

R. C. PURCELL.
DEEP WELL PUMP.
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911,609.

Patented Feb. 9, 1909.

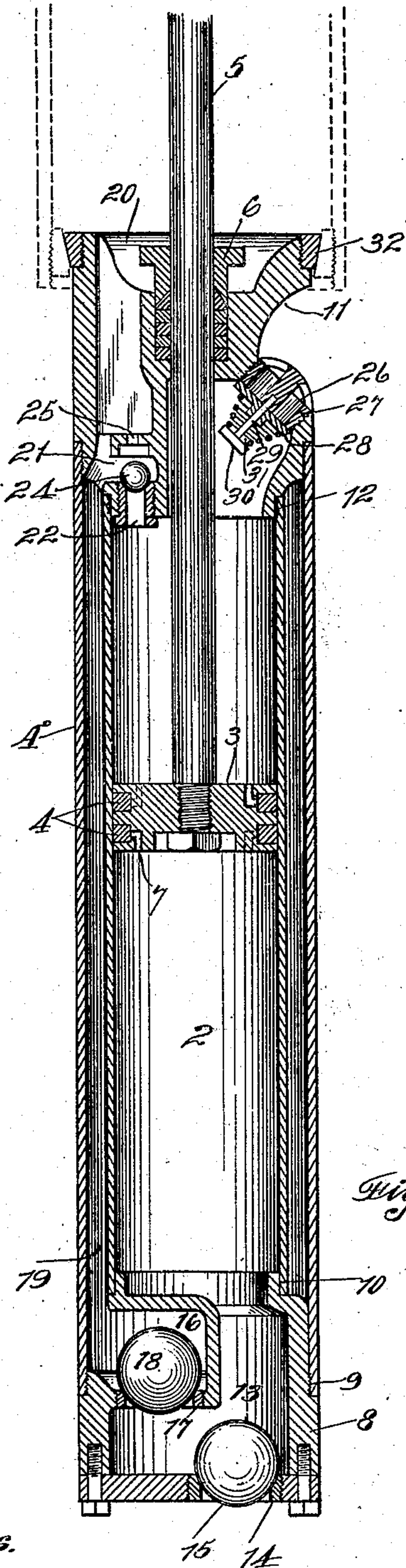


Fig. 1.

Fig. 2.

