

Feb. 24, 1959

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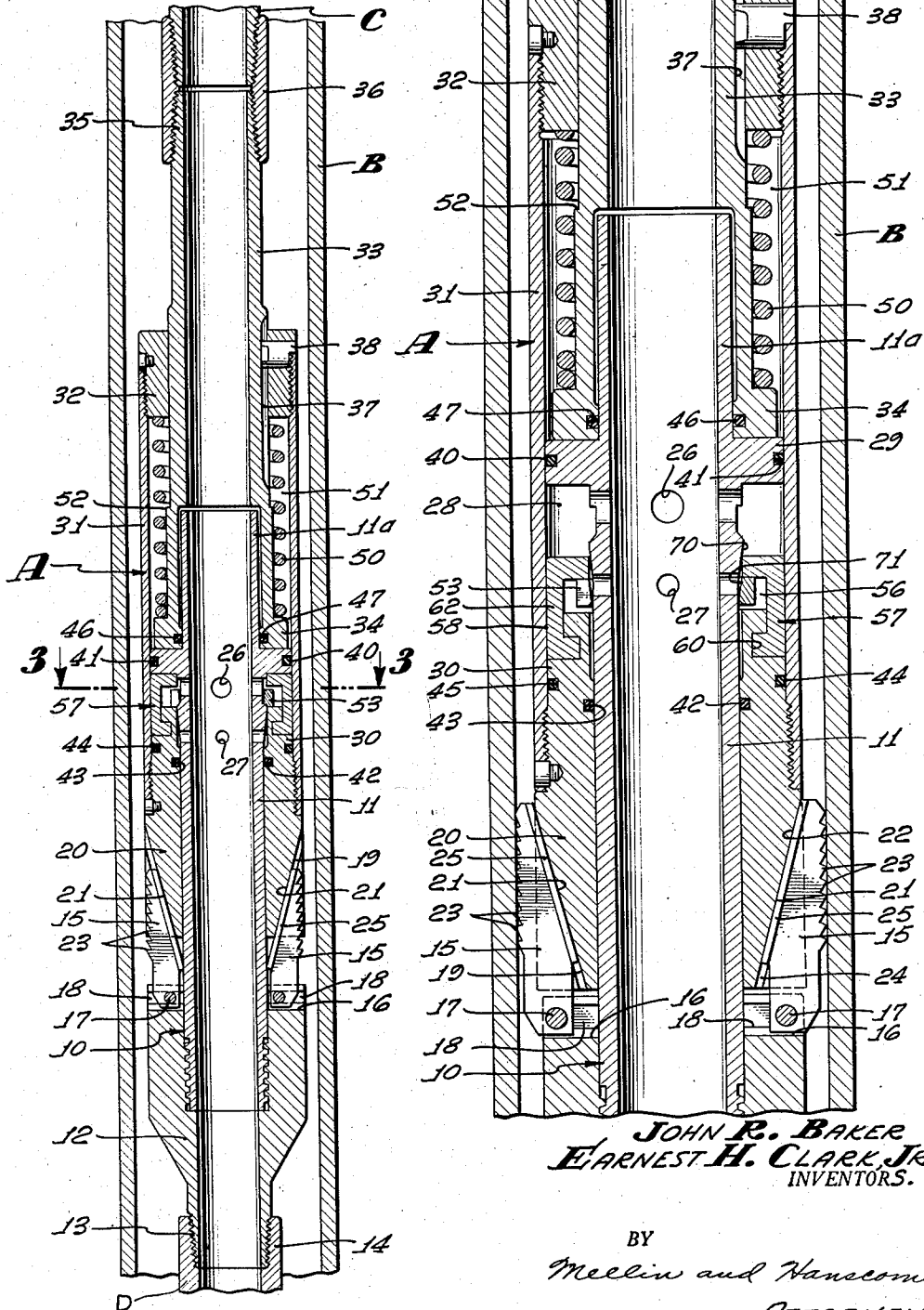
TUBING ANCHOR

Filed Oct. 17, 1955

3 Sheets-Sheet 1

FIG. 1.

FIG. 2.



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FIG. 3.

