

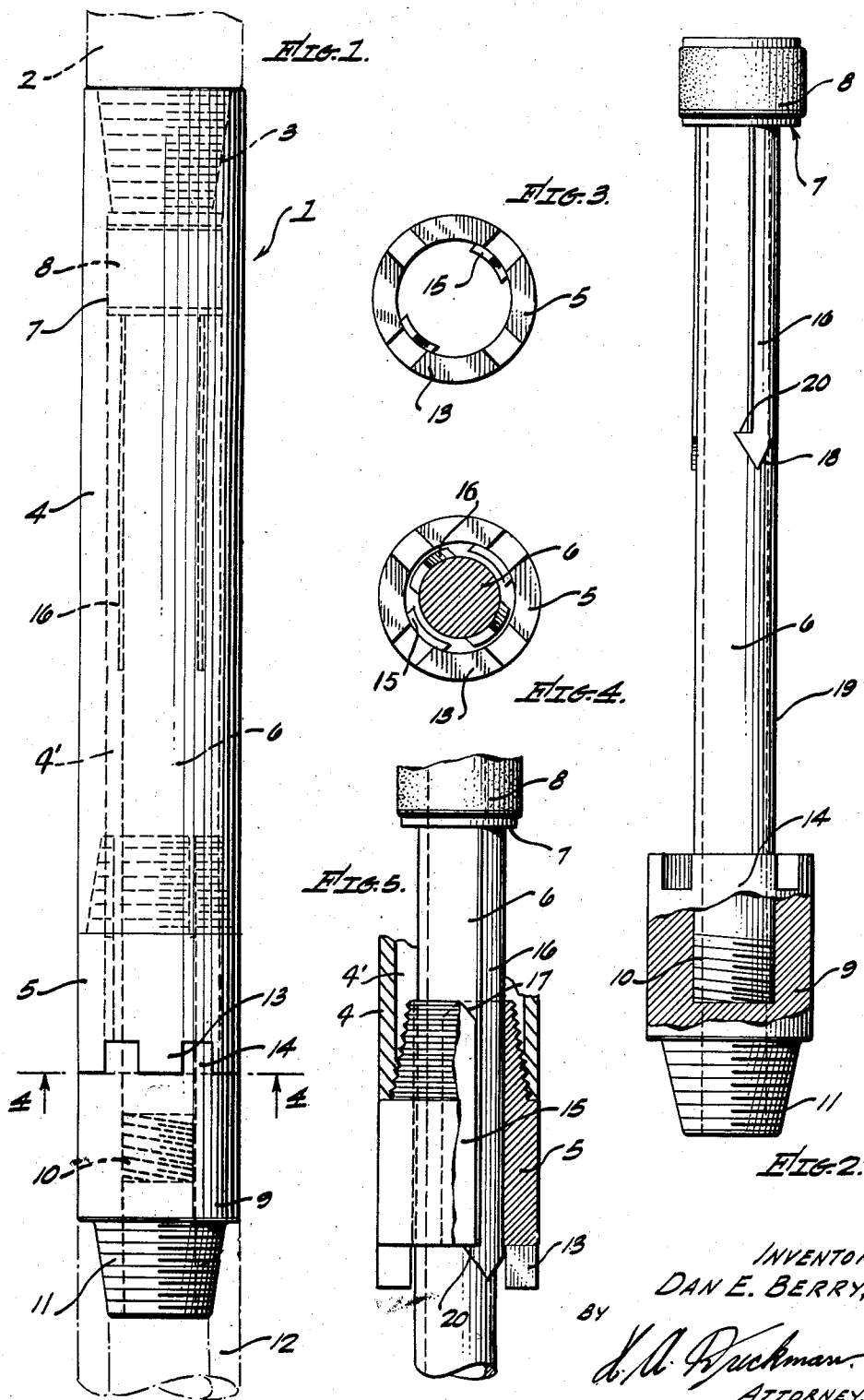
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D. E. BERRY

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RELEASABLE COUPLING AND SAFETY SUB

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INVENTOR.
DAN E. BERRY,
BY
J. M. Puckman
ATTORNEY.

