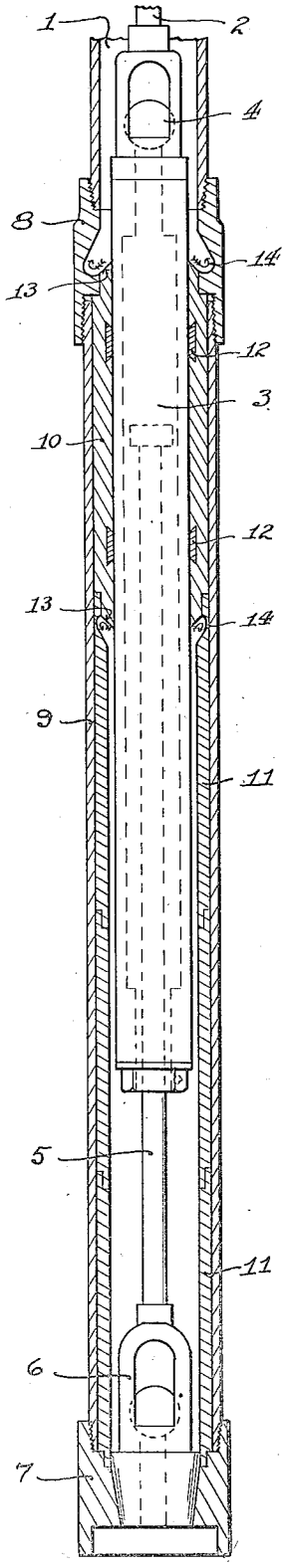
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OIL WELL PUMP

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OIL-WELL PUMP.

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To all whom it may concern:

Be it known that we, CHARLES C. SCHARPENBERG and LEROY G. GATES, citizens of the United States, residing at Bakersfield and Whittier, respectively, in the counties of Kern and Los Angeles and State of California, have invented certain new and useful Improvements in Oil-Well Pumps, of which the following is a specification.

Our invention relates to oil well pumps of the plunger type.

The object of our invention is to provide a pump which is more efficient and economical in operation, and less subject to wear, than pumps of the types now in common use. We attain this object, broadly, by providing a pump having less friction and less leakage past the plunger than the usual pumps, and in which the abrasive action of any sand or other hard particles which may be suspended in the oil is reduced to a minimum. We further provide a pump in which the barrel need not be pulled for renewal when slightly worn, the plunger being the only part which it is necessary to replace. By this feature, considerable time is saved over the present practise of pulling both plunger and barrel when worn.

It is to be understood that the construction herein shown and described may be varied, within the limits of the claims hereto appended, without departing from the spirit of the invention as expressed in said claims.

A preferred embodiment of our invention will now be fully described with reference to the accompanying drawing, in which the figure is a longitudinal section of our improved oil well pump.

In the drawing, the reference numeral 1 designates the tubing string, and 2 is the sucker rod. The plunger 3, which is secured to the sucker rod 2 by the usual upper, or traveling valve 4, may be of any suitable and well known type having a smooth exterior surface. For purposes of illustration, we have shown a familiar type of plunger, employing a garbutt rod 5 to pull the lower, or standing valve 6, which is seated, as usual, in the standing valve barrel 7.

Our improvements relate particularly to the construction of the pump barrel, which comprises a coupling 8 secured to the lower end of the tubing string 1; a tubular shell 9 secured at its upper end to said coupling 8 and to the lower end of which the standing valve barrel 7 is secured, as shown; a working barrel 10 fitted within the upper portion of said shell; and a free barrel, or sleeve 11, of larger interior diameter than said working barrel 10, fitted within the lower portion of said shell. The free barrel or sleeve 11 may be made in sections as shown, if desired. Both the working barrel 10 and the sleeves 11 are close fits within the outside tube 9, and are locked in position by being clamped endwise between the coupling 8 and the standing valve barrel 7. The working barrel 10 is considerably shorter than the plunger 3, in fact, its length is less than the length of the plunger minus the length of the stroke, so that the ends of the plunger, even at the extreme limits of the stroke, project beyond the ends of said working barrel.

The working barrel 10 is a close sliding fit upon the plunger 3, and is preferably formed of some relatively hard wear resisting material such for example as chilled cast iron or manganese steel. On account of its short length, said working barrel can be machined and ground to a very accurate fit upon the plunger 3, and is little subject to distortion from changes of temperature or other causes. This close fit of the plunger 3 within the working barrel 10 not only reduces back leakage at this point to a minimum, but also assists in the exclusion of sand or other foreign matter which might cause abrasion and excessive wear on both plunger and barrel. If desired, the working barrel 10 may be fitted with inserted rings 12 of some suitable soft metal, such as babbitt, lead, or copper, which will reduce the friction of the moving plunger and further reduce back leakage. The free barrel or sleeve 11 is entirely free of the plunger 3 as shown, so that there is no wear on this member.

