United States Patent

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[33] **Great Britain**
[31] **26007/68**

[54] **MOBILE ROCK DRILL RIG**
10 Claims, 8 Drawing Figs.

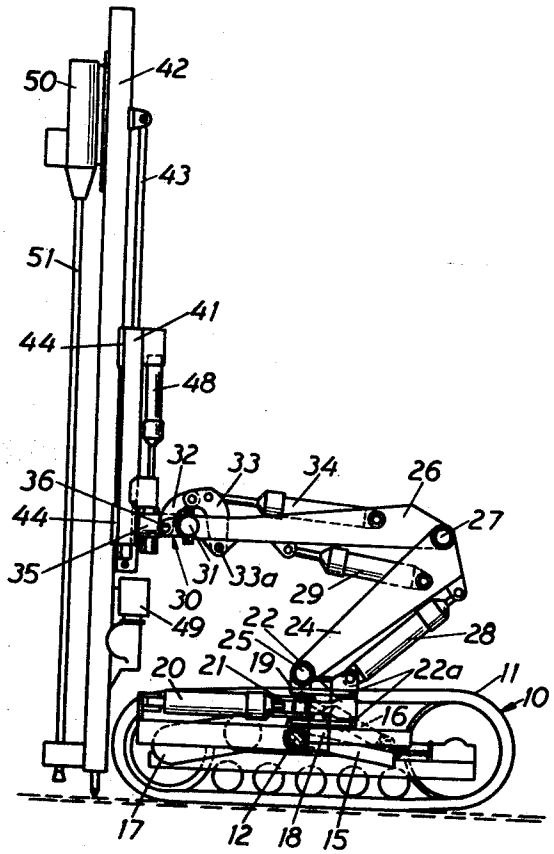
[52] **U.S. Cl.** **173/28,** 173/43
[51] **Int. Cl.** **E21c 11/02**
[50] **Field of Search** 173/22, 23, 27, 28, 38, 43

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ABSTRACT: A drill rig is provided which comprises a foldable two-part boom structure mounted with one end at a mobile chassis for lateral and vertical swinging thereon. A feed bar for a rock drill is mounted at the outer end of the boom structure for universally pivoting thereon.



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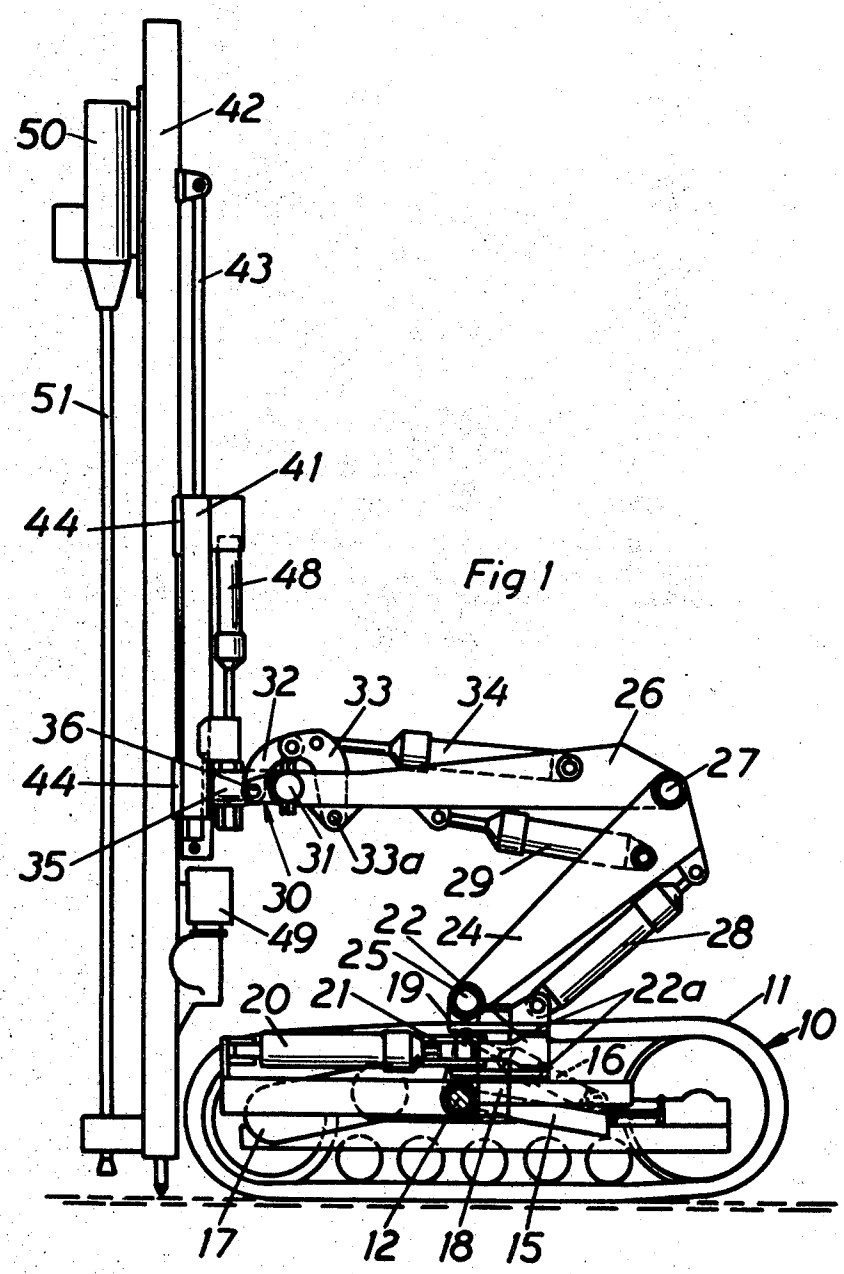


