March 9, 1926. 1,575,888

J. A. ZUBLIN

WELL PUMP

Filed Jan. 25, 1923

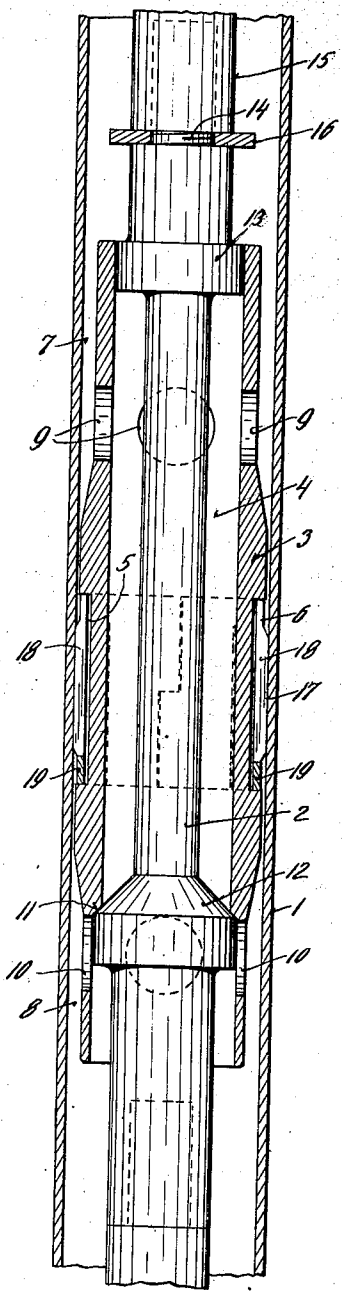


Fig. 1.

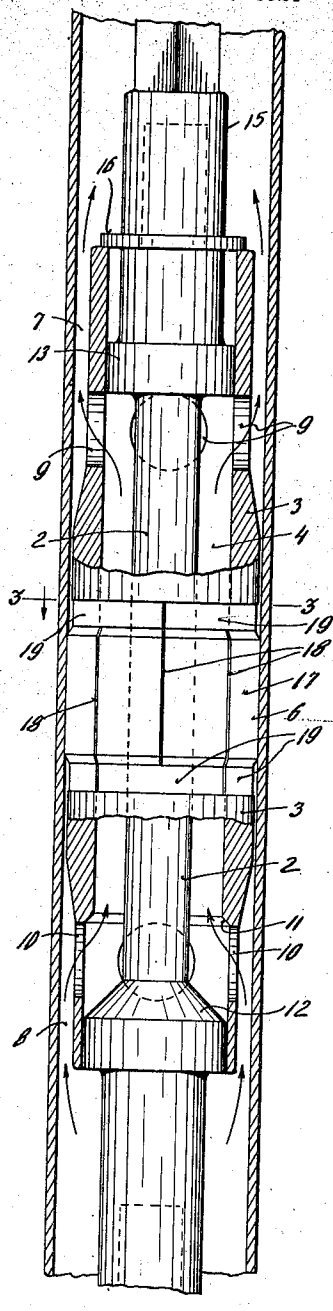


Fig. 2.

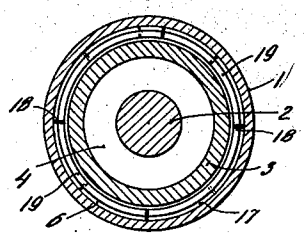


Fig. 3.

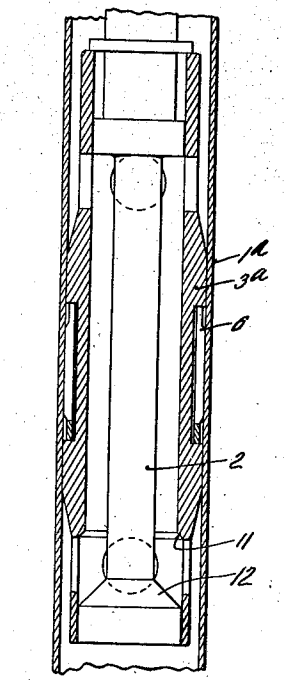


Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN A. ZUBLIN, OF LOS ANGELES, CALIFORNIA.

WELL PUMP.

Application filed January 25, 1923. Serial No. 614,776.

