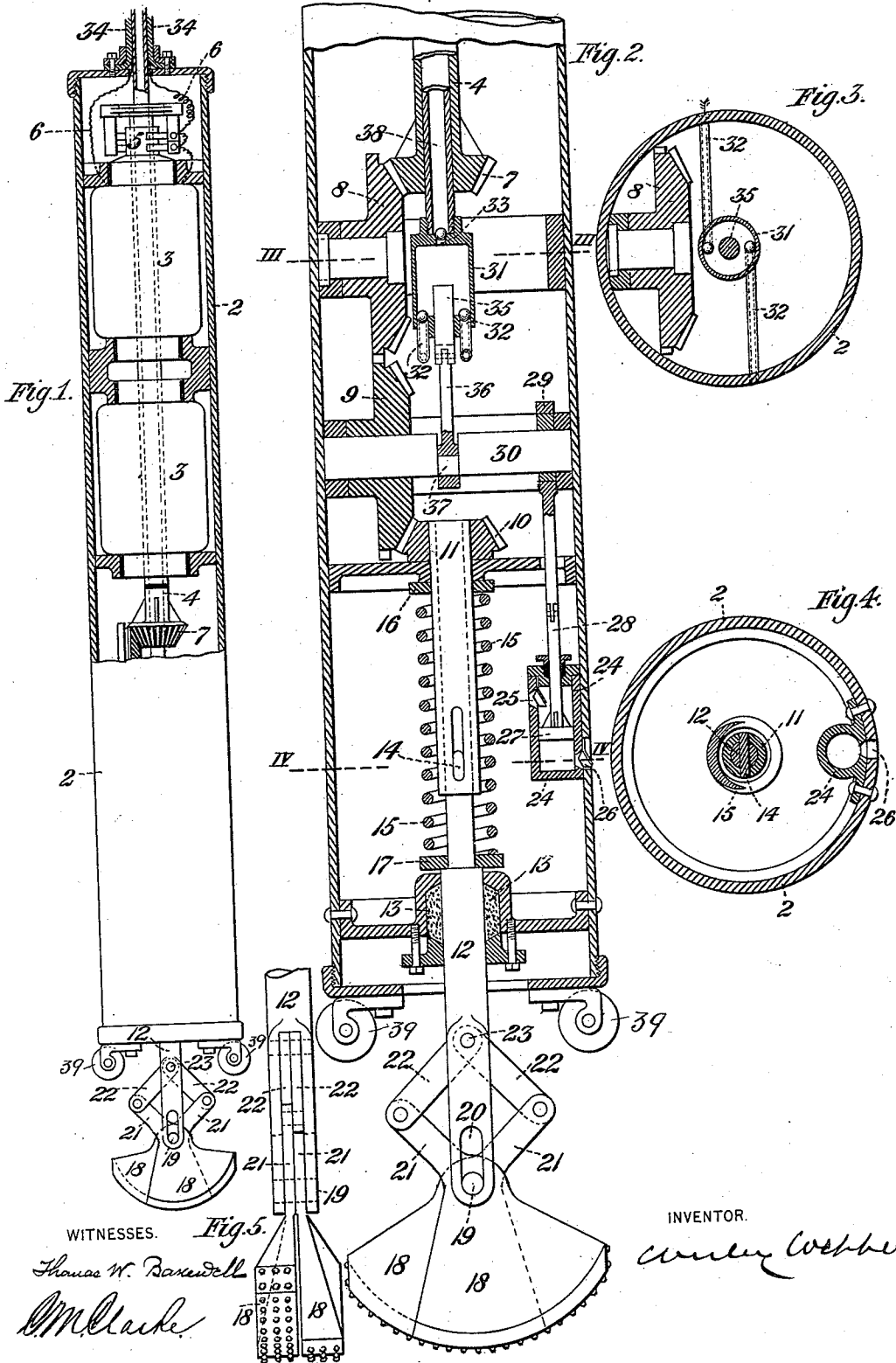


(No Model.)

