

Aug. 10, 1943.

B. J. FESTERVAN ET AL

2,326,528

PARAFFIN SCRAPER

Filed June 11, 1940

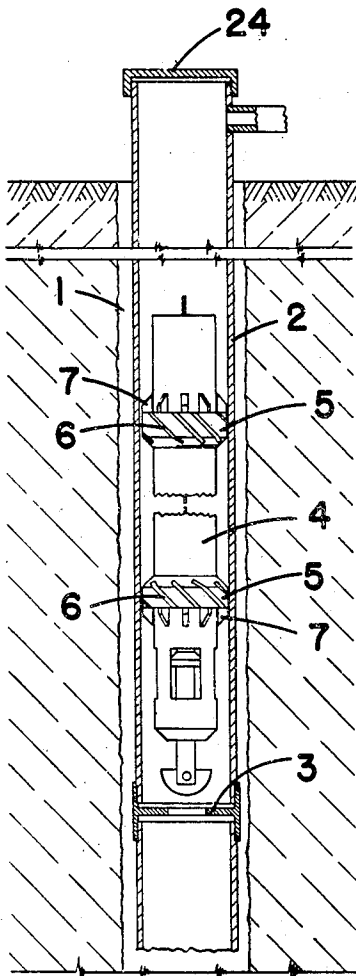


FIG. 1.

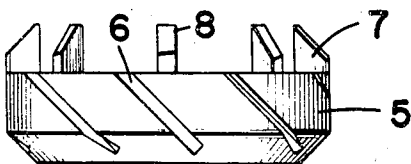


FIG. 3.

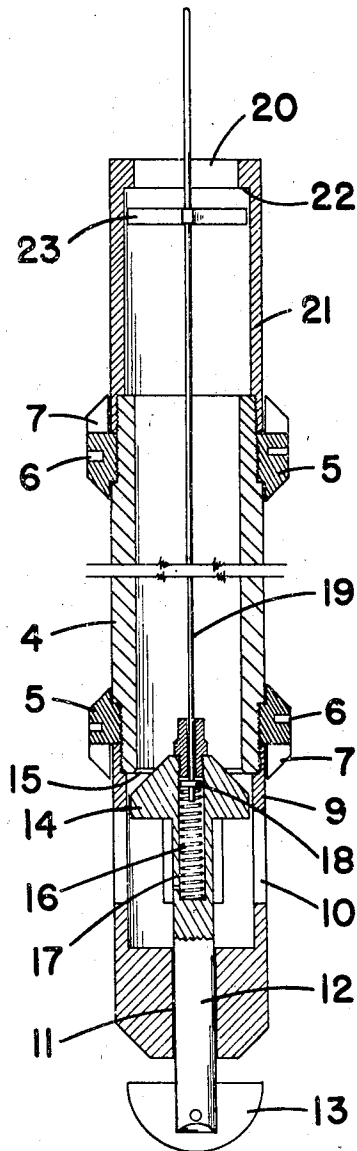


FIG. 2.

Benjamin J. Festervan
Nathan F. Henderson INVENTORS

BY

P. J. Whelan

ATTORNEY.

UNITED STATES PATENT OFFICE

2,326,528

PARAFFIN SCRAPER

Benjamin J. Festervan and Nathan F. Henderson, Monroe City, Tex.

Application June 11, 1940, Serial No. 339,857

4 Claims. (Cl. 166—18)

The present invention is directed to a device for removing paraffin from oil well tubing, and for preventing the accumulation of paraffin therein.

In our co-pending application, Ser. No. 235,795, filed Oct. 19, 1938, now Patent No. 2,225,413, granted December 17, 1940, and entitled Paraffin scrapers, we disclosed a device for use in oil well tubing which is adapted to operate on the go-devil principle. In the operation of said device, which is propelled upwardly from a point intermediate the ends of the tubing to the top by the flow of oil, it is necessary to stop the flow of oil in order to permit the device to drop back to its starting point.

The principal object of the present invention is the provision of a paraffin scraper of the same general nature as that described in our aforesaid application which is capable of automatic and continuous operation without the necessity of stopping the flow of oil in the tubing.

Further objects and advantages of our invention will appear from the accompanying drawing in which

Figure 1 is a front elevation of a device according to the present invention in place in an oil well tubing with the latter broken away to reveal the interior thereof;

Figure 2 is a vertical section through the device of the present invention; and

Figure 3 is a detail view of one of the cutters.

Referring to the drawing in detail, and particularly to Figure 1, numeral 1 designates a borehole which, it will be understood, is normally cased and numeral 2 designates an oil producing tubing, known as an oil string, arranged within said borehole connecting the producing formation with the surface. Fixed in tubing 2 at a point intermediate its ends, said point being selected below that at which paraffin begins to deposit, is a stop 3, which is perforated to permit the passage of oil. This stop is shown in the most elementary manner for the sake of simplicity, and it is to be understood that in the practice of the present invention it is preferred to use the stop described and claimed in our co-pending application, Ser. No. 236,862, filed Oct. 25, 1938, now Patent No. 2,213,580, granted September 3, 1940, and entitled a Stop for oil well casing and tubing.