To all whom it may concern:

Be it known that I, JOHN A. ZUBLIN, a citizen of the Republic of Switzerland, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Well Pump, of which the following is a specification.

This invention relates to well pumps and is particularly directed to an improved pump unit structure adapted for operation in a working barrel or in a pump tubing.

It is an object of the invention to provide a simplified structure of few parts, which is designed to reduce wear to a minimum, and at the same time to provide a structure which can be cheaply and easily manufactured and can be conveniently and easily assembled or disassembled in the field.

Another object is to provide a pump in which the pumped fluid is directed with a washing action against the tubing wall on opposite sides of the pump packing to maintain said wall clean of foreign substances liable to injure the packing.

A further object is to provide a pump unit which may be used and operated for the purposes set forth in my copending application Serial No. 594,194 in which a plurality of pump units operate in a pump tubing at spaced intervals and are adapted to accommodate themselves to internal diameter variations of different makes and weights of standard pump tubing.

Another object is to provide a pump unit in which the sucker-rod extends through the pump plunger and is guided therein, the sucker rod having a valve element cooperating with the plunger to control the passage of fluid through the plunger, and being adapted for an independent initial movement effecting a valve operation and for a subsequent movement translating the plunger.

Various other objects and advantages will be more fully apparent from the following description of the accompanying drawings, which form a part of this disclosure, and which illustrate a preferred form of embodiment of the invention.

Of the drawings:

Figure 1 is a vertical section through a well tubing and a pump unit of the present invention, the pump mechanism being shown in closed position for a lifting stroke.

Figure 2 is a similar view showing the pump mechanism in opened position during a down stroke.

Figure 3 is a plan section on line 3—3 of Figure 1.

Figure 4 is a vertical section illustrating a slightly modified form of pump unit.

In the drawings, 1 designates a pump tubing in which the pump unit reciprocates, and 2 designates a special sucker rod section as part of the sucker rod line. A tubular pump plunger 3 surrounds the sucker rod section 2, forming therewith an annular fluid passage 4 and having a medial ring groove 5 to receive a packing ring 6. The opposite ends of the plunger are of reduced diameter and with the tubing wall form annular fluid passages 7 and 8, the upper end portion of the plunger having ports 9 establishing communication between the fluid passage 7 and the bore 4 of the plunger, and the lower end portion of the plunger having similar ports 10 establishing communication between the fluid passage 8 and the bore 4 of the plunger.

The bore of the plunger is enlarged at its lower end and immediately above the ports 10 is formed to provide an annular valve seat 11. The sucker rod section 2 has a cone valve element 12 at its lower end portion, which has a sliding fit in the enlarged lower end of the plunger bore and is adapted for cooperation with the valve seat 11 to control the central fluid passage 4 of the plunger. The rod section 2 is further provided with a guide collar 13 having a sliding fit in the upper end of the bore of the plunger above the ports 9, the upper end of said rod section having a screw-threaded pin 14 to engage in the upper adjacent standard sucker rod section 15, a stop abutment 16, in the form of a washer, being clamped between the rod sections 2 and 15.

The outer periphery of the plunger from the medial grooved portion to the reduced end portions is shown as tapered to permit an easy insertion of the pump unit into the pump tubing.

This construction provides a pump unit in which the sucker rod extends through the pump plunger and in which the plunger bore forms an annular longitudinal fluid passage 4 communicating through the ports 9 and 10, with the well tubing on opposite sides of the plunger packing, the valve ele-

ment 12 and the washer 16 carried by the sucker rod serving as opposed abutments relatively spaced to permit an initial independent movement of the sucker rod at the beginning of each stroke so that during the initial upward movement of the rod the valve 12 will engage the valve seat 11 of the plunger to close the plunger fluid passage 4 (see Figure 1) and will then translate the pump plunger 3 upwards in a pumping stroke upon a continued upward movement of the rod, a reverse movement of the rod causing the valve 12 to open and the abutment washer 16 to engage the upper end of the plunger (see Figure 2) whereupon a continued downward translation of the rod will effect a return stroke of the plunger.

During such downward translation of the plunger the fluid will flow as indicated by the several arrows, it being noted that such flow is directed through the passages 7 and 8 and the ports 9 and 10 so as to have a direct flushing or scouring action upon the tubing walls on opposite sides of the plunger packing.

