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L. D. BAIRD ET AL

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PUMP

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*Fig. 1.*

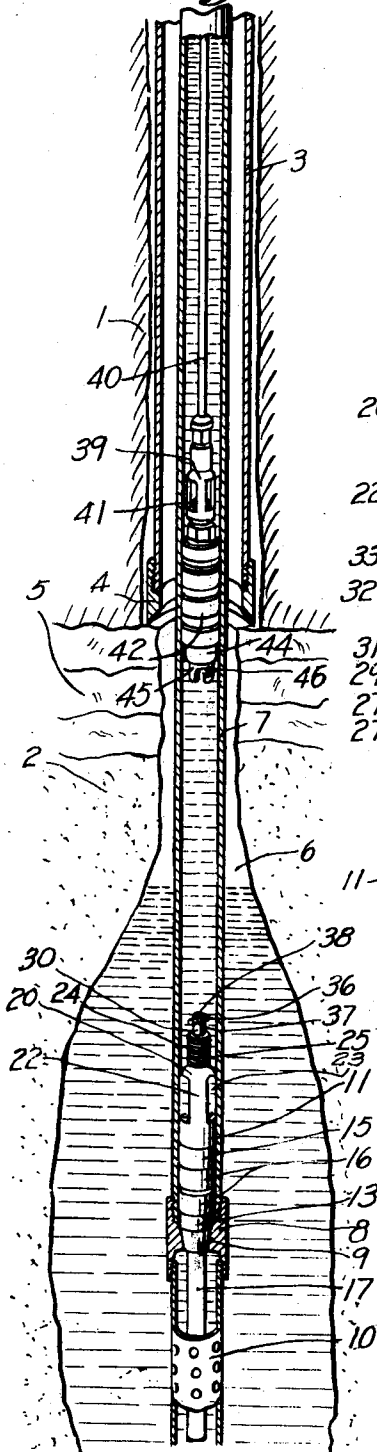


*Fig. 2.*

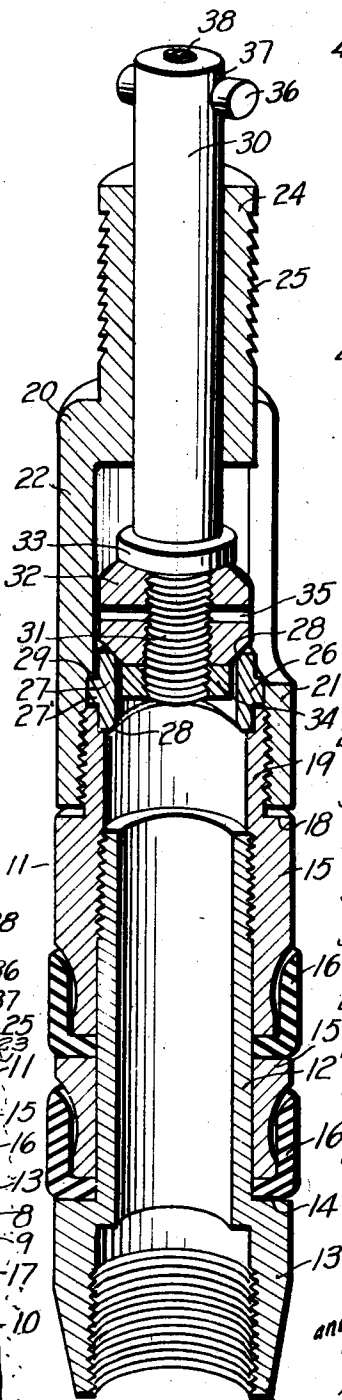
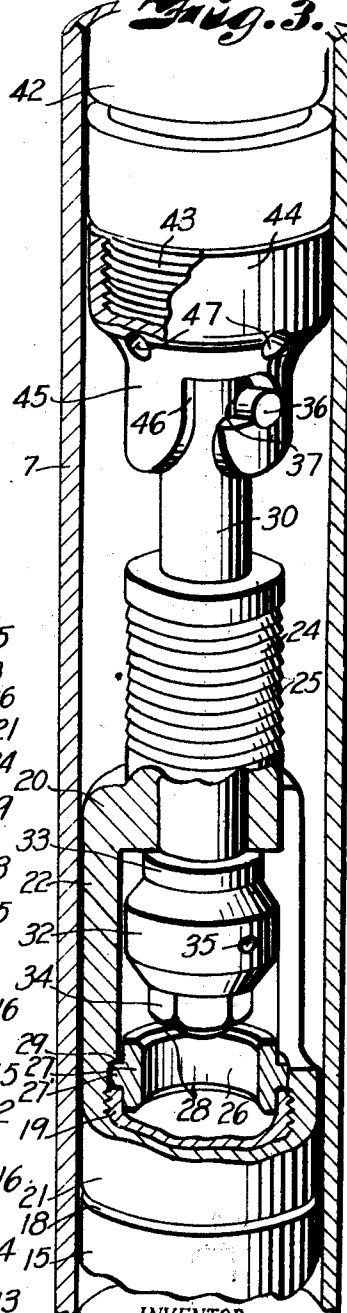