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RELEASABLE COUPLING AND SAFETY SUB

Dan E. Berry, La Habra, Calif.

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4 Claims. (Cl. 166—219)

In recovering pipe from an oil well that pipe is first cut, either by an explosive charge or by a rotary cutter. Thereafter, my releasable coupling and safety sub is threaded into the upper end of the length of pipe, after which the pipe is withdrawn.

An object of my invention is to provide a novel releasable coupling and safety sub in which the coupling may be so positioned that the drill pipe to which it is attached can be continuously rotated, this operation being very desirable under some conditions, especially where circulation is maintained in the well.

Another object of my invention is to provide a novel releasable coupling and safety sub which can also be used as an upward and downward jar for the purpose of loosening pipe prior to withdrawing the pipe from the well.

Another object of my invention is to provide a novel releasable coupling and safety sub, which has a driving connection between the outer barrel and the inner mandrel in both the lowered and raised position of the outer barrel.

A feature of my invention resides in the interengageable splines and the means of guiding the lower lugs or splines past the upper splines on upward movement of the outer barrel.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

In the drawing:

Figure 1 is a side elevation of my releasable coupling and safety sub.

Figure 2 is a side elevation of the inner mandrel.

Figure 3 is a bottom plan view of the outer barrel.

Figure 4 is a sectional view taken on line 4—4 of Figure 1.

Figure 5 is a fragmentary side elevation of the inner mandrel, as well as the lower fitting of the outer barrel, the latter being in raised position.

Referring more particularly to the drawing, my releasable coupling and safety sub 1 is attached to the drill pipe 2 which screws into the upper threaded box 3 of the tool. The releasable coupling and safety sub 1 consists of an outer barrel 4 and a fitting 5 which screws into the bottom of the barrel. A mandrel 6 extends into the barrel 4 and is formed with a piston 7 at the upper end thereof, this piston fitting against the inner wall of the barrel 4 and acting as a guide for the vertical movement of the barrel. The barrel 4 thus is constructed as a cylinder with a space 4' therein and the mandrel 6 being positioned within this space. The piston 7 may be provided with appropriate packing 8 which prevents leakage of fluid past this piston, if circulation is maintained in the well.

A sub 9 is threaded onto the lower end of the mandrel 6 and these threads 10 are left-hand threads, for a purpose which will be subsequently described. The sub 9 is formed with a threaded pin 11 which screws into the upper end of the pipe 12, which is to be recovered. The

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fitting 5 and the sub 9 are connected by a dog clutch, consisting of spaced downwardly projecting teeth 13 on the fitting 5, and spaced upwardly projecting teeth 14 on the sub 9. The teeth 13—14 interengage and form a releasable joint between the fitting 5 and the sub 9 so that these parts may rotate together. On the interior wall of the fitting 5 there are provided two inwardly projecting driving lugs 15 which, in the extended position of the tool, engage and provide a rotational drive with the long splines 16 formed on the upper end portion of the mandrel 6. The upper ends of the lugs 15 are tapered, as shown at 17, and likewise the lower ends of the splines 16 are tapered, as shown at 18. The lower ends of the lugs 15 are horizontal or squared off. These tapered or inclined surfaces will thus guide the lugs past the lower ends of the splines 16 when the barrel 4 is pulled upwardly. The splines 16 project into the space 4' within the barrel 4.

It is to be noted that the splines 16 do not extend for the entire length of the mandrel 6, but are positioned at the upper end portion of this mandrel, there being a substantial unobstructed outer wall of the mandrel below the splines 16 and above the sub 9. This unobstructed outer wall portion is indicated at 19. When the lugs 15 are in driving engagement with the splines 16, as shown in Figure 5, rotation of the barrel 4 will be imparted to the mandrel 6. Also an upwardly facing shoulder 20 is formed on the lower end portion of each of the splines 16 and the lugs 15 strike against these shoulders, if a downward jar is desired. An upward jar can also be imparted by striking the lugs 15 against the bottom face of the piston 7. If the lugs 15 terminate at or below the top surface of the fitting 5 then the top surface of the fitting 5 will also act as a striking surface and will also serve to prevent the mandrel 6 from falling out of the tool.

