Aug. 14, 1945. R. R. RENOUF 2,382,173

STANDING VALVE PULLER

Filed Feb. 21, 1944

Fig. 1

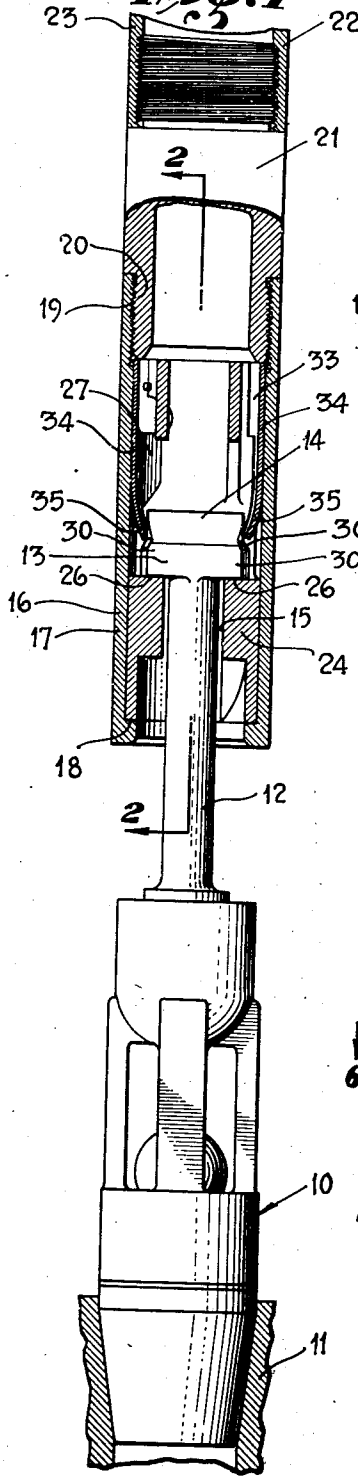



Fig. 2

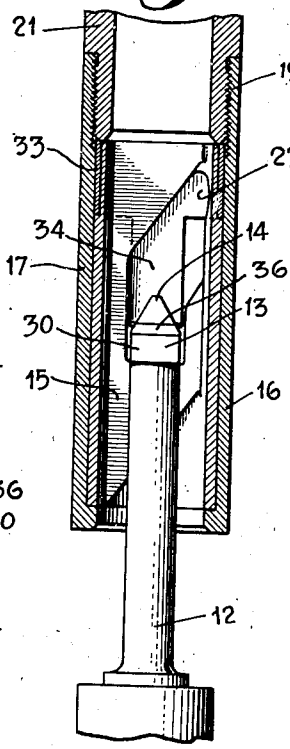



Fig. 3

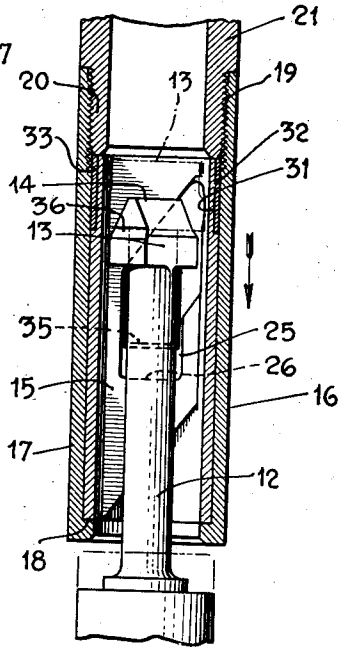



Fig. 4

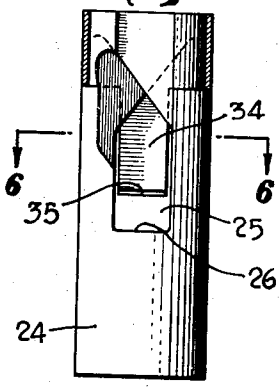



Fig. 5

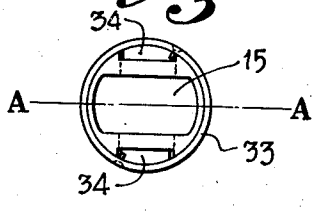
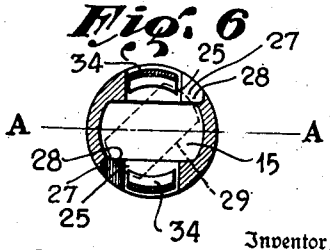



