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WELL PACKER

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Fig. 1

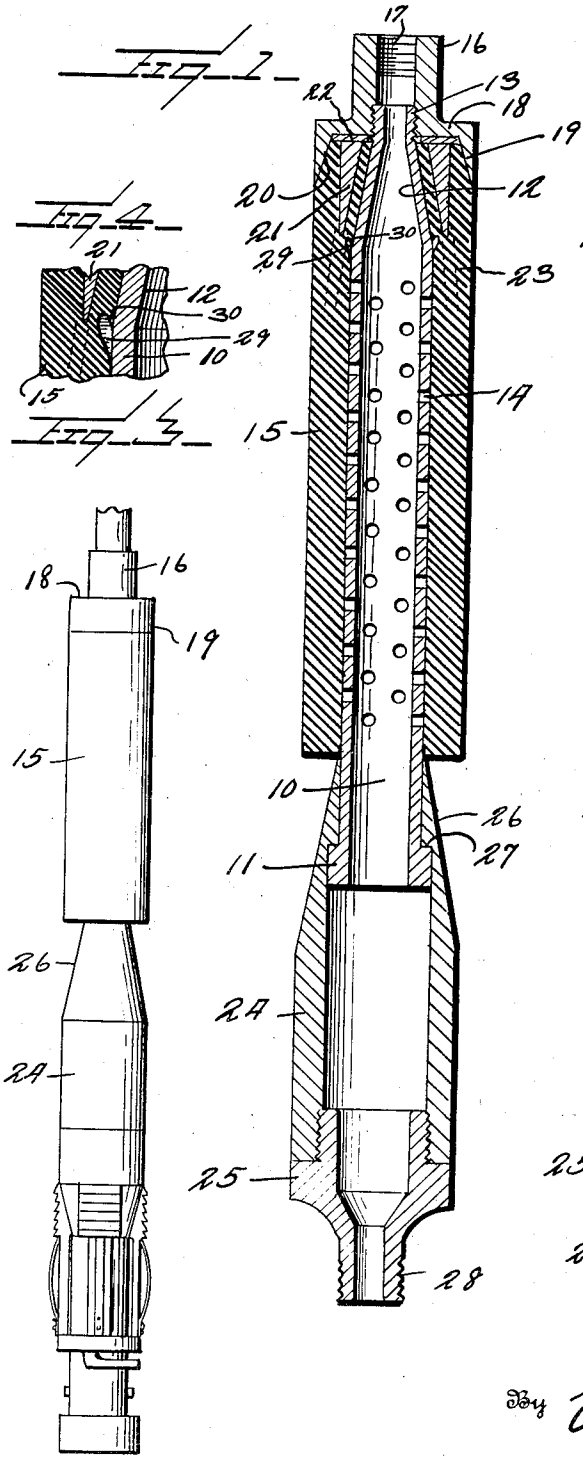
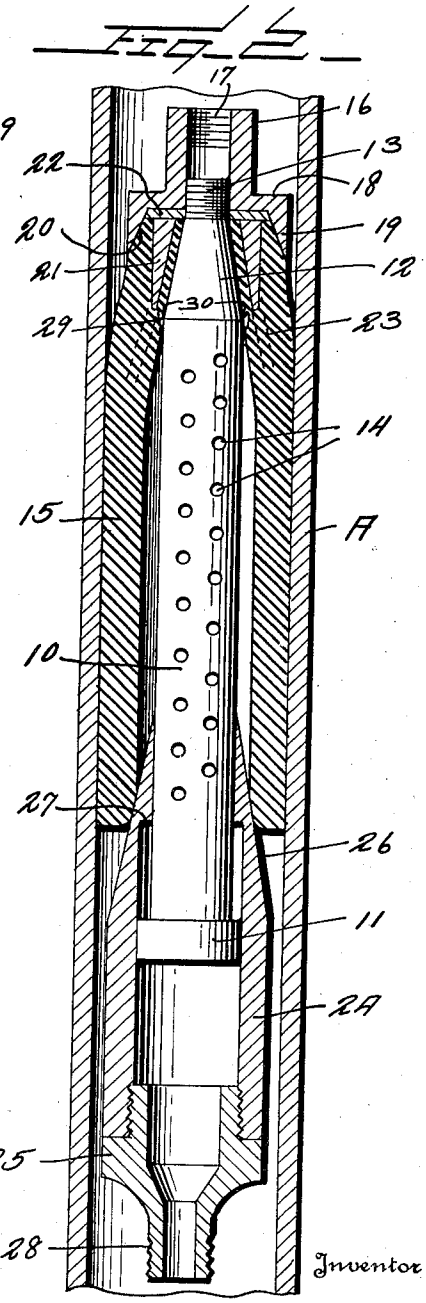