*Fig. 3.*



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## UNITED STATES PATENT OFFICE.

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## PUMP.

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Our invention relates to pumps and more particularly to pumps of the standing valve type for use in oil wells, the principal object of the invention being to provide for positive seating of the standing valve and for removal of the standing valve with the working valve when repairs or replacements are required or as a preliminary step in the cleaning out of the well.

In accomplishing these objects we have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings wherein:

Fig. 1 is a vertical section of a portion of an oil well equipped with a pump embodying our improvement.

Fig. 2 is an enlarged vertical section of the standing valve, showing the valve closed.

Fig. 3 is an enlarged section of the well tubing showing the standing valve connected with the working valve for removal from the well, parts of the valve being broken away for better illustration.

Referring more in detail to the drawings:

1 designates an oil well extended into the oil sand 2 and comprising a casing 3 having its shoe 4 seated on bed rock 5 over the oil sand. Extending through the casing 3 into the well pocket 6 is tubing 7, provided at its lower end with the usual coupling 8 comprising a standing valve seat 9 and from which is suspended the usual strainer 10.

11 designates the standing valve, comprising a sleeve 12 having a tapered base 13 seated in the valve seat 9 of the coupling 8 and comprising a shoulder 14 supporting the valve rings 15 and cups 16 which may be of ordinary construction. Threaded into the head 13 is a depending tube 17 which extends into the strainer to receive the oil to be passed through the pump. The upper valve cup 15 is elongated with its body threaded onto the sleeve 12 to compress the packing rings and having an inset shoulder 18 and threaded nipple 19 for receiving the valve cage 20 of ordinary construction, comprising the lower collar 21 having threaded connection with the valve cup extension 19, the ribs 22 spaced to form the port openings 23 and an upper neck 24, which latter is extended to form a stem guide and provided with downwardly facing corrugations 25 on its outer face to provide a grip for a fishing tool in case of necessity. Within the valve cage is a reversible valve seat 26 comprising a ring 27 having a

beveled inner edge 28 at top and bottom for receiving a valve as will presently be described, and having an outstanding annular ring 27' located between the top of the valve cup extension 19 and a shoulder 29 on the inner face of the valve cage.

Slidable in the guide neck 24 is a stem 30 having a threaded shank 31 at its lower end carrying the valve head 32 which is held to the shank and against the collar 33 on the lower end of the stem by a nut 34. The valve head is threaded onto the shank 31, and in order to facilitate application of the head to the shank and its removal therefrom, I provide the head with laterally opening recesses 35 for receiving a spanner wrench. The stem 30 is of a length to extend a short distance above the top of the valve cage and has a pin 36 located in the transverse bore 37 extending through the stem near its upper end and held in place by a set screw 38 that extends through the end of the stem to contact with the pin; the ends of the pin projecting sufficiently from the sides of the stem to be gripped by a tool as presently described.

