Aug. 10, 1937. A. M. HERBSMAN 2,089,479

METHOD OF CLEANING-OUT OIL WELLS

Filed May 26, 1936

FIG. 1

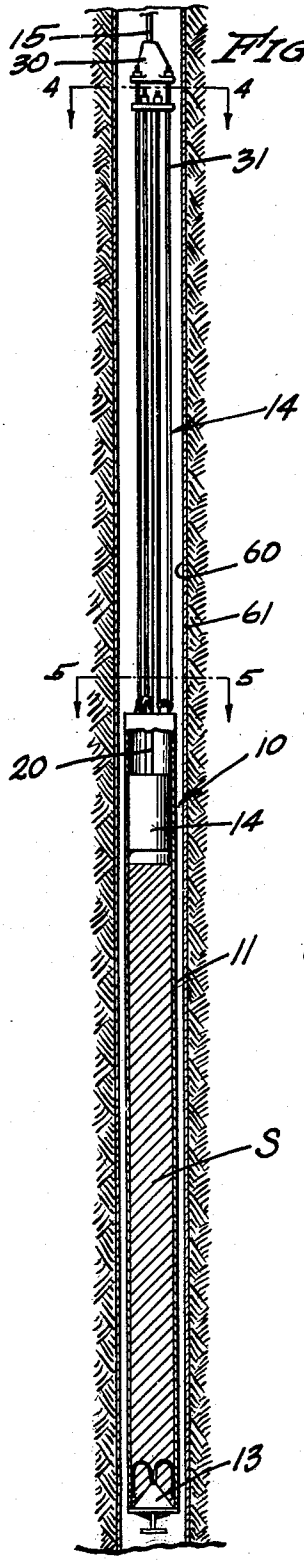


FIG. 3

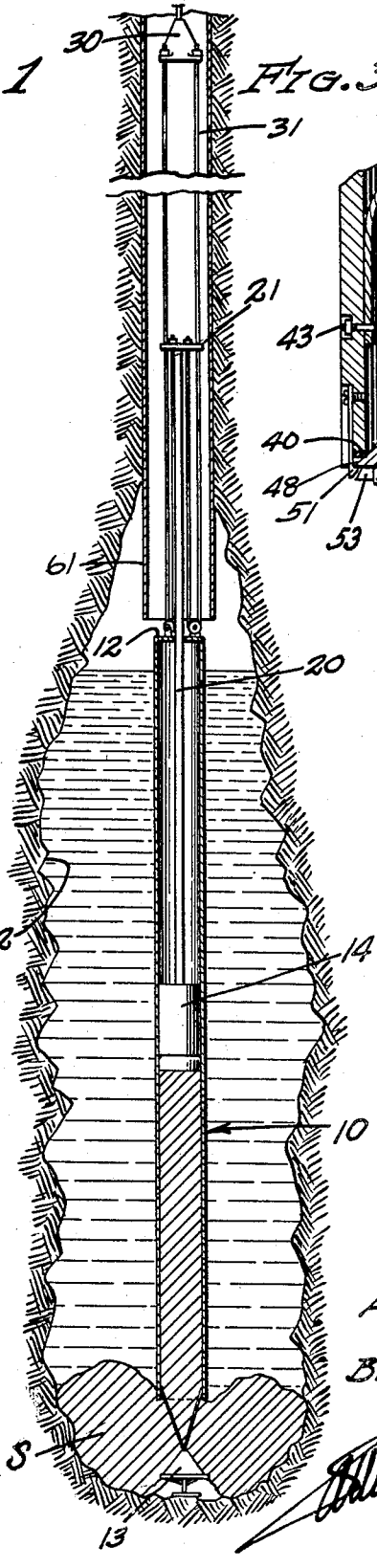


FIG. 2

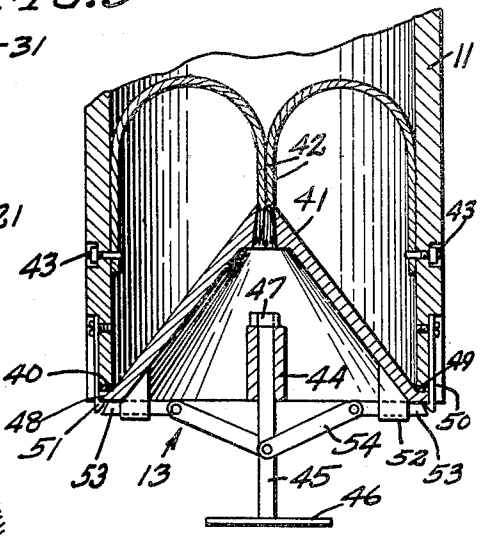


FIG. 4

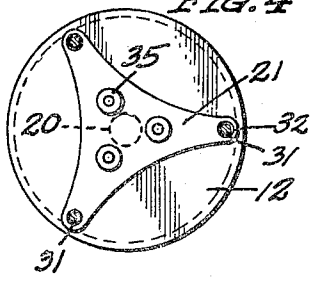
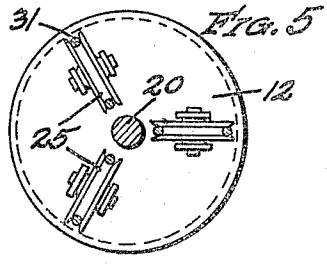


FIG. 5



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METHOD OF CLEANING-OUT OIL WELLS

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1 Claim. (Cl. 166—21)

This invention relates to the petroleum producing art and particularly to the problems involved in maintaining wells in a productive condition.

It often occurs in petroleum wells that the formation adjacent the lower end of the well becomes more or less clogged with paraffin and mud so as to obstruct the seepage of oil into the well. Where the well is in production the paraffin also hinders the pumping of the oil from the well. In some instances the condition above-mentioned occurs before the well has been brought into production and in other instances after the well has been in production for a more or less considerable period of time. Whenever a well thus becomes clogged up it is necessary that this condition be relieved by some means before the well may again be profitably operated.

It is an object of my invention to provide a method of cleaning out paraffin and mud from a well so as to return such well to a productive condition.

The manner of accomplishing the foregoing object as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a diagrammatic vertical sectional view of a dumping device being lowered in a well in the carrying out of the method of my invention, a substantial portion of said device being broken away to illustrate the interior thereof.

