

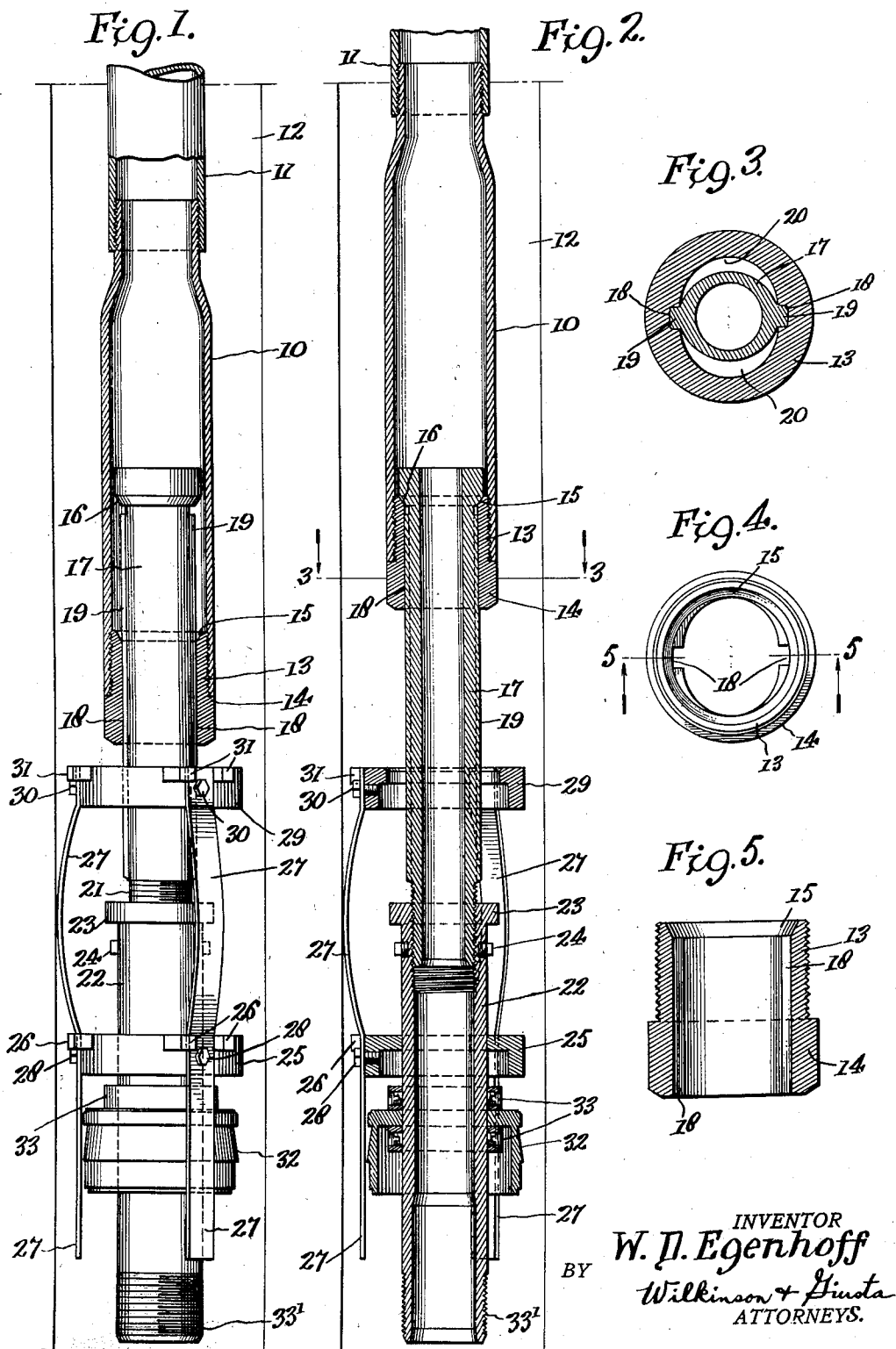
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PRESSURE RELIEF MECHANISM FOR WELLS

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PRESSURE-RELIEF MECHANISM FOR WELLS.

