

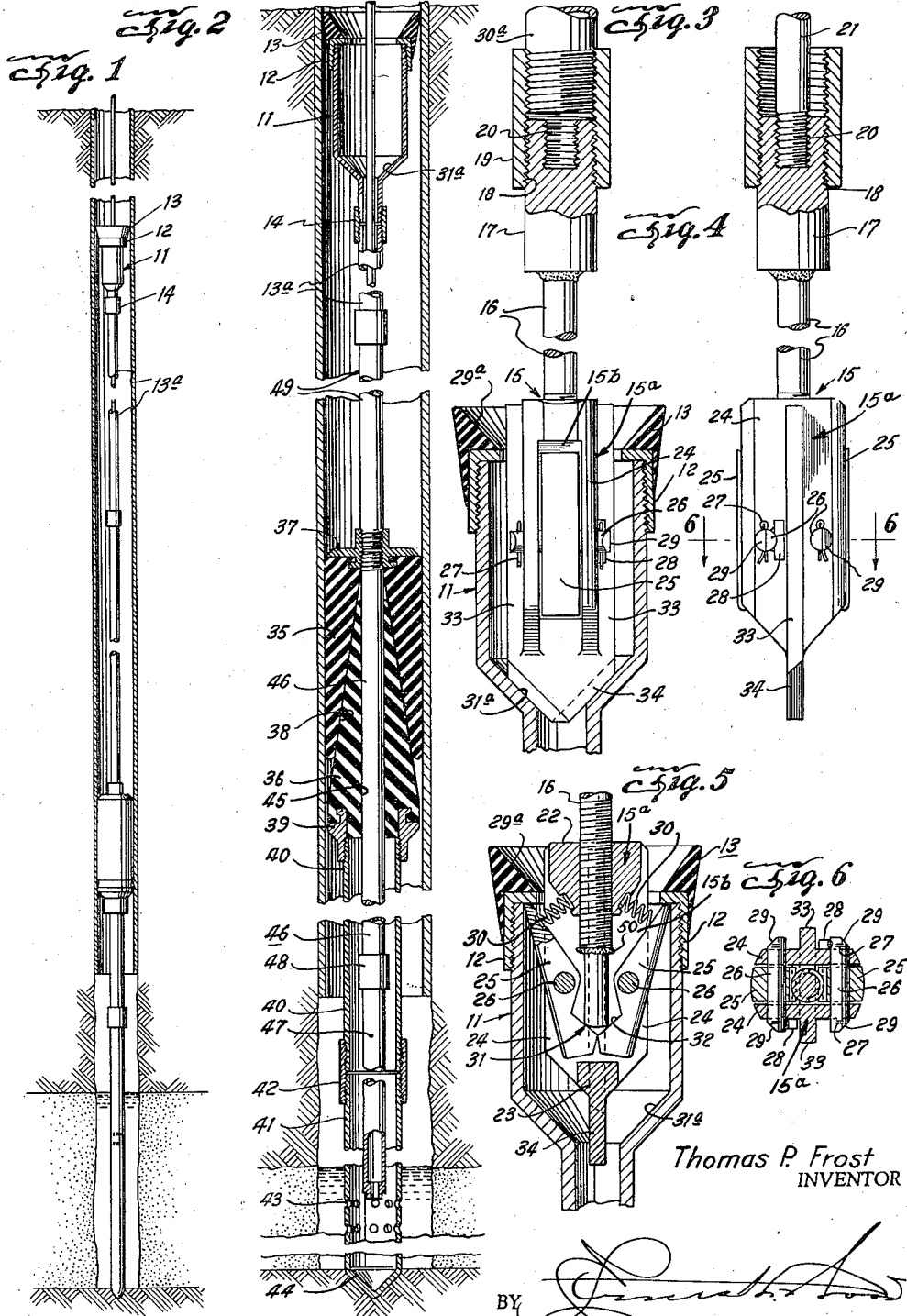
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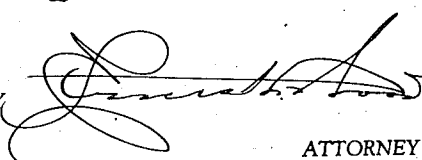
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WELL TOOL RUNNING AND RETRIEVING DEVICE

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WELL TOOL RUNNING AND RETRIEVING DEVICE

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This invention relates to oil field tools and equipment, particularly to a device for running and retrieving well tools in cased wells.

