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BROKEN CASING COUPLING MEANS WITH REMOVABLE INNER GUIDE AND PERMANENT OVERSHOT

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FIG. 1.

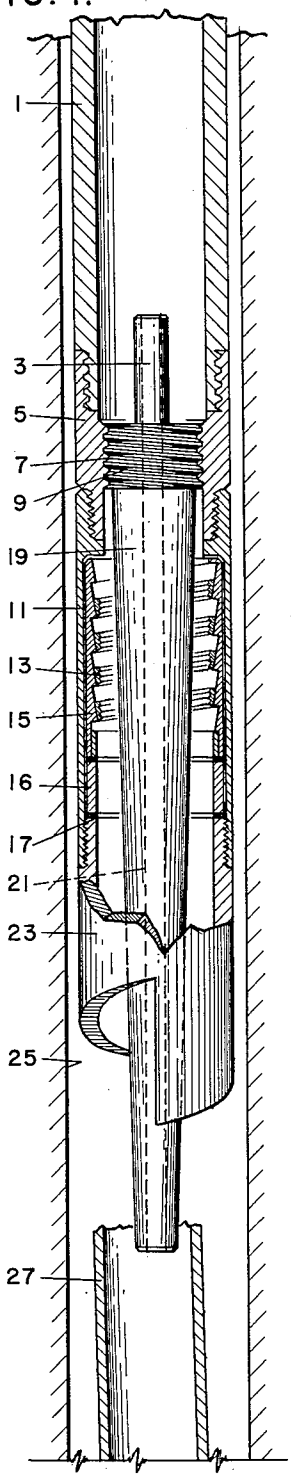
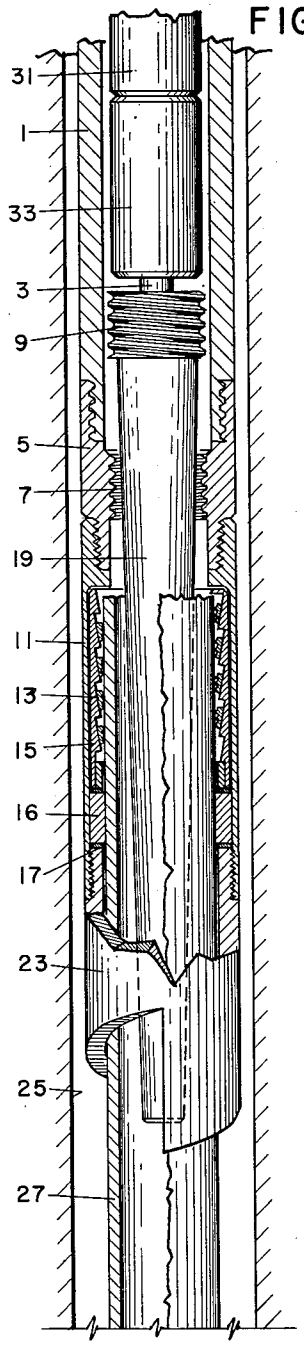


FIG. 2.



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BROKEN CASING COUPLING MEANS WITH REMOVABLE INNER GUIDE AND PERMANENT OVERSHOT

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This invention relates to apparatus for assembling a pipe string in a borehole, and more particularly to apparatus for facilitating the interconnection of well pipe string sections where one section is permanently positioned in the bottom of a borehole.

It is not uncommon for a section of a well pipe string, such as a casing string, to corrode or be otherwise damaged so that it is necessary to cut the casing below the damaged portion in order to effect a repair. In such a circumstance, the operator has the choice of attempting the reconnection of the pipe string sections or of bypassing the casing string remaining in the bottom of the well bore by directional drilling techniques. It is manifest that reconnection of the pipe string sections is the most desirable of the above alternatives, and it is also apparent that such reconnection can be quite difficult.

In accordance with the teachings of the invention, a tubular extension member is provided for the upper pipe string section, having an inner diameter somewhat greater than the outer diameter of the lower pipe string section, or fish, remaining in the borehole. Grapple means are provided in the extension member for gripping the lower pipe string section when slid thereover. Detachably connected to the tubular extension member within the bore thereof is a retrievable guide member extending through the extension member to below the lower end of the extension member so as to enter the bore of the lower pipe string section. When the tubular extension member is lowered over the lower pipe string section, the guide member serves to locate the pipe string section and properly position the extension member thereover. After the grapple is set, the guide member is disconnected and retrieved from the borehole, thus providing a bore through which other pipe strings may be lowered or through which production may be initiated.

Objects and features of the invention not apparent from the above discussion will become evident upon consideration of the following more detailed description thereof when taken in connection with the accompanying drawings, wherein:

FIG. 1 is an elevational view partially in cross section of an embodiment of the invention in position in a borehole during connection operations; and

FIG. 2 is an elevational view of the apparatus of FIG. 1 after the well pipe sections have been interconnected.

