

F. H. OLIPHANT & H. LYDDON.
METHOD OF TREATING OIL WELLS.
APPLICATION FILED FEB. 18, 1905.

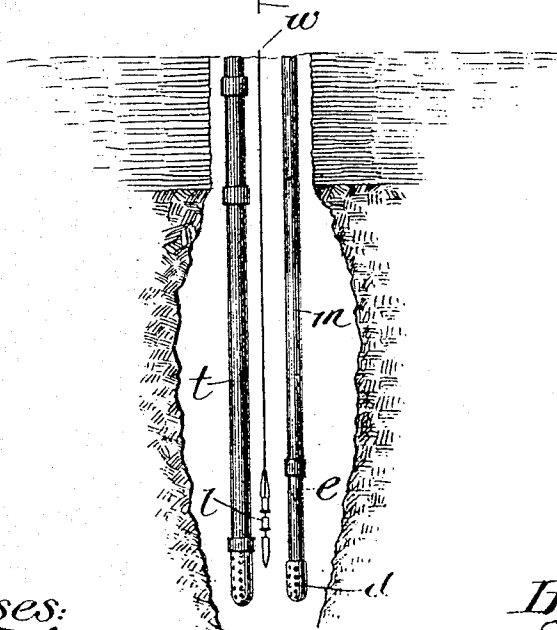
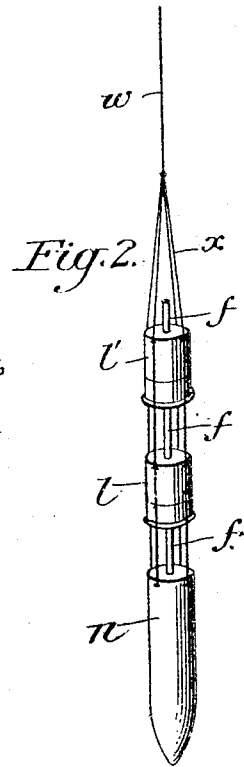
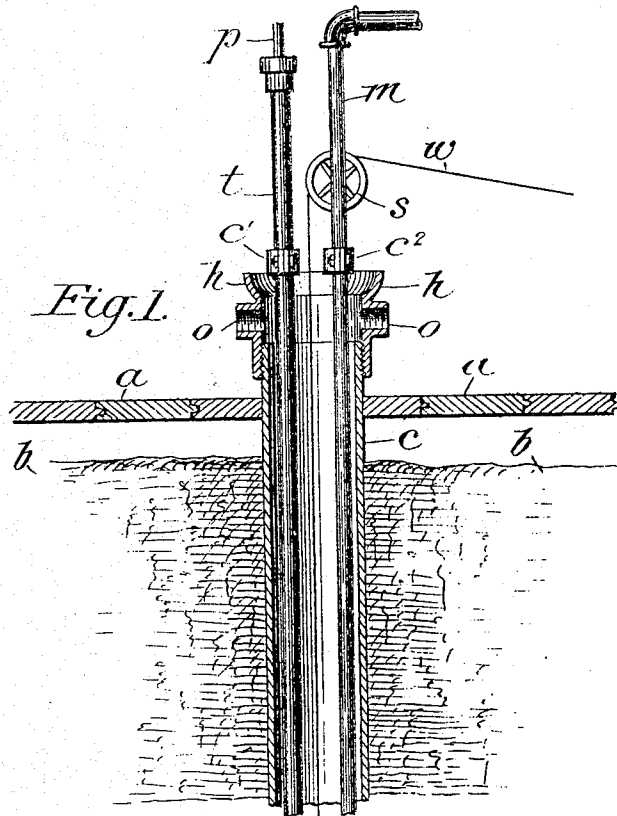
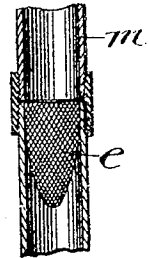


Fig. 3.



Witnesses:
D. W. Edlins.
R. C. Crut.

Inventors:
F. H. Oliphant and
Henry Lyddon
By their attys.
Russell & Co., Wash. D. C.

UNITED STATES PATENT OFFICE.

