

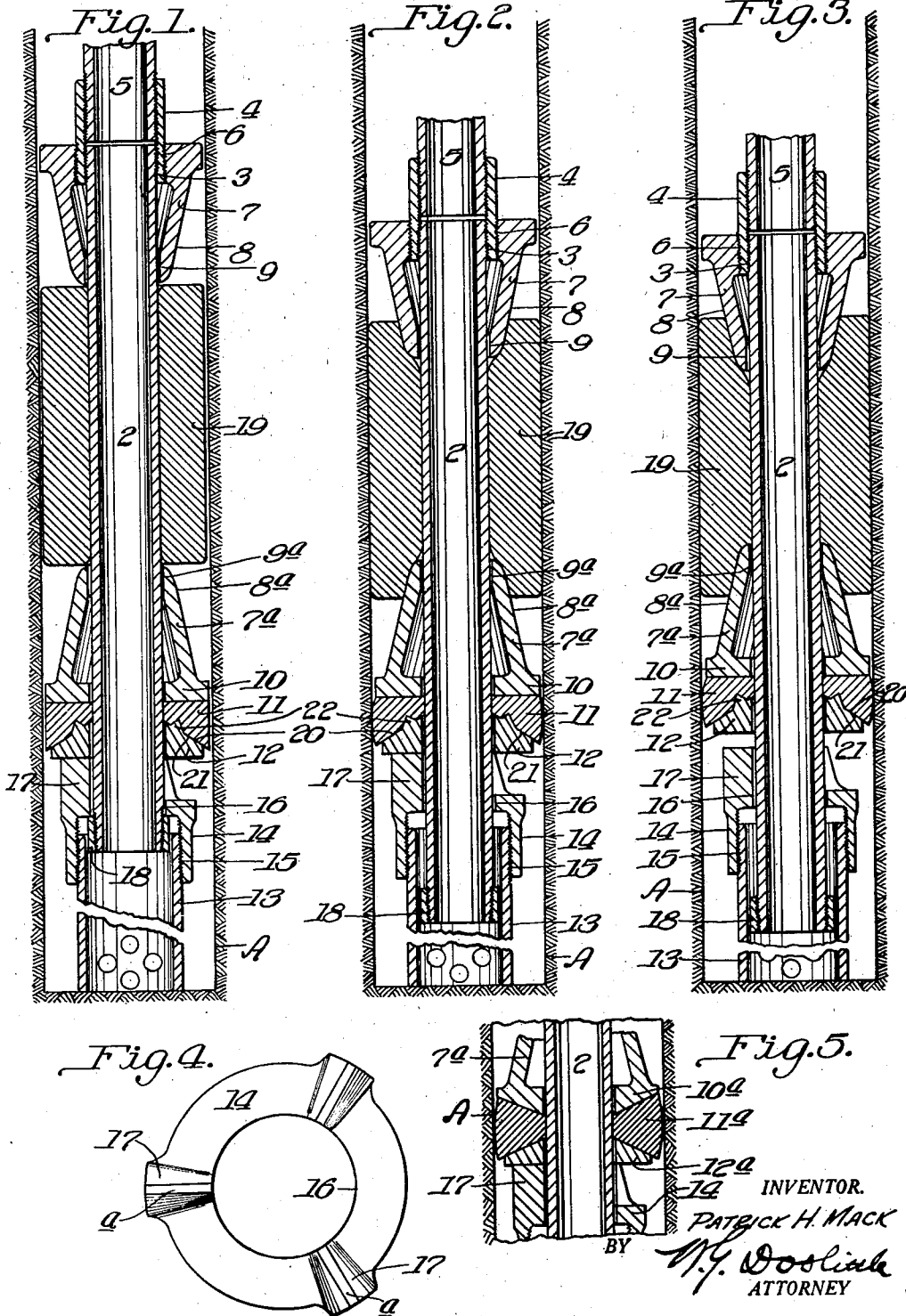
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FLOOD PACKER

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FLOOD PACKER

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Jersey

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4 Claims. (Cl. 166—10)

My invention relates to improvements in packers of the character employed in drilled wells or the like, and more particularly to flood packers employed in the operation of the "flood system".

