April 21, 1970 D. F. HENDERSON 3,507,328

TOOL FOR SCRAPING THE INSIDE OF PIPES

Filed July 31, 1968

Fig. 1

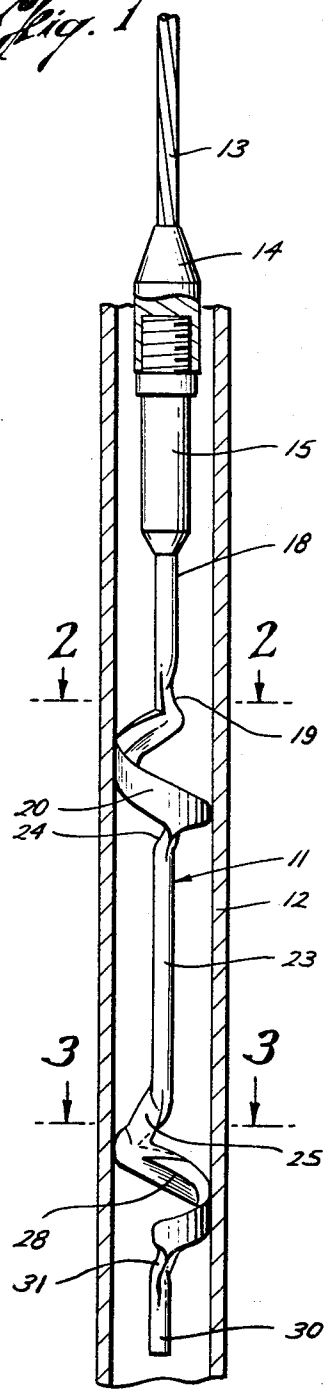


Fig. 2

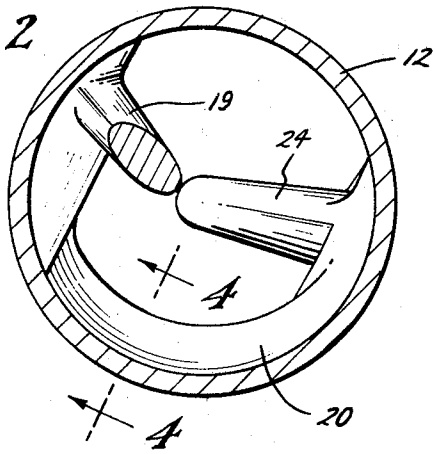


Fig. 3

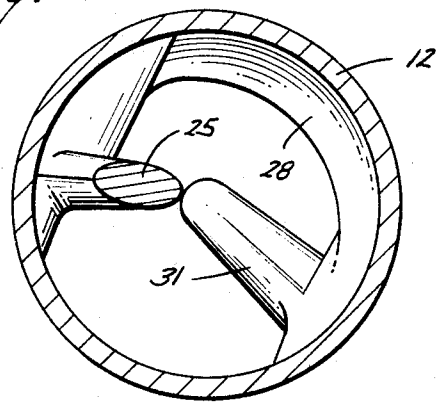
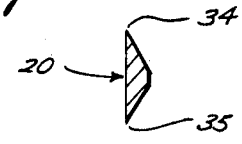


Fig. 4



Don F. Henderson
INVENTOR.

BY Lee R Rankin

ATTORNEY

United States Patent Office 3,507,328
Patented Apr. 21, 1970

3,507,328

TOOL FOR SCRAPING THE INSIDE OF PIPES

Don F. Henderson, Houma, La., assignor to Gem Oil Tool Company, Inc., Houma, La., a corporation of Louisiana

Filed July 31, 1968, Ser. No. 749,190
Int. Cl. E21b 37/02
U.S. Cl. 166—170 3 Claims

ABSTRACT OF THE DISCLOSURE

A scraping tool for use in scraping the inside wall of oil well production pipe and the like having deposits such as paraffin therein. It includes a plurality of axially and radially spaced-apart helical knife blades having upper and lower cutting edges arranged for scraping engagement with the inside wall of the pipe to be cleaned.

This invention relates to a scraping tool for use in scraping the inside wall of pipe. More particularly, it relates to a scraping tool for use in scraping deposits such as paraffin from the inside of production tubing in oil wells, for example.