Fig. 6




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# UNITED STATES PATENT OFFICE

2,382,173

## STANDING VALVE PULLER

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Application February 21, 1944, Serial No. 523,243

7 Claims. (Cl. 294—86)

My invention relates to means for installing and removing a part, such as a standing valve, which has its normal utility in a well at considerable distance from the upper end of the well, and relates in particular to a device of this character which has parts so arranged that the device may be used with greater safety and with the assurance that the part will not be inadvertently dropped within the well.

In the art of pumping oil from wells it is customary to have a standing valve removably seated at the lower end of a string of oil tubing. For the purpose of lifting this standing valve from its seat, an engagement means is provided, part of which is carried by the standing valve structure, and the remaining part of which is carried at the lower end of a suspension means which ordinarily consists of the pump piston and a string of sucker rods which extend through the oil tube to the upper end of the well. It is possible to engage the standing valve puller by lowering the suspension means and then by suitable rotation bringing the engageable parts into interengaging or interlocking position, whereupon the shoulder of the upper part will engage a cooperating shoulder of the lower part. Modern practice in the removing of the standing valve from the lower end of the oil tube involves high speed of vertical movement of the sucker rods and the parts connected to the lower ends thereof and also abrupt stopping and starting movement, with the result that at times the standing valve has been disconnected from the lower end of the suspension means and dropped back into the lower part of the oil tubing. It is an object of the present invention to provide a standing valve puller and inserter having means which will prevent disengagement of the standing valve from the suspension means during the raising and lowering of the same within the tubing, thereby avoiding the accidental release of the standing valve from the suspension means.

It is a further object of the invention to provide a standing valve puller having a barrel part and a stem part, the stem part having a head which projects radially and is adapted to enter a slot in the barrel and engage a shoulder, there being spring means to yieldably hold the head in cooperative relation to the shoulder so that the barrel and stem parts of the device will not become disengaged during raising or lowering of the standing valve within a well.

A further object of the invention is to provide a standing valve puller of the character set forth in the preceding paragraph wherein the barrel consists of an inner part and an outer part, with spring means disposed within the outer part for engagement with the head or hook portion of the stem.

A further object of the invention is to provide a valve stem puller having a barrel or cylinder having inner and outer parts so formed as to provide an annular channel between these parts to receive a ring member having spring fingers projecting therefrom so as to engage the head of the stem which is inserted in the barrel or cylindrical part.

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 partly sectioned elevational view showing the upper and lower parts of the valve puller engaged.

Fig. 2 is a sectional view taken as indicated by the line 2—2 of Fig. 1.

Fig. 3 is a view showing the barrel of the standing valve puller in the same position as Fig. 2, and showing the stem raised, with the head partly rotated as occurs when the head is removed from or moved into the slots of the barrel.

Fig. 4 is an elevational view of the inner part of the barrel, with the spring-holding ring sectioned.

Fig. 5 is a plan view of Fig. 4.

Fig. 6 is a cross section taken as indicated by the line 6—6 of Fig. 4.

In Fig. 1 I show a standing valve 10 projecting upward from a seat 11. This standing valve 10 has an upwardly projecting stem 12 with a T head 13 preferably formed integral with its upper end, which head 13 has an upwardly projecting ridge 14 to guide the head into the axial opening 15 of the barrel 16.

