Feb. 20, 1940. J. E. HALL 2,191,380

WELL PUMP

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Fig. 1.

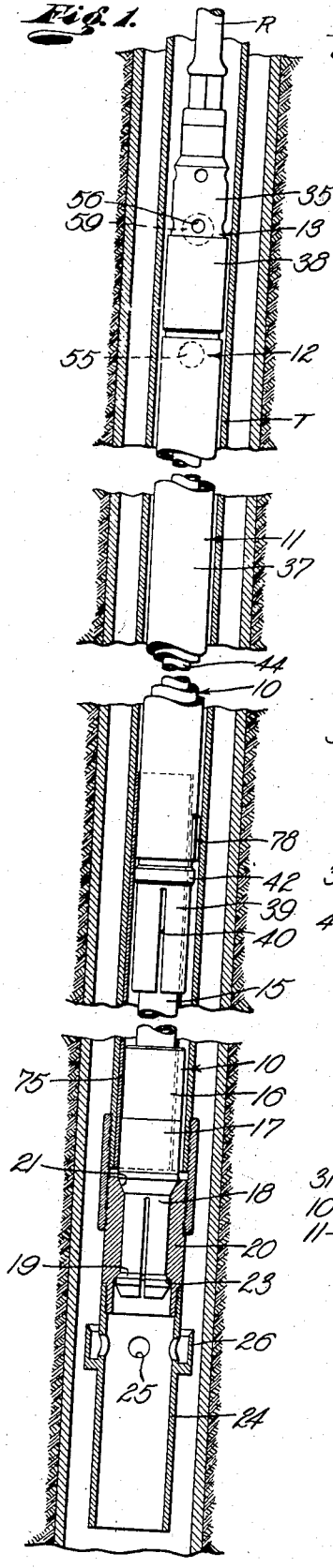

Fig. 2.

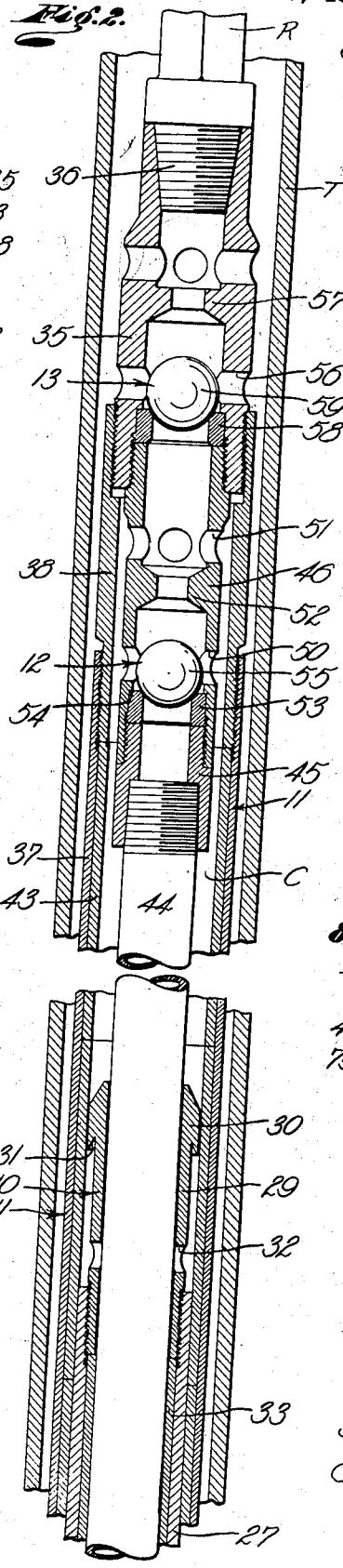

Fig. 3.

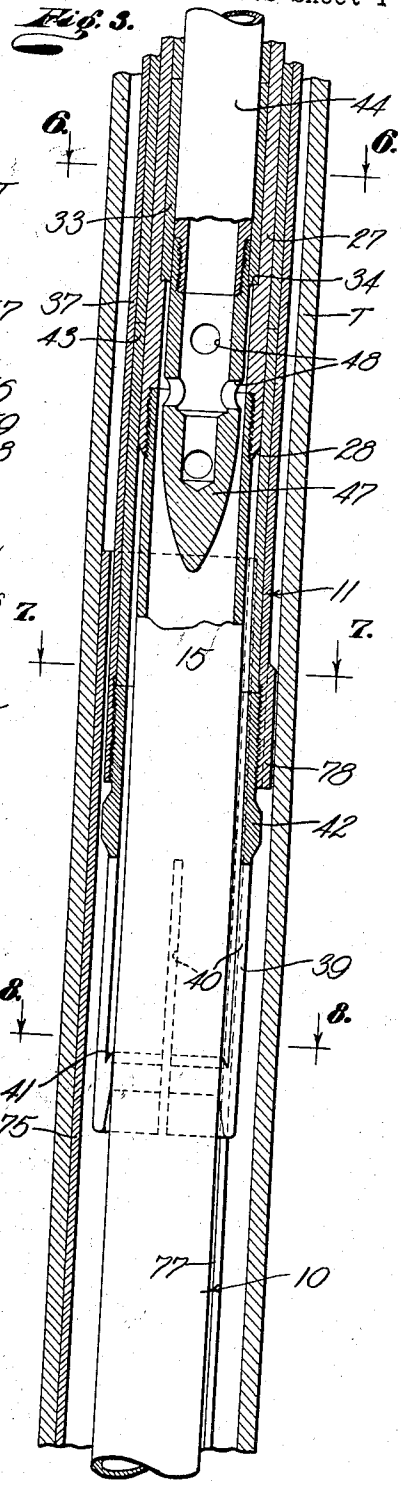

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Fig. 4.

