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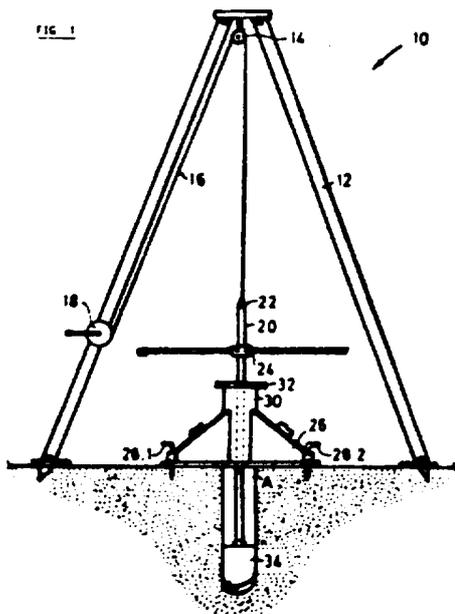
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(54) Title: BOREHOLE DRILLING RIG AND METHOD FOR PRODUCING WATER

(57) Abstract:

A hand operated borehole drilling rig and method for producing water more particularly adapted for use in rural areas to supply safe drinking water.

The rig in its basic form as illustrated in the attached drawing, comprises a sheer legs structure, a novel drilling guide platform and ancilliary equipment in the form of drill bits and shanks to enable a three man crew to operate the rig successfully.



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(56) References cited: US A 3679008; US A 622365; US A 2830790; US A 607229 amended specification

'BOREHOLE DRILLING RIG AND METHOD FOR PRODUCING WATER'

This invention relates to drilling rigs and to a method for sinking a well or borehole for producing water using the rig of the invention.

Traditionally, well or borehole sinking has involved, at its simplest, digging in one form or another using for example hand held tools such as picks and shovels. To speed the process, machinery was developed which generally followed the principle of digging in the first instance but as the machinery became more sophisticated two distinct methods finally emerged.

The first of those and still the most commonly used is percussion drilling while more recently, rotary drilling has become more popular, particularly the so called 'air drill' since apparatus of this kind can sink a borehole in a matter of hours, unlike the percussion method which can sometimes take several days. Unfortunately, the introduction of the rotary air drill has received a somewhat mixed reception in the industry as it seem to have inherent problems, more specifically with soil compaction as the hole proceeds which results in closure of the fissures which would otherwise allow water to drain into the borehole.



All modern rigs and methods of sinking boreholes known to the inventor require fuel driven or electric motors and are relatively elaborate therefore costly to purchase, operate and maintain.

In the context of a labour rich, fuel starved, generally rural economy, existing rigs and methods have been placed at a growing disadvantage so that more apt methods and apparatus are being sought. The inventor believes that he has devised a method and appropriate rig which will minimise present disadvantages and will lend itself to make use of the favourable factors inherent in many developing countries of the world.

According to the invention a method of sinking a well or borehole to produce water includes the steps of choosing a suitable site; locating in the substantially horizontal plane a drilling guide platform; erecting over the platform a sheer legs or like structure carrying at least one pulley in its apex zone; suspending upon a cable passing over the pulley, a first drilling tool; lowering the drilling tool through a substantially vertically disposed bore in the guide platform until contact is made with the zone to be drilled; releasably clamping a shank associated with the drilling tool in a vice like member; rotating the vice like member whilst applying simultaneous downwardly directed pressure; unclamping the member and raising the drilling tool by means of the cable and removing detritus from the drilling tool and thereafter repeating sequentially the above defined drilling operation until a hole of desired depth has been sunk.



Further according to the invention additional shanks may be joined to the first shank and to each other in sequence as the drilling chain lengthens as a result of the drilling tool advancing in depth.

Also according to the invention the first drilling tool may be substituted by one of any number of alternative drilling tools to suit varying soil types as encountered. Percussion drilling may replace rotary drilling in rock formation or a combination of rotation with percussion may be used.

In order to use a percussion technique, a simple mechanism, preferably associated with a hand driven flywheel, may be employed.

In one form of the invention a drilling rig for use in the method of the invention includes a drilling guide platform adapted to be located over a suitable site and anchored in the substantially horizontal plane; a sheer legs or like structure carrying at least one pulley in its apex zone; at least one cable passing over the pulley and adapted to suspend a first drilling tool which is adapted to pass through a substantially vertically disposed bore located in the guide platform and to contact a zone to be drilled; a vice like clamping member adapted to clamp a first shank associated with the drilling tool and further adapted for downwardly directed force to be applied to the vice member during drilling penetration and further to rest upon an upper surface of the drilling guide platform when a second length of shank is being locked into the preceding length so as to restrain loss of the drill chain down the hole during changes to the chain length.

