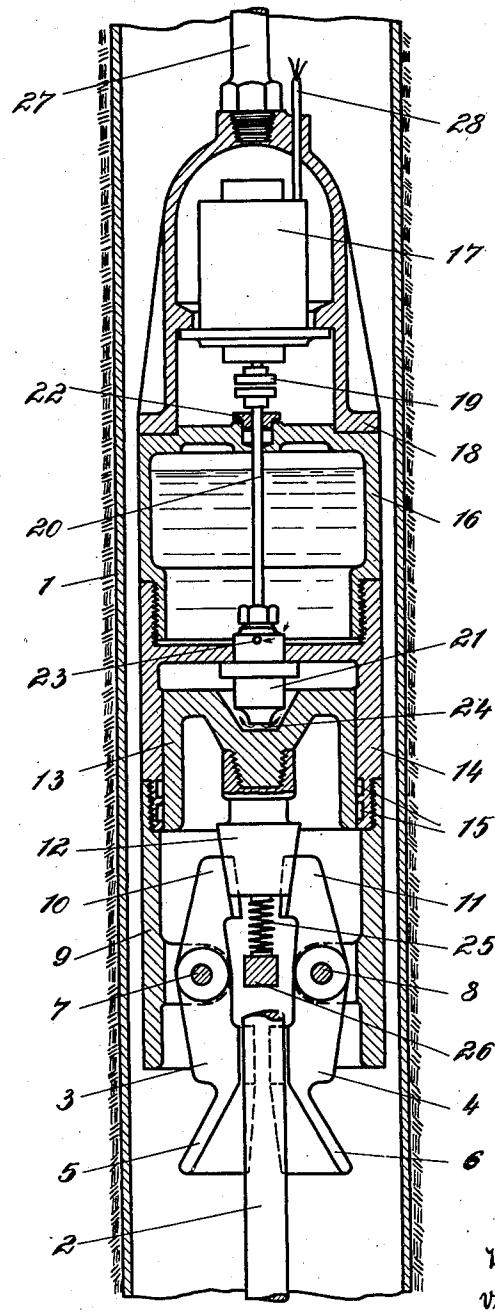
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DRIVEN WELL TOOL

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Inventors
Ludwig Steiner, +
Victor Bartmann
by Knight Bros
Attorneys

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UNITED STATES PATENT OFFICE

LUDWIG STEINER, OF BERLIN, AND VICTOR GUTMANN, OF NUREMBERG, GERMANY, ASSIGNORS TO SIEMENS-SCHUCKERTWERKE GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, OF SIEMENSSTADT, NEAR BERLIN, GERMANY, A CORPORATION OF GERMANY

DRIVEN-WELL TOOL

Application filed June 30, 1926. Serial No. 119,652, and in Germany July 4, 1925.

Our invention relates to hydraulically or pneumatically operated implements or tools for boring wells or sinking shafts.

It is well known to operate implements or tools for boring deep wells, such as borers or drills, gripping devices, tube dies or punches and the like hydraulically or pneumatically. It has been customary in the past to mount the motor and the pump, which put the driving medium, air, water or the like under pressure, above ground. The driving medium under pressure is then conducted to the implement, tool or instrument which has been lowered into the bore hole, by means of a system of pipes. This pipe line must be capable of withstanding the high pressure of the driving medium and the joints of the individual pipe lengths must be well packed. In the rough boring process the provision of a good packing offers considerable difficulties.

Our invention relates to a hydraulically or pneumatically operated implement, tool or instrument for boring wells or sinking shafts in which the long supply pipeline under high internal pressure and its drawbacks are eliminated.

According to our invention the driving medium is put under pressure only at the actual working place, i. e. in the bore hole, well or shaft by means of an electric motor which is supplied with current from above ground. The electric motor and the pump which places the driving medium under pressure are preferably combined into a self-contained unit with the implement or tool. The construction of the unit may be further simplified by arranging the individual machines or members, such as the motor, the pump, the pressure cylinder and so on coaxially.

An embodiment of our invention as applied to a gripping implement is illustrated in the accompanying drawing, which is a view in longitudinal section.

Referring to the drawing, 1 is a tube lined bore hole, well or shaft into which a broken off boring-bar 2 or the like has dropped and which must be removed. For engaging this bar a tool of the well known gripper type with two jaws 3, 4 is employed. These jaws are provided with flared extensions 5 and 6 which facilitate the catching and effect the guidance of the bar between the jaws. The jaws are pivoted at 7 and 8 within the cylindrical casing 9. The upper ends 10, 11 of the double armed gripper levers are provided with conical or tapering recesses. Between these ends is pushed the cone 12 mounted upon the piston 13 guided in the pressure cylinder 14. Between the piston and the cylinder a leather packing collar 15 is provided.

