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Patented Jan. 31, 1899.

W. A. SPRINGER.
PUMPING APPARATUS FOR DEEP WELLS.

(Application filed Apr. 16, 1898.)

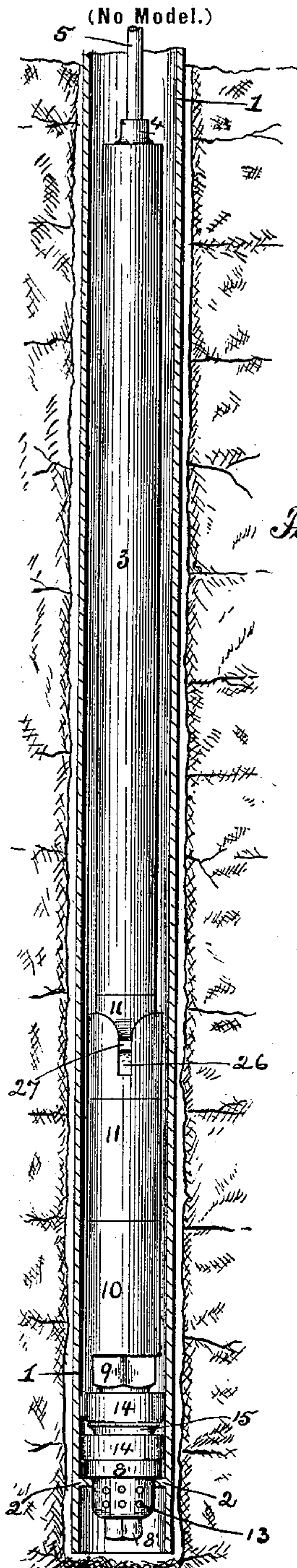


Fig. 1

