Nov. 19, 1929. R. L. DAVIS 1,736,254

SEATER AND PACKER

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Fig. 1

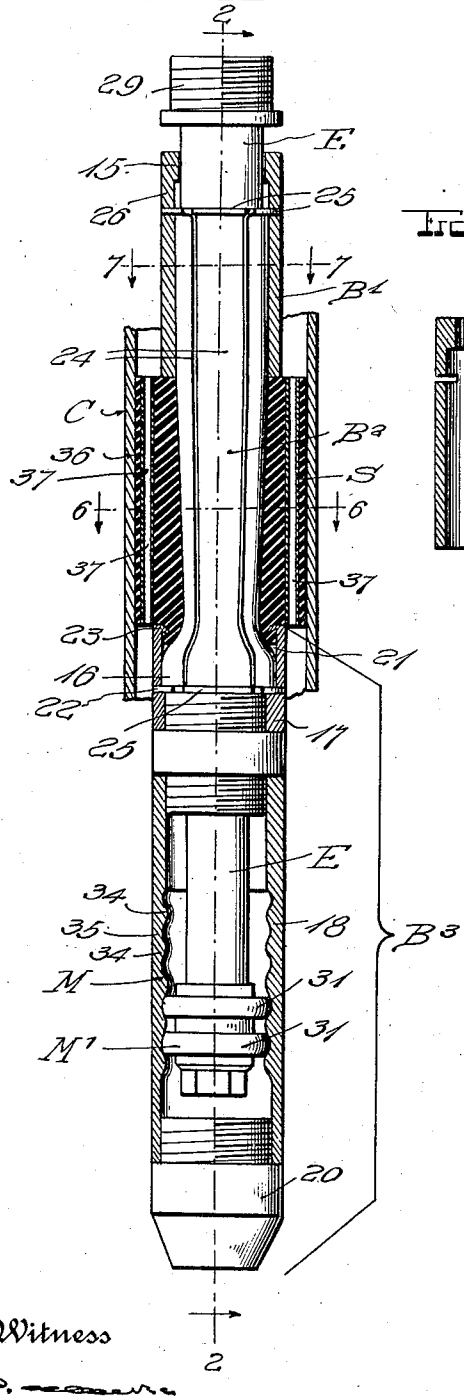


Fig. 11

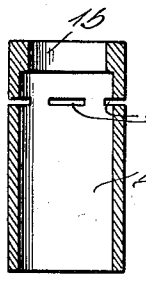
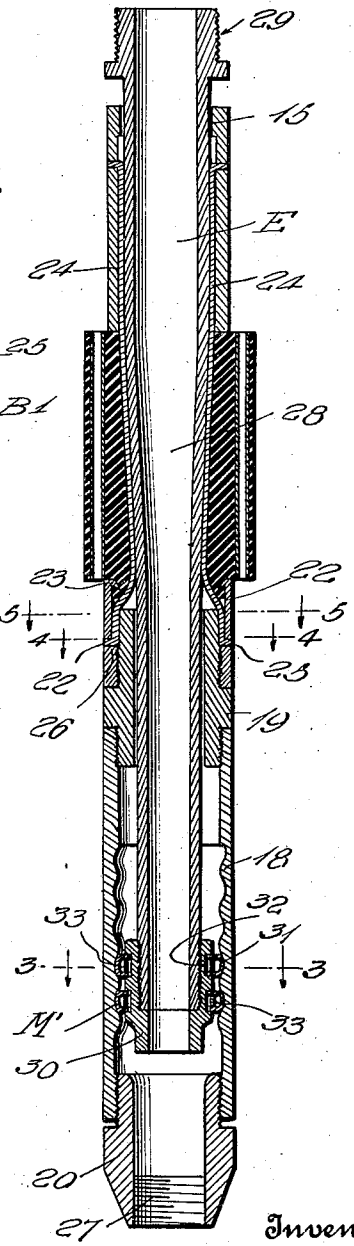


Fig. 2



Witness

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Nov. 19, 1929. R. L. DAVIS 1,736,254

SEATER AND PACKER

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Fig. 3

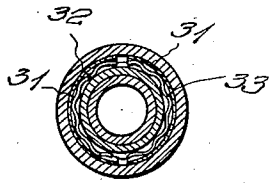


Fig. 4

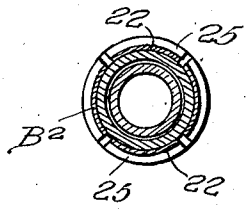


Fig. 5

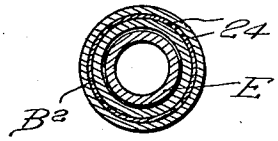


Fig. 6

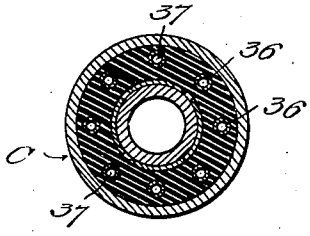
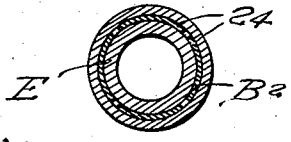