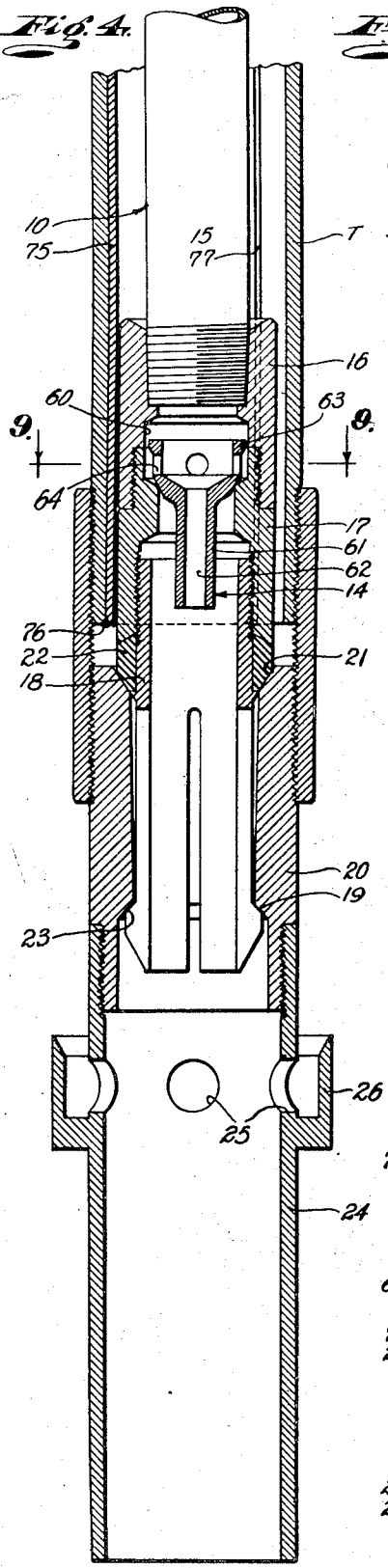


Fig. 5.

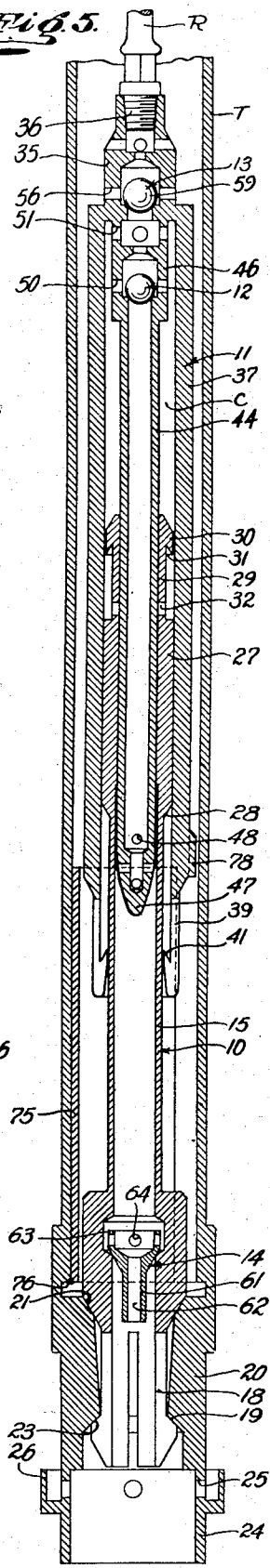


Fig. 6.

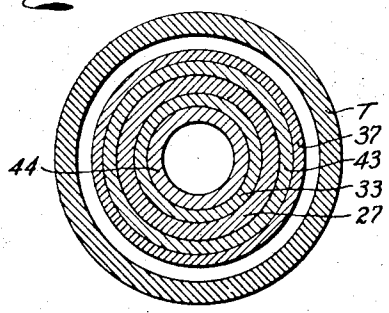


Fig. 7.

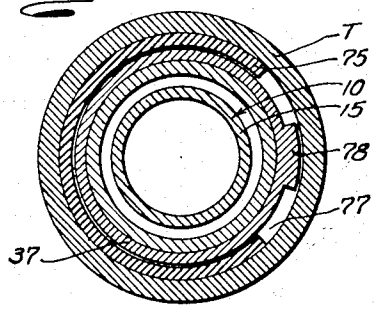


Fig. 8.

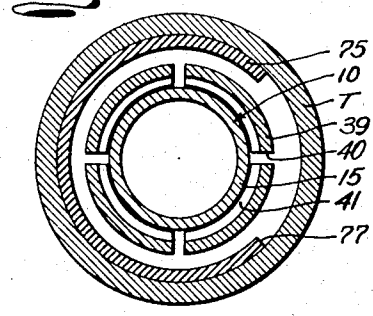
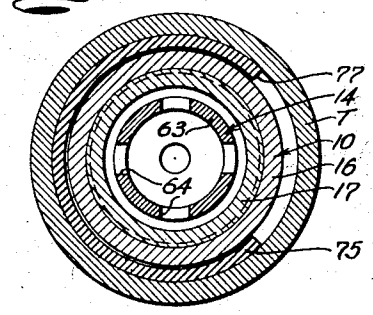


Fig. 9.