In operation.—The tool is lowered into the well until the sub 9 strikes the pipe 12 which is to be recovered. The barrel 4 is now lowered until the teeth 13—14 engage and, thereafter, rotation of the drill pipe 2 will thread the pin 11 into the pipe 12. By raising the barrel 4 sufficiently to disengage the teeth 13—14, it is possible to continue the rotation of the drill pipe 2 without correspondingly rotating the sub 9. The reason is that the lugs 15 are positioned in the clear space 19 of the mandrel 6, and thus unobstructing rotation of the drill pipe and the barrel 4 is permitted. If it is not possible to recover the pipe 12, the tool can be released in the following manner: The barrel 4 is raised until the lugs 15 engage the sides of the splines 16, as shown in Figure 5. Right-hand rotation of the drill pipe 2 will now unscrew the threads 10, after which the barrel 4 and the mandrel 6 can be removed from the well, leaving only the sub 9. The lugs 15 are appreciably shorter than the splines 16 and, consequently, an upward and downward jar can be imparted until the lugs and the splines are engaged.

Having described my invention, I claim:

1. A releasable coupling and safety sub, comprising a barrel, a threaded connection on the upper end of the barrel, a mandrel extending into the barrel and slidable therein, a sub on the lower end of the mandrel, teeth on the barrel and teeth on the sub, said teeth interengaging in the telescoped position of the barrel and mandrel and disengaged in the extended position of the parts, upwardly facing lugs on the inside of the barrel, splines on the outer wall of the mandrel, said splines being arranged on the upper end portion of the mandrel, a portion of the outer wall of the mandrel below the splines being unobstructed to permit rotation of the barrel relative to the mandrel, said lugs being of lesser length than the splines, and a shoulder on the lower end of each of the splines against which the lugs strike while engaging the splines.

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2. A releasable coupling and safety sub, comprising a barrel, a threaded connection on the upper end of the barrel, a mandrel extending into the barrel and longitudinally movable therein, a piston mounted on the upper end of the mandrel and fitting in the barrel, said piston preventing movement of fluid downwardly thereby, a sub on the lower end of the mandrel, teeth on the barrel and teeth on the sub, said teeth interengaging in the telescoped position of the barrel and mandrel and disengaged in the extended position of the parts, upwardly facing lugs on the inside of the barrel, splines on the outer wall of the mandrel, said splines being arranged on the upper end portion of the mandrel, a portion of the outer wall of the mandrel below the splines being unobstructed to permit rotation of the barrel relative to the mandrel.

3. A releasable coupling and safety sub, comprising a barrel, a threaded connection on the upper end of the barrel, a mandrel extending into the barrel and longitudinally movable therein, a piston mounted on the upper end of the mandrel and fitting in the barrel, said piston preventing movement of fluid downwardly thereby, a sub on the lower end of the mandrel, teeth on the barrel and teeth on the sub, said teeth interengaging in the telescoped position of the barrel and mandrel and disengaged in the extended position of the parts, upwardly facing lugs on the inside of the barrel, splines on the outer wall of the mandrel, said splines being arranged on the upper end portion of the mandrel, a portion of the outer wall of the mandrel below the splines being unobstructed to permit rotation of the barrel relative to

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the mandrel, said lugs being of lesser length than the splines, and a shoulder on the lower end of each of the splines against which the lugs strike while engaging the splines, the upper ends of the lugs and the lower ends of the splines being tapered.

4. A releasable coupling and safety sub, comprising a barrel, a threaded connection on the upper end of the barrel, a mandrel extending into the barrel and slidable therein, a sub on the lower end of the mandrel, teeth on the barrel and teeth on the sub, said teeth interengaging in the telescoped position of the barrel and mandrel and disengaged in the extended position of the parts, upwardly facing lugs on the inside of the barrel, splines on the outer wall of the mandrel, said splines being arranged on the upper end portion of the mandrel, a portion of the outer wall of the mandrel below the splines being unobstructed to permit rotation of the barrel relative to the mandrel, said lugs being of lesser length than the splines, and a shoulder on the lower end of each of the splines against which the lugs strike while engaging the splines, the upper end of the lugs and the lower ends of the splines being tapered.

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