5 The "flood system" consists in introducing fluid under pressure into a well, for the purpose of applying and holding pressure on the oil sands thereof. Accordingly, it becomes necessary to pack off the well to confine said pressure to the oil sands, and to prevent water and other fluids from being forced up the well outside the tubing.

One object of my invention is to embody, in a flood packer, a plurality of packing elements, one or more of which may be expanded by the weight 15 of the tubing and one or more by fluid within the well.

A further object is to provide a flood packer having a resilient packing element, expanding means for expanding said element actuated by the weight of the tubing, and an additional resilient 20 packing element actuated by the fluid pressure in the well to effect further sealing action.

The particular features and advantages of my invention will be more clearly understood from 25 the following description taken in connection with the accompanying drawing, wherein:

Fig. 1 is a longitudinal sectional view, showing the packer lowered into a well in unexpanded position;

30 Fig. 2, a similar view, showing the packer expanded by the weight of the tubing thereon;

Fig. 3, a similar view, showing expansion of the additional resilient member by the fluid pressure;

35 Fig. 4, a plan view of the anchor tubing cap member; and

Fig. 5, a fragmentary sectional view, showing a modified construction.

Referring to the drawing, 2 designates a tubular 40 body member threaded at its upper end, as at 3, to receive a coupling member 4, said coupling member being designed to receive the threaded end of a section of a string of tubing 5 employed for lowering the packer into a well A. Member 4 is 45 also externally threaded at 6 to secure the upper threaded end of a cone-shaped expanding element 7 thereto, said element having a downwardly tapering portion 8 and an opening 9 extending therethrough, whereby the element may 50 be positioned over the tubular body 2.

A somewhat similar cone-shaped expanding element or member 7a having an upwardly tapered portion 8a and an opening 9a there- 55 through is disposed on the body member 2. This expanding member 7a is slidably mounted on the

body member and is provided with an apertured base portion 10 normally contacting with and resting on an annular resilient packing member 11, the latter preferably being formed of rubber or other expansible material. A metal pressure 60 ring or washer 12 disposed below and adapted to engage the under surface of the member 11, is slidably mounted on the body member 2.

The body member 2 is designed to telescope 65 within a perforated anchor tubing 13, adapted to have its lower end rest on the bottom of the well A. At its upper end, said anchor is provided with a cap member 14 threaded thereon, as at 15, said cap having an opening 16 there- 70 through to receive and guide the body member 2. The upper portion of member 14 is formed with spaced-apart radial projections 17, preferably three in number, each having a contacting edge a, upon which the pressure ring 12 seats, thereby 75 normally supporting the resilient member 11 and in turn the slidably mounted expanding member 7a.

A collar 18 is threaded on the lower end of the body member 2 and supports the anchor tubing 13, and holds the assembled parts during the 80 process of lowering the packer into the well, said tubing being supported thereon by means of the cap 14.

Positioned on the body member 2 and between the expanding members 7 and 7a, I provide a 85 resilient packing element 19, preferably formed of rubber or other expansible material.

In operation, the packer is lowered into the well A by means of the tubing 5 until the perforated anchor tubing 13 rests upon the bottom 90 of the well, as in Fig. 1. Continued downward movement of the tubing 5 will cause body member 2 to pass downwardly, telescoping within said anchor tubing. During this operation, the packing element 19 will be moved downwardly a 95 slight distance and expanded outwardly against the walls of the well by the entrance of the tapered portions 9 and 9a of the members 7 and 7a respectively, as in Fig. 2. Such packing action is effected and maintained by the weight of 100 the string of tubing 5 thereabove. The annular resilient packing member 11 will also be displaced a slight amount, as shown, due to said weight.

