

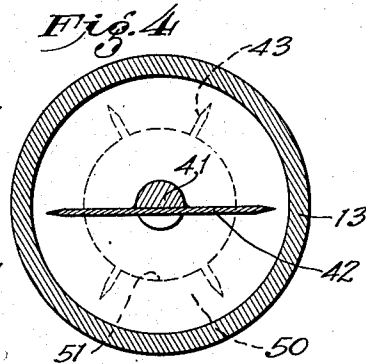
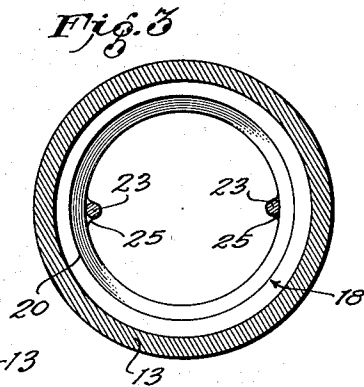
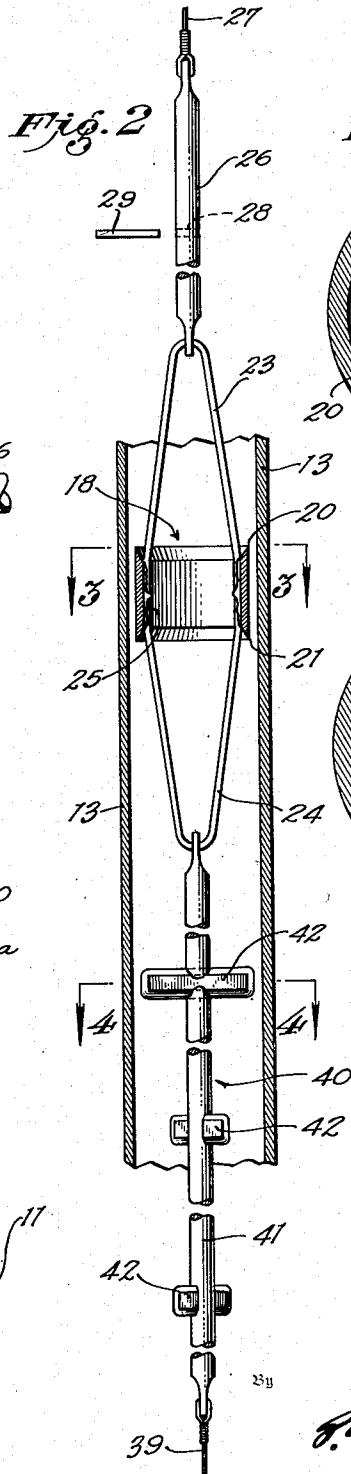
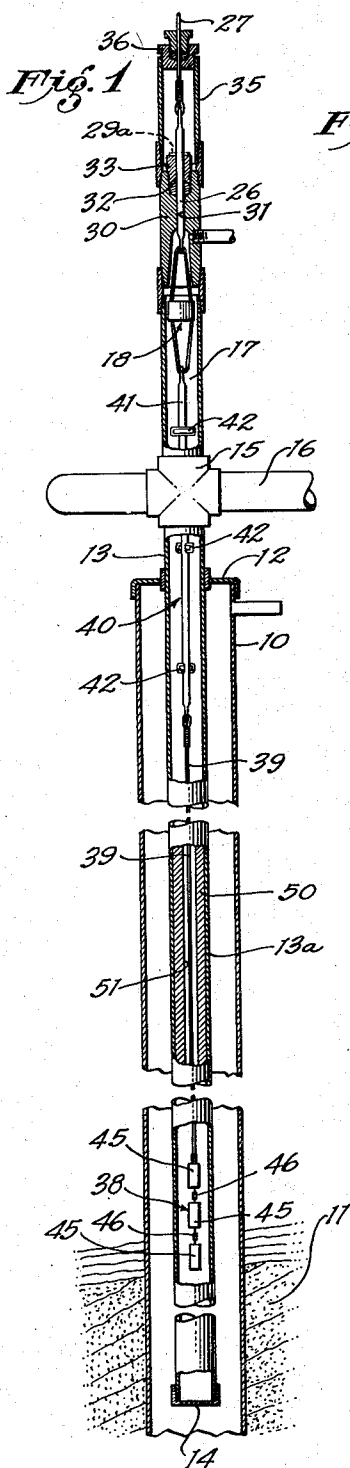
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PARAFFIN CUTTER

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PARAFFIN CUTTER

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2 Claims. (Cl. 166—18)

My invention relates to a simple device for removing from an oil production tube of a well, wax which has accumulated therein, and relates in particular to a device of this character which may be put into use and may be used without necessity of shutting down or materially interfering with the production of oil from the well.

