July 1, 1958 W. G. TALBOTT 2,841,225

PACKER FOR USE IN OIL WELLS AND LIKE

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Fig. 1.

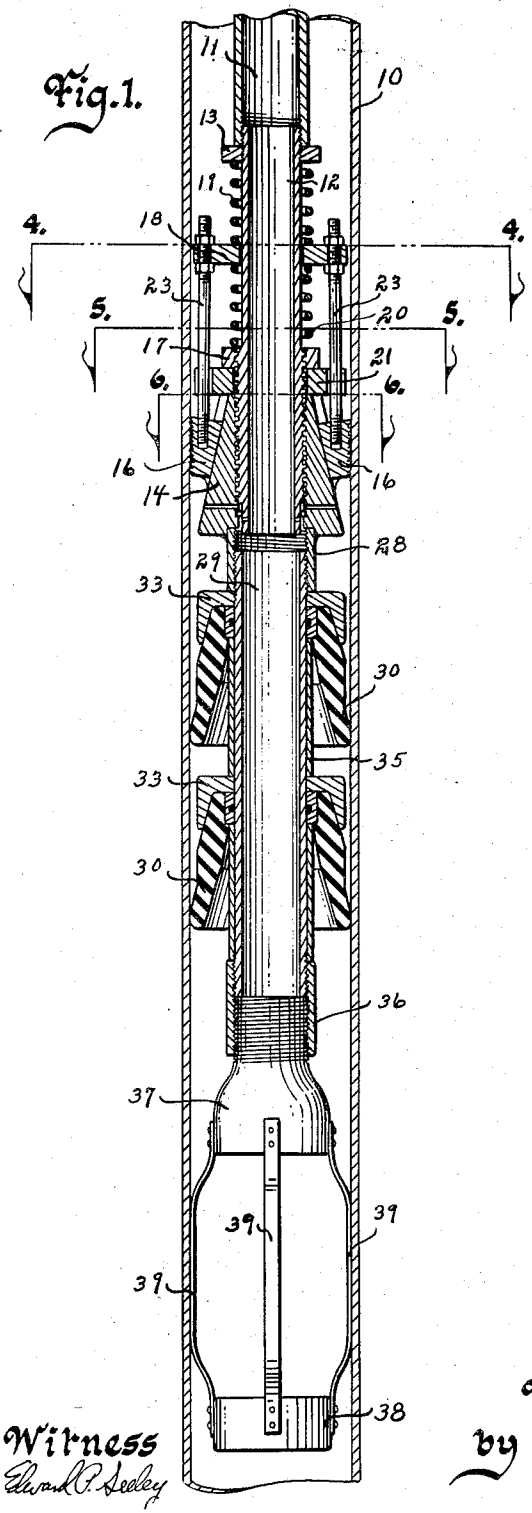
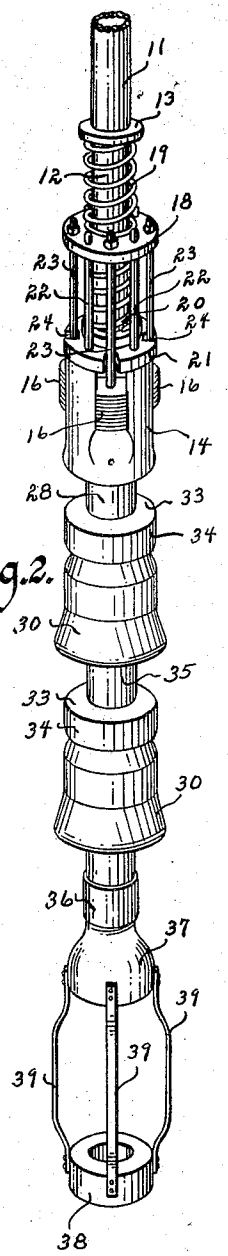


Fig. 2.



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Fig.3.

