W. H. DRINKERN.

APPARATUS FOR HEATING OIL WELLS.

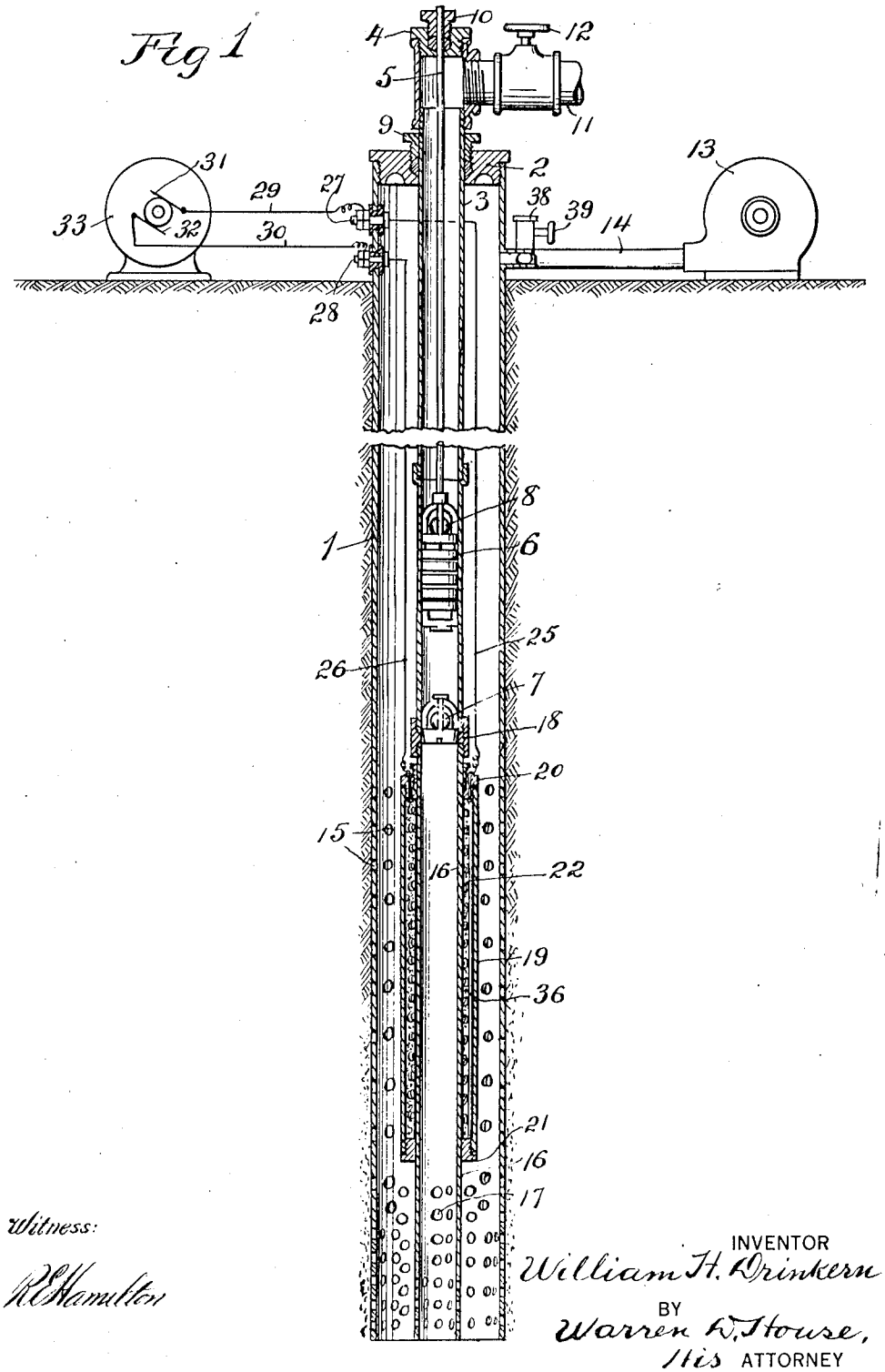
APPLICATION FILED FEB. 14, 1919.

1,309,721.

Patented July 15, 1919.

