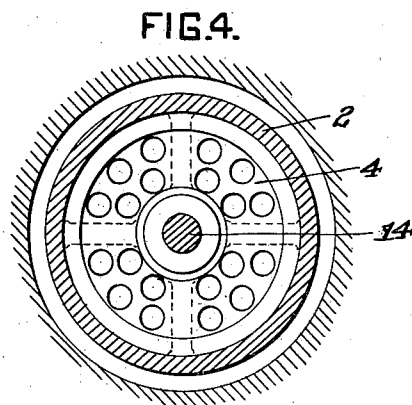
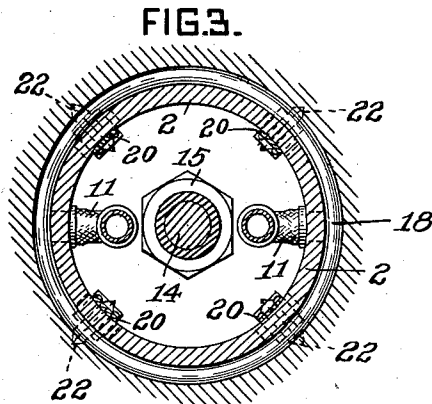
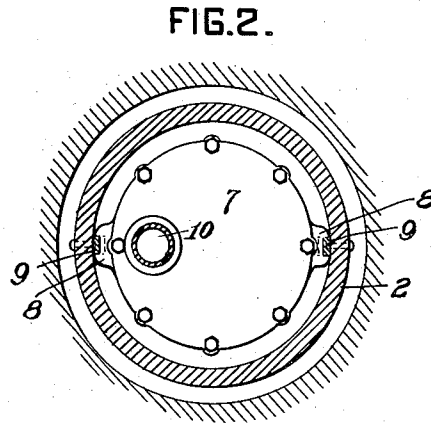
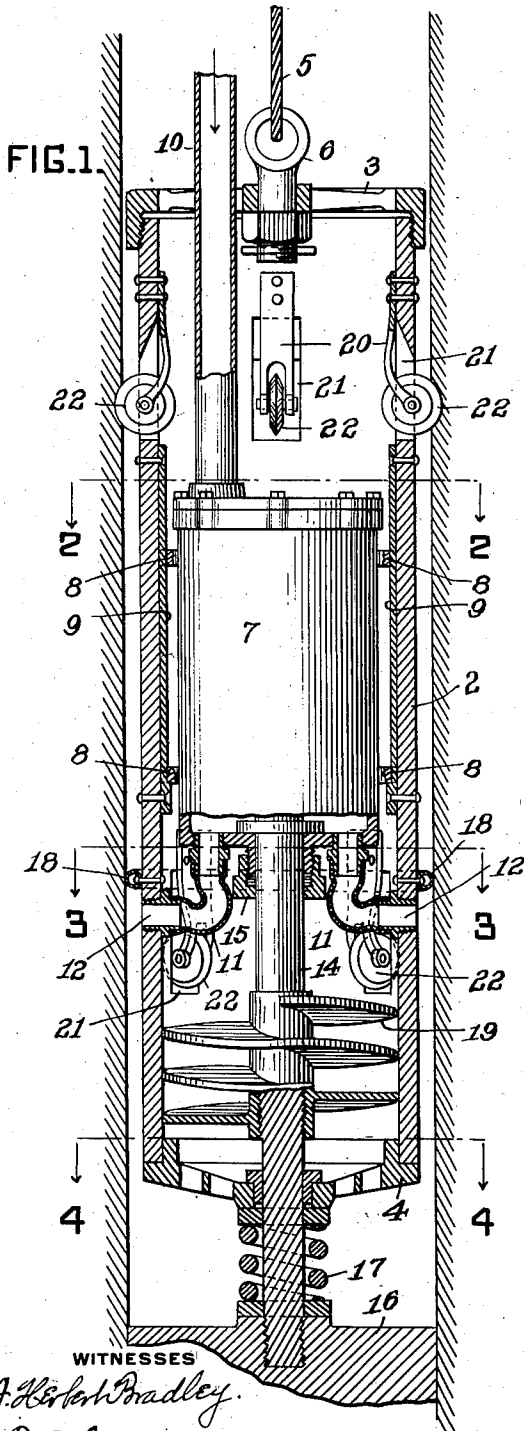


J. & M. M. MAHER & T. TERRY.
WELL DRILLING APPARATUS.
APPLICATION FILED JAN. 6, 1913.

1,072,964.

Patented Sept. 9, 1913.



WITNESSES
J. Herbert Bradley.
D. E. Gaither.

INVENTORS
James Maher
M. M. Maher,
Thomas Terry
By J. H. Bradley

UNITED STATES PATENT OFFICE.

JAMES MAHER, MICHAEL M. MAHER, AND THOMAS TERRY, OF EAST LIVERPOOL, OHIO.

WELL-DRILLING APPARATUS.

1,072,964.

