

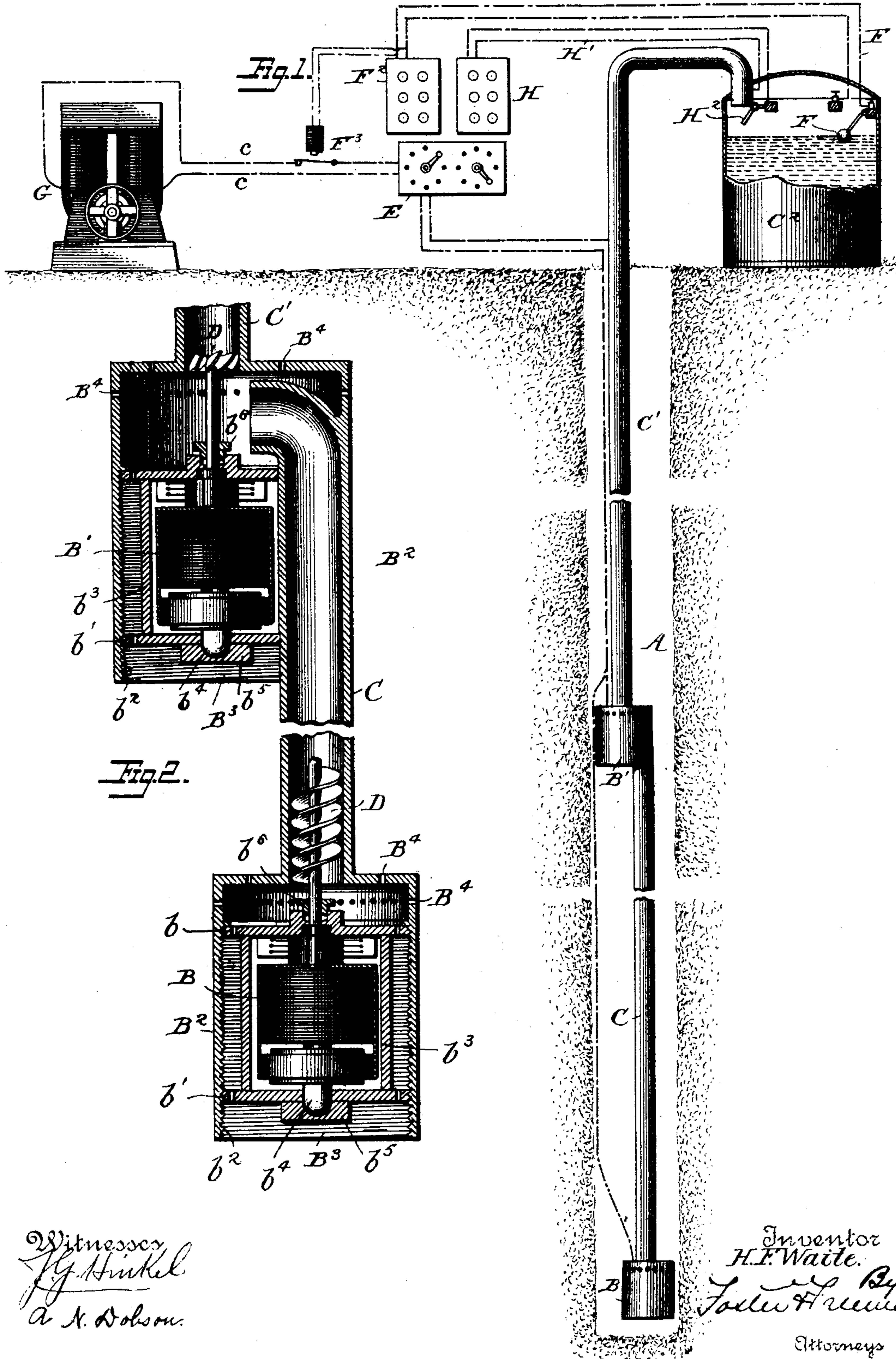
(No Model.)

H. F. WAITE.

ELECTRIC DEVICE FOR PUMPING OIL WELLS.

No. 516,713.

Patented Mar. 20, 1894.



UNITED STATES PATENT OFFICE.

HARRY FULLER WAITE, OF NEW YORK, N. Y.

