Jan. 5, 1932. W. W. AGNEW 1,839,632

METHOD OF AND APPARATUS FOR TREATING OIL WELLS

Filed June 26, 1930

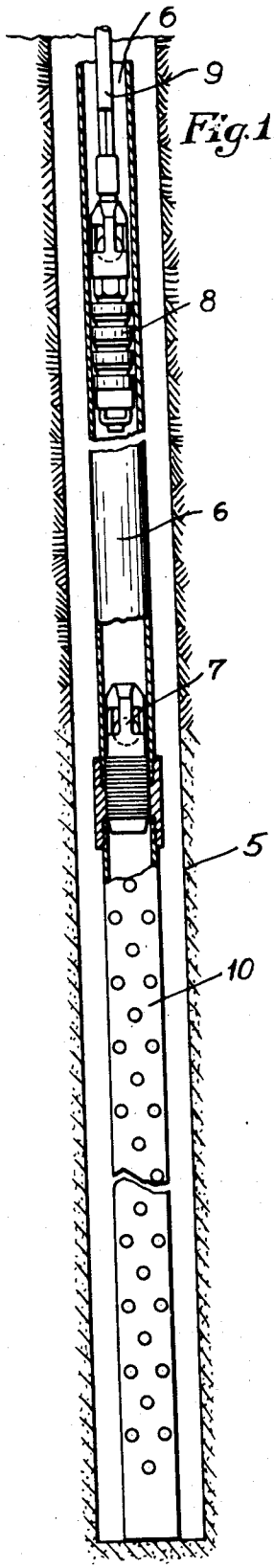


Fig. 1.

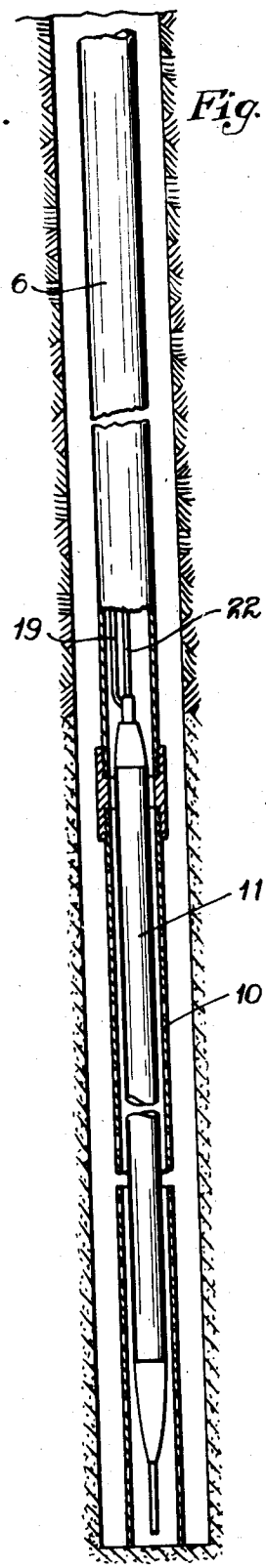


Fig. 2.

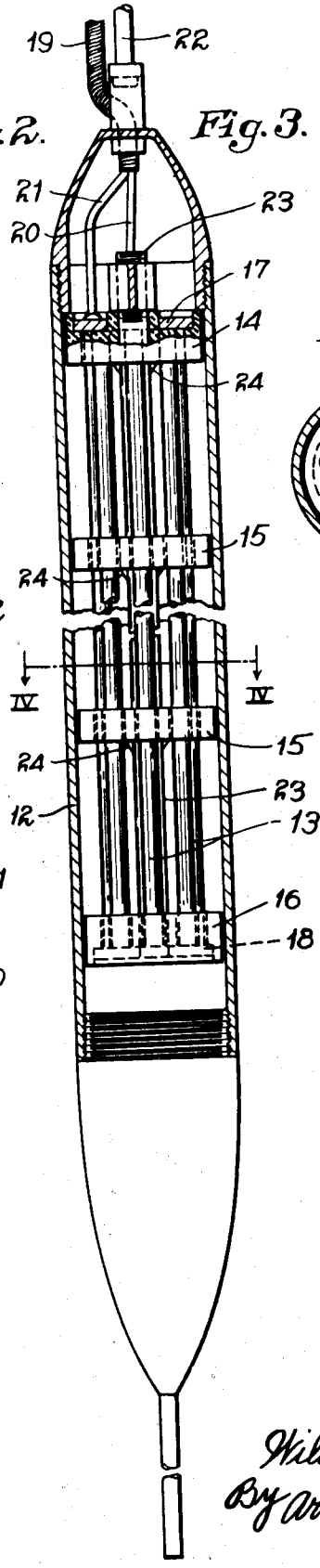


Fig. 3.

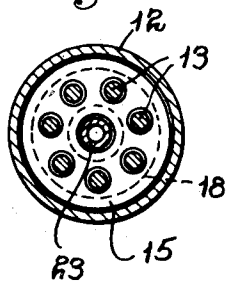


Fig. 4.

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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR TREATING OIL WELLS

Application filed June 26, 1930. Serial No. 463,926.

My invention relates to a method of and apparatus for treating oil wells, and more particularly to the softening of paraffin wax which frequently accumulates in the oil-bearing strata and retards or prevents flow of oil to the pump valve.

