

W. RICHARDS.

PROCESS OF HEATING OIL IN TANKS OR WELLS.

APPLICATION FILED FEB. 15, 1904.

2 SHEETS—SHEET 1.

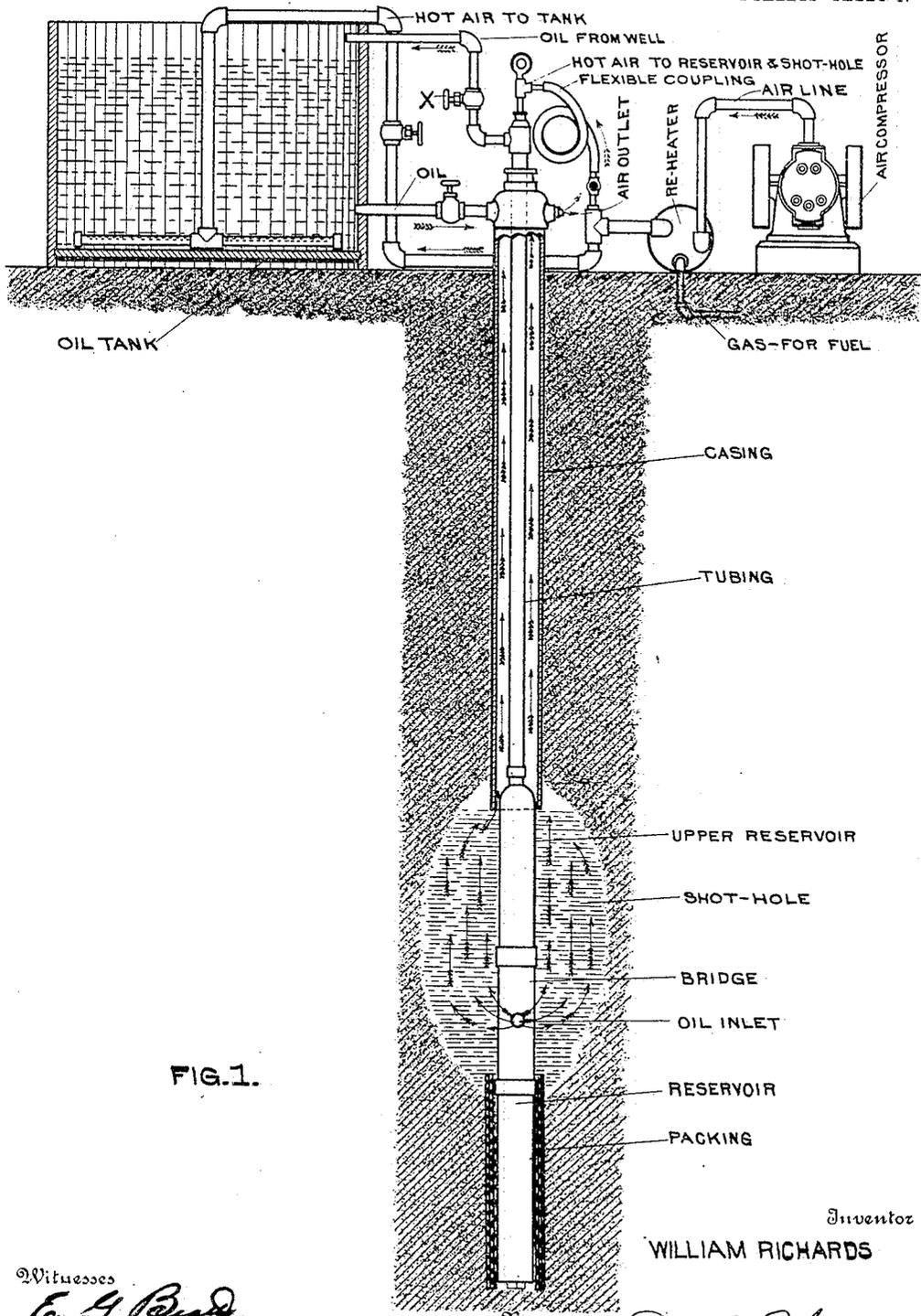


FIG. 1.

