May 25, 1926. 1,586,482

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NONLEAK SEAT AND ANCHOR FOR LINER PUMPS

Filed May 7, 1923

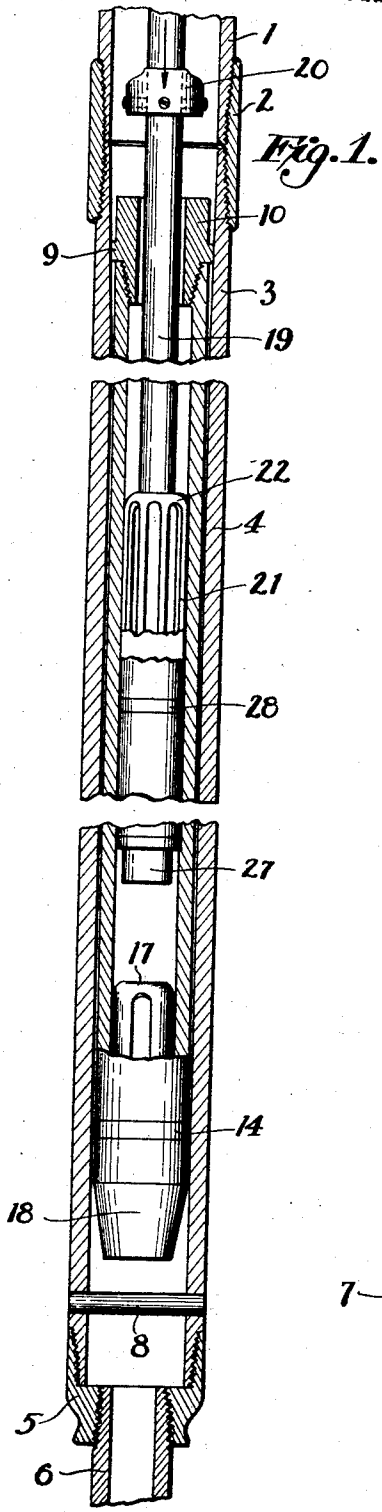


Fig. 1.

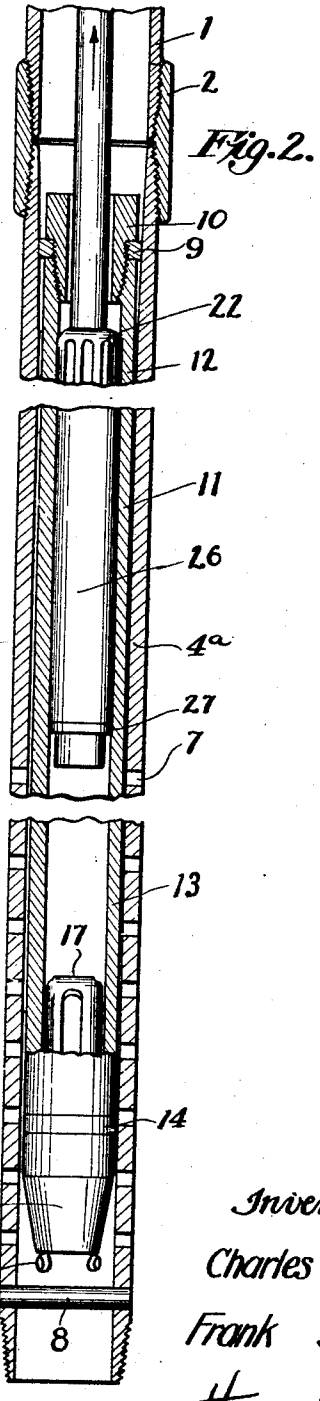


Fig. 2.

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Patented May 25, 1926. 1,586,482

UNITED STATES PATENT OFFICE.

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NONLEAK SEAT AND ANCHOR FOR LINER PUMPS.

Application filed May 7, 1923. Serial No. 637,293.

Although our present invention relates to a non-leaking seat and anchor for liner pumps, the purpose of our invention may be broadly stated as relating generally to the simplification and improvement of liner pumps, especially liner pumps for use in deep wells, such as oil wells.

It is an object of our invention to provide simple and improved means for securing and anchoring a pump at the lower end of and within a pipe through which the oil or other liquid pumped may be withdrawn from a well, and for this purpose we prefer a simplified construction such that the mentioned pipe and the pump which is introduced therethrough may both be supported entirely from the top of the well.

It is a further object of our invention to provide means comprising a very gradually tapered collar and a single anchoring ring adapted to effect a wedging engagement therewith, our preferred construction being such as to obviate the use of soft metal, such as lead or babbitt, and being such as to effect a tight joint, and nevertheless such as shall permit of a disengagement of the anchoring elements when necessary.

It is a further object of our invention to provide suitable means for seating and unseating our anchor ring, which may or may not be made integral with a plug adapted to receive blows from a seating hammer and an unseating hammer such as may be comprised in an organization of our preferred construction.

It is a further object of our invention to improve upon and simplify the construction of stand valves employed in liner pumps.

