

H. R. WILLIAMS,
PUMPING DEVICE FOR OIL WELLS.
APPLICATION FILED DEC. 31, 1915.

1,192,145.

Patented July 25, 1916.

Fig. 1

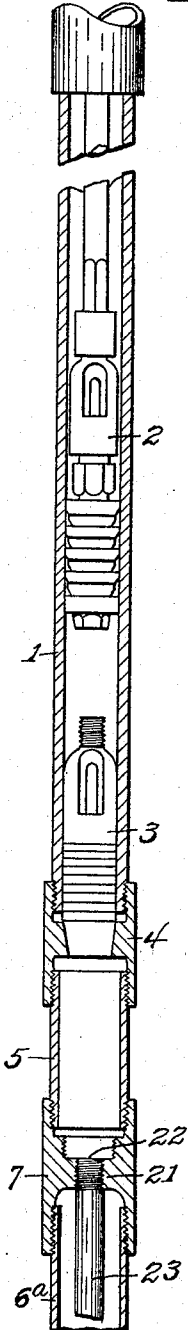


Fig. 2

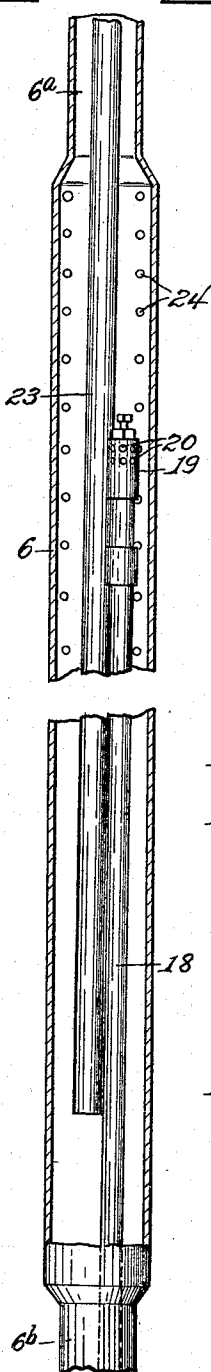


Fig. 3

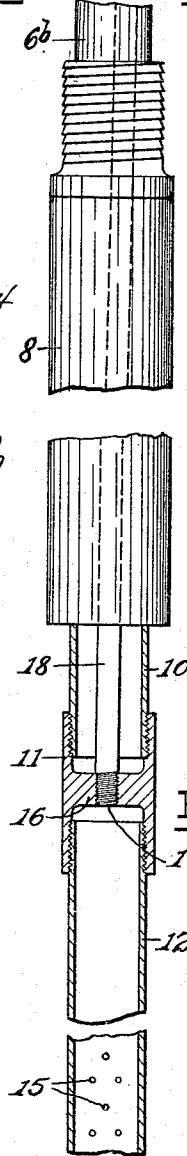


Fig. 4

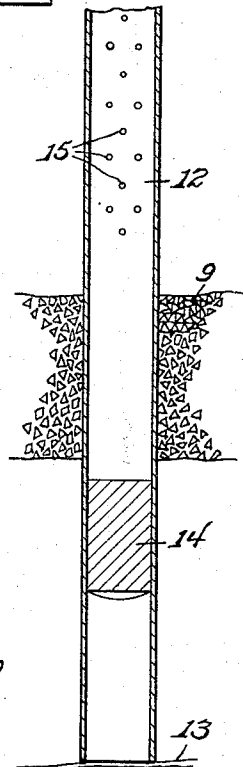
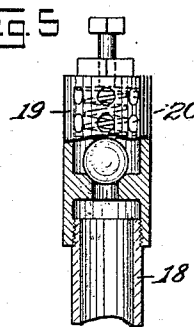


Fig. 5



INVENTOR
H. R. Williams.
By *H. E. Dunlap*
ATTORNEY

UNITED STATES PATENT OFFICE.

HERMAN R. WILLIAMS, OF MANNINGTON, WEST VIRGINIA.

PUMPING DEVICE FOR OIL-WELLS.

1,192,145.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed December 31, 1915. Serial No. 69,556.

To all whom it may concern:

Be it known that I, HERMAN R. WILLIAMS, a citizen of the United States of America, and resident of Mannington, county of Marion, and State of West Virginia, have invented certain new and useful Improvements in Pumping Devices for Oil-Wells, of which the following is a specification.

