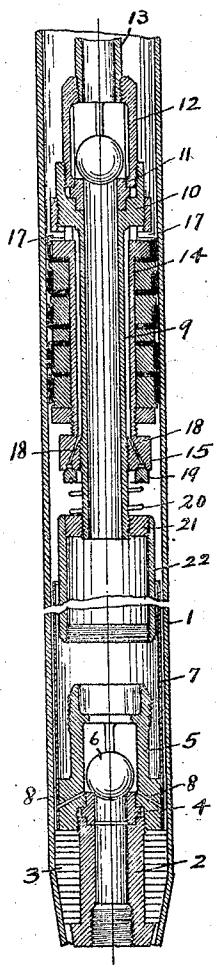
Jan. 12, 1926. 1,569,731

C. R. EDWARDS

PUMP

Filed Sept. 18, 1920



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UNITED STATES PATENT OFFICE.

CHARLES R. EDWARDS, OF HOUSTON, TEXAS.

PUMP.

Application filed September 18, 1920. Serial No. 411,307.

To all whom it may concern:

Be it known that I, CHARLES R. EDWARDS, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in a Pump, of which the following is a specification.

This invention relates to new and useful improvements in a pump.

One object of the invention is to provide a pump of the character described which has been specially designed for pumping oil or other fluids from wells. In pumping oil, or other fluid, containing sand, if the pump is stopped or if the flow of fluid is, for any reason, retarded, the sand has a tendency to settle around the valves and other working parts and seriously interfere with their operation and to sometimes so clog the pump as to interfere with or entirely stop its operation. Furthermore, the sand causes the working parts to wear away very rapidly, thus causing the pump to leak and become inefficient. It is the object of this invention to provide a pump which is so constructed that there will always be a free circulation of fluid therethrough, which is jetted against and past the valves and which sweeps away all sand and other detritus tending to settle in the pump. This circulating fluid is kept in motion through the pump during its operation irrespective of whether there is a continuous current of fluid being produced from the well or not.

Another object of the invention is to provide a pump so constructed that the fluid being pumped will pass up through the tubular sucker rod and will be entirely excluded from the cups of the traveling valve, thus protecting said cups against collection of sand or other detritus between them and the working barrel.

As is well known, oil as pumped from the ordinary well, often becomes laden with sand or other solid matter, and in some cases the oil is of a thick consistency. It is one of the objects of this invention to provide a pump through which a diluting fluid, such as clean light oil, may be introduced into the fluid being pumped, until the same attains a consistency which will permit the ready pumping thereof. This is accomplished by introducing said fluid into the working barrel around the sucker rod which is forced by the action of the pump through the standing valve and up through the traveling valve. A sufficient quantity of this diluting fluid is introduced into the pump to partially balance the column of fluid in the sucker rod and this will have the effect of dividing the work on the cups of the traveling valve between up stroke and down stroke, thus increasing the life of the cups.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

The figure shows a vertical sectional view of the pump.

Referring now more particularly to the drawing, the numeral 1 designates the working barrel which is tubular in form and whose lower end is contracted. Within said lower end there is a tubular nipple 2 which is surrounded by the packing 3 and whose lower end is internally threaded to receive the ordinary gas anchor, common to pumps of this character. The upper end of the nipple 2 supports the annular valve seat 4 which is clamped in place by the cage 5 which is screwed onto the upper end of the nipple and which confines the ball valve 6 which controls said seat, said seat cage and ball valve constituting the standing valve. An upstanding jacket 7 is secured to and surrounds said cage, and stands some distance above it and this jacket is spaced from the working barrel. A plurality, (preferably four), of ducts 8 lead from the space around said jacket, through the jacket and cage 5, and incline upwardly toward said valve underneath it. A traveling valve works in the barrel above the standing valve. This valve includes a tubular nipple 9 whose upper end is formed with an enlarged head 10 seated in which is the annular seat 11, which is held in place by the cage 12, screwed into said head. A hollow sucker rod 13 is attached to this cage and through it the traveling valve is reciprocated up and down. A hollow sleeve 14 surrounds and is spaced from the nipple 9. The upper end of this sleeve is threaded

onto the head 10 and its lower end is anchored by means of the clamp nut 15 which is threaded onto the nipple 19. The sleeve 14 has the usual cup rings 16 secured thereon which fit between it and the working barrel and prevent the passage of fluid between said barrel and the traveling valve. The upper end of the sleeve 14 is spaced from the working barrel and has the constricted inlet ports 17, 17 into the space between said sleeve and the nipple 9, and leading from said space there are the constricted ducts 18 through the nut 15. A ring-like valve 19 is normally held against the underside of the nut 15 by means of a coil spring 20 upon which the valve is seated, and thus normally closes said ducts 18. The lower end of the nipple 9 has a nut 21 threaded thereon, whereon the spring 20 is seated, and a cup-like plunger 22 is threaded onto and depends from said nut 21 and fits loosely within the jacket 7. This plunger is internally threaded so that it may be screwed onto the externally threaded upper end of the cage 5 and when so screwed onto said cage both the standing and traveling valves may be withdrawn from the working barrel by an upward pull upon the sucker rod 13.