The end faces of the working barrel 10 are preferably beveled toward the plunger, as shown at 13, leaving a relatively sharp

edge at the point of contact with the plunger, which tends to scrape sand and other hard particles off the surface of said plunger as it slides into the barrel, thus preventing such particles from entering between the plunger and barrel and causing abrasion and wear. We do not wish to restrict ourselves to the particular form of bevel shown in the drawing, as other forms may be satisfactory. The coupling member 8 and the upper end portion of the free barrel or sleeve 11 are provided with interior annular grooves 14, preferably of inclined and rounded cross sectional contour and merging into the beveled ends 13 of the working barrel 10. Said grooves produce outwardly swirling eddy currents in the oil, is indicated by the curved arrows, which tend to carry sand and other solid particles away from the surface of the plunger 3, thereby preventing such particles from working in between the plunger and the working barrel.

It will now be seen that the friction between the plunger 3 and the working barrel 10 is reduced to a minimum by the shortness of said barrel and the accuracy with which it can be made to fit said plunger, and further, if desired, by the insertion of the soft metal packing rings 12. Back leakage past the plunger is also reduced by said accuracy, and by the packing rings 12. Wear of the plunger 3 and working barrel 10 is reduced to a minimum partly by this same accuracy, and partly by the beveled ends 13 and annular grooves 14, all of which combine to exclude abrasive particles from the barrel 10. Furthermore, said barrel may be made of relatively hard metal, as stated. By reason of the short length of the barrel 10, and the fact that the ends of the plunger 3 are always outside said barrel, even at the extreme limits of the stroke, such wear as does occur in said barrel is evenly distributed throughout its length, without the formation of shoulders at the ends of the stroke. On this account there is no necessity for pulling the barrel for replacement. When sufficient wear has occurred, the sucker rods and plunger only are pulled, and a new plunger, of slightly larger diameter, is substituted, the barrel 10, having worn evenly, being still capable of efficient operation. Thus a great saving of time and labor is effected over the present methods, where both plunger and barrel must be pulled for replacement. The reduction of friction and wear also effect a saving in the power used to operate the pump, and in the cost of repairs.

We claim:

1. An oil well pump comprising a shell; a working barrel secured within said shell and extending for a portion of the length thereof, said shell having an annular interior groove of curved cross sectional contour adjacent each end of said barrel; and a plunger fitting closely within and operating through said barrel, said plunger having a length greater than that of said barrel.

2. An oil well pump comprising a shell; a working barrel secured within said shell and extending for a portion of the length thereof, said barrel having a bore and having its end faces tapered inwardly toward said bore, and said shell having an annular groove adjacent each end of said barrel, one wall of each groove merging into each end face of said barrel; and a plunger fitting closely within and operating through said bore, said plunger having a length greater than that of said barrel.

3. An oil well pump comprising a shell; a working barrel formed of relatively hard metal secured within said shell and extending for a portion of the length thereof; a packing ring of relatively soft metal inserted in the bore of said barrel; and a plunger fitting closely within and operating through said bore, said plunger having a length greater than that of said barrel.

4. An oil well pump comprising a barrel having a portion of its length of reduced interior diameter and provided with an annular interior groove of curved cross sectional contour adjacent each end of said reduced portion; and a plunger, of greater length than said reduced portion, fitting closely therein and operating therethrough.

5. An oil well pump comprising a barrel having a portion of its length of reduced interior diameter, said reduced portion having a bore and its end faces being tapered inwardly toward said bore, and said barrel being provided with an annular interior groove adjacent each end of said reduced portion, one side of each groove merging into each tapered end face of said reduced portion; and a plunger, of greater length than said reduced portion, fitting closely therein and operating therethrough.

6. An oil well pump comprising a barrel formed of relatively hard metal and having a portion of its length of reduced interior diameter; a packing ring of relatively soft metal inserted in the bore of said reduced portion; and a plunger, of greater length than said reduced portion, fitting closely therein and operating therethrough.

7. An oil well pump comprising a shell; a coupling member for attaching said shell to the well tubing string; a working barrel secured within said shell, said coupling member having an annular groove adjacent the upper end of said barrel; a sleeve, of larger interior diameter than said barrel, secured within said shell below said barrel, said sleeve having an annular groove adjacent the lower end of said barrel; and a plunger fitting closely within and operating through said barrel.

8. An oil well pump comprising a shell adapted for connection with the well tubing string; a working barrel positioned within the upper portion of said shell; a sleeve, of greater interior diameter than said barrel, positioned within the lower end of said shell; and a plunger fitting closely within and operating through said barrel, the lower end of said plunger extending within said sleeve.

In testimony whereof we have signed our names to this specification.

CHARLES C. SCHARPENBERG.
LEROY G. GATES.