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A. F. RUTHVEN
RECIPROCATING PUMP

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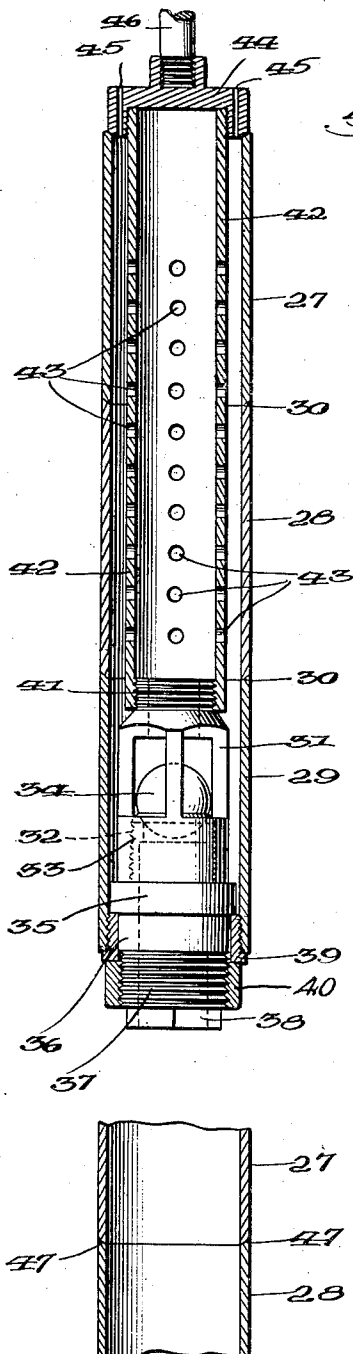


Fig. 1.

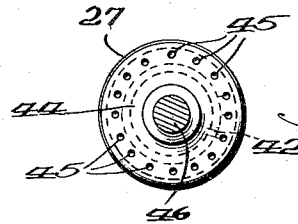


Fig. 2.

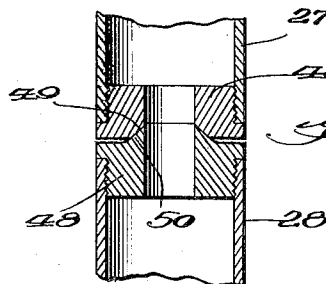


Fig. 3.

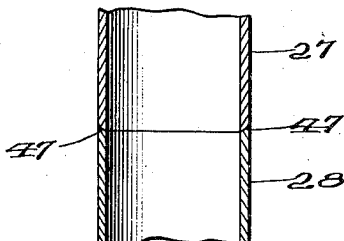


Fig. 4.

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RECIPROCATING PUMP

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Application February 19, 1931, Serial No. 517,058

8 Claims. (Cl. 103—225)

This invention relates to an improvement in reciprocating pumps, and primarily to such deep-well pumps as are employed for pumping water, oil or other liquid.

5 An object of this invention is to provide a flexible plunger for the pump to adapt itself to irregularities in the pump barrel, particularly where a long plunger is required as for the pumping of deep wells. It has been found that a solid
10 plunger often binds against the pump barrel which decreases the efficiency thereof and causes wear and friction between the plunger and barrel. This is entirely obviated by the use of a flexible or sectional plunger. A lock-nut may be em-
15 ployed to connect the plunger with the plunger-valve.

In the accompanying drawing:

Fig. 1 is a sectional view through a flexible plunger;

20 Fig. 2 is a top plan view thereof;

Fig. 3 is a detail sectional view showing a slight modification in the connection between the sections of the plunger; and

25 Fig. 4 is a sectional view of a further modification therein.

In Figs. 1 to 4 are represented a flexible plunger which may be employed in connection with a grooved or other pump barrel. As shown in Fig. 1, the plunger comprises a plurality of sections 27, 28 and 29, which are provided with interfitting joints 30 therebetween formed by beveling the abutting edges of the sections so that one will have a tendency to seat in the end of the other.

35 A cage 31 is disposed within the plunger and is threaded onto the threaded portion 32 of a valve seat 33, which receives the ball valve 34 enclosed within the cage. A flange 35 is formed on the valve seat 33 beneath the threaded portion 32 and is of greater diameter than said threaded portion, and below the collar 34 is a smooth portion 36 of smaller diameter than said collar and terminating in a threaded portion 37, the lower end of which is squared as at 38 to
45 receive a wrench. A collar 39 is fitted over the smooth portion 36 and is screw-threaded into the lower end of the lowermost section 29 of the plunger. A lock-nut 40 is threaded onto the threaded portion 37 to force the upper edge of
50 the collar 39 against the flange 35, in order to rigidly hold the lower end of the section 29 in place.