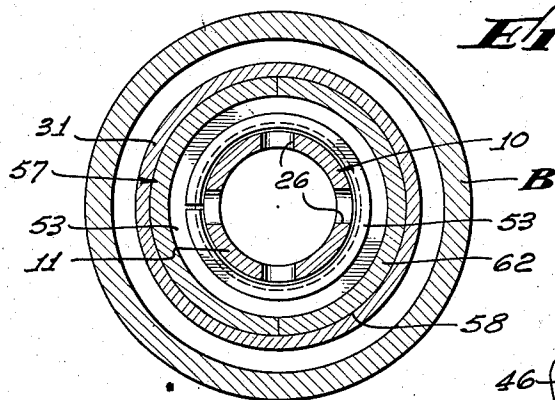


FIG. 5.

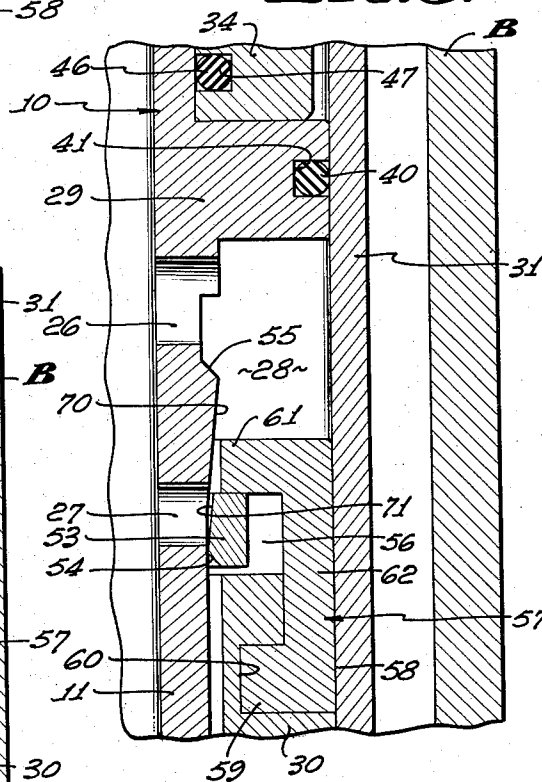
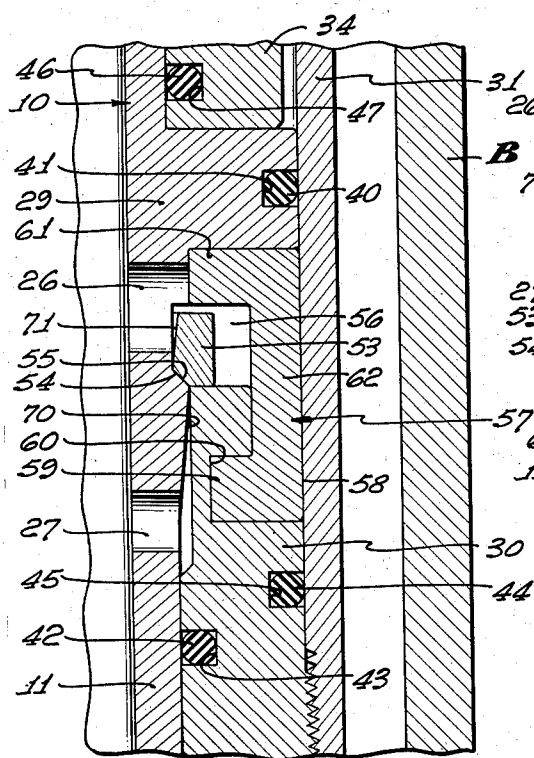


FIG. 4.



