April 28, 1953 J. H. WILLIAMS 2,636,565

AUTOMATIC PARAFFIN CUTTER

Filed Dec. 8, 1950 2 SHEETS—SHEET 1

Fig. 1

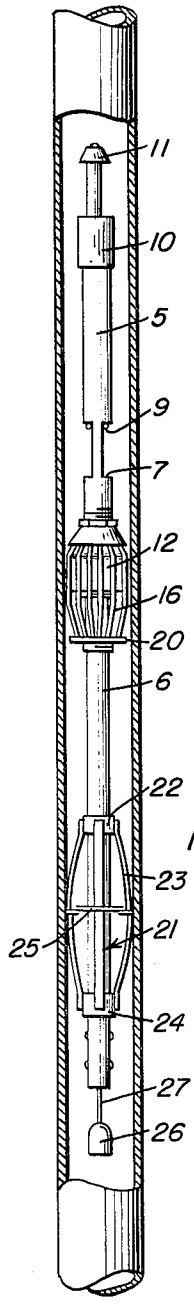


Fig. 5

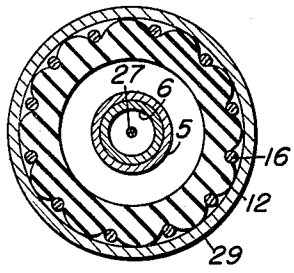
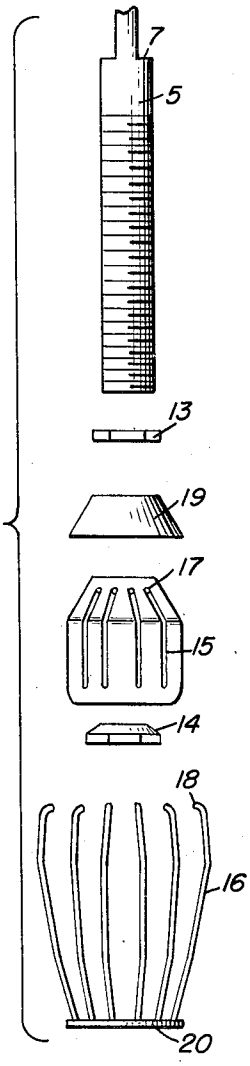


Fig. 8



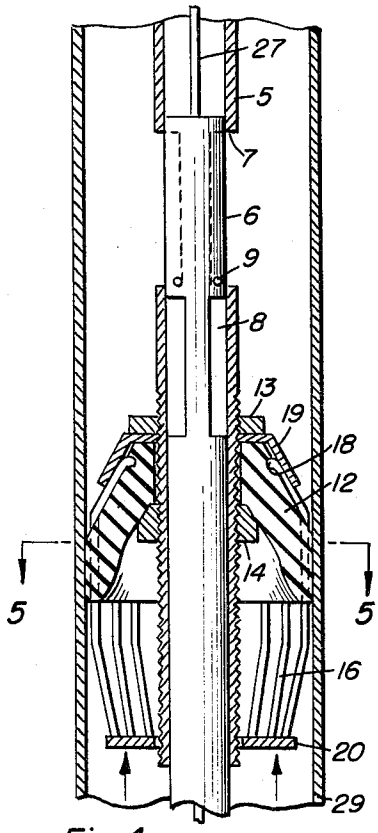
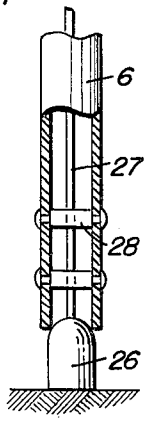