ELECTRIC DEVICE FOR PUMPING OIL-WELLS.

SPECIFICATION forming part of Letters Patent No. 516,713, dated March 20, 1894.

Application filed September 28, 1893. Serial No. 486,707. (No model.)

To all whom it may concern:

Be it known that I, HARRY FULLER WAITE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Pumping Oil-Wells, of which the following is a specification.

My invention relates to pumping oil wells, and it has for its object to provide means whereby such and similar wells may be readily pumped by means of simple and convenient mechanism, which is easily and quickly controlled, and to these ends my invention consists in the various features of construction and arrangement of parts, having the mode of operation substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings: Figure 1, is a general diagrammatic, part sectional view, illustrating the general principles of my invention; and Fig. 2, is an enlarged, vertical section of the pumping engines, as embodied in one convenient form.

It is a well-known fact that in drilling for oil and the like, when the vein of oil is first struck, it usually flows freely from the well, but subsequently, owing to the fall of internal pressure, or other causes, the wells cease to be self-flowing and it becomes necessary to provide artificial means for pumping the oil or other material and delivering it to the proper tanks, or other storage vessels. It is common to pipe the wells, either while they are being drilled, or subsequently thereto, and as they are often many hundred feet deep, it is impossible to use suction pipes, and it is common to provide force pumps, which are fitted in the tube or pipe of the well and operated by mechanism above ground. These pumps are usually provided with a piston-rod, extending the whole depth of the well, which may be a thousand or more feet, and it is evident that it requires a considerable expenditure of force to operate this piston-rod, and for this and other reasons, it has been found necessary to use a very considerable power, somewhere in the neighborhood of twelve (12) horse-power, for instance, to operate the ordinary force pumps as usually applied to oil wells.

It is one of the leading features of my in-

vention to provide means whereby the oil may be pumped from the well at a much less expenditure of power, and to so arrange and construct the parts that the power may be applied directly and in the most efficient manner to do the work intended, and in carrying out this part of my invention, I make use of an electric motor, arranged in the well and connected to suitable mechanism for forcing the liquid up out of the well and so arranged that the operation of the motor can be readily controlled, either automatically or manually, and I will now proceed to describe one embodiment of my invention as illustrated in the accompanying drawings.

I have indicated in the drawings, a single well A, which may be piped in the usual way or not, to protect the walls of the well, and arranged therein and submerged in the body of oil or other material is an electric motor B, and this motor is connected with a pipe C, for the passage of the oil, and in case the well is of great depth, there may be interposed between the lowermost motor B and the top, one or more other motors B', and from the upper motor a pipe C' leads upward and is connected with a suitable receiver, as a trough or tank C².

It will be understood that there may be a separate tank for each well, or there may be, as is common, a large tank with connections from each well leading thereto.

The motors may be of various forms and details of construction, but in Fig. 2 I have illustrated a preferred embodiment, in which there is an outer case B², which is connected to the pipe C and which is provided with an open bottom B³, and may have openings as B⁴, in the sides and top to allow the oil to flow freely into the casing.

Mounted in the casing are the plates b, b', which form the supports or end-plates of the motor, and these are adapted to be adjustably connected with the case B², they being shown as provided with screw-threads on their outer peripheries, arranged to take into the screw-threads b², on the inner side of the case B². These plates are connected by suitable cross-pieces b³, and the plates and side pieces are united closely together, preferably oil-tight, by making the joints secure in any

usual and well-known way, so that the motor is preferably protected from the oil, although this is not absolutely necessary. The oil being practically insulating material, it does not interfere with the operation of the motor, even though the motor is immersed therein.

The motor is provided with the usual field-magnets, armature, commutator and electric connections which need not be described in detail, as their construction is well understood, and the armature is mounted on a shaft b^4 , arranged vertically and supported in the plates b , b' , which latter are provided with a step b^5 , in which the end of the shaft b^4 bears, while a suitable stuffing-box b^6 , is applied to the plate b around the shaft b^4 .

Connected to the shaft b^4 , or an extension thereof, is a propeller or lifter D , it being shown in the shape of a screw in one instance, or having inclined propeller-blades in the other instance, and this propeller is arranged at the end of the pipe C , where it connects with the case B^2 , and is arranged to force or lift the oil or other liquid from the case upward through the pipe. When two or more motors are used to lift the liquid, one portion of the pipe C may discharge into the case B^2 of the motor above it, and so on, until the last motor will deliver the liquid to the tank above the surface of the ground.