2 SHEETS—SHEET 1.

Fig 1



Witness:

R. C. Hamilton

INVENTOR

William H. Drinkern

BY

Warren W. House,

His ATTORNEY

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2 SHEETS SHEET 2.

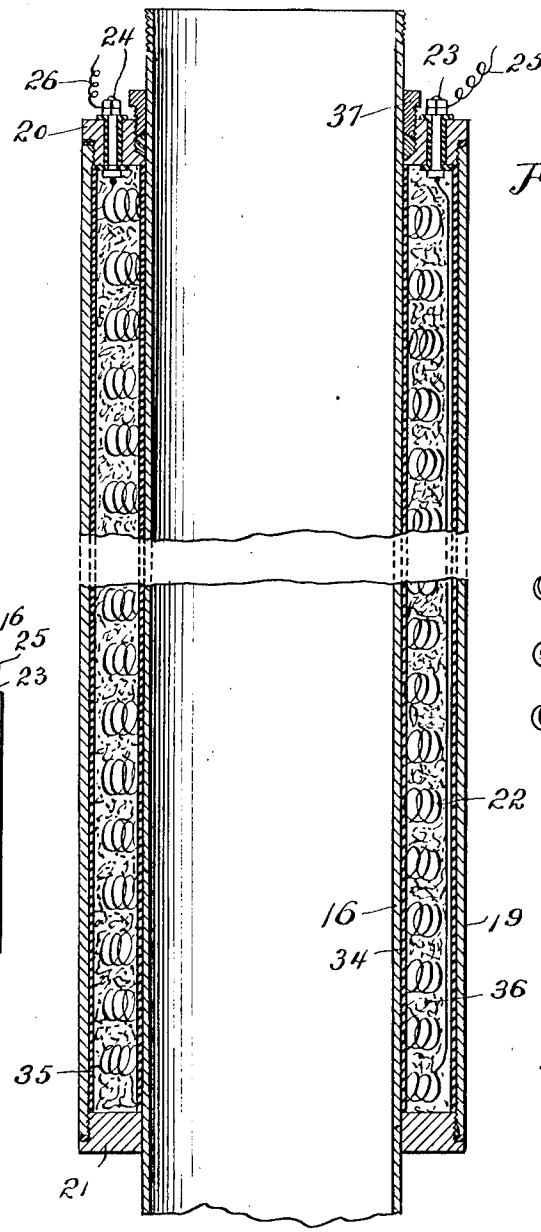


Fig 2

Fig 4

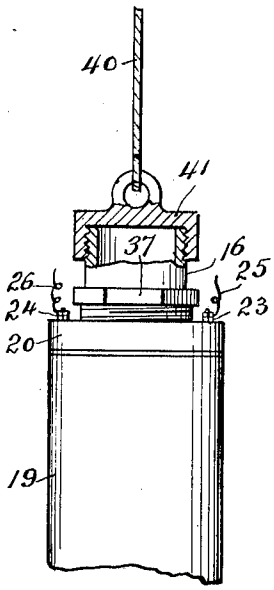


Fig 3

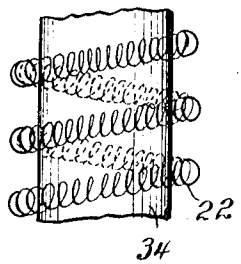
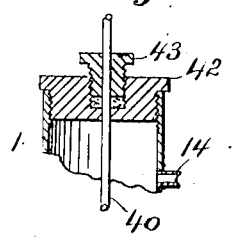


Fig 5



Witness:

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UNITED STATES PATENT OFFICE.

WILLIAM H. DRINKERN, OF BELOIT, KANSAS.

APPARATUS FOR HEATING OIL-WELLS.

1,309,721. Specification of Letters Patent. Patented July 15, 1919.

Application filed February 14, 1919. Serial No. 277,028.

To all whom it may concern:

Be it known that I, WILLIAM H. DRINKERN, a citizen of the United States, residing at Beloit, in the county of Mitchell and State of Kansas, have invented a certain new and useful Improvement in Apparatus for Heating Oil-Wells, of which the following is a specification.

My invention relates to improvements in apparatus for heating oil wells.

