

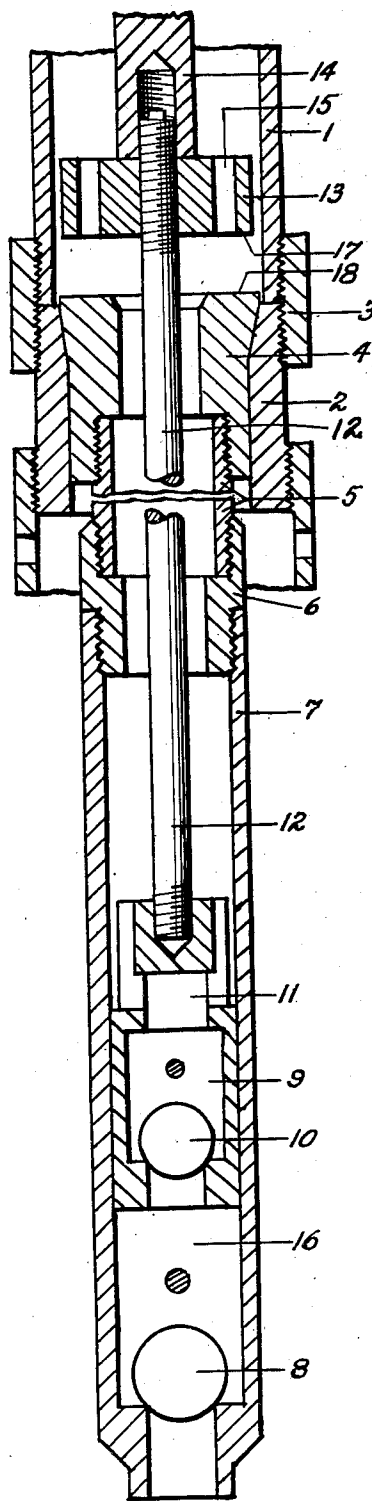
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ADJUSTABLE PUMP ROD

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ADJUSTABLE PUMP ROD

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This invention relates to improvement in pump rod and more particularly to an adjustable pump rod for use in connection with inserted well pumps.

This application is a continuation-in-part (as more fully disclosed later herein) of my co-pending application Serial #397,272, filed June 9, 1941, now Patent 2,386,564 relating to oil and gas separator.

In oil well pumping it is the usual practice to employ inserted pumping apparatus of the reciprocable type comprising a barrel, usually stationarily positioned near the lower end of the well tubing, and a piston or plunger in the barrel and in reciprocable relation to the barrel, both cooperating to advance the flow of fluid in the well tubing, the reciprocation of the plunger being accomplished by a pump rod mounted on the plunger and connected to a string of rods extending upwardly to the ground surface for connection to suitable motor means to actuate same.

Oil well pumps often comprise an assembly of parts made by different manufacturers, the assembly of such parts often producing an over-all length which will vary between considerably wide limits depending upon the particular apparatus used. Different barrels, different hold-down devices, different barrel and hold-down connections and different plungers will cause variations in the over-all length of a given assembled structure. Then again the producer of oil may desire, for effective pumping operation, a plunger consisting of a metallic section in combination with cups or other compressible materials, which latter when secured upon the plunger by the usual clamping means are bound to cause variation in the over-all length of the plunger. Thus when a pump rod considered to be of standard stock length is employed with the various assembly of parts, the plunger frequently is permitted to strike the bottom parts of the barrel or the plunger does not move into sufficiently close relation to the bottom parts of the barrel for effective operation of the pump when pumping gassy fluid. Hence, producers of oil often have found it necessary to have the pump rods altered in length to fit the particular assemblies with which they are to be associated.

It is therefore an object of my invention to provide a pump in which the barrel and plunger

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mechanisms may be comprised of an assembly of stock parts of different manufacture to produce the particular type of pump desired by the purchaser, which stock parts, when employed with my improvement, may be compensated for variations in length and thus rendered effective in all assemblies.

