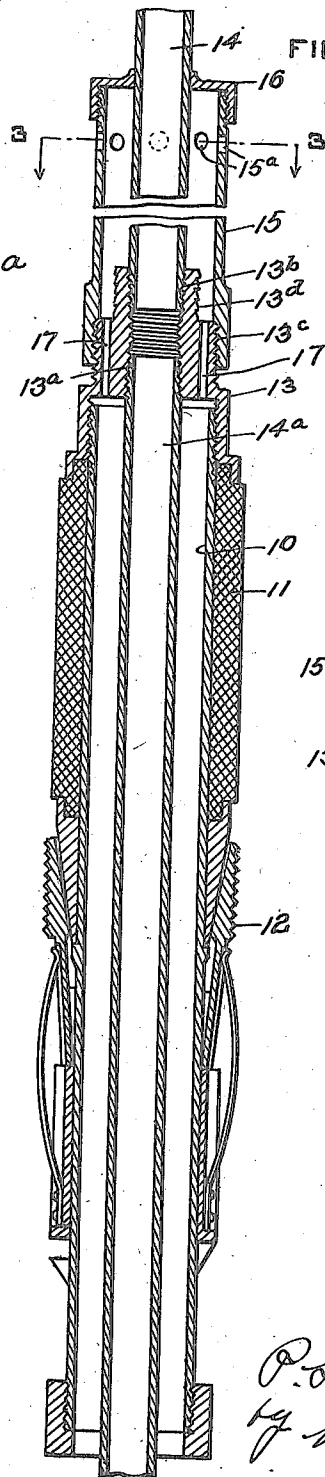
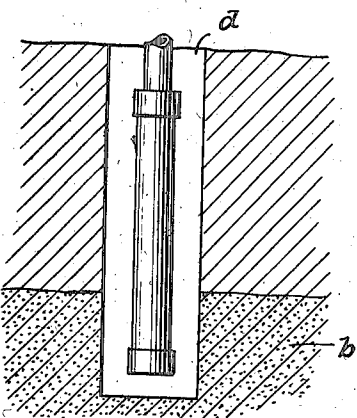
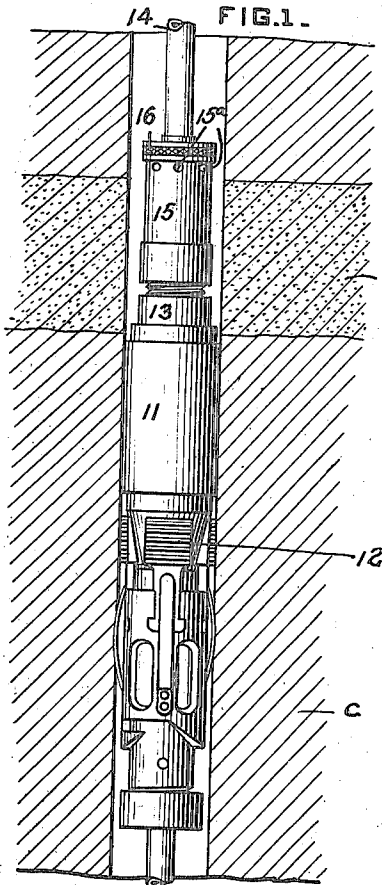


P. H. MACK.
OIL WELL PACKER.
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1,248,881.

Patented Dec. 4, 1917.



WITNESSES

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OIL-WELL PACKER.

1,248,881.

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To all whom it may concern:

Be it known that I, PATRICK H. MACK, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Oil-Well Packers, of which the following is a specification.

This invention relates to improvements in packing structures for deep wells, such for instance as oil wells, and is designed more particularly for certain conditions which may be met in sinking and operating oil wells.

When the well is driven through two or more sands and it is desired to produce oil from said sands, difficulty has heretofore been experienced due to oil from the upper sand or sands running down and producing a clogging or "parafining" effect, thereby tending to materially reduce the production. The present invention is designed to overcome this difficulty by providing a simple and efficient structure whereby the upper oil bearing sand is kept flooded with oil and the overflow therefrom passed into said structure and then to the pumping pocket of the well.

Among the objects of the present invention are, to provide a simple and efficient overflow packing structure; an overflow packer that may be set and maintained in the desired position by the pumping tubing; a construction whereby a plurality of overflow packers may be successfully employed in a single well, and means for converting a non-overflow packer into an overflow packer.

To these and other ends, my invention consists in the improved construction and combination of parts hereinafter fully described, illustrated, and particularly pointed out in the appended claims.