The barrel 16 includes an outer cylindrical part 17 having an internal shoulder 18 at its lower end and having threads 19 at its upper end to receive the threaded portion 20 of a fitting 21 which is connected to the lower end of a suspension means 22. The suspension means 22 may include the lower end of a pump piston or barrel 23 and a string of sucker rods, not shown, extending upward therefrom through the oil tube. The barrel 16 includes an inner part 24 disposed in the outer cylindrical part 17 between the shoulder 18 and the downwardly projecting threaded portion 20 of the fitting 21. This inner part 24 has therein the axial opening

15 which, as shown in Figs. 5 and 6, is of substantially rectangular cross section but with curved end faces conforming approximately to the shape of the head 13. At right angles to the plane A—A of the axial opening 15, the inner body 24 has slots 25 provided with shoulders 26 at their lower ends. As shown at 27, the upper end of each slot 25 is enlarged laterally in one direction to provide a clearance at 28, Fig. 6, to permit the head 13 to be rotated past the dotted line position 29 from a position aligned with the axis A—A into a position aligned with the slots 25, thereby making possible movement of the head 13 relatively upwardly through the axial opening 15, and by relative rotation of the stem 12 and the barrel 16 to carry the head 13 through the position thereof shown in Fig. 3 and shown at 29 in Fig. 6 into alignment with the slots 25, whereupon the projecting portions 30 of the head 13 may be then brought into engagement with the shoulders 26.

The upper end of the inner part 24 is reduced in diameter as indicated at 31, so as to provide between the upper part of the inner portion 24 and the corresponding part of the outer portion 17 of the barrel an annular channel 32. This annular channel 32 receives a ring 33 of short cylindric form. From the ring 33, fingers 34 extend downwardly in the outer portions of the slots 25, the lower ends 35 of the fingers 34 being spaced above the shoulders 26 and being bent inward as shown in Fig. 1 to engage tapered shoulders 36 on the outer faces or end faces of the head 13 when the head 13 is moved upward from the position in which it is shown in Figs. 1 and 2.

To lift the head 13 upward from the position in which it is shown in Figs. 1 and 2 into the upper ends of the slots 25 requires a force considerably greater than any upward force ordinarily applied to or incurred in the standing valve 10 and stem 12 during the raising or lowering thereof within the well; therefore, the spring fingers 34 prevent inadvertently lifting of the head 13 in the slots 25. In other words, the spring fingers 34 hold the downwardly faced shoulders of the head 13 in cooperative relation to the shoulders 26 at the lower ends of the slots 25.

When it is desired to lift the standing valve from its seat 11, the barrel 16 is lowered down over the head 13 and upper portion of the stem 12 to the position thereof shown in Fig. 3. Then, the suspension means is rotated in clockwise direction and moved upward so that the slots 25 will be brought into alignment with the projecting portions 30 of the head 13 and so that the shoulders 26 at the lower ends of the slots 25 will be brought into engagement with the head, as shown in Fig. 1. Upward movement of the suspension means will then lift the standing valve 10 from its seat 11, and the standing valve 10 may be lifted to the surface of the ground without danger of its being inadvertently disconnected from the lower end of the suspension means.

When it is desired to replace the standing valve, it is lowered through the oil tubing in suspended relation to the barrel 16, as shown in Fig. 1. When the lower end of the standing valve 10 comes into engagement with the seat 11, further downward movement of the barrel 16 will cause the lower ends 35 of the fingers 34 to ride downward over the tapered shoulders 33 of the head 13 to a position such as shown in Fig. 3; whereupon, the barrel 16 may be rotated in counterclockwise direction to bring the head 13 into alignment with the axis A—A of the axial passage 15. The barrel 16 may be then lifted free from the head 13, leaving the standing valve 10 at rest in the seat 11.

I claim as my invention:

1. In a standing valve puller, the combination of: first and second engagement members, one of said members being connectable to a standing valve and the other of said members being connectable to the lower part of a suspension means, the upper of said members having an upwardly faced shoulder and the lower of said members having a stem with an integral T head at its upper end having downwardly faced shoulders, the upper of said members having means for guiding said head relatively upward within itself, said members being so formed and said shoulders being so positioned that said shoulders may be brought into, and removed from, confronting relation by relative rotation of said members; a ring mounted in one of said members; and resilient fingers carried by said ring in a downwardly directed position to engage the ends of said T head to yieldingly restrain both upward movement and rotation of said head so as to limit the movement of said members away from said confronting relation whereby the members will not become inadvertently disengaged.