The upper end of the cage 31 is threaded as at 41 to receive a tube 42, which is provided with
55 perforations 43 through the walls thereof to per-

mit the discharge of fluid which may pass into this tube. The upper end of the tube 42 is screw-threaded into a head 44, the outer edge of which abuts against the upper end of the section 27
60 of the plunger and cooperates with the collar 39 and lock-nut 40 to hold the sections in place. These sections are, however, supported relatively loosely with a slight amount of play therebetween, so that they will adapt themselves to irregularities in the pump barrel in which they
65 may be used.

The head 44 has perforations 45 therethrough to permit the discharge of any fluid that passes into the space between the sections of the plunger in the tube 42. The sucker-rods 46 are attached
70 to the head 44 for operation of the plunger.

It has been found that in pumping of very deep oil wells or the like, a plunger of substantial length, such as six or eight feet, is required, and where the plunger fits relatively close to the
75 wall of the pump barrel the two must be perfectly straight or a binding would be caused therebetween, which would interfere with the proper operation of the plunger. Very often the wall of the pump barrel or of the plunger would get
80 out of line slightly, and the plunger would bind, which would interfere with its operation.

By constructing the plunger of a plurality of sections flexibly connected together, a flexible plunger is provided which may adapt itself to
85 irregularities in the pump barrel and maintain smooth operation thereof.

It also renders the plunger more durable and permits it to last very much longer than it would if operated while binding against the wall of the
90 pump barrel. The tube 42 serves to prevent the sections of the plunger from getting substantially out of line but is spaced from the sections sufficiently far to permit self-adjustment to any normal irregularities in the pump barrel.

While the edges of the joints 30 in Fig. 1 are shown as beveled, yet they may be curved, as shown at 47 in Fig. 4, if desired.

In Fig. 3 is illustrated still another form of joint which may be employed between the sec-
100 tions, and in which collars 48 are threaded into the ends of the sections 27 and 28, for instance, and one of these collars 48 is provided with a recess 49 forming a seat for a projection 50 formed on the other collar 48, which provides an
105 interfitting relation between the ends of the sections and holds them in substantial alignment while permitting self-adjustment to irregularities in the pump barrel.

While the periphery of the flexible plunger is 110

shown in Fig. 1 as being smooth, yet it may be grooved if desired, and may be used in a grooved barrel.

I claim:

1. In a pump of the character described, a plunger comprising one or more tubular sections, a valve cage mounted within the plunger, a valve seat connected with the valve cage and having a flange carried thereby, and having a threaded portion below the flange, a collar connected with the sections of the plunger and bearing against the flange, a lock-nut screwed onto the threaded portion for holding the collar in place, a perforated tube connected with the valve cage and extending upwardly therefrom through the sections of the plunger, and a head connected with the perforated tube and adapted to hold the sections of the plunger in place.
2. In a pump of the character described, the combination in a plunger of a plurality of tubular sections arranged approximately in longitudinal alignment, a tube extending upwardly through the sections, a valve cage having means connected with the tube and having means connected with the lower section for connecting the lower ends of the tubular sections and the tube together, and a head connected with the upper end of the tube and arranged to hold the sections of the plunger in place.
3. In a pump of the character described, the combination in a plunger of a plurality of tubular sections arranged approximately in longitudinal alignment, a tube extending through the sections, a valve and cage assembly having screw threaded connection with the lower end of the tube, said assembly having a peripheral flange and a threaded portion below the flange, a collar connected with the tubular sections and bearing against the flange, a lock-nut screwed onto the threaded portion and holding the collar in place, and a head connected with the upper end of the tube and holding the sections of the plunger in place.
4. In a pump of the character described, a plunger comprising a plurality of aligned tubular

sections, the adjacent ends of the sections having interfitted seats in the walls thereof constructed and arranged for tilting of the sections relative to each other responsive to longitudinal irregularities in a pump barrel around the plunger.

5. In a pump of the character described, a plunger comprising a plurality of aligned tubular sections, the adjacent ends of the sections having interfitted seats in the walls thereof constructed and arranged for tilting of the sections relative to each other responsive to longitudinal irregularities in a pump barrel around the plunger, and means for loosely holding the sections against substantial separation.

6. In a pump of the character described, a plunger having a plurality of aligned tubular sections, the end of one section having a concave seat formed directly therein, and the end of the other section fitting directly into said seat, said sections being responsive to longitudinal irregularities in a pump barrel around the plunger.

7. In a pump of the character described the combination of a pump barrel and a plunger therein having a plurality of longitudinally aligned tubular sections, the end of one section having a concave seat formed directly therein, and the end of the other section fitting directly into said seat, said sections being responsive to substantial deviations of the pump barrel out of a straight line.

8. In a pump of the character described the combination of a pump barrel and a plunger therein having a plurality of longitudinally aligned tubular sections, the end of one section having a concave seat formed directly therein, and the end of the other section fitting directly into said seat, said sections being responsive to substantial deviations of the pump barrel out of a straight line, and means extending longitudinally through the sections for loosely holding the sections against substantial separation.

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