W. WEBBER.
DEEP WELL DRILLING APPARATUS.

No. 463,880.

Patented Nov. 24, 1891.



UNITED STATES PATENT OFFICE.

WESLEY WEBBER, OF PITTSBURG, PENNSYLVANIA.

DEEP-WELL-DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 463,880, dated November 24, 1891.

Application filed January 14, 1891. Serial No. 377,709. (No model.)

To all whom it may concern:

Be it known that I, WESLEY WEBBER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Deep-Well-Drilling Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation, partly in vertical section, of my improved well-drilling apparatus. Fig. 2 is a vertical sectional view showing the lower part of the apparatus on a larger scale. Fig. 3 is a horizontal section on the line III III of Fig. 2. Fig. 4 is a similar section on the line IV IV of Fig. 2, and Fig. 5 is a side view of the drilling-bit.

Like symbols of reference indicate like parts in each.

The object of my invention is to provide efficient and economical means for using electrical power in drilling deep wells, and it is an improvement on a device for which I have already obtained Letters Patent No. 431,131.

It consists in the following items of invention: first, in a case adapted to be let into the well containing an electric motor or motors connected by suitable gearing to a rotatory drilling-bit and adapted to transmit rotatory motion thereto, the bit being backed by a spring which prevents the injury which might be occasioned if the entire weight of the drilling-tools were permitted to bear rigidly on the bit; second, in a bit of peculiar construction; third, in a pump which operates to expel from the case inleaking water and other foreign substances and to prevent the same from getting access to the motors; fourth, in a pump which is driven by the motor and is adapted to force to the surface of the well water, together with the sand and other cuttings loosened by action of the drilling-bit.

In the drawings, Fig. 1, 2 represents a cylindrical case in which the mechanism of my improved apparatus is contained. In the upper part of the case are electro-magnets 3, two or more in number, and a shaft 4, journaled in bearings which extend lengthwise of the case through the magnets and are fixed to the armatures of the latter, so as to rotate therewith.

5 represents the brushes and commutator of the magnets, and 6 6 are the electrical conductors, which extend from a dynamo or other source of electrical energy situate at the surface of the well. At the lower end of the shaft 4 is a gear-wheel 7, which, by means of other gearing 8 9 10, journaled in the case, as shown, is connected to a rotary spindle 11, which extends longitudinally in the case 2.

12 is the drilling-shaft, which extends through a stuffing-box 13 at the end of the case, and is also telescopically connected to the spindle 11 and is keyed thereto by a key and slot 14, so that it shall turn with the spindle and shall be capable of slight longitudinal motion relatively thereto.

15 is a strong coiled spring which bears at one end against a shoulder 16 of the case and at the other end against a collar 17 on the drill-shaft, thereby exerting on the latter a continuous outward pressure.

The drilling-bit is preferably constructed as follows: Two wings or segmental disks 18 are pivoted together by a pin 19, which passes through a longitudinal slot 20 at the end of the drill-shaft, and are provided with arms 21, which by means of links 22 are connected pivotally to a pin 23 at a point higher on the drill-shaft. The preferable shape of the parts of the bit in its several dimensions is shown clearly in Figs. 2 and 5. When the case 2 is let into the well, the bearing of the bit 18 on the bottom of the hole by forcing the pin 19 upward in the slot 20 causes the arms 21 and links 22 to act as toggle-levers and to cause the divergence of the parts of the bit. By thus expanding the bit after it has been let into the well I am enabled to drill readily a hole of larger diameter than the case 2. This construction of the bit may be applied, also, to apparatus in which the drill-shaft reciprocates and does not rotate. When the case has been lowered into proper position in the hole, the electric current is transmitted to the motors 3 through the conductors 6. The effect of this is to cause the armatures to revolve and to actuate the shaft 4, the rotation of which is transmitted by the gearing 8 9 10 to the spindle 11 and drill-shaft 12. The drill is preferably studded with diamonds, and its rotation in the well causes it

to deepen the hole by cutting away the earth at the bottom. Injury to the bit and to its actuating mechanism by sudden vertical jars on the apparatus is prevented by the cushioning-spring 15.

