

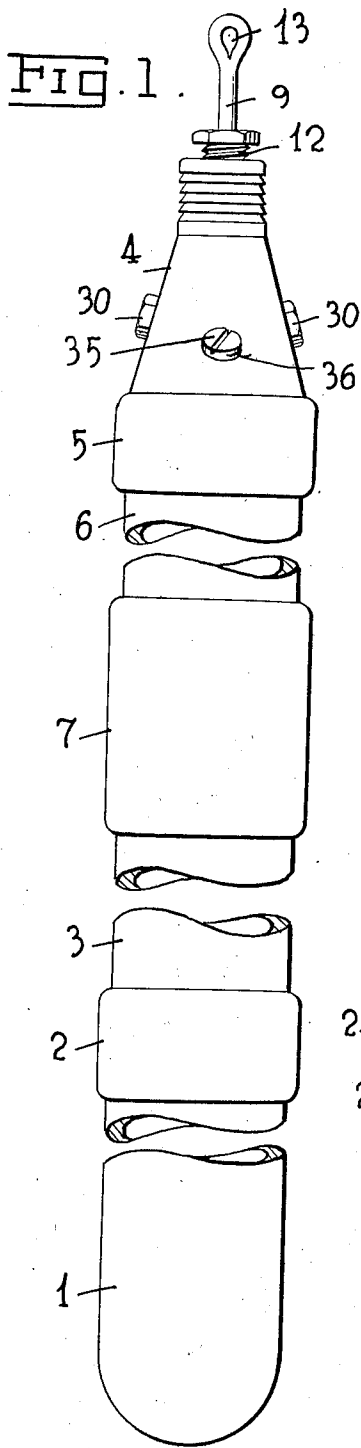
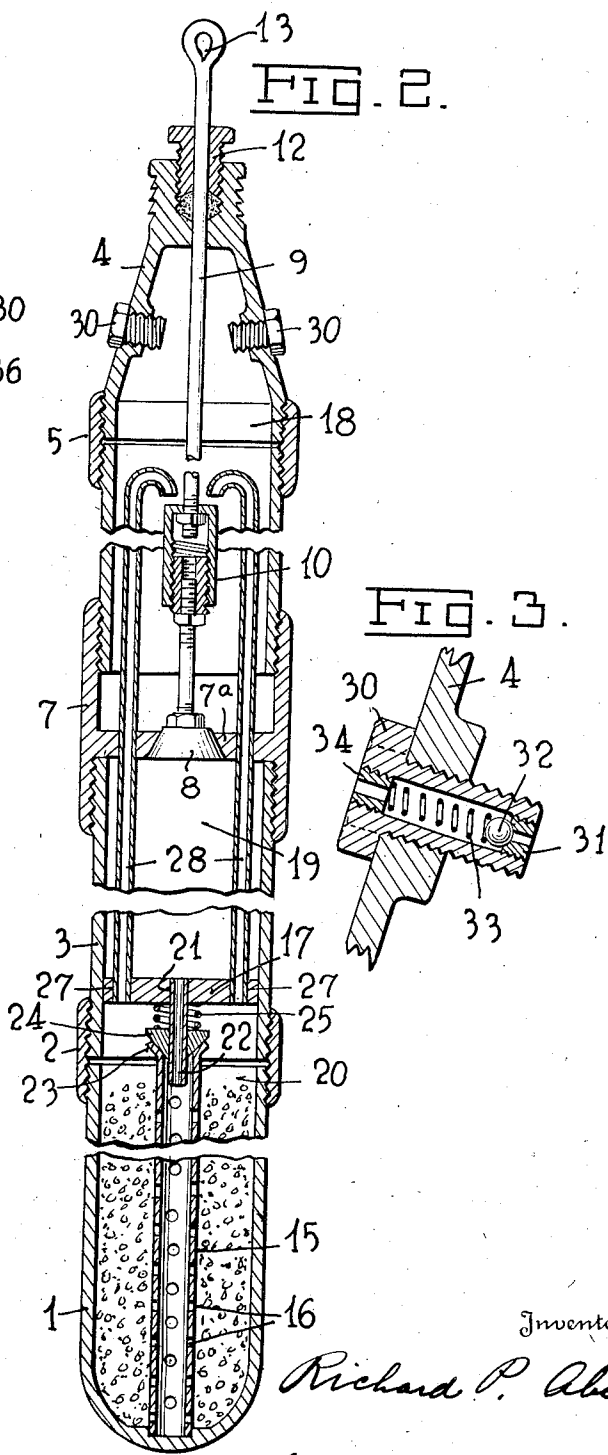
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HEATER FOR OIL WELLS