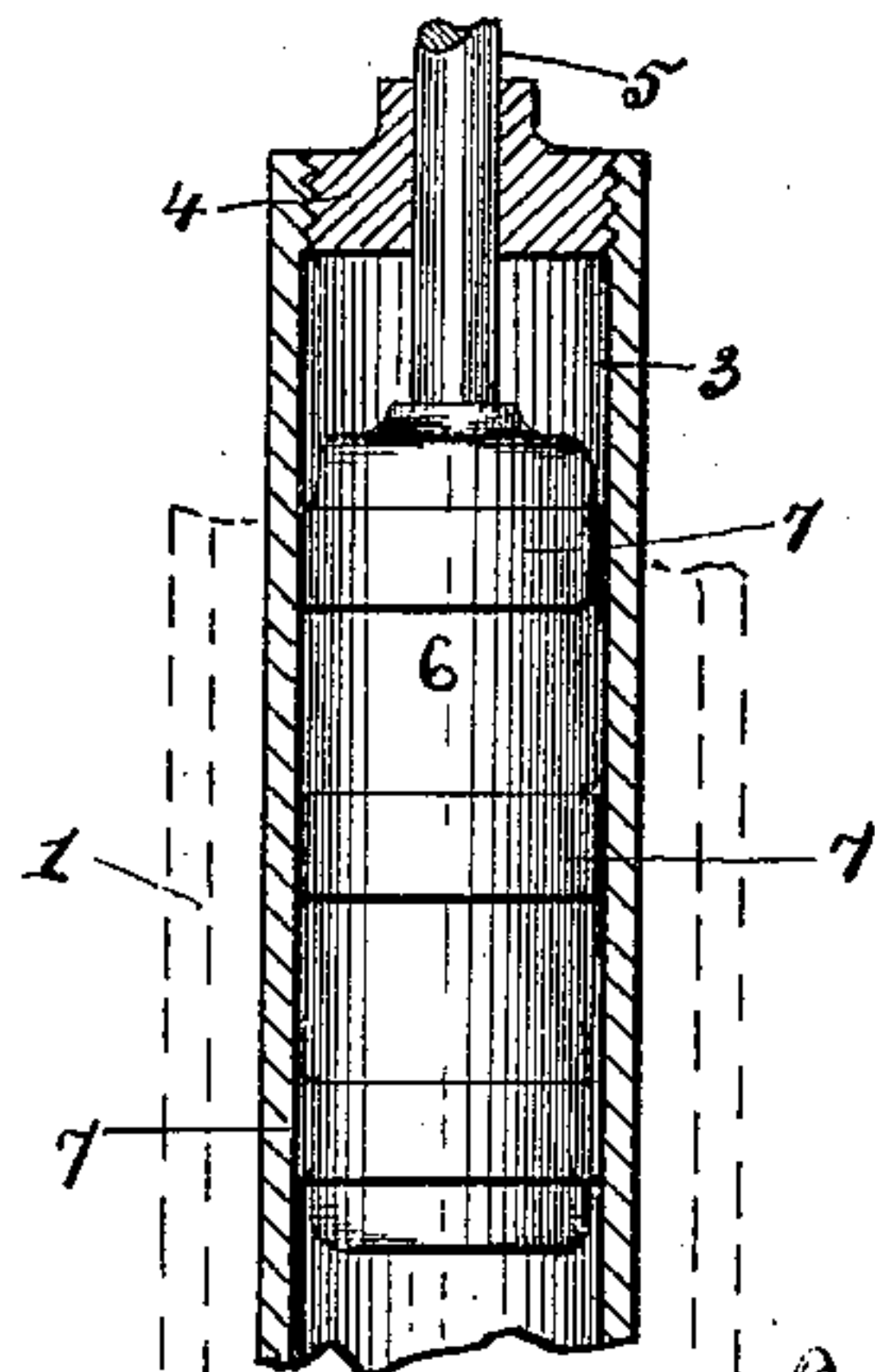


Fig. 2

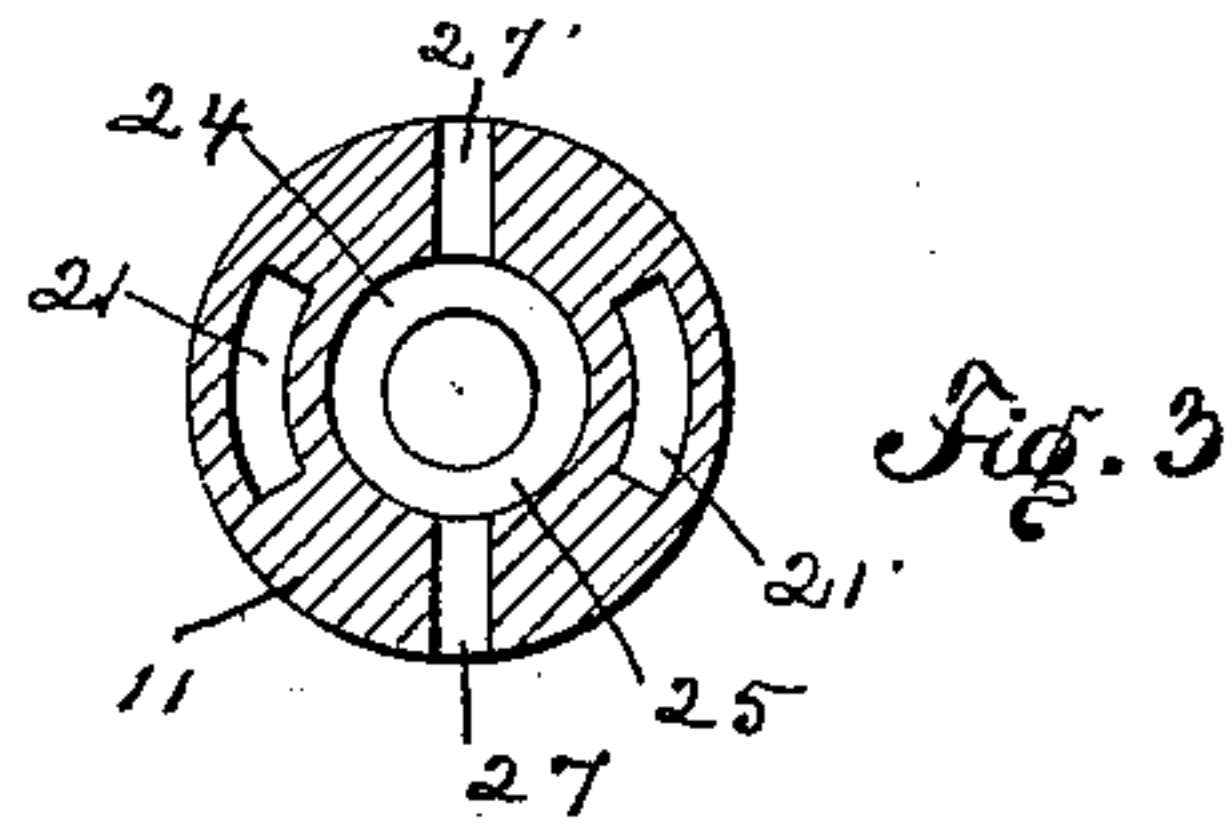
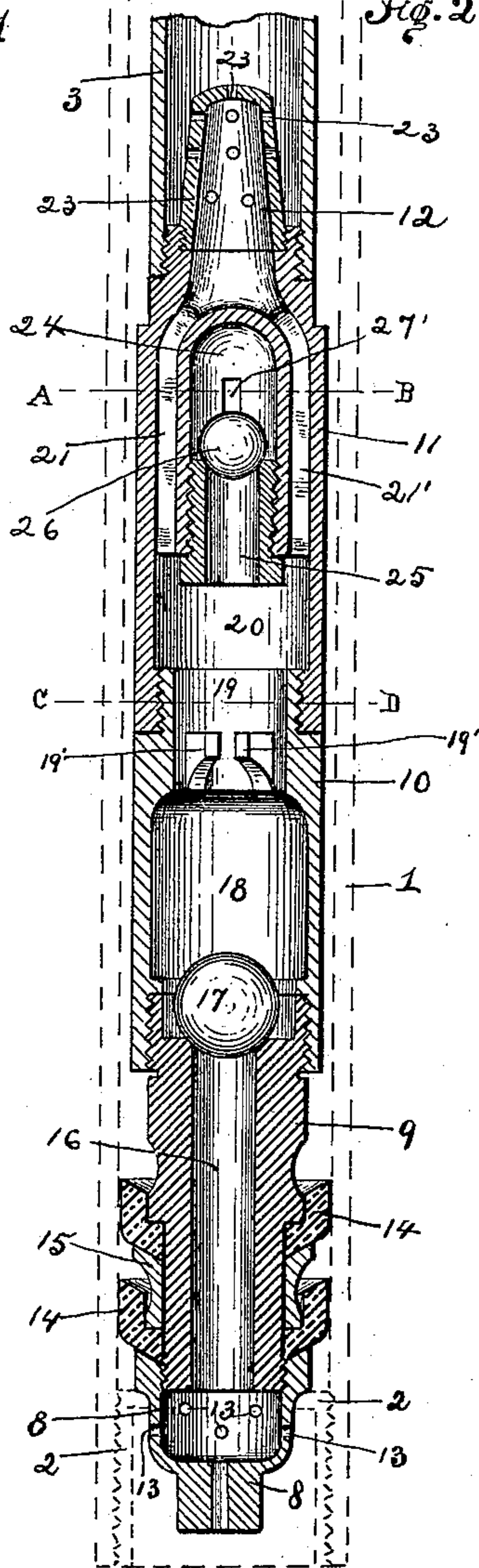


