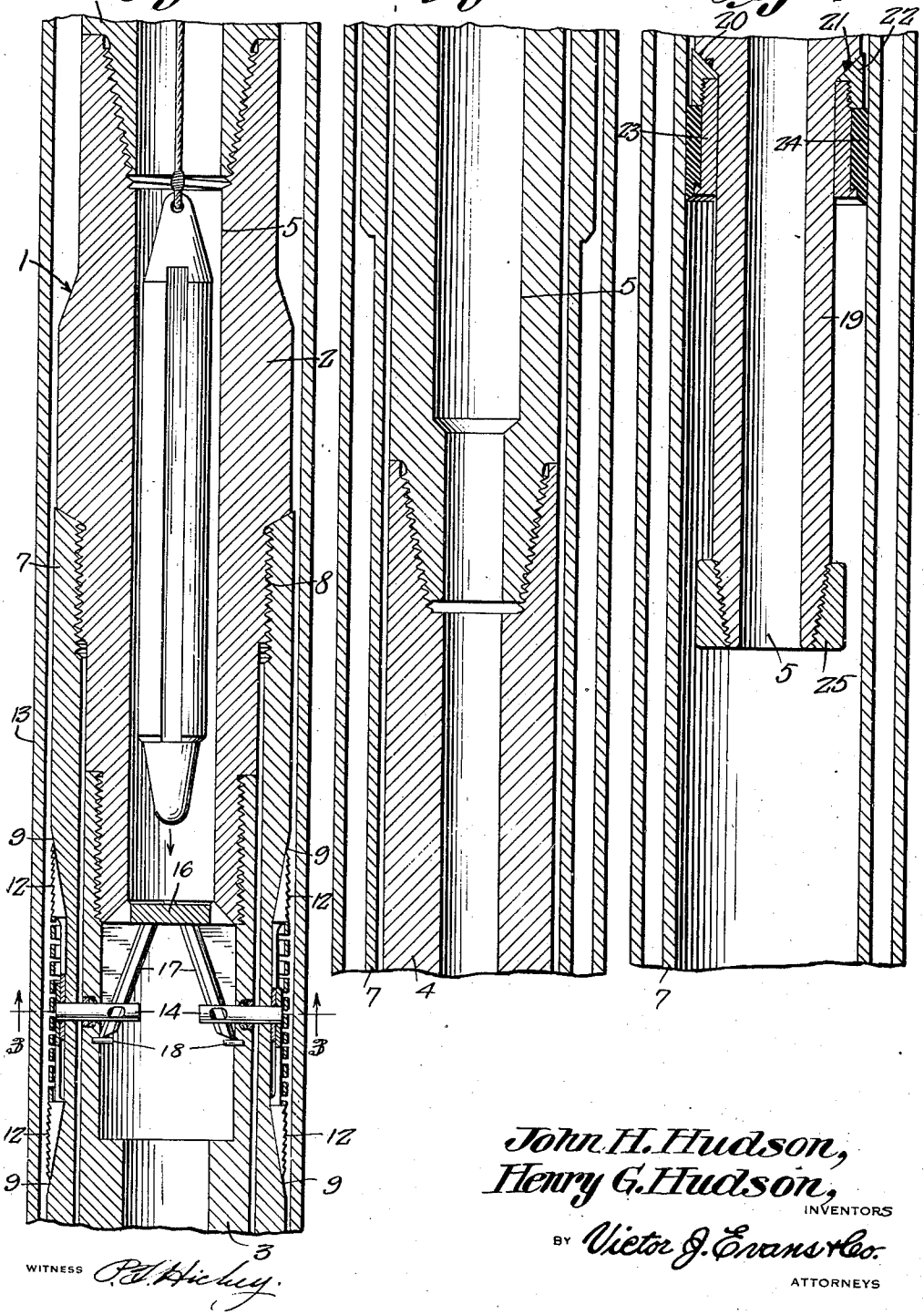
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SETTING AND CEMENTING TOOL

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Fig. 1. Fig. 1A. Fig. 1B.



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Fig. 2.

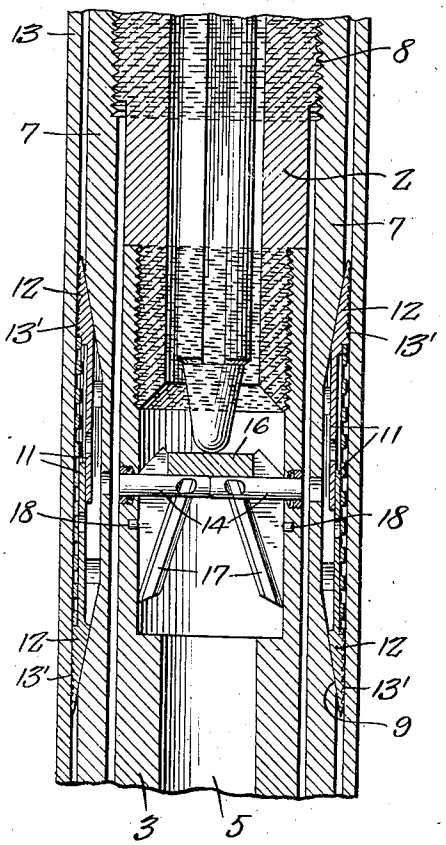


Fig. 3.