Fig. 2 is an enlarged view of the dumping valve employed on the device illustrated in Fig. 1.

Fig. 3 is a view similar to Fig. 1 illustrating the dumping of a quantity of chemical from the aforesaid dumping device in the bottom of a well.

Fig. 4 is an enlarged cross-sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is an enlarged cross-sectional view taken on line 5—5 of Fig. 1.

I will now refer specifically to the drawing wherein I have disclosed the principal element of the apparatus of my invention, which comprises: a dump device 10 including a tubular barrel 11 having a head 12, a releasable dump valve 13, a plunger 14, and a dump suspension and plunger operating tackle 16, by which the dump is suspended from a cable 15.

The plunger 14 has a plunger rod 20, which extends upwardly therefrom through a central aperture in the barrel head 12 and is provided at its upper end with a cable spider 21. Mounted on the head 12 of the barrel 11 are three pulleys 25, as shown in Fig. 5.

Secured upon the lower end of the cable 15 is a cable head 30, to which are connected three cables 31, which extend downwardly through apertures 32 provided in the spider 21. These cables then pass around the pulleys 25, return upwardly to the spider 21, extend through suitable apertures therein, and are provided with clamps 35, as shown in Fig. 4, which fasten the cable ends to the spider. It is thus seen that when the device 11 is suspended from the cable 15 the weight of the device tends, through the tackle 16, to force the plunger rod 20 and the plunger head 14 downwardly.