Another object of my invention is to provide a pump assembly of the character set forth, in which the pump rod includes means adjustable longitudinally with respect to the stationary pump structure to constitute an adjustable abutment, capable of cooperating with an abutment on the stationary pump structure, to limit the downward movement of the pump rod relative to the stationary members of the pump.

Another object of my invention is to provide a pump assembly in which the reciprocable members of the pump are provided with a guide at the upper end of the pump rod to centralize the pump rod in respect to the well tube and the stationary members of the pump and on which the guide includes means adjustable longitudinally with respect to the stationary pump structure to constitute an adjustable abutment capable of cooperating with an abutment on the stationary pump structure, to limit the downward movement of the pump rod relative to the stationary members of the pump.

And a still further object of my invention is to provide a pump assembly of the character set forth in which the stationary members of the pump include a guide surrounding the pump rod to cooperate with the pump rod to centralize same with respect to the stationary pump structure, and in which means is included providing an adjustable abutment above the guide engageable with an abutment on the guide to limit the downward movement of the pump rod relative to the stationary members of the pump.

Other objects and advantages of my invention appear as the specification proceeds.

For a better understanding of my invention, reference should be had to the accompanying drawing, in which drawing the figure is a vertical sectional view taken through a portion of the well tubing and illustrating a plunger and pump barrel embodying my invention assembled therein.

Referring to the single figure of the drawing:

1 is a fragmentary portion of the usual well tubing or eduction pipe.

2 is a shoe attached by a coupling 3 to the lower end of tubing 1.

4 is a hold down of and to releasably retain, in respect to the well tubing 1, an inserted pump embodying my invention.

The inserted pump may further comprise a tube or nipple 5 threadedly received at its upper end in the hold down 4 and likewise received at its lower end in the coupling 6 which in turn is threadedly received in the pump barrel 7.

Pump barrel 7, at its lower end, has the inlet or standing valve 8 (somewhat diagrammatically illustrated) to admit fluid into the pump.

Reciprocally mounted in barrel 7 is a plunger 9 (also somewhat diagrammatically illustrated) which includes the outlet or rising valve 10 at its lower end, and the open cage 11 at its upper end, both being provided to discharge fluid from the pump.

A pump rod 12 is mounted on open cage 11 and extends upwardly through coupling 6, nipple 5 and hold down 4. At the upper end of pump rod 12 there is the guide 13 and the rod coupling 14 which competes the inserted pump and which connects to the usual string of rods (not shown) which extend to the ground surface for connection to any suitable motor means to actuate the pump.

Guide 13 is of less diameter than well tubing 1 and may include longitudinal openings 15, if desired, for passage of pumped fluid upwardly through guide 13 as well as between guide 13 and well tubing 1, during the pumping operation.

When the string of rods (not shown) are reciprocated members 14, 13, 12 and 9 will be reciprocated, and plunger 9, when making an upstroke, in cooperation with barrel 7, draws fluid through standing valve 8, which is open or off its seat, into working space 16 which is increasing in volume, the rising valve 10 being closed or on its seat during the upstroke of the pump.

Plunger 9, when making a downstroke, in cooperation with barrel 7, displaces fluid from working space 16, which is decreasing in volume, through open rising valve 10 which is off its seat, the standing valve 8 during the downstroke being closed or on its seat.

Fluid displaced through open cage 11 of plunger 9 moves upwardly in the space between rod 12, barrel 7, coupling 6, nipple 5, hold down 4, well tubing 1, and guide 13, and also through openings 15 in guide 13 eventually to find its way upwardly in well tubing 1 to the ground surface.

Hold down 4 and coupling 6 are of less inside diameter than pump barrel 7 and also serve to act as a guide to prevent rod 12, should the latter be flexed or bent during reciprocation of the plunger 9, from scoring or scratching the highly polished inside surface of pump barrel 7, which scoring or scratching would render the pump inoperative.

The guide 13, in cooperation with well tubing 1, also acts to centralize the pump rod 12 in respect to the stationary structure of the inserted pump and well tubing 1.