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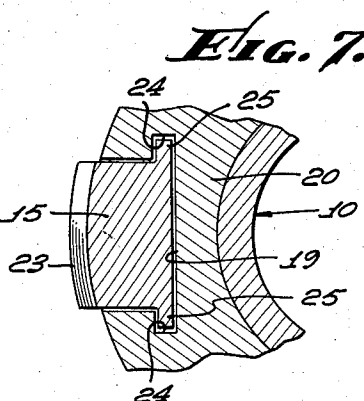
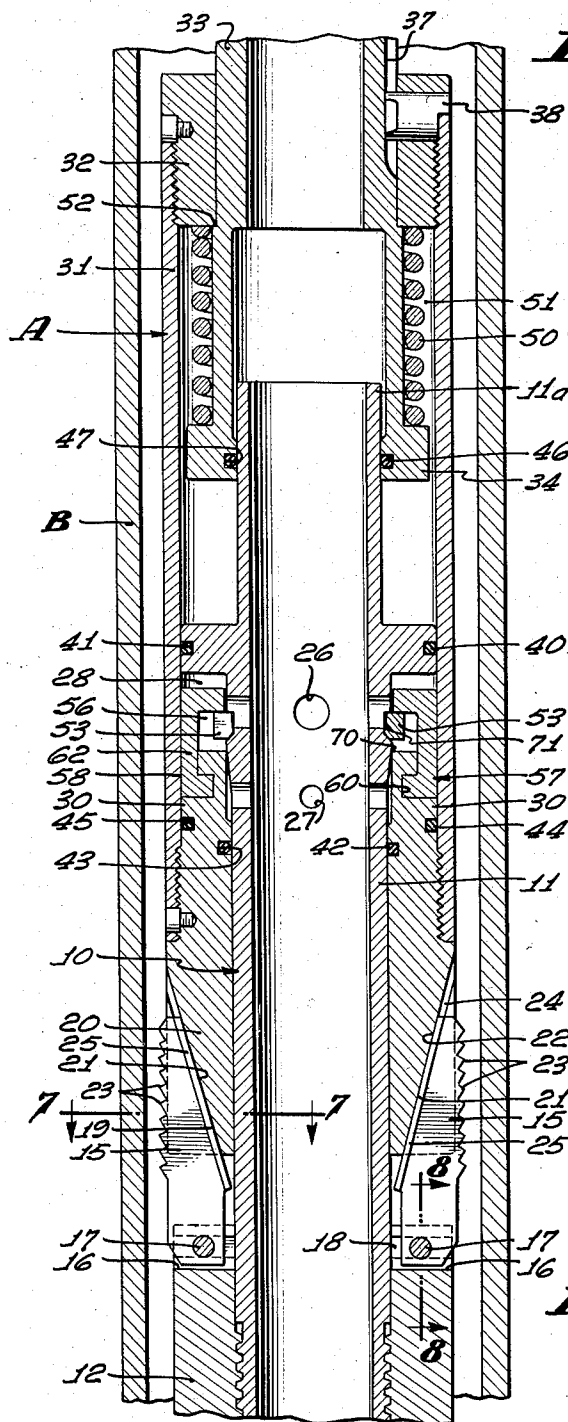
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TUBING ANCHOR

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Application October 17, 1955, Serial No. 540,732

15 Claims. (Cl. 166—212)

The present invention relates to subsurface well tools, and more particularly to apparatus for anchoring a tubular string in a well bore.

An object of the present invention is to provide a hydraulically actuatable retrievable apparatus for securing a tubular string to a well casing, or the like, against upward movement therein, in which the hydraulic pressure developed as a result of running the apparatus through the fluid in the well casing is prevented from expanding the slips or gripping members of the apparatus into engagement with the wall of the well casing. Accordingly, the slips are not dulled during lowering of the apparatus in the well casing and are effective to anchor the apparatus to the casing against upward movement therein, when the anchoring location in the casing has been reached, and to withstand high pressures tending to force the apparatus up the well casing.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of a form in which it may be embodied. This form is shown in the drawings accompanying and forming part of the present specification. It will now be described in detail, for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Fig. 1 is a longitudinal section through a tubing anchor, with its parts in retracted position;

Fig. 2 is a view similar to Fig. 1, on an enlarged scale, disclosing the apparatus anchored against the well casing;

Fig. 3 is an enlarged cross-section taken along the line 3—3 on Fig. 1;

Fig. 4 is an enlarged fragmentary longitudinal section through the latching portion of the apparatus, with the parts disposed in the position shown in Fig. 1;

Fig. 5 is a view similar to Fig. 4, with the parts disposed in the position illustrated in Fig. 2;

Fig. 6 is a view similar to Fig. 1, illustrating the apparatus being elevated in the well casing;

Fig. 7 is an enlarged fragmentary section taken along the line 7—7 on Fig. 6;

Fig. 8 is an enlarged fragmentary section taken along the line 8—8 on Fig. 6.