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UNITED STATES PATENT OFFICE

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WELL PUMP

Jesse E. Hall, Los Angeles, Calif.

Application January 13, 1937, Serial No. 120,364

24 Claims. (Cl. 103—180)

This invention has to do with pumps and has particular reference to well pumps. A general object of the invention is to provide an oil well pump or deep well pump that is practical, effective and particularly efficient in operation.

Considerable difficulty has been encountered in providing a well pump that is practical and efficient under the conditions encountered in deep wells. In many of the pumps heretofore introduced gas accumulated in the pump chambers or displacement chambers producing what is termed a gas lock, which greatly reduced the efficiency of the pumps. In the operation of most deep well pumps the pump rod becomes slack during the down strokes and has a tendency to buckle, loosen and fail due to the alternate tension and slackness to which it is subjected. Further, accumulations of sand, etc. on the valves and other parts of well pumps have greatly interfered with the proper functioning of the pumps.

Another object of this invention is to provide a well pump in which gas cannot accumulate in the displacement chamber or in any other part of the pump to interfere with its proper efficient operation.

Another object of this invention is to provide a well pump that operates in such a manner that the pump rod is kept taut and is not subjected to failure, loosening or buckling.

Another object of this invention is to provide a well pump in which sand and other solid matter in the fluid is kept in suspension so that it cannot interfere with the operation of the pump and cannot accumulate on the valves and other pump parts.

Another object of this invention is to provide a well pump in which the valves are movable with or by the rod and, therefore, are not liable to accumulate sand or solid matter.

Another object of this invention is to provide a well pump in which the pump rod and the moving element of the pump carried by the rod are positively moved downwardly during the down stroke by the fluid pressure or hydrostatic pressure in the tubing, thereby increasing the speed of operation and the length of the effective pump stroke and eliminating slackness in the rod, sticking of the moving pump element, and other disadvantages in well pumps in which gravity alone serves to move the reciprocating pump element downwardly.

Another object of this invention is to provide a well pump embodying means for preventing sand and solid matter from settling in the oil tubing.

Another object of this invention is to provide an improved well pump having means for producing a jetting action in the well at the lower end of the pump to keep the well clean and to prevent the entrance of sand and formation bridges to the pump.

Another object of this invention is to provide a well pump in which the moving or reciprocating pump element is positively held against turning thereby preventing unthreading or the joints in the pump rod.

Another object of this invention is to provide a well pump that automatically unloads or discharges the column of fluid in the tubing when the pump is pulled, which discharge of fluid may be utilized to clean the well.

A further object of this invention is to provide an improved deep well pump that is smooth and regular in operation thereby eliminating churning of the fluid and emulsification of the oil.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side elevation of the improved well pump provided by this invention in the operative position in a well tubing. Fig. 2 is an enlarged longitudinal detailed sectional view of the upper portion of the pump. Fig. 3 is a view similar to Fig. 2 illustrating the intermediate portion of the pump. Fig. 4 is a view similar to Fig. 2 illustrating the lower portion of the pump. Fig. 5 is a sectional diagrammatic or schematic view of the pump illustrating the barrel at or adjacent the upper end of its stroke. Figs. 6, 7 and 8 are enlarged transverse detailed sectional views taken as indicated by lines 6—6, 7—7 and 8—8, respectively, on Fig. 3 and Fig. 9 is an enlarged transverse detailed sectional view taken as indicated by line 9—9 on Fig. 4.

The improved well pump provided by this invention includes, generally, a standing tubular pillar or plunger 10, a reciprocating element or barrel 11 movable on the plunger 10, valves 12 and 13 carried by the barrel 11, jet means 14 for producing a downward jetting acting in the well during the barrel down stroke and other parts, the functions and details of which will be hereinafter described.

The pillar 10 is a stationary or standing element of the pump and is adapted to be releasably secured or anchored in the lower portion of well tubing T. The plunger 10 is an elongate

tubular member or assembly arranged in a substantially vertical position. In practice the plunger 10 may include an elongate tubular column member or lower member 15. A coupling 16 is provided on the lower end of the member 15 and a reducer or adapter 17 may be threaded into the lower end of the coupling 16. An anchor mandrel 18 may be threaded into the lower end of the adapter 17. The anchor 18 illustrated is of typical construction and has a split lower portion provided with an upwardly facing inclined shoulder 19. The anchor 18 is adapted to be releasably latched in an anchor shoe 20 provided on the lower end of the tubing T. The shoe 20 has a tapered seat 21 on its upper end and a sealing member 22 is clamped between the lower end of the adapter 17 and a shoulder on the anchor 18 to seat downwardly against the shoulder 21. The shoulder 19 of the anchor 18 is latched under a downwardly facing inclined shoulder 23 on the interior of the shoe 20. The shoe 20 and the anchor 18 are tubular whereby the lower end of the pillar member 15 is in communication with the well. If desired, a tubular extension 24 may be provided on the lower end of the anchor shoe 20. The extension 24 may have a plurality of lateral ports 25 communicating with an annular cup 26. The anchor 18 latched in the shoe 20 normally holds the pillar 10 stationary and in a central vertical position on the tubing T.