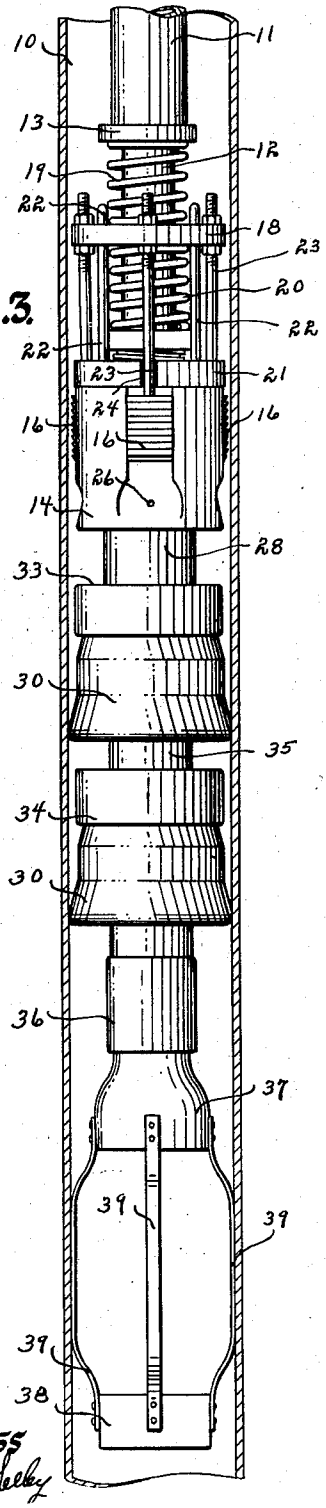


Fig.4.

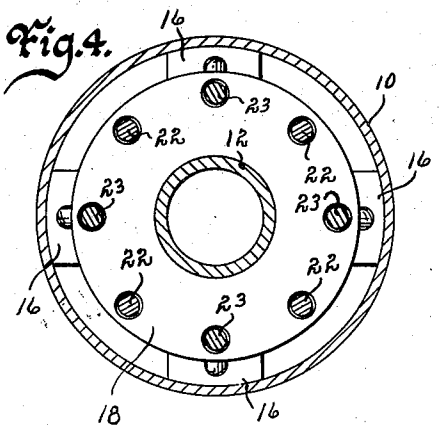


Fig.5.

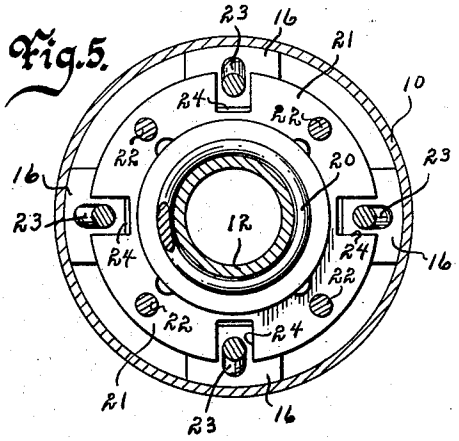
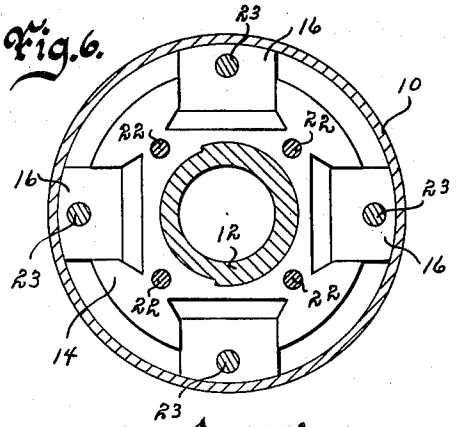


Fig.6.