The tubing anchor A disclosed in the drawings is adapted to be secured to a well casing B, well liner, or the like, against upward movement therein, despite the presence of comparatively high pressure therebelow. The apparatus A is lowered in the well casing by means of a tubular string C, which can be formed of tubing or drill pipe. The lower end of the apparatus can be secured to a lower tool D, such as a retrievable packer, that is adapted to be anchored in packed-off condition in the well casing against downward movement therewithin. Inasmuch as the retrievable packer D forms no part of

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the present invention, only its upper tubular body portion is disclosed.

The tubing anchor A includes a body 10 consisting of an upper tubular body section 11, the lower end of which is threadedly secured within a lower body section 12. This latter section, in turn, has a lower threaded pin 13 adapted to be threadedly secured to the upper box end 14 of the body D of the lower tool. Spaced about the body of the tool are a plurality of slips 15, or corresponding gripping members, which can shift laterally between retracted and expanded positions. The lower ends of the slips are disposed within radial slots 16 in the upper portion of the lower body section 12, the slips being guided in their radial movement by pins 17 secured to their lower portions, each pin projecting in opposite directions from the side faces of a slip and into opposed grooves 18 on opposite sides of the body slot 16. The disposition of the pins into these grooves 18 permits the slips 15 to slide radially relative to the body section 12, while preventing any substantial longitudinal movement of the slips with respect to this body section.

The slips 15 extend upwardly from the lower body section, being received within circumferentially spaced grooves 19 provided in an expander member 20. The base 21 of each groove is inclined in a downward and inward direction, coacting with a companion inclined surface 22 on each slip, in order that downward movement of the expander 20 within the slips 15 will urge the latter radially outward, until their wickers or teeth 23 are in firm anchoring engagement with the wall of the well casing B. Relative upward movement of the expander 20 with respect to the slips 15 will effect retraction of the latter from the wall of the well casing. Such retraction will occur, inasmuch as the side walls of the expander grooves 19 are provided with grooves 24 receiving tongues 25 on the slips, thus forming a positive slidable connection between the expander and the slips.

The expander 20 is shifted downwardly within the slips 15, to force the slips into anchoring engagement with the wall of the well casing, by virtue of fluid under pressure within the tubular string C and the body 10 of the tool. The fluid under pressure will pass through upper and lower sets of ports 26, 27 through the upper body section 11 into a cylinder space 28 defined between an upper annular piston 29 integral with and extending outwardly from the body section above the ports 26 and the upper portion 30 of the expander which may be considered to be the head of the hydraulic cylinder, and also defined between the periphery of the body 11 and a cylinder sleeve or housing 31, the lower end of which is threadedly secured to the expander head 30, and which extends upwardly along and above the piston 29 to a substantial extent.

The upper end of the cylinder sleeve 31 is threadedly secured onto a head 32 that is slidable along a tubular mandrel 33, the lower portion 34 of which is telescoped over the upper body section 11 above the piston 29, and the upper end of which is formed as a threaded pin 35 threadedly secured to a coupling 36 that is, in turn, threaded onto the lower end of the tubular string C. It may be desirable to transmit the turning effort of the tubular string C and mandrel 33 to the lower tool D secured to the lower body section 12. For that purpose, the mandrel 33 may be provided with a longitudinally extending groove or keyway 37 receiving a key or pin 38 secured to the upper head 32. Turning effort imposed on the mandrel 33 will be transmitted through the key 38 to the upper head 32, and from the latter, through the cylinder sleeve 31, expander 20 and slips 15 to the lower body section 12, from where the turning motion is transferred to the lower packer body D.

