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ELECTRIC HEATER FOR OIL WELLS

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Fig. 1.

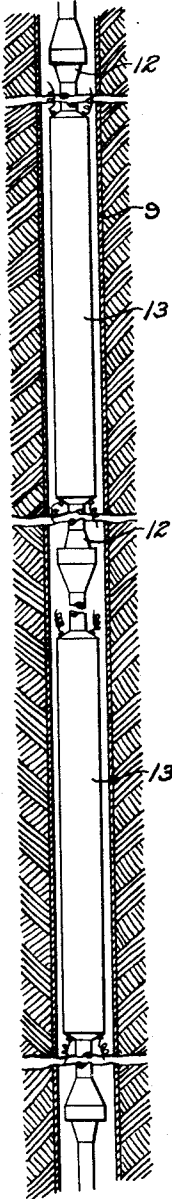


Fig. 2.

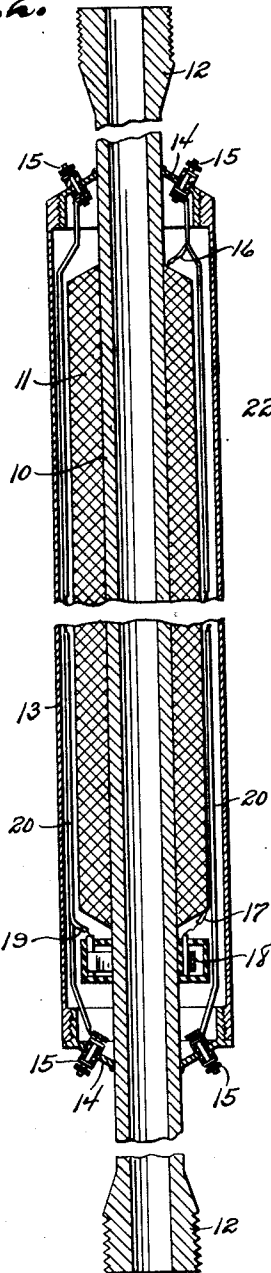
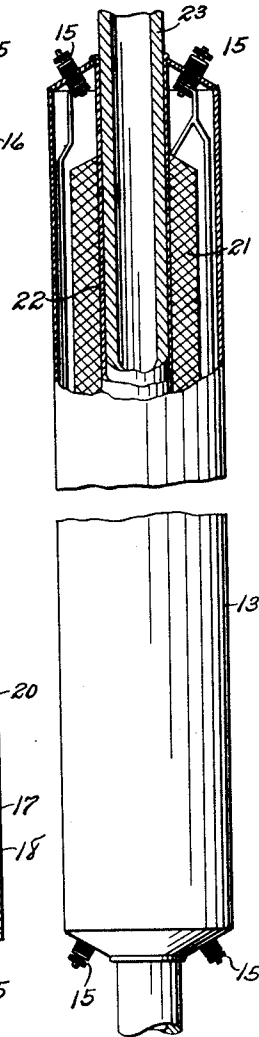


Fig. 3.



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ELECTRIC HEATER FOR OIL WELLS

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2 Claims. (Cl. 219—33)

This invention relates to an electric heater for oil wells, and has for an object to provide a heater which will effectively remove paraffin from oil wells.

Much difficulty is caused by paraffin which begins to form in oil wells about five hundred feet from the top of the tubing. It soon closes up the tubing causing the well to stop flowing. Ordinarily, the paraffin is removed in some instances with a tool called a scratcher which cleans the paraffin from the inside of the tubing. This operation must be performed every few days to maintain production. As an alternative for the scratcher, a chemical is sometimes placed in the well to cut the paraffin loose from the tubing, and in other cases steam is used to melt the paraffin.

The present invention provides a heater which may be built into the tubing string as an integral part thereof or may be slipped onto the string to heat the tubing and cause circulation therein, the combined heat and circulation being found to effectively remove the paraffin, the heater in practice being operated intermittently as becomes necessary.

A further object of the invention is to provide a heater of the induction type which may be readily assembled with the tubing, which will be inexpensive to manufacture, which will be formed of a few strong, simple and durable parts, and which will not easily get out of order.

With the above and other objects in view, the invention consists of certain novel details of construction and combinations of parts hereinafter fully described and claimed, it being understood that various modifications may be resorted to within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawing forming a part of this specification:

Figure 1 is a longitudinal sectional view of a conventional oil well showing a plurality of heaters, constructed in accordance with the invention, therein.