The pump unit of the present invention, while well adapted for operation in a working barrel which is usually machined to standard size, is also adapted for operation in pump tubing, either singly or in multiple, arranged in the manner illustrated and described in my copending application above referred to.

When used in a working barrel, as shown in Figure 4, the pump plunger 3^a will have a close working fit in the barrel 1^a, but when working in pump tubing, as shown in Figures 1 to 3, it is not intended that the plunger 3 shall closely fit the tubing on account of the relatively wide variations in the internal diameter of standard well tubing of different makes and weights. To provide pump units which will operate in such standard tubings it is intended that such units have plungers of a diameter which is slightly less than the internal diameter of the heaviest tubing of a given standard size and to provide an expansible plunger packing which will expand to contact with the tubing wall. This is further desirable for the reason that the ends of tubing sections are sometimes burred or the walls of the tubing dented or otherwise distorted to an extent which would render it difficult, if not impossible, to insert a non-collapsible pump unit into the tubing.

In this manner I provide a pump unit adapted for efficient operation in standard well tubing and which can be inserted in undersized tubing as well as in oversized tubing, the expansible packing being effective in either case for a close working fit against the tubing walls, the expanding action of the ring being continually effective to compensate for wear.

Various types of expanding packing rings may be employed in a pump unit of this type, the specific type shown herein, constituting the subject matter of another application Serial No. 614,775, entitled "Packing ring" and filed on even date herewith, to which reference may be had if desired.

The particular type of packing ring 6 shown in the drawings consists of a split cylindrical member having a medial portion 17 of substantial thickness and end portions which are turned down so as to be considerably thinner. To obtain the greatest degree of resiliency in a ring of this form it is longitudinally slit inwardly with each alternate slit 18 extending from opposite ends inwardly through the thick medial portion and ending at the thinner end portions (see Figure 2). This provides a ring having a relatively thick central packing portion and which is as resilient as the several thinner end portions 19.

In a pump of the above described character the positive action of the valve produces a uniform pumping and insures a uniform wearing in of the valve, these results not being possible in ball valve pumps. Further this construction provides a pump of extreme simplicity and of such sturdy construction as to be practically indestructible, and while such construction is well adapted to fulfill the objects primarily stated it is to be understood that the invention is not to be limited to the form of embodiment herein disclosed, for it is susceptible of embodiment in various other forms, all coming within the scope of the following claims.

I claim:

1. A well pump unit including a tubular plunger forming a longitudinal fluid passage and having a valve seat, a sucker rod comprising a special section having a valve element and a guide collar, both interfitting within reduced ends of the plunger to maintain the rod and plunger in relative axial alignment, and an abutment near the upper end of said special section, the rod having an initial independent movement relative to the plunger whereby during an up stroke the valve element first engages the valve seat to close the fluid passage and then translates the plunger, and during a down stroke the valve first opens the fluid passage and the abutment then translates the plunger.

2. A well pump unit including a tubular plunger forming a longitudinal fluid passage with lateral openings near the ends thereof and having its bore enlarged at one end to define a valve seat, and a sucker rod extending through and guided in said plunger bore and having a valve element slidable in the enlarged portion of the bore past the lateral openings thereto and adapted to cooperate with said valve seat to control said fluid

passage, said rod having an abutment and adapted to have an initial movement independent of the plunger, whereby upon an up stroke of the sucker rod the valve will first close the fluid passage and then translate the plunger in a pumping stroke, and upon a down stroke of the rod the valve will first open the fluid passage and the abutment will then return the plunger.

3. A well pump unit including a tubular plunger forming a longitudinal fluid passage, and a sucker rod extending through and guided by enlarged portions interfitting within reduced ends of said plunger, said plunger having lateral openings and the rod having an initial movement relative to the plunger and formed to close said fluid passage during an initial independent up stroke of the rod and then translate the plunger in a pumping stroke, and to open said fluid passage during an initial independent down stroke of the rod and then return the plunger in a return stroke.

4. A well pump unit adapted for operation either singly or in multiple and including: a plunger open at both ends and reduced at both ends, each reduced end being provided with lateral apertures; and a relatively movable sucker rod section provided with means for closing the lower end of said plunger and with guide means interfitting within said reduced ends.

Signed at Los Angeles, California, this 17th day of January, 1923.

JOHN A. ZUBLIN.