The standing pillar 10 further includes an upper tubular member 27. The upper member 27 may be of larger diameter than the lower member 15 and may be threaded onto the upper end portion of the member 15, as illustrated. The lower end 28 of the upper member 27 is inclined downwardly and inwardly. A puller nut 29 is provided on the upper end of the plunger member 27. The nut 29 may be threaded into the upper end of the member 27 and is preferably of considerable length to project some distance from the upper end of the member. The nut 29 has an annular enlargement 30 on its upper end. The lower end of the enlargement 30 forms a shoulder 31 which is sloped downwardly and outwardly at a substantial pitch. In accordance with the invention the puller nut 29 has a plurality of lateral ports 32 spaced above the upper end of the member 27. The upper member 27 preferably carries a hard wear taking lining 33. The lining 33 may be sectional, as illustrated and may be clamped between the lower end of the puller nut 29 and an upwardly facing annular shoulder 34 on the interior of the member 27 adjacent its lower end. It will be noted that the above described standing pillar 10 is simple in construction as associated with pipe 15.

The barrel 11 is the reciprocating element of the pump and is adapted to be operated or reciprocated by a pump rod R. The barrel 11 preferably includes a head or coupling 35. The coupling 35 may be threaded onto a pin 36 on the lower end of the rod R. The coupling 35 constitutes the body or cage of the valve 13 as will be subsequently described. The barrel 11 further includes a main member or body member 37 of substantial length extending or telescoping downwardly over the standing pillar 10. The barrel member 37 may be connected with the coupling 35 by a suitable adapter 38. In accordance with the invention a puller nut 39 is provided on the lower end of the main barrel member 37. The nut 39 is of substantial length to extend some distance downwardly from the lower end of the member 37. In practice the nut 39 may be threaded into the lower end of the barrel member 37. The lower portion of the puller nut 39 is provided with spaced longitudinal slots 40 to render it flexible and expansible. An annular internal shoulder 41 is provided on the interior of the flexible and expansible nut 39. The shoulder 41 may be adjacent the lower end of the nut 39. The shoulder 41 is sloped downwardly and outwardly and is in the nature of a hook for engaging under the shoulder 31 of the puller nut 29 when the pump is being pulled as will be hereinafter described. The lower protion of the puller nut 39 is rounded and shaped to readily pass downwardly over the upper portion of the standing pillar 10 when the pump is assembled. The puller nut 39 may have a thickened part 42 at the upper ends of the slots 40. The thickened part 42 has tapered upper and lower ends.

The barrel member 37 is preferably provided with a suitable hard wear taking lining 43 for slidably sealing with the upper pillar member 27. The lining 43 may be sectional and may be clamped between the lower end of the adapter 38 and the upper end of the puller nut 39. The interior of the barrel 11 forms the pump chamber or displacement chamber C of the pump. When the barrel 11 is at the lower end of its stroke the upper end of the pillar 10 is some distance below the upper end 35 of the barrel leaving a space or portion of the chamber C which may retain liquid.

The barrel 11 further includes an inner part 44 extending downwardly into the standing pillar 10. The inner part 44 is an elongate tubular member rigidly connected with the upper portion of the barrel 11. In practice a coupler nut or coupling 45 may be provided on the upper end of the inner tube 44 and may be threaded in the lower end of a tubular cage 46. The cage 46 in turn may be threaded onto the lower end of the coupling 35 to connect the inner tube 44 with the barrel proper. The cage 46 constitutes the shell of the valve 12 as will be hereinafter described. The inner tube 44 extends centrally downward through the chamber C and passes into or through the upper member 27 of the standing pillar 10. In accordance with the invention the lower end of the inner tube 44 has communication with the well through the medium of the tubular pillar 10 and the anchor 18 on the lower end of the pillar. In practice a suitable ported toe 47 is provided on the lower end of the inner tube 44. The head 47 is provided with vertically spaced series of lateral ports 48 which place the interior of the inner part 44 in communication with the interior of the lower member 15 of the pillar 10 which is freely open to drain to the well.

It will be observed that the inner tube 44 of the barrel 11 conducts fluid upwardly into the chamber C, reduces the capacity or cross sectional area of the chamber C, acts as a displacement body or pillar in the standing plunger 10 during the down stroke of the conjoined barrel, and serves to guide and stabilize the barrel. The above described lining 33 of the pillar 10 slidably seals with the inner tube 44 of the barrel 10. It is important to note that the relationship between the barrel 11 and the pump rod R is such that the barrel has an upwardly facing surface or surfaces exposed to the hydrostatic head in the tubing T which are of greater cross sectional area than the chamber C about tube 44 so that

the hydrostatic head in the tubing T is imposed on the barrel to force it downwardly to displace the fluid from the chamber C during the down stroke of the barrel.