The principal object of the invention is to provide a running and retrieving device for well tools, so designed and constructed that it may be pre-set at the surface for release engagement with a tool already in the well to effect its removal. Moreover, a device as specified whose release from a tool in situ can be effected from the surface.

Another object of the invention is to provide a tool of the character described, designed primarily for running and retrieving a bottom hole set-down packer and pumping assembly described in my co-pending application filed February 28, 1955, Serial Number 490,775, and now abandoned, although the present device is not limited to the particular adaptation.

Other objects and advantages will be apparent to those skilled in the art from the following description of the invention and from the accompanying drawing and the claims.

In the drawing:

Figure 1 is an elevational view of the bottom hole setdown packer and pumping assembly described in the above identified application, with a different form of connector.

Figure 2 is a vertical sectional view of the assembly shown in Figure 1 on a larger scale but longitudinally contracted.

Figure 3 is an elevational view of the running and retrieving tool in place in the connector shown in Figure 2, with its latching jaws contracted.

Figure 4 shows the running and retrieving tool only of Figure 3, rotated ninety degrees.

Figure 5 is a vertical sectional view of Figure 3 with the running and retrieving tool in part section, rotated ninety degrees.

Figure 6 is a cross-section on the line 6—6 of Figure 4 looking in the direction indicated.

In Figure 3 the running and retrieving tool is shown attached to tubing, while in Figure 4 it is shown attached to a sucker rod.

The present invention is shown in conjunction with modified forms of the connector and the bottom hole packer, described in the above identified application for the purpose of illustrating one adaptation of the invention.

Continuing with a more detailed description of the drawing, reference numeral 11 in Figures 1, 2, 3 and 5 denotes a swedge-nipple threaded on both ends. Mounted on the top of the swedge-nipple 11 is a collar 12, having attached to its upper face a tapered rubber sealing ring 13. Tubing 13a extending to the packer and pump assembly is attached to the lower threaded end of the swedge-nipple 11 by the coupling 14, as shown in Figures 1 and 2.

In Figures 3 and 4 the running and retrieving tool 15 has attached at the top a rod having a bolt-head 17. The

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bolt-head 17 has an outside thread 18 upon which a tubing coupling 19 may be screwed, and an inside thread 20 into which a sucker-rod 21 may be screwed, as shown. The running and retrieving tool 15 has a body 15a comprising the portions 22 and 23, Figure 5, and the side pieces or portions 24 which joint together portions 22 and 23. Body 15a has an opening 15b within which the movable latching jaws 25 operate, as shown in Figures 5 and 6.

The movable latching jaws 25 are supported on the pins 26 which extend through the side pieces 24. The pins 26 are held in position along their axes by the cotter-pins 27 and are kept from rotating by the blocks 28 fastened to them. These pins 26 have a bevel 29 on each end to keep them within the clearance circle formed by the tool body. The movable latching jaws 25 are held open by the springs 30 acting against block portion 22 to engage under the internal flange 29a of the collar 12 when the rod 16 is in the position shown in Figure 5. The rod 16 has a lower part 31 rounded on its end which acts upon the surface 32 of each of the latching jaws 25 when the rod 16 is turned to move downwardly through the block portion 22. The ribs 33 extend along the vertical centerline of the side pieces 24 from the block portion 22 to below the lower block portion 23 to form a tapered blade 34.