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Witnesses

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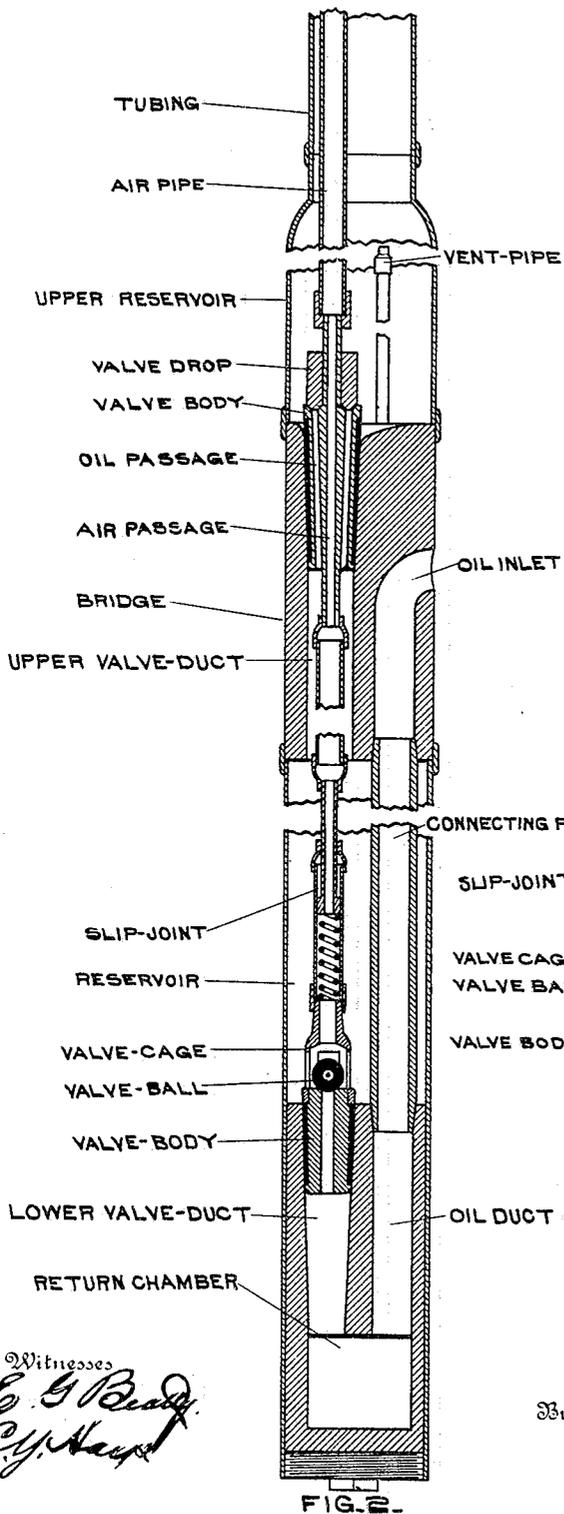


FIG. 2.

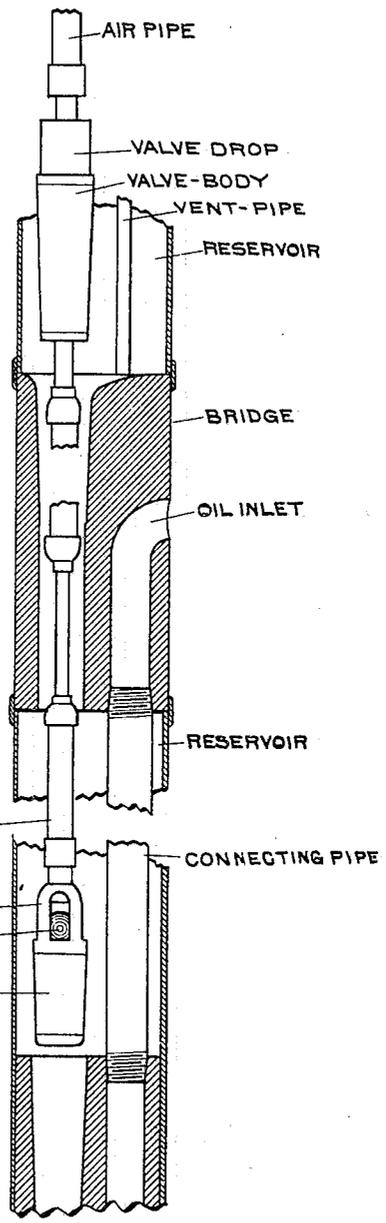


FIG. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM RICHARDS, OF MAYBURG, PENNSYLVANIA.

PROCESS OF HEATING OIL IN TANKS OR WELLS.

SPECIFICATION forming part of Letters Patent No. 781,908, dated February 7, 1905.

Application filed February 15, 1904. Serial No. 193,692.

To all whom it may concern:

Be it known that I, WILLIAM RICHARDS, a citizen of the United States, residing at Mayburg, in the county of Forest and State of Pennsylvania, have invented certain new and useful Improvements in Processes of Heating Oil in Tanks or Wells, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to an improved process of heating oil in tanks and in the well, and will be fully understood by a reference to the accompanying elevated drawings, which form a part of this specification, and in which—

Figure 1 is a vertical section of an oil-well and showing at the surface of the ground the complete equipment by which my process is carried out. Figs. 2 and 3 are details.