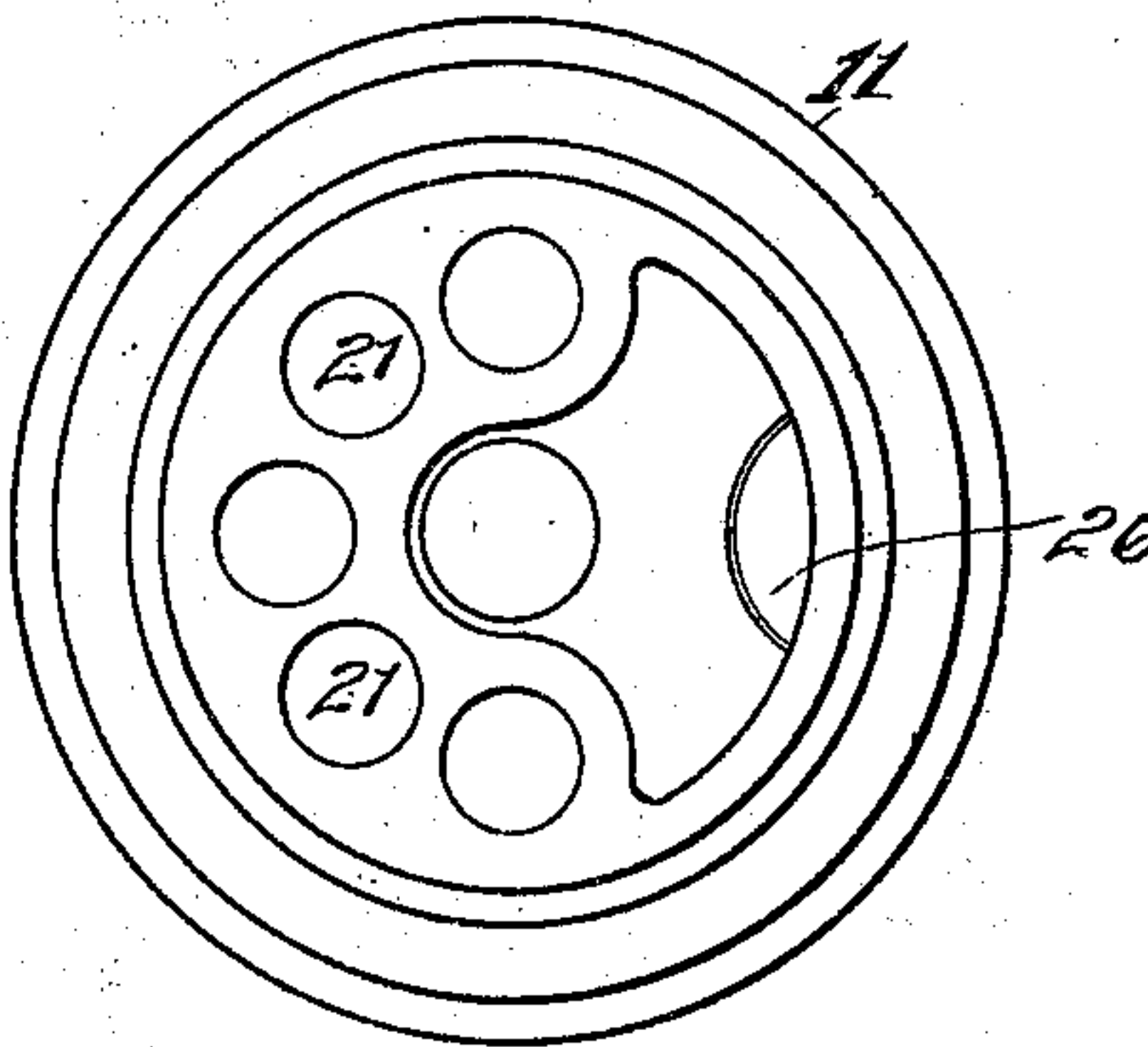
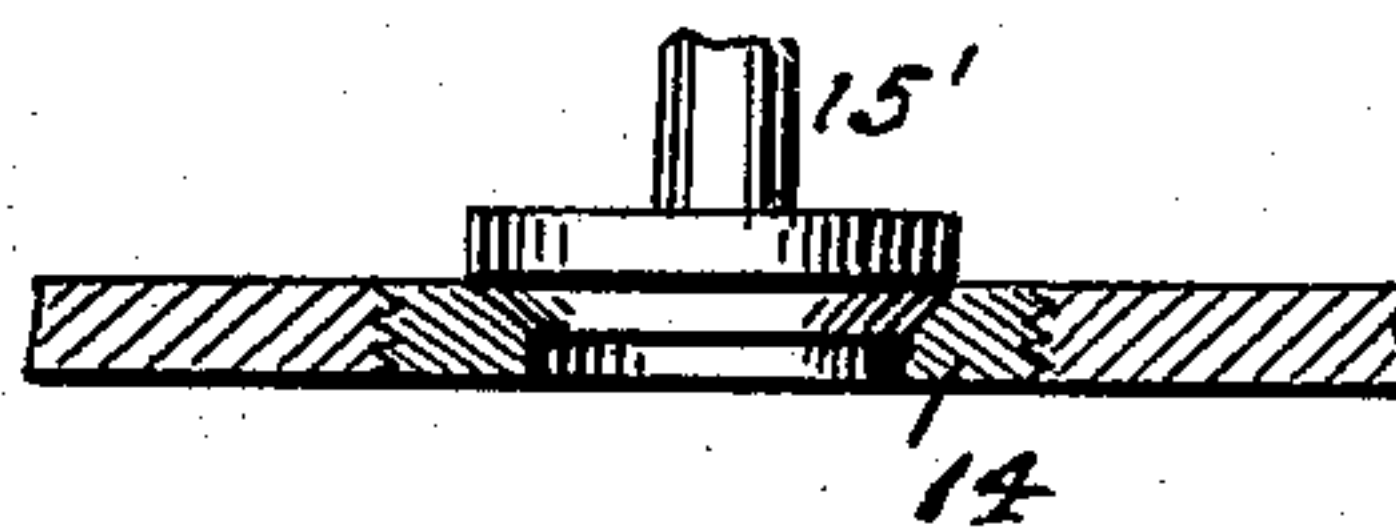