In certain oil producing districts, the oil is found to have a waxy constituent, such as paraffin, which tends to accumulate on the interior walls of a tube or casing set in the well and through which tube or casing oil is flowing from the well. Such tube casing or string of pipe is hereinafter referred to as the oil production tube of the well. The layer of wax gradually builds up on the interior of the production tube so as to gradually reduce the production from the well and to finally completely choke off the production.

It is an object of my present invention to provide a simple device for periodically removing wax from the interior wall of the production tube, this device being hereinafter referred to generally as a paraffin cutter.

It is an object of the invention to provide a device of this character which may be maintained in a substantially inoperative condition in the upper part of the oil production tube, and may be periodically moved from its position of rest, without necessity of shutting down the flow from the well, to remove such quantity of paraffin from the wall of the casing or production tube as to maintain production at a near maximum value for given conditions of operation.

It is an object of the invention to provide a device of the above character which does not require an assembly of rods or tubes for its operation, thereby avoiding the necessity for use, as customary at the present time, of a string of pipe of smaller diameter than the production tube, run down into the production tube from the upper end thereof and with a paraffin remover on its lower end.

It is an object of the present invention to provide a paraffin removing device having a cutter and means disposed below and connected to the cutter for moving the same downward in the production tube so as to remove paraffin from the inner wall thereof.

It is a general characteristic of wells of the character hereinbefore referred to that the paraffin deposits on the inner wall surface of the production tube in a zone intermediate the upper and lower ends of the production tube. It is an object of the present invention to provide a

paraffin cutter or remover adapted to be moved through the zone of paraffin deposition in the production tube so as to remove paraffin from this zone, means above and below the zone of paraffin deposition for moving the cutter through the zone, such motivating means each including separate extension elements, each being preferably greater in length than the vertical dimension of the zone of paraffin deposition. Such extension elements may be conveniently made of small chain wire or cable as will be evident from the detailed description hereinafter written.

It is a further object of the invention to provide a device of the above character having a paraffin cutter preceded by a group of scriber elements or knives, which scribe or cut the deposited wall of paraffin along vertical lines so that the action of the paraffin cutter will be facilitated.

It is a further object of the invention to provide a paraffin removing device of the character described which may be normally locked in the upper part of the production tube and which has, as motivating means therefor, a suspended weight element comprising a plurality of relatively small weights flexibly connected in serial relation.

Further objects and advantages of the invention will be brought out in the following part of the specification.

Referring to the drawing which is for illustrative purposes only:

Fig. 1 is a sectional, partly sectioned schematic view showing a preferred form of my invention.

Fig. 2 is an enlarged sectional view of the paraffin cutter.

Fig. 3 is an enlarged cross-section taken as indicated by the line 3—3 of Fig. 2.

Fig. 4 is an enlarged cross-section taken on the line 4—4 of Fig. 2.

In order to show an environment in which my invention may be advantageously employed, I have in Fig. 1 schematically pictured a well casing 10 which extends down into an oil producing formation 11. The casing 10 is shown with a cap 12 from which an oil production tube 13 is suspended in such manner that an inlet strainer 14 at its lower end will be in a position to receive oil from the production zone of the well.

Screwed on to the upper end of the production tube 13 I have shown a cross-fitting 15 from which piping 16 for carrying off the production from the well is extended in the customary manner. The upper end of a production tube 13

provides a chamber 17, which is preferably above the outlet pipe 16, to receive a cutter or scraper 18, when this cutter or scraper is not being employed to remove wax from the production pipe 13.

As shown to enlarged scale in Fig. 2, the member 18, which will be hereinafter referred to as the paraffin cutter, comprises a cylindrical wall having upwardly and downwardly faced cutting or scraping edges 20 and 21, this member 18 being of such diameter that the edges 21 will be spaced a reasonable working distance from the inner surface of the production tube 13. For example, in a production tube of substantially 2 inch internal diameter, a clearance of one-eighth of an inch may be provided between the edges 20 and 21 and the wall of the production tube 13. Means for engagement or operation are provided the tubular cutter 18 in the form of upwardly and downwardly extending balls 23 and 24, the legs of which may be suitably brazed or welded at 25 to the inner surface of the cutter 18. A bar element 26 is extended upward from the cutter 18 and is connected thereto by engagement with the ball 23, this ball having connected to its upper end a slender extension element 27 which may comprise a wire line or light weight cable which will serve as a suspension means for the cutter 18 during its downward movement through the production tube 13 and as a lifting means during the upward movement of the cutter 18. The bar 26 has a transverse opening 28 to receive a locking pin 29, for holding the cutter 18 in the chamber 17 during the periods of in-operation, as will be explained in the following.