In the art of oil production it is often necessary to heat the oil while it is contained in tanks and also while it is in the well, which requirement is for various reasons too well known to oil producers to require enumeration here. Heretofore steam has been employed as the medium by which heat has been imparted to the oil; but I have discovered that heated air is much better suited to this purpose, and I have therefore devised a new process of applying this discovery, and the means by which this process is carried out is simple, mechanically perfect, convenient of operation, and requires only the addition of a reheater for the air and a modified system of piping in addition to the mechanism shown and described in my application for Letters Patent of the United States for an improved device for raising liquids from wells, which said application was executed by me on the 13th day of January, 1904, filed February 3, 1904, Serial No. 191,841. The mechanism of which said device is composed consists, essentially, of an enlarged reservoir located in the shot-hole of the well and extending below said shot-hole to a considerable distance, which reservoir has interposed or located therein a bridge which has an oil-inlet connected, by way of a connecting-pipe, an oil-duct, a return-chamber, and a valve-duct, with the interior of the lower reservoir. The valve seated in the lower duct is of the ball type very com-

monly used in oil production and is attached to the lower end of the air-pipe, which conducts air from the surface of the ground to the lower reservoir. When this valve is nominally seated in its duct, it allows oil to pass upward through the same into the lower reservoir, but prevents any regurgitation thereof. In said bridge is also a valve-duct, (upper valve-duct,) in which is seated the upper valve of a specially-constructed type, the air-passage through the center of which is a continuation of the air-pipe. An oil-passage is formed about the air-passage for the purpose of permitting the oil to flow from the lower reservoir when air under pressure is admitted to said lower reservoir. A valve-drop is seated upon said valve for the purpose of preventing any downward flow of oil from the upper reservoir. It will be noted from an inspection of Figs. 2 and 3 that the valve-bodies are tapered, as are also the seats which receive them, which is for the obvious purpose of adapting them to seat more effectually. The bodies of the valves are covered with a soft metal for the purpose of making their proper seating additionally sure.

The mechanism thus far described when occupying the position shown in Fig. 1 is the mechanism which constitutes my aforesaid improved device for raising liquids from wells by means of compressed air or other equivalent agency, and this same construction is utilized in my improved process of heating oil; but in this process the air-pipe and the attached valves are raised so that the valves occupy the position shown in Fig. 3, the flexible coupling being for the purpose of allowing the air-pipe to which it is attached to rise, and the ring in the top of said pipe is adapted to the attachment of a suitable hoisting-tackle.

My improved process and the application thereof is as follows: In the air-line leading from the air-compressor to the wells and tank I interpose a reheater, in which the air is heated to a high temperature. Said reheater may be of any suitable construction. After the air-line has passed through the reheater it is continued, and a connection is made therewith by means of a flexible coupling to the

air-pipe which leads into the well and which has the valves attached thereto. Said air-line also extends to the oil-tank and passes to the bottom of the same and is thus adapted to conduct hot air to and discharge the same into the body of oil contained in the tank. It often becomes necessary to heat the walls of the shot-hole for the purpose of melting the paraffin which has become deposited thereon, and for this purpose I propose to open the valve in the oil-pipe which leads from the tank to the interior of the casing and allow heated oil to pass down in the casing to the shot-hole, so that said shot-hole will be nearly or quite filled with hot oil. Inasmuch as the depth of the shot-hole below the surface of the ground sometimes exceeds the depth of two thousand feet, the oil will necessarily part with a portion of its heat in passing down, and it is necessary to employ means of again restoring this lost heat, and for the purpose of reheating the oil in the shot-hole I raise the air-pipe, (the flexible coupling being for the purpose of permitting this,) which of course raises the valves from their seats, the valve in the oil-delivery pipe (indicated by *x*) being closed to prevent the escape of air up through the tubing. Hot air under pressure is now admitted to the air-pipe leading down into the well and escapes by way of the valve-duct, return-chamber, connecting-pipe, and oil-inlet into the shot-hole, where it passes through the oil contained therein and up inside the casing, where a free escape is provided to the atmosphere. Thus

all pressure of air upon the walls of the well or shot-hole is provided against or prevented, as it has been found to be very detrimental to the productive capacity of wells to so prevent the free escape of air therefrom that any considerable pressure will be exerted upon the wall of the producing stratum.

Be it understood that I do not wish to limit myself to the exact combination of operations here described, as the oil in the tank may be heated without reference to passing it into the well and also any quantity of oil naturally contained in the well could also be heated without augmenting the same from the tank without departing from the spirit or scope of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The process of applying heat to oil which consists of passing air through a reheater, of passing said heated air through a body of oil contained in a tank, thereby imparting heat to said oil, of charging the shot-hole with such heated oil, and of continuing the passage of heated air through the body of oil when thus contained in the shot-hole.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM RICHARDS.

Witnesses:

JOSEPH G. RICHARDS,
W. A. HARTMAN.