Fluid is prevented from leaking from the cylinder space

28, except through the ports 26, 27, by the provision of suitable seal members. A seal ring 40, such as a rubber or rubber-like O ring, is disposed in a piston groove 41, slidably and sealingly engaging the inner wall of the cylinder sleeve 31. Fluid is prevented from leaking in a downward direction between the cylinder head 30 and upper body section 11 by providing an internal seal ring 42, such as a rubber or rubber-like O ring, in an internal groove 43 in the cylinder head, which slidably seals against the periphery of the upper body section. A thread seal 44 may be provided in a groove 45 in the cylinder head 30, engaging the wall of the cylinder sleeve 31 to prevent leakage through the threaded connection between the sleeve and the cylinder head or expander 20. Likewise fluid is prevented from passing between the mandrel 33 and the body portion 11a above the piston 29 by a suitable seal ring 46, such as a rubber or rubber-like O ring located in an internal groove 47 in the lower head 34 of the mandrel, which slidably and sealingly engages the periphery of the body 11a above the piston.

In the operation of the apparatus A so far described, it is run in the well casing B by the tubular string C, with its lower body section 12 attached to the body D of the lower tool, and with its expander 20 disposed in an upward position with respect to the slips 15, which are held in a retracted position. As assurance against the dropping of the expander 20 by gravity along the slips 15, a helical compression spring 50 may be disposed in the annular space 51 between the mandrel 33 and the cylinder sleeve 31, with its lower end bearing against the lower mandrel head 34 and its upper end against the upper cylinder head 32. This spring will tend to maintain the expander 20 in its elevated position. The apparatus is lowered through the fluid in the well casing until the location is reached at which it is to be anchored to the latter. When such location is reached, the tubing string C is suitably manipulated to anchor the lower packer D in packed-off condition within the well casing. Thereafter, pressure may be imposed on the fluid in the tubular string C, mandrel 33 and body 10 of the tool, such fluid under pressure passing through the ports 26, 27 and into the cylinder space 28, to act in a downward direction on the cylinder head 30 and shift the expander 20 downwardly within the slips 15, expanding the latter outwardly into anchoring engagement with the wall of the well casing.

It is to be noted that the wickers or teeth 23 on the slips 15 face in an upward direction, so as to anchor the slips to the casing against upward movement with respect thereto. Upward movement of the lower packer D, as a result of pressure in the casing therebelow, is prevented in view of the anchoring of the slips against the well casing. Such pressure is also present within the body 10, and is acting in a downward direction on the expander head 30 to hold the expander 20 wedged behind the slips 15, preventing their retraction from the well casing.

When the apparatus A is to be released from the well casing B, the pressure is relieved and an upward pull taken on the tubular string C, which will be transmitted to the mandrel 33, shifting the latter upwardly along the body 10 and the cylinder sleeve 31. The mandrel is provided with an upwardly facing shoulder 52, which will engage the lower end of the upper cylinder head 32, whereupon further upward movement of the mandrel 33 is transmitted through the head 32 and cylinder sleeve 31 to the expander 20, to raise the latter with respect to the slips 15 and effect a shifting of the slips to their retracted position. During upward movement of the apparatus A in the well casing B, the expander 20 will be held in its upper position relative to the slips 15, to insure that the latter will remain in their retracted position. If it is desired to again anchor the slips to the casing, it is merely necessary to relower the mandrel 33 along the body 10, to reengage the lower head 34 with the piston 29, and then provide pressure in the tubular string C, 75

mandrel 33 and body 10 to again cause such fluid pressure to shift the expander 20 downwardly within the slips 15.

In the lowering of the apparatus through the fluid in the well casing, it has been found that a pressure differential is developed within the body 10 of the tool which can shift the cylinder 31 and expander 20 downwardly relative to the body 10 against the force of the spring 50, to engage the slips 15 with the wall of the well casing. With the slips engaging the wall of the well casing, downward movement of the apparatus will slide the wickers 23 along the casing, which might result in their being dulled when the location in the well casing is reached at which the apparatus is to be anchored. Accordingly, the slips 15 may be unable to withstand any substantial upwardly directed forces or pressure imposed thereon.

