

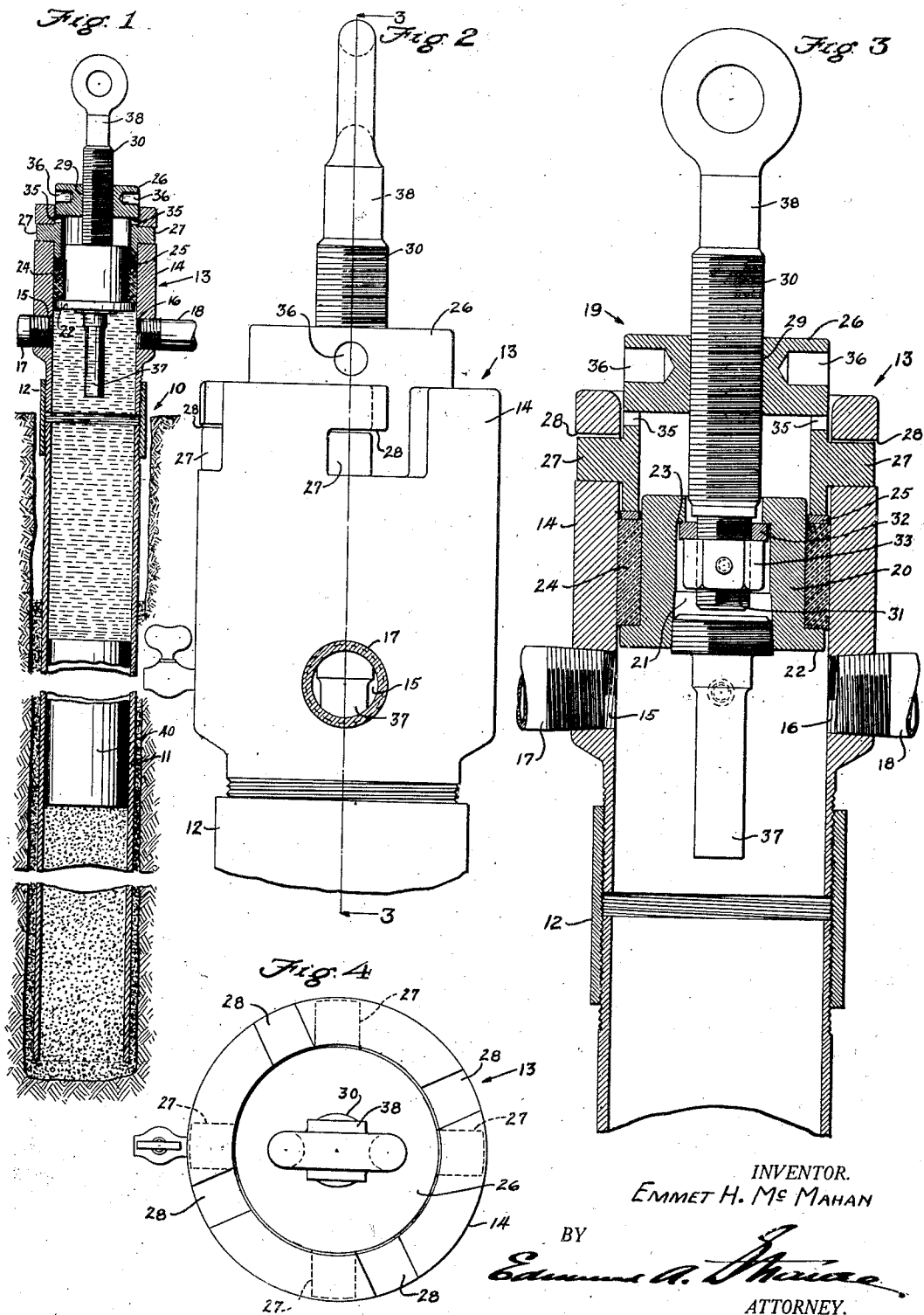
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OIL WELL SEALING DEVICE

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OIL-WELL-SEALING DEVICE

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This invention relates more specifically to a device for sealing the upper end of an oil well casing during the operation of cementing the wall of the well to shut off a flow of water thereto.

