E. J. SINCLAIR.

WELL FLOWING DEVICE.

APPLICATION FILED AUG. 10, 1915.

1,209,505.

Patented Dec. 19, 1916.

Fig. 1.

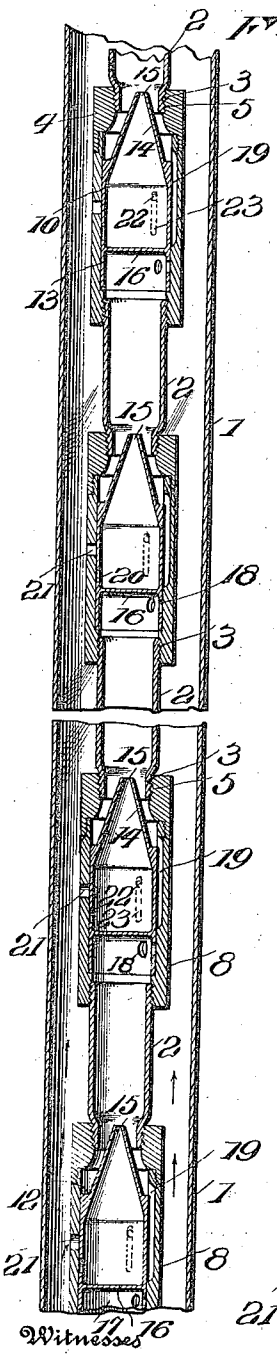
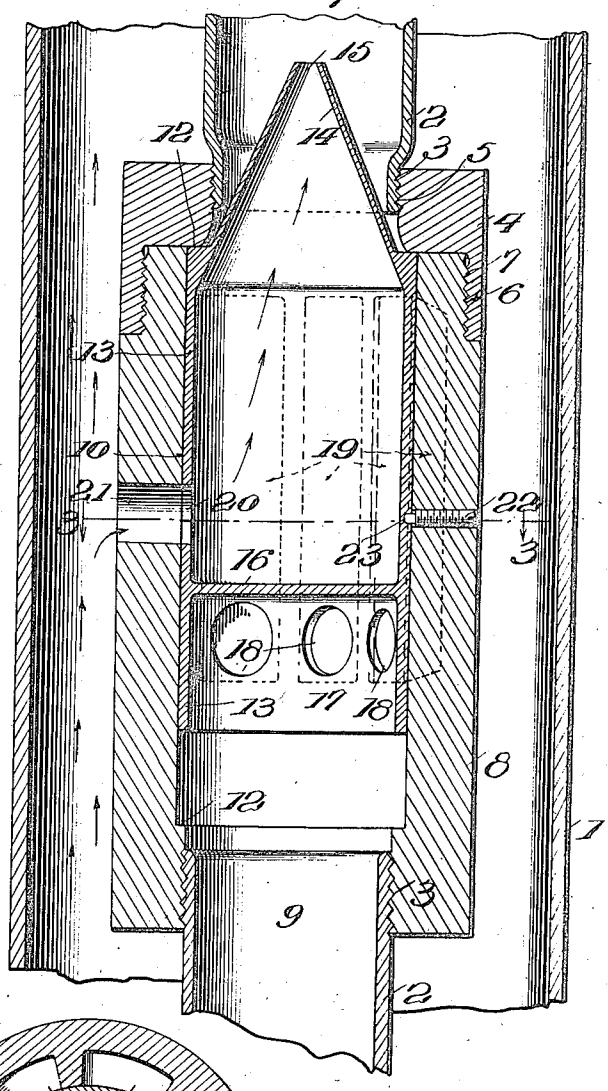


Fig. 2.



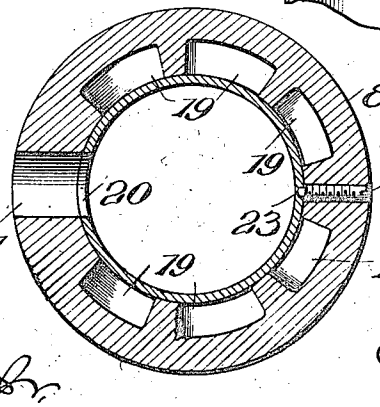


Fig. 3.

Witnesses

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# UNITED STATES PATENT OFFICE.

EDWARD J. SINCLAIR, OF NEW KENSINGTON, PENNSYLVANIA.

## WELL-FLOWING DEVICE.

1,209,505. Specification of Letters Patent. Patented Dec. 19, 1916.

Application filed August 10, 1915. Serial No. 44,796.

*To all whom it may concern:*

Be it known that I, EDWARD J. SINCLAIR, a citizen of the United States, residing at New Kensington, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Well-Flowing Devices, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in well flowing devices, the primary object of which is to devise a mechanism which will operate upon a minimum amount of pressure.