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HEATER FOR OIL WELLS

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7 Claims. (Cl. 166—17)

This invention relates to chemical heaters for oil wells. More particularly, it relates to that general class of heaters which are adapted to be lowered into an oil well to the level of the oil producing strata and which serve to melt paraffine and other solidified petroleum materials which, in many cases, materially limit the productivity of a well.

The invention is an improvement over the heaters shown and described in Vandever applications Serial Nos. 731,537, Patent No. 2,004,452 and 751,214.

Heaters of the general class to which this invention relates, comprise a housing which is adapted to be lowered into a well to be treated. The housing contains in separated compartments chemicals, which, when mixed will produce an exothermic reaction, generating sufficient heat to liquefy a substantial portion of the solidified petroleum material in the oil producing strata.

As has been brought out in the prior applications above referred to it is desirable, in heaters of this type, that simple and rugged means be provided for maintaining the chemicals within the heater out of contact with each other while the housing is being lowered into the well and to provide simple and positive means for bringing the chemicals into contact with each other when the housing has reached the level of the oil producing strata.

It is an object of the present invention to provide a heater of this general type which has an internal construction which will ensure a complete reaction of the chemicals when mixed and which will facilitate such reaction. It has been found that in heaters of this general type considerable difficulty has been encountered in disposing of the gas and steam resulting from the reaction. It is, of course, desirable that a certain predetermined maximum temperature be maintained within the housing in order to increase and localize the heat produced thereby.

It is an object of this invention to provide means for conducting the steam and gases resulting from the reaction to a point near the upper portion of the housing in order that they will not interfere with the downward movement of fluid producing the reaction.

Still a further feature of the invention lies in the construction of the upper ends of the conduits so that the upper portion of the heater may be filled with liquid without likelihood of such liquid being conducted to the lower chamber of the heater by said conduits.

Many further objects and advantages of the in-

vention will become apparent from the following specification when considered in connection with the accompanying drawing.

In the drawing:

Fig. 1 is a side elevation of the improved heater housing broken away at points intermediate its ends;

Fig. 2 is a vertical sectional view of the housing showing the interior arrangement of parts with the main valve in closed position; and

Fig. 3 is an enlarged sectional view of the escape valve.

With more particular reference to the drawing, the heater comprises a housing, generally cylindrical in form, composed of a number of separable parts. The lower end of the housing comprises a rounded end member 1 which is screwed into one side of a coupling 2, which in turn has a suitable length of cylindrical casing 3 threaded into the opposite side thereof. The upper end of the housing is closed by means of a tapered end member 4 screwed into a coupling, into the opposite side of which coupling is screwed a cylindrical length of casing 6 of the same diameter as the casing 3 but in general somewhat longer. The casing elements 3 and 6 are joined together by means of a coupling element 7, the function of which will be apparent. The coupling 7 has a cylindrical internal threaded portion and has a radially disposed inwardly extending web 7^a. The web 7^a has a circular aperture substantially centrally thereof having a conical valve seat adapted to cooperate with a conical faced valve 8. The valve 8 is controlled by an upwardly extending valve stem 9 connected to the valve by a suitable universal connection 10.

