Feb. 15, 1927. 1,617,614

V. YORK

FLOW NIPPLE

Filed Aug. 18, 1924

Fig. 2.

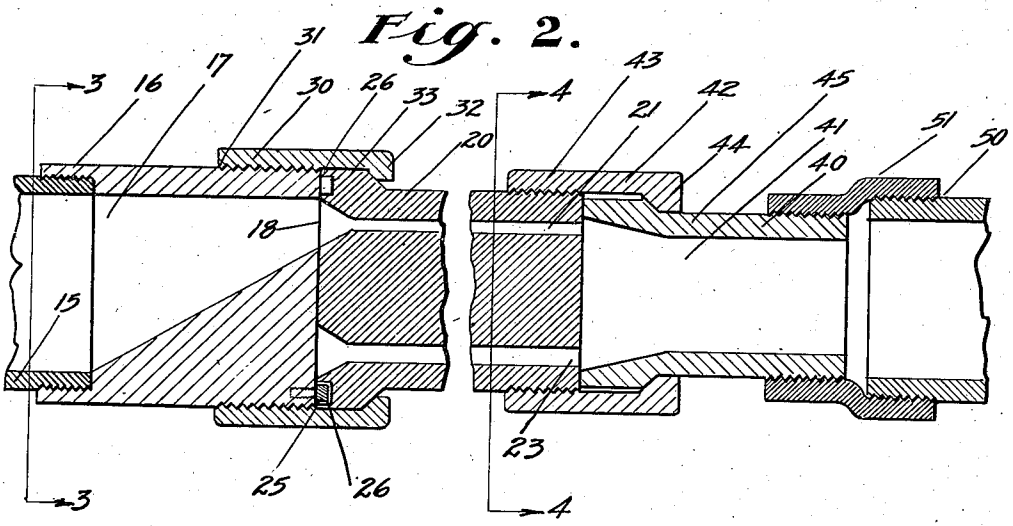


Fig. 3.

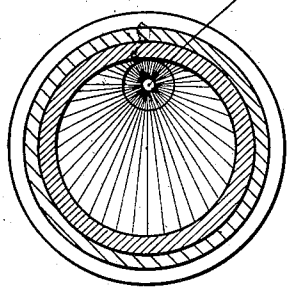
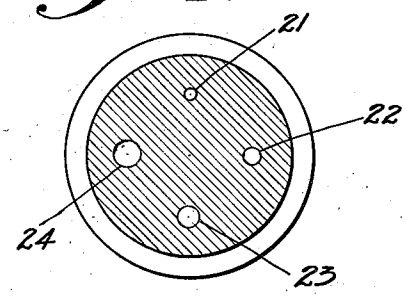


Fig. 4.



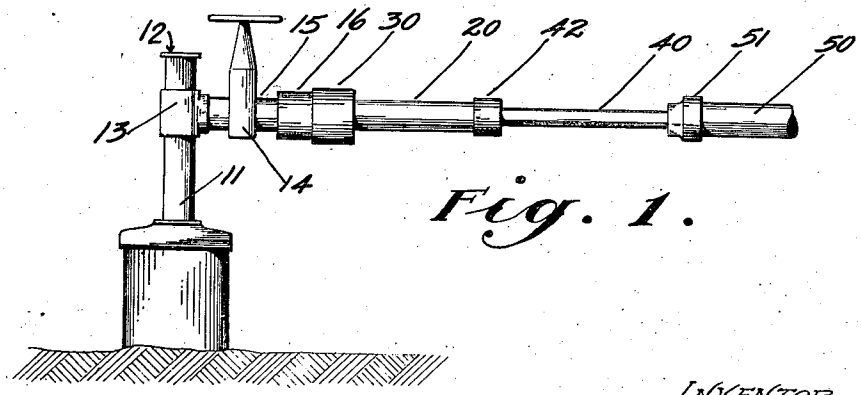


Fig. 1.

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UNITED STATES PATENT OFFICE.

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FLOW NIPPLE.

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In the production of petroleum oils, wells are often brought in which flow due to the gas pressure in the oil sands. In the case of the larger wells, if the well is allowed to flow freely it soon sands up due to the fact that the excessive speed at which the oil and gas enter the well tends to carry into the well and into the passages through the formations around the well large quantities of sand and gravel. This sand and gravel often clog up these passages entirely shutting off the flow of oil and where this occurs in the channels leading into but outside of the well it is extremely difficult to again get the well on production. For the purpose of preventing the wells from sanding up, and for other reasons, it is often desirable to restrain the flow of oil from the well which is ordinarily accomplished at the point where the flow line of the well leaves the casing head, the general practice being to insert a flow nipple at this point.

