 and 18 illustrate diagrammatically various settings of the rotary disc 43 and the standard 45 for different types of drilling. For instance in Figure 17, it is illustrated how it is possible to set the standard 45 and arm 47 to drill a series of holes in straight-away drilling. For instance in drilling of this type, three holes (or any desired number) may be drilled at each setting of the portable drilling rig, as for example, the holes B, C and D may be drilled at one setting of the drilling rig by moving the turn-table to the predetermined positions about its axis, without disturbing the adjustment of the saddle 49 or of the drill carried thereby. Then after these holes have been drilled the drilling rig may be moved along and the holes B', C' and D' may be drilled in the same manner and in the same relative locations to the holes B, C, and D, by merely adjusting or moving the rotary disc 43 so as to bring the standard 45 into the same positions which were employed in drilling the holes of the first set. This will permit of the drilling of a plurality of holes in straight-away drilling operations with a minimum number of operations of setting and without requiring a single resetting or adjustment of the drill, the sadle 49 or the supporting arm 47, the entire operations necessary for positioning the drill to drill the various holes being merely the rotation of the turn-table.

Figure 18 illustrates the adaptability of the drill for drilling a series of holes in a circle or circles. With a single setting of the drilling rig, and a single setting of the saddle 49 and drill 52 thereon as well as of the arm 47 on the standard, any number of holes as indicated at E may be drilled in a circle about the axis of rotation of the rotary disc 43 by merely rotating this disc. Then

by a simple adjustment of the saddle **49** along the arm **47** an inner circle of holes may be drilled as indicated at F, requiring only one setting of the saddle **49** and the simple operation of rotating the rotary disc **43**. This Figure 18 also illustrates how it is possible to drill holes in close to the perimeter of the turn-table structure and between the side bars **31** of the carrying frame **30**. It also shows a hole at G which is drilled through the central opening **46** in the turn-table structure.

Figure 19 illustrates on a larger scale and in side elevation how the drilling rig may be adjusted to permit drilling through the opening **46** in the turn-table structure. This shows the drill **52** turned by means of the saddle **49** inwardly of the standard **45** and by adjustment of the angle of the drill **52** through the medium of the rotary adjustability of the saddle **49**, the angle of the drill hole may be regulated so as to permit cone drilling through the opening **46**.

Stability is given to the turn-table structure by the provision of a lower disc or plate **60'** which is suitably attached, such as by welding to the side bars **31**. The sleeve **41** is rigidly attached, preferably by welding to the disc or plate **60'** and to the stationary disc **39**. A ring **61** is suitably attached, preferably by welding to the sleeve **42** formed on the rotary disc **43**. Ring **61** engages against the undersurface of the plate or disc **60'**.

Figures 11 to 14 inclusive show a modified form of the invention which is similar in many respects to the preferred form, differing therefrom only in that the standard **65** extends through the sleeve **66** which is formed on the rotary disc **67** and consequently the standard rotates on the axis of the rotary disc **67** instead of about or around the axis as in the preferred form. The rotary disc **67** has a supporting track **68** thereon which rides over the upper surface of the stationary disc **69** of the turn-table structure and then also rides upon the upper projecting end of the stationary sleeve **70** which is rigidly attached to the stationary disc **69** and to the stationary disc or plate **71**. The discs or plates **69** and **71** are attached rigidly to the side bars **72** of the supporting or carrying structure **73**. The supporting or carrying structure **73** is just the same as that of the preferred structure. A ring **74** is welded or otherwise suitably attached to the lower end of the standard **65** and engages against the under surface of the stationary plate or disc **71** while a collar **75** is preferably formed on the standard **65** and engages against the upper surface of the rotary disc **67**.

The rotary disc **67** is held in adjusted positions by locking means **76** which is the same as the locking bolt structures shown in the preferred form of the invention.

A drill-supporting arm **77** is adjustably carried by the standard **65** for adjustment vertically along the standard **65** and in swinging rotary movement about the standard. A saddle **78** which is the same as the saddle **49**, is carried by the supporting arm **77**. Practically all of the adjustments possible with the preferred form of the invention are possible with this modified form of the invention, except that no drilling through the turn-table structure is permitted with this modified form of the invention.

If it is so desired, the rotary disc **43** may be placed beneath the stationary disc **39**, or even beneath the carrying frame **73**, co-operating with the stationary disc **60**, without departing from the spirit of the present invention.

Figures 21 and 22 illustrate a still further modified construction of the improved portable drilling rig. This latter modified construction embodies primarily changes in the supporting or carrying frame structure proper and illustrates a plurality of standards carried by the turn-table structure so as to permit the drilling of a plurality of holes at the same time and with one setting of the portable drilling rig.

As clearly shown in Figure 21 of the drawings, the supporting frame **80** is similar in construction to the supporting frames of the other forms of the invention comprising the side rails **81** which carry a rear axle **82** upon which are mounted wheels **83**. The front end of the frame **80** tapers towards its longitudinal center, and differs from the frames of the previously described forms of the invention in that it does not have a front axle but merely has a single wheel **84** swivelly connected thereto in the usual manner of swivel connections, such as by the fork **85** and pivot pin **86**.