The barrel 11 is imperforate and has a valve seat 40 at its lower end. The dump valve 13 may be of any desired construction to effect a dumping of the contents of the barrel 11 when this is desired and the valve shown herein is for illustrative purposes only. The valve 13 comprises a conical body 41 provided at its apex with one or more flexible members, such as cables 42 which are secured to the barrel 11 as by clamp bolts 43. The valve 41 has a web 44 which is apertured to flexibly receive a vertical latch release shaft 45 having a plate 46 on its lower end and a stop nut 47 on its upper end. The valve 13 has an annular seating flange 49 which is adapted to be pressed towards the seat 40 to press a ring of packing 49 between said seat and this flange to tightly close the lower end of the barrel 11. Provided in suitable recesses formed in the outer surface of the barrel 11 are spring latches 50 having latch heads 51 which are adapted to spring into latched positions over the flange 48 to hold the valve 13 in place when it is pushed into sealing relation with the seat 40. Provided on the conical valve body 41 so that they can be positioned opposite the latches 50 are lugs 52 which provide guideways for release bars 53, the latter being connected by links 54 to the latch release shaft 45.

Operation

The operation of the dumper 10 in the performance of the process of my invention is as follows:

Diagrammatically illustrated in the drawing is a well 60 lined with a casing 61 and having a large chamber 62 in the formation at the lower end of the well. In carrying out the method of my invention the head 12 of the dump device 10 is unscrewed from the barrel 11 thereof, the plunger 14 is withdrawn from the barrel, and the dump valve 13 is pushed in place in the lower end of the barrel as shown in Figs. 1 and 2.

I now place in the barrel 11 a quantity of chemical which, in the carrying out of my method, it is desired to introduce into well 60. This chemical consists of metallic sodium or metallic potassium. As is well known in the art, it is necessary to keep these metals insulated from the atmosphere and from all moisture to prevent rapid chemical combination of these metals with the elements. The common method of doing this is to immerse these metals in an insulating liquid and in carrying out my method I maintain the sodium or potassium, whichever may be used, immersed in a bath of kerosene. Assuming that sodium is to be used, a mass S of this metal, cut up in small fragments and submerged at all times in kerosene, is now loaded into the barrel 11 of the dump device 10 and the plunger 14 and barrel head 12 are then installed in the upper end of the barrel, as shown in Fig. 1.

The entire device 10 is then suspended on the cable 15 and the device 10 lowered through the casing 61 into the well 60. The downward movement of the device is continued by paying out on the cable 15 until the plate 46 of the dump valve 13 touches the bottom of the well and forces the latch release bars 53 outwardly releasing the latches 50 and permitting the dump valve 13 to hang downwardly on the cables 42, as shown in Fig. 3. When this takes place the weight of the dump device 10 on the tackle 14 causes the latter to force the rod 20 and plunger 14 downwardly discharging the mass S of sodium into the lower end of the enlarged chamber 62 of the well 60.

The operation of my process is enhanced by the presence of some water in the oil at the bottom of the well 60 and the reaction which takes place between this water and the sodium, when the latter is discharged from the dump device 10. Where the oil at the bottom of the well is relatively free from water the process of my invention embraces the further step of introducing water or an aqueous solution of suitable chemical such as caustic soda, caustic potash, aqua ammonia or some other ammonium salt or by an oxidizing agent such as sodium hypochlorite or of any combination of these solutions. Thus, the introduction of water or aqueous solution in the well in my process may either precede or follow the introduction of metallic sodium or potassium as hereinabove prescribed. This water or solution may be poured directly down the casing 60 from the top of the well or may be introduced into the bottom of the well by any of the well known means available.

While potassium and sodium are solids at ordinary temperatures, these may be prepared in a colloidal form, which is a liquid, and may thus be used in carrying out the process of my invention as above-described. Where a well is in production and the pump tubing and pump become clogged with paraffin the process may be carried out by the introduction of colloidal sodium or colloidal potassium in a liquid form into the pump tubing or casing of the well and permitting the colloidal metal to flow down the well from the upper end thereof. In this manner the casing or pump tubing, as the case may be, is cleaned out throughout its length and rendered suitable for the production of oil from the well.

What I claim is:

A method of cleaning out paraffin from an oil well which comprises: insulating a mass of metallic sodium from the atmosphere, lowering said mass beneath the surface of the oil in said well; discharging said mass of sodium into said oil; and introducing into said well an aqueous alkali solution of caustic soda, or ammonia salt.

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