Fig. 7



Witness

Fig. 8

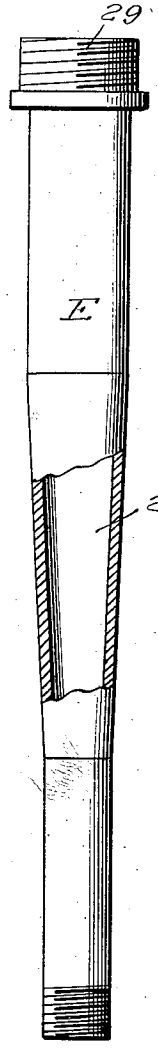


Fig. 9

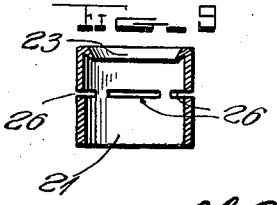


Fig. 10

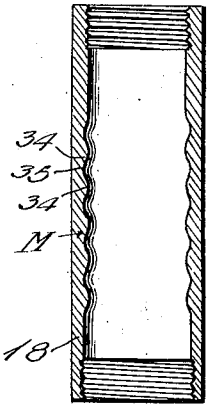


Fig. 12

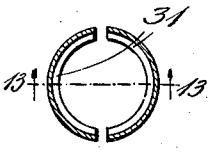


Fig. 13



Fig. 14

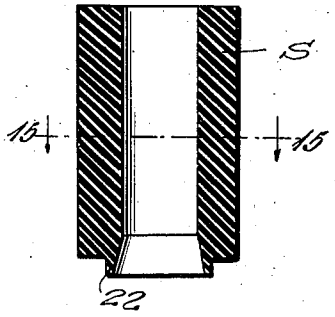
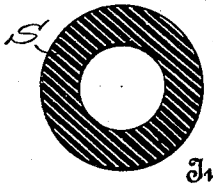


Fig. 15



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Patented Nov. 19, 1929 1,736,254

UNITED STATES PATENT OFFICE

RAY L. DAVIS, OF WHEELING, WEST VIRGINIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE OIL RECOVERY CORPORATION, OF WHEELING, WEST VIRGINIA, A CORPORATION OF WEST VIRGINIA

SEATER AND PACKER

Application filed March 12, 1928. Serial No. 261,110.

The invention relates to a seater and packer for the purpose of totally or partially sealing or packing off oil well or gas well tubing, pipes or casings, or for use with any well or at any other location where it is necessary to seal or partially seal a hole.

The invention embodies an expansible sleeve of rubber or the like to tenaciously engage the well casing or similar part, and it is one object of said invention to provide a new and improved construction for expanding said sleeve into tight contact with the casing or the like. In providing for this expansion of the sleeve, the body of the device upon which the sleeve is mounted, is provided with an expansible tubular portion surrounded by the sleeve and extending between upper and lower tubular body portions of rigid nature, and means is provided within said expansible tubular body portion for expanding the same to thereby expand the sleeve; and it is a further object of the invention to utilize the expansion of the tubular body, to tenaciously secure the lower end of the expansible sleeve to the lower rigid body portion.

Another aim of the invention is to form the above-named expansible body portion of an annular series of resilient strips, and to make novel provision for connecting these strips with the upper and lower, rigid body portions.

A further object of the invention is to provide a device of the class described in which expansion of the sleeve for engaging the casing or the like, is effected by relative sliding of the body carrying said sleeve and an expanding member within said body, and to make novel provision for holding these members against accidental return from sleeve-expanded position.

A still further object is to provide a construction which permits relative sliding of the body and the expanding member in sleeve-contracting direction, under force, thus permitting release of the packer and seater whenever desired, for instance, when it is to be entirely withdrawn from the well or is to be set at a different depth.

Yet another aim is to provide a device of the class described which is of rather simple and inexpensive nature, may be easily operated, and will be of exceptional efficiency.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a longitudinal sectional view partly in elevation showing a seater and packer constructed in accordance with my invention.

Fig. 2 is a central longitudinal sectional view as indicated by line 2—2 of Fig. 1.

Figs. 3, 4, 5, 6 and 7 are horizontal sectional views on the correspondingly numbered lines of Figs. 1 and 2.

Fig. 8 is a side elevation partly broken away and in section, showing the main body of the expanding member.