The upper end of the housing 4 is provided with a suitable packing gland 12 through which the valve stem 9 may reciprocate. This packing gland serves to prevent the escape of fluid from the interior of the housing. The upper end of the valve stem 9 outside of the housing is provided with an eye 13 to which a suitable cable may be fastened for lowering the housing into the well.

The construction thus far described is substantially the same as is shown and described in the prior applications referred to above and it will be seen that as the housing is lowered into the well by means of the cable passing through the eye 13 the weight of the housing will maintain the valve 8 in engagement with its seat.

Mounted centrally of the end portion 1 of the housing is a pipe 15 having a plurality of perforations 16 therein. This pipe extends axially of

the housing upwardly a substantial distance to a point just below a partition wall 17 secured to the walls of the section 3 of the housing providing a fluid tight joint.

5 It will now be seen that the housing internally is divided into three separate upper, lower and central chambers, the web 7^a separating the upper and central chambers and the wall 17 separating the central chamber from the lower chamber. 10 The upper, central and lower chambers are respectively designated by the reference characters 18, 19, and 20.

An aperture 21 is provided in the axial central portion of the partition wall 17 in which is mounted 15 a short downwardly extending tube 22 which extends a short distance into the upper end of the perforated pipe 15. The upper end of the pipe 15 is flared to form a conical valve seat 23 for an annular valve body 24 which is slidably mounted 20 on the outside of the downwardly extending tube 22.

A compression coil spring 25 having one end abutting against the partition wall 17 and the other against the upper surface of the valve body 24 urges the valve body into engagement with its seat.

A pair of apertures 27 are provided in the partition wall 17 radially outwardly of the aperture 21 into which are threaded a pair of upwardly extending tubes 28. The tubes 28 extend upwardly 30 through the chamber 19 passing through the web 7^a and extending well up into the upper portion of the chamber 18. These pipes have their upper end portions bent over in order that the upper 35 portion will be closed and the openings thereof will be faced downwardly, so as to thus provide open ends but not facing upward since water entering the top thereof might cause trouble. It will be apparent that these tubes provide constant 40 communication between the lower and upper chambers and do not have any outlet into the central chamber.

An escape valve is provided in the upper end section 4 of the housing. This escape valve is 45 shown as a casting 30 threaded into a suitable aperture in the end section 4. The casting has an axial bore through its center and has a valve seat 31 mounted at the inner end of the bore with which cooperates a ball valve 32 held in engagement 50 with the seat by means of a compression coil spring 33. The outer end of the coil spring 33 abuts against a collar 34 suitably secured in the bore of the casting 30. This escape valve serves to regulate the maximum pressure which is permitted to exist within the housing. Also, mounted 55 in the upper end section of the casing is a filler plug 35 which serves to close a filling aperture 36.

In the operation of the heater, it will be seen that the lower end section of the heater 1 may be 60 unscrewed from the coupling 2 and the annular space surrounding the perforated pipe 15 filled with a suitable chemical, such for example, as caustic soda and aluminum cuttings. The lower end section is then screwed back to the coupling 65 and the housing is supported by means of the eye 13 on the valve stem 9.

When the housing is thus supported, the valve 8 is brought tightly into engagement with its seat and the upper chamber of the housing 18 may 70 then be partially filled with water through the filler plug 35. It will be apparent that the ends of the tube 28 will prevent this water as it is introduced into the upper chamber from passing downwardly through the tubes into the lower 75 chamber. When the upper chamber has been

partially filled, the filler plug may be replaced and the heater is then ready for operation. It is then lowered into the well and when it has reached the bottom the engagement with the end section 1 with the bottom of the well will permit the displacement of the valve 8 from its seat. Thus, 5 allowing the water in the upper chamber to descend into the central chamber.

