

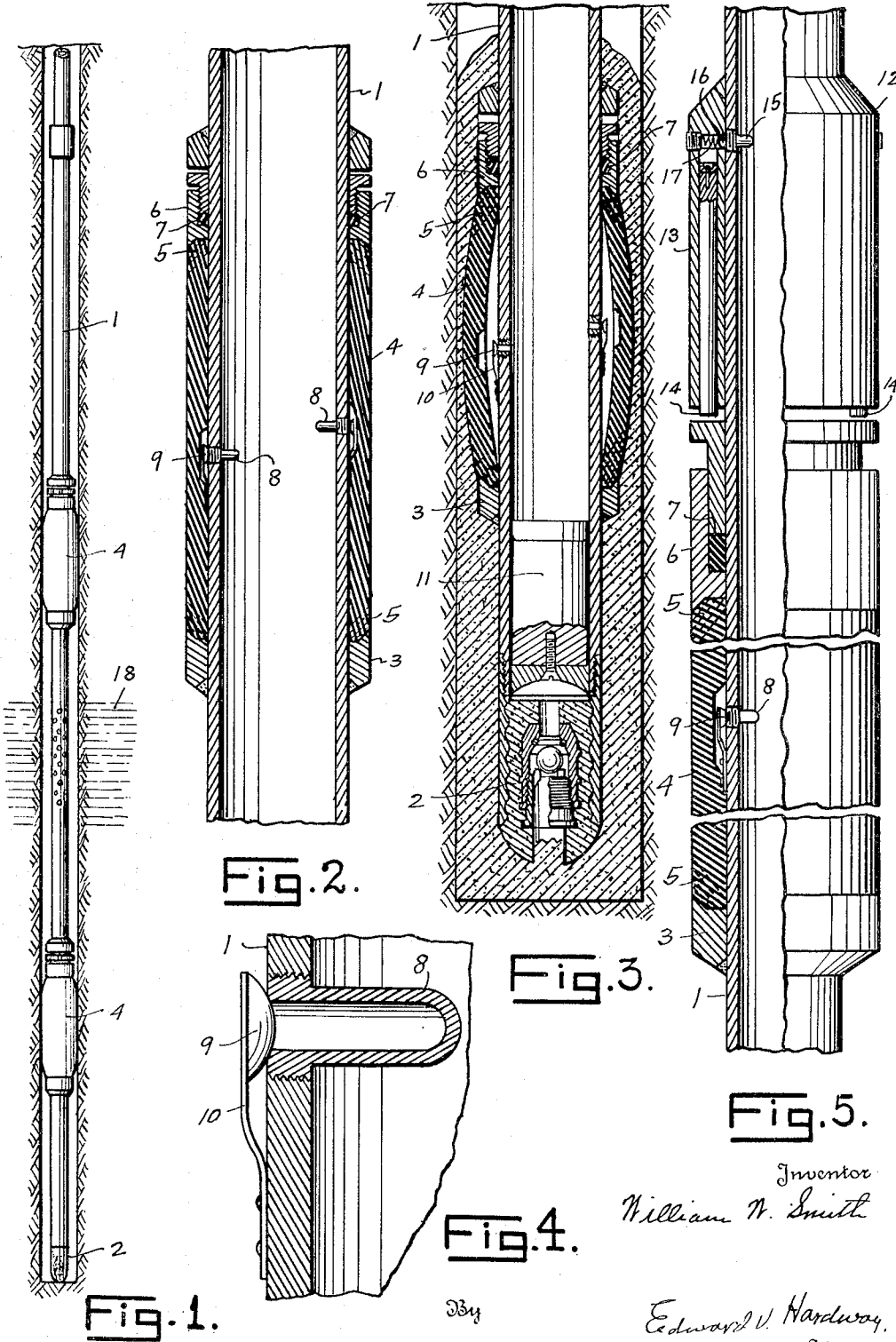
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CASING PACKER

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## CASING PACKER

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5 Claims. (Cl. 166—10)

This invention relates to a casing packer.

It is an object of the invention to provide a novel type of packer mounted on a well casing whereby a fluid tight seal may be formed between the lower end of the casing and the walls of the well bore.

In well drilling it is common practice to set a casing in the well above the oil bearing stratum and then cement about the lower end of the casing and thereafter drill on deeper into the oil sand, the cement excluding water, from water strata above, from reaching the oil bearing stratum. It is an object of this invention to provide a packer that may be used, if desired, in substitution for the cement or if desired the packer may be used and the lower end of the casing also cemented in the usual way. If the packer is used it will assist in holding the lower end of the casing centered in the bore to the end that the cement, if used, will be of substantially uniform thickness all around the lower end of the casing.

It is another object of the invention to provide a type of packing, and a method of expanding the same, of such character that the packing can be readily spaced above and below oil bearing stratum and expanded, and maintained expanded, so as to exclude water from above or below and the casing may then be perforated opposite the oil bearing stratum to permit the inflow of the oil.

It is another object of the invention to provide casing packing of the character described with novel means whereby the packing may be expanded and maintained in expanded position by fluid under pressure.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, examples of which are given in this specification and illustrated in the accompanying drawing, wherein:

Figure 1 shows a side view of a well casing in a well, showing spaced packers in expanded position thereon to form seals with the walls of the well above and below the oil bearing stratum.

Figure 2 shows a fragmentary, vertical, sectional view illustrating one form of the packer in collapsed position.

Figure 3 shows a vertical, sectional view of the type of packer shown in Figure 2 in expanded position.

Figure 4 shows an enlarged fragmentary, vertical, sectional view of a flangible thimble and check valve employed, and

Figure 5 shows a fragmentary side elevation, partly in section, of the packer showing additional means for expanding the same.

