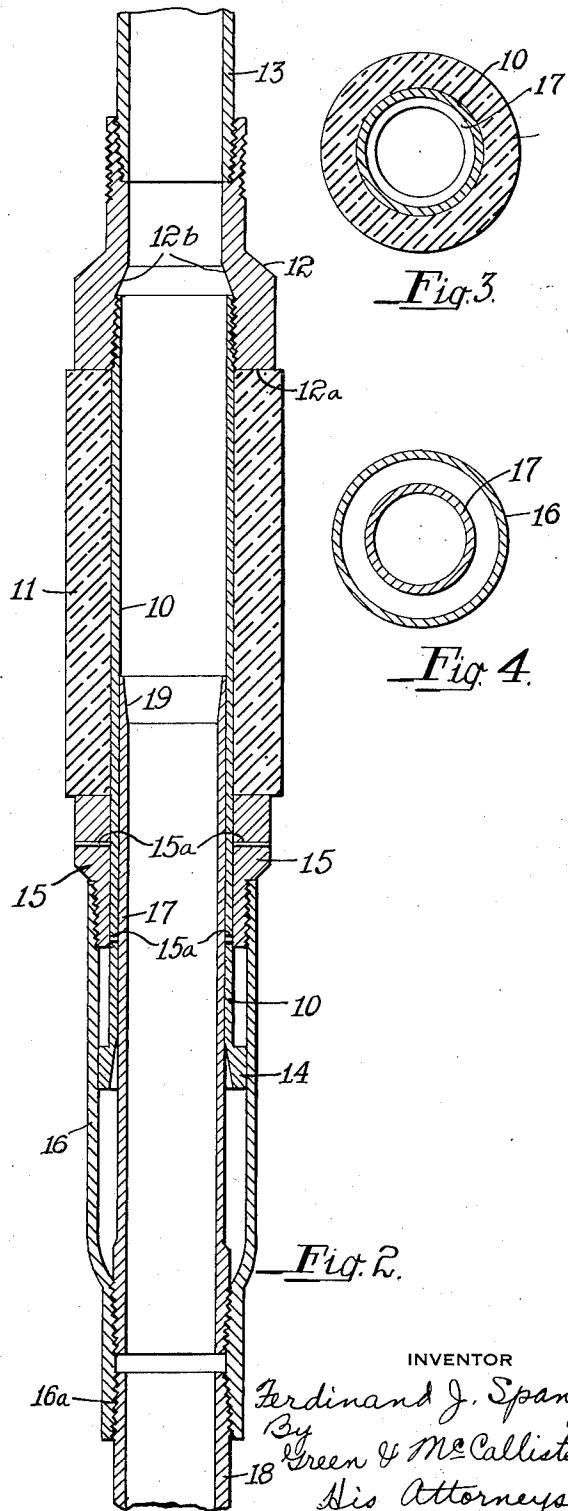


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## WELL PACKER

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4 Claims. (Cl. 166—10)

This invention relates to well packers such as are commonly employed in the drilling of oil and gas wells for the purpose of sealing or packing a portion of the wall of the well to prevent the in-  
5 flow of water or other undesirable liquids, and more particularly to a packer of novel construction which will readily permit the passage of a swab therethrough.

Packers of the type now in ordinary use generally include an expansible packer element such as a rubber sleeve, that is loosely mounted on a tube called the packer body, and is held in place thereon between a coupling member which is secured to the upper end of the packer body, and a shell which is slidably mounted on the lower end thereof. The shell is provided with an inwardly projecting shoulder or collar which is either formed integrally therewith or attached thereto that cooperates with an annular outwardly extending shoulder on the packer body for supporting the shell on the body and limiting the anti-telescopic movement thereof and to secure free sliding movement the internal diameter of the shell is such that it is freely slidable over the  
25 shoulder on the packer body.

When the packer is to be used, it is inserted between two sections of well tubing or casing, with the coupling member and the shell connected to adjacent sections thereof, and lowered into the well. As the lower end of the casing comes in contact with the bottom of the well, the downward movement thereof and of the shell ceases and the rubber sleeve or packer element is then expanded into engagement with the wall of the well by the compressive force on the element due to the weight of the casing above the packer, causing the packer body to move downwardly in the shell.

After the packer has been placed in position in the well, it is often necessary to remove the water and other liquids which have collected in the well. This is accomplished by the use of a suction plunger having a rubber body or cup, known as a swab, which is inserted into the well through the casing and the packer element. While these swabs are of necessity close fitted to the inner diameter of the casing or tubing and while they have certain yieldable qualities, they are not yieldable to the extend that they will carry their load or retain the suction already created therein during their passage through the enlarged diameter of the shell of the packer, and it is not an uncommon occurrence to have this yieldable swab expand to such an extend that it becomes fast within the  
55 shell of the packer, resulting in the breaking of the

swabbing line or the stripping of that line from the socket of the swab.

The primary object of the present invention is to provide a packer having means associated therewith for facilitating the passage of the swab  
5 therethrough.

Another object of this invention is to provide a packer through which a rubber swab or cup may pass without undue expansion or obstruction, and which is simple of construction, easy to manufac-  
10 ture and serviceable in operation.

A further object is to provide a packer having substantially the same internal diameter throughout its length for facilitating the passage of a swab therethrough and preventing the fouling of the  
15 swab.

These and other objects which will be made apparent to those skilled in this particular art, are accomplished by means of this invention, one embodiment of which is described in the following  
20 specification and illustrated in the accompanying drawing, wherein:

Figure 1 is a view in section of a packer made in accordance with my invention and illustrated in its open position;  
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Fig. 2 is a view of the packer illustrated in Fig. 1, in its expanded position;

Fig. 3 is a view in section taken on line III—III of Fig. 1; and

Fig. 4 is a sectional view taken on line IV—IV  
30 of Fig. 1.

