July 8, 1930. G. A. HELMLING 1,770,207

PARAFFIN SCRAPER FOR OIL WELLS

Filed Sept. 8, 1927

Fig. 1.

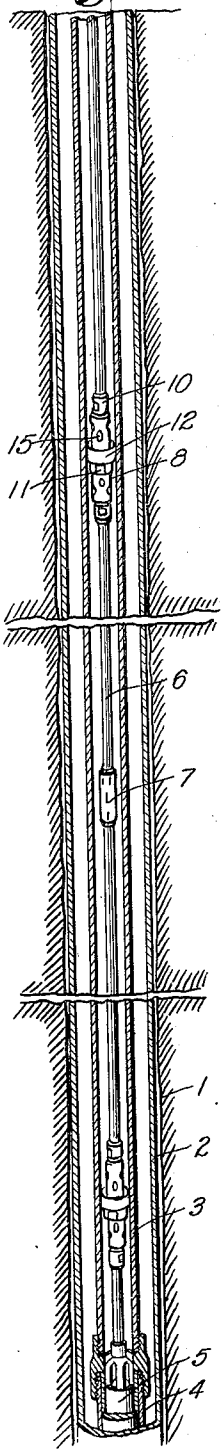


Fig. 2.

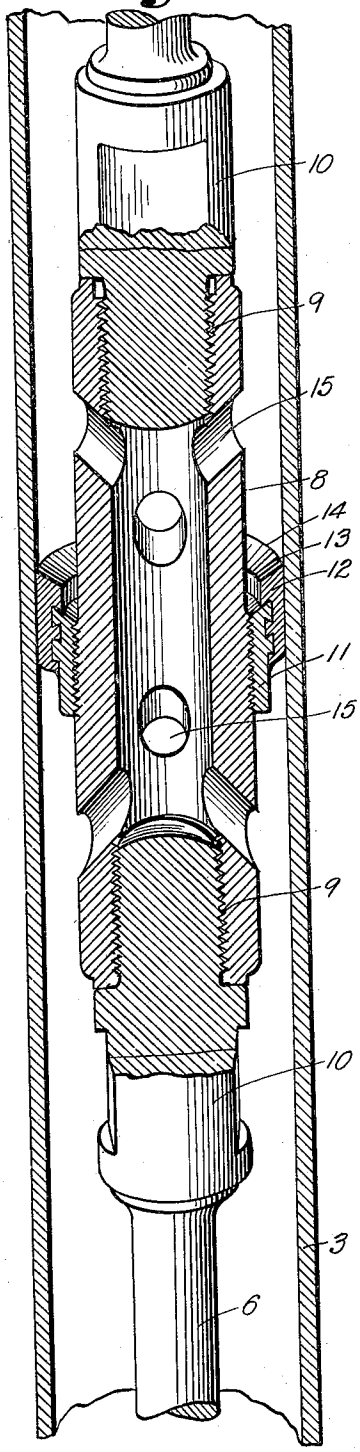


Fig. 3.

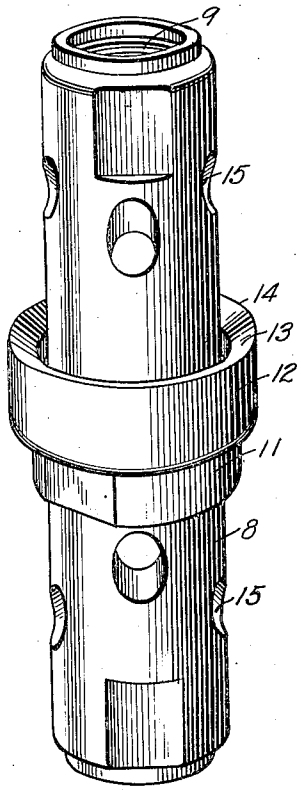
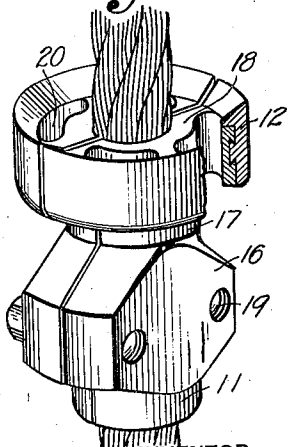


Fig. 4.



