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2,225,413

PARAFFIN SCRAPER

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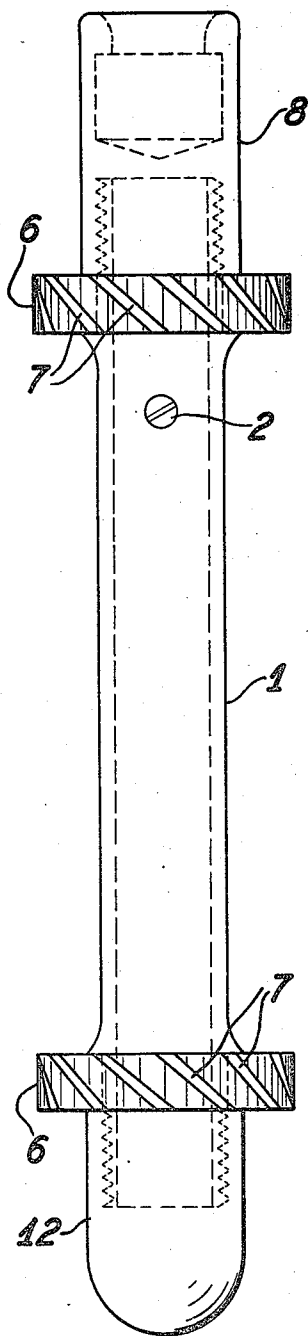


FIG. 1_

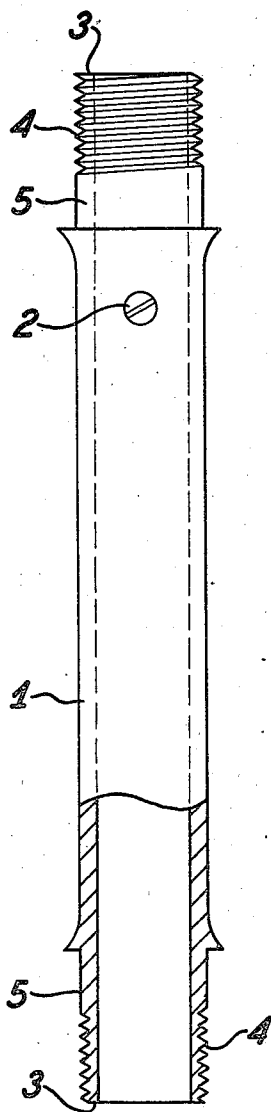


FIG. 2_

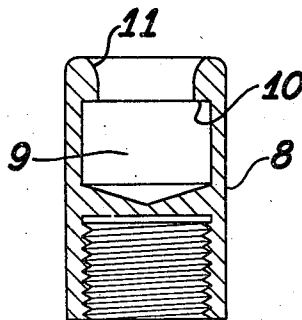


FIG. 3_

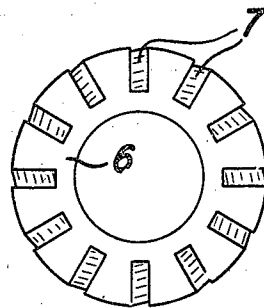


FIG. 4_

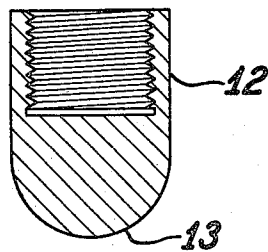


FIG. 5_

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PARAFFIN SCRAPER

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7 Claims. (Cl. 166—18)

The present invention is directed to a device for scraping paraffin from the interior of tubes arranged in oil wells. More specifically, it is directed to a fluid operated rotating drill for the removal of paraffin from said tubes.

One of the important problems in the production of oil from subsurface formations is the accumulation of paraffin on the interior of tubes which lead the oil from the producing formation to the surface. Most oil contains paraffin which, at the temperature obtaining at the depth at which the oil is produced, is in the liquid state. As the oil is caused to flow toward the surface, temperature decreases until a point is reached at which the paraffin crystallizes out and accumulates on the walls of the tubes. In time this accumulation becomes sufficiently great to stop the flow of oil to the surface and to present a removal problem which is at once time-consuming and expensive.

The object of the present invention is to provide a device which may be placed in the tubing through which the oil is produced and which carries cutting edges which are rotated by the flow of fluid in the tubing while at the same time the device is moved longitudinally of the tubing. The device is so constructed that it operates to cut the paraffin wax off the walls of the tubing whether it is allowed to move downwardly through the tubing under static well conditions or is caused to move upwardly through the tubing under flowing well conditions.

An additional object of the present invention is to provide a device of the character described which will be simple in construction, inexpensive and durable.