The present invention seeks to overcome the aforementioned difficulty by preventing the expander 20 from being shifted downwardly within the slips 15 until such action is desired. A latching device is incorporated between the expander 20 and the body 10 of the tool, which is effective to hold the expander in an upward position and which must be subjected to substantial pressures before its release can occur. The latching device consists of a split, inherently contractile ring 53 placed around the body 10 between the expander 20 and the piston 29. This ring has a lower surface 54 inclined at a substantial angle in a downward and outward direction, and this holding surface 54 is adapted to engage a companion holding surface or shoulder 55 provided on the body section 11, preferably immediately below the upper set of ports 26. The ring 53 is contained within an internal groove 56 formed between a coupling or retainer ring 57 and the upper end of the expander or cylinder head 30. Thus, the coupling ring 57 is made of two halves, with its periphery 58 engaging the inner wall of the cylinder sleeve 31. This ring has a lower, inwardly directed flange 59 received within an external groove 60 in the cylinder head, and an upward inwardly directed flange 61 spaced above the upper end of the cylinder head 30 and also extending across the upper end of the latch ring 53. The intermediate web portion 62 of the coupling ring between its upper and lower flanges 61, 59 is disposed radially outward of the periphery of the latch ring 53 to permit outward expansion of the latter to disengage its inclined holding surface 54 from the body shoulder 55.

When the apparatus A is run in the well casing B, the latch ring 53 is located with its lower inclined surface 54 in engagement with the companion body shoulder 55. At this time, the expander 20 is in its uppermost position within the slips 15, with the upper end of the coupling ring 57 disposed adjacent the body piston 29. The inherent, contractile force of the latch ring 53 and the angle of inclination of the body shoulder 55 are such as to require a substantial downward force by the upper flange 61 on the latch ring to expand the ring outwardly free of the holding shoulder 55. As an example, the force required to free the latch ring from the shoulder may correspond to a pressure differential of 250 to 350 p. s. i. within the annular cylinder space 28.

During lowering of the apparatus in the well casing, pressure differential will be developed in the body 10, but the total force of such pressure acting in the cylinder space 28 in a downward direction on the expander 20 will never reach the unit pressure that is necessary to release the latch ring 53 from the holding shoulder 55. The downward force of the pressure on the head 30 will cause the upper ring flange 61 to engage the ring 53, which will effectively prevent downward movement of the expander 20 within the slips 15. Accordingly, the expander will remain in its upper retracted position with respect to the slips.

When the location is reached in the well casing at which the slips 15 are to be expanded into anchoring engagement with the wall of the well casing, the lower packer D is set and sufficient pressure differential is developed

within the packer body 10 to overcome the holding force of the latch ring 53. Such pressure will act in a downward direction on the cylinder head 30, being exerted through the upper flange 61 on the ring 53. Because of the inclined coaction between the lower end 54 of the ring and shoulder 55, the pressure will eventually cause the ring 53 to be expanded outwardly off the shoulder 55, whereupon the cylinder 31, 30 is shifted downwardly relative to the body 10, to shift the expander within the slips 15 and expand the latter outwardly into anchoring engagement with the wall of the well casing B. During downward movement of the cylinder 30, 31 the ring 53 will also slide downwardly along the body 11.

It is preferred that the body have a relatively steep tapered periphery 70 that inclines in a downward and inward direction from the holding shoulder 55 and along which a companion tapered surface 71 of the ring 53 can slide, to permit the ring to retract to some extent. The coaction between this relatively steep body surface 70 and the ring surface 71 will then cause the ring 53 to support the body 10 of the tool, and the apparatus D secured therebelow from the expander 20 and the anchored slips 15, and will prevent the force of gravity, or other relatively light forces, as well as the force of the compression spring 50, from inadvertently shifting the parts back to a retracted position, in the event the pressure within the body 10 of the tool is relieved, or is reduced to any substantial extent.

When it is desired to retract the slips 15 from the well casing, the pressure is relieved and an upward pull is taken on the tubing string C and mandrel 33. The mandrel shoulder 52 moves upwardly against the force of the compression spring 51, which exerts a comparatively light force, until the mandrel shoulder engages the upper cylinder head 32. An upward pull can now be taken on the cylinder 31 and the expander 20, to shift the latter upwardly relative to the slips 15 and the body 10 of the tool. The latch ring 53 will not offer very great resistance to such upward movement, in view of the relatively steep taper or inclination of the coacting surfaces 71, 70 on the ring 53 and the body 10. When the expander 20 has been shifted upwardly to its fullest extent, the slips 15 will be completely retracted and the latch ring 53 can again snap back into its position above the holding shoulder 55, to again preclude inadvertent downward movement of the expander 20 within the slips 15. The apparatus can now be elevated to a new location in the well casing or removed entirely therefrom; or, if desired, it can be lowered to another setting position within the well casing. During such lowering movement, any fluid pressure differential within the body 10 of the tool cannot effect a downward shifting of the expander 20 within the slips 15.