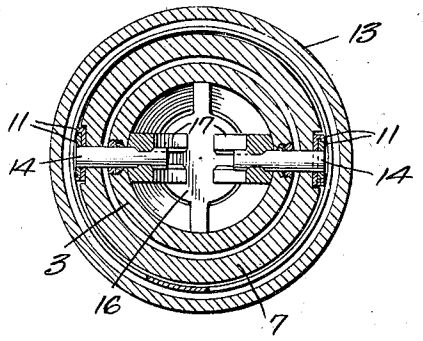
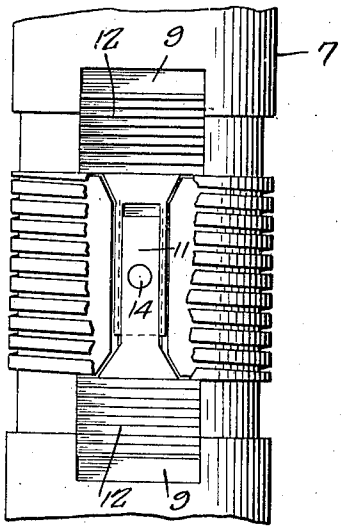


Fig. 4.



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SETTING AND CEMENTING TOOL

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Application June 22, 1938, Serial No. 215,275

3 Claims. (Cl. 166—1)

Our invention relates to improvements in well equipment and particularly to devices for anchoring or securing liners or the like in the casing of a well from vertical movement either upwardly or downwardly regardless of the pressure existing in the well.

While the invention has been devised for the purpose of anchoring a liner within a well to enable the latter to be cemented to the casing, it will be understood by those skilled in the art that the mechanism may be employed in any environment where it is desirable to make a tight connection between the interior of a well casing and the exterior of an internal member such as well tubing. Obviously, it will be especially useful in pumping or flowing wells.

One of the principal objects of the present invention is to provide an anchoring mechanism or tool which may be controlled from above the surface of a well in a manner to reliably secure the liner to the casing against vertical movement either upwardly or downwardly regardless of the pressure existing in the well or otherwise applied to said liner.

Another object of the invention is to provide a tool attachable to the liner of a well and lowerable therewith into the casing of the well and operable for effecting engagement of the liner with the casing and for detaching the tool from the liner.

A further object of the invention is to provide a tool equipped with means for preventing the entrance of cement or the like to within the liner during the cementing operation of the liner to the tube.

A special object of our invention is to provide a tool of the above described character which is simple in construction, durable in use, efficient in operation and economical in manufacture.

Other objects and advantages will be apparent from the following description, appended claims and annexed drawings.

Referring to the drawings wherein like reference characters designate like parts throughout the several views:

Figure 1 is a longitudinal sectional view of the upper section of the tool illustrating the same connected to the upper section of the liner and disposed within the casing of a well.

Figure 1*a* is a similar view to Figure 1, illustrating the intermediate section of the tool.

Figure 1*b* is a view similar to Figure 1*a*, illustrating the lower section of the tool.

Figure 2 is a view similar to Figure 1, but illustrating the bolts in retracted position and the liner anchored to the casing.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a fragmentary side elevation of the liner illustrating the slips and spring in retracted position.

In practicing our invention we provide an elongated cylindrical shaped tool 1 having upper, intermediate and lower sections 2, 3 and 4 respectively. The sections are fashioned with a longitudinally extending bore 5 having open ends. Each of said sections is connected together by right-hand screw threads. The upper end of the upper section is internally screw threaded for the reception of a lowering pipe 6. A liner or sleeve 7 is secured to the upper section between the ends thereof by means of left-hand screw threads 8. Said liner extends downwardly about the lower portion of the upper section 2, intermediate section 3 and lower section 4 as clearly illustrated in the drawings. Adjacent the lower end of the upper section 2 the sleeve is fashioned on the outer peripheral face with a pair of oppositely disposed recesses having upper and lower inclined end sections 9. Positioned within the recesses 9 are pairs of slips 11, each fashioned with gripping jaws 12 for engagement with the interior wall of the casing of the well as indicated at 13.

A spiral spring is mounted about the liner 7 between the jaws of the slips and normally tends to urge the jaws of each pair away from each other and into engaging position with the interior of the casing 13.

Mounted within the upper end of the intermediate section 3 and subjacent the lower end of the upper section 2 is a pair of oppositely extending bolts 14 having outer end sections extending through the wall of the section 3 into suitable apertures formed in the wall of the liner intermediate of the ends of the recesses. Said end sections extend beyond the inner wall of said recesses and engage within openings formed in the overlying end of the slips whereby to secure said slips in retracted position against the tension of the spring thereby maintaining the jaws out of engagement with the interior wall of the tube 13. The wall of the intermediate member 3 is provided with packing devices about the bolts 14 whereby to prevent leakage of liquid and the like from the bore 5 to between the outer face of the section 3 and interior face of the liner.

