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UNIT RATCHET PACKER

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2 Sheets-Sheet 2

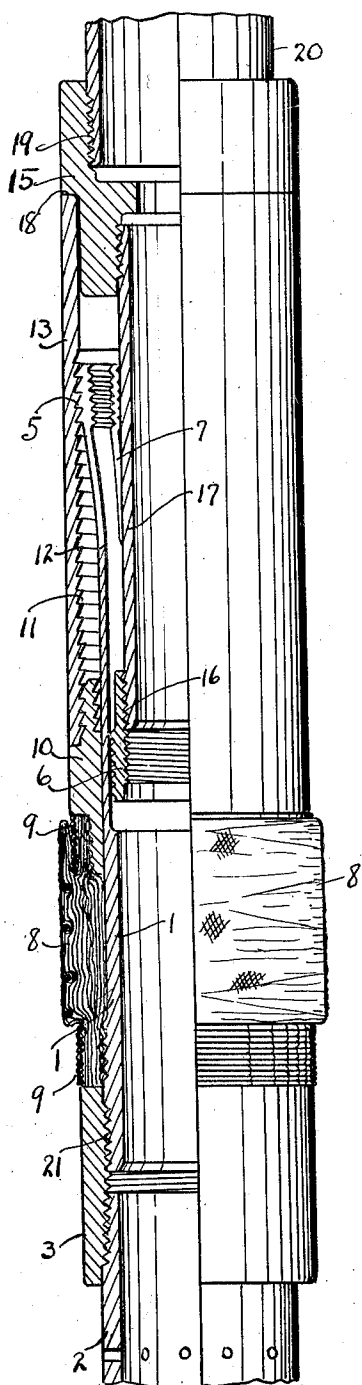


Fig. 3.

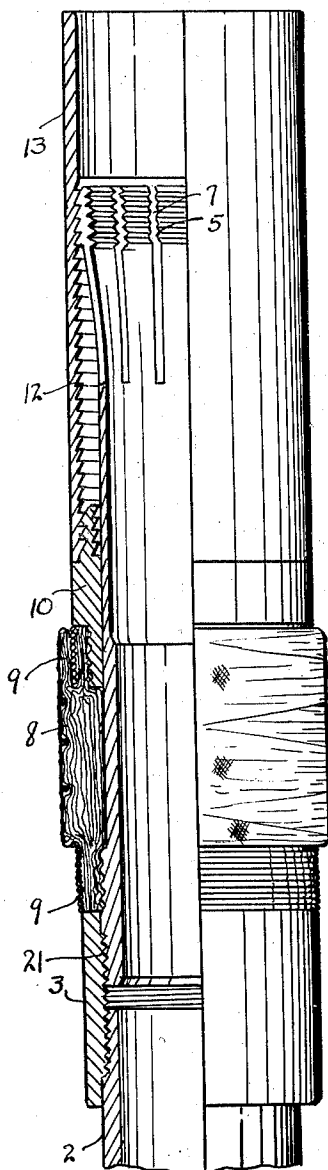


Fig. 4.  
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## UNITED STATES PATENT OFFICE

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## UNIT RATCHET PACKER

Application filed November 23, 1926. Serial No. 150,332.

My invention relates to packers for use in wells and has particular application in deep wells for oil, gas, water and the like.

I aim to provide a packer of this character which may be readily expanded at the desired place in the well to effectively seal off the space between the casing and the walls of the well or between the liner and casing, as may be the case.

It is an object to so design the packer that it may be lowered by means of a setting tool, expanded by continuous right-hand downward rotation and pressure, the setting tool being automatically released when the packer is expanded.

It is a further object to provide means to release and collapse the packer so that it may be withdrawn in case it is not desired to allow it to remain in the position in which it is set.

Various other objects of the invention residing in the particular construction and arrangement of the parts will be set out in the description which follows.