The valve 12 is the foot valve or the lower valve and controls communication between the well and the displacement chamber C. In the preferred form of the invention the valve 12 is located at the upper end of the inner tube 44 of the barrel 11 to have constant communication with the chamber C adjacent its upper end. The above mentioned cage 46 forms the body or cage of the valve 12. The cage 46 has a series of lateral ports 50 adjacent its lower end and a series of lateral ports 51 adjacent its upper end placing its interior in communication with the chamber C. A partition or web 52 extends across the interior of the cage 46 between its series of ports 50 and 51 and is ported for the free flow of fluid through the cage. A replaceable hardened valve seat 53 is clamped between a shoulder 54 on the interior of the cage 46 and the upper end of the coupling 45. The valve 12 further includes a valve proper or ball 55 in the cage 46 for sealing downwardly against the seat 53. The ball 55 is adapted to cooperate with the seat 53 during the down stroke of the barrel 11 to close communication between the barrel C and the well. The valve ball 55 is unseated during the up-stroke of the barrel 11 to admit fluid from the well to the chamber C. The web 52 limits the upward travel of the ball 55. It will be observed that the head 47 on the lower end of the inner tube 44 forms a traveling intake for the valve 12 that travels upwardly with the valve during the intake or up-stroke of the barrel tube 44. The valve 12 moving with the reciprocating barrel 11 does not accumulate sand or solid matter.

The valve 13 is the working valve and controls communication between the pump chamber C and the well tubing T. The valve 13 is located at the upper end of the barrel being spaced above the valve 12. In the arrangement illustrated the valve 13 includes the cage or coupling 35 described above. The coupling 35 has lateral ports 56 connecting its interior with the interior of the tubing T. In practice there may be two vertically spaced sets of spaced ports 56. The coupling 35 may have an internal web 57 between the sets of ports 56. The web 57 is ported for the free flow of fluid. A hardened replaceable valve seat 58 is clamped between the upper end of the cage 47 and an internal shoulder in the coupling 35. The valve 13 further includes a valve ball 59 in the coupling 35 for cooperating with the seat 58. The ball 59 is adapted to seal downwardly against the seat 58 during the up-stroke of the barrel 11 to close off communication between the tubing T and the chamber C. The ball 59 lifts or unseats during the down stroke of the barrel 11 to allow the fluid to pass from the chamber C into the tubing T.

It is to be particularly noted that the ports 51 which place the interior of the valve 13 in communication with the chamber C are at the upper end of the chamber so that any gas that may be drawn into the chamber C is allowed to pass out through the ports 51 before the discharge of the liquid from the chamber C thus eliminating a gas lock in the chamber. Further, it will be observed that the fluid that is the last to enter the chamber C is the first to be expelled from the chamber through the ports 51 and the valve 13.

The jet means 14 operates to direct a jet or stream of fluid downwardly into the well during the down stroke of the barrel 11 and is operable to direct a similar stream downwardly when the pump is pulled or withdrawn as will be hereinafter described. The jet means 14 includes or provides a socket or chamber 60 at the lower end of the standing plunger 10. In practice the chamber 60 may be in the adjacent end parts of the coupling 16 and the adapter 17. The lower wall of the chamber C is inclined to form a seat.

The means 14 further includes a floating jet or nozzle 61. The nozzle 61 has a longitudinal opening 62 that is restricted or limited in fluid capacity relative to the fluid capacity of the pillar member 15. An enlarged rim 63 is provided on the upper end of the nozzle 61. The rim 63 is movable vertically in the chamber 60 and is adapted to seat downwardly on the lower wall of the chamber. A plurality of lateral ports 64 is provided in the wall of the rim 63 to increase the communication between the interior of the adapter 17 and the chamber 60 when the nozzle 61 is raised and to maintain sufficient communication between the interior of the adapter and the lower end of the pillar member 15 when the upper end of the rim 63 engages the upper wall of the chamber 60. During the down stroke of the barrel 11 the valve 12 is closed due to the increased pressure in the chamber C and the inner tube 44 of the barrel 11 moving downwardly through the pillar 10 displaces fluid downwardly from the interior of the pillar. This displaced fluid is ejected under pressure through the restricted opening 62 in the form of a jet of high velocity. This jet of fluid agitates the fluid in the well at the lower end of the pump and prevents sand from packing and accumulating about the intake of the pump. During the upstroke of the barrel 11 the upward fluid flow through the chamber 60 lifts the nozzle 61 and fluid is free to flow around the rim 63 and through the ports 64. The nozzle 61 formed and ported as above described does not materially interfere with the upward flow of fluid into the pillar 10 during the upward stroke of the barrel 11. The nozzle 61 serves to prevent the entrance of accumulations or bodies of sand and earth formation into the pump and the jet discharging from the nozzle provides a desirable agitation at the lower end of the pump. The nozzle 61 may be omitted if desired.

The improved well pump of the present invention may include means for preventing rotation of the barrel 11 relative to the pillar 10 and for creating fluid agitation or fluid flow in the lower portion of the tubing T to prevent sand from accumulating in the tubing. This means comprises a tube or sleeve 75 arranged within the tubing T to engage against its internal wall. The sleeve 75 is arranged and proportioned to surround the lower member 15 of the standing pillar and to receive the lower portion of the barrel 11 as it moves downwardly during the down stroke. The sleeve 75 is stationary. In practice the lower portion of the sleeve 75 may be welded to the tubing T at 76. In accordance with the invention the sleeve 75 is longitudinally split being provided with a longitudinal opening 77 in its wall. The opening 77 extends between the opposite ends of the sleeve 75 and is of substantial width as illustrated in Figs. 7, 8 and 9. A projection or key 78 is provided on the lower member 15 of the pillar 10 to operate in the opening 77. The key 78 is much smaller in width than the opening 77 so that it does not

interfere with the fluid flow through the opening. The key 78 is adapted to cooperate with the side walls of the opening 77 to prevent rotation of the barrel 11 relative to the plunger pillar 10 and, therefore, prevent unthreading of the joints in the pump rod R.