Another object of my present invention is to devise a mechanism of the character described which will operate with a predetermined quantity of pressure and flow the liquid a predetermined height while the pressure remains constant.

A still further object of the present improvement is to devise such a mechanism of simple construction and having but few movable parts.

Other objects and advantages of the present improvement will be set forth in the following description and drawing in which—

Figure 1 is a sectional view of a well casing with my improved flowing mechanism placed therein. Fig. 2 is an enlarged sectional view of one of the ejector nozzles. Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2.

Referring now to the drawings in detail in which like reference numerals designate similar parts, 1 represents the well casing which is of the usual type. Within the said casing I provide a plurality of sections of tubing, indicated by the numeral 2, having their ends externally screw-threaded at 3. These sections of tubing may be of any desired length, depending upon how far apart the ejector nozzles are placed, as will be hereinafter described.

Screw-threaded upon the lower end of each of the sections of tubing 2, is a cap 4, having internal screw-threads 5, meshing with the screw-threads 3 on the tubing 2. The lower end of the cap 4 is provided with internal screw-threads 6, meshing with external screw-threads 7, carried upon the upper end of an ejector casing 8. The lower end of the casing 8 is provided with an opening 9, which is internally screw-threaded at 10, which screw-threads mesh with the internal screw-threads 3, carried by the upper end of the next section of tubing 2, extending downwardly below it. The ejector casing 8 is hollow and has an enlarged interior opening 10 which is of greater diameter than the opening 9, and also of greater diameter than the sections of tubing 2. The difference in diameter of the two openings forms shoulders 12 at the upper and lower ends of the casing and serving as stops for the piston hereinafter to be described. Mounted within the opening 10 is a reciprocating piston 13, the upper end of which is formed into a conical nozzle 14 having a reduced opening 15. The piston is of a length less than the length of the enlarged opening 10 of the casing 8, whereby a region of reciprocation is left. The lower end of the piston 13 is provided with a web 16 placed a distance above the lower end of the heater forming a cup 17, the object of which will be hereinafter set forth. One wall of the cup 17 is provided with a plurality of openings 18, which are adapted to communicate with a plurality of passages 19 when the piston is in its uppermost position, the object of which will be hereinafter set forth. Above the web 16 on the opposite side of the piston is an opening 20 which is adapted to communicate with a passage 21 formed through the adjacent side of the ejector casing 8, the purpose of which will be hereinafter described.

The inner end of a set-screw 22 screwed through the casing 8 fits within a groove 23 in the wall of the piston 13, which insures that the piston will not move circumferentially and thereby throw the openings 14 and 15 out of their proper alinement.

The operation of my improved flowing device is as follows: A mechanism comprising a plurality of ejectors and joined by sections of tubing 2 is placed within the well-casing, the lower end of the lowermost section of tubing submerged in the oil or water in the bottom of the well. Air-pressure is then fed into the casing at a point outside of the sections of tubing 2 and the ejector casings 8. This air or gas may be of any desired pressure according to the force with which it is desired to eject the liquid from the well. However, the pressure must be sufficient to cause the water to flow up within the lowermost section of the tubing 2 and exerting its pressure against the cup 17 of the piston 13, force the said

piston upward to the limit of its upward movement. After the piston has moved a very short distance under the action of the pressure, it will throw the openings 18 into communication with the plurality of passages 19, whereby the water will be by-passed through the opening 18 and the said passages 19 and thence upwardly into the section of tubing 2 above the piston. The water will be passing through the by-passes 19 while the piston is moving upwardly and until the said piston closes the by-passes 19. As the piston 13 moves upwardly, it will register the opening 20 in the piston and the passage 21 in the ejector casing 8, thereby admitting air under pressure from the well casing which will act on the by-passed water passed above the piston and expel it under extenuated pressure through the ejector nozzle openings 15. It is to be understood that the water, after lifting the piston and by-passing water through the passages 19, becomes reduced in pressure and is not sufficient to hold the piston 13 upwardly and consequently the said piston will drop. The dropping of the piston 13 will close the by-passes and the pressure will then be sufficient to again raise the piston and by-pass another charge of water to the section of tubing above it. The air expelled from the nozzle opening 15 will mingle with the water by-passed through the passages 19 and force the said water upward under pressure sufficient to operate the next piston above it. This operation is continued, each piston operating as the water-supply reaches it. Since the air supplied within the casing is constant the flow of water and air and reciprocation of the pistons will be constant so that the water and gas will be expelled from the upper end of the uppermost tubing in a continuous stream.