In many instances, it is desirable to remove deposits from the inside of a pipe, such as paraffin from the inside of production tubing, which may collect there during use. There have been a number of prior art tools developed for this general purpose, but none have been fully satisfactory for various reasons. It is desirable to have a tool which is simple in construction, relatively inexpensive and which is relatively free of balling up or plugging up. It is also desirable to have one which will operate quickly and efficiently.

Conventional knives (gauge or "biscuit-cutter") tend to plug when scraping heavy deposits of paraffin, slowing or stopping their downward travel, and in some instances, causing them to be blown or kicked up the oil well by fluids. Stated otherwise, none of the prior art devices are as fully satisfactory as the tool of this invention.

It is therefore an object of this invention to provide an improved tool for scraping the inside of pipe, which overcomes the deficiencies of the prior art noted above.

Briefly stated, this invention is for a scraping tool for use in scraping the inside wall of oil well production pipe and the like, having deposits therein. It includes a plurality of axially and radially spaced-apart helical knife blades. Each of the blades is provided with upper and lower cutting edges arranged for scraping engagement with the inside wall of the pipe to be cleaned. The knives together extend substantially around the full inside circumference of said pipe. Means are also provided for supporting the blades in the aforesaid radially and axially spaced-apart position during relative axial movement of the blades through the pipe to be cleaned in order to scrape the deposits therefrom.

In the preferred embodiment, each of the blades is connected near each end thereof to the support means, to thereby provide an open space on the radially inward side of each of the knives.

A preferred embodiment of the tool also includes knives, wherein the outside surface of each defines a section of a generally cylindrical surface. The top and bottom edges of the knives are preferably tapered radially inward to provide the knives with a generally triangular shape in vertical cross-section.

Reference to the drawing will further explain the invention wherein like numerals refer to like parts and in which:

FIG. 1 is a generally side elevation view of one embodiment of the tool shown supported in an oil well production tubing or the like.

FIG. 2 is a cross-sectional view taken generally along line 2—2 of FIG. 1.

FIG. 3 is a cross-sectional view taken generally along line 3—3 of FIG. 1.

FIG. 4 is a cross-sectional view of one of the knife blades taken generally along line 4—4 of FIG. 2.

Referring now to FIG. 1, one preferred embodiment of the tool is designated by the numeral **11** and is shown being supported inside of a pipe such as production tubing **12** by any suitable means such as a rod, wire line, or the like. For purposes of convenience a wire line **13** is shown connected to connector **14** which has threaded thereinto the tool of this invention which includes an adaptor member **15** at the upper end thereof.

Adaptor member **15** has attached thereto and depending therefrom an upper rod **18** having a radially outwardly curved lower portion **19** to which is connected upper knife blade **20**. Knife blade **20** is generally helical and extends substantially around at least half the circumference of the inside of tubing **12**. The lower end of knife blade **20** is connected to lower rod **23** by means of a radially outwardly curved portion **24** provided at the upper end thereof. It is to be noted that rod **23** is preferably generally axially aligned with rod **18**.

Rod **23** is also provided with a radially outwardly curved portion **25** near the bottom end thereof to which is attached lower knife blade **28**. Knife blade **28** is similar to knife blade **20** except that it is laterally spaced-apart therefrom. Hence, it may be stated that blades **20** and **28** are both axially and radially spaced apart and together cover substantially the full inside circumference of tubing **12**.

Optionally, the bottom end of knife blade **28** may be connected to bottom rod **30** having a radially outwardly curved portion **31**. In the embodiment shown, bottom rod **30** is also axially aligned with rods **23** and **18**.

Preferably, the outside surface of each of the knives **20** and **28** defines a section of a generally cylindrical surface. Further, and as shown in FIG. 4, each of the blades, such as blade **20**, is provided with an upper cutting edge **34** and a lower cutting edge **35** which are arranged for scraping engagement with the inside wall of tubing **12**. In addition, edges **34** and **35** taper radially inwardly to provide knife **20** with a generally triangular shape in vertical cross-section.

It is to be understood that the tool of this invention may be used with either manually-operated or automatic paraffin scraping equipment. The particluar arrangement of the knives permits faster and more efficient cutting of paraffin with less chance of plugging or balling up.