It is to be noted that longitudinally spaced sets of ports 26, 27 are provided through the body 10 with the upper set of ports 26 being disposed at or slightly above the uppermost position that the latch ring 53 can occupy, and the lower set of ports being disposed immediately above the seal ring 42 on the cylinder head 30 when the latter is in its uppermost position. This arrangement is provided to insure against any solid particles that might have passed into the cylinder space 28, as a result of downward movement of the cylinder 31, 30 along the body 10, preventing relative upward movement of the cylinder along the body. Any such particles can be forced out of the cylinder space 28 through the upper sets of ports 26 when the cylinder 31, expander 20 and latch ring 53 are elevated along the body to effect reshifting of the slips to their retracted position. The upper set of ports 26 precludes the presence of any dead pockets or spaces into which sand particles or the like can pack.

It is, accordingly, apparent that a tubing anchor has been provided which is actuable hydraulically to expand the slips into anchoring engagement with the wall

of the well casing, and in which hydraulic forces incident to the lowering of the apparatus through the fluid in the well casing are incapable of anchoring the slips against the well casing. Thus, the slips are prevented from being inadvertently expanded against the wall of the well casing during descent of the apparatus in the latter, preventing dulling of the teeth or wickers of the slips, and insuring that they will be in appropriate condition for anchoring the apparatus to the well casing securely, and with a capability to withstand comparatively high pressure that might be imposed on the anchor A and tending to elevate it in the well casing.

The inventors claim:

1. In a well tool: a body; expander means on said body; slips cooperable with and shiftable with respect to said expander means for anchoring the tool to the wall of a well casing; fluid actuated means for moving said slips and expander means in one direction relative to each other to shift said slips to casing anchoring position; said slips having casing engaging wickers facing in the same direction as said slips are movable relative to said expander means; latch means operatively connected to said expander means for preventing relative movement between said slips and said expander means and releasable in response to a predetermined pressure imposed upon said expander means to permit relative movement between said slips and expander means; and means for shifting said fluid actuated means to relatively move said slips and expander means in the opposite direction to reset said latch means.

2. In a well tool: a body; an expander on said body and having an expander surface inclined downwardly and inwardly; slips engageable with said surface and shiftable relative to said expander for anchoring said tool to the wall of a well casing; fluid actuated means for relatively moving said expander downwardly within said slips to expand said slips against the wall of the well casing; said slips having upwardly facing wickers on their exterior surfaces; latch means operatively connected to said expander for preventing downward movement of said expander relative to said slips and releasable in response to a predetermined pressure imposed upon said expander to permit downward movement of said expander relative to said slips; and means for elevating said fluid actuated means with respect to said body to reset said latch means in its condition preventing downward movement of said expander relative to said slips.

3. In a well tool: a body; an expander on said body and having an expander surface inclined downwardly and inwardly; slips engageable with said surface for anchoring said tool to the wall of a well casing; fluid actuated means for relatively moving said expander downwardly within said slips to expand said slips against the wall of the well casing; said slips having upwardly facing wickers on their exterior surfaces; releasable latch means engageable with said body and expander to prevent downward movement of said expander relative to said slips, said latch means being releasable in response to a predetermined fluid pressure imposed on said expander and urging it downwardly of said body; and means for elevating said fluid actuated means with respect to said body to reset said latch means in its condition preventing downward movement of said expander relative to said slips.

4. In a well tool: a tubular body; an expander slidable longitudinally on said body and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of the well casing; means responsive to fluid pressure in said body for shifting said expander downwardly of said body to expand said slips outwardly; latch means engageable with said body and shifting means and releasable in response to a predetermined force exerted on said latch means by said shifting means for resisting downward movement of said expander along said body; and means

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for elevating said shifting means with respect to said body to re-engage said latch means with said body to again resist downward movement of said expander along said body.