Upon up stroke of the traveling valve, fluid is drawn up through the standing valve and upon down stroke of the traveling valve, the fluid will pass above it and upon successive strokes this process will be repeated, forcing the fluid up through the hollow sucker rod to the ground surface. This fluid is laden with sand which has a tendency to settle around the valves, particularly when there is not much fluid being pumped and the current up through the pump is weak. To obviate this, I constantly supply clean oil into the working barrel around the sucker rod so as to maintain a suitable head of clean oil above the traveling valve during the down or discharge stroke of said valve. This relieves the cups or other packing between the traveling valve and the working barrel of excessive one way pressure and greatly lessens the wear of said cups or other packing as it greatly lessens the difference of the static pressure of the sandy oil below the traveling valve and the clean oil above the traveling valve outside of the hollow sucker rod and therefore prevents the forcing of the sandy oil into the working joint between the traveling valve and working barrel. This is also much aided by the peculiar construction of, and the passage of clean oil downwardly to, the standing valve. Upon up stroke a limited supply of the clean oil passes through the constricted ports 17 into the space between the nipple 9 and sleeve 14 and thence through the constricted ducts 18 past the valve 19 and into the chamber beneath the traveling valve. Upon down stroke, the valve 19 closes and the clean oil is then driven under pressure partly through between the plunger and jacket, thus cleansing the jacket, and partly through ducts 8 and is projected against the valve 6 and it all returns with a strong current up through the standing and traveling valves and on up through the sucker rod and sweeps out all sand and settlings and carries the same up out of the pump.

It is to be observed that inasmuch as the fluid being pumped passes up through the hollow sucker rod 13 there can be no settling of sand around the traveling valve to wear away the cups thereof.

What I claim is:—

1. A pump including a working barrel, a standing valve therein, a traveling valve reciprocable therein and having a fluid passageway therethrough for ascending fluid and, controlled by an upwardly opening valve, said traveling valve having also a fluid passageway therethrough for descending fluid and controlled by a downwardly opening valve, said last named passageway being provided to conduct a cleansing fluid from within the barrel above the traveling valve and discharge the same into the working barrel beneath said traveling valve and means separating the ascending and descending fluids.

2. A pump including a working barrel, a standing valve in the lower end thereof, a traveling valve reciprocable above the standing valve, a tubular sucker rod to which the traveling valve is attached and through which the fluid being pumped is delivered, and valve controlled conduits in said traveling valve through which a diluting fluid may be discharged from said working barrel up through said valves and sucker rod to be mingled with the fluid being pumped.

3. A pump including a working barrel, a standing valve fixed to the lower end thereof, and provided with a duct, a traveling valve reciprocable above the standing valve, a hollow sucker rod attached to said traveling valve and adapted to reciprocate the latter, a valve-controlled fluid passageway through said traveling valve through which fluid is introduced into the working barrel, beneath the traveling valve, upon up stroke of the latter, said fluid being driven by said traveling valve, upon down stroke through said ducts and against the standing valve.

4. A pump including a working barrel, a standing valve fixed in the lower end thereof, a tubular jacket fixed to and upstanding from said valve, a traveling valve in said barrel above the standing valve, a tubular sucker rod through which said traveling valve be reciprocated, a plunger

carried by the traveling valve and provided to reciprocate back and forth in said jacket as the pump is operated, said traveling valve having a valve-controlled passageway therethrough provided to admit fluid into said barrel beneath the traveling valve upon up stroke of the latter, said fluid being forced, upon down stroke thereof, in through between said plunger and jacket and thence up through the traveling valve and sucker rod.

5. In combination with a pump, of a working barrel, a traveling valve therein, cup shaped packing rings carried by said valve and interposed between it and the working barrel, a tubular sucker rod to which the traveling valve is attached, said traveling valve having a passageway through it which continues on up through the sucker rod, a valve controlling said passageway, said traveling valve also having a passageway through it from end to end, which separates into a plurality of discharge ports around the traveling valve, a downwardly opening valve controlling said ports, said last mentioned passageway being provided to permit the passage of a cleansing fluid from within the barrel above the traveling barrel, and to discharge the same beneath said traveling valve to surround the fluid being pumped with said cleansing fluid.

6. In a pump, a working barrel, a standing valve therein, a traveling valve in said barrel above the standing valve, said traveling valve being provided with a fluid passageway through which the fluid being pumped may pass upwardly, an upwardly opening valve controlling said passageway, said traveling valve also being provided with a fluid passageway for descending fluid, leading from the barrel above the traveling valve and communicating with the interior of the barrel beneath the traveling valve, a downwardly opening valve controlling said last named passageway, and means to prevent the intermingling of the oppositely moving fluids.