The running and retrieving tool operates as follows: The rod 16 is rotated, causing its lower end 31 to bear against the inclined convergent surfaces 32 of the movable latching jaws 25 which rotate about their pivot pins 26 and assume positions in parallelism with the longitudinal axis of the tool against the resistance of springs 30, as indicated in Figures 3 and 4. The running and retrieving tool is then placed in the connector 11 and the rod 16 is turned in the opposite direction sufficiently to raise its end 31 to the position shown in Figure 5, thus allowing the jaws 25 to be biased by springs 30 to open position and engage the flange 29a of the collar 12 as illustrated. The string may now be lowered in the customary manner, either by using tubing 30a as in Figure 3 or the sucker-rod 21 as in Figure 4. When the equipment suspended by the tool strikes the bottom of the hole, the blade engages the tapered part of swedge-nipple 11. Consequently, when rod 16 is turned so that it tends to move downwardly, the blade 31 bites into the tapered portion 31a of the connector 11, preventing the tool from turning, so that rod 16 can be screwed downwardly sufficiently to cause the latching jaws 25 to close, as already described. This allows withdrawal of the tubing 30a or sucker-rod 21, as the case may be, and with it the running and retrieving tool attached. The pumping equipment may now be lowered into the working barrel, which may be incorporated in the tubing assembly, either above or below the packer, with the necessary sucker rod. The well is then ready for operation.

To retrieve the packer and pump assembly, the rod and pumping equipment are removed. The running and retrieving tool is now lowered into the well casing with the latching jaws 25 extended and when the jaws are brought into contact with the annular flange 29a of the connector 11, they are thereby contracted to permit the tool to enter the connector whereupon its springs 30 will again expand its jaws outwardly into engagement with the undersurface of the flange 29a, enabling the packing assembly and its associated elements to be withdrawn from the well.

To prevent the rod 16 from backing out of the threaded bore of the block portion 22, an annular bead 50 is formed on the rod below the threads thereon and is of a diameter greater than the bore through which the rod is threaded.

The packer assembly referred to above is comprised

of two principal parts 35 and 36 in Figure 2 which are correspondingly tapered for telescoping relationship and both are preferably made of rubber. The upper part 35 is molded on a special topped flange 37 and has a coniform cavity 38 formed within it which extends from the special flange 37 downwardly to its lower end. The lower part 36 is an elongated conical expander or wedge molded on a special collar or coupling 39. A pipe 40 connects to the coupling 39 at its upper end and to a perforated landing nipple 41 at its lower end by a conventional coupling 42. The landing nipple 41 is closed at its tapered lower end 44. The bore 45 of the lower part 36 of the packer assembly is made sufficiently large to allow free movement axially of the passing tube 46, which connects at its upper end to flange 37 of the part 35 and at its lower end to the production tube 47 by means of a coupling 48. Obviously, the working barrel 49 may be connected between the coupling 48 and the production tube 47, if desired. In either case, the coupling 48 will be used for the connection to the passing tube 46. This coupling 48 acts as a stop when the passing tube 46 is pulled upwardly through the lower part 36, bearing against the special coupling 39 and carrying the parts 36 and 39 with it. The free passage of this tube 46 through the upper part 35 of the packer makes possible the expansion or freeing of the packer, according to whether the upper part 35 is raised or allowed to settle from the weight of the assembly above it, as previously explained.

The packer assembly shown in Figure 2 is reverse to the showing of the packer assembly of the afore-said application. This reversed form of packer assembly is especially advantageous, since, in this form, sand and other foreign matter, which may be scraped from the inside of the casing when the packer opens upon being withdrawn, does not fall into wedging elements of the packer.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed to fall within the scope and meaning of the appended claims is also considered to be within the spirit and intent of the invention.