Fig. 4

Fig. 3

Fig. 2



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WELL PACKER

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5 Claims. (Cl. 166—10)

This invention relates to devices for packing oil, gas or water wells where there is high pressure and the general object of the invention is to provide a packing device of this character which is adapted to be disposed within the well tube anchored against downward movement and then initially expanded to fit against the well casing wall of well and in which the pressure of the gas, oil or water within the well will cause the further and complete expansion of the packer so that the passage of fluid up around the packer will be entirely prevented.

Another object is to provide a device of this kind which is very simple and which may be easily applied.

The invention is illustrated in the accompanying drawing, wherein:—

Figure 1 is a longitudinal sectional view of the packer in its initial condition and before expansion;

Figure 2 is a longitudinal section of a well tubing and with my packer in place therein and expanded;

Figure 3 is an elevation of my improved well packer showing the anchoring means;

Figure 4 is a fragmentary vertical section on the same plane as Figure 1 but enlarged to show the cavity in the upper portion of the packing sleeve.

Referring to the drawing, it will be seen that my packer comprises a tubular core 10 formed with an annular shoulder 11 at its lower end, the upper end of the core being tapered at 12 and terminating in a screw-threaded nipple 13. This core is perforated for nearly its entire length, the perforations being designated 14. Surrounding the core is a packing sleeve 15 which is made of rubber or rubberized fabric or like material which is elastically expansible. This sleeve initially fits closely around the core 10 as shown in Figure 1.

The sleeve is engaged with the upper tapered end of the core as follows:—

The annular head 16 is screw-threaded at its lower end for engagement with the screw-threads 13 and is also screw-threaded at 17 for engagement with a well pipe. The head 16 at its lower end is provided with outstanding annular portion 18 having the flange 19. This flange is beveled on its inner surface at 20, this beveled inner surface fitting against a corresponding beveled surface at the upper end of the packing 15. Inserted within the upper end of the packing sleeve is an annular wedge 21 and bearing against this wedge is an annular metal plate 22 against which the head 16 bears. Thus it will be seen that as the head 16 is screwed down on the core, the wedge 21 will be forced into the upper end of the sleeve 15 and will force the inner portion of this sleeve tightly against the tapered portion 12 of the core. The tapered face 20 of the flange 19 will also act to force the upper end of the sleeve inward so that a water-tight engagement is secured between the upper end of the sleeve and the upper end of the core.

In order to prevent the wedge 21 from being pulled out of the sleeve, I preferably provide the reinforcing strips of fabric shown in dotted lines in Figure 1 and designated 23 which are inserted through apertures in the wedge 21 and extend down into the rubber sleeve, thus stiffening the sleeve at this point.

For the purpose of forcing the lower end of the sleeve 15 outward against the well tube A after this packer has been inserted in the wall, I provide a tubular body 24 screw-threaded at its lower end for engagement with the coupling or nipple 25, this body 24 at its upper end being tapered at 26 upon its outer surface and the interior of the body below the upper end being formed with a shoulder 27 which coacts with the shoulder 11 to prevent this annular wedge 24 from being detached from the core but permitting the limited sliding movement of the annular wedge 24 upon the core 10. The coupling or nipple 25 is tubular and exteriorly screw-threaded at 28 at its lower end for engagement with an anchor of any ordinary or suitable character so that when the packing device has been inserted within the well tube to the point desired, this anchor may be operated to anchor the packer from any downward movement. Any suitable anchoring means such as commonly used in oil or gas wells may be used with this packer.

In the use of the device, it is inserted in a contracted condition as shown in Figure 1 into the well until it has reached the point desired. It is then anchored against further downward movement and after it is anchored, the head 16 is forced downward by the pipe extending upward therefrom and this acts to force the packing sleeve against the tapered surface of the wedging member 24, wedging the lower end of the packing sleeve outward to the position shown in Figure 2.