15 This invention relates broadly to pumping apparatus, and more particularly to an apparatus for preventing the injury to oil-wells which results from exhausting the oil therefrom.

As is well known, great injury to a well results from the exhaustion of the oil therefrom, or from the removal of the oil to a point where the producing sand is uncovered. Chief among the injuries resulting are that the well pressure of oil on the producing sand, required for maintaining said sand in porous condition, is removed; the lighter hydrocarbons which should be conserved to keep the well active are too freely carried off by the well's gases, resulting in the sand becoming coated and closed with paraffin; water entering the casing through leakage or otherwise is permitted to come into contact with the producing sand; and gas entering the casing above the oil-producing sand is permitted to injuriously contact with the latter. As will be understood, these remarks apply particularly to wells which have a low production and which, consequently, require pumping only at intervals.

The present invention has for its primary object to provide an apparatus whereby the removal of oil below a predetermined level is effectually prevented, thereby maintaining the producing sand sealed at all times and obviating the injuries above mentioned which may result from careless or neglectful pumping performed with the usual apparatus heretofore employed.

With this and other objects in view, the invention resides in the features of construction, arrangement of parts and combinations of elements which will hereinafter be fully described reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of the working barrel having reduced ends and the upper portion of the perforated tube; Fig. 2 is a similar section of the tube having reduced ends; Fig. 3 is a view showing the upper

end of the anchor in vertical section and showing the packer therefor in side elevation; Fig. 4 is a vertical section of the anchor projected through the oil-producing sand and which rests upon the well bottom; and Fig. 5 is a partial vertical section of the adjustable check valve, enlarged.

Referring to said drawings, in which like designating characters distinguish like parts throughout the several views—1 indicates generally the working barrel embodying a working valve 2 and a standing valve 3, said parts being of a common type. Connected to the lower end of the working barrel by a coupling 4 is a short nipple 5. A tube 6 of larger diameter than the working barrel 1 and nipple 5 has its opposite ends 6^a and 6^b reduced, as by swaging, to the diameter of said barrel and nipple, the upper of said ends being connected to said nipple by means of a coupling 7, and the lower of said ends being connected to the upper end of a packer 8 which is located at a suitable height above the oil-producing sand 9. Threaded within the lower end of the packer 8 is the upper end of a nipple 10 to the lower end of which is connected by means of a coupling 11 the upper end of the anchor 12 which extends downward through the oil-producing sand 9 and rests upon the bottom 13 of the well. Said anchor is plugged in the usual manner at a point below the sand 9, as shown at 14, and is provided above the sand with perforations 15 through which the oil enters.

The coupling 11 is of a reducing type, having an internal web 16 intermediate its ends, said web having a threaded opening 17 of relatively small size therein. Threaded into said opening 17 is the lower end of a stand pipe 18 of materially less diameter than that of the nipple 10, said pipe extending upward through the interiors of said nipple 10, packer 8 and tube 6 and having its upper end located adjacent to the upper end of the body portion of said tube 6. Mounted upon the said upper end of said pipe 18 is a check valve 19 which may be of any appropriate form, but which is herein shown as of adjustable ball-check type with perforations 20 in the walls of the valve casing. Said valve is designed to permit the outward passage of oil which rises to the valve level through the pipe 18, and also to maintain a constant back pressure of oil upon the sand 9.

The coupling 7 is similar in form to the coupling 11, having a web 21 provided with a relatively small threaded opening 22 in which is screwed the upper end of a small pipe 23 which is suspended within the tube 6 with its lower end open and located adjacent to the lower end of the body portion of said tube, as shown in Fig. 2.

Provided in the body portion of the tube 6 above the level of the lower end of the suspended pipe 23 are perforations 24 through which the oil may pass to and from the interior of the well-casing (not shown) which is disposed in encircling relation to said tube 6.

In practice, the oil which flows into the well from the producing sand 9 enters the anchor 12 through the perforations 15 and gradually rises under pressure until it unseats the ball-check valve 19; whence it passes outward through the perforations 20 in the casing of said valve to the interior of the tube 6. The said tube 6 thus becomes gradually filled to a point where the oil overflows outward through the perforations 24 to the interior of the well casing in which the oil is permitted to rise as ordinarily.

