Oct. 27, 1936. D. RALLET ET AL 2,058,825

DEPARAFFINATOR

Filed June 10, 1935

Fig. 1

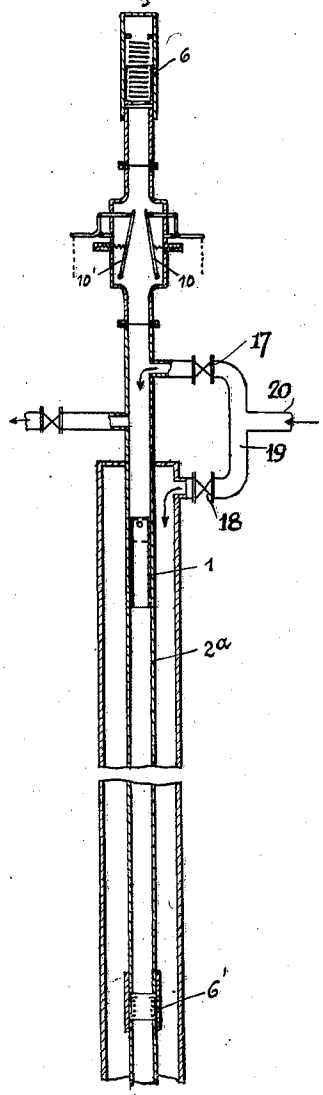


Fig. 2

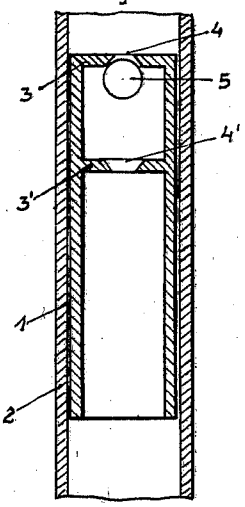


Fig. 3

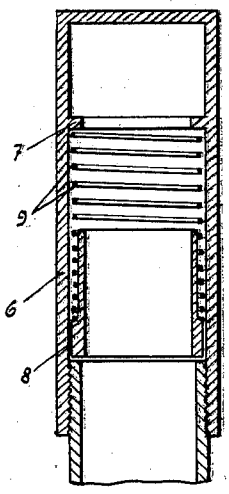


Fig. 4

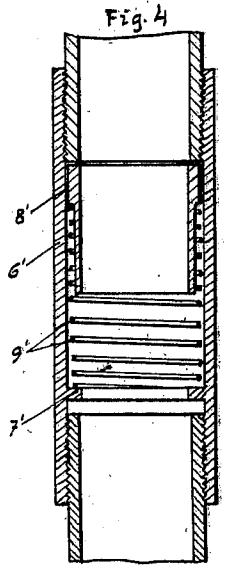
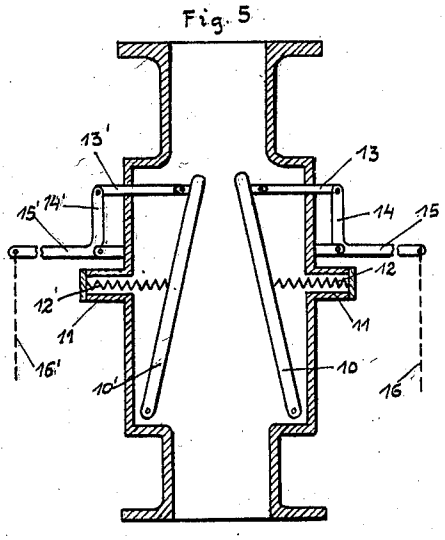


Fig. 5



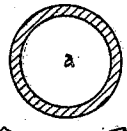


Fig. 6a.

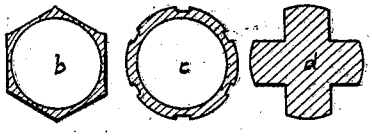
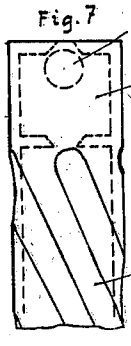


Fig. 6b. Fig. 6c. Fig. 6d.