During the down stroke of the barrel 11 the lower portion of the barrel moves downwardly through the sleeve 75 to displace the fluid therein upwardly through the relatively restricted opening 77. The fluid is thus made to flow upwardly through the opening 77 and the lower portion of the tubing T at a substantial velocity to carry the sand and solid matter upwardly with it. Accordingly, as fluid is discharged from the chamber C into the tubing T during the down stroke of the barrel 11 the fluid in the lower portion of the tubing T carrying sand, etc. also moves upwardly and mingles with the fluid discharged from the pump chamber C. The barrel 11 operating in the sleeve 75 produces an agitation and fluid flow in the lower portion of the tubing that prevents the settling and accumulation of sand in the lower portion of the tubing about the foot of the pillar tube 15. The parts are proportioned so that the barrel member 37 and the nut 39 are received in the sleeve 75 with suitable working clearance.

It is believed that the operation of the pump provided by the invention will be readily understood from the foregoing detailed description. During the up-stroke of the barrel 11 a reduced pressure is created in the chamber C resulting in opening of the valve 12. Fluid flows upwardly through the anchor 18 and the pillar 10 to pass through the valve 12 into the chamber C. The valve 13 of course remains closed during the up-stroke of the barrel 11. As described above, the nozzle 61 lifts or rises during the up-stroke of the barrel 11 to permit the free flow of fluid upwardly through the standing pillar 10. The toe 47 on the lower end of the inner tube 44 constitutes the intake for the valve 12. This intake of course moves upwardly throughout the up-stroke or intake stroke so that its ports 48 receive or admit any rising gas that there may be in the fluid handled.

When the barrel 11 moves downwardly during the down stroke the valve 12 is closed and the valve 13 opens under the increased pressure developed in the chamber C to permit the fluid to be discharged from the chamber into the tubing T. As pointed out above, the working barrel 11 has an aggregate surface exposed to the downwardly directed hydrostatic pressure in the tubing T that is greater than the cross sectional area of the chamber C. Thus the hydrostatic pressure in the tubing T serves to force or move the barrel 11 downwardly to effect the displacement of fluid from the chamber C into the tubing T. The hydrostatic pressure acting downwardly on the barrel 11 positively moves the barrel and rod R downwardly to maintain the rod under tension so that looseness and slack cannot develop in the rod. This is important as it prevents loosening of the joints in the rod, buckling of the rod and failure of the rod due to shock at the ends of the pump strokes. The barrel 11 moving downwardly through the sleeve 75 displaces the fluid from the sleeve and causes it to flow upwardly through the opening 77 at a relatively high velocity. Thus sand, etc. that may tend to accumulate in the lower portion of the tubing T is constantly agitated and forced upwardly through the opening 77 with the fluid and is held in suspension to be carried away by the pumped fluid. The inner tube 44 of the barrel 11 moves downwardly through the stationary pillar 10 throughout the down stroke of the barrel to displace fluid downwardly from the pillar. This fluid displaced downwardly is forced through the relatively restricted opening 62 in the nozzle 61 in the form of a jet. This fluid jet produces a desirable agitation in the well at the lower end of the pump, breaks up formation bridges and accumulations of sand and assists in keeping the well clean.

The pump of the invention includes only two simple valves 12 and 13 which are both carried by the reciprocating barrel 11. The valves moving with the barrel are not liable to become sanded up or made inoperative by accumulations of sand, etc. The barrel 11 is positively operated in both directions being raised by the mechanically operated rod R and being moved downwardly by the hydrostatic pressure in the tubing T. Accordingly, the pump is very smooth and even in operation and the parts are not subject to sudden shock due to play and slackness developing in the rod. As pointed out above, the intake of the valve 12 moves upwardly during the intake stroke. Gas that may be passed into the chamber C is put under compression in the upper portion of the chamber C during the initial portion of the down stroke of the barrel 11 and when its pressure reaches a given point the valve 13 opens to allow the discharge of the gas into the tubing T. As the ports 51 are adjacent the upper end of the chamber C the gas in the chamber is free to discharge outwardly through the valve 13 into the tubing T. Accordingly, during the down stroke of the barrel 11 the gas as well as the liquid is displaced from the chamber C. The amount of fluid displaced from the chamber C at any given stroke is exactly equal to the fluid drawn into the chamber during the up stroke of the barrel and the fluid last drawn into the chamber C is the first to be forced out through the ports 51. The ports 51 being at the upper end of the chamber permit the discharge of the gas from the chamber and thus prevent a gas lock. A limited amount of liquid may remain in the lower portion of the chamber C during the operation of the pump. This liquid however, being substantially incompressible, does not interfere with the operation of the pump.

When the pump is to be pulled or withdrawn from the well the rod R is pulled upwardly beyond the normal upstroke of the pump. This brings the shoulder 41 of the puller nut 39 into engagement with the inclined lower end 28 of the pillar member 27. Because of the inclination of the end 28 of the plunger member 27 the flexible puller nut 39 spreads or expands when the shoulder 41 rides over the end. Thus the puller nut 39 is free to move upwardly over the upper member 27 of the plunger. When the shoulder 41 of the puller nut passes the upper end of the member 27 the puller nut springs back to its original shape so that the shoulder 41 may engage with the shoulder 31 of the pillar head 30.

