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OIL WELL FLOODING APPARATUS

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Fig. 1.

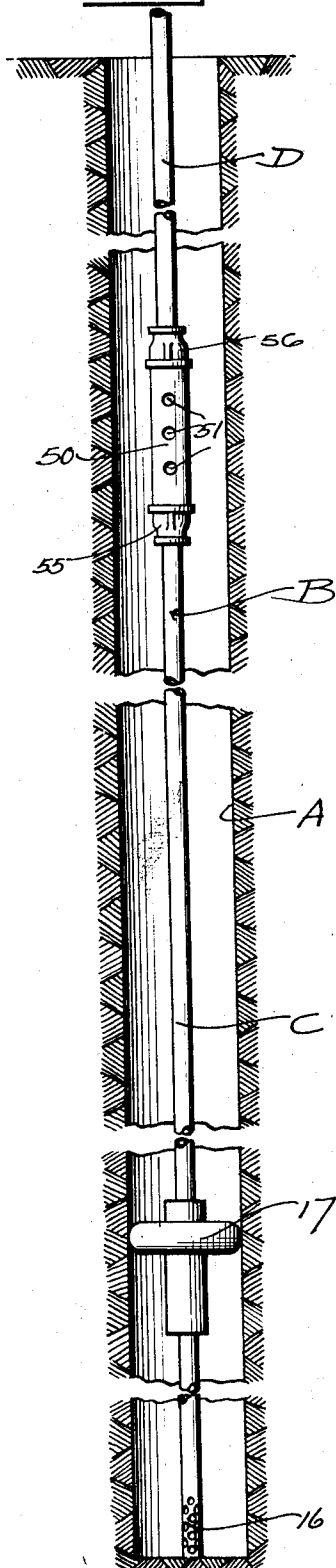


Fig. 2.

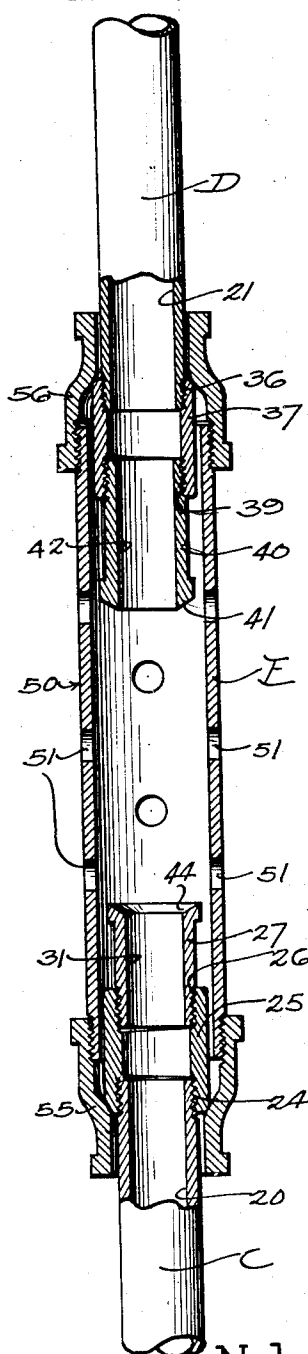
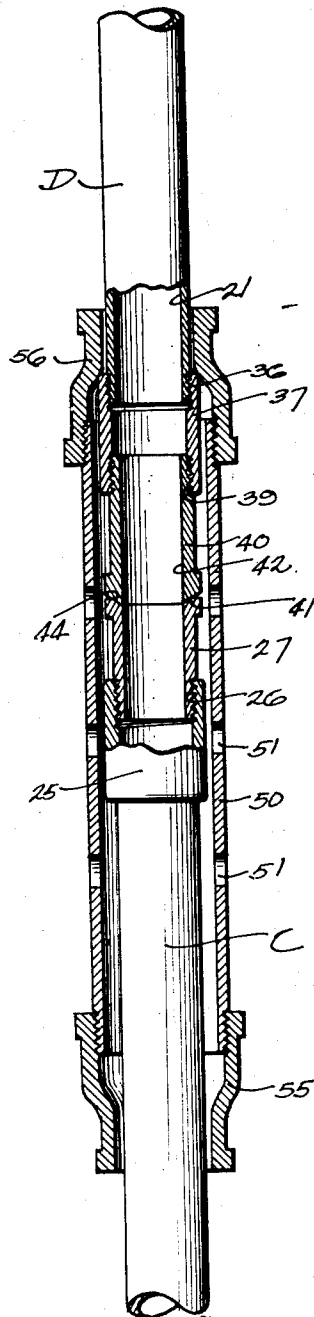


Fig. 3.