The object of my invention is to effect a maximum production of oil from an oil well. In practice it has been demonstrated that accumulations of solid ingredients of oil, such as paraffin, greatly decreases the output of an oil well.

My invention aims to liquefy such solid ingredients in the oil in the casing of the well and in the sand immediately adjacent to and around the casing, so that such ingredients may be removed by pumping or otherwise with the oil.

My invention provides further a novel apparatus for heating the oil in an oil well while the oil is subjected to pressure greater than atmospheric, thereby increasing the heating effect, the excess pressure being utilized for forcing the heated oil out of the casing and into the ground around the casing, so as to liquefy the solid oil ingredients and thereby increasing the amount of oil supplied to the casing.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings, which illustrate the preferred embodiment of an apparatus for carrying my invention into effect,

Figure 1 is a view partly in vertical section and partly broken away of my improved apparatus.

Fig. 2 is an enlarged vertical section, partly broken away, of my improved electrical heating device.

Fig. 3 is a reduced elevation of a portion of the electrical heating device.

Fig. 4 is a view partly in side elevation and partly in vertical section and partly broken away of the electrical heating device.

Fig. 5 is a reduced vertical sectional view of the upper end of the casing having fitted therein a screw plug adapted to receive therethrough a cable.

Similar reference characters designate similar parts in the different views.

1 designates the usual casing of an oil well. The upper end of the casing is provided with a closure comprising a screw plug 2 through which extends a vertical eduction conductor 3 provided at its upper end with a closure consisting of a screw plug 4 through which extends a slidable piston rod 5 to the lower end of which is secured the usual piston 6. In the lower end of the conductor 3 is provided an upwardly opening check valve 7, and the piston 6 carries the usual upwardly opening check valve 8.

A stuffing ring 9 encircles the conductor 3 and has screw thread connection with the plug 2. A stuffing ring 10 encircles the rod 5 and has screw-threaded connection with the plug 4.

The conductor 3 near its upper end is provided with a discharge branch 11, in which is mounted a shut-off valve 12.

An air compressor 13 at the surface of the ground discharges into the casing 1 through a conductor 14.

The lower portion of the casing 1 is provided with inlet openings 15 for the admission of oil from the surrounding earth.

For heating the oil in the casing 1, any suitable means may be employed. The means illustrated in the drawing comprises the following described parts: I provide an electrical heater consisting of a vertical inner tube 16, provided in its lower portion with oil inlet openings 17 and having an externally screw-threaded upper end which is adapted to be fitted in the screw-threaded lower end of a coupling 18 at the lower end of the conductor 3. Encircling the inner tube 16 is an outer tube 19, which is spaced apart from the casing 1, and is also spaced apart from the inner tube 16, thereby providing an air tight chamber, the upper end of which is closed by a closure comprising a ring 20 having screw-threaded connection with the upper end of the outer tube 19. The lower end of the chamber is closed by means of a closure comprising a ring 21 tightly embracing the inner tube 16 and having screw-threaded connection with the lower end of the tube 19.

Encircling the tube 16 is a heating coil 22 of suitable resistance wire having its ends respectively attached to binding screws 23 and 24, which extend vertically through and are insulated from the ring 20.

The binding screws 23 and 24 have respectively connected to them insulated wires

25 and 26, which are respectively connected to two binding screws 27 and 28, which extend laterally through and are insulated from the casing 1.

Electrical conductors 29 and 30 respectively connect the binding screws 27 and 28 with the brushes 31 and 32 of a suitable dynamo 33.

The exterior of the tube 16 may be covered with suitable insulation 34, which may be sheet asbestos or other non-conductor of a refractory nature. Similar insulation 35 may be provided on the inner side of the tube 19.

The chamber between the tubes 16 and 19 may be filled with insulation material 36, which may be of any usual character, that is an electrical non-conductor and also a good heat conductor.

The insulation 36 serves to retain the heating coil 22 in its proper place and to prevent its distortion.

A packing ring 37 encircles and is fitted to the tube 16 and has screw-threaded connection with the ring 20.