FIDELIO H. OLIPHANT AND HENRY LYDDON, OF OIL CITY, PENNSYLVANIA;
SAID LYDDON ASSIGNOR OF ONE-HALF OF HIS RIGHT TO SAID OLIPHANT.

METHOD OF TREATING OIL-WELLS.

No. 797,529.

Specification of Letters Patent.

Patented Aug. 15, 1905.

Application filed February 18, 1905. Serial No. 246,197.

To all whom it may concern:

Be it known that we, FIDELIO H. OLIPHANT and HENRY LYDDON, citizens of the United States, residing in Oil City, county of Venango, Pennsylvania, have invented certain new and useful Improvements in Methods of Treating Oil-Wells; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to methods of treating oil and other wells—such as gas-wells, salt-wells, sulfur-wells, &c.—for the purpose of melting and cleaning off the paraffin, sulfur, and any other deposits that may accumulate on the walls of the well and also for the purpose of spalling off or melting the rocky surfaces of the well-walls, so as to renew the surfaces of these interior walls.

Other objects and advantages of the invention will appear from the following description and will also be apparent to those skilled in the art.

The invention relates more especially to the treatment of oil-wells, though, as above indicated, it is useful for treating gas-wells, sulfur-wells, salt-wells, and indeed wells of any other description where it is desirable to renew the surfaces of the interior walls of the wells at considerable distances below the surface of the ground, and particularly wherever there are deposits of paraffin, sulfur, or other oily, slimy, or viscous matters which by adhering to the walls gradually clog up the pores or veins and obstruct the output. It is well known that the formation of these deposits on the walls, especially of oil and gas wells, physically obstructs the flow through the veins, crevices, or porous strata, and many plans have been resorted to for the purpose of removing these obstructions. Among these plans it has been proposed to melt the deposits by forcing steam down into the wells through long pipes; also, to force down into the wells the hot products of combustion from furnaces located above the ground. Explosive materials have also been lowered into the wells, and the interior walls have been cracked and broken and the veins and

crevices opened by the explosion of such materials. Other plans have also been proposed; but owing principally to the depth of the wells and the consequent difficulty of delivering heat at the points where it is desired none of them have gone into general use.

Our invention is differentiated from all prior methods known to us by the facts that no furnace or other apparatus for heating steam, air, or gas above ground is required, and also that the combustible material is not heated or lighted until it reaches the point where it is desired to apply the heat, and, further, by the fact that we are able to maintain combustion in the wells at any desired point below the surface of the ground for indefinite periods.

In the accompanying drawings an apparatus is illustrated for carrying out the invention.

In the drawings, Figure 1 shows a section of an oil-well equipped with such an apparatus, and Fig. 2 is a detail of a suitable form of igniting device in elevation. Fig. 3 is a detail showing in full lines the wire-gauze cone or diaphragm *e* in the burner-pump *m*.

Referring to the drawings, *a* denotes the floor of the usual derrick, and *b* indicates the ground. The usual casing is indicated at *c*, and *h* denotes the casing-head, the cap of which has been removed, leaving the upper end of the head open. The usual pipe-openings in the casing-head are shown at *o o*, and *t p* indicate, respectively, the usual well-tubing and polish-rod, these parts being shown herein as supported by a clamp *c'*, resting on the upper edge of the casing-head and being illustrated merely because it is not necessary to remove them when practicing the invention, and not because this tube and rod form any part of the invention.

It is characteristic of our invention that a fuel is employed which may be delivered by gravity or forced by pressure through a pipe down into the well at any desired point below the ground and discharged into the well where it is desired to produce the flame. To this end we employ a hydrocarbon fuel in the gaseous or liquid form, preferably naphtha,

benzin, or gasolene, and *m* in Fig. 1 is an ordinary iron pipe for conducting such fuel from a tank or reservoir above ground down into the well to the point where it is desired to apply the treatment. At its lower end this pipe is provided with a perforated cap *d*, constituting a burner, and it contains within it a short distance above the burner a wire-gauze cone or diaphragm *e* to prevent any explosion in the delivery-pipe and the purpose of which will be presently described.

