B. F. GARDNER.

METHOD OF AND APPARATUS FOR PUMPING OIL AND OTHER WELLS.

APPLICATION FILED JUNE 1, 1909.

965,287. **Patented July 26, 1910.**

Fig. 1

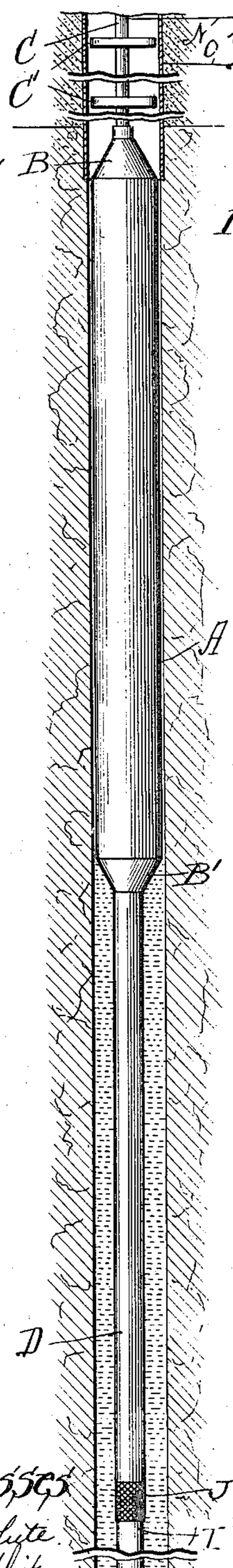


Fig. 2.

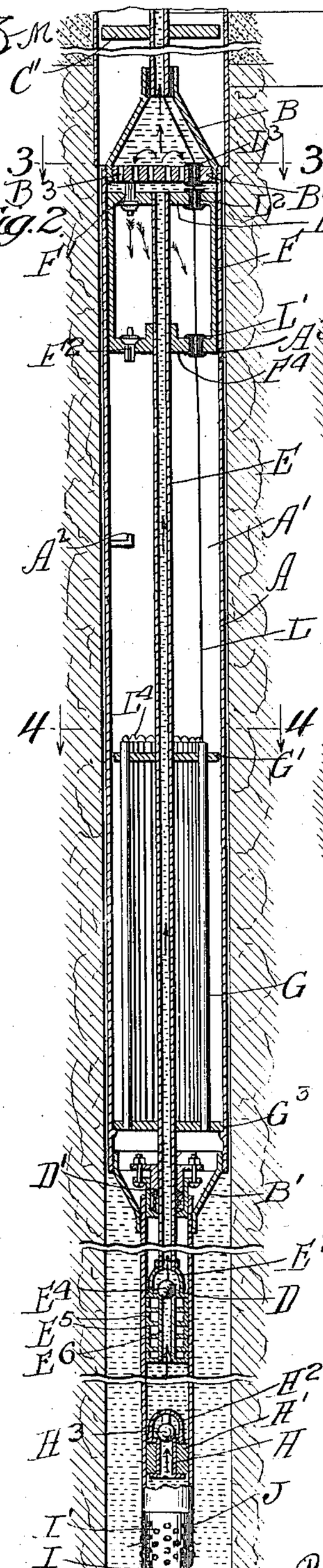


Fig. 3.

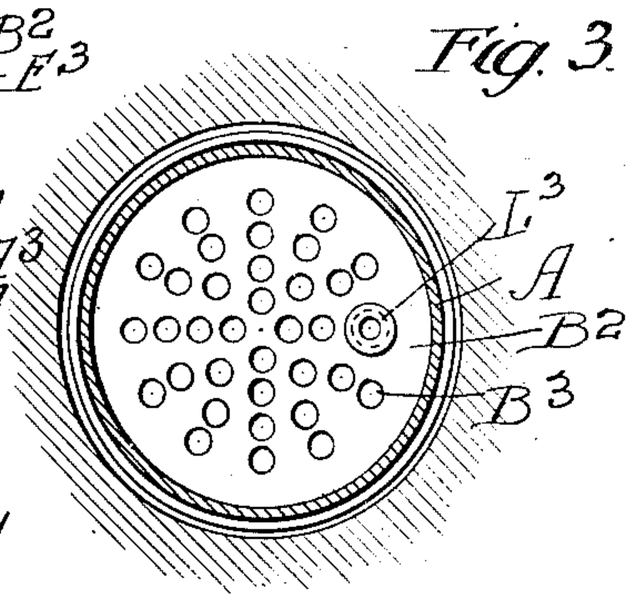
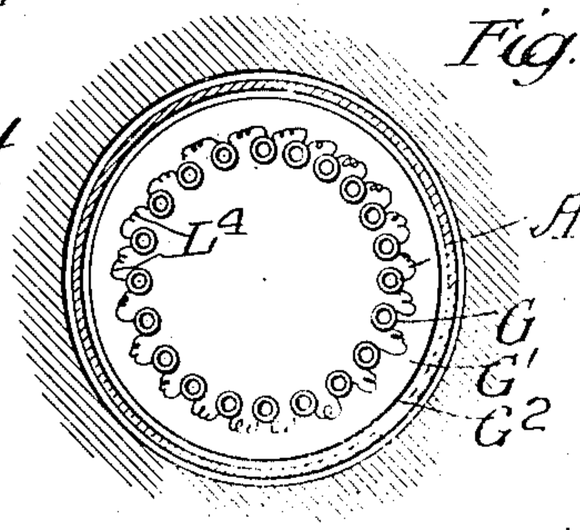