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

ROBERT C. PURCELL, OF OAKLAND, CALIFORNIA.

DEEP-WELL PUMP.

No. 911,609.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT C. PURCELL, citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Deep-Well Pumps, of which the following is a specification.

My invention relates to a pumping apparatus which is especially designed for use in deep well operations, and in which it is desirable to remove the pump bodily from the casing of the well.

It consists in the combination of parts and in details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the working barrel of the apparatus. Fig. 2 is a bottom plan view of the upper head. Fig. 3 shows a modified form of valve.

It is the object of my invention to provide a conveniently arranged, double-acting pump, which may be introduced into a well casing to any desired depth for use, and easily removed therefrom when required.

As shown in the drawings, A is an outside cylindrical shell of such diameter as to be capable of sliding within the well casing, and 2 is the pumping barrel member, within which the piston 3 is fitted with suitable packing rings 4.

5 is the piston or pump-rod extending upwardly through a stuffing-box 6 in the upper head of the pump, so as to form a tight joint; and as the pump is double-acting, I have shown small openings 7 into the top and bottom of the piston, these openings connecting with the interior of the piston chamber and extending outwardly to the annular grooves in which the rings 4 are fitted.

The pressure caused by the reciprocation of the piston will be alternately transmitted to force the upper rings into a close fit with the inside of the pump cylinder when the piston is drawn upwardly, and in like manner the lower rings are caused to make a similar fit when the piston is depressed.

The lower head 8 may be in the form of a cylindrical casting, having an exterior threaded portion at 9 upon which the outer shell A is screwed, so that its outer surface will be substantially flush with the lower part of the casting 8. The upper portion is reduced above the threaded portion 9 to fit the interior diameter of the shell A. Above

this it is again reduced to form a shoulder, at 10, over which the inner pump shell 2 is fitted. The upper end of the outer shell A is in like manner screwed upon the upper head casting 11, with the outer periphery of which the outer diameter of the shell is flush; and the inner pump cylinder 2 is screwed upon the reduced portion of the lower part of the upper head, as shown at 12, thus locking these parts securely but detachably together.

The lower head 8 is formed with two chambers. The chamber 13 has an opening in the bottom into which the inlet valve seat 14 is screwed, or otherwise fixed. This valve seat may be fitted either to receive a ball valve, as at 15, or, if desired, a suitably guided flat-faced valve 15' may be substituted, as plainly shown in Fig. 3. The other chamber 16 projects into the chamber 13, and its lower surface is above and to one side of the valve 15, so that the upper part of the chamber 13 lies substantially above the valve, and the projecting portion of the chamber 16 acts as a stop and guide for the valve 15, so that said valve, when opened by the inrush of fluid from below, will be allowed the proper lift, and at the same time it will be compelled to fall back upon the valve seat when the piston moves in the opposite direction, and the valve closes. The space between the bottom of the chamber 16 and the level of the valve seat 14 is such that the valve 15 cannot pass into that space, but will be compelled to fall upon its seat when closing.