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OIL-WELL FLOODING APPARATUS

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This invention relates to improvements in means for flooding oil wells.

In districts where a considerable number of wells have been drilled for the production of petroleum, and after the flow of petroleum has ceased or has become unprofitable, it is the practice to flood some of the old wells with water in order to force the petroleum to higher levels where the same may be reached by drilling in a profitable manner. This flooding of old wells is very often carried out with difficulty, and the head of water within the well is very often rendered ineffective incident either to clogging up of the well by the falling of sediment thereinto, or by the formation or admission of roily water to the bottom of the well. To obviate these and other difficulties I have provided a practical apparatus used for such flooding purposes. It is the custom with conventional flooding apparatus to provide a T fitting in the pipe within the well at a suitable distance above the bottom of the well, which is open at all times for the flow of ground waters from the well into the pipe where they may reach the bottom of the well. These waters are very often emulsified, and pieces of sediment may often clog the opening in the T. These difficulties are overcome with my improved apparatus, incident to the provision of a novel type of valve which is provided upon the water flooding pipe, at a suitable distance within the well where the inlet of water with respect to the pipe may be controlled.

Further and important objects that I attain incident to the provision of the improved oil well flooding apparatus are first, the regulation of the flow and pressure of water to the oil bearing sand; second, the exclusion of sediment from the oil sands by reason of the facile closing of the valve to exclude roily water; third, I am able to accurately test whether or not the sand at the bottom of the well is taking water; fourth, the apparatus may be controlled in facile manner from the ground surface at the top of the well; and fifth, the valve means provided as a novel feature of this invention is such as will not restrict the passage-way of

the pipe sections and will permit of cleaning of the well by pumping.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views, Figure 1 is a sectional view taken through a well, showing the improved oil well flooding apparatus as used in connection therewith.

Figure 2 is a view, partly in section, showing more particularly the improved valve structure of the well flooding apparatus, in open position.

Figure 3 is a view similar to that illustrated in Figure 2 with the valve closed.

In the drawing wherein for the purpose of illustration is shown only a preferred embodiment of this invention, the letter A may generally designate a well, from which the ordinary casing has been "pulled," and which well has become non-productive in so far as the flow of petroleum is concerned. At the bottom of these types of wells oil bearing sands are found through which water will percolate to reach the petroleum whereby the petroleum may be forced to a higher level where the same may be economically pumped. The improved oil well flooding apparatus B is adapted to be placed in the well A, and consists of the lower pipe section C; upper pipe section D; and means E for connecting the sections C and D so that they may be moved into abutting closed relation with each other, or away from each other for a purpose to be subsequently described.

For the purposes of this invention the lower pipe section C may be of any approved length sufficient to have the lower perforate end 16 thereof reach the bottom of the well. This pipe section C upwardly above the perforate end 16 may have a conventional type of packer 17, either of the elastic or other type, and which packer 17 when the oil well flooding apparatus is in position engages the side walls of the well

A to provide a liquid sealed connection therewith whereby any sediment, rocks, or other matter which enters the well A thereabove may not fall into clogging engagement with the perforate end 16 of the lower pipe section C.

