May 13, 1924. 1,494,069

C. H. McCREADY ET AL

DEEP WELL PUMP

Filed Dec. 3, 1923 2 Sheets-Sheet 1

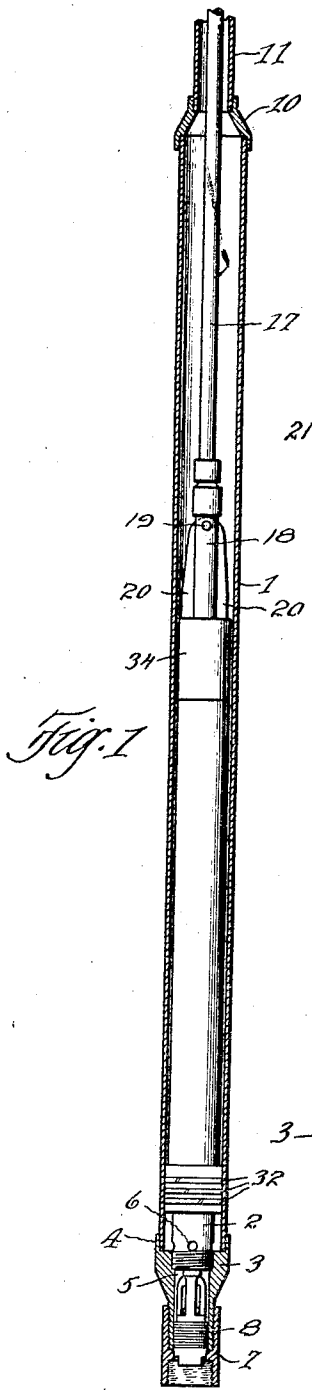


Fig. 1

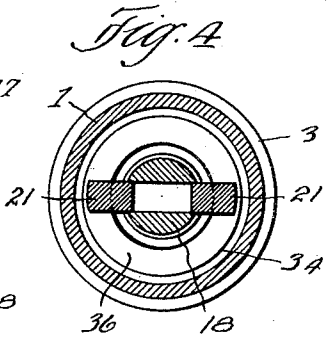


Fig. 4

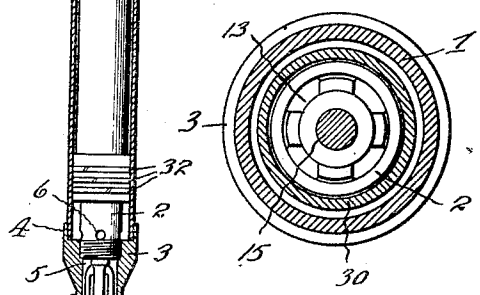


Fig. 5