Fig 1

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Fig 3

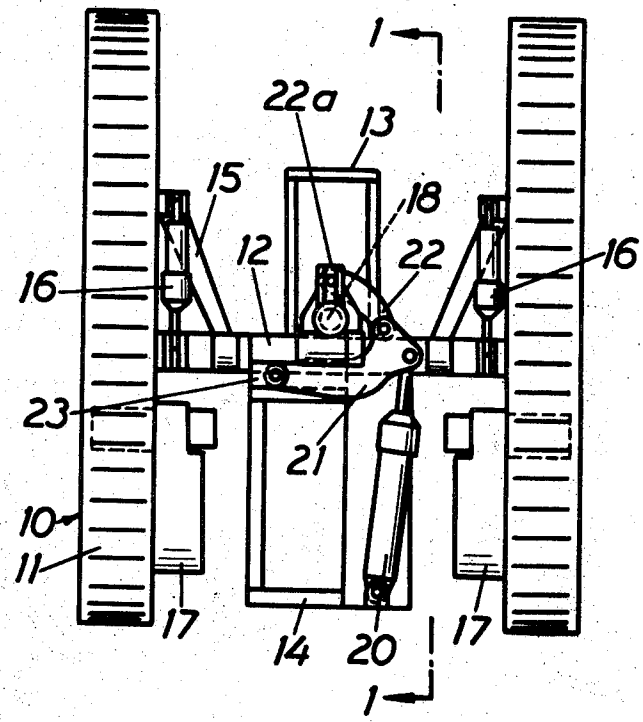


Fig 2

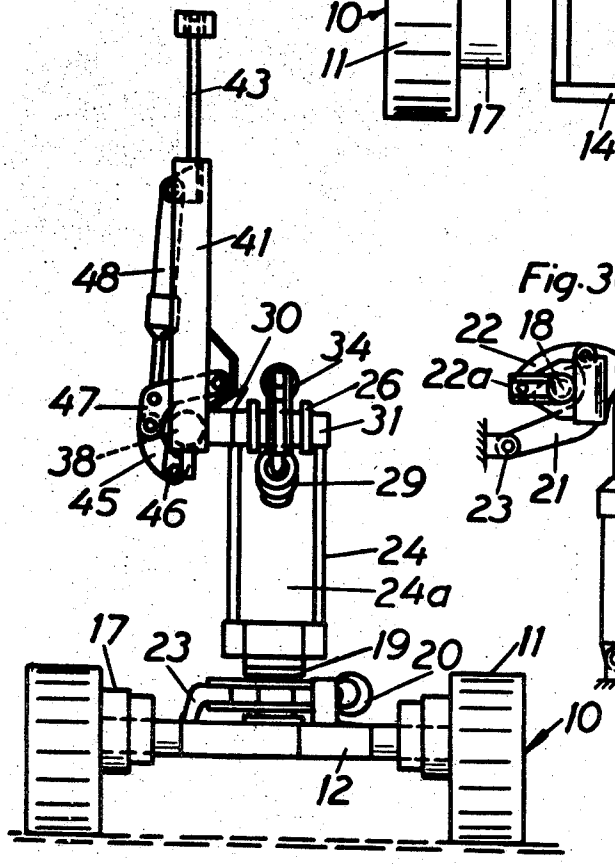
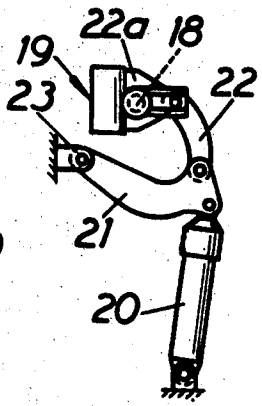


Fig.3a

Fig.3b



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Fig 4

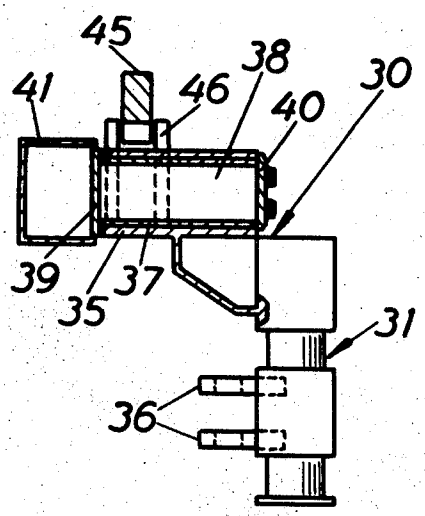


Fig 5

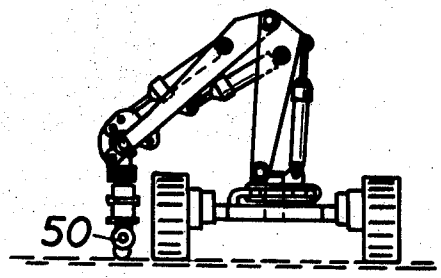


Fig 6

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MOBILE ROCK DRILL RIG

This invention relates to mobile rock drill rigs which have power means for moving a drill into various operating positions. A general object of the invention is to provide a mobile drill rig of the character described which permits adjusting of the drill within an unusually wide range of horizontal, vertical and intermediate drilling positions. A more particular object of the invention is to provide a mobile drill rig which permits drilling of downward and upward directed parallel holes in front of and on either side of its mobile base. Another object of the invention is to provide a mobile drill rig which permits drilling of parallel forward directed holes on either side of its mobile base.

The above and other purposes are obvious from the following description and drawings in which an embodiment of the invention is illustrated by way of example.

In the drawings:

FIG. 1 is a side view in partly section on line 1–1 in FIG. 3 of a drill rig according to the invention;

FIG. 2 is a front end view of the drill rig in FIG. 1 with a rock drill, a supporting frame and a feed bar removed;

FIG. 3 is a top view of the drill rig of FIGS. 1—2 with also a boom structure removed;

FIG. 3*a* and 3*b* shows a turn mechanism illustrated in FIG. 3 in two alternative positions.

FIG. 4 shows on a larger scale connecting parts between an outer boom and a feed bar of the drill rig of FIGS. 1—3; and

FIGS. 5—6 show the drill rig of FIGS. 1—3 in various drilling positions.

The drill rig in the figures includes two frames **10** provided with endless trackways **11**. A transverse axle **12** spanning the space between the frames **10** is journaled to each frame by the end parts of the axle which thus can be considered as aligned trunnions. The axle and two platforms **13**, **14** form a rigid chassis which is stabilized by two struts **15** at one end rigidly secured to one of the track frames **10** and at the other end journaled on the axle **12**. On the chassis there are mounted auxiliary equipments (not shown) such as a hydraulic oil pump usually driven by a pneumatic motor, an oil tank, a water trap for the air supply line etc.