It is the principal feature of this invention that the upper pipe section D may be moved into engagement with the lower pipe section C so that the passageways 20 and 21 of the pipe sections C and D respectively may be placed in a communicating relation with a liquid sealed connection at the point of engagement of these pipes, or so that the pipe sections may be moved away from each other whereby water may enter from the well A into the upper end of the lower pipe section C and pass therethrough into the well through the perforate end 16 thereof. To this end the upper end of the pipe section C is screw threaded, at 24, for receiving thereon a coupling sleeve 25, and which coupling sleeve 25 upwardly thereon and on the inner surface thereof is screw threaded, at 26, for detachably supporting a tubular valve part 27, which may be of brass or similar material, and for purposes of this invention may be included as a part of the lower pipe section C. In similar manner the lower end of the upper pipe section D is screw threaded exteriorly thereof, as at 36, to detachably receive in screw threaded relation therewith the coupling sleeve 37, and which coupling sleeve 37 is interiorly screw threaded within the same at the lower end thereof, as at 39, for detachably receiving a tubular valve part 40. The tubular valve parts 27 and 40 may both be of similar material, and are respectively provided with passageways 31 and 42 therethrough, which are of the same diameter as the pipe section passageways 20 and 21. These tubular portions 27 and 40 are so formed that they may engage each other at their facing edges with a ground joint, it being preferred to provide a beveled seat 44 on the upper margin of the lower part 27 which slopes downwardly in a converging relation with the passageway 31 of the part 27, and the lower edge of the tubular valve portion 40 is provided with a beveled surface 41 thereon adapted to engage in snug seating relation upon the beveled seat 44 to provide a ground joint which provides a liquid sealed connection when the parts 27 and 40 are in engagement, whereby water forced through the pipe sections C and D cannot leak at the juncture of the valve parts 27 and 40.

Referring to the means E, the same connects the pipe sections C and D, and consists of a sleeve or cylinder portion 50, having radial openings 51 therein, throughout the length and diameter thereof. At its lower and upper ends the cylinder portion 50 is provided with coupling members 55

and 56 respectively, which are of such a nature that they receive the pipe sections C and D respectively therethrough in sliding engagement, and which themselves may engage the coupling sleeves 25 and 37 to prevent disconnection of the means E from either of the pipe sections C and D.

Referring more particularly to the operation of this invention, the lower pipe section C is placed in the well A as above mentioned, the upper pipe section D of course being connected therewith by the perforate sleeve or cylinder structure E. The waters which percolate into the well A are of course used primarily for the purpose of flooding the well at the bottom thereof, and these waters until they become substantially clear should be excluded from the pipe section C. This exclusion is effected by merely lowering the upper pipe section D until the same engages the lower pipe section as above mentioned. When the waters above the packer 17 have settled so that they may be admitted into the pipe section C, the upper pipe section D is lifted from the ground surface, and the portion E is lifted therewith until the coupling 55 on the lower end of the cylinder 50 engages the shoulder or sleeve 25, and at which time the operator knows that the waters within the well A are flowing into the lower pipe section C to a point below the packer 17 for the purpose of flooding the oil bearing sands at the bottom of the well. During time when roily water exists in the well the valve structure is closed by lowering the pipe section D, as above described. It is very important at times to test whether or not the sands in the bottom of the well are taking water, and this test can be made by closing the valve structure as above described, and by pouring water into the upper pipe section D the operator is enabled to find out whether the water being poured in drains into the oil bearing sands. The valve may be controlled with ease from the surface, because of the fact that the valve need not necessarily be located deep in the well, it only being necessary that the valve be placed in the well so that waters which drain into the well may be used for flooding purposes. When it is desired to pump out the well for cleaning the same the valve may be closed as in Figure 3, and the well pipe sections may be used in connection with pumping apparatus for pumping the well at a point adjacent the oil bearing sands.

Various changes in the shape, size, and arrangement of parts may be made to the form of this invention without departing from the spirit of the same or scope of the claims.

I claim:

1. Apparatus of the class described consisting of upper and lower pipe sections, valve parts carried by said upper and lower

pipe sections in a facing relation which will relatively abut when the sections are moved towards each other to provide a ground joint connection, and coupling means movably
5 connected with both the upper and lower pipe sections including a perforate sleeve.

2. In oil well flooding apparatus of the class described the combination of upper and lower pipe portions, substantially tubular
10 portions at the facing ends of said pipe portions, couplings for connecting said tubular portions to the pipe portions providing annular shoulders exteriorly thereof, a perforate sleeve receiving the tubular portions
15 therein, and means connecting the perforate sleeve with the upper and lower pipe portions in a sliding relation therethrough, said means adapted for abutment with the shoulders provided by said couplings whereby to
20 normally maintain the pipe portions in aligning relation so that the tubular portions at their facing ends may be placed in or out of engaging relation.

3. Those steps in the method of flooding an
25 oil well which consist in trapping percolating waters within a percolating well exteriorly of the tubing at a location above the lower end of the tubing and above oil bearing sands in the bottom of the well, allowing
30 the sediment to settle from these waters and the water to clarify, and then allowing the clear water only to enter the tubing for flow into the oil bearing sands to the exclusion of the sediment.

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