Fig. 4

Fig. 7



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AUTOMATIC PARAFFIN CUTTER

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Fig. 2

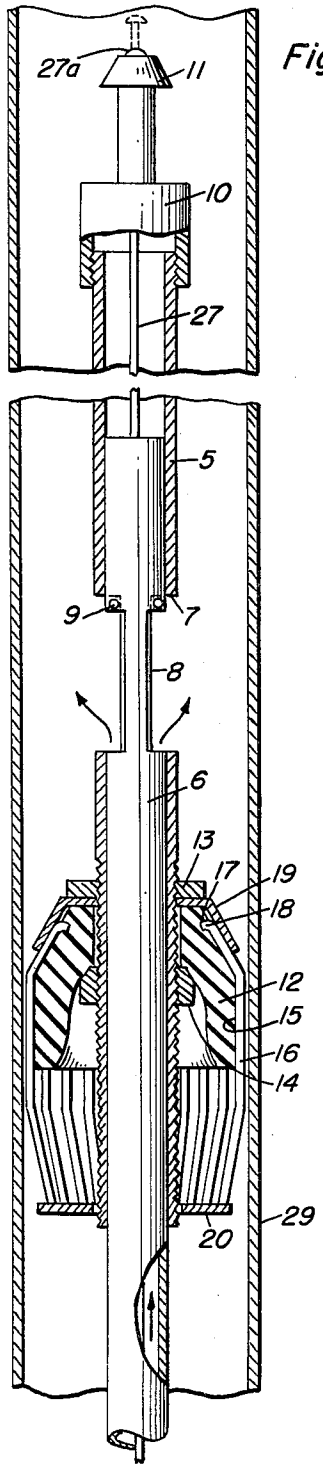
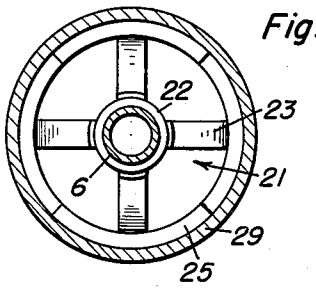


Fig. 6



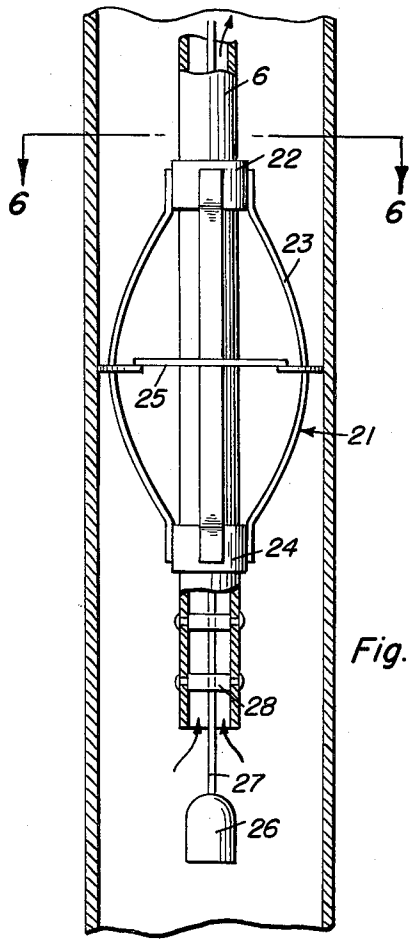


Fig. 3

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AUTOMATIC PARAFFIN CUTTER

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3 Claims. (Cl. 166—18)

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The present invention relates to new and useful improvements in paraffin cutters for use in oil wells or for use as a tubing cleaner in other types of flowing wells.

An important object of the invention is to provide an improved device for removing paraffin and including a scraper continuously operated by the flow of the well fluid from top to bottom of the well and without necessitating cutting off the flow.

Another object is to provide a novel by-pass tube construction for the fluid and on which a scraper and tube lifting packing cup are supported and wherein the tube is automatically closed for raising the scraper by flow of the fluid and opened to by-pass the fluid and permitting the scraper to lower by gravitation.

A further object is to provide a device of this character of simple and practical construction, which is efficient and reliable in operation, relatively inexpensive to manufacture and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a vertical sectional view of a well tubing showing the scraper therein;

Figure 2 is an enlarged fragmentary vertical sectional view of the by-pass tube shown in open position;

Figure 3 is an enlarged side elevational view of the scraping element with parts shown in section;

Figure 4 is an enlarged vertical sectional view of the packing cup;

Figure 5 is a transverse sectional view taken on a line 5—5 of Figure 4;

Figure 6 is a transverse sectional view taken on a line 6—6 of Figure 3;

Figure 7 is a fragmentary vertical sectional view of the lower tube showing the by-pass cut-off valve; and,

Figure 8 is a group elevational view of the packing cup.

Referring now to the drawing in detail, wherein for the purpose of illustration I have disclosed a preferred embodiment of my invention, the numeral 5 designates an upper tube in which a lower tube 6 is slidable. Registrable vertical slots 7 and 8 are formed in the sides of the upper and lower tubes to form by-pass ports and stop

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pins 9 are carried transversely of lower tube 6 about its slots and are movable vertically in the slots 7 of the upper tube to hold the slots in open or closed position.

The upper end of upper tube 5 is closed by a cap 10 having a frusto-conical head 11 rising therefrom and lower tube 6 slides upwardly and downwardly in the lower end of the upper tube.