In the accompanying drawings,

Figure 1 is a sectional view of a portion of a well showing a packing structure for overflow purposes in position therein, the packing structure employing the present invention.

Fig. 2 is a longitudinal sectional view of the packing structure shown in Fig. 1.

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 2.

In the drawing, *a* represents an upper sand, *b* the sand from which the oil is being

pumped, and *c* an intermediate stratum between these sands, the well being indicated at *d*.

10 indicates a tube on which the various parts of the packer are mounted, 11 a rubber packing, and 12 the slip structures, these being of the general type of well packers adapted to be set by superimposed weight. The elements 10, 11 and 12 are commonly employed in well packers, the individual elements being varied by different manufacturers. In each instance, however, there is generally present a cap through which pressure is exerted on the rubber packing to expand the same, either by a threading action or by weight. In the form shown in the drawing, the setting of the packer is accomplished by superimposed weight, the slips 12 being released to grip the walls of the well, thus permitting the superimposed weight to apply the necessary pressure. As is usual in this type of packer, the cap is threaded to the upper end of the tube 10, the cap being indicated generally at 13.

In the present invention, the usual cap structure is substituted by the cap 13, preferably formed as shown in the drawings, having an internal thread 13^a for securing the pumping pipe sections to the cap, the upper section 14 entering the top of the cap, the lower section 14^a entering the bottom of the cap, the cap serving to join these sections together to form a continuous passageway through the packer, section 14^a preferably extending downward to the pumping pocket, while section 14 leads upward to the top of the well. Obviously, the sections 14 and 14^a simply represent strings of pipe connected together to produce the required length. Cap 13 is also provided with an external thread 13^c adapted to receive the lower end of a tubular structure 15 of suitable length, the upper end of this structure being provided with an inlet for oil.

In the form shown in the drawing, the inlet is provided by a plurality of openings 15^a extending on a single horizontal plane, these openings, as shown in Fig. 1, being substantially on or slightly above the top plane of the upper sand. The upper end of the structure 15 is preferably closed by suitable means, that shown being a cap 16 threaded to the structure, the purpose of the cap or cover being to prevent the en-

trance of earthy material into the interior of the structure 15.

The structure 15 may be in the form of a single member or it may be a built-up tubular structure, such for instance as might be provided by connecting pipe sections together, a structure which can be readily assembled in the field. The length of this structure would obviously depend upon the thickness of the sand stratum or strata, approximating the length of the zone which is to be maintained flooded. As shown more particularly in Figs. 2 and 3, the cap 13 is provided with a plurality of longitudinally extending openings 17, these being preferably arranged in a circle between the planes of the threads 13^b and 13^c, and are adapted to afford open communication between the interior of the structure 15 and the interior of tube 10. As a result, any oil which enters the structure 15 through openings 15^a passes through the openings 17 into the open channel formed by the interior of tube 10 and the exterior of section 14^a of the tubing through which pumping is had, this channel having its lower end open to the well below the packer, enabling the oil so passed to reach the pumping pocket. Obviously, a separate packer structure may be employed for each upper sand, the overflow from one sand passing into the oil of the sand below, and passing onward through the succeeding packer. As a result, the oil may be obtained from a plurality of sands, each of the upper sands being maintained flooded.

The cap may also be provided with external threads 13^a, thus enabling the cap to be employed in connection with ordinary casing where this overflow feature is not necessary or desired, or where it is desired to set the packer other than by the pumping tubing.

Since the outfit of a well drilling crew generally includes one or more packers of the usual type, as well as tubing, it will be readily understood that, to meet service conditions involving the overflow feature, it would be necessary only to carry a cap 13 in stock, the usual cap of a packer being taken off and cap 13 placed in position. The length of the zone to be maintained flooded being known, the structure 15 can be readily fabricated, after which the top of the structure is closed, either by the cap 16 or other suitable cover, cap 16 being loose on the tubing 14. As the testing of the well will indicate the point where it is desired that the packer be located, the section 14^a will be built up to the proper length, the structure 15 attached to the cap, and the pipe 14 connected to the upper end of the cap. When the packer has reached its proper position, the slips are released in the well known manner, and the packer set, thus not only providing for the isolation of the upper

sands, but also completing the pumping tubing line and anchoring the latter by the packer.

It will be obvious that the invention is not limited to the specific form of packer shown in the drawing, any preferred form of structure for this purpose being usable in connection with the overflow feature which the invention is designed to provide.

What I claim is:—

1. The combination with the pumping tubing of an oil well, of means for retaining a flooded condition in the sand above the pumping sand and for delivering oil from the flooded sand to the pumping sand comprising a packer-structure surrounding the pumping tubing and including a tubular body-member, a packing member and a cap, and an upwardly projecting apertured tubular member secured to the cap, said cap having a passage connecting the interiors of the upwardly projecting member and the body member exterior of the pumping tubing.