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UNITED STATES PATENT OFFICE

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PARAFFIN SCRAPER FOR OIL WELLS

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My invention relates to apparatus for cleaning well tubing and more particularly to the removal of accumulation of paraffin from the tubing of oil wells.

In pumping oil wells it is necessary to frequently remove the pump plunger for the renewal of cups which have become scored or otherwise impaired by sand entering the pump with the oil, or for the replacement of broken parts. In wells producing oil having a high paraffin content, the walls of the tubing often become clogged with an accumulation of the paraffin to such an extent as to interfere with free flow of the oil and passage of the pump plunger through the tubing. The paraffin being compressible, may, when accumulated on the wall of the tubing, permit the removal of the plunger but interfere with its replacement, or when the plunger is returned through the tubing, the paraffin will enter and clog the plunger valve.

In fields producing paraffin oil, it is customary to remove the paraffin from the wall of the tubing after the plunger has been removed, by boring, steaming, or chemical treatment. Such removal of paraffin requires considerable time, in addition to that spent in removing and repairing the pump plunger.

It is the object of my invention to avoid the loss of time incident to removal of paraffin by such means or methods and in accomplishing this object I provide apparatus for the effective removal of paraffin from the walls of tubing simultaneously with the removal of the pump plunger from the well.

In the accompanying drawings illustrating the preferred form of the invention:

Fig. 1 is a central vertical section of a portion of an oil well illustrating a tube cleaning apparatus embodying my invention.

Fig. 2 is an enlarged central vertical section of a part of the tubing and a pumping line comprising joints of sucker rods connected by a coupling including my invention.

Fig. 3 is an enlarged detail perspective view of my tube-cleaning device.

Fig. 4 is a similar view of the tube-cleaning device applied to a wire pumping line.

Referring more in detail to the drawings:

1 designates a well hole lined with a casing 2 and containing tubing 3 which extends through the casing and connects with a pump barrel 4 in accordance with common practice. The pump, indicated by barrel 4, includes a plunger 5, which reciprocates in the barrel and is suspended from and operable by sucker rods 6 formed in joints of approximately twenty (20) foot lengths connected by couplings 7 of any suitable form.

Reciprocation of the plunger in contact with the pump barrel causes grinding of the plunger rings and cups, requiring frequent replacement and repair, particularly when pumping in loose formations where sand often enters between the plunger and barrel, damaging the plunger rings and cups by scoring, in addition to their natural wear. Consequently, it is necessary to frequently remove the plunger for repair and replacement of parts.

When pumping in wells producing paraffin oil the paraffin content of the oil adheres to the wall of the tubing particularly in the upper portion of the tubing, due to temperature changes; often clogging the tubing to an extent sufficient to choke the flow of oil and necessitating removal of the sucker rods in order that the tubing may be cleaned of the paraffin accumulation. In some cases, the accumulation is such as to interfere with the removal of the rods, and, in any event, it would constitute an obstruction to the return of the plunger.

In order to avoid loss of time, incident to the cleaning of the tubing with separate tools or by chemical treatment, I remove the paraffin from the tubing simultaneously with removal of the pump plunger, by scraping the wall of the tubing with a cutting member attached to the pumping line.