In pumping, the oil is drawn upward through the suspended pipe 23 until it has receded to a point leaving the lower end of said pipe uncovered, the oil in the casing without the tube 6 returning to said tube until the lowermost of the perforations 24 have been uncovered. As is obvious, when the lower end of said suspended pipe has been uncovered, as aforesaid, no further oil can be removed from the well. Thus, there will at all times be contained a quantity of oil completely filling the anchor 12 and the stand pipe 18, said oil serving to completely seal the producing sand against water or gas which may enter the well casing above the packer. Further, this quantity of oil will have sufficient weight to exert such a back pressure on the producing sand as will effectually prevent destruction of the natural porosity of the latter; will hold back or prevent the too rapid escape of the lighter hydrocarbons which would otherwise result; will prevent the escape of gas which might otherwise interfere with the valves of the working barrel, and will prevent oil from being blown out of the tubing at intervals during pumping. It will thus be observed that the conservation of that condition which is necessary to maintain an oil well active for a long period of time results from the use of the invention hereinbefore described.

What is claimed is—

1. Means for protecting the producing sand of oil-wells, comprising a tubular anchor projected through said sand, a tubular packer located above said sand, a coupling interposed between said anchor and

said packer and preventing communication between said parts, a perforated tube located above and connected to said packer, a stand-pipe connected to said coupling and extending upward into said tube, said stand-pipe affording communication between said anchor and said tube, and a pipe depending within said tube to a point below the level of the upper end of said stand-pipe, said depending pipe affording a passage through which fluid is pumped from the well.

2. Means for protecting the producing sand of oil-wells, comprising a tubular anchor projected through said sand, a tubular packer located above said sand, a coupling interposed between said anchor and said packer and preventing communication between said parts, a perforated tube located above and connected to said packer, a working barrel located above said tube, a stand-pipe connected to said coupling and extending upward into said tube, said stand-pipe affording a passage through which oil rises to said tube, and a pipe depending within said tube to a point below the level of the upper end of said stand-pipe, the suction produced in the working barrel acting to withdraw oil from the tube until the lower end thereof is uncovered.

3. Means for protecting the producing sand of oil-wells, comprising a tubular anchor projected through said sand, a tubular packer located above said sand, a coupling interposed between said anchor and said packer and preventing communication between said parts, a perforated tube located above and connected to said packer, a working barrel located above said tube, a stand-pipe connected to said coupling and extending upward into said tube, said stand-pipe affording a passage through which oil rises to said tube, a coupling interposed between said tube and said working barrel, a pipe depending from the last-mentioned coupling to a point within the tube below the upper end of said stand-pipe, said depending pipe affording a passage through which the oil is withdrawn from said tube under the force exerted by the parts operating within the working barrel.

4. Means for protecting the producing sand of oil-wells, comprising a tubular anchor projected through said sand, a tubular packer located above said sand, a coupling interposed between said anchor and said packer and preventing communication between said parts, an apertured tube located above and connected to said packer, a working barrel located above said tube, a standpipe connected to said coupling and extending upward into said tube, said stand-pipe affording a passage through which oil rises to said tube, a check-valve controlling the upper end of said stand-pipe, and a pipe depending within said tube to a point below

the level of the upper end of said stand-pipe, the suction produced in the working barrel acting to withdraw oil from the tube until the lower end thereof is uncovered.

5 5. Means for protecting the producing sand of oil-wells, comprising a tubular anchor projected through said sand, a tubular packer located above said sand, a coupling interposed between said anchor and
10 said packer and preventing communication between said parts, an apertured tube located above and connected to said packer, a working barrel located above said tube, a stand-pipe connected to said coupling and
15 extending upward into said tube, said stand-pipe affording a passage through which oil rises to said tube, a check-valve

controlling the upper end of said stand-pipe, a reducing coupling interposed between said tube and said working barrel, a
20 pipe depending from the last-mentioned coupling to a point within the tube below the upper end of said stand-pipe, said depending pipe affording a passage through
25 which the oil is withdrawn from said tube under the force exerted by the parts operating within the working barrel.

In testimony whereof, I affix my signature in presence of two subscribing witnesses.

HERMAN R. WILLIAMS.

Witnesses:

D. S. GARBER,
W. C. BYRD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."