The water in the central chamber may then flow downwardly through the tube 22 into the 10 perforated pipe 15 and outwardly through the perforations 16 into contact with a relatively large area of the caustic soda and aluminum cuttings in the annular space around this pipe. This will immediately cause a reaction resulting in the 15 generation of considerable heat. As a result of this reaction, considerable steam and gas also will be generated, some of which may pass into the central perforated pipe 15 and some of which may accumulate in the upper end of the lower 20 chamber 20. The gas accumulating in the central pipe 15 will be permitted to pass into the upper end of the lower chamber 20 by displacement of the valve body 24. The gas from the upper end of the chamber 20 will be conducted by means of 25 the tubes 28 into the upper portion of the upper chamber, thus in no way interfering with the downward movement of water from the upper chamber through the central chamber into the 30 lower chamber.

Considerable pressure will be built up until a point has been reached where the escape valve 32 will be forced from its seat permitting the escape of surplus gas. The retention of considerable 35 pressure within the housing serves materially to intensify the heat produced and increase the efficiency of the heater.

It will be apparent from the foregoing that the heater disclosed in this application provides for a uniform and complete reaction of the materials 40 contained in the heater, and provides a relatively simple and rugged construction.

Other modifications and advantages will become apparent to those skilled in the art.

What I claim is:

1. A heater for oil wells comprising a housing adapted to be lowered into a well to be heated, said housing being divided internally into an upper chamber, a lower chamber and a central chamber, a chemical contained in said lower 50 chamber and a fluid contained in said upper chamber, and means for conducting gases in said lower chamber through the central chamber to the upper portion of said upper chamber.

2. A heater for oil wells comprising a housing adapted to be lowered into a well to be heated, said housing being divided internally into an upper chamber, a lower chamber and a central chamber, a chemical contained in said lower 60 chamber and a fluid contained in said upper chamber, and conduits establishing communication between the upper portion of said lower chamber and the upper portion of said upper chamber.

3. A heater for oil wells comprising a housing adapted to be lowered into a well to be heated, said housing being divided internally into an upper chamber, a lower chamber and a central chamber, a chemical contained in said lower 70 chamber and a fluid contained in said upper chamber, and a pair of conduits having their lower ends communicating with the upper portion of said lower chamber and their upper ends opening into the upper portion of said upper chamber. 75

4. A heater for oil wells comprising a housing adapted to be lowered into a well to be heated, said housing being divided internally into an upper chamber, a lower chamber and a central chamber, a chemical contained in said lower chamber, and a fluid contained in said upper chamber, and a plurality of conduits connecting the upper portion of said lower chamber and the upper portion of said upper chamber, the upper end portions of said conduits being open to the space in said upper chamber, the extreme upper end of said tubes being closed over to prevent the access of fluid thereto during the filling of said upper chamber.

5. A heater for oil wells comprising a housing adapted to be lowered into a well to be heated, said housing being divided internally into an upper chamber, a lower chamber and a central chamber, a chemical contained in said lower chamber and a fluid contained in said upper chamber, and a plurality of conduits connecting the upper portion of said lower chamber and the upper portion of said upper chamber, the upper ends of said conduits being turned over and having the openings therein downwardly faced whereby to prevent the admission of fluid to said conduits while the upper chamber is being filled.

6. A heater for oil wells comprising a housing

adapted to be lowered into a well to be heated, said housing being divided internally into upper, lower and central chambers, said lower chamber adapted to contain a chemical said upper chamber adapted to contain a body of liquid, which, when mixed with said chemical will produce an exothermic reaction, means for controlling the flow of liquid from the upper chamber into said lower chambers, and conduits for conducting gas and steam from the upper portion of said lower chamber to the upper portion of said upper chamber.

7. A heater for oil wells comprising a housing adapted to be lowered into a well to be heated, said housing being divided internally into upper, lower and central chambers, said lower chamber adapted to contain a chemical said upper chamber adapted to contain a body of liquid, which, when mixed with said chemical will produce an exothermic reaction, means for controlling the flow of liquid from the upper chamber into said lower chambers, conduits for conducting gas and steam from the upper portion of said lower chamber to the upper portion of said upper chamber and means for maintaining a predetermined maximum pressure within said housing.

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