As a convenient means for mounting the scraper on rods comprising a pumping line, I provide a rod coupling of special construction consisting of a tubular body 8 having internal threads 9 at its opposite ends for attachment of the coupling to the pins 10 of the sucker rods. Mounted on the coupling 8, preferably by screw threads, is a collar 11,

carrying an annular ring 12 having a beveled upper rim 13, forming a knife edge 14, the outer diameter of the ring being substantially that of the inner diameter of the tubing so that the knife edge moves with close relation to the wall of the tubing when the rods are lifted and scrapes the paraffin accumulation off the tubing into the pocket formed between the ring and the coupling collar.

In order that oil may pass up the tubing or drain back into the well from above the scraper, I provide the tubular coupling with ports 15 above and below the scraper, forming a by-pass through the coupling providing communication between the portions of the tubing above and below the scraper.

In order to avoid damage to the tubing, I preferably form the scraper ring of relatively soft metal which will yield in contact with any irregularity in the tubing, and in order to firmly attach the ring to the tubing I form the collar 11 of harder metal and connect the ring to the collar in a suitable manner, as by tongue and groove as illustrated in the drawings.

In Fig. 4 I have illustrated a modified form of the device which may be applied to a rod joint intermediate its ends, and which is particularly adapted for application to a wire pumping line.

In the modified example, the coupling member is formed of mated halves for clamping on a rod or wire line. In this form a clamp portion is preferably provided as designated by 16, and a neck element 17 joints the clamping portion to a body portion 18 that carries the cutting member 12, the collar 11 being in this form preferably integral with the body portion 18, and the members of the clamp being connected by bolts 19. Openings 20 are provided in the body member, for passage of oil therethrough, corresponding to the ports 15 and hollow interior of the tubular body 8 shown in the preferred form of the device.

A plurality of the devices will ordinarily be installed on a pump line, whether wire or rod, for example, every 200 feet, so that measured portions of the tubing wall will be cleaned in upward movement of the line whereby piling up of the deposits on any one cutter to clog the tube will be avoided.

The device being constructed according to my invention, and attached to sucker rods or a wire line as illustrated in the drawings, the rods or line may be operated to operate the pump, and oil will flow upwardly in the tubing, passing through the channel in the coupling or clamp body in its passage through the tubing. Paraffin will adhere to and accumulate on the wall of the tubing between the scraper members during the pumping operation, but when the rods are pulled to remove the plunger for repair or replacement of parts, the scraper is moved upwardly with the rods, removing the paraffin from the wall of the tubing and elevating it for removal at the mouth of the tubing.

It is apparent, therefore, that with the use of my invention a separate cleaning operation is unnecessary and the time ordinarily lost by boring or chemically treating the tubing is avoided.

What I claim and desire to secure by Letters Patent is:

1. A device of the character described, including a sucker rod coupling, and a ring on said coupling comprising mounting and scraper members of different degrees of hardness, the scraping member having an outwardly beveled edge, the coupling member having an interior channel with ports opening laterally thereto at opposite sides of said ring to permit passing of fluid through the coupling member and around the ring.

2. A device of the character described, inincluding a coupling member for the joints of a sucker rod, an anchor ring threaded onto the outer wall of the coupling member, and a scraping ring of different degree of hardness than the anchor ring, keyed to the anchor ring and having an outwardly beveled edge for scraping contact with the wall of a well tubing, the coupling member having an interior channel and ports inclined in the direction of flow through the tubing and opening through the wall of the coupling member at opposite sides of the ring to provide a passage for fluid through the coupling member.

3. A device of the character described including a sucker rod coupling having an interior channel and longitudinally spaced ports leading from said channel through the wall of the coupling, and a metal ring on said coupling between the ports including a mounting member and a scraper member having an upwardly directed annular cutting edge.

4. In a device of the character described, a mounting member adapted to be attached to a sucker line, and a scraping member keyed to the mounting member comprising a metal ring having an upwardly directed annular peripheral cutting edge for contact with the inner wall of a well tubing, the mounting member having channels to provide passages for fluid between the portions of the tubing above and below the scraping member.

In testimony whereof I affix my signature.

GEORGE A. HELMLING.