These flow nipples are ordinarily steel plugs or nipples having a small hole therethrough. These holes may be from ¼ inch to 1 inch in diameter and there may be a drop in pressure therethrough of several hundred pounds. To produce this large drop in pressure it is of course necessary to have a very high velocity in the orifice of the flow nozzle, and these flow nozzles rapidly cut out in ordinary use.

It is an object of my invention to provide a flow nozzle which will have a plurality of orifices, any one of which can be quickly brought into service so that as one wears another will be immediately available without shutting down the production of the well for a long period. It is sometimes desirable to quickly change the amount of restraint put upon the well and it is a further object of my invention to provide a flow nipple having a plurality of different sized orifices, any one of which may be put in service as desired.

Further objects and advantages will be made evident hereinafter.

Referring to the drawings which are for illustrative purposes only,

Fig. 1 is a view of a portion of an oil well equipped with my invention.

Fig. 2 is a section through a portion of the apparatus shown in Fig. 1 on an enlarged scale.

Fig. 3 is a section on a plane represented by the line 3—3 of Fig. 2.

Fig. 4 is a section on a plane represented by the line 4—4 of Fig. 2.

The invention as applied to a flowing well is shown in Fig. 1 in which 11 is the oil string through which the oil flows upwardly from the bottom of the well. The upper portion of this string is closed by a cap 12. Attached to the string 11 by means of a T 13 is a flow line having a valve 14 therein. This valve is connected by means of a close nipple 15 with an anterior bushing 16. This bushing has an eccentric opening 17 therein, this opening terminating at 18 at a point to one side of the center of the bushing 16. Fitting against the posterior surface of the bushing 16 is a flow nipple 20, this nipple having a plurality of orifices 21, 22, 23 and 24, therethrough. In the method of assembly shown, the orifice 21 registers with the opening 18. An accurate registration is insured by means of a dowel pin 25 fitting in holes 26. For the purpose of holding the flow nipple 20 solidly against the anterior bushing 16 I provide a clamping sleeve 30 which is threaded at 31 on the bushing 16 and which is provided with an inwardly projecting flange 32 which engages a flange 33 on the flow nipple 20. All of the orifices 21, 22, 23 and 24 communicate with a common opening 41 in a posterior bushing 40. This bushing is held against the posterior end of the flow nipple 20 by means of a clamping collar 42 threaded on the flow nipple at 43 and having an inwardly projecting flange 44 engaging a flange 45 on the posterior bushing 40. This bushing 40 is connected to a delivery pipe 50 by means of a reducing coupling 51.

With the parts assembled in the position shown, the oil from the well flowing upwardly under a pressure several hundred pounds per square inch is delivered into the T 13 and through the opening 17 into the orifice 21. The flow nipple 20 may be made of any desired length so that the friction of the liquid flowing through the orifice 21 results in a very considerable drop in pressure therethrough. The pressure at the discharge end of the orifice is ordinarily only slightly above atmospheric and the pressure at the inlet end of the orifice may be several hundred pounds per square inch. By holding the pressure on the well in this manner, it is possible to control the flow and prevent violent changes in the formation surrounding the well. It also prevents the sanding

up of the well. When it is desired to change the size of the orifice due to change in conditions of the well or due to a wearing out of the orifice in service, it is possible to quickly do this by loosening the clamping sleeves 30 and 42 and turning the flow nipple 20 to bring another one of its orifices into register with the opening 18. The dowel 25 insures an accurate register at all times, there being four of the holes 26 corresponding to the four orifices in the flow nipple. If desired, more than four orifices may be placed in a single flow nipple. When it is desired to change the nipple, it is of course necessary to close the valve 14.

I claim as my invention:

1. A device for controlling the flow from a well, comprising: an anterior bushing adapted to be secured to a flow line of said well, and having an eccentrically disposed flow opening at its transverse posterior surface; a flow nipple engaging said posterior surface of the bushing and provided with a plurality of flow orifices of different relative diameters relatively spaced circularly and adapted to be placed in concentric alignment to separately register with said flow opening, said flow orifices having respective inlet throats, each gradually enlarged rearwardly to a diameter not less than that of said flow opening so that said flow opening and the flow orifice selected for use will constitute a flow passage free from abrupt wall surfaces facing the flow; and means for clamping the anterior bushing and the flow nipple together with one of said flow orifice throats in accurate registry with said flow opening, the anterior bushing and flow nipple having coengaging means positively insuring such registry and maintaining said bushing and nipple against relative rotation during a tightening of said clamping means.