The chassis including the axle **12** is thus free to swing relative to each of the frames **10** and a stabilizing double-acting hydraulic cylinder **16** is mounted at each side to adjustably connect the axle **12** and the respective trackway frame. A valve unit (not shown) may interconnect corresponding ends of the two cylinders **16** by suitable conduits in a known manner thereby permitting oscillation of one track assembly relative to the other and relative to the chassis **12**, **13**, **14**. The trackways are independently driven by air motors and gear boxes **17** suspended on each track frame.

A first head **19** is journaled on an upright pivot shaft **18** is fixed to the chassis and may be rotated by means of a double-acting hydraulic cylinder **20** and a link mechanism **21**, **22**. The cylinder **20** is pivotally secured to the chassis and to a curved link **21**, which at one end is pivotally journaled to a lug **23** on the chassis and at the other end is pivotally connected to another curved link **22**. This link **22** is pivotally connected to a pair of lugs **22** a on the head **19**. FIG. 3*a* and 3*b* shows the link system **21**, **22** when it has turned the head **19** 90° from its middle position shown in FIG. **3**.

A first or inner boom **24** is pivotally mounted at the head **19** on a pivot **25** which is perpendicular to the pivot shaft **18**, and a second or outer boom **26** is pivotally mounted on a pivot **27** at the outer end of the inner boom **24**. The inner boom **24** of the boom structure **24**, **26** is actuated by means of a double-acting hydraulic cylinder **28** pivotally mounted between the boom and the head **19** and the outer boom is actuated by means of a double-acting hydraulic cylinder **29** pivotally mounted between the outer boom **26** and the inner boom **24**. In FIG. **2**, the cylinder **29** is not illustrated due to the fact that the inner boom **24** is provided with a backplate **24***a*. At its free end, the outer boom **26** supports a second head **30** which is swingable on a pivot **31** which is a part of the head **30**, by means of a double-acting hydraulic cylinder **34** and a link

mechanism comprising links **32**, **33**. The link **33** is pivotally secured to the outer boom **26** at **33***a* and the link **32** to lugs **36** on the pivot **31** and to the link **33**. A double-acting cylinder **34** is pivotally connected between the boom **26** and the link **33**. This link system **32**, **33** permits 180° rotation of the head relative to the outer boom **26** as is shown in FIG. **6**.

The head **30** (FIG. **4**) also comprises a sleeve **35** which is perpendicular to and fixedly united with the pivot **31**. Inside the sleeve **35** are two bushings **37** in which a pivot or stub shaft **38** carrying a rectangular plate **39** is journaled. The shaft **38** is secured against axial movement by the plate **39** and by an end cover **40** clamped to the shaft by bolts. The plate **39** is united with a supporting frame **41** on which a feed bar **42**, guided by guide members **44**, is supported and longitudinally slidable. A link mechanism of the character described is also used for rotating the stub shaft **38** and thus the feed bar **42** through an angle of 180°. This mechanism comprises a link **45** which is pivotally connected to a link **47**. The link system is actuated by a double-acting hydraulic cylinder **48** pivotally connected between the supporting frame **41** and the link **47**. The axial movement of the feed bar is produced by a double-acting hydraulic cylinder which is mounted inside the supporting frame **41** and has a reciprocable piston rod **43** connected to the feed bar **42**. Reference numeral **49** indicates a drill feed motor **45** which over a chain or other flexible member (not shown) serves to feed a drill **50**, e.g. a hammer drill, with a drill steel **51** towards a rock surface. The drill **50** is guided for longitudinal movement on the feed bar **42**. The drill **50**, the feed bar **42**, the feed motor **49** and the supporting frame **41** are not illustrated in details since they may be carried out in any conventional manner well known to those familiar with the art.