It is a further object of our invention to provide an improved pump housing section and an improved shoe, or other means to prevent the loss of parts in case of accident or disconnection, and adapted to be employed in conjunction with a tapered anchor-receiving collar of our preferred design.

Other objects of our invention will appear from the following description of preferred embodiments thereof taken in connection with the appended claims and the accompanying drawings, in which—

Figure 1 is a vertical section, with parts broken away, adapted to show various parts of our device in their assembled relationship and in the relative positions which they may occupy during the anchoring of a liner pump in place.

Fig. 2 is a similar view, showing certain alternative features and exhibiting the parts in the relative position which they may occupy during the unseating of our anchoring means, for the removal of a liner pump.

It is believed that the general character of our invention will be readily understood from a detailed description of the embodiments shown in the drawing, in which it will be understood that 1 is a section of the main or exit pipe through which oil or other liquid may be delivered, this pipe being adapted to fit within a well casing (not shown) and connected by means such as the hub or coupling 2 with a tapered pump-supporting collar 3 with which is connected, by means such as the coupling 2^a, a pump housing 4. The housing section 4 may be of any usual construction but, under certain conditions, we find it advantageous to provide it with a shoe or reducer 5 adapted to carry an extension 6, the shoe or reducer 5 being suitable to prevent the loss of pump parts in case of accident or disconnection.

Under other conditions than those referred to, we may employ a pump housing section 4^a, provided with perforations or apertures 7, through which oil or other liquid may enter the pump housing and we may, in any case, substitute a pin 8 for other means of preventing a loss of pump parts in case of accident or disconnection.

It being an object of our present invention to simplify the construction by which a liner pump is anchored, we have preferred to employ for this purpose a single anchoring element, which is preferably of hard metal. From one point of view our construction here referred to may be regarded as an improvement upon the construction disclosed in patent to Drader and Candee, No. 1,151,765, August 31, 1915, in which a plurality of anchoring rings of soft metal, such as lead, are employed. Soft metal being liable to easy deformation, and liable to become unseated as a result of wear or vibration, we prefer to form our anchoring ring of a metal at least as hard as copper or a mild steel; and it is desirable that the collar 3, which may be tapered throughout only a portion of its length as shown, with which the anchor ring 9 may cooperate, should be

provided with an accurate and only a very gradual taper, in order that the ring 9, from which the parts of our liner pump are supported, may be very firmly lodged or seated by a wedging action therein.

It being understood that our anchoring ring is to be seated or unseated by the bumping or hammering action of movable elements which may be associated with the sucker rod of our pump, we may form the said ring 9 either as a separate element as shown in Figure 2, or as an integral part of a threaded bump plug 10, as shown in Fig. 1, whose lower extension is adapted to support a removable working barrel of any usual or preferred construction.

Before the mentioned removable working barrel is inserted in a well, our pump is completed by the introduction of a valved plunger, which may be of any usual or preferred construction, except that we prefer to associate therewith suitable means for the seating and unseating, as occasion may require, of the mentioned anchor ring 9. For the purpose of seating this anchor ring we may provide the lowermost section of the sucker rod 19 with means such as the seating hammer 20, adapted to contact with the bump plug 10, with which, as mentioned above, our anchor ring may be associated; and to facilitate the unseating of the mentioned anchor ring as occasion may require we employ the upper portion of the valve cage 21 which provides a hammer 22. The hammer 20 may be provided by a coupling which connects the lower sections of the sucker rod together.

The plunger 26, provided with the bottom bushing 27 and the top bushing 28, carrying a valve seat, adapted to receive a ball check valve, may be of any usual or preferred construction, and these parts last mentioned constitute no part of our present invention.

From the foregoing it will be appreciated that we have provided a simplified and improved pump construction by which the working barrel of a liner pump is adapted to be removably and yet securely suspended within a tapered collar, which in turn may be suspended by an oil-delivery pipe extending to the top of a well, and that we have also provided simple and suitable means to effect a seating or an unseating of our anchoring or securing ring, the novel features referred to being adapted to cooperate with additional improvements tending to the retention of the parts of a liner pump in their intended relationships, and to other simplification in the construction and operation thereof.

It will, however, be obvious that various features of our present invention may be independently used, and that various modifications may be made therein without departing from the spirit or the scope thereof as the same is indicated above and in the following claim.

What we claim is:

A pump comprising a pump housing having a tapered seat formed on its interior surface, a barrel, a part resting upon the top edge of the barrel, a plug extending through said part and having a portion threaded into the barrel thus fastening the part to the barrel and permitting the barrel to be suspended by the plug, said part being adapted to seat upon said tapered seat, a plunger reciprocable in said barrel, a sucker rod secured to the plunger and extending upwardly through the plug, means permitting fluid to pass upwardly through the plug upon the upward stroke of the plunger, and means providing hammers upon the sucker rod above and below the plug for seating and unseating said part.

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

CHAS SPRAGUE.
FRANK SPRAGUE.