A turn-table structure **88** is rotatably carried by the frame **80** and operates in exactly the same manner as the turn-table structures of the previously described forms of the invention, being held locked in adjusted positions by the locking mechanism **89**, which is the same construction as the locking mechanism shown in Figures 9 and 10 of the drawings. While in all of the forms illustrated the template or stationary disc **39** which is provided with the circumferentially spaced notches or slots **56**, is shown positioned above the carrying frame, it is to be understood that in any of those forms or in the form illustrated in Figures 21 and 22, these notched discs may, without departing from the spirit of the present invention, be placed beneath the carrying frame or they may be spaced above the upper discs **43**, et cetera.

The turn-table structure **88** has a plurality of standards **90** carried thereby which may be located at any suitable point radially from the axis of rotation of the turn-table structure, but preferably they are diametrically opposed so as to avoid unnecessary congestion and permit maximum adjustments of the tool-carrying bars **91** which are carried thereby. The tool-carrying bars **91** are mounted for vertical adjustment along and rotary movement about the standards **90** through the medium of the clamp structures **92**. Rock drills or other analogous tools are supported and carried by the tool-carrying arms **91** through the medium of the saddle brackets **93**. These saddle brackets **93** are of approved construction and are illustrated more in detail in Figure 2*a*. They will permit movement of a tool carried thereby longitudinally along the arms **91**, in rotary movement about the arms, and in pivotal movement relative to the arms, thereby permitting practically any desired positioning of a tool carried by the portable drilling rig.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In a portable drilling rig, a supporting frame, a turn-table disc rotatably carried by said supporting frame and provided with a central opening therethrough, and drill-carrying means carried by said disc and arranged whereby a drill thereon may be positioned to operate through the opening in the turn-table disc.

2. In a portable drilling rig, a supporting frame, drill-carrying means adjustably carried by said

frame for rotary movement on an axis perpendicular to the plane of the carrying frame, drill-supporting means adjustably carried by said drill-carrying means and constructed and arranged whereby a drill supported thereby may be positioned to drill holes within or exteriorly of the space encompassed by said carrying frame.

3. In a portable drilling rig, an open supporting frame, wheels on said supporting frame, a turntable disc rotatably carried by said supporting frame for rotary movement about a vertical axis, a vertical standard carried by said disc, a horizontal drill carrying arm carried by said standard for vertical and rotary movement relative to the standard, a drilling machine carried by said horizontal arm for movement along the arm and rotary movement about the arm, whereby the drilling machine may be adjusted to drill within or without the boundaries of said supporting frame, said turntable disc having an axial opening therethrough, said drilling machine adjustable whereby it may be positioned to drill through said opening.

4. In a portable drilling rig, an open supporting frame, wheels on said supporting frame, a turntable disc rotatably carried by said supporting frame for rotary movement about a vertical axis, a vertical standard carried by said disc, a drilling machine, and means connecting said drilling machine to said vertical standard whereby the drilling machine may be adjusted to drill within or without the boundaries of said supporting frame in or at various angles transversally of the axis of the standard, said turntable disc having an axial opening therethrough, said drilling machine being adjustable for positioning to drill through said opening.

5. In a portable drilling rig, an open supporting frame, wheels on said supporting frame, a turntable disc rotatably carried by said supporting frame for rotary movement about a vertical axis, a vertical standard carried by said disc, a drilling machine, and means connecting said drilling machine to said vertical standard whereby the drilling machine may be adjusted to drill within or without the boundaries of said supporting frame in or at various angles transversally of the axis of the standard, said turntable disc being provided with an opening therethrough, said means being adjustable whereby the drilling machine may be positioned to drill through the opening in said turntable.

6. In a portable drilling rig, a supporting frame, wheels on said supporting frame, a turntable disc rotatably carried by said supporting frame for rotary movement about a vertical axis, a vertical standard rigidly carried by said disc, a drilling machine, means for supporting said drilling machine from said vertical standard whereby the drilling machine may be adjusted at various vertical positions along the length of the standard, and rotatably adjusted at any angle within 180° of the axis of the vertical standard and horizontally at various positions toward or away from the axis of the standard, said turntable being provided with an opening therethrough, said means being arranged whereby the drilling machine may be adjusted to drill through the opening in said turntable.

7. In a portable drilling rig, a supporting frame, wheels on said supporting frame, a turntable disc rotatably carried by said supporting frame for rotary movement about a vertical axis, a vertical standard rigidly carried by said disc, a drilling machine, means for supporting said drilling machine from said vertical standard whereby the drilling machine may be adjusted at various vertical positions along the length of the standard, and rotatably adjusted at any angle within 180° of the axis of the vertical standard and horizontally at various positions toward or away from the axis of the standard, said turntable being provided with an opening therethrough, said means being arranged whereby the drilling machine may be adjusted to drill through the opening in said turntable.

8. In a portable drilling machine, a carrying frame, a stationary plate carried by said carrying frame, a rotary turntable disc carried by said frame, a standard carried by said rotary disc, drill-supporting means carried by said standard for vertical and rotary movement relative thereto, means associated with said rotary disc and said stationary plate for locking the rotary disc in adjusted positions, said rotary disc provided with an opening therethrough, said drill-supporting means constructed and arranged whereby a drill carried thereby may be positioned to operate through the opening in the rotary disc, or at various positions and at various angles to the vertical, exteriorly of the circumference of the disc.

CHARLES A. HIRSCHBERG.