My invention has for its object the provision of means for more effectively softening and removing the paraffin than by various systems heretofore employed, and in a simple and inexpensive manner, without danger of injuriously affecting the well.

One manner in which my invention may be practised is shown in the accompanying drawings wherein Figure 1 is a vertical sectional view of the lower portion of a well, with the pumping apparatus in position therein; Fig. 2 is a view showing the working valve and the standing valve of Fig. 1 removed, and my heating device in position for treating the well; Fig. 3 is a vertical sectional view, on an enlarged scale, of the heating device of Fig. 2, and Fig. 4 is a view taken on the line IV—IV of Fig. 3.

The oil-bearing strata or sand at or near the bottom of the well is indicated by the numeral 5, while the numeral 6 indicates the working barrel portion within which a standing valve 7 and a working valve 8 are located. The working valve 8 is operated by a pump rod 9. The parts thus far described may be of various well-known standard forms of pumping apparatus.

When hardened paraffin accumulates in the oil-bearing strata 5, it of course obstructs flow of oil to the strainer pipe or anchor pipe 10 that is connected to and disposed beneath the working barrel of the pump. Thereupon it becomes necessary to break up or remove the accumulated paraffin. Heretofore, various means have been employed for opening up the oil-bearing strata at the bottom of the well as by shooting or by directing a steam jet into such strata. Both of these systems are open to various objections. For example, in the case of the steam jet, the steam in flowing to the bottom of the well suffers a loss in temperature and becomes condensed, and furthermore, becomes cooled through contact with the sides of the well at the bottom thereof, causing an accumulation of fresh water in the hole.

In practising my method, the pump rods 9 and the valves 7 and 8 are removed from the tubing 6, whereupon an electric heating element 11 is lowered into the tubing until it reaches approximately the bottom of the well, at the strainer pipe 10. Usually, there is an accumulation of water or oil in the bottom of the well in which the heating element 11 is immersed, so that such liquid will become heated to a temperature at which the paraffin is liquefied and can be pumped from the well with the oil and water.

The heating device 11 has a casing 12 within which a series of annularly-arranged electric resistor elements are supported. A series of perforated spacing blocks 14, 15 and 16, which may be of slate or other suitable insulating material, serve to maintain and support the heating elements 13 in spaced relation to one another.

A conductor block 17 is set within a recess in the upper side of the insulating block 14, and a conductor block 18 is set within a recess in the underside of the insulating block 16. The upper ends of the resistor bars 13 are connected to the conductor block 17 and the lower ends thereof are connected to the block 18. A conductor 23 extends through the central portions of the blocks 14, 15 and 16, and is electrically connected at its lower end to the block 18.

A cable 19 leads from a source of electrical energy at the top of the well and contains conductors 20 and 21. The conductor 20 is connected to the upper end of the conductor 23, while the conductor 21 is connected to the block 17. The current will therefore flow through the conductor 20, the conductor 23,

block 18, resistors 13, block 17 and the conductor 21 to effect heating of the liquid and hence of the paraffin. A lifting rod or cable 22 is provided for lowering the heating device 12 into the well and for removing it therefrom.

The casing 12 is provided with screw caps for protecting the conductor members within the casing, and which nevertheless permit convenient access to the interior of the casing. The central conductor 23 is shown as having lugs 24 struck out therefrom to maintain the spacing blocks 15 at proper vertical positions.

When the heating device 12 has been removed from the pump tubing, the valves 7 and 8 and the pump rod 9 may then be placed in position and pumping operations again started, the paraffin of course being still in liquid form by reason of the heated condition of the well, and hence will be pumped from the well, before it becomes again hardened.

My invention has the further advantage that it is unnecessary to pull or remove the pump tubing from the well in order to insert the heater, thereby saving not only expense but also delay.

I claim as my invention:—

1. A heating device for treating wells and the like, comprising a fluid-tight casing having end portions of tapering form, to permit of convenient movement into and from pump tubing, one of said end portions being removable, an electrical conductor extending through the uppermost end portion, upper and lower conductor blocks in the casing, perforated insulating discs in the casing, resistor bars connected at their upper and lower ends, respectively, to said blocks and each extending through a perforation in each of said discs, a connection between the said conductor and one of the blocks, and an electrical conductor connected to the other block.

2. A heating device for treating wells and the like, comprising a fluid-tight casing having end portions, one of said end portions being removable, an electrical conductor extending through the uppermost end portion, upper and lower conductor blocks in the casing, perforated insulating discs in the casing, resistor bars connected at their upper and lower ends, respectively, to said blocks and each extending through a perforation in each of said discs, a connection between the said conductor and one of the blocks, and an electrical conductor connected to the other block, the uppermost and lowermost discs each being recessed for the reception of one of the conductor blocks.

3. A heating device for treating wells and the like, comprising a fluid-tight casing having end portions, one of said end portions being removable, an electrical conductor extending through the uppermost end portions, upper and lower conductor blocks in the casing, perforated insulating discs in the casing, resistor bars connected at their upper and lower ends, respectively, to said blocks and each extending through a perforation in each of said discs, a connection between the said conductor and one of the blocks, and an electrical conductor connected to the other block, the uppermost and lowermost discs each being recessed in its outer side for the reception of one of the conductor blocks.

In testimony whereof I, the said WILLIAM W. AGNEW, have hereunto set my hand.

W. W. AGNEW.