Fig. 4.



Witnesses:
H. R. Lubyte.
K. A. White.

Inventor
Benjamin Franklin Gardner

UNITED STATES PATENT OFFICE.

BENJAMIN FULTON GARDNER, OF CHICAGO, ILLINOIS.

METHOD OF AND APPARATUS FOR PUMPING OIL AND OTHER WELLS.

965,287. Specification of Letters Patent. Patented July 26, 1910.

Application filed June 1, 1909. Serial No. 499,617.

To all whom it may concern:

Be it known that I, BENJAMIN FULTON GARDNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of and Apparatus for Pumping Oil and other Wells, of which the following is a specification.

The object of my invention is primarily the more facile pumping of fluid, oil and water, from oil wells, and in carrying it into execution I employ heat within the well itself, of a degree sufficient to liquefy the paraffin or other residue of petroleum that collects in the bottom of the well, in the crevices and interstices of the rock, and obstructs the flow. The heat, which is generated by an electric heater, is also of sufficient degree to generate the steam or gas pressure which acts upon the piston-head of a reciprocating pump, causing the lifting or upward stroke, while the weight of the fluid above said pump, or upon the piston-head, causes the downward stroke.

In the drawings—Figure 1 is an elevation of mechanism embodying my apparatus and adapted to carry out my improvement in the art; Fig. 2, a vertical, central section through said apparatus; Fig. 3, a horizontal section taken on the correspondingly numbered line in the preceding figure, and Fig. 4, a like section taken on the line 4—4 of Fig. 2 and giving a top-plan view of the heater.

Referring now to said drawings, A represents the case or cylinder containing the electric heater, piston and tubular plunger-rod.

A^1 indicates the interior of the case or cylinder and A^2 is a bracket attached to the inside of said cylinder and which opens the valve F^2 on the down stroke of piston F, to discharge a load of fluid therefrom, as will presently appear.

A^3 is a port in the cylinder, which is uncovered at the end of the upward stroke of the piston, allowing the steam or gas in said cylinder to escape into the well, an exhaust port in fact.

B and B^1, Figs. 1 and 2, are conical caps inclosing both ends of cylinder A.

B^2 is a perforated plate connected to the bottom of cap B, and B^3 indicates the holes or perforations in this plate.

From the top of cap B a pipe or tubing C conveys the fluid from said cap to the surface of the ground. Insulating disks C^1 are placed at various points along this tubing to keep the same centered in the well and for the purpose of electrically insulating it from the wall or casing of said well.

D, in Figs. 1 and 2, is the working barrel of the pump, and D^1, Fig. 2, is a stuffing-box through which the tubular plunger-rod E works. The function of this stuffing-box is to avoid flooding of the interior of the cylinder.

E^3 is the ball cage of the plunger of the pump, and E^4 is the ball of this valve.

E^5 represents the cups on the plunger and E^6 is an opening or bore through the plunger through which the fluid passes as it is pumped.

H^2 in Fig. 2 is the ball cage of the standing valve indicated by H in same figure, H^1 the packing of said valve and H^3 the ball thereof.

Reference letter I, Figs. 1 and 2, indicates a perforated pipe used as an intake and I^1 indicates the holes or perforations in said intake. A wire screen J placed over the holes of the intake keeps out material that would obstruct the working of the valves. The structure rests upon a pointed anchor K which centers, seats and supports the pump and tubing.

G indicates an electric heater composed of tubes framed into and supported by plates G^1, G^3, Figs. 2 and 4, and G^2 is an insulating part between the upper plate and the case or cylinder, while the lower plate G^3 is in contact with said cylinder for grounding purposes.

L, Fig. 2, is an insulated electrical conductor which transmits the current from tube C to the heater. L^1, L^2, and L^3 are insulators in the piston F and perforated plate B^2 which protect this conductor.