In order to prevent the case 2 from being turned in the well by the rotation of the drilling-bit, I employ wheels 39, journaled at the periphery of the case, so that when it is let into the well they will penetrate slightly the wall of the hole and will thus hold the case with the required steadiness.

When the drilling is carried on to great depth in the hole, the pressure of water which usually accumulates therein becomes correspondingly great, and the water tends to force itself into the interior of the case through any crevice therein. The stuffing-box 13 is designed to prevent the water from entering around the drill-shaft; but, as under great pressure this will not suffice to exclude it entirely, I provide inside the case a small pump-cylinder 24, having an inlet-port 25, opening within the case, and an outlet-port 26, opening to the exterior of the case, and having valves controlling these ports, as shown. A piston 27, provided with a suitable valve, is arranged within the cylinder, and its stem 28 is connected to an eccentric 29 on the shaft 30 of one of the gear-wheels. The rotation of the shaft 30 will reciprocate the piston 27, which, acting as a pump-piston, will draw from the case any water contained therein and will eject it through the port 26 into the well.

In order to make it unnecessary to remove the case for the purpose of cleaning the well of the sand and debris dislodged by the drilling-bit, or at least making it unnecessary to remove it so frequently as otherwise would be required, I employ a pump-cylinder 31, supported within the case and having one or more valve-controlled inlet-ports 32, opening at the exterior of the case, and a valve-controlled outlet-port 33, which opens into a pipe 38. The shaft 4 is preferably hollow, and the pipe 38 passes through it and is connected at its upper end to a strong hollow cable or hose 34, which extends to the surface of the well, and which may be the cable in which the conductor-wires 6 are bound. The plunger 35 of the pump-cylinder is connected by a pitman 36 to an eccentric or crank-pin 37 on the shaft 30. As the plunger is reciprocated by the rotation of said shaft it draws in water and sand through the inlet-port and ejects the same through the outlet-port and the hollow cable to the top of the well.

The advantages of my invention in respect of the saving of labor which it affords and

the rapidity of its action will be appreciated by those having occasion to use the same.

Without limiting myself precisely to the described construction and arrangement of the parts of the apparatus, which may be varied by the skilled mechanic within the limits of my invention, what I claim is—

1. In deep-well-drilling apparatus, the combination of an electric motor, a drill-shaft connected with the motor and actuated thereby, a longitudinally-yielding spring connection for the drill-shaft, and a case adapted to contain the several parts and to bear upon the said spring connection, substantially as and for the purposes described.

2. In deep-well-drilling apparatus, the combination of a case adapted to be let into the well, an electric motor in the case, a drill-shaft actuated thereby, and a drilling-bit carried by the shaft and consisting of divergeable parts, substantially as and for the purposes described.

3. In deep-well-drilling apparatus, the combination of a case adapted to be let into the well, an electric motor in the case, a drill-shaft actuated thereby, a drilling-bit carried by the shaft and consisting of divergeable parts, and toggle-levers by which the parts of the bit are spread, substantially as and for the purposes described.

4. In deep-well-drilling apparatus, the combination of a case adapted to be let into the well, an electric motor in the case, and a pump for ejecting water therefrom, substantially as and for the purposes described.

5. In deep-well drilling apparatus, the combination of a case adapted to be let into the well, an electric motor, a pump having an inlet-port communicating with the exterior of the case, and an outlet-port connected by a channel with the surface of the well, said pump being connected with and driven by the motor, substantially as and for the purposes described.

6. In deep-well-drilling apparatus, the combination of a case adapted to be let into the well, an electric motor, a pump having an inlet-port communicating with the exterior of the case, and an outlet-port connected by a hollow cable with the surface of the well, said pump being connected with and driven by the motor, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 6th day of January, A. D. 1891.

WESLEY WEBBER.

Witnesses:

W. B. CORWIN,
H. M. CORWIN.