In the embodiment described above, the tool is particularly useful in that it is subject to a minimum of plugging up. Its scraping action is shared equally between its two cutting knives which are located at different levels and on opposite sides of the tool. In the embodiment shown, each cutting element is open on its inner side to achieve maximum "washing" (cleaning effect) from the well fluids being bypassed.

The tool of this invention permits it to be run through most valves, landing nipples and other recesses which ordinarily "hand up" conventional tools.

The tool of this invention provides faster paraffin removal because of the more efficient slicing effect realized by the inclined edges of the spiral cutter blades and, in addition, these blades remain sharp after extensive use.

It is to be understood that in certain situations, more than two blades may be used, but in any event it is desirable that all of the blades together cover substantially the full circumference of the pipe to be cleaned.

While rods **18**, **23** and **30** have been described as being discontinuous at the intervals radially inward from blades **20** and **28**, it is to be understood that they could be one continuous rod extending from top to bottom of the tool. However, in such instance, each of the blades **20** and **28** would be somewhat less open on the radially inward side thereof and hence might have a tendency to ball up more than the preferred embodiment as shown in the drawings. Nevertheless, it is intended that the claims of this application are broad enough to cover such modified structure. In such modified structure, the cutter blades **20** and **28** are welded or otherwise attached near the ends thereof to a single bar.

In any event, during use of the tool of this invention, it is caused to move longitudinally relative to the tubing to thereby cause blades **20** and **28** to contact and scrape the paraffin deposits from the inside thereof.

It will thus be apparent that the industry has been provided with a tool which is of simple construction, unique in design, and which cleans more efficiently and faster than prior art tools.

Further modifications may be made in the invention without departing from the scope thereof. Accordingly, the foregoing description is to be construed as illustratively only and is not to be construed as a limitation upon the invention as defined in the following claims.

What is claimed is:

1. In a scraping tool for use in scraping the inside wall of oil well production pipe and the like having deposits therein, comprising:

a plurality of axially and radially spaced-apart helical knife blades, each blade having upper and lower cutting edges arranged for scraping engagement with the inside wall of the pipe to be cleaned, said knives together extending around substantially the full inside circumference of said pipe; and

means for supporting said blades during relative axial movement of said blades through said pipe to scrape said deposits therefrom, said support means including separate axially aligned and spaced-apart rod members, with each end of each of said blades being connected to different ones of said rod members.

2. In a scraping tool for use in scraping the inside surface of oil well production pipe and the like having deposits therein, comprising:

a pair of axially spaced-apart and laterally opposed helical knife blades, each blade having upper and lower cutting edges arranged for scraping engagement with the inside wall of the pipe to be cleaned; and

means for supporting said blades during relative axial movement of said baldes through said pipe to be cleaned to scrape said deposits therefrom, said support means including discontinuous rod means comprised of a plurality of axially aligned and spaced apart rod sections, with the ends of each of said blades being supported by a different one of said rod sections, whereby said support means is discontinuous along the axial span covered by each of said blades, and whereby said blades are each provided with an open space on the radially inward side thereof.

3. In a scraping tool for scraping paraffin deposits from the inside wall of oil well production tubing, comprising:

an upper rod member arranged for relative axial movement in a generally central position through said tubing and having a radially outwardly curved lower portion;

a first helical knife blade attached to said lower portion of said upper rod member, said first knife blade having upper and lower cutting edges arranged for scraping engagement with the inside wall of the pipe to be cleaned;

a lower rod member generally axially aligned with and spaced-apart from said upper rod member and having radially outwardly curved portions on the top and bottom ends thereof, with said upper portion connected to said first helical knife blade, and with said spacing between said upper rod member and said lower rod member being substantially equal to the axial length of said first blade; and

a second helical knife blade attached to said bottom curved portion of said lower rod member, said second knife blade having upper and lower cutting edges arranged for scraping engagement with the inside wall of said pipe, said second knife blade being radially spaced apart from said first blade, and said first and second blades together extending around substantially the full inside circumference of said pipe.

References Cited

UNITED STATES PATENTS

2,192,086	2/1940	Kjerulff	166—176 X
2,772,741	12/1956	Polson	166—176
2,797,757	7/1957	Webre	166—176
2,997,106	8/1961	Tripplehorn	166—176

DAVID H. BROWN, Primary Examiner