Referring to the drawing, Fig. 1 is a side view partly in elevation, and partly in central longitudinal section of the upper portion of a packer and setting tool embodying my invention. Fig. 2 is a similar view of the lower end of said packer. Fig. 3 is a similar view of the packer in expanded position. Fig. 4 is a view similar to Fig. 3 with the setting tool withdrawn. Like numerals of reference are applied to like parts in all the views.

The packer which I employ includes a packer stem or tube 1, the lower end of which may be connected with the strainer or perforated pipe 2 by a left-hand coupling 3. The upper end of the packer stem is threaded internally with a right-hand thread 4 to receive the setting tool collar 6, the threaded area 4 being of slightly smaller internal diameter than the stem itself. The outer surface of the stem at the upper end is formed with coarse buttress threads 5, inclined downwardly, as shown. The upper end of the stem is slotted longitudinally at 7 and the slotted portion is normally flared resiliently outwardly.

The outer surface of the packer stem is adapted to receive a packing element 8, which

is preferably made up of layers or windings of canvas or similar flexible material adapted to be folded or crumpled longitudinally to expand same. The lower end of the packer canvas rests upon the upper end of the coupling 3. The stem 1, above the coupling, is corrugated or fluted circumferentially to furnish means for attachment of the canvas thereto, which is bound firmly against the said stem by means of wire 9 or other similar fastening means.

The upper end of the packer is attached to the lower reduced end of the setting sleeve 10. Said sleeve fits slidably upon the stem 1, except at the upper end, where it is formed with buttress threads adapted for engagement with the threads 5 upon the stem. The lower end of the setting sleeve is corrugated and the packer is secured on the corrugated surface by means of windings of the wire 9, as at the lower end. The outer face of the setting sleeve is threaded at 11 with a downwardly inclined buttress thread for engagement with the packer barrel 12.

Said barrel 12 has buttress threads 11 thereon throughout the greater part of its length, the upper end 13, however, being smooth on its interior and adapted to receive the lower end of the guide 14 upon the setting head 15.

The setting tool collar 6 extends but a short distance above the threaded portion 4 and is threaded on its inner face at 16 for engagement with the barrel 17 of the setting tool. Said barrel is of materially smaller diameter than the packer barrel 13 and is secured at its upper end within the guide portion 14 of the setting head.

The setting head has a lower shoulder 18 above the guide portion which is adapted to contact with the upper end of the packer barrel 13. The said head is secured at 19 to a pipe or stem 20, extending upwardly to the surface.

In the operation of my improved packer, the parts are assembled as shown in Figs. 1 and 2, the setting tool being lowered with the packer thereon into the well through means of the stem 20 from the surface. When the strainer has been set in the position desired, the packer is then expanded by rotat-

ing upon the stem 20 and the setting tool, thus tending to screw the setting collar 6 downwardly with a right-hand rotation, so as to disengage the setting tool from the upper threaded end 4 of the packer stem. When it  
 5 has been thus screwed downwardly out of engagement, the setting sleeve will move freely downwardly under the weight of the stem 20 and the setting tool and the shoulder 18  
 10 will come in contact with the upper end of the packer barrel 13, forcing said barrel along with the setting sleeve 10 downwardly upon the packer stem, thus crumpling and expanding the packer 8. It will be noted that  
 15 the downwardly movement of the packer barrel 13 can only disengage the setting sleeve 10 from the packer stem when the collar 6 has been disengaged to allow the stem to contract at the upper end. When the setting  
 20 sleeve has been thus forced free from the upper end of the packer stem, the barrel 13 will move downwardly and the upper end of the packer stem will be automatically forced resiliently outward by the construction of the slotted upper end of the packer  
 25 stem and the threaded outer face 5 of the packer stem will contact with the interior threaded portion of the packer barrel 13, as shown in Figs. 3 and 4. This engagement  
 30 will automatically prevent any upward yielding of the packer barrel after the packer has been set. When the packer has been thus set in expanded position, the setting tool may be then withdrawn, leaving the packer and  
 35 the strainer in position.