Further according to the invention, the vice like clamping member preferably includes at least one elongated handle by which to exert both rotational and downwardly directed force to the shank and thereby to the drilling tool during the drilling operation.

In order to facilitate further understanding of the invention, the preferred apparatus and method of the invention will now be described in greater detail with reference to the accompanying drawings, in which, figure 1 represents a schematic side elevation; figure 2 is a plan elevation of a drilling guide platform; and figure 3 is a side elevation of the drilling guide platform as seen in figure 2.

Referring firstly to figure 1, reference numeral 10 indicates generally a drilling rig in accordance with the present invention. The sheer leg structure 12 includes a pulley 14 centrally disposed in the apex region of the sheer legs. Over the pulley 14 is suspended a cable 16 which is at one end wound onto the drum of a winch 18, the winch being conveniently attached to one of the limbs of the sheer legs 12. The opposite end of the cable 16 is coupled to a shank 20 by means of a swivel 22.

In order to impart rotary motion to the shank 20, a clamp 24 which includes elongated handles is attached as shown. A drilling guide platform 26 is securely anchored to the ground by means of pegs 28.1 and 28.2 (only 2 shown). The guide platform 26 includes a vertical bore 30 and a removable bearing assembly 32, being so adapted that a drilling tool 34 (which is coupled to shank 20) may pass snugly through the bore 30 so as to contact the ground in the drilling zone 'A'.



To maintain a vertical alignment as the hole deepens, the split shell bearing assembly 32 is securely located atop the guide platform 26 so as to provide a bearing surface for the shank 20 and for any additional shanks (not shown) introduced into the drilling chain as the hole deepens.

Referring now to figures 2 and 3, the guide platform 26 can be seen in greater detail. In figure 2, the arrangement of the split shell bearing 32 can be more clearly seen. The bearing 32 is securely located by means of locating pins 36 and includes an aperture 37, through which the shanks 20 (see figure 1) pass.

The guide platform 26 is securely anchored to the ground by means of pegs 28 generally and preferably in four locations as seen in figure 2. The platform 26 includes handles 38 to facilitate both initial location and subsequent removal of the platform 26. Optional tool attachment points 40 may be provided wherever desired.

Using the example of a borehole, the preferred method of using the drilling rig 10 is as follows. A suitable site is chosen at which is located the drilling guide platform 26, taking reasonable care to ensure substantially horizontal alignment. Platform 26 is then securely anchored to the ground by means of pegs 28 generally.

Over the platform 26 is erected a sheer legs 12 such that the apex region is substantially vertically over the drilling platform 26. The cable 16 is then drawn out from the winch 18 and passed over the pulley 14 and attached to a first shank 20 via swivel 22. The shank 20 is made fast at its opposite end with drilling tool 34 and the whole assembly is lowered through the bore 30 in the drilling guide 26 until the tool 34 contacts the ground in the drilling zone 'A'.

In order to commence drilling, the clamp 24 is releasably attached to shank 20, the split bearing shells 32 are placed in position and drilling commences with rotation and simultaneous downward pressure being applied to the handles of the clamp 24 which in turn imparts like motion to the drilling tool 34 via the shank 20. As the drilling tool 34 cuts into the ground, earth and rock (if present), forms a detritus which is retained in a chamber associated with the drilling tool 34. Once the drilling tool is filled with detritus, extraction for cleaning becomes necessary.

At this stage, the bearing shells 32 are removed, the clamp 24 is loosened but not removed and the drilling chain is extracted using the winch 18 and cable 16 until it clears the drilling platform 26. The detritus is then removed from the drilling tool 34, which is then re-inserted through the guide platform 26, whereupon using the procedure detailed above, drilling is recommenced.

As the hole deepens, it will become necessary to add additional shanks 20 to the drilling chain. In order to achieve this, the shank 20 already in use is securely clamped using clamp 24, which is then allowed to rest upon the upper surface of the guide platform 26. The cable 16 is then uncoupled from the shank 20 which is now held securely in position by the clamp 24. The cable 16 is coupled to an additional shank which is hoisted using the winch 18 and brought into contact with the first shank 20 to which it is made fast. In this way, any number of shanks may be introduced into the drilling chain. It will be further apparent that raising the drilling tool 34 for cleaning purposes will require a reversal of the procedure described above.

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Should rock or different soil types be encountered, the drilling tool 34 may be substituted for any number of alternatives as required. The majority of such drilling tools will be common to the art.