The piston-head F is hollow and made to contain a predetermined quantity of fluid which is admitted to the cup-like piston-head through valve F^1 at the end of the upward stroke when the valve is opened by

coming in contact with the perforated plate B^2; and F^2 is a similar valve arranged to discharge the fluid from said head when it reaches the end of the downward stroke, by impinging upon bracket A^2 and being opened thereby. The hollow or tubular plunger-rod E is connected at the upper end to, and continued through the piston F, and at the lower end to the plunger through the cage E^3, so that it may act as a lift pump.

L^4, Fig. 4, indicates the heating tubes connected in multiple to conductor L. The lower ends of these tubes are connected in multiple to the plate G^3 which is in electrical contact with case or cylinder A, grounding the return circuit.

M, Figs. 1 and 2, is a dynamo or other source of electrical energy, located on the surface of the earth at or near the wells.

N is the positive lead from the dynamo and is connected to the tubing C, and O is the negative lead from the casing or earth back to the dynamo.

In operation, after the various parts of the device are assembled the pump is attached to the tubing and lowered into the well in the usual way. Sufficient fluid, water or oil, is put into the case A to generate enough steam or gas for several strokes of the pump. However, as it is desirable to submerge the entire pump mechanism in the fluid of the well, the fluid pressure will cause the fluid to rise in the working barrel, and up through the hollow plunger-rod to the height of the fluid in the well, which will ordinarily be at a point above the piston-head. The piston on its upward stroke fills with fluid from the reservoir afforded by tubing C and conical cap B. The gravity of the fluid, piston-head, plunger and valves causes the piston to descend and at the lower end of the stroke the fluid in the piston-head falls or is sprayed upon the hot tubes of the electric heater by the opening of the valve F^2. Steam, or gas, in the case of oil, is generated in sufficient force to cause the piston to ascend and, through the connecting rod E, convey the lifting force to the plunger in the working barrel. When the piston has reached the extremity of its upward stroke the exhaust port A^3 in the case A is opened and the gas or steam escapes into the well, agitating the fluid and heating it, thereby dislodging paraffin or other residue of petroleum from the rock and melting it, relieving the well of obstruction and increasing the production.

An oil field for miles in either direction may be operated by a central electric plant through the employment of the apparatus and method hereinabove described.

Having thus described my invention, I do not limit myself to the specific details of construction set forth, considering that they may be widely varied without departing from the principle thereof, but

What I claim and desire to secure by Letters Patent of the United States is:

1. An apparatus for pumping wells, a casing having a working barrel, a hollow plunger rod arranged within the casing and extending into the working barrel and carrying a valved piston, a hollow plunger on said rod and receiving a portion of the pumped fluid, means for discharging the fluid from the plunger, and means within the casing for vaporizing the discharge fluid thereby generating a motive fluid for driving the piston upwardly.

2. An apparatus for pumping wells, a casing having a working barrel, a hollow plunger rod arranged within the casing and extending into the working barrel and carrying a valved piston, a hollow plunger on said rod and receiving a portion of the pumped fluid, means for discharging the fluid from the plunger, and means within the casing for vaporizing the discharge fluid thereby generating a motive fluid for driving the piston upwardly, and said casing provided with means for exhausting the motive fluid when the plunger reaches the limit of its upstroke.

3. An apparatus for pumping wells comprising a pumping piston, means for utilizing the weight of the fluid within the well for operating the pumping piston downwardly, means for vaporizing a portion of the body of fluid utilized to move the piston downwardly to generate a motive fluid whereby the piston is moved in the opposite direction.

4. An apparatus for pumping wells comprising a pumping piston, means for utilizing the weight of the fluid within the well for operating the pumping piston downwardly, means for vaporizing a predetermined amount of fluid to generate a motive fluid whereby the piston is moved upwardly, and means for exhausting the motive fluid when the piston is at the limit of its upward stroke.

5. An apparatus for pumping wells, a piston-cylinder submerged therein, a piston carried to the limit of descent therein by the weight of the fluid in the well, a heater arranged beneath said piston and capable of rapidly vaporizing fluid fed thereto to generate steam or gas pressure, means supplying a measured quantity of the fluid contents of the well to said heater at the termination of the downstroke of the piston head, and a pump operated by the piston.

6. In an apparatus for pumping wells, a piston cylinder submerged therein, a piston working in said cylinder and carried to the limit of its descending stroke by suitable

means, an electric heater located in the bottom of the cylinder, a source of electrical energy located on the surface and supplying current to said heater, means supplying a measured quantity of the fluid contents of the well to said heater at the termination of the downstroke of the piston to be vaporized thereby and generate steam or gas pressure to move said piston upwardly, and a pump operated by said piston.

BENJAMIN FULTON GARDNER.

Witnesses:
WM. BARRETT FITZGERALD,
M. WALZEN.