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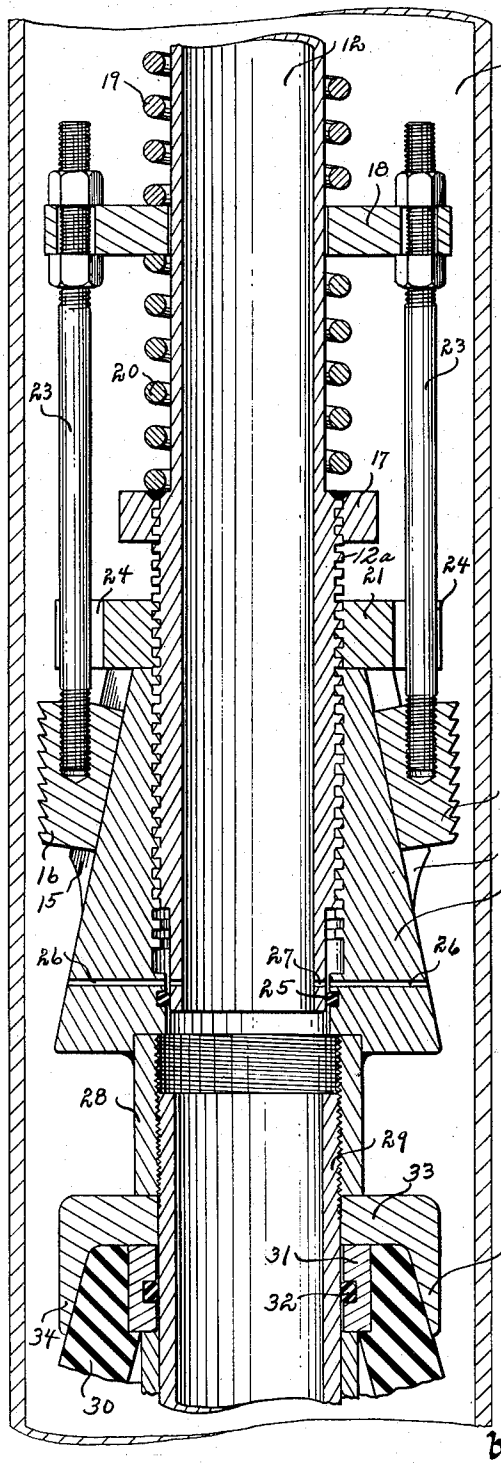
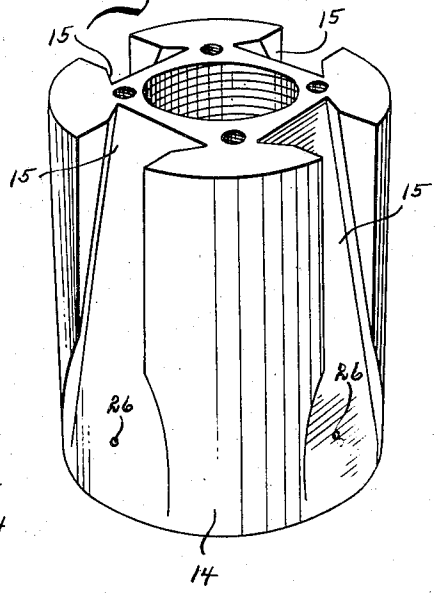


Fig. 7.

Fig. 8.



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United States Patent Office

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PACKER FOR USE IN OIL WELLS AND LIKE

William G. Talbott, Wichita, Kans.

Application January 27, 1956, Serial No. 561,828

4 Claims. (Cl. 166—140)

This invention relates to the oil well drilling and well treating art and more particularly to an oil well casing packer means.

In part this invention is an improvement over the packer described in the Robert E. Cloud Patent No. 2,729,293, issued January 3, 1956, on a high pressure casing packer.

It is now quite common, after an oil well has been drilled, to treat the pay strata by oil pressure, sand-fracturing, hydrafracturing, and like. This is accomplished after the casing has been set and comprises the introduction of the treating substance or solution into the oil bearing strata under great pressures, for the purpose of breaking up the strata and inducing oil flow. Such high pressures are also experienced in the acid treatment of a formation as well as other well conditioning processes.

Inasmuch as the matter is introduced through a pipe extending downwardly in the casing, a seal is necessary between the lower end of the pipe and the casing. Such seal means are called packers and heretofore have been very complicated and costly. Furthermore, they are most difficult to operate and in some cases become so unmanageable that they can not be removed from their great depth of operation, and the well is thus ruined and must be abandoned at great financial loss.

The Cloud device herebefore referred to attempted to overcome many of these problems. However, one difficulty with the Cloud packer was the possibility of getting the unit sandlogged or sand fouled and thereby preventing the withdrawal of the unit. This is especially true in fracturing where sand is used with the solution injected under pressure. Another objection was in the normal removal of the unit, the lower portion was detached and dropped with only the small retaining guide rods holding the unit together. This fragile connecting means might well develop into a complete loss of the equipment and well. Also the device could not be reset without completely removing the unit from the well.

Therefore, one of the principal objects of my invention is to provide a packer that permits the cleaning of of the same in case it becomes sand logged.

A further object of this invention is to provide a packer means that is at all times under the complete control of the operator.

A further object of my invention is to provide a packer for oil field usage that can be set accurately at the desired depth.

A still further object of this invention is to provide an oil or gas well packer that may be easily and quickly removed from the well after it has served its purpose.

Still further objects of this invention are to provide a packer that is economical in manufacture and durable in use.

These and other objects will be apparent to those skilled in the art.

My invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Fig. 1 is a side longitudinal sectional view of my packer in a casing and ready for use,

Fig. 2 is a perspective view of the packer before being inserted in a well,

Fig. 3 is a side view of the unit in a casing and with the casing broken away,

Fig. 4 is a cross sectional view of the device taken on line 4—4 of Fig. 1 and more fully illustrates its construction,

Fig. 5 is a cross sectional view of the device taken on line 5—5 of Fig. 1,

Fig. 6 is a cross sectional view of my packer taken on line 6—6 of Fig. 1,

Fig. 7 is an enlarged longitudinal sectional view of the upper portion of my unit, in a casing, but in a released condition, and

Fig. 8 is an enlarged perspective view of the cone bearing member.