7. In a pump, a working barrel, a standing valve therein, a traveling valve in said barrel, a tubular sucker rod, to the lower end of which the traveling valve is attached, said traveling valve being provided with a valve controlled fluid passageway through which fluid being pumped is delivered into the sucker rod, and having another valve controlled fluid passageway through which fluid is delivered from above said traveling valve through the barrel beneath the traveling valve, said last named passageway being formed at its lower end to deliver said fluid in an annular sheet all the way around the traveling valve.

8. In a pump, a traveling valve provided with valve controlled fluid passageways therethrough, through one of which a fluid is forced upwardly, upon down stroke of the valve, and through the other of which fluid passes downwardly upon up stroke of said valve, a barrel in which said traveling valve operates, a standing valve in the barrel beneath said traveling valve having a valve controlled fluid passageway through which the fluid being pumped may pass upwardly and also having fluid passageways through which the fluid delivered downwardly through the traveling valve is discharged into the first named passageway of the standing valve.

9. The combination in a pump of a working barrel, a standing valve therein, through which the fluid beneath it is permitted to pass upwardly, said valve being provided with radiating ducts, a traveling valve in the barrel above the standing valve and provided with valve-controlled fluid passageways through one of which fluid passes downwardly upon up stroke of the valve and through the other of which fluid passes upwardly upon down stroke thereof, said traveling valve operating upon down stroke to force the fluid between said valves, through said ducts and up through the standing and traveling valves.

10. A pump, including a working barrel, a standing valve fixed to the lower end thereof and provided with a duct, a traveling valve reciprocable above the standing valve, a hollow sucker rod attached to said traveling valve and adapted to reciprocate the latter, said traveling valve being provided with a valve controlled fluid passageway through which fluid is introduced into the working barrel beneath the traveling valve upon upstroke of the latter, said fluid so admitted being driven by the traveling valve through said duct against the standing valve.

11. A pump including a working barrel, a standing valve and a traveling valve associated therewith, said valves having controlled fluid passageways through which fluid may pass upwardly through them, and being also provided with other controlled passageways through which fluid may be forced downwardly therethrough.

12. A pump including a working barrel, a standing valve therein having fluid passageways therethrough, a traveling valve therein equipped with means for working against the fluid pressure at both ends of the traveling valve, said traveling valve being provided with controlled fluid passageways whereby fluid may intermittently and in phase with the change of travel of said traveling valve be conducted alternately both ways through each of said valves.

13. A pump including a working barrel, a standing valve therein, a traveling valve

in said barrel, both valves having controlled passageways through which fluid may be conducted alternately both ways through said traveling valve and standing valve.

14. In a deep well pump a barrel, a standing valve therein, a traveling valve in the barrel above the standing valve, a tubular sucker rod to which the traveling valve is attached, said traveling valve having a valve controlled fluid passageway therethrough, through which the fluid being pumped may pass into the sucker rod, said traveling valve also having a valve controlled passageway leading downwardly therethrough, through which cleansing fluid in the barrel around the sucker rod may be discharged beneath the traveling valve, the discharge end of said last named passageway being formed to discharge an annular sheet of cleansing fluid around the fluid being pumped, up through the traveling valve, said sheet of cleansing fluid excluding the fluid being pumped from the working joint between the traveling valve and barrel.

15. In a deep well pump, a barrel, a standing valve fixed therein, a traveling valve above the standing valve, a tubular sucker rod, to the lower end of which the traveling valve is attached, each of said valves having fluid passageways therethrough, through which the fluid being pumped may be delivered into the sucker rod, valves controlling said respective passageways, said traveling valve and standing valve each having fluid passageways therethrough, through which a cleansing fluid may be delivered from the barrel above the traveling valve, and discharged against the valves controlling said passageways just preceding the closing of said valves, and a downwardly opening valve controlling the passage of said cleansing fluid through the traveling valve.

16. In a pump a working barrel, a standing valve associated therewith, a traveling valve in the barrel, said pump having an annular passageway within the working barrel between said valves forming a guideway for a cleansing fluid.

17. In a pump a working barrel a standing valve associated therewith, a traveling valve for the barrel, said pump having two fluid passageways within the working barrel and between the said valves.

18. In a pump a working barrel, a travelling valve with passageways for conducting one fluid upwardly and one downwardly a standing valve associated with the barrel and having passageways to permit a fluid to pass upwardly therethrough and also having openings to permit the fluid moving downwardly through the travelling valve to be discharged against the standing valve, said pump also having two passageways inside the working barrel and between said valves forming conduits for ascending and descending fluid.

19. In a pump a barrel, a travelling valve therein, a standing valve associated with the barrel, said pump having passageways for conducting the cleansing fluid through the working parts of said valves during the closing of the valves, said passageway being disposed so as to conduct the cleansing fluid between the ascending fluid being pumped and the inside of the working barrel.

In testimony whereof I have signed my name.

CHARLES R. EDWARDS.