The paraffin scraper of the present invention is designated by numeral 4 and consists of a cylinder provided externally with longitudinally spaced discs 5, each of which is provided with helically arranged grooves 6. These discs are of

a size such that there is a clearance of only about $\frac{1}{8}$ of an inch, or less, between their periphery and the inner surface of the tubing. The spiral grooves serve the purpose of providing a passage for upflowing oil, which, in its passage, not only lifts the device, but by virtue of the spiral grooves causes the device as a whole to rotate whereby the teeth formed by the grooves act as a cutting means for removing accumulated paraffin. In this improved embodiment each of the discs is also provided with circumferentially spaced longitudinally extending teeth 7, which are so bevelled as to present a cutting edge in the direction of rotation of the discs to which they are attached.

By reference to Figure 3, which represents the upper disc 5, it will be seen that the disc is adapted to rotate to the right and that the teeth 7 are so bevelled as to form a cutting edge 9 facing the direction of rotation. The teeth 7 on the upper disc extend upwardly and the teeth 7 on the lower disc extend downwardly, so that on the upward travel of the scraper the upper teeth 7 will be adapted to cut away any extra thick deposits of paraffin, and likewise on the downward travel of the scraper, the lower teeth 7 will be adapted to serve the same purpose.

The lower disc 5 is held in place by a cap 9 which has circumferentially spaced ports 10, and which has in its lower end a central opening 11 adapted to receive a rod 12 on the lower end of which is a semicircular plate 13 which serves the purpose of bringing the scraper to rest against the stop 3 without closing the opening in said stop.

The upper end of rod 12 is provided with a conical head 14 which is adapted to seat against a bevelled edge 15 on the lower end of cylinder 4. The inner end of rod 12 has a recess 16 in which is a string 17 working against a piston 18 to which is attached a rod 19 extending the length of the scraper and protruding beyond the upper end thereof through a hole 20 in a cap 21 which serves to hold the upper cutting disc 5 in place. The hole 20 is large enough to admit a fishing tool which may be of the character described in our co-pending application Ser. No. 235,794, filed Oct. 19, 1938, now Patent No. 2,243,419, granted May 27, 1941, and entitled Fishing tool, this fishing tool being adapted to coact with the angular portion 22 of the upper end of the cap. The rod 19 is provided with a spacer 23 which rides in the cap 21.

The upper end of tubing 2 has a plate or other obstruction 24 against which the free end of

the rod 19 strikes when the scraper rises to the surface.

In the use of the device in the present invention, it is placed in the tubing, falls by gravity to the stop 3, the force of its impact with the stop being sufficient to force valve 14 on to its seat 15. The oil coming up through the stop 3 then is forced to pass around the cutting discs 5 and in so doing forces the scraper upwardly while simultaneously rotating it. When the scraper reaches the top of the tubing 2, the upper end of rod 19 strikes against the plate 24 and forces the valve 14 off its seat. The spring 17 serves to absorb the shock when the rod 19 hits the plate 24. With the valve 14 opened oil is able to flow through the cylinder 4 whereby the scraper is free to drop in the tubing by gravity.

It will be apparent that changes may be made in the device of the present invention without departing from the scope thereof. Such changes are contemplated within the scope of the dependent claims, in which it is intended to claim the present invention as broadly as the prior art permits.

We claim:

1. A paraffin scraper adapted to move freely up and down an oil well tubing comprising a hollow open-ended cylinder, circumferential cutters mounted on such cylinder, helical passages in said cutters, a valve adapted to stop the flow of oil through said cylinder whereby oil is forced through said helical passages, means carried by the cylinder for closing said valve when the cylinder reaches its lowermost position in the tubing, and for opening said valve when the cylinder reaches its uppermost position in the tubing.

2. A paraffin scraper adapted to move freely

up and down an oil well tubing between stops arranged in said tubing comprising a hollow, open ended cylinder, circumferential cutters mounted on said cylinder, a valve adapted to stop the flow of oil through said cylinder, and projections on either side of said valve protruding beyond either end of said cylinder, whereby when the cylinder reaches the lowermost stop the valve is closed, and when the cylinder reaches the uppermost stop the valve is opened.

3. A paraffin scraper according to claim 2 in which the circumferential cutters have an outside diameter only slightly smaller than the inside diameter of the tubing and are provided with helical grooves spaced circumferentially on their outer surfaces, whereby movement of fluid through said grooves causes rotation of the cutters.

4. A paraffin scraper adapted to move freely up and down an oil well tubing between stops arranged in said tubing comprising a hollow open-ended cylinder, circumferential cutters mounted on said cylinder, a valve seat in said cylinder, a valve adapted to be seated on said seat, a rod extending from said valve to a point below the lower end of said cylinder and adapted to strike the lowermost of said stops in the downward travel of said cylinder to move said valve into closed position, a rod extending from said valve upwardly to a point above the upper end of said cylinder and adapted to strike the uppermost of said stops on the upward travel of said cylinder to thereby open said valve, and a resilient connection between said latter rod and said

valve.

BENJAMIN J. FESTERVAN.
NATHAN F. HENDERSON.