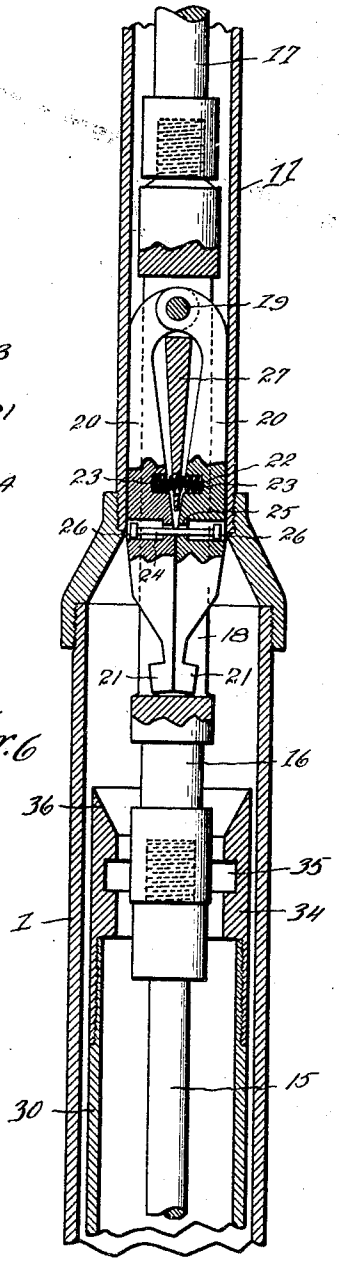


Fig. 6

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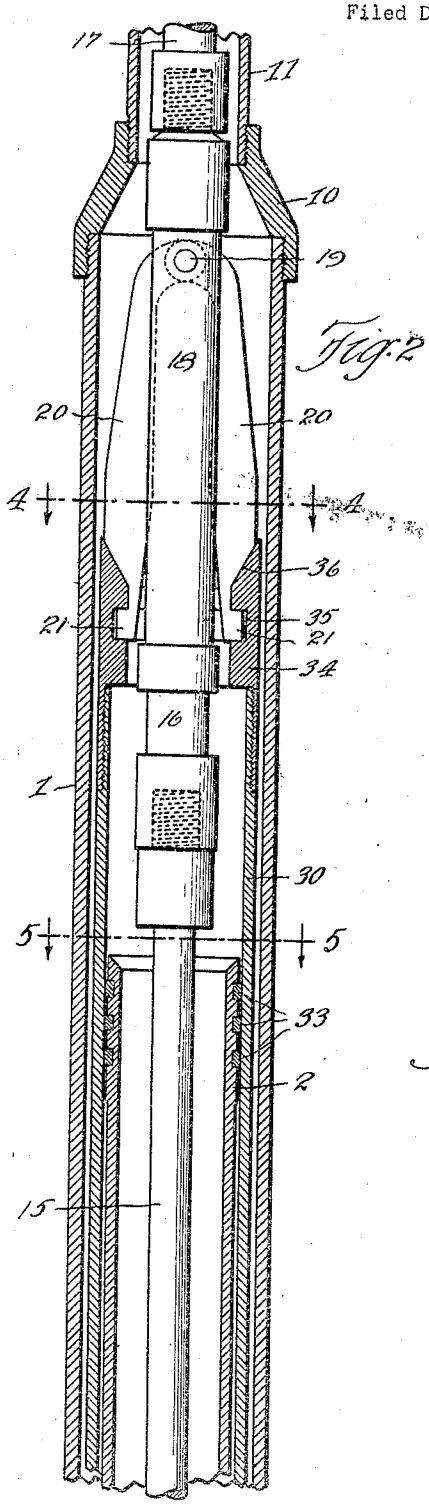


Fig. 2

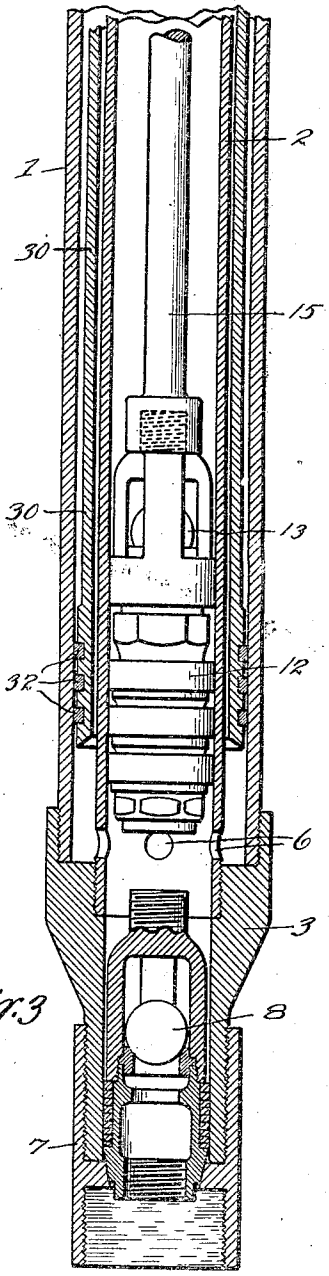


Fig. 3

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UNITED STATES PATENT OFFICE.