Specification of Letters Patent.

Patented Sept. 9, 1913.

Application filed January 6, 1913. Serial No. 746,409.

To all whom it may concern:

Be it known that we, JAMES MAHER, MICHAEL M. MAHER, and THOMAS TERRY, residents of East Liverpool, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Well-Drilling Apparatus, of which the following is a specification.

The primary object of this invention is to provide novel and efficient means for actuating drilling and other tools employed in sinking deep wells.

The invention as here embodied includes a motor that is lowered progressively in the hole as the drilling proceeds and which acts directly on the tool driving spindle, the motor being thus maintained in close relation to the work and rendering unnecessary the cumbersome motive apparatus and motion transmitting devices now usually employed in deep well work.

An important feature of the invention is the provision of means whereby the fluid discharged from the motor is utilized for softening the material being drilled and for washing the drillings away from the tool; also means for inducing an upward flow of the spent fluid which serves as a carrier for the drillings.

In the accompanying drawings, Figure 1 is a vertical section of the improved apparatus. Figs. 2, 3 and 4 are sectional plan views on lines 2-2, 3-3, and 4-4, respectively, of Fig. 1.

Referring to the drawings, 2 designates a casing carrying at its upper end the open cap 3 and at its lower end the screen-like head 4. The casing is suspended on cable 5 which is connected to ring 6 secured to cap 3. Within and spaced from casing 2 is the motor cylinder or casing 7, carrying laterally projecting lugs 8 which embrace vertical guides 9 secured to casing 2, whereby the motor may move vertically but is prevented from rotating. Connected to the upper end of cylinder 7 is the motive fluid inlet pipe 10, and extending from the bottom of the cylinder are the flexible fluid outlets 11 which connect with lateral openings 12 in casing 2.

Cylinder or casing 7 may contain a motor of any suitable type for imparting rotary motion to shaft or spindle 14 extending therefrom through stuffing box 15 and downwardly through head bottom 4 where it is adapted to connect with tool 16. A spring

17 interposed between the tool and head 4 permits of an upward yielding movement when the tool encounters hard rock or other substance which obstructs its course, the upward movement of spindle 14 forcing the motor in an upward direction, the flexible fluid outlets 11 permitting of such movement. This provision for upward movement protects the tool and its actuating means from breaking strains.

Motors of various types may be employed, and as the motor construction forms no part of the present invention it has not been illustrated. In the present adaptation a water turbine is contemplated which receives water under pressure through pipe 10, the spent water discharging through outlets 11 and 12. It will be understood, however, that we do not restrict ourselves to water as a motive fluid, the invention contemplating any motor that will rotate the tool and cause the latter to drill or cut by a grinding action as distinguished from the reciprocating or striking action of drilling tools now generally employed.

In the operation of the apparatus here shown, casing 2 maintains the tool in close proximity to the work, the casing being lowered progressively as the work proceeds, water under pressure being admitted through pipe 10 to the motor. The spent fluid discharging from the motor to the exterior of casing 2 is utilized for facilitating the drilling operation, the water flowing downward to the drilling zone and materially softening the material in which the drill or other tool is working and thereby facilitating the hole-forming operation. A rubber ring 18 or other packing means encircles casing 2 above outlets 12 and engages the wall of the hole and prevents the discharging water from flowing upwardly around the casing. The drill actuating means is utilized for mixing the spent fluid and drillings and inducing an upward flow thereof through the open lower end 4 of the casing, said means being here embodied in the spiral conveyor 19 secured to spindle 14 in the lower portion of casing 2, the water and drillings being thus agitated and mixed and drawn upwardly into the casing and forced upwardly therethrough around cylinder 7 and out through the open upper end of the casing into the hole above the tool, and from the latter it may flow to the surface or be withdrawn by any suitable means. To prevent

casing 2 from rotating within the hole, spring arms 20 are secured thereto adjacent lateral openings 21, with disks 22 journaled on the free ends of the arms. These disks engage the hole wall, as indicated in Fig. 1, and while they facilitate the vertical movement of the casing, the latter is prevented from rotating. It is preferred to provide these holding devices in the upper portion of the casing, also in the lower portion thereof above conveyer 19, although it will be understood that they may be arranged at any suitable or convenient place and in any number that may be desired.

We have not particularized with regard to tool 16 as the latter may be of any suitable form for drilling or for performing other work within a hole that may be accomplished by a rotary movement.

With the apparatus herein proposed the hole-forming mechanism is self-contained, and is lowered to work progressively as the latter proceeds, avoiding the use of strings of drilling tools and other cumbersome and costly apparatus usually employed in the drilling of deep wells. As the weight of the improved apparatus is insignificant as compared with drilling tools now generally used, less power is required for operating them and for withdrawing the same from the well. With the improved apparatus the drilling proceeds with a rotary grinding action as distinguished from the hammering, battering or percussion action of tools now generally used, and it is therefore quite impossible for the drill or other tool being rotated to wedge and stick in the hole.