As shown in Fig. 1, a stuffing box 30 is connected to the upper end of the production tube 13, this stuffing box having an axial opening 31 and a packing gland 32 through which the bar 26 extends to the exterior of the production tube. When the bar 26 is pulled up through the stuffing box 30, the pin 29 may be passed through the opening 28, as shown in dotted lines 29a, in a position above the gland nut 33 of the stuffing box 30, thereby supporting the cutter 18 and its associated elements in raised, or inoperative position. When the cutter 18 is supported in inoperative position, the packing gland 32 serves to prevent escape of oil from the upper end of the production tube 13 around the bar element 26 and the suspension means. When it is desired to lower the cutter 18 within the tube 13, a cable packing device 35 is screwed on to the upper end of the stuffing box 30 after removal of the pin 29 from its position 29a, the load at this time being taken by the suspension element 27 which extends through a packing gland 36 forming the upper part of the member 35.

A feature of my present invention is the provision of means below the cutter 18 to apply a downward force to move the cutter downward under control of the suspension means comprising the member 27 which may extend to and be wound upon a drum, not shown in view of the common practice of drum and cable usage in oil well equipment. I accomplish this purpose by the provision of a weight element 38 which is connected to the cutter 18 through use of a slender extension element 39, which may be a wire of slightly less than one-eighth of an inch diameter, depending upon the weight to be supported thereby. Although all practices of my invention do not require the same, I provide in conjunction with the cutter 18 a scoring or scribing means 40 comprising a supporting bar 41

which is connected to the cutter 18 by means of the lower ball 24, this bar 41 having thereon a plurality of scoring or scribing blades 42. Disposed at different angles so that as the member 40 moves downward through the portion of the production tube 13 having an internal coating of wax or paraffin thereon, such coating will be scored as indicated in dotted lines 43 in Fig. 4. The slender extension element 39 is connected to the lower end of the bar 41 and to the upper end of the weight element 38 which comprises a plurality of weight sections 45 connected together in a flexible manner by links 46. The purpose of making the weight element 38 sectional instead of as a single bar of considerable length, is to avoid the possibility of breaking the strainer 14 at the lower end of the production tube 13 should the weight element 38 be lowered to such an extent as to be brought into engagement with the strainer 14. It will be perceived that as the strainer 14 is engaged, as the result of lowering the weight element 38, the blow which is struck thereagainst will be initially that which is due to the weight of the lowest weight section 45, instead of a heavy blow which would result if the sections 45 were formed rigidly into a single bar.

In Fig. 1 I show a portion 13a of the production tube 13 lying in the zone of paraffin deposition, and accordingly show a wall or layer 50 of paraffin built up on the interior thereof. It is a feature of the invention to make the slender extension element 39 of such length that it will pass through the restricted opening 51 formed by the layer 50 and support the weight element 38 in the production tube 13 below the zone of paraffin deposition. Being thus supported below the zone of paraffin deposition in the production tube 13, the weight element 38 is free to move downward as the cutter 18 and the associated scoring and scribing means 42 are lowered, and such weight element will be capable of exerting sufficient downward force to move the cutter 18 down through the zone of deposition to scrape or slice off a material portion of the accumulated paraffin, which will be carried out of the upper end of the production tube 13 by the upward flow of oil. The vertical cutting or scribing of the layer of paraffin 50, as indicated in dotted lines in Fig. 4, facilitates the breaking up of the paraffin in such a manner that it may pass readily upward through the axial opening of the cutter 18 and thence upward through the production tube 13 and the outlet pipe 16 to a suitable point of disposal.

A single round trip of the paraffin removing means disclosed is sufficient to accomplish the desired result, and in view of the simplicity of operation of the device, the cutter 18 may be passed through a round trip at frequent intervals, thereby maintaining the production of the well at a mere maximum value, instead of waiting until the flow from the well is shut off completely, or nearly so, before cleaning out the accumulated paraffin.

I claim as my invention:

1. A wax cutter for use in the oil production tube of a flowing well subject to wax deposition in a zone therein comprising a wax cutting assembly embracing an annular ring of slightly less external diameter than the internal diameter of the oil production tube and an elongated bar depending therefrom provided with a plurality of radially extending blades, means for suspending said paraffin cutting assembly in the oil pro-

duction tube above the zone of wax deposition, and a slender elongated element extending from said bar downwardly through the zone of wax deposition and having a weight secured to its lower end, said suspending means being adapted to lower said cutting assembly by virtue of the effect of said weight through the zone of wax deposition whereby the wax is substantially removed and is carried upwardly to the surface by the flow of oil through the oil production tube.

2. A wax cutter for use in the oil production tube of a flowing well subject to wax deposition in a zone therein comprising a wax cutting assembly embracing an annular ring of slightly less external diameter than the internal diameter of the oil production tube and an elongated bar de-

pending therefrom provided with a plurality of radially extending blades, means for suspending said paraffin cutting assembly in the oil production tube above the zone of wax deposition, and a slender elongated element extending from said bar downwardly through the zone of wax deposition and having a plurality of spaced flexibly connected weight elements secured to its lower end, said suspending means being adapted to lower said cutting assembly by virtue of the effect of said weight elements through the zone of wax deposition whereby the wax is substantially removed and is carried upwardly to the surface by the flow of oil through the oil production tube.

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