2. The combination with the sectional pumping tubing of an oil well, of a packer structure surrounding the tubing and carried thereby including a packing-member, a body-member and a cap secured to the upper end of the body-member, said cap having means for coupling adjacent pumping tubing sections, and an apertured tubular member projecting upwardly from the cap and secured thereto, said cap having a passage therein in communication with the projecting tubular member and the body-member.

3. The combination with the pumping tubing of an oil well, a packer structure surrounding the pumping tubing and including a tubular body-member, a packing-member and a cap, and an upwardly projecting apertured tubular member secured to the cap, said cap having a plurality of passages connecting the interiors of the upwardly projecting member and the body-member exterior of the pumping tubing.

4. In packing structures for oil wells, a packing member, and a cap located at the upper end of the packer, said cap having a threaded opening adapted to receive and engage tubing sections, said cap being perforated in the direction of its length to provide for passage of oil from above the cap to the interior of and through the packer, and an apertured tubular member of less diameter than the packing member secured to and projecting upwardly from the cap.

5. In packing structures for oil wells, a packing member, and a cap located at the upper end of the packer, said cap having a threaded opening adapted to receive and engage tubing sections, said cap being perforated in the direction of its length to provide for passage of oil from above the cap

to the interior of and through the packer, said cap also being externally threaded to permit the attachment of an upwardly extending tubular member.

5 6. In packing structures for oil wells, a packing member, and a cap located at the upper end of the packer, said cap having a threaded opening adapted to receive and engage tubing sections, said cap being per-
10 forated in the direction of its length to provide for passage of oil from above the cap to the interior of and through the packer, said cap also being externally threaded to permit the attachment of an upwardly ex-
15 tending tubular member, said member being external of and spaced from the tubing to form an annular chamber adapted to receive oil from sand above the packer.

7. In packing structures for oil wells, a
20 packing member, and a cap located at the upper end of the packer, said cap having a threaded opening adapted to receive and engage tubing sections, said cap being per-
25 forated in the direction of its length to provide for passage of oil from above the cap to the interior of and through the packer, and a tubular member threaded to said cap and projecting upwardly therefrom external of and spaced from the tubing, said
30 member being perforated intermediate its ends to permit the passage of oil into said chamber, and means for closing the upper end of said chamber against the entrance of sand and earth.

35 8. In packing structures for oil wells, a packing member, and a cap located at the upper end of the packer, said cap having a threaded opening adapted to receive and engage tubing sections, said cap being per-
40 forated in the direction of its length to provide for passage of oil from above the cap to the interior of and through the packer, and a tubular member threaded to said cap and projecting upwardly therefrom external of and spaced from the tubing, said
45 member being perforated intermediate its ends to permit the passage of oil into said chamber, and means for closing the upper end of said member against the entrance
50 of sand and earth, said latter means being in the form of a cap threaded to the upper

end of said member and free from threaded connection with the tubing.

9. Means for transforming a non-over-
flow packer into an overflow packer com- 55
prising a cap adapted to be substituted for the endwise pressure-imparting cap of the non-overflow packer and having means to permit passage of fluid therethrough independent of the normal fluid flow path, said
60 cap having an internal threaded opening to receive and engage tubing sections, and also having an external threaded portion adapted to receive and engage upwardly projecting tubing controlling the point of
65 oil overflow.

10. Means for transforming a non-over-
flow packer into an overflow packer comprising a cap adapted to be substituted for
70 the endwise pressure-imparting cap of the non-overflow packer, said cap having an internal threaded opening to receive and engage tubing sections, and also having an external threaded portion adapted to re-
75 ceive and engage upwardly projecting tubing controlling the point of oil overflow, said cap being perforated longitudinally between said threaded portions to permit of the passage of the overflow oil through the
80 packer.

11. Means for transforming a non-over-
flow packer into an overflow packer comprising a cap adapted to be substituted for
85 the endwise pressure-imparting cap of the non-overflow packer, said cap having an internal threaded opening to receive and engage tubing sections, and also having an external threaded portion adapted to re-
90 ceive and engage upwardly projecting tubing controlling the point of oil overflow, said cap being perforated longitudinally between said threaded portions to permit of the passage of the overflow oil through the packer, said cap having additionally an
95 external threaded portion adapted to receive a casing section.

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

PATRICK H. MACK.

Witnesses:

W. E. BURDICK,
FINETTA G. McFADDEN.