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The present invention relates to oil wells, and relates more particularly to means for releasing pressure in the tube of deep wells.

An object of the present invention is to provide a structure for use in deep oil wells for releasing the pressure of the column of fluid therein in the tubing or pipe so that the latter may be easily handled in unscrewing the connected parts, and wherein neither weight nor strain of the tubing is imposed upon the retainer, packer or other devices, which run upon the tubing during the unscrewing operation.

Another object of the invention is to provide means for permitting circulation around the tubing before unscrewing from the retainer or other device on the tubing, a device which may be used as a set of jars in case unscrewing is found impossible, and a device which insures the running in of the retainer or other device on the tubing, more certain and permits the tubing to be raised to a considerable height before the motion is transmitted to the retainer or other device mounted on the tubing.

The invention further provides a structure wherein a free circulation is permitted around the retainer or other device which is run on the tubing during the operation of the device and which embodies a valve structure which may be retained open during such operation.

Briefly stated, the invention has reference to an improvement upon a device known as the "Baker cement retainer" and is adapted to release the pressure in the same so as to facilitate not only the handling and adjustment of the cement retainer in the well, but to also permit of the easy flushing out and accumulations cement from the tubing and adjacent parts before the cement sets and requires drilling.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claim appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views.

Figure 1 is a side elevation, partly in section, of an oil well tubing device constructed according to the present invention, showing the valve open for relieving pressure in the tubing.

Figure 2 is a similar view showing the

valve closed for forcing fluids under pressure down through the tubing.

Figure 3 is a transverse section taken through telescoping valve parts of the tubing on the line 3-3 of Figure 2,

Figure 4 is a detail bottom plan view of the valve seat bushing used in the upper valve part, and

Figure 5 is a vertical section taken through the same on the line 5-5 of Figure 4.

Referring to the drawing, 10 designates a tube section which is threaded or otherwise suitably connected at its upper end to a tube or pipe 11 extending downwardly into a well opening 12. The tube section 10 is enlarged to the full diameter of the central tube or pipe used in the well and is internally threaded at its lower end for the reception of a bushing 13 provided with an external shoulder 14 near its lower end adapted to abut the lower extremity of the tube section 10 to limit the upward turning of the bushing 13 and to jam against the tube section 10 for holding the bushing in place. The upper end of the bushing 13 is provided with an inwardly beveled annular valve seat 15 adapted to receive thereagainst a correspondingly beveled valve head 16 which is carried upon the upper end of a slidable tube section or shank 17 which is fitted through the bushing 13 and arranged for telescopic engagement in the tube section 10. The bushing 13 is provided at inner opposite sides with a pair of longitudinal key ways or grooves 18, shown in Figures 4 and 5 and through which slidably fit keys or feathers 19 which project outwardly from opposite sides of the shank 17 and which extend lengthwise thereof throughout substantially the entire length of the shank 17 for holding the latter from turning in the bushing 13.

From Figure 3 it will be noted that the shank 17 has its exterior sides, between the feathers 19, flattened, and the bushing 13 is provided with concave recesses or grooves 20 opposite the flat faces and which produce an oval formation of the inner wall of the bushing 13 in cross section, so as to provide passages between the opposite sides of the shank 17 and the bushing 13. These passages establish communication between the interior of the tube section 10 and the surrounding well opening 12 and open downwardly through the bushing 13 and the tube section 10.