The axis of the upright pivot shaft **18** can be considered as a first axis of turning and the axes of the pivots **25**, **27**, **31** and the stub shaft **38** respectively as second, third, fourth and fifth axis of turning. As illustrated, the pivots **25**, **27** and **31** are parallel with each other and perpendicular to the pivot shaft **18** and the stub shaft **38**. This geometrical configuration together with the use of wide-angle turn mechanisms for the heads **19**, **30** and the frame **41** makes it possible to adjust the drill through a wide range of operating positions. FIG. **5** shows a position for drilling parallel forward directed bottom holes and in FIG. **6** other drill positions are illustrated.

The drill rig above described and illustrated in the drawings should only be considered as an example and may be modified in several different ways within the scope of the following claims.

We claim:

1. A mobile rock drill rig comprising a pair of laterally spaced elongated frames each having an endless ground engaging trackway thereon, a chassis suspended between said frames, a head means mounted at said chassis for pivoting about an upright first axis, power actuated turning means for turning said head means about said upright first axis, first boom means mounted with one end at the head means for power actuated pivoting thereon about a second axis perpendicular to said upright first axis, second boom means carried by the outer end of said first boom means for power actuated pivoting thereon about a third axis parallel with said second axis, and a feed bar for feeding and supporting a rock drill mounted at the outer end of said second boom means for power actuated pivoting about each of two fourth and fifth axes, said fourth and fifth axes being perpendicular to each other and one of which being parallel with said second axis.

2. A drill rig according to claim 1 in which said head means is turnable about said upright axis through an angle of at least substantially 180° by the action of said power-actuated turning means.

3. A drill rig according to claim 2 in which said head means is mounted on an upright pivot shaft, the longitudinal axis of which providing said upright first axis, said turning means for turning the head means comprising a first link pivotally connected to the chassis, a second link pivotally connected

between said first link and the head means and a double-acting fluid cylinder pivotally connected between the chassis and said first link.

4. A drill rig according to claim 2 in which power-actuated turning means are arranged for swinging the feed bar about each of said fourth and fifth axes through angles of at least substantially 180°.

5. A drill rig according to claim 4 in which the feed bar is pivotally mounted at a second head means for pivoting thereon about said fifth axis, said second head means being mounted at the outer end of the second boom means for pivoting about said fourth axis which is parallel with said second axis.

6. A drill rig according to claim 5 in which a power-actuated turning means is provided for pivoting said second head means about said fourth axis, said turning means comprising a first link pivotally connected to the second boom means, a second link pivotally connected between the first link and said second head means, and a double-acting fluid cylinder pivotally connected between the first link and the outer boom means.

7. A drill rig according to claim 6 in which a supporting frame is disposed between the feed bar and said second head member, the feed bar being axially slidably carried by said supporting frame and the supporting frame being pivotally mounted at the head member for swinging thereon by the action of a turning means which comprises a first link pivotally connected to the supporting frame, a second link connected between said first link and the second head portion and a double-acting fluid cylinder pivotally connected between the first link and the supporting frame.

8. A drill rig according to claim 1 in which the feed bar and the head member are pivoted by means of link mechanisms each of which being actuated by a fluid cylinder.

9. A drill rig according to claim 1 in which the chassis is journaled to each said trackway frame by means of aligned trunnion means, a double-acting fluid cylinder being pivotally connected between each of said trackway frames and the chassis.

10. A mobile rock drill rig comprising a pair of laterally spaced elongated frames each having an endless ground engaging trackway thereon, a chassis forming member suspended between said frames, an upright pivot shaft on said chassis forming member, a first head means journaled on said upright pivot shaft, a power-actuated foldable two-part boom structure pivotably mounted at the head means, a second head means pivotally mounted at the outer end of said boom structure, a feeding and supporting means for a rock drill pivotally mounted at said second head means, and a power-actuated turning means for adjusting said first head means into various positions between a position in which said boom structure is substantially perpendicular to the longitudinal axes of the trackway frames and projecting past one of the frames and a position in which the boom structure is substantially perpendicular to the longitudinal axes of the frames and projecting past the other of the frames, said feeding and supporting means being swingable on said second head means through an angle of at least substantially 180° in planes substantially perpendicular to a central plane through the boom structure.