The motor or motors are operated from any suitable source as a generator G , and this generator is connected to the motors by suitable conductors c , c , which may be led to the motors in any suitable way, either through the pipes C , C' , or outside thereof, they being properly insulated of course, and a suitable controller or resistance device E is arranged in the circuit, there being one for each well, or if preferred one for each motor, but it is preferable to have all the motors in each well run from the same circuit, and under control of a single resistance device, so that they may work practically in unison, they being connected in series or multiple, according to the current used and the winding of the motor.

It will be understood that while only a single well is shown in the drawings and electrical connections are shown between the generator and the motors therein, there may be a number of wells, each having a motor or motors, all fed from the same source and connected thereto in the usual and well-known way.

The tank or reservoir C^2 is provided with automatic means which will control the operation of the pumps, so as to stop them when it is full, and I have shown a float F arranged to be lifted and close the connections of a circuit F' , which circuit is connected with an alarm or indicator F^2 at the central station, and which is also connected with a cut-out F^3 , so that when the circuit is closed by the oil rising in the tank, the circuit of the motor or motors supplying the tank may be automatically opened, thereby stopping the further operation of the motors. It is also de-

sirable to provide means which may indicate at the central office whether the motors are operating normally or not, and to accomplish this I provide a signal or indicating device H , which is connected by conductors H' to the tank C^2 or pipe C' , and is provided with a weighted valve H^2 , or other means, so arranged that when the oil is flowing normally from the pipe, the circuit will be open, but when for any reason the flow is discontinued, the circuit H' will be closed by the valve H^2 , and the fact indicated on the indicator H .

By this arrangement, it will be seen that I provide means whereby a number of wells and pumps therein can be operated from a single source of power, and whereby their operation can be controlled from the central station, requiring the attendance of a single operator, and whereby the conditions of working are clearly and automatically indicated, and in this way I am enabled to save the great expense of providing separate engines to operate the usual pumps at the different wells. More than that, I am also able to save a power to operate the pumps, in that I dispense with the long and heavy piston-rods now ordinarily used, and I can apply the power directly and in the most economical way to forcing the oil to the surface.

Having thus described and illustrated the general principles of operation of my invention, I do not deem it necessary to describe specifically the construction of the elements used, as they are well known to those skilled in the art, and they can vary in accordance with the circumstances under which they are used.

What I claim is—

1. The combination with the pipe of an oil well having an enlarged casing provided with openings for the passage of the oil, of an electric motor mounted in the casing, a propeller connected to the shaft of the motor and extending into the pipe, a source of electricity, and electric connections between the source and said motor, substantially as described.

2. The combination with the pipe of an oil well having an enlarged casing provided with openings to receive the oil, of an electric motor mounted in the casing and provided with means for protecting it from the oil, an extension to the armature shaft of the motor projecting into the pipe, a propeller mounted on the extension, and connections between the motor and the source of electric power, substantially as described.

3. The combination with the pipe of an oil well, of an electric motor connected thereto, a propeller connected to the motor, a source of electric power, connections between said source and said motor, a tank, electrical devices connected with the tank and controlling the circuit of the motor, and an indicator connected to the pipe to indicate the flow there-through, substantially as described.

4. The combination with the pipe of an oil well, of a casing, plates fitting the casing,

an electric motor mounted on the plates, the shaft of the motor being supported thereby, a step for said shaft connected to one of the plates, and a propeller connected to said shaft
5 and fitting the pipe, substantially as described.

5. The combination with the pipe of an oil-well, of a case, plates adjustably connected to the case, side pieces extending between the
10 plates and inclosing an electric motor, a vertical shaft for the electric motor supported in the plates, a step for the shaft, and a screw connected to the shaft and fitting the pipe, substantially as described.

6. The combination with the pipe of an oil- 15 well, of a series of electric motors mounted therein at different distances from the bottom, each motor being directly connected with a propeller in the pipe, a source of electric energy, and connections between the source 20 and the motors, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HARRY FULLER WAITE.

Witnesses:

PEYTON W. HUGHES,
WM. H. WOODHULL.