In the cementing of oil wells, it is customary as each "string" of casing is lowered into position to withdraw the drilling tools and introduce a measured quantity of liquid cement into the well casing, and then after sealing the upper end of the casing string to introduce fluid above the cement to force the same upwardly in the space between the wall of the well and casing to completely shut off the water that may be flowing thereinto. The same procedure is followed as each succeeding string is lowered until the entire wall of the well has been effectually sealed from the flow of water thereto, at which time the perforated liner is lowered into its proper position slightly above the oil sands.

It is an important object of my invention to provide a simple device that may be detachably mounted on the upper end of a well casing to effectually seal the same against the pressure of the water introduced for the purpose of forcing the liquid cement into position.

A further object is to provide a device in which the pressure of the fluid for forcing the liquid cement in place is utilized to operate the same to effectually seal the casing.

Other objects and advantages will be apparent from the following description, reference being had to the drawings accompanying the same, in which:

Fig. 1 is a central longitudinal section through the upper end of an oil well, with the sealing device in operative position on the casing.

Fig. 2 is an enlarged side elevation of the sealing device.

Fig. 3 is an enlarged longitudinal section through the sealing device secured to the upper end of a well casing.

Fig. 4 is a plan view of the sealer.

Referring now more specifically to the drawing, 10 designates an oil well, 11 the lowermost string of well casing mounted therein, its end disposed above the bottom thereof.

The upper end section of the string of casing is provided with an internally threaded coupling 12 to which the sealing device is secured when it is desired to cement the water off after a drilling operation.

The sealing device 13, preferably consists of a substantially tubular body member or sleeve 14, externally threaded on its lower end for engaging the coupling 12, and open at its upper end. The wall of the body member directly above the lower threaded end is provided with diametrically disposed threaded openings 15, 16, in which are screwed the ends of fluid supply pipes 17, 18, for introducing fluid into the interior of the casing to force the cement in place as will be more fully explained hereinafter.

Disposed within the body member 14 is a sealing or packing mechanism 19, which preferably consists of a shoe 20 provided with a centrally disposed bore 21, threaded at its lower end and having an annular external flange 22 formed thereon, the upper end of bore 21 being provided with an annular internal flange or abutment 23. Surrounding shoe 20 is an expansible packing member 24, formed of rubber or other suitable material, the thickness of the wall of the packing member being substantially equal to the space formed between the peripheral walls of the shoe and the body member. The lower end of the packing member rests on the upper surface of the flange 22, and a metal ring or bushing 25 disposed on its upper end.

Disposed in the upper end of the tubular body member is a cap member 26 having a chambered lower end, and provided on its outer peripheral wall with a plurality of locking lugs 27, square in cross section, that are adapted to engage locking recesses 28 formed in the upper annular end of the body member to hold the cap in locked engagement with the body member when mounted therein. Cap 26 is provided with a centrally disposed threaded bore 29 which is engaged by an eye bolt 30 having a reduced lower threaded end 31 which extends when the sealing member is assembled within the bore of the shoe. Mounted on the reduced threaded end of eye bolt 30, is a washer 32 and a nut 33, the

upper surface of the washer engaging the internal flange 23 of the shoe. The wall of the cap is provided with air exhaust or bleeder ports 35, and directly thereabove with spanner wrench sockets 36 for quickly releasing the cap from engagement with the expansible member after a sealing operation.

