

Jan. 19, 1937.

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2,067,885

SETTING TOOL FOR PACKERS AND THE LIKE

Filed May 3, 1934

2 Sheets-Sheet 1

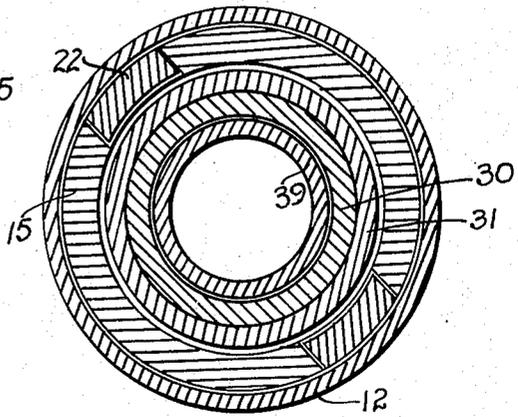
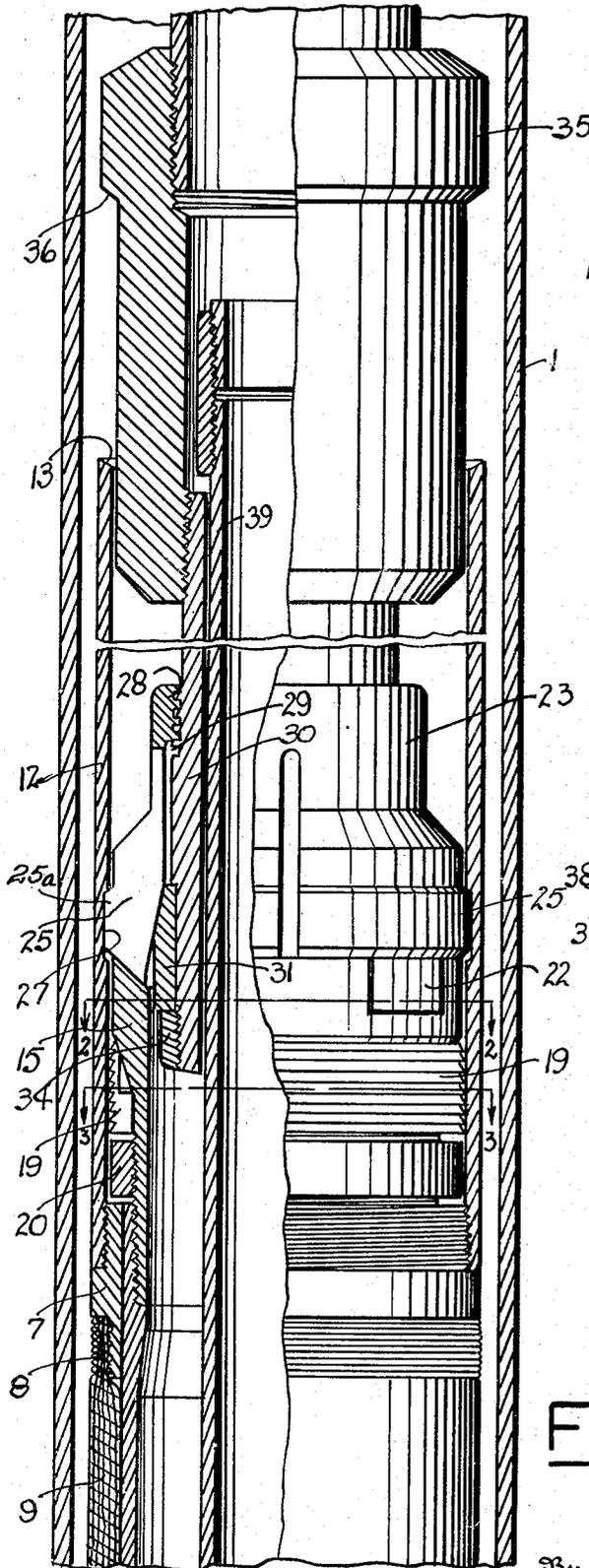


Fig. 2.

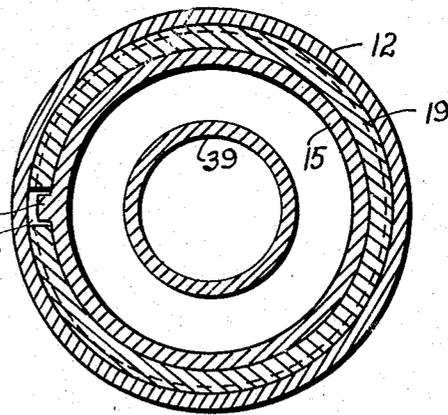


Fig. 3.

