Oct. 25, 1938. C. C. HOGG 2,134,610

OIL BEARING SAND HEATER

Filed April 26, 1937

Fig. 1.

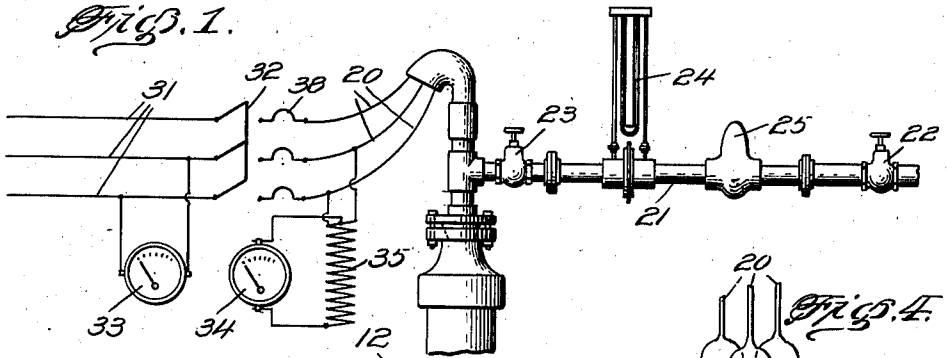


Fig. 2.

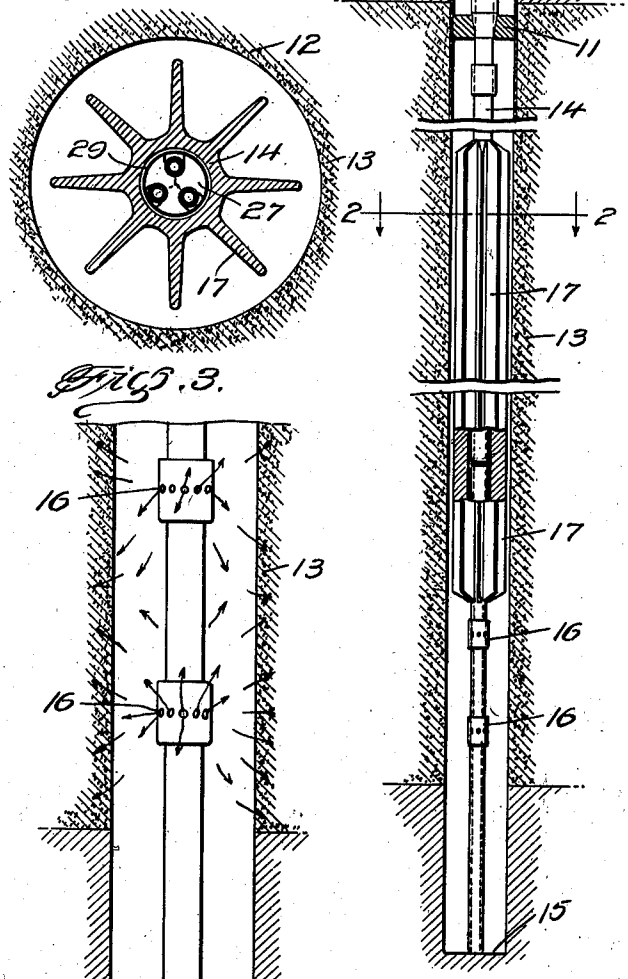


Fig. 3.

Fig. 4.

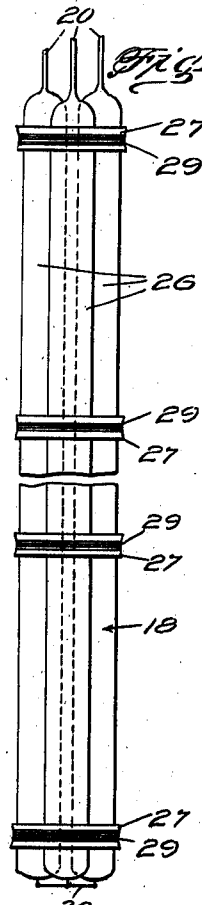
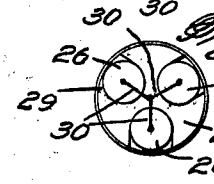


Fig. 5.



Coy C. Hogg. INVENTOR

BY Victor J. Evans & Co.

ATTORNEYS

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OIL-BEARING SAND HEATER

Coy C. Hogg, Titusville, Pa.

