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APPARATUS FOR CLEANING OIL WELLS

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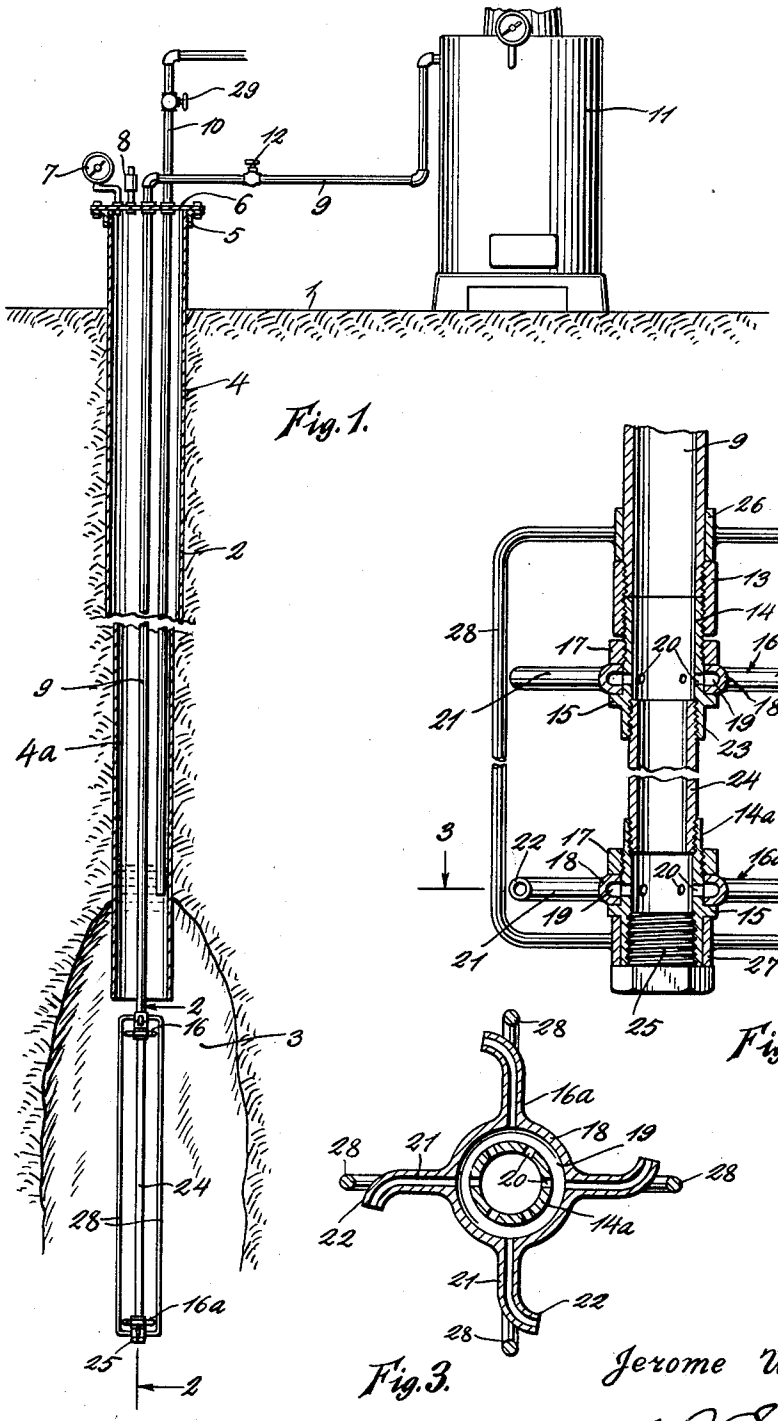

Fig. 1.

Fig. 2.

Fig. 3.

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APPARATUS FOR CLEANING OIL WELLS.

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This invention relates to improvements in apparatus for cleaning oil wells.

It is well known to those versed in the art of oil production that only a small part of the actual amount of oil present in the ground is recovered. This is due to the fact that the wells clog up or become sealed by reason of paraffine or asphaltum hardening on the inner surfaces of the walls and closing up the pores whereby the oil present in the surrounding material is prevented from flowing into the well.

I am aware that many different methods have been proposed for removing the paraffine that seals the wells among which may be mentioned the introduction of heat in sufficient amounts to melt the paraffine so as to permit it to be removed by pumping or otherwise. The use of heat for the purpose of cleaning wells seems to be the one method that holds out the greatest prospects for success and it is to the improvements in apparatus for carrying out such a method that this invention is directed.

I have found that in order to successfully remove paraffine by means of heat it is quite important that the contents of the well should be agitated so as to drive the heat carrying material towards the walls of the well and to maintain the contents under pressure. I have therefore invented an apparatus that can be used to carry out such a method in a satisfactory way.