Fig. 1. C.C. Brown Inventor  
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2 Sheets-Sheet 2

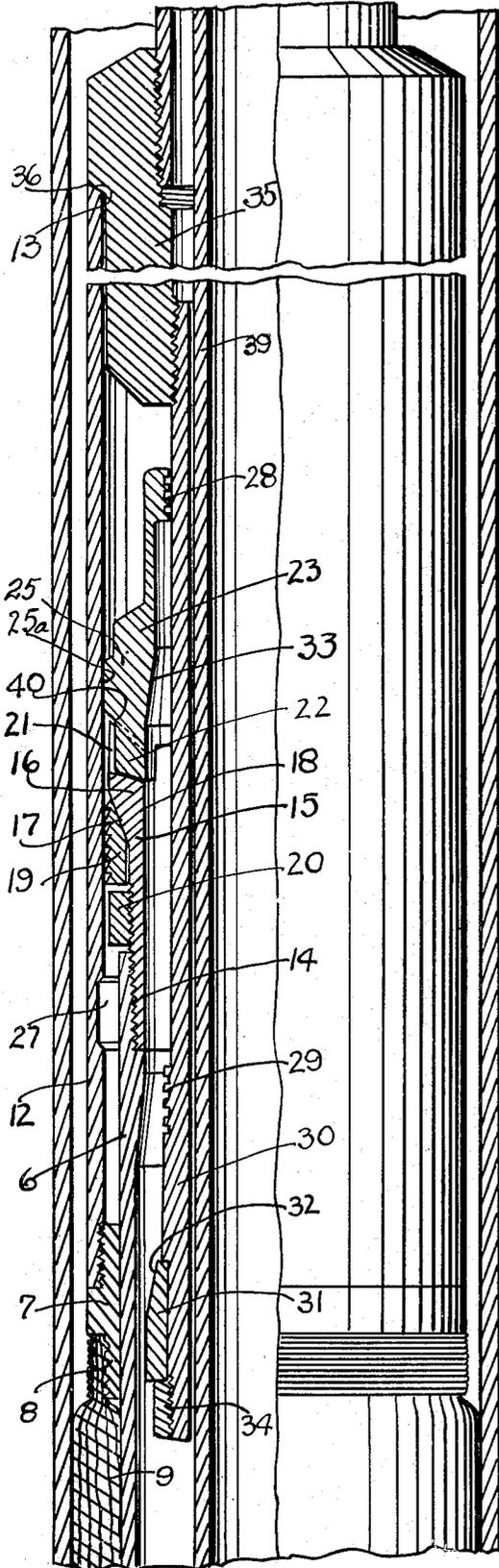


Fig. 4.

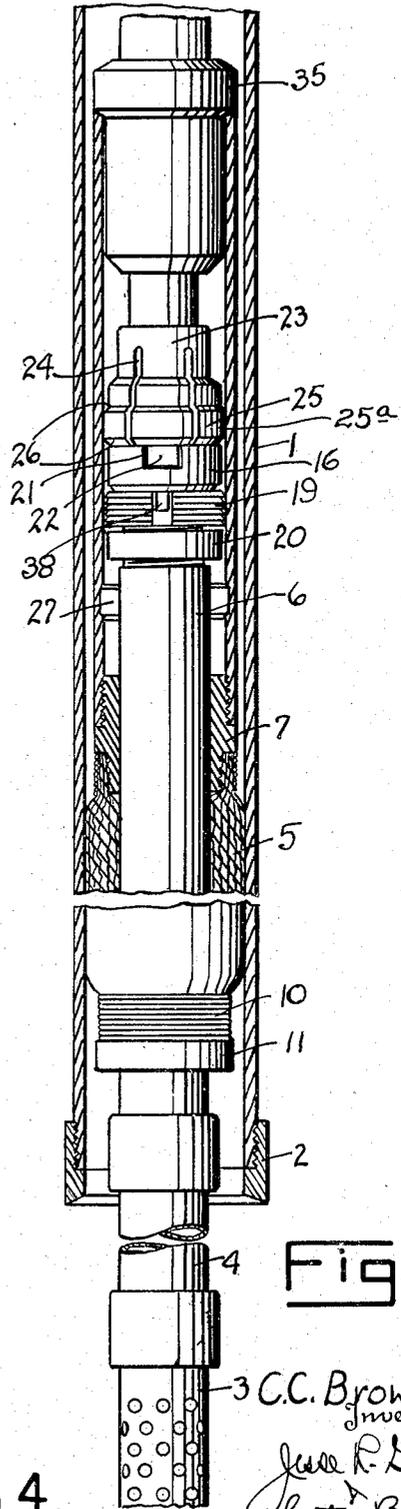


Fig. 5.