CHARLES H. McCREADY, OF OKMULGEE, AND PAUL C. McCREADY, OF BARTLESVILLE, OKLAHOMA.

DEEP-WELL PUMP.

Application filed December 3, 1923. Serial No. 678,108.

To all whom it may concern:

Be it known that we, (1) CHARLES H. McCREADY and (2) PAUL C. McCREADY, citizens of the United States, residing at (1) Okmulgee, in the county of Okmulgee and State of Oklahoma, and (2) Bartlesville, in the county of Washington and State of Oklahoma, have invented a certain new and useful Improvement in Deep-Well Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to the class of pumps that are used in deep wells which produce either oil or water, and its objects are to provide a simple, comparatively inexpensive, and durable pump of this class that has considerably greater capacity than prevailing types of deep well pumps, although very little more power is required to operate it; that is adapted for use with standard tubing, and permits of the withdrawal therefrom and replacement therein in the usual way of the sucker rods and working valve, as for the purposes of inspection, renewal of the cups, etc.; and that is so constructed that a disconnection of the sucker rods from the sleeve piston which remains in the well is automatically effected when the sucker rods are withdrawn from the tubing, and a re-uniting of the parts similarly made when the sucker rods are replaced.

The foregoing objects, with others hereinafter appearing, are attained in the construction illustrated in the accompanying drawings wherein Fig. 1 is a sectional side elevation of the pump applied to a section of tubing; Fig. 2 is a central vertical section through the upper end of the pump with the working parts in raised position; Fig. 3 is a similar view through the lower end of the pump with the working parts in lowered position; Figs. 4 and 5 are transverse sections on the respective lines 4—4 and 5—5 of Fig. 2; and Fig. 6 is a view similar to Fig. 2 showing the sucker rods disconnected from the sleeve piston as occurs when the rods are withdrawn from the tubing.

The pump comprises an outer barrel 1 and an inner barrel 2 which are spaced apart and rigidly connected together at their lower ends by a base 3. The base is shown as terminating at its upper end in an internally threaded flange 4 within which the threaded lower end of the barrel 1 is screwed and as having a bore 5 which is internally threaded at its upper end for the reception of the threaded lower end of the barrel 2. Adjacent its lower end, the latter barrel is provided with a plurality of openings 6 through which the interiors of the two barrels communicate. A shoe 7 is applied to the lower end of the base 3 and supports the standing valve assembly 8 which is fitted within the bore 5. A reducing coupling 10 is threaded onto the upper end of the outer barrel 1 and connects it to the lower end of the well tubing 11. It will be observed that the inner surface of the coupling 10 tapers from the internal diameter of the barrel 1 to that of the tubing 11.

Operating within the inner barrel 2 is a valved piston 12, commonly known as a working valve. The valve designated 13, which is incorporated in the piston, is of the usual type and opens as the piston descends to permit the fluid which is below the piston to pass above the same, and closes as the piston ascends to lift the body of fluid thereabove. The piston 12 is connected in the usual way to a sucker rod section 15 which is applied, at its upper end, to a latch block 16 which, in turn, has its upper end connected to a string of sucker rods, the lower section of which is designated 17. Within the upper end of an opening 18 of the latch block is pivotally supported, upon a pin 19, opposed latch members 20 which terminate at their lower ends in lugs 21. The latch members are forced apart by a spring 22 which is compressed between said members and has its ends engaged in recesses 23 thereof, and the members are maintained against undue separation by a pin 24 which extends through aligned bores 25 of the members and has enlargements 26 which occupy enlargements of said bores. To strengthen the latch block 16, a web 27 extends between the portions on opposite sides of the opening 18.