In addition to carrying fuel down into the well the pipe *m* is utilized for conducting a supply of air, oxygen, or any other supporter of combustion along with the fuel and delivering it at the point where it is desired to produce the flame. Although, as here shown, the pipe *m* conducts both the fuel and the medium to support and continue combustion, it will be understood that a separate pipe may be employed for this purpose. The upper end of the pipe *m* or any other pipe or hose that may be employed is connected to any suitable source of pressure for forcing the air or other combustion-supporter down the pipe and out into the well through the perforations in the burner-cap *d*.

Having provided for the delivery of the fuel at the desired point in the well, as above described, and for maintaining combustion of the same by producing an upward draft in the well by means of the air that is delivered under pressure, as already explained, we ignite the fuel in the present instance by lowering into the well a torch or firing-tube having a fuse which is lighted before the tube is lowered into the well. We would have it understood, however, that the present invention is not limited to any particular means for igniting the fuel, it being only necessary that some means should be employed that will serve to cause ignition at the point below ground where it is desired to produce the flame.

A suitable form of igniting-tube or torch is shown in Fig. 2, where *n* is a small section of iron tubing closed at its lower end and hung from the lower end of a wire *w* by other wires *x*. Above this tube and held by the same wires *x* are cartridges *l l'*, spaced short distances apart, and the tube and cartridges contain any sort of slow-burning powder, preferably the kind employed in making ordinary colored fire and composed mainly of saltpeter, sulfur, and carbon, though any other form of powder may be employed. Through the center of these cartridges passes a fuse or slow-burning match *f*, which extends down into the tubing *n* at the bottom, and it is lighted before the torch is lowered into the well.

The tube *m* may be supported from the open top of the casing-head by means of a clamp *c*² or other support that will allow the burner to

be elevated or depressed, and a wheel or pulley *s*, that has any suitable support above the casing-head, is provided for lowering the torch into the well by means of the wire *w*.

Such being the construction of a simple apparatus for carrying out our invention, we proceed as follows: The tube *m* having been lowered in the well the required depth before the upper end is connected to the fuel-supply, we introduce a wire with a small weight at the end and lower it into the tube until the weight strikes the diaphragm or cone *e*. In this way we ascertain the proper depth to which the torch should be lowered, and having withdrawn the wire we attach the torch to its lower end and connect the upper end of the pipe *m* to the fuel-supply and the source of compressed air or other medium for supporting combustion. We then light the fuse of the torch and lower it into the well to the point ascertained by the measurement above described, and then turn on the benzin, gasolene, or whatever other fuel is employed, and start the air under pressure down the pipe at the same time. By the time the torch reaches the point in the well where the burner is located, or shortly thereafter, the fuse will have lighted one or more of the cartridges, and the mixture of air and gas issuing from the burner *d* will immediately be ignited and will continue to burn so long as the supply of fuel and circulation of air is maintained down the pipe.

It is to be noted that by forcing the air down into the well through a closed pipe and delivering it at the point where the flame is desired an upward draft of air is maintained in the well and out the openings at the top, thereby providing for the indefinite maintenance and continuation of combustion so long as the supply of fuel and air is kept up. It is also to be noted that the depth below ground at which the flame may be produced is practically unlimited, as by delivering the air-supply at the bottom of the well a chimney-like draft out the open end is established and maintained, and such draft is regulable by the amount and pressure under which the air is delivered.

Having thus described our invention, what we claim is—

1. The herein-described method of treating oil and other wells, the same consisting in discharging gaseous or liquid fuel at the point in the well where the flame is desired, igniting the same, forcing air down the well and discharging it at the same point, and causing an upward circulation thereof in the well and out an opening at the top thereof to maintain combustion.

2. The herein-described method of treating oil and other wells, the same consisting in leaving a vent or opening at the top of the

797,529

well, forcing a mixture of air and gaseous or liquid fuel down into the well and discharging it at a selected point in the well, and igniting the fuel at that point, the mixture of air and fuel being delivered under pressure so as to create an upward circulation thereof in the well and out the opening at the top thereof to maintain combustion.

In testimony whereof we affix c
in presence of two witnesses.

FIDELIO H. OI
HENRY LYDD

Witnesses:

N. F. TROSH,
WM. G. HILL.