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APPARATUS FOR REMOVING PARAFFIN FROM OIL WELLS.

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1,358,393. **Patented Nov. 9, 1920.**

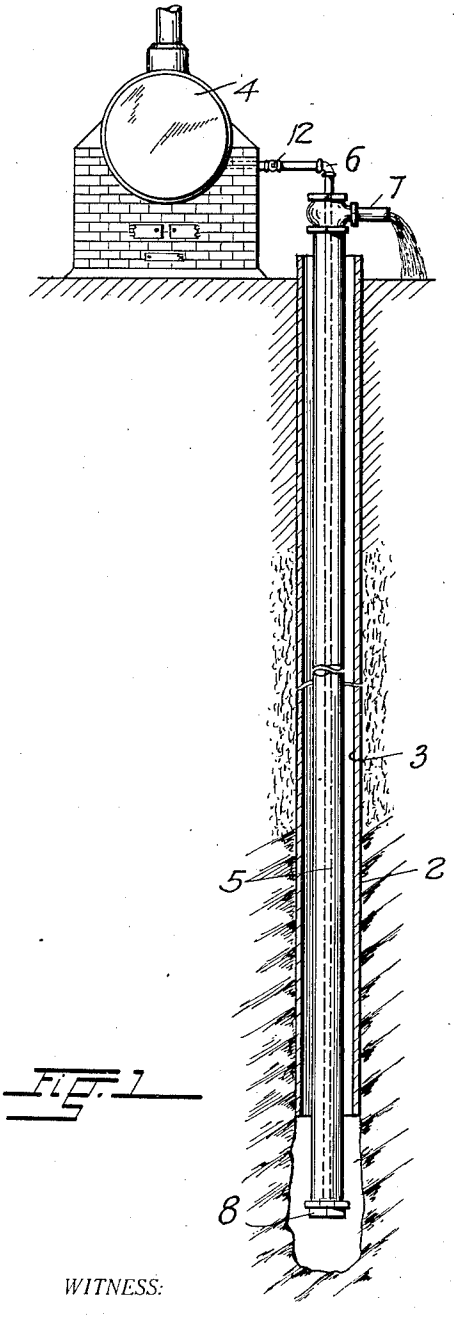


Fig. 1

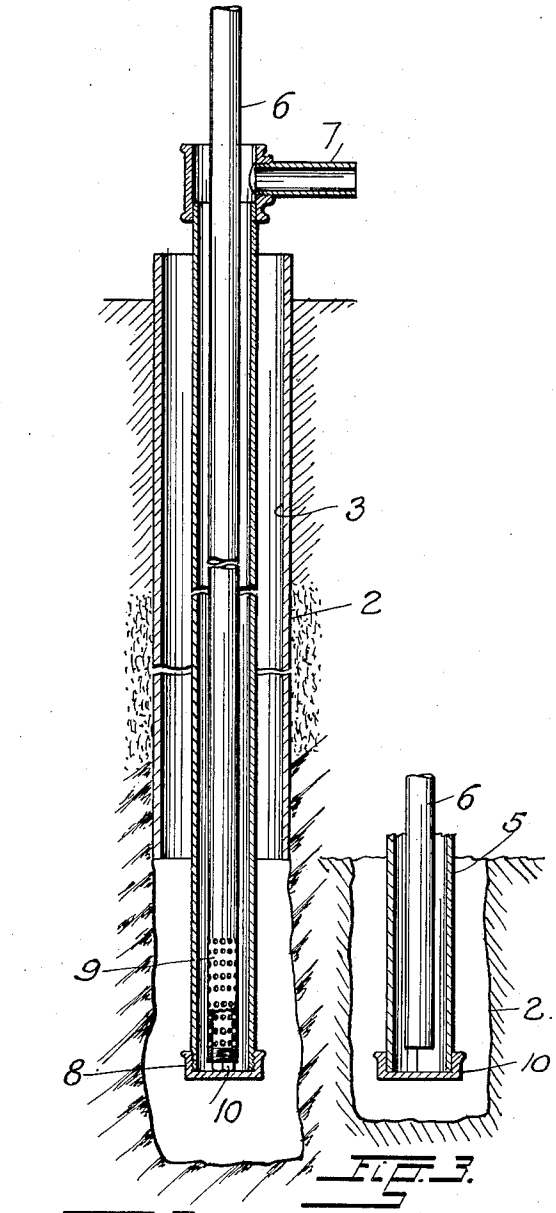


Fig. 2

Fig. 3.

WITNESS:

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APPARATUS FOR REMOVING PARAFFIN FROM OIL-WELLS.

1,358,393. Specification of Letters Patent. Patented Nov. 9, 1920.

Application filed March 25, 1920. Serial No. 368,543.

To all whom it may concern:

Be it known that I, SAMUEL F. RATHVON, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Apparatus for Removing Paraffin From Oil-Wells, of which the following is a specification.

This invention relates to apparatus for removing paraffin from oil wells, and its primary object is to provide a simple and efficient apparatus for melting the paraffin contained in the oil-bearing strata of an oil-well and thereby allow of its being discharged with the oil.

It is a well-known fact that the presence of paraffin interferes with the flow of oil into a well and that if found in large quantities it often accumulates in the bore to the extent that the outflow of oil is obstructed.

Several methods have been devised to avoid an occurrence of this character, the most popular, perhaps, being the introduction of steam into the well for the purpose of melting the paraffin.