The packing sleeve will then be expanded, either by the pressure of the fluid within the well or by pressure forced downward through the nipple 17. This pressure forces the packing sleeve outward as shown in Figure 2 and brings it

in tight contact with the wall of the well tube and thoroughly packs the well. It will be seen that the greater the pressure within the core, the tighter will the packing be forced against the wall of the well.

Preferably the upper end of the packing sleeve 15 is formed with an annular cavity designated 29, which cavity extends upwardly and outwardly into the body of the sleeve 15 so as to form a relatively thin upper wall 30. When fluid is forced into the space between the sleeve 15 and the core 10, this fluid will pass up into this annular cavity 29 and force the thin lip or wall 30 inward tightly against the core, thus preventing the passage of fluid between the inner face of the packing and the outer face of the core. This is shown most clearly in Figure 4.

It will be seen that this construction at the upper end of the sleeve acts to secure a tight joint between the sleeve and the core 10 under all circumstances so that the packing sleeve will not blow out at this point and that the pressure on the inside of the packing sleeve aids in forming a particularly tight joint between the upper end of the packing sleeve and the core and head.

It will be seen that this packer can be readily inserted within the well and expanded or as readily withdrawn.

What is claimed is:—

1. A well packer including a central perforated core open at its lower end, a packing sleeve of elastic material disposed around the core, a head on the upper end of the core and engaging the sleeve with the core to form a fluid-tight joint, and an annular wedge open at its lower end and having limited sliding engagement with the lower end of the core and having its small end insertible into the lower end of the sleeve and movable upwardly therein the sleeve terminating at a point above the largest diameter of the annular wedge.

2. A well packer including a central perforated tubular core open at its lower end, a packing sleeve of elastic material disposed around the core, the upper end of the core being threaded, a nipple engaging the upper end of the core and having a head and an annular flange engaging around the upper end of the sleeve, and an annular wedge open at its lower end having limited sliding engagement with the lower end of the core and having its small end insertible into the lower end of the sleeve, the sleeve terminating above the point of largest diameter of the wedge whereby when the core and packing sleeve are depressed, the lower end of the packing sleeve will be wedged outwardly.

3. A well packer including a central perforated core open at its lower end having an annular shoulder at its lower end, a packing sleeve of elastic material disposed around the core, means at the upper end of the sleeve for engaging the sleeve with the core, said means constituting a coupling for a well pipe, an annular member open at its lower end having a wedge-shaped upper end surrounding the lower end of the core and insertible between the packing sleeve and the core, the sleeve terminating above the point of largest diameter of the wedge, said annular member being tubular and provided with an inwardly extending shoulder coacting with the shoulder on the lower end of the core to permit limited vertical movement of the annular member, and means at the lower end of the annular member for connecting it to an anchor.

4. A well packing including a central perforated core tapered at its upper end and exteriorly screw-threaded at its upper extremity, a packing sleeve of elastic material disposed around the core, a metallic wedge disposed in the upper end of the sleeve and surrounding the tapered portion of the core, and a nipple having screw-threaded engagement with the upper extremity of the core and having a marginal flange tapered on its inner face and fitting against the upper end of the sleeve exteriorly of the wedge whereby as said nipple is turned downwardly on the core, the wedge will be forced into the sleeve to force it against the tapered upper end of the core, and an annular wedge having limited sliding engagement with the lower end of the core and having its tapered end insertible into the lower end of the sleeve, said annular wedge having means whereby it may be connected to an anchor.

5. A well packer including a central perforated core, a packing sleeve of elastic material disposed around the core, a head on the upper end of the core and engaging the sleeve with the core to form a fluid-tight joint, and an annular wedge having limited sliding engagement with the lower end of the core and having its small end insertible into the lower end of the sleeve and movable upwardly therein and on the core, the upper portion of the packing sleeve being formed with a fluid-receiving cavity on its inside face, the cavity extending upwardly into the body of the core to provide a thin wall between said cavity and the inner face of the packing sleeve adapted to be forced inwardly against the core by pressure of fluid within the cavity.

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