United States Patent [19]
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[54] STRINGSHOT BACK-OFF TOOL
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[57] ABSTRACT
Back-off of a blocked tubing fish in a well bore is effected by firing a stringshot positioned in the well bore externally of the tubing below the blocked section. The stringshot is lowered to its position through a guide tool from which an overshot is suspended in gripping engagement with the top of the fish.

7 Claims, 7 Drawing Figures
This invention relates to a well bore tool and associated method by means of which removal of blocked tubing from a well bore is effected.

As is well known to persons skilled in the oil well drilling art, it is sometimes necessary to remove tubing from a well bore that is blocked by irretrievably stuck tools, wire, sand, etc. When the blocked tubing includes in its string, side pocket gas lift valves, the cutting of the tubing below the blocked section for removal of the fish is troublesome and has heretofore required inefficient, expensive and time-consuming removal methods. This results from the restricted size of the annulus or space between the well bore casing and the tools and components associated with the blocked tubing string. It is therefore an important object of the present invention to provide a method and tool by means of which removal of blocked tubing under the foregoing circumstances, is made unexpectedly simple and efficient.

In accordance with the present invention, a conventional overshot gripping device is suspended from a conventional washpipe by means of a novel tool whereby the overshot device may be effectively engaged with the top of the fish to apply torsional and axial forces for back-off and removal purposes. A stringshot is lowered by means of a wireline into the washpipe and guided through the tool into the annular space about the overshot device externally thereof so that the stringshot may be ultimately lowered to a desired position below the blocked section at which it is fired. Once the stringshot is fired, the wireline may be reeled out of the bore hole and the fish removed. The entire operation may thus be effected in one trip into the bore hole. This is particularly advantageous especially where the blocked tubing is provided with a plurality of gas lift valve formations which would ordinarily require the use of a cutter tool and a number of trips into the bore hole in order to remove the entire fish.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a simplified sectional view through a bore hole within which the apparatus associated with the present invention is installed.

FIG. 2 is a perspective view showing the guide tool of the present invention.

FIG. 3 is an enlarged sectional view of the guide tool shown in FIG. 2.

FIG. 4 is an end view of the guide tool.

FIG. 5 is an enlarged longitudinal sectional view showing the guide tool in operative association with related apparatus.

FIG. 6 is an enlarged transverse sectional view taken substantially through a plane indicated by section line 6—6 in FIG. 5.

FIG. 7 is an enlarged transverse sectional view taken substantially through a plane indicated by section line 7—7 in FIG. 5.

Referring now to the drawing in detail, FIG. 1 illustrates a typical vertical bore hole 10 enclosed by a bore hole casing 12 within which the apparatus associated with the present invention is installed. As shown, a fish in the form of a tubing string generally referred to by reference numeral 14 is blocked within the bore hole 10 above a packer 16. Further, the tube string 14 is provided with a plurality of side pocket, gas lift valve formations 18 making removal of the fish difficult, as aforementioned.

In order to effect removal of the blocked tubing, a conventional overshot gripping device 20 of a construction and operation well known to persons skilled in the art, is lowered into engagement with the top 22 of the tubing string or fish. For this purpose, the overshot device is suspended from the lower end of a conventional washpipe 24 by means of the tool 26. Torque may thus be transmitted through the washpipe 24 and tool 26 to the overshot device 20 in order to apply torsional stress to the blocked tubing 14 in an effort to effect release of the tubing. If the packer 16 fails to release, back-off removal may be effected by means of a conventional stringshot 28 positioned externally of the tubing below the overshot device 20 at the end of a wireline 30. As will be explained in detail hereafter, the stringshot is lowered by means of the wireline to its position through the washpipe 24 and guided through the tool 26 into the annular space between the blocked tubing and the well bore casing 12.

As more clearly seen in FIGS. 2 and 3, the tool 26 comprises an axially elongated body 32 which may generally cylindrical in shape and preferably of an external cross-sectional dimension equal to that of washpipe 24 to which it is threaded connected. Thus, the upper end of the body 32 is internally threaded at 34. Further, the upper end portion of the body 32 is tubular in that it is provided with an axial bore 36 adapted to be aligned with the axial passage in the washpipe. The lower end portion 38 of the body 32 on the other hand, is solid and is provided with an internally threaded connector 38 by means of which the tool is removably connected to the overshot device 20.

The tool body 32 is provided with a lateral spacer formation 40 more closely spaced from the upper end than the lower end. The centralizer formation is dimensioned so as to engage the walls of the well bore casing and thereby maintain a minimum spacing between the well with a give lateral bore in direction as shown and the overshot device 20 suspended from the lower end of the tool body. Further, the tool body is provided with a longitudinal slot 42 that extends downwardly from the centralizer formation 40 toward the solid end portion 36. The bottom of the slot is defined by a beveled surface 44 extending from the tubular bore 36 within the upper end portion of the tool body to the external surface of the tool body at the lower solid end portion. This beveled surface constitutes a guide surface for the stringshot and wireline.

Referring now to FIG. 5, it will be noted that the wireline 30 from which the stringshot is suspended, extends from the washpipe 24 into the bore 36 of the tubular end portion of the tool body to which the washpipe is threaded connected by the externally threaded portion 46 at its lower end. The wireline 30 is then guided by the beveled surface 44 downwardly and externally of the overshot device 20 threadedly connected to the lower solid end portion of the tool body. Accordingly, the stringshot will be guided during its
lowering movement through the washpipe and guide tool to its desired position below the overshot device as aforementioned bypassing the side pocket, gas lift valve formation 18. Passage of the stringshot is made possible because of the lateral spacer 40 maintaining the desired spacing.

As is well known, by those skilled in the art, the conventional stringshot may be fired by electrical current supplied thereto through the wireline. Firing of the explosive material within the stringshot for this purpose is effected after a left hand torsional stress is applied to the fish by torque transmitted through the washpipe and tool body. Following the firing of the stringshot, the wireline and stringshot are removed from the bore hole and the unblocked tubing withdrawn.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed is new is as follows:

1. In combination with a gripping device for removal of tubing or the like from a vertical well bore, a tool adapted to be suspended from a washpipe through which a stringshot is lowered by a wireline into the well bore below the gripping device, said tool comprising an axially elongated body having a solid end portion connected to the gripping device and a tubular end portion connected to the washpipe, guide means on the body for directing the wireline from the tubular end portion externally of the axially elongated body into the well bore surrounding the tubing below the gripping device and means mounted on the body for spacing the gripping device and the tubing from the well bore in a direction aligned with guide means.

2. The combination of claim 1 wherein said guide means includes a longitudinal slot formed in the axially elongated body, and an internal bevel surface defining the bottom of said slot extending from the tubular end portion toward the solid end portion of the elongated body.

3. The combination of claim 1 wherein said spacing means comprises a centralizer formation from which the guide means extends.

4. The combination of claim 3 wherein said guide means includes a longitudinal slot formed in the axially elongated body below the lateral spacer centralizer formation, and an internal bevel surface defining the bottom of said slot extending from the tubular end portion toward the solid end portion of the elongated body.

5. The combination of claim 1 wherein said spacing means includes a lateral spacer formation on the axially elongated body above the guide means for maintaining a space within the well bore into which the stringshot is guided.

6. The combination of claim 5 wherein said guide means includes a longitudinal slot formed in the axially elongated body below the lateral spacer formation, and an internal bevel surface defining the bottom of said slot extending from the tubular end portion toward the solid end portion of the elongated body.

7. The combination of claim 6 wherein said elongated body is substantially equal in external cross-sectional dimension to the washpipe.

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