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# UNITED STATES PATENT OFFICE

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## SETTING TOOLS FOR PACKERS AND THE LIKE

Cicero C. Brown, Houston, Tex.

Application May 3, 1934, Serial No. 723,678

10 Claims. (Cl. 166—10)

My invention relates to setting tools employed in setting packers and the like in deep wells.

It is an object of my invention to provide a setting tool which will maintain a rigid hold upon the packer, preventing its release and setting until the proper point is reached where it is desired that the packer be expanded.

It is a difficulty with most setting tools now employed in handling packers that the tool is liable to release the packer so that it may be expanded and set in the hole before the proper position in the well has been reached. If an obstruction is encountered in the hole while the packer is being lowered and it becomes necessary to draw the packer upwardly away from the obstruction temporarily and then again to lower it in the hole, it is frequently found that during this operation the setting tool has become disconnected in such way that the packer is expanded at the wrong point and the problem of getting the packer out of the hole again has to be solved.

I desire to overcome this difficulty by forming a rigid connection between the setting tool and the packer barrel which can only be released when the parts have been unscrewed by positive rotation of the setting tool.

It is another object of the invention to provide means to prevent release of the packer after it has been once set in position in the hole.

My invention lies particularly in the construction and arrangement of the parts, making up the setting tool which will be more specifically hereinafter described.

Referring to the drawings herewith, Fig. 1 is a central longitudinal section through a well casing showing the packer and setting tool partly in elevation and partly in central vertical section.

Fig. 2 is a transverse section on the plane 2—2 of Fig. 1.

Fig. 3 is a similar transverse section on the plane 3—3 of Fig. 1.

Fig. 4 is a section similar to that shown in Fig. 1 but with the parts in different position.

Fig. 5 is an assembly view partly in section and partly in elevation illustrating the position of the parts while the packer is being expanded.

I have shown my invention as used within a well employing an outer casing 1, the lower end having the usual casing shoe 2 thereon.

In setting a strainer and packer, as will be understood from Fig. 5, the strainer 3 at the lower end of the liner 4 is shown as projecting below the liner into the producing stratum. A packer 5 is ordinarily set to seal off the passage

upwardly of fluid from the well between the liner and casing. My invention is connected with the setting tool employed in setting the strainer and the packer in position.

The packer here shown is one of ordinary construction in which there is a packer barrel 6 which is in fact a section of the liner. Upon the outer surface of this barrel is a sleeve 7 slidable thereon. The lower end of this sleeve is reduced in diameter and corrugated for attachment thereto of the upper end 8 of the packing member 9. This is an ordinary canvas packer, the lower end of which is similarly attached by wrappings of wire at 10 to a coupling member 11 secured to the liner. At the upper end of the sleeve 7 is a setting sleeve 12, which extends upwardly a suitable distance in the casing and has its upper end beveled at 13 for contact with the setting tool.

The upper end of the packer barrel 6 is threaded for connection at 14 with a nipple 15. Said nipple has its upper end increased in outer diameter at 16 and the lower side thereof is beveled at 17 to form an expanding member contacting with the upper flaring end 18 of a slip or dog 19 toothed on its outer surface to engage the setting sleeve 12 and prevent relative downward movement of the nipple 15 relative to the setting sleeve.

Below the slip 19 is a collar 20, which limits the downward movement of the slip upon the nipple, allowing a slight play in both upward and downward directions. The upper end of the nipple 15 is beveled inwardly and downwardly at 21 and is slotted downwardly at 22 at opposite points to receive downwardly extending arms 23 upon an upper latching collar 23.

The latching collar 23 is slotted for a portion of its length at 24, said slots extending upwardly from the lower end to provide, between said slots, the arms 25, which may be moved resiliently inwardly under pressure. Adjacent the lower ends of these arms the said arms are increased in thickness outwardly and beveled at 26 on the upper and lower sides thereof, thus providing a projection 25a adapted to engage within an annular recess 27 in the inner wall of the packer barrel. Above the latching ribs thus provided the latching sleeve is reduced in diameter and its upper end has an inwardly extending flange threaded at 28 with a coarse thread to engage with the threaded area 29 upon the setting mandrel 30.