A removable valve seat 17 is fitted into the opening in the bottom of the chamber 16, and a valve 18 is fitted to rise and fall with relation to this seat. The chamber 16 has an ample opening into the passage 19 which lies between the outer and inner shells A and 2, and the liquid which is drawn into the lower part of the apparatus through the valve opening 14, is forced upwardly through this annular passage 19 to a discharge opening 20 through the upper head 11. This upper head has within it a valve chamber 21 with a removably fitted valve seat or seats 22, through which communication is had with that portion of the pump cylinder above the piston 3. These parts, shown in the vertical section, may represent a sufficient number of valve chambers 21 arranged segmentally within the head 11, to easily

dispose of the water lifted by the piston in its upward movement, and the discharge from the chamber 21 takes place through the passage or passages 20, through which the
 5 water from the annular passage between the cylinders passes, and also the water impelled by the upward movement of the piston is discharged.

24 are valves closing upon the valve seats
 10 20, and these valves, of which there will be as many as there are openings into the chamber 21, will close when the piston 3 moves downwardly, and will be lifted by the upward pressure of the fluid on the upward
 15 movement of the piston. The upper wall of the chamber 21 may either be chambered, as shown at 25, to serve as a guide to receive the valve 24, if the latter be a ball valve, or it may be perforated so that if a flat valve is
 20 used the stem of the valve will be suitably guided to allow the valve to lift and close. This pump is intended to be submerged, and the inlet in the space above the piston 3 is effected through a passage 26, which opens
 25 upwardly and diagonally between the piston-rod 5 and the outer periphery of the head 11. As in the case of the discharge openings, this passage may represent a plurality of such inlet openings, if desired. The valve seat 27
 30 is here shown as screwed into the opening which is threaded for the purpose, and the valve 28, here shown as a flat or puppet valve, closes against the flat inner surface of the seat.

35 29 is a centrally disposed stem fixed in the seat, having a head, as at 30, and a spiral spring 31 is sufficiently compressed between this head and the valve 28. The valve being centrally perforated and sliding freely
 40 upon the stem 29 will compress the spring in opening to allow the admission of fluid into the upper part of the pump cylinder through the passage 26, and will be immediately closed by the spring and interior
 45 pressure when the pump piston rises.

The tapering sleeve 32 may be fitted around the upper end of the upper head 11, and serves to hold the parts in place within the well casing, at the same time allowing
 50 the pump to be easily withdrawn altogether by pulling up on the plunger or piston-rod.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

55 1. A pumping apparatus of the character described, having in combination concentric

cylinders spaced apart to form an intermediate annular passage, heads at the upper and lower ends of the cylinders each of said heads having its inner end formed with two
 60 diameters, one for each of the cylinders, said heads having chambers formed therein at each side of the center, an upwardly lifting valve in each of the chambers of the lower head, an upwardly opening valve in one of
 65 the chambers of the upper head, a valve in the other chamber of the upper head and opening inwardly to admit fluid into the inner cylinder above the piston, a piston operable in the inner cylinder, a piston rod by
 70 which the piston may be operated, and means for securing the apparatus submerged within a well casing.

2. An improved pumping apparatus having in combination concentric shells or cylinders of different lengths and spaced apart to form an intermediate annular passage, a head at the lower end of the cylinders formed with two diameters to each of which one of the cylinders is secured, said head having an
 80 inwardly projecting portion forming a chamber at one side of the center and separating the remaining portion of the head into a second chamber, an upwardly lifting valve in each of said chambers one of said chambers
 85 connecting with the space between the cylinders and the bottom of the extension of the head being disposed in the range of movement of the valve of the other chamber so as to form a stop therefor, an upper head having
 90 its inner portion provided with two diameters to which the upper ends of the cylinders are secured, said upper head having a chamber at each side of its center and both connecting with the space above the piston, an
 95 upwardly opening valve in one of the chambers of the upper head, an inwardly opening spring-pressed valve in the other chamber of the upper head, a screw threaded valve seat fitting an opening leading into the second
 100 chamber of the upper head and against which said valve seats, a piston operable in the inner cylinder, and a rod for operating the piston.

In testimony whereof I have hereunto set
 my hand in presence of two subscribing witnesses.

ROBERT C. PURCELL.

Witnesses:

LEWIS S. MITCHELL,
 EDWIN R. TABER.