With reference now to FIGS. 1 and 2, there is shown a lower casing string 27 in a borehole 25. It is assumed that the lower casing section 27 has become twisted off during a well completion operation and that it is desired to reconnect an upper casing string thereto. A section of an upper casing string 1 is illustrated as being of somewhat greater diameter than the diameter of lower casing string 27. A tubular extension member for casing string 1 comprises a casing sub or safety joint 5 threadedly connected to the housing of a casing patch tool 11, and a lowermost outer guide member 23. Within the housing of casing patch tool 11 is positioned grapple or slips 13 connected to an annular carrier member 15 therefor. The carrier member 15 rests on a shoulder 17 at the upper end of outer guide member 23 and includes an annular sealing element 16 for effecting a fluid seal between carrier

member 15 and the casing patch tool housing. It is manifest that the grapple 13 and the carrier member 15 therefor will be securely held within the casing patch tool housing. A suitable casing patch tool is illustrated and described at page 796 of the Composite Catalog of Oil Field Equipment and Services, 22d edition (1957).

Left-hand internal threads 7 are provided in the bore of the tubular extension member immediately above the grapple 13. The threads are here shown as being within the bore of the safety joint 5. The function of the threads will become apparent below. The inner diameter of the outer guide member 23 is somewhat greater than the outer diameter of casing section 27 so that the outer guide member can slide over the casing section to permit the grapple 13 to grip the casing section 27 after the grapple is slid thereover.

A retrievable guide member 19, having a threaded upper section 9 matching the threads 7, is shown extending from the casing sub 5 to substantially below the lowermost end of outer guide mmeber 23. Preferably, the inner guide member 19 is in the form of a truncated cone so as to facilitate stabbing of the guide member into the bore of the casing section 27. The space between the inner guide member 19 and the grapple 13 is substantially greater than the thickness of the casing section 27. A fishing neck 3 is affixed to the upper end of the inner guide member 19 so that a work string overshot 33 (see FIG. 2) in the lower end of a work string 31 may be slid thereover and affixed thereto. A longitudinal bore 21 extends through the inner guide member 19 and fishing neck 3 so that fluids may pass therethrough into the bore of the casing string 1 as the casing string is lowered through the borehole.

The apparatus described above is lowered until the lower end of the inner guide member 19 is substantially at the upper end of casing string 27. The guide member 19 is stabbed into the bore of the casing 27, and the string is lowered until the grapple 13 grips the casing string 27, as shown in FIG. 2. A work string 31 and overshot 33, preferably having slips therein, are lowered in the casing until the fishing neck 3 is engaged and gripped. The inner guide member 19 is rotated counterclockwise, as viewed, until it is released from the safety joint 5. After the inner guide member 19 and work string have been removed from the borehole, a mill is lowered through the casing string 1 to cut out the internal threads 7 in the safety joint 5. If it is so desired, casing 1 may be disconnected from safety joint 5 and a casing string of smaller diameter may be connected thereto.

The invention is not necessarily to be restricted to the specific structural details or arrangement of parts herein set forth, as various modifications thereof may be effected without departing from the spirit and scope of the invention.

The objects and features of the invention having been completely described above, what is claimed is:

1. Apparatus for connecting together upper and lower pipe string sections in a borehole, comprising:

a tubular extension member for said upper pipe string section having an inner diameter greater than the outer diameter of said lower pipe string section;

annular grapple means connected in said extension member for gripping said lower pipe string section when slid thereover;

a retrievable inner guide member detachably affixed to the upper end of said extension member within the bore of said extension member above said grapple means and extending through said extension member and grapple means to below the lower end of said extension member so as to enter the bore of said

lower pipe string section, said guide member having a longitudinal bore therethrough; and

a fishing neck connected on said guide member extending above the threaded portion thereof to permit disengagement of said guide member from said extension member and retrieval of said extension member from the pipe string.

2. Apparatus for connecting together upper and lower pipe string sections in a borehole, comprising:

a tubular extension member for said upper pipe string section having an inner diameter greater than the outer diameter of said lower pipe string section;

grapple means in said extension member for gripping said lower pipe string section when slid thereover;

internal threads in the bore of said tubular extension member above said grapple means;

a retrievable, substantially conical inner guide member having a threaded upper portion engaging said internal threads of said tubular extension member, extending below the lower end of said extension member to enter the bore of said lower pipe string section;

said guide member having a longitudinal bore therethrough and a fishing neck on said guide member extending above the threaded portion thereof to permit disengagement of said guide member from said extension member by a work string overshot.

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