What is claimed is:

1. A running and retrieving tool, comprising a body having an opening therein, a rod received through the said body above said opening, means connecting the body and rod for suspending the body from the rod and permitting movement of the rod downwardly with respect to the body upon landing of the body, jaws mounted on said body for pivotal movement between a latching position in which an upper end of each jaw is extended outwardly of the body and a releasing position in which said upper end is retracted toward said body, a lower end of each jaw being disposed inwardly within said opening in the latching position of such jaw, spring means urging said jaws toward latching position, and a part on the lower end of the rod engageable with the lower ends of said jaws for moving them to releasing position upon downward movement of the rod relative to the body.

2. A tool of the character defined in claim 1, wherein the lower end of each of said jaws is provided with an inwardly and downwardly convergent face with which said rod part is engageable.

3. A tool of the character defined in claim 1, wherein said rod is rotatable and threadedly received through said body.

4. Well apparatus, comprising a tubular member for suspending equipment within a well, an inwardly extending flange on the tubular member defining an opening through the upper end thereof, and a tool for running and retrieving said tubular member, said tool including a body having an opening therein and being landable within said opening of the tubular member, jaws mounted on said body for pivotal movement between a position

in which one end of each jaw is extended outwardly of the body for latching beneath the flange of the tubular member, when the body is landed within the opening of the tubular member, and a releasing position in which said one end of each jaw is retracted from beneath said flange to permit removal of the body from the well separately from said tubular member, the other end of each jaw being disposed inwardly of said body opening in the latching position thereof, spring means between the body and jaws urging the jaws toward one of said latched and releasing positions, and a rod connected to and suspending the body within the well and movable vertically with respect to said body upon landing of said body within the well, said rod having a part within said body opening engageable with said other ends of the jaws moving them into said other position upon movement of the rod in one vertical direction relative to the body.

5. Well apparatus, comprising a tubular member for suspending equipment within a well, an inwardly extending flange on the tubular member defining an opening through the upper end thereof, and a tool for running and retrieving said tubular member, said tool including a body having an opening therein and a part thereon engageable with said tubular member to land the body within said opening of the tubular member, a rod received through said body above said body opening, means connecting the body and rod for suspending the body from the rod and permitting movement of the rod downwardly with respect to the body upon landing of the body within the opening of the tubular member, jaws mounted on said body for pivotal movement between a position in which an upper end of each jaw is extended outwardly of the body for latching beneath the flange of the tubular member, when the body is landed within the opening of the tubular member, and a releasing position in which said upper end is retracted from beneath said flange to permit removal of the body from the well separately from said tubular member, a lower end of each jaw being disposed inwardly of said body opening in the latching position thereof, spring means urging said jaws toward latching position, and a part on the lower end of the rod engageable with the lower ends of said jaws for moving them to releasing position upon downward movement of the rod relative to the body.

6. Well apparatus of the character defined in claim 5, wherein the lower end of each of said jaws is provided with an inwardly and downwardly convergent face with which said rod part is engageable.

7. Well apparatus of the character defined in claim 5, wherein said rod is rotatable and threadedly received through said body.

8. Well apparatus comprising a body lowerable into a well and having parallel side portions joined at the top and bottom of said body and defining an intermediate opening, the top of said body having a threaded bore entering said opening, a transverse pin on each side of the longitudinal axis of said body and extending through the parallel side portions thereof, a jaw mounted on and rotatable about each of said pins within said intermediate opening, a tubular connector for suspending equipment therefrom and having an internal flange on its upper end and a tapered bottom, means normally biasing the upper ends of said jaws outwardly to engage under said internal flange so as to support the connector from the body, rotatable means threadedly received by said threaded bore for engagement with said jaws, and means integral with the bottom of said body for engagement with the tapered bottom of said connector to hold said body against rotation when said jaws are biased into engagement with said flange, whereby said rotatable means may be moved vertically with respect to said body for drawing the upper ends of said jaws into said intermediate opening to thereby release said body

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for removal from the well separately from the connector.