My improved apparatus and the combination of elements embodied therein can best be described when reference is had to the accompanying drawing which shows the preferred embodiment of my invention and in which:

Fig. 1 is a vertical section through a well showing my apparatus in place therein;

Fig. 2 is a section taken on line 2—2, Fig. 1 showing parts of my invention to an enlarged scale; and,

Fig. 3 is a section taken on line 3—3, Fig. 2.

Numeral 1 represents the surface of the ground and 2 a well whose lower end has been enlarged so as to form a chamber 3. Wells of this type are usually lined with a metal casing which has been designated by numerals 4 and 4ª.

In applying my apparatus to the well I secure a flanged coupling member 5 to the upper end of the casing section 4 and secure to this a plate 6. This plate is provided with four holes or openings for the reception of a pressure gauge 7, a safety or poppet valve 8, a steam pipe 9 and an outlet pipe 10. The steam pipe has its upper end connected to the boiler 11 and is provided with a control valve 12. Secured to the lower end of the steam pipe 9 by means of a coupling 13 is a connector 14 whose interior and exterior diameters are respectively the same as those of the pipe 9. This connector has an annular collar 15 which serves as a support or bearing for the rotary repulsion distributer 16 which will presently be described. A threaded ring 17 serves to hold the distributer in place. The distributer 16 is constructed in the same manner as the distributer 16ª that is shown in section in Fig. 3 but is reversed so that it will rotate in the opposite direction. Each of these distributers has a hub portion 18 provided with an annular groove 19 which is in communication with the interior of the connector through the holes 20. Each distributer 16 and 16ª has four or more arms 21 whose outer ends are curved in the manner indicated at 22 in Fig. 3. The ends 22 of the upper distributer are curved in the opposite direction from those of the lower so that they will rotate in opposite directions when steam flows outwardly through the hollow arms 21. The lower end of the connector 14 is internally threaded in the manner indicated by numeral 23 for the reception of a pipe 24 to whose lower end a connector 14ª is connected. This connector is substantially identical with the distributer 14 and has its lower end closed by a plug 25. A ring 26 rests upon the upper end of the coupling 13 and a similar ring 27 is clamped between the flange 15 of the connector 16ª and the head of the plug 25 and these rings are connected by a plurality of rods 28 that form a cage within which the distributers 16 and 16ª rotate and which protect these distributers against injury while they are inserted and removed.

The device operates as follows: Let us assume that the parts are assembled in the manner shown and that steam at a pressure of about one hundred pounds per square inch is being generated in the boiler 11; let us now open the valve 12 so that steam may flow downwardly through the pipe 9. A part of this steam will flow outwardly through the hollow arms 21 of the distributer 16 and another part will flow outwardly through the corresponding arms of the dis-

tributer 16ª. These distributers will rotate in opposite directions and distribute the steam to the sides when, if the chamber 3 is empty, the steam will strike the walls and cause the same to become heated whereby the paraffine will melt. The condensed steam will accumulate in the bottom of the chamber. The chamber 3 and the well will soon become filled with steam which will increase the pressure within the well, when the pressure has attained a value of seventy-five pounds per square inch or thereabouts, measured by the gauge 7 the supply is adjusted so as to maintain this pressure. If the pressure is inadvertently increased beyond the desired value, the safety valve 8 operates to relieve it. As long as the pressure is maintained in the well, the parts are kept hot and will soon melt or dissolve objectionable sealing material such as paraffine. The water of condensation and oil from the well will soon reach a level above the lower end of the pipe 10 and the valve 29 in the outlet pipe can now be opened. The pressure within the casing will cause liquid to rise in pipe 10 and to flow outwardly which makes it possible to determine the progress made in the cleaning operation by the composition of the liquid exhausted. By varying the length of the pipe 10 the depth at which the sample liquid is obtained can be determined. This is very important as it makes it possible to determine how far the operation has proceeded at any time. When the operation has been carried on until the paraffine has melted the pumping operation may be commenced. I also desire to call attention to the fact that it is possible to insert the pump pipes without withdrawing the steam pipe 9 which may be left in place. This makes it possible to simultaneously heat the contents of the well and to continue pumping. In this manner the danger of clogging the pump with paraffine is obviated.

I desire to lay emphasis upon the fact that by virtue of my improved construction no loss of steam can result since the top of the casing is closed, until the maximum pressure is attained and the safety valve opens. Hence, the steam effective for use with my improvement is always maintained at the desired pressure to perform the function required.

Having now described my invention what I claim as new is:

A rotary steam distributing device for cleaning oil wells comprising a hollow member (14) having an outwardly extending cylindrical flange (15), an externally threaded portion a short distance above said flange, a threaded ring (17) secured to the threaded portion, a cylindrical bearing surface between said flange and said threaded portion, a reaction turbine member (18) rotatably mounted on said cylindrical bearing surface between the flange and the ring, said turbine member having a plurality of hollow radial arms whose ends are curved in the same direction, the interior of said arms being in communication with an annular groove (19), said hollow member having openings (20) through which communication is effected between the interior and the annular groove.

In testimony whereof I affix my signature.

JEROME WIESMAN.