It was found however, that this method is unsatisfactory not only by reason of the limited amount of heat conveyed by the steam, especially in wells of great depth, but also owing to the accumulation of water in the bottom of the well which interfered with the subsequent removal of the oil.

Another method contemplates the removal of the paraffin by circulating hot water through a closed pipe inserted in the well and passing through a furnace placed above the same. This method while avoiding the objectionable accumulation of water of the first-mentioned process has the disadvantage of insufficient heating capacity, it having been found by carefully conducted experiments that in order to successfully remove the paraffin for the free flow of oil into the well it is necessary to heat the rock in the fissures and crevices in which it is contained to a high temperature and to a considerable depth.

To attain this result it is essential that the heating fluid introduced into the well should retain a high temperature during its flow to the bottom portion thereof irrespective of the distance to be traversed and that the fluid be conducted through the bore without coming in contact with the walls thereof, whereby to permit of the ready outflow of the melted paraffin.

With these objects in view my improved apparatus introduces hot water into a conduit spaced from the walls of the well under a continuous pressure which not only increases its temperature but also causes it to retain its heat with very little loss irrespective of the depth to which it is conveyed.

I furthermore provide means for a continuous discharge of the heating fluid at the mouth of the well after it has performed its function in melting the waxy matter in the lower portion of the same, for the purpose of maintaining a feed of uniform temperature unobstructed by the return flow of cooled water.

An additional advantage of my improved melting apparatus lies in that it permits of employing the same tube which is used in pumping the oil from the well thereby reducing the cost of operation, and in that in flowing wells it may be continuously used without interfering with the natural outflow of the oil.

In the accompanying drawings in the various views of which like parts are similarly designated, I have illustrated the simple mechanism employed,

Figure 1 representing a sectional view of an oil-well showing the apparatus employed in its operative condition;

Fig. 2, a similar view drawn to an enlarged scale, showing the liquid conveying elements of the apparatus in detail, and

Fig. 3 a broken section of the lower portion of said conveying elements showing a modification in their construction.

In the drawings, the reference character 2 designates the vertical bore of an oil-well and 3 the metal casing of the same which terminates at a distance above the bottom of the well to permit of the inflow of oil from the crevices and fissures of the surrounding rock.

A boiler 4 of suitable size and construction is positioned near the mouth of the well to heat the liquid by which the paraffin in the portion of the bore not covered by the casing is reduced to a liquid state.

The reference numeral 5 designates a conduit of the type ordinarily used in pumping the oil from the well and 6 designates a pipe of smaller diameter which is connected with the water space of the boiler.

The conduit has as usual a spout 7 at its upper end for the discharge of rising

liquid and it is adapted for use by having its lower end closed by means of a screw cap 8.

The pipe 6 which in practice extends in the center of the conduit throughout the length thereof has in its lower portion a multitude of perforations 9 for the issuance of the heating liquid and its end is closed by a screw plug 10 which may be conveniently employed to support the pipe upon the bottom of the conduit.

In the modification shown in Fig. 3 the pipe 6 is suspended above the bottom surface of the conduit and it is open at its end to allow the hot liquid to pass into the conduit without the use of perforations or other outlets such as are shown in the form of the apparatus illustrated in Fig. 2.

In utilizing my apparatus the conduit and the pipe in the relative positions shown in the drawings, are lowered into the well and the water in the boiler is heated to a steam generating condition in order to obtain the pressure which is essential to produce the desired results.

After the water has been heated to the required temperature a cock 12 which controls the flow through the pipe 6, is opened and the hot water under pressure of its steam flows from the boiler into and through the pipe to be discharged at the lower end thereof into the conduit in which it is suspended.

The temperature of the water is raised by the vapor pressure to which it is constantly subjected and the same pressure accelerates the downward movement of the water and causes it to retain its high temperature until after it has been discharged into the conduit, it being understood without further illustration that in order to obtain satisfactory results an automatic feeding appliance must be connected with the boiler to compensate for the continuous outflow of water.

The hot water rising in the conduit first of all melts any paraffin which may have accumulated in the bottom of the well and subsequently conveys its heat to the surrounding rock with the result that the waxy matter which obstructs the flow of oil from the fissures thereof is likewise melted.

The water rising in the conduit in ratio to its inflow is constantly discharged through the spout above the mouth of the well and the melted paraffin is discharged from the well with the oil either by a natural outflow while the heating process is carried on or by a pumping action after the cap at the end of the conduit, and the pipe have been removed.

In order to obtain the best results it is necessary that the rock in which the paraffin is contained be heated to a considerable depth and this can be accomplished only by a long continuous supply of water at a maximum degree of heat.

What I claim and desire to secure by Letters-Patent is:

1. The combination with a boiler having a space for heated water and above the same a space for steam, whereby the water is kept continuously under more than atmospheric pressure, of a vertical pipe connected with said water-space and adapted to extend downwardly in an oil well, and a vertical return conduit communicating at its lower end with the lower end of said pipe and having an escape-opening for the water at its other end.

2. The combination with a boiler having a space for heated water and above the same a space for steam, whereby the water is kept continuously under more than atmospheric pressure, of a vertical conduit adapted to extend downwardly in an oil well, said conduit being closed at its lower end and having an escape opening at its upper end, and an open-ended pipe spaced inside the conduit and connected at its upper end with said water space of the boiler.

In testimony whereof I have affixed my signature.

SAMUEL F. RATHVON.