5. In a well tool: a tubular body; an expander slidable longitudinally on said body and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; means responsive to fluid pressure in said body for shifting said expander downwardly of said body to expand said slips outwardly; latch means carried by said shifting means and engageable with said body for resisting downward movement of said expander along said body, said latch means being releasable from said body in response to a predetermined force exerted on said latch means by said shifting means; and means for elevating said shifting means with respect to said body to re-engage said latch means with said body to again resist downward movement of said expander along said body.

6. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; means coupling said slips to said body to prevent relative longitudinal movement between said slips and body; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; and latch means carried by said cylinder and engageable with said body to resist downward movement of said expander along said body, said latch means being releasable in response to a predetermined force imposed thereon by said cylinder.

7. In a well tool: a tubular body having a piston and upper and lower ports below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said ports into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; and latch means carried by said cylinder and engageable with said body adjacent said upper port to resist downward movement of said expander along said body, said latch means being releasable in response to a predetermined force imposed thereon by said cylinder.

8. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; and a split, inherently contractible latch ring carried by said cylinder and engageable with an upwardly facing shoulder on said body to resist downward movement of said expander along said body, said latch ring being releasable from said shoulder in response to a predetermined downward force imposed thereon by said cylinder.

9. In a well tool: a tubular body having a piston and upper and lower ports below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said

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expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said ports into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; and a split, inherently contractible ring carried by said cylinder and engageable with an upwardly facing shoulder on said body adjacent said upper ports to resist downward movement of said expander along said body, said latch ring being releasable in response to a predetermined downward force imposed thereon by said cylinder.

10. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; and a split, inherently contractible latch ring carried by said cylinder and engageable with an upwardly facing shoulder on said body to resist downward movement of said expander along said body, said latch ring being releasable from said shoulder in response to a predetermined downward force imposed thereon by said cylinder; said body having a downwardly converging surface engaged by said latch ring upon its release from said shoulder to resist upward movement of said expander along said body.

11. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; latch means carried by said cylinder and engageable with said body to resist downward movement of said expander along said body, said latch means being releasable in response to a predetermined force imposed thereon by said cylinder; and a mandrel telescoped over said body above said piston and engageable with said cylinder to elevate said expander along said body.

12. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; latch means carried by said cylinder and engageable with said body to resist downward movement of said expander along said body, said latch means being releasable in response to a predetermined force imposed thereon by said cylinder; a mandrel telescoped over said body above said piston and engageable with said cylinder to elevate said expander along said body; and spring means between said mandrel and cylinder tending to elevate said cylinder and expander with respect to said mandrel and body.

13. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to

be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; a split, inherently contractible latch ring carried by said cylinder and engageable with an upwardly facing shoulder on said body to resist downward movement of said expander along said body, said latch ring being releasable from said shoulder in response to a predetermined downward force imposed thereon by said cylinder; and a tubular mandrel telescoped over said body above said piston and engageable with said cylinder to elevate said cylinder and expander with respect to said body.

14. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; and a split, inherently contractible latch ring carried by said cylinder and engageable with an upwardly facing shoulder on said body, said latch ring being releasable from said shoulder in response to a predetermined downward force imposed thereon by said cylinder; said body having a downwardly converging surface engaged by said latch ring upon its release from said shoulder to resist upward movement

of said expander along said body; and a tubular mandrel telescoped over said body above said piston and engageable with said cylinder to elevate said cylinder and expander along said body to relocate said latch ring in a position engaging said body shoulder.

15. In a well tool: a tubular body having a piston and a port below said piston; an expander slidable longitudinally on said body below said piston and having an expander surface inclined downwardly and inwardly; slips carried by said body and coacting with said expander to be shifted outwardly into anchoring engagement with the wall of a well casing; a cylinder secured to said expander and extending upwardly therefrom along said piston; fluid under pressure being adapted to pass through said port into said cylinder to shift said expander downwardly of said body to expand said slips outwardly; latch means carried by said cylinder and engageable with said body to resist downward movement of said expander along said body, said latch means being releasable in response to a predetermined force imposed thereon by said cylinder; and means for elevating said cylinder along said body to re-engage said latch means with said body to again resist downward movement of said expander along said body.

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