The operation of the device will be readily discernible from the following description. When it is desired to cement a section of an oil well, a measured quantity of liquid cement is introduced into the well through the string of casing, the usual wooden cylindrical plug 40 is then placed on top of the cement as illustrated in Fig. 1, the mandrel 37 which is in screw threaded connection with the bore of the shoe being utilized to force the plug downwardly into the casing when the packer is applied thereto. The locking lugs are then rotated into engagement with the locking recesses formed in the upper end of the body member to lock the same to the body. A wrench is then applied to the squared portion 38 of the eye bolt to force the shoe upwardly into the chambered end of the cap member, this operation expanding the packing member circumferentially to fill the annular space between the inner peripheral wall of the body member and shoe to effectually seal the upper end of the casing against fluid pressure. Fluid under pressure is then introduced through the fluid supply pipes 17 and 18 to force the plug 40 and the cement disposed therebelow downwardly and then upwardly between the wall of the well and casing, to effectually shut off any water that may be flowing thereinto.

It will be noted that on the introduction of fluid pressure into the casing above the cement, that the force of the same will act against the lower end of the shoe to further expand the packing member and thus insure an extremely tight seal.

What I claim is:

1. A casing head sealing mechanism comprising a vented casing head, an expansible packing member mounted in said head above the vented openings, and screw operated means connected to the packing member for expanding the same, said packing member adapted to be further expanded automatically on an increase of water pressure within the casing after an expanding operation.

2. A device of the class described comprising a tubular member adapted to be secured to the upper end of a well casing having fluid inlet ports leading thereinto, a stationary abutment member detachably secured to the upper end of the tubular member, a movable abutment member mounted therebelow, an expansible member surrounding said movable member, whereby on the introduction of water pressure below said movable member the packing member will be expanded in water tight engagement with the tubular mem-

ber, and means connected to the movable abutment member for manually operating the same, independently of the water pressure.

3. A device of the class described comprising a hollow sleeve having fluid inlet ports leading thereinto adapted to be secured to the upper end of a well casing, a stationary abutment member detachably secured to the upper end of said hollow sleeve, a movable abutment member mounted below said stationary member, an expansible packing ring mounted between said abutment members, said movable member adapted to be operated to expand said packing on the introduction of fluid pressure to the well casing, and mechanical means secured to said stationary abutment member and engaging said movable abutment member for expanding said packing member independently of fluid pressure.

4. A sealing device for sealing the upper end of well casing comprising a tubular member having fluid inlet ports leading thereinto, a cap member detachably secured to the upper end of said tubular member, a shoe member loosely mounted below said cap member, an expansible packing ring surrounding said shoe member and engaging said cap member, and a shoe adjusting mechanism secured to said cap member for moving said shoe to expand said ring into fluid tight engagement with said tubular member.

5. A casing head comprising a tubular member adapted to be detachably secured to the upper end of a well casing, a stationary abutment member mounted in the upper end of said tubular member and detachably secured thereto, said abutment member provided with a centrally disposed threaded bore, a threaded bolt loosely engaging said bore, a hollow movable member having an exterior circular abutment flange on its low end and an interior circular abutment flange at its upper end, the lower end of the threaded bolt extending into said movable member having a nut thereon adapted to engage the interior flange of the movable member on a rotation of the threaded bolt to move the hollow movable member upwardly, and a cylindrical sleeve formed of an expansible material surrounding said movable member its ends engaging the exterior flange of the movable member and the lower abutment end of the stationary abutment member, whereby when the hollow member is moved upwardly by the threaded bolt the expansible sleeve will be expanded to pack the space between the hollow movable member and the tubular member to form a fluid tight joint.

6. A casing head sealing mechanism comprising a vented body member adapted to be detachably secured to the upper end of a well casing, an expansible packing sleeve disposed in said casing above the vented openings, a mechanism engaging the sleeve for automati-

5 cally expanding the same into water tight engagement with the wall of the vented body member on an introduction of water pressure below the same, and screw means connected to the mechanism for manually expanding the packing.

In witness that I claim the foregoing I have hereunto subscribed my name this 7 day of May, 1924.

EMMET H. McMAHAN.

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