In these drawings I have used the numeral 10 to designate a well casing such as would be in a drilled well. The numeral 11 designates the pipe used to place the packer at the desired depth and through which the cracking or like medium is injected under great pressure. Threaded on the lower end of the pipe 11 is a short tubular member 12 having coarse external threads 12*a* on its lower end portion, as shown in Fig. 7. The numeral 13 designates a collar at the upper end of the member 12. Threaded onto the outer lower end portion of this member 12 is the hollow cone bearing member or wedge slip expander 14. In the downwardly and outwardly sloping side of the cone bearing I have provided four spaced apart downwardly and outwardly extending dovetail grooves 15 as shown in Fig. 8. In each of these grooves I have slidably mounted a grip lug 16 having the usual teeth on its outer side as shown in Fig. 2. The numeral 17 designates a small collar on the member 12 at about the top of its external threaded portion. The numeral 18 designates a washer plate slidably embracing the member 12. The numeral 19 designates a coil spring embracing the member 12 and between the collar 13 and washer 18. The numeral 20 designates a coil spring embracing the member 12 and between the collar 17 and washer 18. Thus the washer plate is floatably mounted between the two coil springs and is slidably yieldably mounted on the tubular member 12. At the top of the cone bearing is a guide plate 21 having posts 22 extending upwardly and slidably through the washer plate 18.

The numeral 23 designates four spaced apart control rods each secured at its upper end to the plate washer 18 and its lower end to a grip lug 16, respectively. Notches 24 are cut in the periphery portion of the guide plate 21 for the passage of the four control rods, as shown in Fig. 5. By this arrangement the relative movement of the washer plate 18 will lower or raise the four lug grips 16. When these members are lowered the lug grips will expand outwardly to engage the inside of the casing 10, and when elevated will slidably withdraw the lug grips from engagement with the inside of the casing 10. On the inner wall of the cone bearing and near its lower end is a resilient O-ring 25 capable of embracing the lower end of the tubular member 12 when it is in a lowered position in the cone bearing. The numeral 26 designates a plurality of lateral passageways through the cone bearing 14 and located above the O-ring, as shown in Fig. 7. The numeral 27 designates a plurality of lateral passageways through the wall

of the tubular member 12 and located near the bottom of the same. Secured on the bottom of the cone bearing is a collar 28. Threaded at its upper end into this collar 28 is a pipe length 29. This pipe 29 is to carry the actual packer means and may be of any suitable type. The packer valve per se is designated by the numeral 30 and is hollow cone shape and made of suitable flexible resilient waterproof material, such as rubber composition. On the inner top of the member 30 is a metallic collar 31 carrying an O-ring 32. Above each member 30 is a metallic washer 33 having a rim skirt 34 embracing the upper portion of the member 30, as shown in Fig. 3. These packer units are slid onto the pipe 29, and are spaced apart by a sleeve 35. They all are fastened to the pipe by a threaded collar 36. To yieldingly prevent the rotation of the packers 30 in the casing 10 I use any suitable friction means. In the drawings I show a cage type having a top portion 37 threaded into the collar 36, a lower portion 38, and spring rib lengths 39 extending between the members 37 and 38. These spring ribs yieldingly engage the inside of the casing 10 and thereby yieldingly resist rotation within the casing.

The practical operation of the device is as follows:

The device is placed on the pipe 11 with the parts arranged as shown in Fig. 7, i. e., the lug grips are positioned upwardly and inwardly so not to engage the inside of the casing 10. This is accomplished by partially unthreading the tubular member 12 from the cone bearing 14, thus elevating the plate 18, through the coil spring 20 and thereby moving and holding the lug grips in an elevated relative position on the cone bearing. In such condition the unit is lowered downwardly in the casing 10 to point of use. Then by rotating the pipe 11 in one direction the tubular member 12 will thread downwardly into the cone bearing which is yieldingly held against rotating by the drag of the spring ribs 39. This action will move the coil spring 19 downward on the plate washer and thus yieldingly force the control rods 23 downwardly and their lug grips 16 downwardly and outwardly into positive locked engagement with tthe inside of the casing 10. The passageways 27 in the tubular member 12 will be below the O-ring 25, as shown in Fig. 1. The treatment fluid or material is then passed under pressure through the pipe 11, the tube 12, the cone bearing 14, collar 28, pipe 29, and into the casing 10 below the packer valve gaskets 30. To release the unit for withdrawal, the pipe 11 is rotated in the opposite direction to partially unscrew the tubular member 12 from the cone bearing. This action causes the spring 20 to exert force on the under side of the plate 18, thus raising and withdrawing the wedge slip grip lugs 16 from the casing. At this time, the entire unit may be withdrawn from the casing. It will be noted that never is the cone bearing 14 detached from the tubular pipe 12. There, therefore, will never be any drop jolting of one element from the other. The two coil springs 19 and 20 will smoothly yieldingly move the locking means both into and out of engagement without jar, or jerk. The locking lugs may be actuated at any time at any location and as many times as is required. The device is always ready for resetting without its removal from the well. In case of the unit becoming fouled by sand or like, the tubular member 12 may be rotated to bring its passageways 27 above the O-ring 25. Washing or cleansing fluid may be forced through the pipe 11, tubular member 12, out the passageways 27 and 26, and into the casing 10 above the packer. This fluid can flow upward and out of the top of the casing 10, carrying with it the foreign matter. Or if desired the fluid flow may be reversed, or if desired the top of the casing 10 may be sealed and the fluid forced downwardly past the valve gasket members 30. Obviously various combinations may be worked with the passageways 27 and 26 available for use in case of trouble.

So that the passageways 27 will have a tolerance in communicating with the passageways 26, I have left the extreme lower portion of the tubular member 12 and expander 14 free of threads, as shown in Fig. 7.

Any suitable stop means may be used to prevent the accidental complete unscrewing of the member 12 from the cone bearing 14. In the drawings the lug grips 16 are stopped in their upward movement by the member 17, and the space between this member and the plate 18 is such, together with the spring 20, to prevent accidental detachment.

Some changes may be made in the construction and arrangement of my packer for use in oil wells and like without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. In a device of the class described to be used in a well casing having a tubular member adapted to have its upper end secured to a pipe and having a threaded lower portion, a cone bearing wedge slip expander threaded onto the lower portion of said tubular member, wedge grip lugs longitudinally slidably mounted on said expander, a plate washer slidably mounted on said tubular member, rods connecting said plate washer to said wedge grip lugs, at least one packer valve secured to said expander, a frictional drag unit secured to said packer valve and engaging said well casing and tending to keep said expander and said packing valve in a fixed position; the improvement of a collar carried by said tubular member at the upper portion thereof, a coil spring surrounding said tubular member between said collar and said plate washer whereby the turning of the pipe in one direction causes said tubular member to thread deeper in said expander thereby forcing said collar against said spring and depressing said plate washer and said rods to engage said grip lugs with said well casing, a second collar carried by said tubular member below said plate washer, and a second coil spring surrounding said tubular member between said plate washer and said second collar whereby the turning of the pipe in the opposite direction causes said tubular member to unthread from said expander thereby forcing said second collar against said second spring and raising said plate washer and said rods to disengage said grip lugs from said wall casing.

2. In a device of the class described to be used in a well casing, having a tubular member adapted to have its upper end secured to a pipe and having a threaded lower portion, a cone bearing wedge slip expander threaded onto the lower portion of said tubular member, wedge grip lugs longitudinally slidably mounted on said expander, a plate washer slidably mounted on said tubular member, rods connecting said plate washer to said wedge grip lugs, a second pipe secured to said expander at the lower end thereof, said second pipe carrying at least one packer valve and a friction drag unit, said friction drag unit engaging said well casing thereby tending to hold said expander, and said packer valve in a fixed position; the improvement of a collar carried by said tubular member at the upper portion thereof, a coil spring surrounding said tubular member and extending from said collar to said plate washer whereby the turning of the first mentioned pipe in one direction causes said tubular member to thread deeper into said expander thereby forcing said collar against said spring and depressing said plate washer and said rods to engage said grip lugs with said well casing, a second collar carried by said tubular member below said plate washer, and a second coil spring surrounding said tubular member and extending from said plate washer to said second collar whereby the turn-

ing of the first mentioned pipe in the opposite direction causes said tubular member to unthread from said expander thereby forcing said second collar against said second spring and raising said plate washer and said rods to disengage said grip lugs from said wall casing.

3. The structure of claim 2 wherein said tubular member is provided with a plurality of passageways adjacent its lower end, and said expander having a plurality of passageways above its base portion, and both of said passageways capable of registering with each other upon the turning of the first mentioned pipe to permit the passage of fluid into the well casing above the base portion of the expander and above the packer valve.

4. The structure of claim 2 wherein an O-ring is partially embedded in the inner surface of said expander adjacent the end thereof to frictionally engage the end portion of said tubular member at times.

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