9. Well apparatus comprising an elongate body lowerable into a well having parallel side portions defining an intermediate opening, said body having a threaded bore entering said opening from the top thereof, a pair of jaws pivoted for rotation in said opening on transverse axes disposed one on each side of the longitudinal axis of said body, a tubular connector for suspending equipment therefrom and having an annular internal flange at its top, means normally biasing the upper ends of said jaws outwardly under said internal flange so as to support the connector from the body, and means threaded through said bore for movement vertically with respect to the body and engaging said jaws to actuate the same out of engagement with said internal flange and permit removal of said body separately from said connector.

10. Well apparatus comprising an elongate body lowerable into a well and having parallel spaced apart side portions defining a transverse opening therebetween, a jaw on each side of the longitudinal axis of the body and pivoted in said opening for rotation about a transverse axis, said jaws jointly having downwardly convergent confronting surfaces below their pivotal axes, a tubular connector for suspending equipment therefrom and having an internal flange on its upper end, means normally urging the upper ends of said jaws outwardly under said flange to support the connector from the body, and rotatable means threadedly received by said body and entering said transverse opening from the top for movement vertically with respect to said body to engage said convergent surfaces of said jaws to contract said jaws against the resistance of said biasing means and thereby permit removal of said body from the well separately from the connector.

11. The structure of claim 10, wherein said connector has a tapered bottom, and means on the lower end of said body for engagement with said tapered bottom when the upper ends of the jaws are normally urged outwardly under the internal flange of the connector for holding said body against rotation in said connector during rotation of said rotatable means.

12. Well apparatus, comprising an elongate body lowerable into a well and composed of parallel side pieces integrally joined at their tops and bottoms and defining therebetween an opening extending transversely through said body, said body having a threaded bore entering said opening from the top thereof, a pair of jaws pivoted to said body in said opening, a tubular connector for suspending equipment therefrom and having an internal flange, means normally biasing the upper ends of said jaws outwardly for engagement with the underside of said flange so as to support the connector from the body, and means threadedly received in said threaded bore for engagement with said jaws and for movement vertically with respect to said body whereby the upper ends of said jaws may be retracted to permit the body to be removed from the well separately from the connector.

13. The structure of claim 12, wherein each of said

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jaws has an inclined inner surface confronting a correspondingly inclined surface of the companion jaw to define jointly downwardly converging surfaces below the pivotal joints of said jaws with which said rotatable means engages to retract said jaws.

14. A running and retrieving tool for wells, comprising an elongate body lowerable into a well and composed of side pieces joined together and defining therebetween an opening extending transversely through said body, said body having a threaded bore entering said opening from the top thereof, a pair of jaws pivoted to said body in said opening, means normally biasing the upper ends of said jaws outwardly, and means threadedly received in said threaded bore for movement vertically with respect to said body and upon undergoing such movement, engaging said jaws and moving the upper ends of said jaws inwardly to a retracted position.

15. A well tool comprising an elongate body, jaws disposed in a vertically extending opening in said body and pivotally connected to the body about parallel transverse axes disposed one on each side of the longitudinal axis of said body, means normally biasing the upper ends of said jaws outwardly beyond the sides of said body, and means suspending said body and reciprocable longitudinally through the upper end of said body, said suspending means having a portion engageable with said jaws below their pivotal axes to move the upper ends of said jaws inwardly toward the body against the resistance of said biasing means.

16. A running and retrieving tool for wells, comprising a body having an opening centrally thereof, jaws mounted on said body for pivotal movement between a latching position in which one end of each jaw is extended outwardly of the body and a releasing position in which said one end is retracted toward said body, the other end of each jaw being disposed inwardly within said opening when such jaw is in said latching position, spring means arranged between the body and jaws for urging the jaws toward one of said latching and releasing positions, a rod, and means connecting the rod and body together for suspension of the body from the rod within a well and permitting vertical movement of the rod with respect to said body upon landing of said body within the well, said rod having a part within said opening engageable with said other ends of the jaws for moving them into said other position upon movement of the rod in one vertical direction relative to the body.

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