Further objects and advantages of the present invention will appear from the following detailed description of the accompanying drawing in which

Fig. 1 is a side view of the complete device;

Fig. 2 is a side view of the body portion of the device with the cutters removed;

Fig. 3 is a side view of a removable cap adapted to be secured to the upper end of the complete device;

Fig. 4 is an end view of one of the cutters; and

Fig. 5 is a side view, in section, of a removable cap adapted to be secured to the lower end of the complete device.

Referring to the drawing in detail, numeral 1 designates an elongated body portion of any desired cross-sectional configuration, but preferably circular to minimize the resistance to rotation, which may be solid or hollow as shown, in

which latter event it is provided with a plug 2 which may be opened to permit the filling of the interior with a weighting material such as mercury or water if desired. At each of its ends body 1 is provided with a nipple 3, each of said nipples being provided with threads 4 and with a smooth bearing portion 5 intermediate said threads and the main body portion. Fixed on each of the bearing portions 5 is a ring gear 6 which is provided with spiral grooves 7 which are so pitched, preferably at about 60° as to impart a lifting and rotating action to the body portion when fluid passing longitudinally along said body portion passes through said groove. To this end the ring gears are made with an outside diameter which is only a small fraction of an inch, say about $\frac{1}{16}$, less than the inside diameter of the tubing in which the device is to operate.

One end 3 of the body portion carries a screw threaded cap 8 the outer end of which is provided with a socket having an inner cylindrical cavity 9 the outer end of which is provided with shoulder 10 from which the wall flares outwardly as at 11 to the outer end of the cap 8. This cap is placed on the upper end of the device and serves as a receiving socket for a fishing tool.

The other end 3 of the body portion 1 is provided with a cap 12 which has a rounded end 13 which, if desired, may be made of rubber or other shock absorbing material. The purpose of this cap is to stop the downward movement of the whole assembly when it is placed in the tubing by abutting against a stop arranged for that purpose in the tubing. It will be observed that these removable caps serve the additional function of rendering the cutting gears replaceable whereby the life of the assembly as a whole is not limited by the life of the cutting edges.

In utilizing the device of the present invention, a stop of any suitable construction is located in the tubing at a point where the temperature is such that paraffin remains liquid. It will be understood that this stop must be of such a construction that it will not impede the flow of oil through it. The flow of oil through the tubing is stopped and the device of the present invention is introduced into the top of the tubing, through which it moves downwardly by the force of gravity. In its downward movement fluid passing through the groove 7 causes the device to rotate and imparts to it the action of a rotary drill. When the device reaches the stop the upper end of the tubing is opened to permit the flow of oil. The movement of oil upwardly imparts a lifting and rotating action to the scraper.

It is important to note that in this movement the scraper is set into rapid rotation before it reaches the paraffin coating on the walls whereby in its upward movement the device also has the action of a rotary drill.

- 5 It will be understood that the embodiment shown in the drawing is for illustrative purposes only and can be modified both as to size, shape and arrangement of parts without departing from the scope of the present invention. For example, while two cutting gears are illustrated, only one will suffice. Again it is to be noted that the cutting gears may be rigidly fixed to the elongated body or may be journaled for relative rotation with respect thereto. In the latter case, the device may be allowed to drop freely through the tubing, but should be moved upwardly by a wire line. Likewise, the cutters may be made in any desired configuration and a separate disk provided on the elongated body portion to accomplish rotation thereof upon movement thereof relative to the oil in the tubing.

We claim:

1. A device for removing paraffin from the inside of a vertical oil-carrying tubing comprising an elongated buoyant body adapted to be moved freely within said tubing by the action of flowing fluid in the tubing, a laterally projecting cutting disk arranged on said body adjacent each end thereof, inclined passages arranged longitudinally in each of said disks for the flow of fluid therethrough, a blunt-nosed cap for securing one of said disks to said body and a cap provided with

a cavity for a fishing tool securing the other of said disks to said body.

2. A device in accordance with claim 1 in which the end of said blunt-nosed cap is constructed of shock absorbing material.

3. A device in accordance with claim 1 in which the end of said blunt-nosed cap is constructed of rubber.

4. A device for removing paraffin from the inside of a vertical oil-carrying tubing comprising an elongated buoyant tubular body adapted to be moved freely within said tubing by the action of flowing fluid in said tubing, a laterally projecting cutting disk arranged on said body adjacent each end thereof, inclined passages arranged longitudinally in each of said disks for the flow of fluid therethrough, and a cap arranged on each end of said body for sealing the interior of said body in a fluid tight manner.

5. A device in accordance with claim 4 in which one of said caps is provided with a cavity for a fishing tool.

6. A device in accordance with claim 4 in which one of said caps is provided with a blunt nose constructed of a shock absorbing material.

7. A device in accordance with claim 4 in which one of said caps is provided with a cavity for a fishing tool and the other cap is provided with a blunt nose constructed of a shock absorbing material.

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