Normally seated against the lower end of the upper section 2 is a release head 16 provided with

downwardly and outwardly extending prongs 17 extending through openings in the bolts 14 and engaging shear pins 18 secured to the inner face of the member 3 as illustrated in Figure 1 of the drawings. The shear pins 18 normally support the head 16 against the lower end of the upper section 2 and serve to maintain the bolts 14 in extended position.

When it is desired to clamp or anchor the liner 7 to the casing 13 a weight is lowered through the lowering pipe 6 and impacted against the head 16 thereby causing the ends of the prongs 17 to shear the pins 18, permitting the head and prongs to move downwardly and effect retraction of the bolts 14 as clearly illustrated in Figure 2 of the drawings. When the bolts 14 are moved to retracted position the overlying ends of the slips are released and the respective slips of each pair moved away from each other by the action of the spring, thereby causing the jaws to engage the casing and thus anchor the liner to said casing.

When the bolts 14 are thus actuated to retracted position, the outer ends thereof are moved out of the openings in the liner thus releasing the tool from bolted engagement with the liner. The lower end section of the lower section 4 is fashioned with a reduced shank 19 forming an inclined shoulder 20 in which is mounted a gasket 21 for engagement with a similar shaped face of a nut 22 threadedly secured on the upper end of a piston 23 equipped on the outer face thereof with a band of yieldable material 24 engaging the inner wall of the liner as illustrated in Figure 1b. The piston 23 is slidably mounted on the shank 19 and the lower end of said shank is equipped with a nut 25 for limiting the downward movement of the piston relative to the shank.

In operation the tool sections 2, 3 and 4 are threaded together and secured onto the lower end of the lowering pipe 6. When thus assembled, the liner 7 is threaded onto the upper section 2 of the tool by means of the left-hand threads 8 and the slips are adjusted towards each other and the bolts moved outwardly to extended position. The pair of the shearing pins 18 are inserted in the wall of the section 3 forming a rest for the lower ends of the prongs 17 as clearly illustrated in Figure 1 of the drawings. The parts thus assembled are then lowered a desired distance into the casing of a well and the weight operated to effect shearing of the pins 18 whereby the jaws of the slips engage the casing as heretofore set forth. When the liner is thus anchored to the casing, the tool and lowering pipe are rotated in a direction to effect unthreading of the tool from the liner and the tool raised a sufficient distance within the liner to position the piston at the top of the liner thereby preventing cement and the like introduced into the casing about the exterior of the lining from entering the interior of said liner. When the cement is thus introduced about the liner, the tool is removed from the casing and the cement allowed to set about the liner, thus securing the latter to the casing.

What we claim is:

1. A device of the character described, comprising, a tool adapted to be secured to the end of a lowering pipe for lowering into a well casing, said tool fashioned with upper, intermediate and lower sections, a liner threaded to said upper section and extending downwardly about said intermediate and lower section, pairs of slips carried by said liner for engagement with said well casing, a spring carried by said liner and engaging said slips for urging the latter into casing engaging position, bolts slidably mounted in said intermediate section and normally extending through said liner for maintaining said slips in non-casing engaging position against the tension of said spring, and a bolt actuating device within said intermediate section and adapted to be operated by a weight for moving said bolt to retracted position to permit said slips to be actuated into casing engaging position by the action of said spring whereby to secure said liner to said casing.

2. A device of the character described, comprising, a tool adapted to be secured to the end of a lowering pipe for lowering into a well casing, said tool fashioned with upper, intermediate and lower sections, a liner threaded to said upper section and extending downwardly about said intermediate and lower section, pairs of slips carried by said liner for engagement with said well casing, a spring carried by said liner and engaging said slips for urging the latter into casing engaging position, bolts slidably mounted in said intermediate section and normally extending through said liner for maintaining said slips in non-casing engaging position against the tension of said spring, a bolt actuating device within said intermediate section and adapted to be operated by a weight for moving said bolt to retracted position to permit said slips to be actuated into casing engaging position by the action of said spring whereby to secure said liner to said casing, and a piston carried by said lower section and engaging the inner periphery of said liner for precluding admittance of foreign matter within said liner from above upon unthreading and partial withdrawal of said tool from said liner.

3. A device of the character described, comprising, a tool adapted to be secured to the end of a lowering pipe and lowered into a well casing, said tool fashioned with upper, intermediate and lower sections, a liner threaded to said upper section and extending downwardly about said intermediate and lower section, pairs of slips carried by said liner for engagement with said well casing, a spring carried by said liner and engaging said slips for normally urging the latter into casing engaging position, bolts mounted in said intermediate section and normally extending through said liner for maintaining said slips in non-casing position, shear pins mounted within said intermediate section subjacent said bolts, a bolt release head within said intermediate section and seated against said upper section, said head provided with inclined prongs extending through said bolts and engaging said pins whereby to maintain said bolts in extended position, said head adapted to be actuated downwardly by a weight to effect shearing of said pins by said prongs to effect retraction of said bolts to release said slips whereby the latter are moved to casing engaging position by the action of said spring.

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