Fig. 7



D. Rallet & J. Keller
INVENTORS

By Glascock Downing & Seebold
ATTYS.

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DEPARAFFINATOR

Dumitru Rallet and Franz Keller, Moreni, Rumania

Application June 10, 1935, Serial No. 25,958
In Rumania September 22, 1934

4 Claims. (Cl. 166—18)

It is known that in oil wells which are flowing or employing gas lift and which are delivering petroleum containing paraffin, paraffin is deposited on the inner wall of the tubing so that a removal of paraffin is absolutely necessary for maintaining production. This has hitherto been effected by means of a cylindrical or helical cutter inserted in the tubing, which method however has important disadvantages, one of which is that the cutter has to be inserted in the bore hole on a cable of suitable length and has to be operated from above by means of a special machine.

The present invention relates to means for removing paraffin which are very simple and allow of the removal of paraffin being carried out in a very easy and convenient manner, the paraffin removing device being arranged from the start directly in the tubing and being set in operation completely automatically by the gas pressure prevailing in the tubing.

In the accompanying drawing a constructional example of a device according to the invention is illustrated.

Fig. 1 is a general view of the device arranged in the tubing,

Fig. 2 is a longitudinal section through the paraffin removing device itself,

Figs. 3 and 4 are sections through the upper and lower shock absorbers,

Fig. 5 is a longitudinal section of a further shock absorber arranged below that shown in Fig. 3,

Figs. 6*a*, 6*b*, 6*c*, and 6*d* show cross-sections through various constructions of the paraffin removing device, and

Fig. 7 shows a paraffin removing device of different construction.

The deparaffinator according to the invention consists of a reciprocating scraping element 1, which is arranged in the interior of the tubing 2 and rests against the inner wall thereof with small play. The element 1 is provided at its upper end with a disc-like web 3, below which at a certain distance is a second web 3', each web being fitted with a central circular opening 4, 4'. Both webs 3, 3' are inserted and secured in a suitable manner in the inner wall of the tubing. Between the two webs 3, 3' is a ball 5, which is somewhat larger than the circular opening 4, 4' and which is forced against the holes 4' or 4 when the element 1 rises or falls respectively, and in this simple manner acts as a valve.

In order to hold the element 1 at the upper and lower ends after it has completed its up and down movement in the tubing, suitable shock absorbers are provided at the ends. The shock absorbers each consist of a sleeve 6, which is screwed to the two adjacent lengths of tubing and is provided at one end with a circular web 7, while above or below it there is provided a length of tube 8, which is movable in the sleeve. Between the movable tube 8, and the circular web 7, a spiral spring 9, secured thereto in a suitable manner is stretched.

The mode of operation of the deparaffinator is as follows:

When the connection between the tubing 2 and the boring tube 2 has been made by opening the cocks 17, 18 in the connecting pipe 19 the element 1 is forced downwardly by the gas lift in the tubing on account of the pressure of the gas which is forced in through the pipe 20, which presses the ball 5 into the hole 4' of the web 3', and thereby forms a valve. After the element 1 has been arrested in its downward movement by the lower shock absorber provided in the sleeve it will be forced upwardly again by the pressure of the mixture of gas and crude oil which has been forced upwardly in the tube, whereby the ball 5 will press against the opening 4 in the web 3 and thus form a valve in the opposite direction. During these automatically produced up and down movements of the element 1 caused by the pressure of the gases which are introduced or by the pressure of the mixture of crude oil and gas the layer of paraffin deposited on the inner walls of the tubing will be scraped off by the ends of the element.

Since the element is driven upwardly with greater force than that with which it is driven downwardly, the shock absorber 7, 8, 9 provided in the sleeve 6 is generally not sufficient to arrest the tube 1 in its upward movement, for which reason there is provided below the ordinary shock absorber a further specially constructed shock absorber, the details of which are shown in Fig. 5. This consists of two resilient arms 10, 10', the lower ends of which are constructed as hinges, while at the middle they are connected with helical springs 12, 12' arranged and supported in branch pipes 11, 11'. The upper ends of these resilient arms 10, 10' are hinged to horizontal arms 13, 13', each of which is pivoted through a vertical arm 14, 14' to a second horizontal arm 15, 15', to the outer end of which is secured a rope or cable 16, 16'.