Once a suitable depth has been reached, the drilling chain is extracted. The sheer legs 12 and the drilling platform 26 are also removed. The bore of the borehole may now be cased using any desired casing such as for example steel or rigid P.V.C. plastics, whereafter, installation of the desired pump may be commissioned.

Should rock formations be encountered which cannot be penetrated by rotary motion, the rig 10 may simply be adapted to a percussion mode of drilling (not illustrated) in the following manner. The cable 16 is removed from winch 18 and attached to a remotely located apparatus comprising in its simplest form, a hand operated flywheel and cam, such that rotary motion of the flywheel is converted to reciprocating by the action of the cam. A suitably adapted tool 34 will have to be used in place of the tools normally used during rotary drilling.

It will be readily apparent that the rig 10 as illustrated and herein described may be easily mechanised. It is felt that numerous advantages, uses and embodiments of the invention, will be readily apparent to those persons skilled in this field of art.



CLAIMS

Claim 1. A method of sinking a well or borehole to produce water which includes the steps of choosing a suitable site; locating in the substantially horizontal plane a drilling guide platform; erecting over the platform a sheer legs or like structure carrying a least one pulley in its apex zone; suspending upon a cable passing over the pulley, a first drilling tool; lowering the tool through a substantially vertically disposed bore in the guide platform until contact is made with the zone to be drilled; releasably clamping a shank associated with the drilling tool in a vice like member; rotating the vice like member whilst applying simultaneous downwardly directed pressure; unclamping the vice member and raising the drilling tool by means of the cable and removing detritus from the drilling tool and thereafter repeating sequentially the above defined drilling operation until a hole of desired depth has been sunk.

Claim 2. A method of sinking a well or borehole as claimed in Claim 1 wherein additional shanks may be joined to the first shank and to each other in sequence as the drilling chain lengthens as a result of the drilling tool advancing in depth.

Claim 3. A method of sinking a well or borehole as claimed in Claims 1 and 2 wherein the first drilling tool may be substituted by one of any number of alternative drilling tools to suit varying soil types as encountered.

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- Claim 4. A method of sinking a well or borehole to produce water as claimed in any one of Claims 1 through 3 in which the drilling operation is performed using entirely manual labour.
- Claim 5. Apparatus adapted for use with the method claimed in Claims 1 through 4 including a drilling guide platform adapted to be located over a suitable site and anchored in a substantially horizontal plane; a sheer legs or like structure carrying at least one pulley in its apex zone; at least one cable passing over the pulley and adapted to suspend a first drilling tool which is adapted to pass through a substantially vertically disposed bore located in the guide platform and to contact the zone to be drilled; a vice like clamping member adapted to clamp a first shank associated with the drilling tool and adapted for downwardly directed force to be applied to the clamp member during drill penetration and to rest upon an upper surface of the drilling guide platform when a second length of shank is being locked to the preceding length so as to restrain loss of the drilling chain down the hole during changes to the chain length.
- Claim 6. Apparatus adapted for use with the method claimed in 5 wherein the means of operation is entirely manual labour.