Operating within the space between the outer barrel 1 and the inner barrel 2 is a sleeve piston 30 which is fitted at its lower

end with piston rings 32 to effect a fluid-tight joint with the outer barrel. Likewise, the upper end of the inner barrel 2 is fitted with rings 33 which engage the inner surface of the sleeve piston 30. Connected, as by screw threads, to the upper end of the sleeve piston 30 is a keeper 34 wherewith the latch members 20 cooperate. The keeper is cylindrical on its outer side and on its inner side is provided with an annular groove 35. The internal diameter of the keeper is substantially equal to or slightly greater than the internal diameter of the inner barrel 2, and from a short distance above the groove 35 to the upper end of the keeper its interior surface gradually diverges to provide a cam portion 36. When the parts are in readiness for use, the lugs 21 of the latch members 20 occupy the groove 35 and thus lock the sleeve piston to the sucker rods, and as the sucker rods are reciprocated by the pumping apparatus, the pistons 30 and 12 are moved up and down within the respective barrels 1 and 2.

As the pistons rise, fluid is drawn into the inner barrel and, through the openings 6, into the outer barrel, the standing valve 8 opening to permit of the ingress of the fluid. As the pistons descend, the standing valve is maintained closed and the fluid within the space between the inner and outer barrels is forced through the openings 6 into the inner barrel and it with the fluid formerly contained within the inner barrel rises past the valve 13 of the piston 12. On the subsequent ascending stroke of the pistons, the fluid above it will be lifted and a new charge of fluid drawn into the lower ends of the inner and outer barrels 1 and 2.

When the sucker rods are "pulled", as for the purpose of inspecting the piston 12 or renewing the cups thereof, the latch members 20 engage the converging inner wall of the coupling 10 and are forced inwardly by reason thereof, as illustrated in Fig. 6. As soon as the latch members are retracted sufficiently to withdraw their lugs 21 from the groove 35, the sleeve piston is released and left within the outer barrel so that the sucker rods, latch block, and piston 12 may be withdrawn through the tubing 11 in the usual way. Upon the replacement of the parts, the lower ends of the latch members enter the upper end of the keeper 34 and are forced inwardly by the wall 36. As soon as the lugs 21 register with the groove 35 they are forced into the groove by the action of the spring 22 whereupon the parts are coupled together for resumption of the pumping operation.

Having thus described our invention, what we claim is:—

1. In apparatus of the class set forth, the combination of an outer barrel, an inner barrel, a sleeve piston operating between said barrels, a valved piston operating within the inner barrel, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of the barrels, means for reciprocating the pistons, the interiors of the inner and outer barrels communicating below the lowest operative position of the pistons.

2. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, a piston within the inner barrel, said piston incorporating an upwardly opening valve, a sleeve piston within the space between the barrels, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of the barrels, and means through which the pistons are reciprocated in unison, the interiors of the barrels communicating below the lowest operative position of the pistons.

3. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, a base through which the lower ends of said barrels are connected together and spaced apart, said base having a bore through which fluid is admitted to the inner barrel, an inwardly opening valve controlling the passage of fluid through said bore, a sleeve piston within the space between the barrels, a piston within the inner barrel, the latter piston incorporating an upwardly opening valve, and means through which said pistons are reciprocated in unison, the inner barrel having an opening situated below the lowest operative position of the pistons and through which the interiors of the two barrels communicate.

4. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, said barrels being rigidly connected together and spaced apart at their lower ends, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of the barrels, a sleeve piston within the space between the barrels, a piston within the inner barrel, the latter piston incorporating an upwardly opening valve, piston reciprocating means connected to the last mentioned piston, and means for separably connecting the sleeve piston to the piston reciprocating means, the interiors of the barrels communicating below the lowest operative position of the pistons.

5. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, said barrels being rigidly connected together and spaced apart at their lower ends, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of the barrels, a sleeve piston within the space between the barrels, a piston within the inner barrel, the latter piston incorporating an upwardly opening valve, piston reciprocating means

connected to the last mentioned piston, a latch for separably connecting the piston reciprocating means to the sleeve piston, and means for automatically releasing said latch when the piston reciprocating means with the valved piston are withdrawn from the outer barrel, the inner barrel having an opening below the lowest operative position of the pistons and through which the interiors of the barrels communicate.

6. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, means connecting together and spacing apart the lower ends of said barrels, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of said barrels, a sleeve piston within the space between the barrels, a piston within the inner barrel, the latter piston incorporating an upwardly opening valve, piston reciprocating means connected to the valved piston, a latch separably connecting the piston reciprocating means with the sleeve piston, and an abutment wherewith said latch is engaged when the piston reciprocating means and valved piston are withdrawn from the outer barrel for automatically releasing the latch, the inner barrel having an opening situated below the lowest operative position of the pistons and through which the interiors of the barrels communicate.

7. In an apparatus of the character set forth, the combination of an outer barrel, an inner barrel, means for connecting together and spacing apart the lower ends of said barrels, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of the barrels, a sleeve piston within the space between the barrels, a valved piston within the inner barrel, piston reciprocating means connected to the valved piston, said means incorporating a latch through which the sleeve piston is adapted to be connected to said means, a member through which the upper end of the outer barrel is adapted to be connected with the lower end of well tubing, the latch being arranged for cooperation with said member whereby the latch is released from the sleeve piston upon withdrawal of the piston operating means from the outer barrel, the inner barrel having an opening situated below the lowest operative position of the pistons and through which the interiors of the barrels communicate.

8. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, means connecting together and spacing apart the lower ends of said barrels, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of the barrels, a sleeve piston within the space between the barrels, a valved piston within the inner barrel, piston reciprocating means connected to the valved piston, a latch member carried by said means, a keeper carried by the upper end of the sleeve piston and wherewith said latch member is adapted to cooperate for connecting the sleeve piston to the valve reciprocating means, and a member situated at the upper end of the outer barrel wherewith said latch member is adapted to engage for releasing it from the keeper when the valve reciprocating means is withdrawn from the outer barrel, the inner barrel having an opening situated below the lowest operative position of the pistons and through which the interiors of the barrels communicate.

9. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, means connecting together and spacing apart the lower ends of said barrels, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of said barrels, a sleeve piston within the space between the barrels, a valved piston within the inner barrel, piston reciprocating means connected to the valved piston, latch members pivotally connected to said means, means tending to force said latch members outwardly, a keeper carried by the upper end of the sleeve piston and having longitudinally spaced abutment portions, the latch members having portions that are adapted to fit between said abutment portions, and a member applied to the upper end of the outer barrel and having a cam surface wherewith the latch members are adapted to engage thereby to be moved inwardly and released from the keeper, the inner barrel having an opening below the lowest operative position of the pistons and through which the interiors of the barrels communicate.

10. In apparatus of the character set forth, the combination of an outer barrel, an inner barrel, means connecting together and spacing apart the lower ends of said barrels, valve mechanism permitting the entrance of fluid to and preventing the discharge of fluid from the lower ends of said barrels, a sleeve piston within the space between the barrels, a valved piston within the inner barrel, piston reciprocating means connected to the valved piston, latch members pivotally connected to said means, means tending to force said latch members outwardly, a keeper carried by the upper end of the sleeve piston and having longitudinally spaced abutment portions between which lugs of the latch members are adapted to fit, and a member applied to the upper end of the outer barrel and having an upwardly converging surface wherewith the latch members are adapted to engage thereby to be moved inwardly and released from the keeper, the upper end of the keeper having a downwardly converg-

ing inner wall for automatically contracting the latch members when they are inserted into the keeper, the inner barrel having an opening below the lowest operative position of the piston and through which the interiors of the barrels communicate.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses.

CHARLES H. McCREADY.
PAUL C. McCREADY.

Witnesses:
A. E. DAVIDSON,
CLYDE HOLDREN.