This specially constructed shock absorber is very effective because on account of the strongly resilient arms 10, 10' the element 1 rising and entering between them in most cases does not

pass right through but is stopped between the upper ends of the arms 10, 10'. By pulling on the two ropes 16, 16' the arms 10, 10' are drawn apart so that the element 1 can drop and descend again.

If however the element 1 should pass between the arms 10, 10' its speed will be reduced to such an extent that it can be arrested by the ordinary shock absorber 7, 8, 9 provided above.

The deparaffinator 1 may be constructed in various forms, for example as a simple straight sided and smooth walled tube with round (Fig. 6a), hexagonal or polygonal cross-section, in which case it will simply move up and down. It may however, also be constructed in such a manner that while moving up and down it will also rotate. This is effected by giving the element a helical shape (Fig. 6b) or by providing a smooth walled tube on its outer surface with helical channels (Fig. 6c), whereby in both cases a rotary movement can be obtained during the up and down movement of the element 1. The element 1 may have any shape which will produce such a rotary movement, for example, as shown in Fig. 7, which shows an arrangement in which the deparaffinator consists of a rotary member 17 which is helical and cross shaped in cross-section and a cylindrical ball valve 18.

The arrangement according to the invention as described and illustrated is suitable both for continuous and for intermittent gas lift.

Since the deparaffinator on account of being grasped between the arms 10, 10' of the shock absorber will be somewhat compressed at its upper end it is advisable, after a certain number of up and down movements, to draw the element 1 through a template so as to force it back to its original shape.

The constructional form described and illustrated is only intended as an example and can be varied in any suitable manner in the sense of the invention without exceeding the scope thereof, the essence of the invention consisting in an automatic up and down movement of the deparaffinator proper caused automatically by the gas pressure with simultaneous rotation, and the provision of ordinary and specially constructed shock absorbers for arresting the deparaffinator at the upper and lower end of the tubing. Obviously the varieties of shock absorbers described here can be replaced by similar elements of other construction.

What we claim is:—

1. In combination, an oil well flow tubing, a reciprocating element, disposed within the flow tubing and comprising a length of tube, two centrally apertured webs arranged transversely in the tube, a ball movable in the tube between the discs and adapted to seat against one aperture or the other under the action of pressure for enabling the element to be driven up and down in the tubing by fluid pressure, the element being capable of rotation with the tubing and being adapted to scrape paraffin deposit off the inside of the tubing, and shock absorbers at the upper and lower ends of the tubing for arresting the reciprocating element at the ends of its travel.

2. In combination, an oil well flow tubing, a reciprocating element adapted to travel up and down within the tubing and to rotate therein and to scrape paraffin deposit off the inside of the tubing, and shock absorbers at the upper and lower ends of the tubing for arresting the reciprocating element at the ends of its travel, each comprising a sleeve in line with the tubing, an inwardly projecting flange near one end of the sleeve, a movable tube in the sleeve, adapted to intercept the reciprocating element and a helical spring between the movable tube and the flange.

3. In combination, an oil well flow tubing, a reciprocating element adapted to travel up and down within the tubing and to rotate therein and to scrape paraffin deposit off the inside of the tubing, shock absorbers at the upper and lower ends of the tubing for arresting the reciprocating element at the ends of its travel, and a third shock absorber near the upper end of the tubing comprising two resilient arms pivoted at their lower ends and having their upper ends inclined inwardly to intercept the reciprocating element, springs urging the upper ends inwardly, and rods and levers for swinging the arms outwards to release the reciprocating element after same has been caught between them.

4. In combination, an oil well flow tubing, a reciprocating element, disposed within the flow tubing and comprising a length of tube, two centrally apertured webs arranged transversely in the tube, a ball movable in the tube between the discs and adapted to seat against one aperture or the other under the action of pressure for enabling the element to be driven up and down in the tubing by fluid pressure, and a helical portion for imparting rotary motion to the element when travelling in the tubing, the element being adapted to scrape paraffin deposit off the inside of the tubing.

DUMITRU RALLET.
FRANZ KELLER.