As illustrated in the drawing, my improved well packer includes a tube 10 forming the packer body around which an expansible packer element 11 made of any suitable material, such as a rubber  
35 sleeve, is loosely mounted. The upper end of the tube 10 is connected to a coupling member 12 having a shoulder 12a thereon, which cooperates with a collar 15 supported on the lower end of the tube 10, to hold the packer element 11 in position on the packer body. The collar 15 is slidably mounted on the packer body 10 and is yieldably held against an annular shoulder 14 which extends outwardly from the lower end of the body 10 by means of frangible pins 15a.  
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In order to actuate or expand the packer element 11, means are provided for moving the collar 15 relative to the tube 10. This means comprises a shell-like member 16 which is connected to the coupling 15 and extends a considerable distance below the lower end of the tube 10 terminating in a threaded socket 16a for receiving a section of casing 18. Since the collar is freely slidable on the body 10, the internal diameter of the shell 16 must be considerably greater than  
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the external diameter of the tube 10 so that it will pass freely over the shoulder 14.

When the packer is to be used it is inserted at the desired point in a string of well casing or tubing and the coupling 12 is connected to one section 13 of the casing while the socket 16a of the shell 16 is threaded over the lower casing section 18 and the casing and packer are then lowered into the well. As the lower end of the string of casing or tubing strikes the bottom of the well, the shell 16 is held stationary while the weight of the casing connected above the coupling 12 transmits a telescopic pressure to the packer body 10 and causes it to move through the collar 15 into the interior of the shell, shortening the distance between the shoulder 12a and the collar 15 whereby the packer element 11 is expanded into engagement with the wall of the well. (Figure 2.)

To fully expand the packer element 11, it is essential that the shell 16 be of such length that the packer body 10 cannot be moved into contact with the socket portion 16a and, as a result of this construction, a chamber is always formed beneath the lower end of the tube 10 which is considerably greater in diameter than the internal diameter of the packer body and which interferes materially with the passage of a suction plunger or swab through the packer. This difference between the internal diameter of the shell 16 and the internal diameter of the tube 10 must necessarily be material since it is not only essential to secure sufficient strength in the body of the packer and in the shell to carry the required load of casing, but also enough space to form a shoulder on the end of the body 10 of such size that it will also have sufficient strength to carry this load.

In order to prevent the fouling of the swab during its passage through the packer and to secure a close fit between the swab and the packer during its passage therethrough, I provide a tube 17 of relatively thin material which is threadably secured to the socket 16a at the bottom of the shell 16 and is telescopically extended into the packer body 10. Preferably this tube 17 is provided with an internal diameter that is substantially identical with the internal diameter of casing 18, and an external diameter substantially the same as the interior of the tube 10, and in order to avoid the formation of an internal shoulder in the packer the coupling 12 is provided with a beveled surface 12b adjacent the upper end of the body 10. Since the tube or sleeve 17 does not carry any of the weight of the packer or of the tubing or casing and does not need any annular supporting shoulders, it may be made relatively thin, consequently, the difference between the internal diameter of this sleeve 17 and the internal diameter of the packer body 10 is relatively slight and as a result of the beveled surface 12a the swab does not pass suddenly from one diameter to another during its passage through the packer.

In order to further facilitate the passage of the swab through the packer, the upper end of the tube 17 is provided with a relatively long internal bevel or taper 19 and this surface with the internal beveled surface 12a acts to prevent the swab from passing abruptly from a section of one diameter into a section of different diameter.

From the foregoing description, it is apparent

that I have provided a packer for drilling operations through which a swab rubber or cup may be readily passed without danger of becoming fouled or otherwise fast within the packer since an internal passage is provided through the packer which is of substantially the same diameter throughout its length and prevents the yieldable swabbing element from expanding to any appreciable extent and since there are no abrupt internal shoulders in the packer, and since the swab cannot expand therein, it is impossible for it to stick or become fast therein and lose its suction.

What I claim as new and desire to secure by Letters Patent is:

1. A well packer comprising a tubular packer body, a packer element loosely mounted on said body, an actuator shell of greater diameter than said body telescopically supported thereon, and a thin walled tubular member secured to said shell and telescopically extending into said body, the external diameter of said tubular member being slightly less than the internal diameter of said body to form a passage of substantially the same diameter throughout the length of said packer.

2. A well packer comprising a tubular body terminating at its lower end in an outwardly extending annular shoulder, a collar supported on said shoulder and slidable on said body, a packer element surrounding said body and supported on said collar, a shell having an internal diameter greater than the external diameter of said tube and shoulder secured to said collar, and a thin walled tube secured to said shell and telescopically received within said body.

3. A well packer comprising a packer body having an enlarged outwardly projecting shoulder on the lower end thereof, a collar supported on said shoulder, an expansible packer element loosely mounted on said body and supported on said collar, an actuator shell for expanding said packer element, threadedly connected to said collar, said shell being freely slidable over the shoulder on said body, and a sleeve having an external diameter slightly less than the internal diameter of said packer body secured to said shell and extending into the interior of said body.

4. A well packer comprising a tubular packer body having an enlarged outwardly projecting shoulder on the lower end thereof, a collar supported on said shoulder and slidable on said body, an expansible packer element surrounding said body and supported on said collar, a breakable connection between said collar and said packer body, an actuator shell for expanding said packer element threadedly connected to said collar and adapted to break said breakable connection, said shell having an internal diameter substantially greater than the external diameter of the shoulder on the lower end of said packer body and being freely slidable thereover, a thin walled tubular member secured to said shell telescopically extending into the interior of said body, said member having an external diameter slightly less than the internal diameter of said packer body to form a passage of substantially the same diameter throughout the entire length of said packer.