Referring now more particularly to the drawing wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a well casing adapted to be set in a well.

The lower end of the well casing may be equipped with a conventional type of float shoe 2 containing a valve which is arranged to be maintained closed as the casing is lowered into the well. Above the shoe there is a collar 3 secured in any suitable manner on the casing. Above this collar and surrounding the casing there is an expansible packer sleeve 4 whose lower end abuts the collar and whose upper end fits closely about the casing. The upper and lower ends of the packer sleeve are suitably reinforced by the reinforcing 5 so that the packer sleeve, at its ends, will at all times closely surround and grip the casing.

There is a slidable collar 6 around the casing and abutting the upper end of the sleeve 4 and containing a suitable stuffing box 7 forming a fluid tight joint with the casing. Opposite the packer sleeve and threaded through the wall of the casing there are one or more hollow thimbles 8 which project into the casing and whose inner ends are closed and formed of frangible material. These thimbles are hollow as shown in Figure 4 and their outer ends are formed with valve seats which are closed by the outwardly opening valves 9. These valves are fastened to the free ends of outwardly yieldable arms 10 whereby the valves are normally held in closed position.

When the casing is lowered into the well it will fill, or may be filled, with the drilling fluid and a plug 11 may then be forced under pressure down through the casing, said plug seating closely within the casing. This plug will engage against, and shear off the inner ends of the thimbles 8 and will move on down to the set shoe 2 and the fluid above, under pressure, may then pass out through the open passageways through the thimbles, unseating the valves 9 and expanding the packer sleeve 4 out against the walls of the well. The valves 9 will then automatically close to trap the liquid within the sleeve 4 to maintain said sleeve expanded.

If it be desired to also cement the lower end of the casing a plastic cement may be placed in the casing and the plug 11 inserted above it and pressure applied to the plug to force the same down and this cement will be forced out through the set shoe 2 and will pass up around the lower end of the casing and between the walls of the well and the packing as shown in Figure 3, and the packing will be expanded as above stated, where-

by the lower end of the casing may also be cemented so as to effectively exclude water from above from reaching the oil bearing strata beneath when the plug and set shoe are drilled out and the hole is deepened into the oil bearing strata.

Additional means have been provided for expanding the packer sleeve which additional means will now be described. Referring to Figure 5 a housing 12 may be secured on the casing above the stuffing box 7 and this housing is provided with cylinders as 13, in which the plungers 14 are located. The upper end of each cylinder is provided with a thimble 15, similar to the thimble 8 and anchored to the casing. This thimble 15 is hollow and its inner end is closed and projects into the casing and is formed of frangible material. The inner end of the thimble is formed with the valve seat as shown in Figure 4 which is controlled by the outwardly opening valve 16. This valve is normally held closed by the spring 17. In this form as the plug 11 is forced downwardly under pressure through the casing the projecting inner end of the thimbles 15 will be sheared off and the pressure fluid will thereupon enter the upper ends of the cylinders 13 and force the plungers 14 downwardly. These plungers will operate against the gland of the stuffing box 7 and force the collar 6 downwardly thus assisting in the expansion of the packer sleeve beneath and when the thimbles 8 below are sheared off the pressure fluid will then enter and further expand the sleeve 4. The valves 9 and 16 will thereupon close and maintain the packer in expanded position. If desired the casing may be equipped with spaced packers as shown in Figure 1 so located that when the casing is lowered in the well these packers will be on opposite sides of the oil bearing stratum 18. These packers may then be expanded in the manner hereinabove explained and maintained expanded so as to seal off water above and beneath the productive stratum and to prevent said water from reaching said stratum.

The drawing and description disclose what are now considered to be preferred forms of the invention by way of illustration only while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. The combination with a well casing having a frangible, tubular, thimble extended inwardly through the wall thereof, an expansible packer on the casing around the thimble, means adapted

to be actuated, by fluid pressure, to remove the extended end of the thimble and to close the casing beneath whereby to admit the fluid into the packer to expand the same, and means for trapping the pressure fluid in the packer to maintain the packer expanded.

2. The combination with a well casing, of an expansible packer thereon, means outside the casing operable by the pressure of fluid forced through the casing to apply endwise pressure to the packer to expand the same and means for trapping fluid within the packer outside the casing for maintaining the packer expanded.

3. The combination with a well casing of an expansible sleeve like packer thereon, one end only of which is secured to the casing and the other end of which is slidable on the casing, said casing having a passageway leading from within the casing into the packer, an outwardly opening valve within the packer normally closing the passageway, frangible means extended into the casing and normally closing the passageway and means arranged to be actuated by pressure fluid exerted through the casing to break and pass beneath said closing means to open the passageway to admit pressure fluid from the casing into the packer to expand the packer.

4. The combination with a well casing, of an expansible packer thereon, mechanical means outside the casing operable by pressure of fluid forced through the casing to apply endwise pressure to the packer to initially expand the same, said casing having a normally closed passageway leading from within the casing into the packer means arranged on the casing for closing said passageway and to be actuated by the pressure of fluid forced through the casing to open the passageway to admit the pressure fluid into the packer to finally expand the packer.

5. The combination with a tubular well casing, of an expansible packer thereon, said casing having a passageway leading from within the casing into the packer, means in the casing normally closing said passageway, means adapted to be actuated downwardly through the casing by the application of fluid under pressure to open said passageway and to close the casing beneath the opened passageway whereby the pressure fluid may enter the packing through the passageway to expand the packing and back pressure valve means for closing the passageway to entrap said liquid within the packer to maintain the packer expanded.

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