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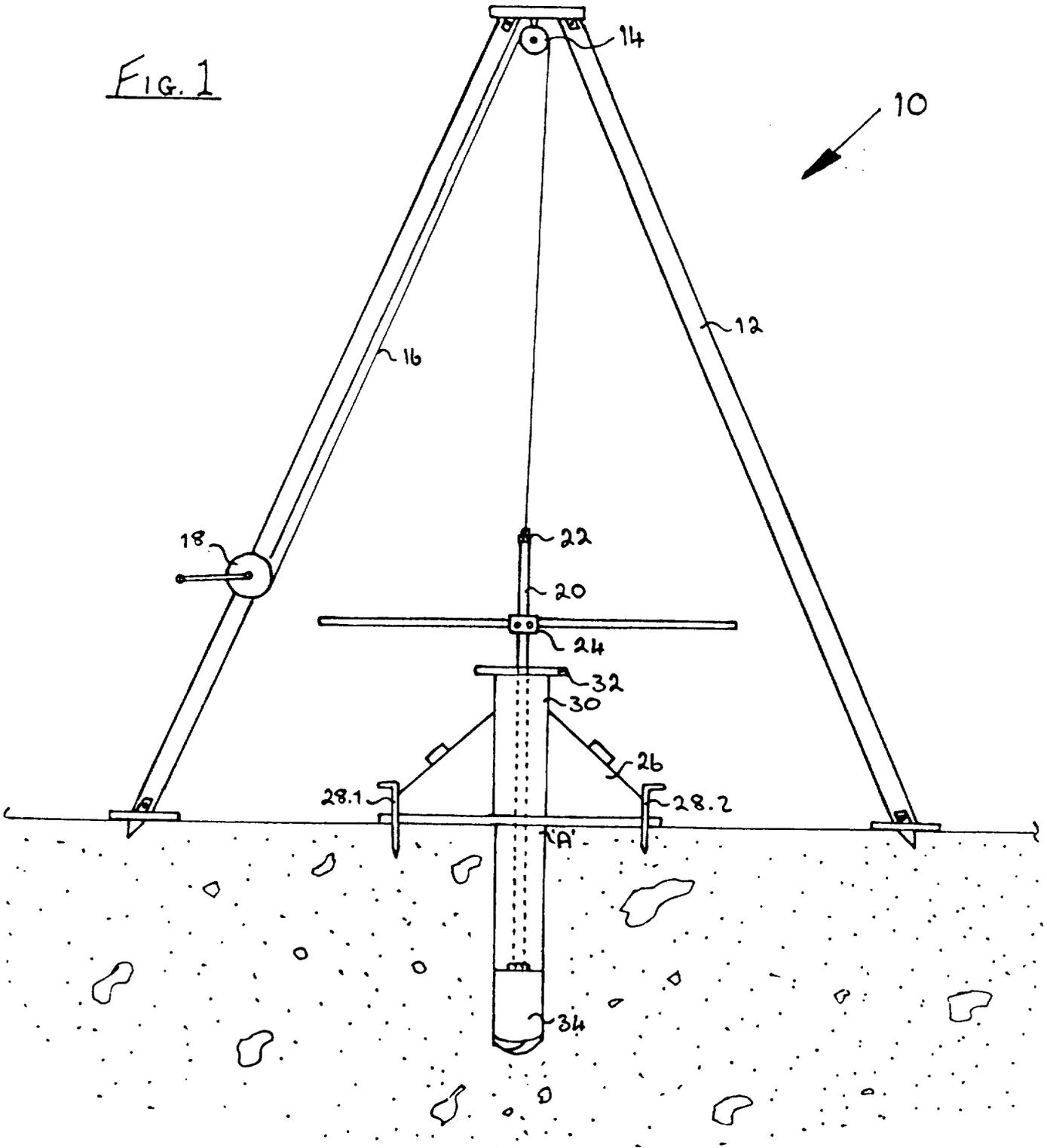
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PATENT AGENT FOR THE APPLICANT

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FIG. 1



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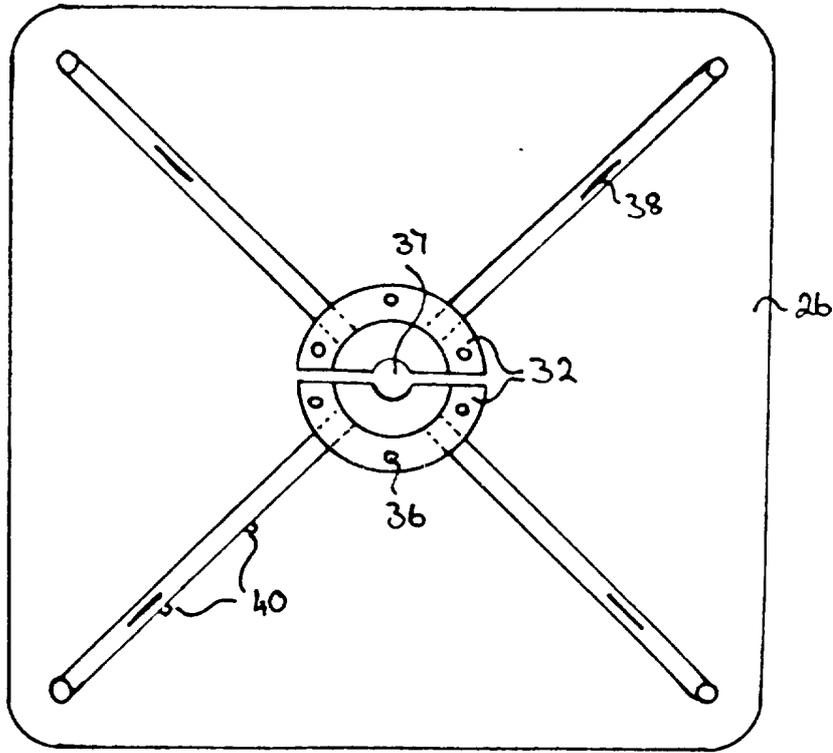


FIG. 2

FIG. 3