2. A device for controlling the flow from a well, comprising: an anterior bushing adapted to be secured to a flow line of said well, and having a bore gradually converging to an eccentrically disposed flow opening at the transverse posterior surface of said bushing; a flow nipple engaging said posterior surface of the bushing and provided with a plurality of flow orifices of different relative diameters relatively spaced circularly and adapted to be placed in concentric alignment to separately register with said flow opening, said flow orifices having respective inlet throats gradually enlarged rearwardly to a diameter not less than that of said flow opening so that the bore of said bushing and the flow nipple orifice selected for use will constitute a flow passage free from abrupt wall surfaces facing the flow; and means for clamping the anterior bushing and the flow nipple together with one of said orifice throats in accurate registry with said flow opening, the anterior bushing and the flow nipple having coengaging means positively insuring such registry and maintaining said bushing and nipple against relative rotation during a tightening of said clamping means.

3. A device for controlling the flow from a well, comprising: an anterior bushing adapted to be secured to a flow line of said well, and having an eccentrically disposed flow opening at its transverse posterior surface; a tubular posterior bushing adapted to be secured to a delivery pipe of said well; a flow nipple arranged between adjacent faces of said anterior and posterior bushings and provided with a plurality of flow orifices of different relative diameters relatively spaced circularly and adapted to be placed in concentric alignment to separately register with the eccentrically disposed flow opening of the anterior bushing, said flow orifices having respective inlet throats, each gradually enlarged rearwardly to a diameter equal to that of said eccentrically disposed flow opening so that each of said throats when positioned for use will embrace the full flow from said flow opening, all of said flow orifices communicating with said posterior bushing; means for clamping said posterior bushing to said flow nipple; and means for clamping said anterior bushing and said flow nipple together with one of said flow orifices in accurate registry with said flow opening, the anterior bushing and the flow nipple having coengaging means positively insuring such registry and maintaining said bushing and nipple against relative rotation during a tightening of said clamping means.

4. A device for controlling the flow from a well, comprising: an anterior bushing adapted to be secured to a flow line of said well, and having an eccentrically disposed flow opening at its transverse posterior surface; a flow nipple engaging said posterior surface of the bushing and provided with a plurality of flow orifices of different relative diameters relatively spaced circularly and adapted to be placed in concentric alignment to separately register with said flow opening, said flow orifices having respective inlet throats, each gradually enlarged rearwardly to a diameter not less than that of said flow opening so that said flow opening and the flow orifice selected for use will constitute a flow passage free from abrupt wall surfaces facing the flow; and means for clamping the anterior bushing and the flow nipple together with one of said flow orifice throats in accurate registry with said flow opening, the anterior bushing and the flow nipple having coengaging means positively insuring such registry and maintaining said bushing and nipple against relative rotation during a tightening of said clamping means, said coengaging means comprising a

dowel fixed to said anterior bushing and engaging into one of a plurality of relatively spaced recesses formed in said flow nipple.

5. A device for controlling the flow from a well, comprising: an anterior bushing adapted to be secured to a flow line of said well, and having an eccentrically disposed flow opening at its transverse posterior surface; a tubular posterior bushing adapted to be secured to a delivery pipe of said well; a flow nipple arranged between adjacent faces of said anterior and posterior bushings and provided with a plurality of flow orifices of different relative diameters relatively spaced circularly and adapted to be placed in concentric alignment to separately register with the eccentrically disposed flow opening of the anterior bushing, said flow orifices having respective inlet throats, each gradually enlarged rearwardly to a diameter equal to that of said eccentrically disposed flow opening so that each of said throats when positioned for use will embrace the full flow from said flow opening, all of said flow orifices communicating with said posterior bushing; means for clamping said posterior bushing to said flow nipple; and means for clamping said anterior bushing and said flow nipple together with one of said flow orifices in accurate registry with said flow opening, the anterior bushing and the flow nipple having coengaging means positively insuring such registry and maintaining said bushing and nipple against relative rotation during a tightening of said clamping means, said coengaging means comprising a dowel fixed to said anterior bushing and engaging into one of a plurality of relatively spaced recesses formed in said flow nipple.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 13th day of August, 1924.

VICTOR YORK.