The setting mandrel 30 is a tubular member, the lower end of which is provided with a ring 31, the upper end of which is beveled on its outer side at

32 for contact with the inner beveled surface 33 upon the latching sleeve 23. It is held in position in a shallow recess in the mandrel by a clamping collar 34 on the lower end of the mandrel. The upper end of the mandrel is connected on its outer face to a setting head 35. Said head is of material thickness so as to fit loosely within the setting sleeve 12. It has a shoulder 36 overhanging the upper end of the setting sleeve by means of which a blow may be struck upon the setting sleeve.

While the device is being lowered into the well the parts are assembled as shown in Fig. 1. The upper end of the latching sleeve 23 is screwed upon the threaded area 29 of the mandrel 30 and when in this position the upper end of the ring 31 engages against the inner surface of the latching collar and forces the rib 25 thereon into the inner recess 27 in the setting sleeve. This holds the mandrel from longitudinal movement relative to the setting sleeve so that the parts can not be accidentally separated while the device is being manipulated in the casing. The slip ring 19 is split at one side, as shown at 37, to interfit with a lug or ridge 38 on the outer surface of the nipple 15, thus preventing relative rotation of the parts. The parts thus locked together may be moved as a unit in either upward or downward direction without any danger of becoming unlatched. When the proper position in the well has been reached where the packer is to be expanded, the setting tool is rotated within the latching sleeve to screw the setting mandrel downwardly and release the same therefrom. When this threaded connection has been released the mandrel may drop downwardly from beneath the latching arms 25 so that the connection between the mandrel and the setting sleeve has been released. The lowering of the mandrel relative to the packer will bring the shoulder 36 on the setting head 35 against the upper end of the setting sleeve 12 and force the same downwardly along the packer barrel and thus compressing the packing member longitudinally and expanding the same out against the casing as shown in Fig. 4.

When the setting mandrel is being lowered the packer barrel with the latching sleeve and latching arms above it remains stationary and the parts will finally assume the position shown in Fig. 4 with the slip 19 engaging the inner surface of the setting sleeve and thus preventing the upward movement of the setting barrel relative to the packer barrel. It will then be possible to withdraw the setting tool upwardly from the well, the threads 29 engaging the latching collar and withdrawing it upwardly from the well.

The advantage of my device lies in the fact that the parts making up the packer and setting tool are capable of being latched securely in position so that they may be manipulated in the well without danger of becoming released until the proper point in the well has been reached. This is of material value and leads to safety in operation and prevents the accidental setting of the packer at the wrong position in the well.

What I claim as new is:

1. A setting tool for well packers having a packer barrel, a packing member thereon and a packer setting sleeve secured to the upper end of said packing member and slidable on said packer barrel, including a mandrel, a setting collar thereon adapted to engage upon said setting sleeve, a latching collar having a threaded connection with said mandrel, a projection on said

latching collar adapted for engagement within a groove in said setting sleeve, means on said mandrel engaging beneath said latching collar to retain said projection fixed in said groove, and a nipple on said packer barrel interengaging with said latching collar, said latching collar being releasable both from said mandrel and said setting sleeve upon downward screwing of said mandrel relative to said latching collar.

2. A setting tool for well packers having a packer barrel, a packing member thereon and a packer setting sleeve secured to the upper end of said packing member and slidable on said packer barrel, including a mandrel, a setting collar thereon adapted to engage upon said setting sleeve, a latching collar having a threaded connection with said mandrel, a projection on said latching collar adapted for engagement within a groove in said setting sleeve, means on said mandrel engaging beneath said latching collar to retain said projection fixed in said groove, and a nipple on said packer barrel interengaging with said latching collar, said latching collar being releasable both from said mandrel and said setting sleeve upon downward screwing of said mandrel relative to said latching collar, and means on said nipple engaging the interior of said setting sleeve to prevent relative upward movement of said sleeve.