Application April 26, 1937, Serial No. 139,045

3 Claims. (Cl. 166—17)

This invention relates to oil bearing sand heaters and has for an object to provide apparatus for heating compressed air in the oil well at the oil bearing sand.

It is well known that if oil sand can be raised in temperature large amounts of gas will be set in motion and as a result the oil recovery will be increased considerably. With this in mind the present invention provides a novel electric heater which will be self-contained and may be lowered into position with the cables that furnish the electrical energy to heat the coils, compressed air being used as a heat transmitting medium, the air passing around the heater and after being heated passing through the more permeable portions of the sand and not only heating the oil sand of the well itself but driving oil to other producing wells in the vicinity.

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 part of this specification,

Figure 1 is a vertical sectional view of oil sand heating apparatus constructed in accordance with the invention, parts being shown in elevation and parts being shown diagrammatically.

Figure 2 is an enlarged cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detail vertical sectional view showing the compressed air outlets adjacent to the heater.

Figure 4 is a detail side elevation showing the electrical resistance elements of the heater.

Figure 5 is a bottom plan view of the parts shown in Figure 4.

Referring now to the drawing in which like characters of reference designate similar parts in the various views, 10 designates the casing of an oil well, and in applying the invention a bottom hole packer 11 is secured below the slate formation 12 and adjacent the surface of the oil bearing sand 13. The packer localizes the heated compressed air at the sand strata.

A pipe 14 is disposed axially in the casing and extends to the bottom 15 of the well and is provided near the bottom of the well with compressed air outlets 16. Above the outlets and below the packer 11 the pipe is provided with fins 17 which dissipate the heat from a novel electric heater 18 which is located axially in the pipe within the finned portion thereof, as best shown in Figure 1.

The upper end of the pipe 14 is provided with an elbow forming a weather head 19 through which three well insulated wires 20 are conducted into the pipe and suspend the heater 18 in operative position as well as supply the energizing current to the heater. A supply pipe 21 is connected to the pipe 14 and may be connected to any suitable source of compressed air supply. The pipe 21 is equipped with valves 22 and 23 for controlling the pressure, and is also equipped with a manometer 24 and orifice used to measure flow of air and also with a conventional pressure regulator 25.

Preferably three heating elements 26, of the conventional resistance type are assembled as a compact unit by a plurality of spacer blocks 27, shown best in Figure 2, bound together by a wire wrapping 29. Each spacer block is of smaller diameter than the bore of the pipe so that compressed air may pass freely through the pipe in contact with the heating elements and emerge through the outlets 16.

The resistance coils of all of the heating elements are connected together at the bottom by conductors 30, best shown in Figure 5. The three heater supporting and current supplying wires 20 are connected to conductors 31 of three-phase alternating current, the current supply being controlled by a conventional switch 32. A volt meter 33, ammeter 34, instrument transformer 35 and fuses 28 for protection all of the conventional type are employed in the usual manner.

Preferably the heating elements 26 are of the 440 volt 20 ampere 5,000 watt type. The maximum temperature of the elements is about 750° F. 6,000 cubic feet of air per hour more or less under pressure of from 20 to 400 pounds may be admitted through the pipe 14. In practice the air temperature is about 550° F. at the sand 13. The temperature of the heating elements may be controlled by the volume of compressed air introduced to prevent the heating elements from burning up.

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. Apparatus for heating oil bearing sand of an oil well, comprising a casing, a bottom hole packer secured adjacent the surface of the oil bearing sand, a compressed air pipe disposed

axially in the casing and having outlets localizing the introduction of compressed air below said packer and at the most permeable sand strata, a heater in said pipe below said packer and adjacent to said outlets.

2. Apparatus for heating oil bearing sand to increase oil production, comprising a compressed air pipe having heat dissipating fins disposed at the sand strata, a heater disposed in the pipe at the fin portion thereof, a bottom hole packer surrounding the pipe above the fin thereof, outlets in the pipe below the fin portion, and means for supplying compressed air to the pipe.

3. Apparatus for heating oil bearing sand of an oil well, comprising a compressed air pipe having outlets at the sand strata, a plurality of heating elements in the pipe at the sand strata and spaced from the pipe to permit compressed air passing the heater, means binding the elements in a compact bundle, and energy conducting means suspending the elements in the pipe.

COY C. HOGG.