Figure 2 is a longitudinal sectional view of the heater constructed to form an integral unit of the well tubing.

Figure 3 is a modified form of the heater constructed to be slipped onto the well tubing.

Referring now to the drawing in which like characters of reference designate similar parts in the various views, 10 designates a pipe upon which is wound an induction coil 11. The pipe is considerably shorter than, but similar in diame-

ter to, a section of the well tubing. The pipe is provided at its ends with couplings 12 by which the pipe is connected in the tubing string.

A cylindrical protecting jacket 13, containing oil, surrounds the coil and is spaced therefrom. The jacket has its ends threadedly engaged with flanged end plates 14 which are fixed to the pipe. The end plates are of different diameters and one end of the jacket is of greater diameter than the other to permit the jacket to be slipped over the coil and the ends of the jacket, and simultaneously secured to the end plates. Binding posts 15 extend through, and are insulated from the end plates 14. The conductors leading from the source of current supply are connected to the binding posts.

One end of the coil is connected to one of the binding posts by a conductor 16. The other end of the coil is connected by a conductor 17 to a temperature relay or thermostat 18 of conventional type, located within the jacket and secured to the pipe 10. The thermostat is connected by a conductor 19 to the other binding post. The two binding posts just described are shown at the top of Figure 2, while the binding posts shown at the bottom of the figure are connected to the upper binding posts by conductors 20 for conducting the energizing current to the next heating unit.

A modified form of the invention is shown in Figure 3, for use where it is desired to slip the heater on the well tubing instead of building it into the well tubing as an integral unit. In this form of the invention, the induction coil 21 is wound on a metal sleeve 22 which may be slipped upon and nicely fit the well tubing 23, which in this case, corresponds to the pipe 10 previously described. The remaining parts of the heater are identically the same as previously described so have been given like designating numerals.

In practice, five or six heaters constructed as above described, may be spaced along three hundred feet to five hundred feet of well tubing, above the level of the standing oil in the well casing 9. Ordinarily, the oil in most wells stands to a height of fifteen hundred feet from the top of the well in a well of about thirty-two hundred feet in depth.

In operation, an alternating current source of supply is used about four hundred and fifty volts which is standard in most oil fields. The coils of the heaters are connected in multiple, and the thermostat of each coil cuts out the coil when it reaches about 260° F. so that the coil cannot burn out, but will still be hot enough to remove par-

affin. In induction heaters of this type the coil is not a resistance coil and does not in itself become hot but the alternating flux generated sets up currents in the pipe 10 and jacket 13, which comprise the heat generating elements of the heater. Practically, the coil 11 acts as the primary winding of a transformer and the pipe 10 and jacket 13 acts as a short circuited secondary winding. In practice it has been found that the space between the well tubing and the well casing 9 is heated by the heaters, as well as is the tubing itself for the full length thereof. A circulation results in the tubing to assist in warming the tubing uniformly throughout its length to remove accumulated paraffin therefrom. Also, it will be pointed out that the oil in the jacket 13 of the heater is heated to the same temperature as the oil inside the tubing. As one example, the oil in the jacket reached a temperature of 170° F., while the pipe 10 of the heater was found to reach a temperature of 260°.

From the above description it is thought that the construction and operation of the invention will be fully understood without further explanation.

What is claimed is:

1. An electric heater for oil wells comprising,

a pipe considerably shorter than but similar in diameter to a section of well tubing provided at its ends with couplings by which the pipe is connected as a unit in the well tubing, a coil surrounding the greater portion of the pipe, means for supplying alternating current to the coil to heat the pipe by induction, a protecting jacket surrounding the coil and spaced therefrom adapted to contain oil, end plates fixed to the pipe and threadedly engaged with the ends of the jacket, the end plates being of different diameters, one end plate being larger than the other to permit the jacket to be slipped over the coil and the ends of the jacket simultaneously secured to the end plates, binding posts extending through and insulated from the end plates, electric conductors connected to the binding posts, and a rheostat disposed within the jacket, one end of the coil being connected to one of the binding posts, the rheostat being connected to the other binding post and to the other end of the coil.

2. The structure as of claim 1 and in which said coil is formed on a sleeve in lieu of said pipe adapted to be slipped onto well tubing instead of being coupled as a unit in the well tubing.

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