The pressure cylinder 14 is screwed with its lower end into the casing 9 of the gripping tool and with its upper end over the storage receptacle 16 for the water to be put under pressure. Upon the receptacle 16 is mounted the electric motor 17 by means of the flange 18 of its casing. The rotor of the motor 17 is connected with the shaft 20 of the pump 21 by the coupling 19. The leakage of water from the storage receptacle 16 into the casing of the motor is prevented by the stuffing box 22 upon the shaft of the pump.

The pump 21 is an ordinary rotary pump. Such a pump is particularly suitable for operating our improved implement, since high pressures may be obtained then with little space requirement and with small delivery volumes.

The complete implement or tool is suspended from a supporting rod 27, adjacent to which the cable 28 for the supply of the electric motor with current is led above ground.

Our improved implement or tool operates in the following manner: In the inoperative position of the implement the receptacle 16 is filled with liquid, the piston 13 in the pressure cylinder is raised and the gripper jaws 3 and 4 are spread apart. In this state the tool is lowered into the bore hole. As soon as an obstacle is encountered in the bore hole the motor is started. The pump 21 then sucks liquid from the storage receptacle 16 through the opening 23 and forces it at 24 into the pressure cylinder 14. The piston 13 in the cylinder 14 then moves downwards and forces the arms 10, 11 of the hinged

gripper apart by means of the cone 12 and closes the jaws 3 and 4 upon the rod 2. The downward motion of the piston 13 consequently stops and the pressure in cylinder 14 rises. As soon as it has reached a certain value the motor is stopped. Since with the increasing pressure the pump load and thus the motor load increases, the increase of the pressure may be observed by the deflection of the pointer of a measuring instrument inserted above ground in the motor circuit and the motor be switched off at the right time. The motor may equally well be switched off automatically by means of an automatic maximum switch.

The implement together with the article gripped is then raised by means of the suspension rod 27 and lifted out of the bore hole. By reversing the direction of rotation of the motor by which the liquid is retransferred from cylinder 14 to receptacle 16, the individual movable parts of the implement are returned into their initial position and the gripped article released. In order to accelerate the removal of the water from the pressure cylinder 14 the pump may in returning the piston be assisted by a spring 25 provided between the cone 12 and the abutment 26 for the article to be gripped.

It will be understood that instead of the gripping implement described and illustrated other tools, such as a tool for perforating the lining tube of the bore hole 1 may be provided, in which case the punches may be operated by the parts 10 and 11, for instance.

We desire to have it distinctly understood that we do not intend to limit ourselves to the exact details shown or described, but that we intend to include as part of our invention all such changes and modifications of parts as would suggest themselves to persons skilled in the art and as would fall within the scope of the claims.

We claim as our invention:—

1. A well tool comprising an electric motor, a directly coupled pump and a cylinder directly adjacent to said pump and into which the operating medium is discharged by the pump, a piston disposed in said cylinder and an operating tool directly connected with and actuated by said piston, all of said elements forming together a tool entity which can be lowered into a well.

2. A well tool comprising an electric motor, a directly coupled pump, a liquid storage tank for supplying an operating liquid to the pump, and a cylinder directly adjacent to said pump and into which the operating medium is discharged by the pump, a piston disposed in said cylinder and an operating tool directly connected with and actuated by said piston, all of said elements forming together a substantially cylindrical tool entity which can be lowered into a well.

3. A well tool comprising an electric motor, a directly coupled pump, a liquid storage tank for supplying an operating liquid to the pump, and a cylinder directly adjacent to said pump and into which the operating medium is discharged by the pump, a piston disposed in said cylinder and an operating tool directly connected with and actuated by said piston, all of said elements being mounted in coaxial relation to each other and forming together a substantially cylindrical tool entity which can be lowered into a well.

4. A well tool comprising an electric motor, a rotary piston pump directly coupled with said motor, a liquid storage tank for supplying an operating liquid to the pump and containing the intake end of the pump, and a cylinder mounted so as to surround the discharge end of the pump and containing a piston operated by the liquid discharged by the pump into said cylinder, and an operating tool directly coupled with said piston, all of said elements being arranged in co-axial relation to each other and forming a substantially cylindrical tool entity which can be lowered into a well.

In testimony whereof we affix our signatures.

LUDWIG STEINER.
VICTOR GUTMANN.