Fig. 3

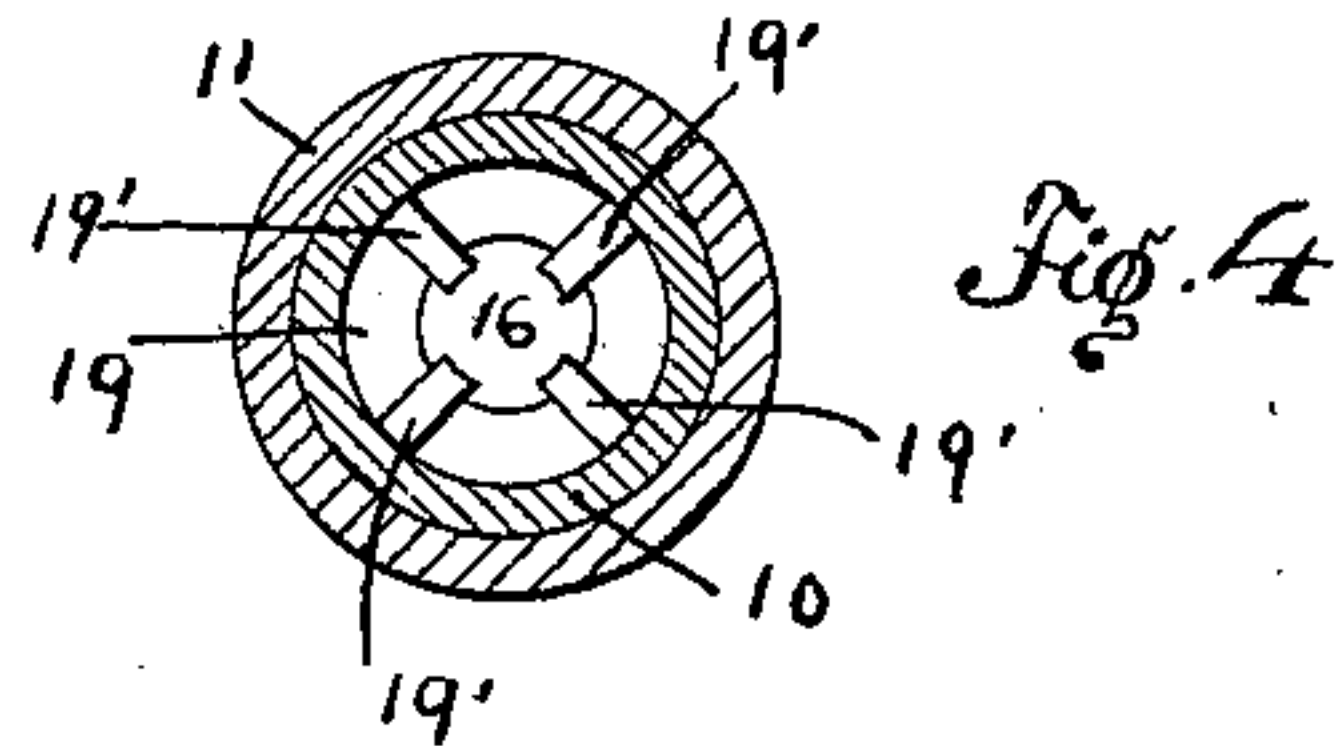


Fig. 4

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UNITED STATES PATENT OFFICE.

WILLIAM A. SPRINGER, OF STURGEON, PENNSYLVANIA.

PUMPING APPARATUS FOR DEEP WELLS.

SPECIFICATION forming part of Letters Patent No. 618,623, dated January 31, 1899.

Application filed April 16, 1898. Serial No. 677,876. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. SPRINGER, a citizen of the United States of America, residing at Sturgeon, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pumping Apparatus for Deep Wells; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to certain new and useful improvements in a pumping apparatus for deep wells.

Throughout the oil-fields much difficulty has been experienced with the pumping devices, and particularly with that class of pumps in which a hollow reciprocating piston-valve is used, for the reason that in wells of small bore it is difficult to provide a reciprocating valve of sufficient strength to withstand the necessary strain to which they are subject, and the result is that the valve becomes broken and out of order and is difficult to remove. Other disadvantages arise from pumping devices of this class, and with a view of providing a device that will overcome these difficulties I have constructed a form of pump which I shall presently describe in detail and afterward its operation.

With the above objects in view the invention finally consists in the novel construction, combination, and arrangements of parts, as will be referred to by reference-figures in the accompanying drawings, in which—

Figure 1 is a vertical side view of my improved pumping device as it would appear arranged within the bottom of the well. Fig. 2 is a vertical side view of the same in section, showing its interior working parts. Fig. 3 is a plan sectional view through the same on the line A B of Fig. 2. Fig. 4 is also a plan sectional view through the same upon the line C D.

Referring now to the drawings for the detail parts, the reference-numeral 1 designates a tube fitted into the well and extending from the ground surface to the bottom of the well. This tube within its lower end is provided with a suitable seat 2, upon which the pumping device rests. The pumping-barrel 3, which is usually about five or six feet long,

is attached to the upper end of the pumping device and is provided at its upper end with the head 4, through which the pump-rod 5 operates. A solid piston 6, provided with packing-rings 7, is arranged to reciprocate within the pump-barrel and may be of any suitable structure.

The pumping device consists of the parts or sections 8, 9, 10, 11, and 12, each of which is provided with threaded portions for connecting to one another, the section 8 being in the form of a hollow strainer-cup with perforations 13 extending through its sides and up through the nut portion 8'. Located above the strainer-cup and upon the portion 9 which connects thereto are the leather cups 14 and metal cup 15. These leather cups are somewhat larger in diameter than the body of the pump and fit tightly against the interior walls of the tube 1. A chamber 16, leading upwardly from the interior of the strainer-cup, is formed within the portion 9 and is provided at its upper end with a valve-seat for the sustaining-valve 17. An enlarged chamber 18 is formed above the valve within the part 10, and above this chamber is formed a smaller chamber 19, within which are arranged the stop-bars 19', which are adapted to prevent the valve from rising too far. Within the section-piece 11 is formed the chamber 20, which has the two ports 21 and 21' leading therefrom up to the interior of the hollow section or thimble 12, which extends up into the interior of the pump-barrel and is provided with the perforations or openings 23. A sub-chamber 24, communicating with the aforesaid chamber 20, has screwed therein the hollow plug 25. This plug is provided with a valve-seat at its top for the discharge-valve 26, and within the walls of this chamber are formed the discharge-ports 27 and 27', which lead out to the interior of the tube 1.