Figs. 9 and 10 are vertical sectional views of two of the sections of the lower, rigid portion of the main body of the device.

Fig. 11 is a vertical sectional view of the upper, rigid body portion.

Fig. 12 is a horizontal sectional view through one of the sectional, spring-pressed rings which are instrumental in holding the relatively slidable parts of the device against accidental return to sleeve-contracting position after being moved to sleeve-expanded position.

Fig. 13 is a detail sectional view on the correspondingly numbered line of Fig. 12.

Fig. 14 is a vertical sectional view showing a different form of expansible sleeve.

Fig. 15 is a horizontal sectional view on line 15—15 of Fig. 14.

The form of construction herein illustrated, may be considered as preferred, and while this form of construction will be specifically described, it is to be understood that within the scope of the invention as claimed, variations may be made.

The device embodies a main body whose principal portions are denoted at B^1, B^2 and B^3; an expansible sleeve S surrounding the body portion B^2, and an expander E slidable within the body to expand the portion B^2 and the sleeve S. Then too, in the construction shown, the invention embodies co-acting means M—M^1 for holding the expander E

against accidental return to sleeve-contracting position, after movement to the position at which it expands and holds the sleeve S in expanded condition.

The portion B^1 of the body is the uppermost portion thereof, being in the form of a short length of tube internally contracted somewhat at its upper end as denoted at 15. The body portion B^2 is in the form of a resilient tube preferably formed of spring metal and of longitudinally split form to permit expansion and contraction. In the construction disclosed, this tube B^2 is downwardly tapered to a plane near its lower end, below which plane it is enlarged as at 16 and is received within the upper end of the lower body portion B^3, the latter being of tubular form. This lower body portion B^3 preferably consists of a relatively short, upper tubular section 17, a comparatively long tubular section 18 below said section 17, a tubular coupling 19 connecting the sections 17—18, and a tubular terminal 20 carried by the lower end of the section 18.

Immediately above the enlarged lower end 16 of the tube B^2, this tube is inwardly spaced from the surrounding portion of the tubular section 17, above described, providing an annular space 21. The expansible sleeve S of rubber or other desired material, surrounds the expansible tube B^2 between the section 17 and the body portion B^1 and is provided at its lower end with a flange 22 which projects into the space 21. Hence, upon expansion of tube B^2, not only is the sleeve S expanded, but the flange 22 of this sleeve is tightly clamped between the lower portion of said tube and the upper end of the section 17. By preference, this section is provided with an inwardly projecting rib 23 to bite into the flange 22, thus forming an even more tenacious connection between the sleeve S and the lower portion B^3 of the body.

I prefer to form the tube B^2 of a plurality of individual spring metal strips 24, disposed in an annular series and all extending longitudinally of the body with their upper and lower ends received in the body portions B^1 and 17, the terminals of these ends being turned outwardly at 25 and received in slots 26 with which said body portions B^1 and 17, are formed. The strips 24 are held against disengagement from the slots 26, by contact with the expander E. Downward forcing of this expander, when the terminal 20 is solidly supported, effects expansion of the tube B^2 and the sleeve S, forcing the latter into tight contact with the casing or the like C. Terminal 20 may rest upon any desired solid support and it is shown internally threaded as at 27 so that it may be connected with a downwardly projecting pipe leading for instance to a suitably anchored strainer or itself perforated to admit liquid.

The expander E, in the construction shown, is formed primarily from a single metal tube having a tapered portion 28 within the tube B^2, for expanding the latter when said expander is forced downwardly. The upper end of this expander is preferably provided with screw-threads 29, permitting the attachment thereto of a string of tubing or piping, or a portion of an oil pump, which pump may be in any desired elevation above the seater and packer herein described. The lower end of the expander E carries a tubular head 30, in the form of the invention herein disclosed, said head being disposed within the body section 18. In the construction illustrated, this head carries means M′ above briefly referred to. Preferably, this means consists of a plurality of sectional, transversely split, channel-shaped rings 31 received in circumferential grooves 32 in the head 30 and pressed constantly outward by annular springs 33. The means M preferably consists of alternate, circumferentially extending ribs 34 and grooves 35 at the interior of the body section 18, all ribs and grooves being suitably curved to permit the means M′ to readily move thereover when the expander E is either forced downwardly to expand the sleeve S or is forcibly pulled upwardly to contract said sleeve. After setting of the device by depression of the expander E however, the means M—M′ co-operate in holding the expander against accidental return to sleeve-contracting position. While these means are preferably of the natures described, they could be of other desired forms and obviously the shoulders provided by the ribs 34 need not necessarily be of the exact configuration herein disclosed.