Prior to this engagement, the toe 47 on the lower end of the inner tube 44 moves out of the puller nut 29 thus placing the chamber C in direct communication with the interior of the plunger 10. The fluid in the chamber C is then free to discharge downwardly through the nozzle 61. When the lower end of the puller nut 39

passes the ports 32 the interior of the pillar 10 is placed in communication with the tubing T. This unloads the fluid column from the tubing T removing the weight of the column from the pump assembly whereby it may be easily pulled from the well. If desired fluid may be pumped downwardly through the tubing T at this time to circulate through the ports 32 and the pillar 10 to discharge from the nozzle 61 in the form of a jet to clean the lower portion of the well. When the shoulder 41 of the puller nut 39 is engaged with the shoulder 31 of the puller nut 29 a substantial up-pull may be placed on the rod R to spring the anchor 18 out of the shoe 20. This, of course, frees the pump for withdrawal from the well on the rod R.

Having described only a typical preferred form and application of my invention I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A self-washing, self-de-sanding pump for placement in a well tubing, including a tubular, standing pillar with a nozzle for directing a jet of fluid to the foot of the pump, a plunger device reciprocatively operative in the pillar and having an outer barrel fitting the pillar, and means operative on a downward stroke of the barrel of said device to conduct away sand from about the pillar when the sand is agitated by said part, and said device operative to force a jet of fluid through the nozzle on the same de-sanding stroke.

2. A well pump adapted for use in a tubing including, a standing pillar-like, constantly open-bore plunger anchorable in the tubing, a barrel movable on the plunger, the interior of the barrel forming a displacement chamber, a part on the barrel extending through the chamber and operable in the plunger and adapted to conduct fluid to the chamber, a valve carried by the barrel at the upper end of said part for controlling communication between said part and the chamber, and a valve carried by the barrel controlling communication between the chamber and the tubing.

3. A well pump adapted for use in a tubing including pillar-like plunger open lengthwise at all times to drain to the and anchorable in the tubing, a barrel movable on the plunger, the interior of the barrel forming a displacement chamber, the barrel having a tubular part passing through said chamber and extending into the plunger and operable to conduct fluid to the chamber, the lower end of said part being open to the well at all times, the cross sectional area of the chamber being less than the area of the barrel surface exposed to the hydrostatic pressure in the tubing whereby said pressure moves the barrel downwardly to displace fluid from the chamber, a valve controlling communication between the upper portion of the chamber and the tubing, and a valve controlling communication between said part and the chamber.

4. A well pump for use in a well tubing including, a pillar-like or stationary, plunger set in and constantly open to drain to the tubing, a barrel movable on the plunger, the interior of the barrel forming a chamber, a tubular part movable with the barrel and extending through the chamber to operate in the plunger and adapted to conduct fluid to the chamber, a valve on said part movable in the chamber for controlling communication between said part and the chamber, and a valve carried by the barrel to control the discharge of the chamber.

5. A well pump for use in a well tubing including, a plunger stationary in the tubing and open at all times to the well, a barrel movable on the plunger, the interior of the barrel forming a chamber, a tubular part movable with the barrel and operating in the plunger, the interior of said part having communication with the chamber and having communication with the well at all times to form a moving intake for the chamber, an inlet valve controlling the inlet of fluid to the chamber, and an outlet valve at the upper end of the chamber.

6. A well pump for use in a well tubing including, a stationary, tubular pillar or plunger seated in and open to drain to the tubing and well, a barrel movable on the plunger, the interior of the barrel forming a chamber, a tubular part movable with the barrel and operating in the plunger, said part having communication with the chamber and having communication with the well at all times to form a moving intake for the chamber, a valve on said part movable through the chamber to control communication between the said part and the chamber, and a valve controlling communication between the chamber and the tubing.

7. A well pump for use in a well tubing including, a stationary, tubular pillar or plunger seated in and open to drain to the tubing and well, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger, the lower end of said part being open to the well at all times whereby said part forms a moving inlet for the chamber, a valve controlling said tubular part, and an outlet valve having communication with the upper portion of the chamber.

8. A well pump for use in a well tubing including a stationary tubular plunger in the tubing and open to drain to the well, a reciprocable barrel telescoping over the plunger and defining a chamber, the barrel having a surface of greater area than the cross sectional area of the chamber exposed to the hydrostatic pressure in the tubing whereby said pressure moves the barrel downwardly to displace fluid from the chamber during the down stroke, a tubular part movable with the barrel and operating in the plunger, the lower end of said part being open to the well at all times whereby said part forms a moving inlet for the chamber, a valve controlling said tubular part, and an outlet valve for the chamber.

9. A well pump for use in a well tubing including, a standing tubular pillar or plunger in and constantly open to drain to the well tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger, the lower end of said part being in communication with the well at all times forming a moving inlet for the chamber, means preventing rotation of the barrel, a valve controlling communication between said tubular part and the chamber, and an outlet valve for the chamber.

10. A well pump for use in a well tubing including, an anchored, open bore pillar or plunger in and draining to the well tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger, the lower end of said part being in communication with

the well at all times forming a moving inlet for the chamber, cooperable parts on the barrel and tubing preventing rotation of the barrel, a valve controlling said tubular part, and an outlet valve for the chamber.

