

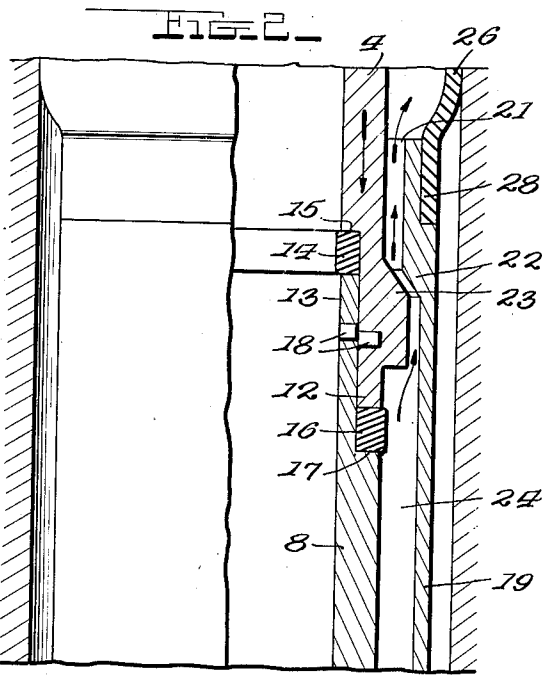
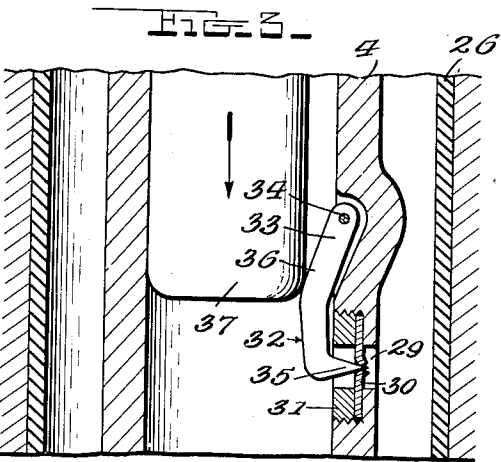
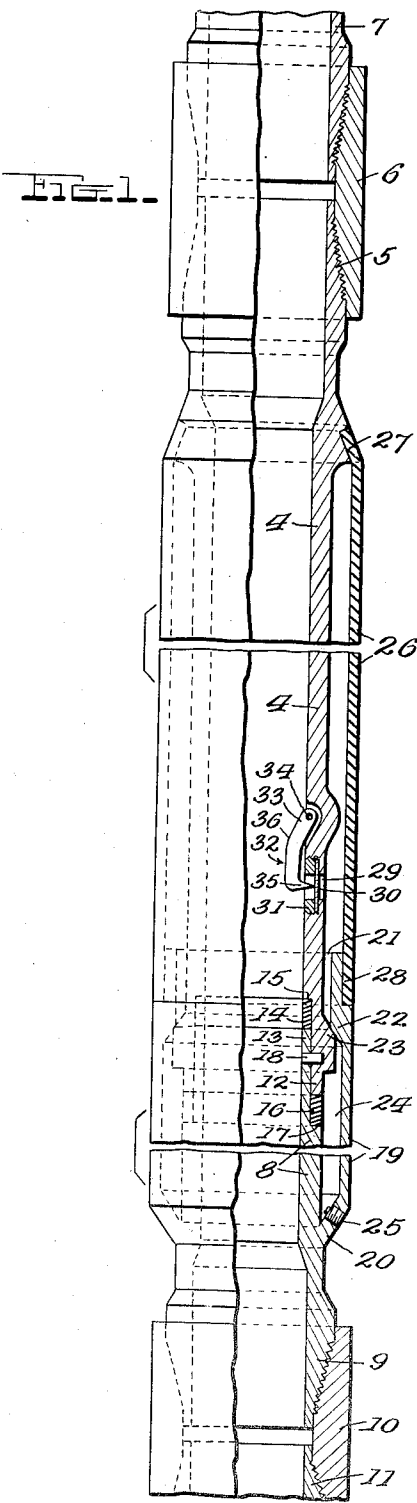
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WELL PACKER

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WELL PACKER

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7 Claims. (Cl. 166-10)

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The invention relates to a new and improved well packer adapted to perform the usual function of such a device but so constructed that a few sizes will supply all common size requirements.

The principal object of the invention is to provide an improved construction which includes a chamber filled with compressed gas, an expansible jacket, and novel means whereby the compressed gas may be released from said chamber and admitted to said expansible jacket to expand the latter fluidly against the surrounding casing or wall of the well.

A further object is to embody upper and lower tubular members in the construction, to make novel provision whereby relative movement of said tubular members will effect release of the above mentioned gas from said chamber, and to provide readily releasable means for normally holding said members against said relative movement.

Another object is to provide the aforesaid releasable means in the form of a shear pin which may be cut or broken by relative sliding of the above mentioned tubular members when the packer has been lowered to the required depth.

Yet another object is to make novel provision whereby the compressed gas may be released from the aforesaid expansible jacket to deflate the latter if the packer is to be withdrawn.

A still further object is to provide a rupturable disk which releases the gas from the jacket when ruptured, and to make novel provision for rupturing said disk.

Yet another object is to provide a novel construction which may be easily reconditioned for further use after withdrawal from a well.

Fig. 1 of the accompanying drawing is a view partly in elevation and partly in longitudinal section showing the improved packer coupled to superjacent and subjacent pipe sections, the parts being in their normal relative positions for lowering into a well.

Fig. 2 is an enlarged fragmentary view, similar to a portion of Fig. 1, but showing the compressed gas released and entering the expansible jacket to expand the latter.

Fig. 3 is a detail vertical sectional view showing the manner of releasing the gas from the jacket if the packer is to be withdrawn from the well.