3. A setting tool for well packers having a packer barrel, a packing member thereon and a packer setting sleeve secured to the upper end of said packing member and slidable on said packer barrel, including a mandrel, a setting collar thereon adapted to engage upon said setting sleeve, a latching collar having a threaded connection with said mandrel, a projection on said latching collar adapted for engagement within a groove in said setting sleeve, means on said mandrel engaging beneath said latching collar to retain said projection fixed in said groove, and a nipple on said packer barrel interengaging with said latching collar, said latching collar being releasable both from said mandrel and said setting sleeve upon downward screwing of said mandrel relative to said latching collar, a slip ring on said nipple, means on said nipple for expanding said ring on relative upward movement of said ring, and downwardly inclined teeth on said ring to engage said setting sleeve.

4. A barrel, a packing member thereon, a packer setting sleeve telescoping over said barrel and fixed to the upper end of said packing member, a setting mandrel, a setting head thereon to engage the end of said sleeve, a latching collar releasably connected with said mandrel, means on said collar engaging within a recess in said setting sleeve, means on said mandrel to hold said engaging means in engagement within said recess whereby said mandrel is fixed against longitudinal movement relative to said sleeve, said latching collar and said mandrel being disconnectable from each other and from said sleeve by a downward screwing of said mandrel whereby said head may engage said setting sleeve.

5. A barrel, a packing member thereon, a packer setting sleeve telescoping over said barrel and fixed to the upper end of said packing member, a setting mandrel, a setting head thereon to engage the end of said sleeve, a latching collar releasably connected with said mandrel, means on said collar engaging said setting sleeve to hold said mandrel against longitudinal movement in either direction relative to said sleeve, said latching collar and said mandrel being disconnectable from each other and from said sleeve

by a downward screwing of said mandrel whereby said head may engage said setting sleeve.

5 6. A barrel, a packing member thereon, a packer setting sleeve telescoping over said barrel and fixed to the upper end of said packing member, a setting mandrel, a setting head thereon to engage the end of said sleeve, a latching collar releasably connected with said mandrel, means on said collar adapted to engage within a recess in  
10 said setting sleeve, means on said mandrel holding said engaging means in engagement within said recess whereby said mandrel is fixed against longitudinal movement relative to said sleeve, said  
15 latching collar and said mandrel being disconnectable from each other and from said sleeve by a downward screwing of said mandrel whereby said head may engage said setting sleeve and  
20 move the same downwardly to compress said packing member longitudinally, and means on said packer barrel engaging said sleeve to prevent upward movement of said sleeve relative to said barrel.

7. A barrel, a packing member thereon, a setting sleeve telescoping over said barrel and secured to said packing member, a setting mandrel, a setting head on said mandrel to engage said sleeve to force the same downwardly, means releasably connected with said mandrel to engage with said setting sleeve and prevent longitudinal movement of said mandrel relative to said sleeve in either direction, said means being  
30 releasable on rotation of said mandrel to allow said mandrel to be moved downwardly to engage said head with said sleeve.

35 8. A barrel, a packing member thereon, a sleeve telescoping over said barrel and secured to said packing member, a nipple on said barrel, a setting mandrel, a setting head on said mandrel to engage said sleeve to force the same downwardly, latching-means releasably connected with  
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said mandrel to engage with said setting sleeve and prevent longitudinal movement of said mandrel relative to said sleeve in either direction, said means being releasable on rotation of said mandrel to allow said mandrel to be moved downwardly to engage said head with said sleeve, and interengaging means on said latching means and said nipple to prevent relative rotation when said latching means is engaged with said sleeve.

9. A barrel, a packing member thereon, a sleeve telescoping over said barrel and secured to said packing member, a nipple on said barrel, a downwardly and inwardly inclined bevel on the outer surface of said nipple, a slip on said beveled surface, downwardly inclined teeth thereon to engage the inner surface of said sleeve upon relative upward movement of said slip on said nipple, a setting mandrel, a setting head on said mandrel to engage said sleeve to force the same downwardly, means releasably connected with said mandrel to engage with said setting sleeve and prevent longitudinal movement of said mandrel relative to said sleeve in either direction, said means being releasable on rotation of said mandrel to allow said mandrel to be moved downwardly to engage said head with said sleeve.

10. A barrel, a packing member thereon, a sleeve telescoping over said barrel and secured to said packing member, a setting mandrel, a setting head on said mandrel adapted on downward movement to engage said sleeve to force the same downwardly, a latching collar threaded on said mandrel, means on said collar interfitting within a recess on said sleeve to latch said collar and sleeve, means on said mandrel to hold said interfitting means in engagement with said sleeve, said latching collar being released from said mandrel and said sleeve on downward screwing of said mandrel.

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