The lower end of upper tube 5 is externally threaded and on which is secured an expansible rubber packing cup 12 by upper and lower nuts 13 and 14. The cup 12 is substantially bell-shape and is formed with external vertical grooves 15 in which resilient guide rods 16 are seated. Recesses 17 are formed in the cup at the upper ends of the grooves to receive inwardly projecting upper ends 18 on the rods. The upper ends of the rods are held engaged in the grooves and recesses by a cap 19 under upper nut 13. A ring 20 unites the lower ends of the rods.

A scraper designated generally at 21 is attached to lower tube 6 and comprises an upper collar 22 fixed to the tube 6 and to which a plurality of resilient vertical metal straps 23 are welded or otherwise suitably secured at their upper ends. The straps 23 are arcuate with outwardly curved central portions and are welded or otherwise suitably secured at their lower ends to a sliding collar 24 surrounding tube 6. Arcuate scraper blades 25 are welded at their central portions in a horizontal position to the central portion of straps 23 and with the ends of the blades overlapping to form a complete circular expansible scraper.

A valve 26 closes the lower end of lower tube 6 and is provided with a valve stem 27 sliding in guides 28 secured in the tube, the stem extending vertically in the upper and lower tubes and is slidable at its upper end in cap 10 and head 11 to project outwardly of the latter. A head 27a is formed on the upper end of stem 27 to limit downward movement of valve 26.

In the operation of the device, the upper and lower tubes 5 and 6, with the packing 12 and scraper 21 carried thereby are free to move upwardly and downwardly in the well tubing 29. The device moves downwardly by gravity and lower tube 6 moves slower due to friction of the scraper blades with the walls of the well tubing and accordingly upper tube 5 slides downwardly on lower tube 6 to open the by-pass openings 7 and 8 and fluid in the well is permitted to flow upwardly through the tubes 5 and 6 and out through the openings 7 and 8 as the device drops in the well tubing.

Upon striking the bottom of the well, valve or closure 26 is forced upwardly to close lower tube 6 and the upward flow in the well then expands packing 12 to first lift the upper tube 5 which closes openings 7 and 8 and pins 9 then pick up lower tube 6 and scraper 21 to move the same upwardly with tube 5.

During this upward movement the weight of valve 26 will cause the valve to open while by-pass openings remain closed to prevent by-passing the fluid through the tubes and when head 11 strikes the top of the well the sudden arresting of the upward movement of upper tube 5 will cause the further upward movement of lower tube 6 by its inertia and thus again open the openings 7 and 8 to again by-pass the fluid and permit the device to again drop downwardly to repeat the cycle.

In view of the foregoing description taken in conjunction with the accompanying drawings, it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A paraffin cleaner for well tubing comprising an upper tube having a closed upper end and a lower tube slidable in the lower end of the upper tube and having an open lower end, an expansible and contractible packing carried by the upper tube and responsive to upward flow of liquid in the well to move said lower tube upwardly, said tubes gravitating in a lowering movement, registrable by-pass openings in the sides of the tubes above the packing to by-pass liquid to a point above the packing, a stop carried by one tube and spaced abutments on the other tube engaging the stop to couple the tubes to each other for limited relative movement therebetween and holding the openings in either an open or closed position, closure means at the lower end of the lower tube normally held in open position by gravity and moved into closed position by contact thereof with the bottom of the well, and a scraper carried by the lower tube in scraping engagement with the tubing and frictionally retarding movement of the lower tube relative to the upper tube to close the by-pass openings upon an initial upward movement of the upper tube, the upward movement of said tubes being checked by impact of the upper tube with the top of the well and causing the opening of the by-pass openings by the resulting inertia of the lower tube.

2. A paraffin cleaner for well tubing comprising an upper gravity-actuated tube closed at its top and a lower gravity-actuated tube slidable in the lower end of the upper tube, means carried by the upper tube responsive to flow of the well to lift the tubes, registering by-pass openings in the sides of the tubes to by-pass liquid to a point above said means, a stop carried by one of the tubes, means on the other of the tubes engaging the stops at longitudinally spaced points and coupling the tubes to each other for limited relative movement and holding the tubes in position with the openings either open or closed, closure means at the lower end of the lower tube normally held open by gravity action and closed by contact thereof with the bottom of the well upon a descending movement of the tubes, and a scraper carried by the lower tube, said scraper frictionally engaging the tubing to retard movement of the lower tube relative to the upper tube to open the by-pass openings upon an initial descending movement of the upper tube and to close the by-pass openings upon an initial ascending movement of the upper tube.

3. The combination of claim 2 wherein said scraper comprises a plurality of vertical resilient bow-shaped members fixed at one end to the lower tube, an annular member connecting the other ends of said bow-shaped members to each other and free to move longitudinally of said lower tube, and arcuate scraper blades carried horizontally by said bow-shaped members and overlapping each other at each end portion.

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