With the expander E raised to the limit permitted by the head 30 and the coupling 19, the entire device is lowered into the well until the main body B^1—B^2—B^3, comes to rest, provision having been previously made for arresting the descent of this body at the desired depth. Further descent of the expander E is now effected, with the result that it expands the resilient tubular body portion B^2, thereby also expanding the sleeve S into tight contact with the casing or the like C. During this descent of the expander E, the means M′ successively engages the ribs and grooves 34—35 and these means serve to hold the expander against accidental ascent when moved to its final position. Nevertheless, if the seater and packer is to be removed from the well or is to be set at another depth, upward pulling of the expander E, is permitted by sliding of the means M′ over the ribs and grooves, allowing movement of said expander to a position at which it leaves the sleeve S free to contract and disengage from the casing or other well or pipe part C.

If the device is used under conditions which necessitate that some gas be permitted to es-

cape from below the sleeve S, this sleeve will be provided with longitudinal ports 36 from end to end, said ports being provided with metallic liners 37 which prevent them from being closed upon expansion of the sleeve. If the device is to be used under conditions which require that no gas shall escape through the sleeve S, then this sleeve will be of the solid, imperforate form shown in Figs. 14 and 15. Ordinarily, the entire interior of the device is left open from end to end to permit discharge of liquid. However, if a total seal is to be effected, any suitable plug (not shown) may be threaded into the lower end of the terminal 20.

On account of the advantageous results obtainable from the details disclosed, they are preferably followed as above stated. However, attention is again invited to the fact that within the scope of the invention as claimed, variations may be made.

I claim:—

1. A device of the class described comprising a tubular body having an expansible portion between its ends, an expansible sleeve surrounding said expansible body portion, an elongated member slidable in said tubular body and having means for expanding said expansible body portion upon downward sliding of said member, and a spring-pressed detent on said elongated member below said expansible body portion, said tubular body having longitudinally spaced internal shoulders below said expansible portion with which said detent is successively engageable as said member is moved downwardly, said detent and shoulders holding said member against accidental return movement.

2. A device of the class described comprising a tubular body having an expansible portion between its ends, an expansible sleeve surrounding said expansible body portion, an elongated member slidable in said body and having a peripheral groove below said expansible portion thereof and a self-expanding ring in said groove projecting beyond the periphery of said member, said tubular body being provided with a plurality of internal annular ribs spaced apart longitudinally of said body below said expansible portion of the latter and successively engaged by said ring when said elongated member is moved downwardly, said ring and ribs being co-operable in holding said sleeve-expanding member against accidental return movement.

3. A device of the class described comprising separate upper and lower tubular body sections spaced apart and of rigid inexpansible nature, a resilient longitudinally split tube extending between and connected to said body sections, an expansible sleeve surrounding said tube, and means for outwardly springing said tube to thereby expand said sleeve.

4. A device of the class described comprising separate upper and lower tubular body sections spaced apart and of rigid inexpansible nature, a resilient longitudinally split tube extending between and connected to said body sections, said tube being downwardly tapered, and a downwardly tapered expanding member received in said tube for expanding the latter to thereby expand said sleeve.

5. A device of the class described comprising upper and lower tubular body portions spaced apart and of rigid nature, said body portions each having a plurality of circumferentially spaced slots, an annular series of resilient strips extending between and having their ends received within said body portions, the extremities of said strips being turned outwardly in said slots, an expansible sleeve surrounding said series of strips, and means within said series of strips for outwardly springing the latter to expand said sleeve.

6. A device of the class described comprising upper and lower tubular body portions spaced apart and of rigid nature, said body portions each having a plurality of circumferentially spaced slots, an annular series of resilient strips extending between and having their ends received within said body portions, the extremities of said strips being turned outwardly in said slots, said strips being disposed in downwardly converging relation to points near their lower ends to provide a downwardly tapered tube, a downwardly tapered expanding member within said tube for expanding the latter, and an expansible sleeve surrounding said tube to be expanded thereby.

7. A device of the class described comprising separate upper and lower tubular body sections spaced apart and of rigid inexpansible nature, a resilient expansible tube extending between and connected to said body sections, the tube being received within said lower body section and an annular space being provided between said tube and the surrounding upper end of said lower body section, an expansible sleeve surrounding said tube and having a flange extending into the aforesaid space, and means for expanding said tube to clamp said flange and expand said sleeve.

8. A device of the class described comprising upper and lower tubular body sections spaced apart and of rigid inexpansible nature, a longitudinally split expansible tube extending between said sections and received at its ends therein, said ends of said tube being provided with outstanding flanges and said body sections having means receiving said sections, an expansible sleeve surrounding said tube between said body sections, and means within said tube for expanding it.

In testimony whereof I have hereunto affixed my signature.

RAY L. DAVIS.