2. In a standing valve puller, the combination of: first and second engagement members, one of said members being connectable to a standing valve and the other of said members being connectable to the lower part of a suspension means, the upper of said members having an upwardly faced shoulder and the lower of said members having a downwardly faced shoulder, one of said members comprising a tubular barrel and the other of said members comprising a stem to extend into said barrel, said members being so formed and said shoulders being so positioned that said shoulders may be brought into and removed from confronting relation by relative rotation of said members, said barrel having therein an annular chamber; a metal ring in said annular chamber; and fingers extending from said ring, the ends of said fingers being positioned so as to engage said stem and limit the movement of said members away from said confronting relation whereby the members will not become inadvertently disengaged.

3. In a standing valve puller of the character described, the combination of: a stem having a shank and a T head on the outer end of said shank; a tubular barrel comprising an inner part and an outer part, said inner barrel part having an axial opening to receive said head and a portion of said shank, and having diametrally opposed slots to receive the radially projecting portions of said head, there being shoulders at the ends of said slots against which said projecting portions of said head may rest when said stem and said barrel are interlocked; a ring disposed within said outer barrel part; and fingers projecting from said ring and along said slots to engage said projecting portions of said head and yieldably hold the same in said slots.

4. In a standing valve puller of the character described, the combination of: a stem having a shank and a T head on the outer end of said shank; a tubular barrel comprising an inner part and an outer part, there being an annular

channel between said inner and outer parts, said inner barrel part having an axial opening to receive said head and a portion of said shank, and having diametrally opposed slots to receive the radially projecting portions of said head, there being shoulders at the ends of said slots against which said projecting portions of said head may rest when said stem and said barrel are interlocked; a ring disposed within said annular channel; and fingers projecting from said ring and along said slots to engage said projecting portions of said head and yieldably hold the same in said slots.

5. In a standing valve puller of the character described, the combination of: a stem having a shank and a T head on the outer end of said shank; a tubular barrel comprising an inner part and an outer part, said inner part having at one end thereof an external annular depression so as to form an annular channel between said inner and outer parts, said inner barrel part having an axial opening to receive said head and a portion of said shank, and having diametrally opposed slots to receive the radially projecting portions of said head, there being shoulders at the ends of said slots against which said projecting portions of said head may rest when said stem and said barrel are interlocked; a ring disposed within said annular channel; and fingers projecting from said ring and along said slots to engage said projecting portions of said head and yieldably hold the same in said slots.

6. In a standing valve puller of the character described, the combination of: a stem having a shank and a T head on the outer end of said shank; a tubular barrel comprising an inner part and an outer part, there being an annular channel between said inner and outer parts, said inner barrel part having an axial opening to receive said head and a portion of said shank, and having diametrally opposed slots to receive the radially projecting portions of said head, there being shoulders at the ends of said slots against which said projecting portions of said head may rest when said stem and said barrel are interlocked; a ring disposed within said annular channel; and a finger projecting from said ring and along one of said slots to engage a projecting portion of said head and yieldably hold the same from disengagement with the slot in which it reposes.

7. In a standing valve puller, the combination of: first and second engagement members, one of said members being connectable to a standing valve and the other of said members being connectable to the lower part of a suspension means, the upper of said members having an upwardly faced shoulder and the lower of said members having a downwardly faced shoulder, one of said members comprising a tubular barrel and the other of said members comprising a stem to extend into said barrel, said members being so formed and said shoulders being so positioned that said shoulders may be brought into and removed from confronting relation by relative rotation of said members, said barrel having therein an annular chamber; a ring in said annular chamber; and projections extending downwardly from said ring into positions enabling same to yieldingly apply restraining forces to said stem sufficient to restrain movement of said members away from said confronting relationship.

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