In the operation of the apparatus shown, the tube 16 may have its upper end screwed into the coupling 18 and lowered into the casing 1 with the conductor 3. When the conductor 3 has been properly positioned, with the electrical heater located in the lower portion of the casing 1, the current from the dynamo 33 is permitted to pass from the brush 32 by means of the conductor 30, binding post 28, conductor 26, heating coil 22, conductor 25, binding post 27, conductor 29, back to the brush 31 of the dynamo.

At the same time, the valve 12 may be closed and the air compressor 13 started into operation so as to discharge compressed air into the casing 1, thereby raising the pressure in the casing above atmospheric pressure and to an amount sufficient to accomplish the function desired from the compressed air.

The coil 22 becomes highly heated, due to the passage therethrough of the current and this heat is conducted through to the oil in the tube 16 and in the casing 1 and also to oil in the sand surrounding the casing, or such oil bearing earth as may be around the casing at the particular point at which the oil well is located.

One function of the compressed air or other pressure fluid which may be employed is to accelerate the heating operation and also to force the heated oil from the casing into the surrounding earth, so that solid ingredients of the oil in a zone around the casing and in the casing may be liquefied to enable its ready removal by pumping or other means.

After the heating operation has progressed, a length of time sufficient to liquefy the oil which is in the casing at the time, and also the oil in a limited area around the casing, removal of the oil with the liquefied solid ingredients may be begun.

The valve 12 may then be opened. The air pressure in the casing 1 may now be reduced to atmospheric by being allowed to escape from the casing 1 by the pipe 14, which may be provided with an outlet branch 38 having a suitable shut-off valve 39, which is opened to permit the compressed air to escape.

The pump rod 5 and piston 6 may then be operated in the usual manner to force the oil upwardly through the conductor 3 and through the discharge branch 11.

If desired, instead of supporting the electrical heater from the conductor 3, the latter may be removed from the casing and the heater lowered by means of a cable 40, which has its lower end attached to a screw cap 41, Fig. 4, fitted tightly to the upper end of the tube 16.

When the electrical heater is to be lowered with the cable 40, the conductor 3 and ring 2 are removed from the casing, after which the heater is lowered by the cable 40 into its proper position, the cable 40 being extended through a screw plug 42, which is mounted into the upper end of the casing 1 in lieu of the plug 2, as shown in Fig. 5.

A packing ring 43 encircles the cable 40 and has screw-threaded connection with the plug 42.

After the electrical heater has been operated to liquefy the solid ingredients of the oil in the casing, the plug 42 may be removed and the heater withdrawn from the casing, after which the conductor 3 is again lowered into the casing and the plug 2 refitted in the upper end of the casing. The pump piston 6 may then be operated to pump out the oil with the liquefied ingredients.

What I claim is:—

1. In an apparatus of the kind described, the combination with the casing of an oil well closed at its upper end, an eduction conductor in said casing extending through said casing, a shut-off valve in said conductor, an air compressor discharging into said casing, and means for heating oil in said casing adjacent to the lower end of said conductor.

2. In an apparatus of the kind described, the combination with the casing of an oil well closed at its upper end, an eduction conductor extending through said casing, an air compressor discharging into said casing, and means for heating oil in said casing adjacent to the lower end of said conductor.

3. In an apparatus of the kind described, the combination with the casing of an oil well closed at its upper end, an eduction conductor extending through said casing, an air

compressor discharging into said casing, a tube in said casing connected with the lower end of said conductor, an outer tube encircling said tube, closures spaced apart from each other between said tubes affording an air tight chamber between said tubes, an electrical heating coil in said chamber, and means for supplying electrical current to said heating coil.

4. In an apparatus of the kind described, the combination with the casing of an oil well closed at its upper end, means for supplying fluid under pressure to said casing, an eduction conductor extending through said closed end into said casing and having a removable closure in its upper end and provided with a lateral discharge branch, a shut-off valve in said branch, an upwardly opening check valve in said conductor, a pump piston in said conductor above said check valve, a pump rod connected to said piston and extending through and slidable in the closure at the upper end of said conductor, an inner tube connected to the lower end of said conductor, an outer tube encircling said inner tube, two closures spaced apart from each other between said tubes affording an air tight chamber between said tubes, an electrical heating coil encircling said inner tube in said chamber, and means for supplying electrical current to said coil.

In testimony whereof I have signed my name to this specification.

WILLIAM H. DRINKERN.