The abutment 17, provided by the bottom of guide 13, when brought to bear upon the abutment 18, provided by the top of hold down 4, arrests the downward movement of rod 12.

The rod coupling 14 and the guide 13, in combination, adjust the pump rod 12 for length. The upper threaded end of pump rod 12 extends through the correspondingly threaded guide 13 and is received in the correspondingly threaded

rod coupling 14. The guide 13 may be rotated on rod 12 until rod 12 is of the proper or desired length, after which rod coupling 14 is screwed downwardly on rod 12 until contact is made between guide 13 and rod coupling 14, the last named operation acting to secure against accidental loosening of the rod coupling 14 and the guide 13 on and in desired position relative to pump rod 12. By this construction the valves of the pump may be brought in closest possible proximity, which is highly desirable to avoid gas locking when gassy fluid is being pumped, yet at no time will the load of the reciprocable parts be accidentally or otherwise imposed or placed upon the plunger 9 and valves, this condition being taken care of by the abutment 17 on guide 13 and abutment 18 on the hold down 4 when rod 12 is adjusted to the proper or desired length.

Thus it is seen that any minor variations in the length of the several pump parts may be compensated for by a simple adjustment of guide 13 and rod coupling 14 relative to the barrel assembly, and the plunger 9 may be permitted to approach so closely to the interior lower end of the pump barrel 7 as to assure maximum efficiency of operation of the pump, while assuring that the abutment 17 on guide 13 will engage the abutment 18 on hold down 4 before the lower end of plunger 9 or rising valve 10 can strike the interior lower end of barrel 7 or standing valve 8.

The construction of the present application differs from that of my co-pending Patent 2,386,564 in that a separator barrel and supporting means construction for and surrounding the pump assembly of that patent is omitted from the construction of the present application, and the member 5 of the present application instead of being made of extended lengthy sections immediately joined by a coupling so constructed as to avoid interior wear of the lengthy sections by the pump rod during the reciprocation of the pump rod also having been omitted, this having been done to simplify the drawing and shorten the specification of the present application; however, I wish that it be understood that the present invention may be used with equal facility in connection with the invention of Patent 2,386,564 as well as with the many modifications of inserted well pumps.

While I have shown and described the preferred embodiment of my invention, I do not desire to be limited to any of the details of the construction shown or described herein, except as defined by the claims.

I claim:

1. In combination with a well tubing, an inserted pump, retaining means to hold said pump in said well tubing and enable withdrawal by upward axial pull, said pump comprising the combination of: a pump barrel, a plunger reciprocally positioned in said pump barrel, a pump rod mounted on said plunger and extending upwardly beyond said pump barrel to reciprocate said plunger in said pump barrel, a first abutment on the non-reciprocable portion of said pump above said plunger, a guide on said pump rod substantially above said first abutment and capable of cooperating with said well tubing to substantially centralize said pump rod in respect to said pump barrel and said well tubing, a second abutment associated with said guide engageable with said first abutment, means associated with said guide to dispose said second abutment in adjustably spaced relation to said first abutment to thereby adjustably limit extent of movement of said

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plunger in said pump barrel, and means for locking said means associated with said guide in any adjusted position.

2. In combination with a well tubing, an inserted pump, retaining means to hold said pump in said well tubing and enable withdrawal by upward axial pull, said pump comprising the combination of: a pump barrel, a plunger reciprocatingly positioned in said pump barrel, a pump rod mounted on said plunger and extending upwardly beyond said pump barrel to reciprocate said plunger in said pump barrel, a first guide on the non-reciprocable portion of said pump above said plunger, a second guide on said pump rod substantially above said first guide, said guides cooperating to substantially centralize said pump rod in respect to said pump barrel and said well tubing, a first abutment on said first guide, a second abutment on said second guide engageable with said first abutment, means associated

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with said second guide to dispose said second abutment in adjustably spaced relation to said first abutment to thereby adjustably limit extent of movement of said plunger in said pump barrel, and means for locking said means associated with said second guide in any adjusted position.

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