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

1. In a well flowing mechanism, a delivery pipe, a plurality of pressure actuated valves therein, said valves having openings communicating with the delivery pipe and openings communicating with the well-casing, said valves automatically operated as said fluid reaches them.

2. A well flowing mechanism, comprising a delivery pipe, a series of pressure actuated valves therein, said valves comprising a casing, a member reciprocally mounted therein, the said member having two compartments, one communicating with the delivery pipe and the other compartment communicating with the well-casing, the said members reciprocated as the fluid under pressure reaches them.

3. A well flowing mechanism, comprising a delivery pipe, a series of actuated valves therein, said valves comprising a hollow casing communicating at the upper and lower ends with the delivery pipe, a reciprocating member within the said casing, the said member having two chambers, an opening in the wall of one chamber, a plurality of by-pass channels in the casing, the said opening adapted to communicate with the said channels when the member is in its uppermost position, and means for supplying air under pressure to the other chamber of the member for the purpose described.

4. A well flowing mechanism comprising a delivery pipe, a series of pressure actuated valves therein, said valves comprising a hollow casing, a member reciprocally mounted therein, the said member comprising two chambers, one chamber communicating with the delivery pipe, the other chamber communicating with the well-casing, the last named chamber having a reduced opening communicating with the delivery pipe, the parts arranged as and for the purpose described.

5. A well flowing mechanism comprising a delivery pipe, a series of pressure actuated weighted valves therein, said valves comprising a hollow casing communicating at its upper and lower ends with the delivery pipes, a reciprocating member mounted therein, said member comprising two chambers, the lower chamber communicating with the delivery pipe, an opening in the said chamber, a plurality of by-pass channels in casing, said opening and channels adapted to communicate when the reciprocating chamber is in its uppermost position, whereby the fluid in the delivery pipe is by-passed from the lower chamber to the section of the delivery pipe above the upper chamber, and means for supplying air to the upper chamber for the purpose described.

6. A well flowing mechanism comprising a delivery pipe, a series of pressure actuated valves therein, said valves comprising a hollow casing communicating at its upper and lower ends with the delivery pipe, a reciprocating member within the said casing, said member having two chambers, means in the lower chamber for by-passing the fluid from the said chamber to the section of the delivery pipe above the upper chamber, an opening in the wall of the upper chamber, a passage in the valve casing, said opening thrown into communication when the reciprocating member is in its uppermost position, the upper portion of the upper chamber conically shaped and having a reduced outlet opening, the air in the valve casing fed into the upper chamber, for the purpose described.

7. A well flowing mechanism comprising a delivery pipe, a series of pressure actuated valves therein, said valves comprising a hollow casing communicating with the delivery pipe at its upper and lower ends, a re-

ciprocating member within said casing, said member having two chambers, the lower chamber communicating with the delivery pipe, an opening in the wall of the said chamber, a plurality of by-passed channels in the valve casing, the said opening in the reciprocating member and channels in the valve casing being thrown into communication when the reciprocating member is in its uppermost position, whereby the fluid in the lower chamber of the reciprocating member is by-passed around the upper chamber into the section of the delivery pipe above it, the upper chamber having an opening in one wall thereof, a passage in the valve casing, said opening and passage communicating when the reciprocating member is in its uppermost position, the upper end of said chamber of conical form and having a reduced outlet opening communicating with the section of the delivery pipe above it, whereby the air under pressure in the casing is fed into and through the upper chamber, and delivered into the section of the delivery pipe above it, the parts arranged as and for the purpose described.

8. A well flowing mechanism, comprising a delivery pipe, a plurality of pressure actuated valves therein, said valves having a movable member having openings communicating with the well casing and with the delivery pipe, said movable member actuated by the pressure of the fluid upon reaching it.

9. A well flowing mechanism comprising a delivery pipe, a series of pressure actuated valves therein, said valves having a movable member having two compartments, one communicating with the delivery pipe and the other compartment communicating with the well casing, said movable member actuated by the pressure of the fluid upon reaching it.

10. A well flowing mechanism, comprising a delivery pipe, a plurality of pressure actuated valves therein, each valve having an intermittently movable member having openings communicating with the well casing and with the delivery pipe, said movable member actuated by the pressure of the fluid in the delivery pipe when said fluid reaches it.

11. A well-flowing mechanism comprising a delivery pipe, a series of pressure actuated valves therein, each valve having an intermittently movable member having two compartments, one communicating with the delivery pipe and the other compartment communicating with the well casing and the delivery pipe, said intermittently movable member intermittently actuated by the pressure of the fluid in the delivery pipe when said fluid reaches it.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

EDWARD J. SINCLAIR.

Witnesses:
C. R. WRIGHT, Jr.,
GEO. M. BOND.