The working valve comprises a cage 39 suspended from the usual sucker rods 40 and housing a fluid check valve for controlling flow through the working barrel when the working valve is reciprocated by the sucker rods. In one construction as the lower member of the working valve 42 carries a male thread, I provide a collar 44 which threads onto threaded neck 43 provided with a downwardly extending sleeve 45 provided with downwardly opening bayonet slots 46, one side having an arm capable of permitting a seating engagement of pin 36 on valve stem rod 30, so that after the working valve is hooked to the standing valve it will be possible to lift valve head 32 off its seat 27 to bleed the chamber above of fluid, and to eliminate foreign substance which might have become temporarily seated in and would affect the efficient seating of the valve. We do not desire to be limited to any one manner of connection from the working valve to the standing valve, as different type working valves will require different means of clutch connection, the manner of clutch opening and seat, however, being identical in so far as engagement with pin 36 on valve stem 30 of the standing valve is concerned.

The reducing neck between the collar and sleeve is preferably provided with ports 47

for permitting a greater fluid entry to the working valve on its downward charge stroke.

When a pump embodying our improvement is to be installed in a well, the tubing is set, the standing valve hooked to the working valve through the bayonet joint (Fig 3) and the two valves let in together on the sucker rod. When the standing valve reaches the coupling at the bottom of the tubing, weight of the rod will force the standing valve to its seat, but in order to insure a close fit of the standing valve head in the coupling seat, it is desirable to raise and lower the sucker rod with short strokes to reciprocate the stem of the standing valve in its guide neck to produce a jarring action which will hammer the standing valve to its seat.

When the standing valve is set, the working valve is given a part rotation to expose the vertical leg of the bayonet slot to the pin on the standing valve stem, and the working valve is raised in the tubing to free the standing valve and position the working valve in proper pumping location. With the parts so arranged, the pumping may be effected by reciprocating the working valve by means of the sucker rod, the automatic valves opening and closing in accordance with ordinary pumping practice.

Should it be desired to remove the standing valve for repairs or replacement or when the tubing is to be pulled at well cleaning periods, the working valve is lowered onto the standing valve and rotated to seat the pin 36 in the bayonet slot. When the valves are connected through the bayonet joint, the working valve is lifted, lifting the standing valve and carrying the latter with it from the well. Should the standing valve stick in its seat so that an ordinary pull is insufficient to remove it, then the short stroke, jarring action heretofore described may be resorted to, the head of the standing valve rapping the top of the cage at the upper limit of its reciprocation to jar the valve cage from its coupling seat. It is apparent that when the standing valve is lifted through connection of its stem with the working valve, the standing valve is unseated so that contents of the tubing may flow out through the valve and relieve the rod of the weight of the oil in

the part of the tubing above the working valve. When the connection is made between the working valve and standing valve and upward movement of the sucker rods is made and then partially held, the contents of the tubing above both valves may be bled through the opening back into the well.

It is apparent, therefore, that we have provided a valve of this general type which can not only be securely seated to provide for proper pumping operation, but which may be unseated under a jarring action, and that removal of the working and standing valves is facilitated through the bleeding operations to eliminate dead weight of the contents of the tube above the valve.

It is also apparent that because of the extension of the stem of the standing valve for a substantial distance through the guide neck of its cage, an accurate true seat of the standing valve head is effected, which increases the serviceability of the valve.

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

1. In a pump, a working valve, a swedged coupling on the lower end of the working valve having openings for the passage of oil, a standing valve comprising a cage, a valve seat and a neck on the cage, a valve member cooperative with said seat and having a stem slidable in said guide neck and receivable in the swedged end of the coupling, and means on the swedged coupling and on the standing valve stem for removably connecting the working valve with the stem.

2. In combination with a pump barrel, a standing valve at the bottom of the barrel including a seat, a crown and a stem slidable in the crown, having a valve member on its lower end co-operative with the seat with its upper end terminating within the barrel above the crown, a plunger reciprocable in the barrel having a nipple at its lower end adapted to receive the upper end of the standing valve stem, the nipple and stem having one a bayonet slot and the other a pin for interlocking the plunger and stem.

In testimony whereof we affix our signatures.

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