A preferred construction has been disclosed and will be rather specifically described, but variations may well be made within the scope of the invention.

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a threaded upper end 5 to be coupled at 6 to a pipe section 7, and a lower tubular member 8 is also provided, said lower member 8 having a threaded lower end 9 to be coupled at 10 to a pipe section 11. The lower end 12 of the upper member 4 is internally enlarged and the upper end 13 of the lower member 8 is reduced, in order that these ends may be telescoped as shown. An upper elastic seal ring 14 is disposed between the upper extremity of the member 8 and a shoulder 15 on member 4, and a lower elastic seal ring 16 is positioned between the lower end of member 4 and a shoulder 17 on member 8. Both seal rings are preferably of rubber bonded to all surfaces with which they contact in a manner known as "welding." The seal rings will yield to permit relative inward sliding of the members 4 and 8 when required, for a purpose to appear, but end sliding is normally prevented by a shear pin 18 which connects the telescoped ends of said members 4 and 8.

A sleeve 19 surrounds the member 8 and the adjacent end of the member 4, said sleeve being spaced outwardly from said members. The lower end of this sleeve 19 is closed and is gas tightly joined at 20 to the member 8, while the upper end of said sleeve is open at 21. This end of the sleeve is provided with an internal circumferentially extending valve seat 22 which faces downwardly. The member 4 is formed with an external circumferential valve 23 which faces upwardly and gas tightly contacts with the seat 22. The space below the valve and seat constitutes a chamber 24 for compressed gas, and a gas injection valve for said chamber is indicated at 25 in Fig. 1.

An expansible jacket 26, preferably formed from rubber, surrounds the member 4 and at its upper end is gas-tightly secured to said member, as indicated at 27. The lower end of the jacket 26 surrounds the upper end of the sleeve 19 and is gas tightly secured at 28 to said sleeve. In securing the ends of the jacket, bonding known as "welding" is preferably employed.

From Fig. 1 it will be seen that the jacket 26 is normally prevented from communicating with the gas chamber 24, by the valve 23 and seat 22, allowing lowering of the packer into a well with said jacket in contracted condition. However, when the packer has been lowered to the required depth, such relative inward sliding of the tubular members 4 and 8 as to cut or break the pin 18 and open the valve 23 (Fig. 2) may be effected. The compressed gas from the chamber 24 then discharges through the open end 21 of the sleeve

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19 into the expansible jacket 26. This jacket is thus expanded into tight contact with the wall or casing of the well and effectively performs the required packing operation. Provision is made, however, to permit deflation of the jacket if the packer is to be withdrawn, as described below.

The member 4 is formed with a gas escape passage 29 communicating with the interior of the jacket 27, said passage 29 being normally closed by a rupturable disk 30 held detachably in place by means of a threaded ring 31. A striker 32 is mounted in position to strike the disk 31 and break or rupture the latter when required (Fig. 3), thereby permitting escape of the gas from the jacket 26 to effect contraction of the latter if the packer is to be withdrawn from the well.

The striker 32 preferably comprises an arm 33 pivotally hung at 34 in the member 4, the lower end of said arm having a lateral spur 35 to strike the disk 30. The arm 33 has a cam portion 36 to be struck by an object 37 lowered into the member 4 to swing said arm and break or rupture the disk 30, as seen in Fig. 3.

After withdrawal of the packer from the well, it may be easily conditioned for further use, by simply replacing the ruptured disk with a new disk, and recharging the chamber 24 with compressed gas.

From the foregoing it will be seen that effective provision has been disclosed for attaining the desired ends, but attention is again invited to the possibility of making variations.

I claim:

1. In a well packer, an upper tubular member having coupling means at its upper end, a lower tubular member having coupling means at its lower end, the lower end of said upper tubular member and the upper end of said lower tubular member being slidably and gas-tightly telescoped with each other, releasable means connecting said telescoped ends and normally holding them against relative sliding, a sleeve surrounding and spaced outwardly from said telescoped ends, the lower end of said sleeve being closed and secured to said lower tubular member, the upper end of said sleeve being open and having an internal circumferentially extending downwardly facing valve seat, said upper tubular member being provided with an external circumferential upwardly facing valve normally contacting with said valve seat, said sleeve, said valve seat, and said valve providing a compressed gas chamber between

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said sleeve and said tubular members, and an expansible jacket surrounding said upper tubular member and having its upper end gas-tightly secured to said upper tubular member, the lower end of said jacket being gas-tightly secured to the upper end of said sleeve; whereby upon release of said releasable means and downward movement of said valve from said seat, compressed gas from said gas chamber will fill and expand said expansible jacket.

2. A structure as specified in claim 1; said releasable means consisting of a shear pin connecting said telescoped ends of said tubular members.

3. A structure as specified in claim 1; in which an elastic sealing ring seals said telescoped ends of said tubular members gas tightly, said lower member having an upwardly facing surface contacting with the lower edge of said elastic sealing ring, said upper member having a downwardly facing surface contacting with the upper edge of said elastic sealing ring.

4. A well packer as in claim 1, wherein, a gas-expanded jacket surrounds the upper member, being connected at its upper end to said upper member and connected at its lower end to the upper end of said sleeve, said member having an escape passage for the gas within said jacket, a disk normally closing said passage gas tightly, and a striker mounted in the upper member to rupture said disk when operated.

5. A well packer as in claim 4; wherein said striker has an actuating portion extending into the interior of said tubular member to be struck by an object lowered into said member.

6. A well packer as in claim 4; wherein said striker comprises an arm pivotally hung in said tubular member and having a lateral projection at its lower end to strike said disk.

7. A well packer as in claim 4; wherein means is provided for detachably securing said disk in place to permit replacement thereof.

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