The shank 17 is provided with an exteriorly threaded portion 21 at its lower end which engages in threaded relation within the upper end of a lower tube section 22 and the latter has an outstanding annular head or flange 23 at its upper end adapted to receive impact from the lower end of the bushing 13 when the tube section 10 is lowered in the well opening. A pair of stops or studs 24 are screwed into opposite outer sides of the lower tube section 22 beneath the head 23, and mounted on the tube section 22 is a collar 25 having pairs of lugs 26 on its peripheral face equi-distantly spaced thereabout to receive therebetween flat springs 27. The springs 27 are held by screws 28 to the collar 25 and are bowed outwardly above the collar for frictional contact with the inner wall of the well opening 12. The springs 27, and the ring 29 and collar 25, comprise a trip which is adapted to coact with the pins or knobs 24 in the usual operation of the Baker cement retainer for releasing and coupling the tubing to the head of the cement retainer. A ring 29 is secured to the upper ends of the springs 27 by screws 30 and the springs are held in position upon the ring by lugs 31 arranged in pairs and equi-distantly spaced apart upon the outer surface of the ring 29 to register with the lugs 26 on the collar 25.

The lower ends of the springs 27 extend below the collar 26 for a considerable distance, and arranged between the lower ends of the springs 27 is a packer head 32 mounted on the lower tube section 22 by collars 33 held in place by set screws or the like against the opposite sides of the packer head 32. The lower tube section 22 may be provided with any other suitable apparatus capable of being mounted on the tube for operation in the usual manner. The lower end of the tube 22 is provided with exterior screw threads 33 for attachment to other sections and devices which are used in the lower end of the well opening 12.

When the device is adjusted as shown in Figure 2 with the upper tube section 10 raised, the valve head 16 engages the valve seat 15 and closes the passages at opposite sides of the shank 17, so that material forced downwardly through the tubing 10 and 11 is forced through the shank 17 and into the lower tube section 22. When it is desired to release the pressure in the tubing 10, for unscrewing the same, it is only necessary to lower the upper tubing sections so that the section 10 slides downwardly with its bushing 13 over the shank 17 to unseat the valve head 16 and permit the material under pressure to pass downwardly through the lateral passages from the interior of the tubing into the well opening 12. It will be noted that the head 16 is of reduced diameter as compared with the internal diameter of the tube

section 10 so that when the valve is open the material may pass freely downwardly about the sides of the head 16 into the lateral passages.

When the circulation downwardly through the tubing 10 and 11 can be obtained only through high pressure during cementing or other operations, the packer, retainer or other device which is mounted on the lower tube section 22, may be set, and the valve 16 opened by lowering the tube section 10, the cement or other fluids may be pumped into the bottom of the tubing under practically no pressure, the valve 16 again closed, and the cement or other fluids may then be forced into proper formation.

When the tubing 10 is turned, the shank 17 is also rotated as it is keyed to the lower end of the tubing 10 and the unscrewing of the tube is thus insured irrespective of the position of the valve.

Should, however, the threads be jammed, or for other reasons, the parts cannot be unscrewed or separated, the tubing 10 may be reciprocated so as to bring the bushing 13 with its shoulder or hammer 14 downwardly into contact with the head 23 of the lower tube section 22 and thence upwardly against the head 16 so as to jar the tubing and thus loosen the otherwise inseparable parts. The ring 29 is of sufficient internal diameter to permit the bushing 13 to freely pass there-through during the hammer action.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claim.

What is claimed is:—

In well tubing, an upper tube section, a bushing fitting in the lower end of said tube section and having an inner wall oval in cross section with longitudinal key ways in opposite sides across the minor axis of the inner wall, a hollow shank slidably fitting through the bushing and having longitudinal feathers at opposite sides engaging said key ways to hold the shank from turning in the bushing, said shank having flattened opposite exterior walls between the feathers for cooperation with the oval shaped inner wall of the bushing to provide lateral passages at the lower end of said tube section, said bushing having a valve seat on its upper end and said shank having a valve head on its upper end adapted to engage the valve seat when said tube section is raised to close said lateral openings, said tube section being adapted to be lowered to unseat said valve head and open said lateral passages to relieve pressure in the tube section.

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