If it becomes necessary thereafter to withdraw the packer due to the fact that the well does not produce properly or for any other reason, a tool may be inserted into the well,  
 40 said tool being in the nature of a tap and having an outer threaded surface to engage within the inner threaded face 4 of the packer stem. It may be screwed downwardly with a right-hand motion of the threaded  
 45 tap, thus provided, until the continued rotation of the stem in a right-hand direction will unscrew the left-hand threaded portion 21 of the packer barrel from the collar 3, thus allowing the packer to be withdrawn,  
 50 leaving the strainer in the well.

The advantages of this construction lie in the fact that the packer is easily expanded by the usual right-hand rotation of the setting tool and a continuous downward pressure thereon. There is also the advantage of  
 55 the automatic locking arrangement of the packer stem with the packer barrel as described. The arrangement described and shown in the drawing will have many obvious advantages apparent to those skilled in the art, without further description.

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

1. In a well packer, a packer stem, the  
 65 upper end of which is slotted and adapted

to flare resiliently outwardly, a setting head connected therewith and adapted to be disengaged therefrom by a downward right-hand rotation, a setting sleeve on said stem,  
 70 a packing member secured thereto and to said stem, there being a ratchet engagement between said sleeve and said stem, releasable when said setting head is detached, and means connected with said setting head to force said  
 75 setting sleeve downwardly to expand said packing member.

2. In a well packer, a setting head, a packer stem having its upper end slotted longitudinally and flared resiliently outward, the inner face of said slotted end having a right-hand threaded internal engagement with said  
 80 setting head, a downwardly inclined buttress thread on the outer face of said slotted end, a setting sleeve having threaded engagement with said buttress thread, a packer secured  
 85 on the lower end of said packer stem and to said setting sleeve, a packer barrel above said setting sleeve having internal buttress threads to engage said packer stem, and means to screw said setting head downwardly  
 90 to release said stem therefrom and to also force said setting sleeve downward to expand said packer.

3. In a well packer, a setting head, a packer stem having its upper end slotted longitudinally and flared resiliently outward, the inner face of said slotted end having a right-hand threaded internal engagement with said  
 95 setting head, a downwardly inclined buttress thread on the outer face of said slotted end, a setting sleeve having threaded engagement with said buttress thread, a packer secured on the lower end of said  
 100 packer stem and to said setting sleeve, ratchet means secured to said setting sleeve to engage with said stem when said setting sleeve is moved downwardly, and means to screw said setting head downwardly to release said stem  
 105 therefrom and to also force said setting sleeve downward to expand said packer.

4. In a well packer, a setting head, a packer stem having its upper end slotted longitudinally and flared resiliently outward, the inner face of said slotted end having a right-hand threaded internal engagement with said  
 110 setting head, a downwardly inclined buttress thread on the outer face of said slotted end, a setting sleeve having threaded engagement with said buttress thread, a packer secured on the lower end of said packer stem and to  
 115 said setting sleeve, a packer barrel above said setting sleeve having internal buttress threads to engage said packer stem, and detachable means to release said packer stem from said setting head and to expand said packer.

5. In a well packer, a packer stem, a packing member of compressible material on said stem, a setting sleeve on said stem and having a threaded connection therewith at the  
 125 upper end of said stem, a setting collar

screwed within said packer stem, and adapted to be disengaged therefrom by being screwed downwardly, said stem being slotted and resilient at the upper end to contract and  
5 release said setting sleeve and to flare normally outward, and means interengaging with said stem when expanded to prevent relative upward movement of said setting sleeve.

- 10 6. In a well packer, a packer stem having a smooth exterior between its ends, its upper end being slotted and threaded on its interior and on its exterior faces, a setting collar having a right handed connection with the interior of said stem, a setting sleeve having a  
15 threaded engagement on the outer threaded portion of said stem, a packer on said smooth exterior of said stem, the upper end of said packer being connected with said sleeve, and  
20 means to slide said sleeve downwardly to expand said packer only when said setting collar is disconnected from said stem.

In testimony whereof I hereunto affix my signature this 18th day of November, A. D.  
25 1926.

ALBERT L. ROCO.

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