The device when put together, as shown, is forced down into the well until seated upon the seat 2 at the bottom of the well, as shown in the drawings at Figs. 1 and 2. The pump-rod is then connected up to the walking-beam, and when put into operation the pumping would proceed as follows: Upon the up or lifting stroke of the piston the oil is sucked in at the strainer-cup, thence upwardly, raising the sustaining-valve 17 into chambers 18

and 20, up through ports 21 and 21', and through perforations 23 of the thimble 22 and out into the working barrel. Upon the downward or discharge stroke of the piston the
 5 oil is forced out of the pump-barrel down the ports 21 and 21' into the chamber 20, up through the hollow plug 25, raising discharge-valve 26 into subchamber 24, and out of the discharge-ports 27 and 27' into the tube
 10 1. As the pumping proceeds the oil rises in the tube to the top of the well.

The pumping device may be operated without the use of the thimble 22; but I prefer to use the thimble or other suitable perforated
 15 device for the reason that should any of the rings become detached or broken in parts from the piston it prevents such parts from interfering with the valves.

With other forms of pumping devices, in
 20 which the sustaining-valve is screwed to the tubing at the bottom of the well, it is necessary to withdraw the tubing to unscrew the valve, should it become broken or out of order, and the withdrawing of this tubing entails considerable expense and labor; but
 25 with my improved device I am enabled to withdraw the whole pumping apparatus by simply pulling up the pump-rod, as all working parts are connected together with the
 30 pump-barrel, and by the use of a solid piston with stationary valves I am able to pump wells of small bore without danger of the working valves being broken or disarranged.

Having thus fully shown and described my
 35 improved device, what I claim as new, and desire to secure by Letters Patent, is—

1. In a pumping apparatus for deep wells, the combination with a pump-barrel having a solid reciprocating piston operating therein,
 40 and a stationary lifting and discharge valve mechanism connected at the end thereof, of the ports or passages 21 and 21' leading upwardly from the interior chambers between the valves and terminating in a perforated
 45 passage or thimble within the pump-barrel below the piston, substantially as shown and set forth.

2. In a pumping apparatus for deep wells, the combination with the pump-barrel having
 50 a solid reciprocating piston operating therein, and a stationary lifting and discharge valve mechanism connected at the base thereof, of the ports 21 and 21' leading upwardly from

the interior chambers between the said valves and terminating in a perforated passage or
 55 thimble within the pump-barrel, below the piston, and a perforated strainer or inlet arranged at the base of the sustaining-valve chamber, substantially as shown and set forth.

3. In a pumping apparatus for deep wells, the combination with the pump-barrel having a solid reciprocating piston operating therein, and a stationary lifting and sustaining valve mechanism connected at the base thereof, of
 60 the ports 21 and 21' leading upwardly from the interior chambers between the valves and terminating in a perforated passage or thimble within the pump-barrel below the said piston, a perforated strainer arranged at the
 65 base of the inlet to the sustaining-valve chamber, and the outlet or discharge ports 27 and 27' leading from the interior of the discharge-valve chamber to the annular space between the walls of the said valve mechanism and the
 70 well-tubing, substantially as shown and set forth.

4. In combination with the well-tubing and the pump-barrel having a solid reciprocating piston operating therein, of a combined stationary sustaining and discharge valve mechanism consisting of the connected ports 8, 9,
 80 10 and 11 having interior chambers and valves as shown, the ports 21 and 21' leading from the chambers between the valves and terminating in a perforated thimble at the top within the pump-barrel and the discharge-ports
 85 27 and 27' leading from the discharge-valve chamber to the annular space between the said valve mechanism and the well-tubing, all combined and arranged to operate as shown
 90 and set forth.

5. In a pumping apparatus for deep wells, the combination with a stationary sustaining and discharge valve and a pump-barrel with solid movable piston, of a perforated passage
 95 or thimble arranged between the discharge-valve and the piston substantially as and for the purpose set forth.

In testimony whereof I have hereunto affixed my signature in the presence of two
 100 scribing witnesses.

WILLIAM A. SPRINGER.

Witnesses:

L. H. MCCABE,
 EMMET BARR.