After the packer is set, fluid under pressure 105 may then be introduced through the tubing 5 and the packer, to enter the area in the well therebelow, through the perforated tubing 13, and exert the required pressure upon the oil sands. 110

The fluid rising around the outside of the tubing 13 contacts with the under surface of the pressure ring 12 by reason of the latter being supported upon the spaced-apart projections 17 of the cap member 14. When the pressure of said fluid reaches a certain amount, the ring 12, together with expanding member 7a, are raised thereby, as in Fig. 3, displacing the member 11 to more firmly engage the walls of the well and the body member 2. This action eliminates the possibility of the anchor tubing 79 being raised from engagement with the bottom of the well, as is sometimes the case where the fluid pressure in the well contacts with members or parts fixedly attached to the upper end of the anchor.

In the forms of Figs. 1 to 3 inclusive, I have shown the lower face 20 of the resilient member 11 tapering upwardly and inwardly, and a complementary tapering upper face 21 on the pressure ring 12 contacting therewith, for the purpose of effecting a positive displacement of the member 11 outwardly toward the walls of the well A. An annular V-shaped projection 22 is provided on the face 21 of the ring 12 and is adapted to be entered in the complementary groove in the face 20 of the member 11, for urging said member into intimate contact with the body member 2 to effect a positive sealing action.

In the form of Fig. 5, I have shown a slightly modified construction. In this form, the apertured base portion 10a of the lower expanding member 7b is formed with an upwardly and outwardly tapering lower face, and the upper face of the pressure ring 12a with a downward and outward taper to receive the wedge-shaped annular resilient member 11a therebetween. It will readily be seen that upward movement of the ring 12a by the action of the fluid pressure in the well, as in the other form, will effect a packing engagement with the walls of the well and the exterior of the body member 2, to produce a perfect seal.

I claim:

1. In a well packer, the combination with telescoping means including a tubular body and an anchor tubing, of a packing element on the body, expanding members therefor actuated by said telescoping means, an apertured cap member secured to one end of the anchor tubing, said cap member having spaced apart projections, a pressure ring on said projections, and a packing member between the ring and one of the expanding

members, said pressure ring being movable by means of the fluid pressure in the well to displace the packing member.

2. A well packer comprising a tubular body and an anchor tubing in telescoping relation, a packing element on said tubular body, expanding members therefor actuated by relative movement of said tubular body and said anchor tubing, a pressure ring, a packing member between the ring and one of said expanding members, said ring being movable toward said expanding members by fluid pressure, and means for supporting said ring on said anchor tubing and exposing areas of said ring on the face opposite said packing member.

3. A well packer comprising a tubular body, an anchor tubing into which said tubular body telescopes, a pressure ring above said anchor tubing, means for supporting said pressure ring on said anchor tubing and contacting with a portion only of the undersurface of said ring, a packing element on said tubular body above said ring, a pair of expanding members at opposite ends of said packing element, the upper of said expanding elements being secured to said tubular body, and the lower one being freely slidable thereon, and a packing member between said ring and said lower expanding member, said pressure ring and said packing member having contacting faces to cause an outward expansion of said packing member when said packing ring is moved upwardly towards said lower expanding element.

4. A well packer comprising a tubular body, an anchor tubing in telescoping relation therewith, a packing element on said tubular body, expanding members therefor having conical surfaces insertable between said packing element and said tubular body, one of said expanding members being in inverted position and secured to said tubular body above said packing element, and the other of said expanding members being below said packing element in upright position and freely slidable on said tubular body, a pressure ring below said lower expanding member, said pressure ring having a slightly conical upper surface, a packing member between said ring and said lower expanding member, and means for supporting said ring on said anchor tubing, said supporting means contacting only with a small part of the lower surface of said ring to expose areas of said ring to upward fluid pressure.

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