11. A well pump for use in a well tubing including a stationary, tubular pillar, a plunger having a constantly open inlet and outlet to the well, a tubular barrel part operating in the pillar and having an outlet valve to feed fluid to the tubing and closing on downstroke of the barrel part, and means at the lower end of the pillar for jetting well fluid displaced therefrom, on downward stroke of said part, back to the well to wash the foot of the pump.

12. A well pump for use in a well tubing as set forth in claim 11, and in which said means includes a floating nozzle providing a larger suction area than jetting area.

13. A well pump for use in a well tubing including, a stationary tubular plunger in the tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger to form a moving inlet for the chamber, a valve controlling the inlet of the chamber, a valve controlling the outlet of the chamber, and means for producing an up flow of fluid in the lower portion of the tubing during the down stroke of the barrel.

14. A well pump for use in a well tubing including, a stationary tubular plunger in the tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger to form a moving inlet for the chamber, a valve controlling inlet of the chamber, a valve controlling the outlet of the chamber, and means for producing an up flow of fluid in the lower portion of the tubing during the down stroke of the barrel, said means including a sleeve in the tubing receiving the barrel and having a longitudinal fluid duct.

15. A well pump for use in a well tubing including, a stationary tubular plunger in the tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger to form a moving inlet for the chamber, a valve controlling said tubular part, an outlet valve for the chamber, a puller nut on the plunger, and a puller nut on the barrel engageable with the nut on the plunger to pull the plunger, said tubular part being out of the plunger when said nuts are about to engage to allow free draining of the tubing through the plunger.

16. A well pump for use in a well tubing including, a stationary tubular plunger in the tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger to form a moving inlet for the chamber, a valve controlling said tubular part, an outlet valve for the chamber, a puller nut on the plunger, a puller nut on the barrel engageable with the nut on the plunger to pull the plunger, said tubular part being out of the plunger when said nuts are about to engage to allow free draining of the tubing through the plunger, and a nozzle on the lower end of the plunger for jetting fluid downwardly.

17. A well pump for use in a well tubing including, a stationary tubular plunger in the tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger to form a moving inlet for the chamber, a valve controlling said tubular part, an outlet valve for the chamber, a puller nut on the upper portion of the plunger, and a puller nut on the lower portion of the barrel expansible to spring over the plunger and engage the nut on the plunger when the pump is pulled.

18. A well pump for use in a well tubing including, a stationary tubular plunger in the tubing, a reciprocable barrel telescoping over the plunger and defining a chamber, a tubular part movable with the barrel and operating in the plunger to form a moving inlet for the chamber, a valve controlling said tubular part, and an outlet valve for the chamber, said tubular part being adapted to be moved out of said plunger to allow free draining of the tubing through the plunger.

19. A well pump including, a standing plunger having a free drain to the well, a traveling barrel movable on the plunger and defining a displacement chamber, a tubular part on the barrel operable in the plunger, said part being open to the well at all times and being adapted to conduct fluid to the chamber, a valve controlling communication between said part and said chamber and carried by said part to move through said chamber, an outlet valve for the chamber, the barrel being adapted for operation by a pump rod, and means on the barrel for moving the barrel downwardly during the down stroke, said means comprising a surface on the barrel exposed to downward pressure.

20. A pump of the class described, having, in combination, a suction plunger and a relative standing, tubular pillar operatively fitting and on which said plunger works and including a constantly open nozzle part to direct a jet of fluid to the pump foot and which nozzle part is movably mounted in the foot of the pillar, the said part having a valve forming portion, and a seat for said portion in the pillar and forming a larger intake capacity for the pump on suction stroke than the jet discharge, and a pump barrel in which the pillar is seated.

21. A standing pillar pump having, in combination, a tubing, a tubular pillar seated at its lower end in the tubing and having bleeder ports, a displacement plunger packed and working in the pillar, a barrel concentrically joined to the upper end of the plunger and packed and working on the outside of the pillar to form a pumping chamber in the working barrel above the pillar and dischargeable to the tubing, the pillar being open at its bottom for jetting fluid back to the well on down stroke of the plunger, and means for connecting the barrel on up stroke to the pillar to pull it from its seat; the lower end of said barrel passing above said ports before the pillar is in lifting engagement with and by the barrel so that fluid in the tubing may be drained down to and through the pillar before it is lifted from its seat so that the tubing may be pulled dry.

22. A pump of the class described having, in combination, a standing pillar with a movable jetting nozzle at its foot and a seat part thereat, and a pump barrel telescoping on the pillar and having a fluid expelling plunger working in the pillar; said nozzle provided with a valve-forming portion closing on said seat part during expelling stroke of the plunger.

23. A sucker rod pump having, in combination, a reciprocative pumping part and a sucker rod

therefor, a standing pillar operatively fitting and on which said part works, a tubing in which the pillar is fixed, and means keying said part and the tubing to prevent relative rotation while the parts are in pumping position in a well.

24. A pump of the class described including a fixed tubing part, a standing pillar seated in the tubing, a plunger device reciprocative in the pillar and having an outer barrel part fitting the pillar; one of the said parts having a flow channel which is open to its top for free up and down flow of fluid between the barrel part and the tubing part whereby to provide for expulsion of substantially all of the fluid trapped on down stroke of the barrel part in the bore of the tubing.

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