We claim:—

1. In well drilling apparatus, the combination of a casing adapted to be lowered in a hole being drilled, a tool operating spindle extending downwardly from the casing, and spindle rotating means within the casing and slidable vertically therein together with the spindle to compensate for obstructions encountered by the tool.

2. In well drilling apparatus, the combination of a casing adapted to be lowered in a hole being drilled, a tool operating spindle extending downwardly from the casing, spindle rotating means within the casing and slidable vertically therein together with the spindle to compensate for obstructions encountered by the tool, and spring means for opposing upward movement of the spindle and its rotating means.

3. In well drilling apparatus, the combination of a casing adapted to be lowered in a hole being drilled, a tool actuating spindle rotatable in the casing, fluid driven tool rotating means, means for conducting fluid to the rotating means and from the latter to the drilling zone, the casing being open at its lower and upper ends with space

between the casing and the spindle-rotating means for the passage of fluid and drillings, and means for inducing a flow of spent fluid and drillings upwardly through the casing.

4. In well drilling apparatus, the combination of a casing adapted to be lowered in a hole being drilled, a tool actuating spindle rotatable in the casing, tool rotating means within the casing, means for conducting fluid under pressure to the tool actuating means and from the latter into the drilling zone, sealing means at the exterior of the casing above the fluid discharge adapted to engage the hole wall for preventing flow of fluid upwardly around the exterior of the casing, the casing being open at its lower and upper ends and provided with space for the flow of spent fluid and drillings upwardly therethrough.

5. In well drilling apparatus, the combination of a casing adapted to be lowered in a hole being drilled, a tool actuating spindle rotatable in the casing and extending downwardly through the lower end thereof, fluid actuated mechanism within the casing for rotating the spindle, a fluid inlet for said mechanism and a flexible fluid outlet for the same for conducting spent fluid to the exterior of the casing, the casing being open at its lower and upper ends for the flow of spent fluid and drillings upwardly therethrough, the casing provided with space for such upward flow.

6. In well drilling apparatus, the combination of a casing open at its upper and lower ends, a cylinder within the casing with space between the cylinder and casing for the upward passage of fluid and drillings, a rotatable tool operating spindle extending downwardly from the cylinder through the lower end of the casing, spindle-driving fluid actuated means within the cylinder for driving the spindle, means for admitting fluid to the upper end of the cylinder, means for conducting fluid from the lower end of the cylinder to the space beneath the casing, and a spiral conveyer within the casing and secured to the spindle beneath said cylinder for inducing a flow of fluid and drillings upwardly through the casing.

7. In well drilling apparatus, the combination of a casing open at its upper and lower ends, a cylinder within the casing with space between the cylinder and casing for the passage of fluid upwardly therebetween, the cylinder provided with a fluid inlet at its upper end, fluid outlets extending from the lower end of the cylinder to the exterior of the casing, sealing means at the exterior of the casing and above said outlets for engaging the wall of the hole, a vertical tool actuating spindle rotatable in the cylinder and extending downwardly through the open lower end of the casing, fluid actuated

spindle-rotating means within the cylinder, and means within the casing beneath the cylinder and actuated by the spindle for inducing a flow of fluid and drillings upwardly through the casing.

5 8. In well drilling apparatus, the combination of a casing open at its upper and lower ends, a cylinder movable vertically within the casing with the cylinder provided with a fluid inlet at its upper end and fluid outlets extending from the lower end of the cylinder to the exterior of the casing, a vertical tool actuating spindle within and movable vertically with the cylinder and extending downwardly through the open lower end of the casing, fluid-actuated spindle-rotating means within the cylinder, means within the lower portion of the casing and beneath the cylinder and actuated by the spindle for inducing a flow of fluid upwardly through the casing, and a spring for opposing upward movement of the spindle and cylinder.

25 9. In well drilling apparatus, the combination of a casing open at its upper and lower ends, fluid actuated tool operating means within the casing above its lower end with a tool carrying spindle extending downwardly through the open lower end of

the casing, and a spiral conveyer in the lower portion of the casing and secured to the spindle for inducing a flow of fluid and drillings upwardly through the casing. 30

10. In well drilling apparatus, the combination of a casing open at its upper and lower ends, vertical guides within the casing, a cylinder within the casing and movable on the guides and held by the latter from rotating, a fluid inlet at the upper end of the cylinder and fluid outlets extending from the lower end thereof to the exterior of the casing, a vertical tool actuating spindle rotatable in the cylinder, a stuffing box in the lower end of the cylinder with the spindle extending downwardly therethrough and through the open lower end of the casing, a rotatable spindle driving means within the cylinder, and a spring for opposing upward movement of the spindle and cylinder. 35 40 45 50

In testimony whereof we affix our signatures in presence of two witnesses.

JAMES MAHER.

MICHAEL M. MAHER.

THOMAS TERRY.

Witnesses:

I. E. HUNT,

A. J. LAWTON.