June 17, 1947. W. L. CHURCH 2,422,223

SAFETY JOINT

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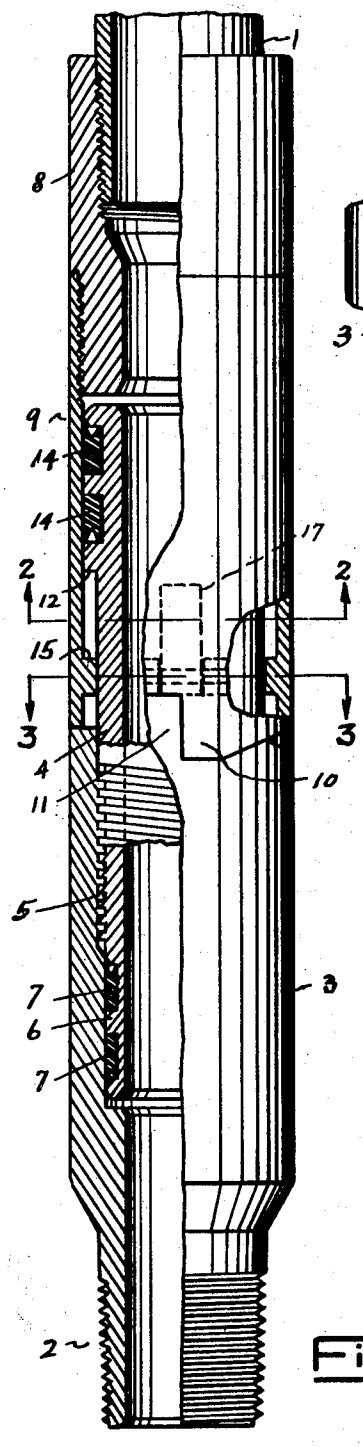


Fig. 1.

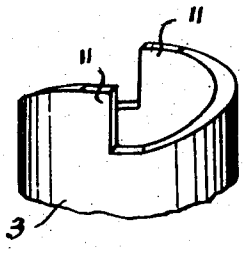


Fig. 4.

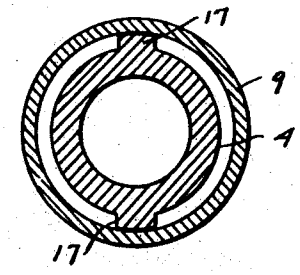


Fig. 2.

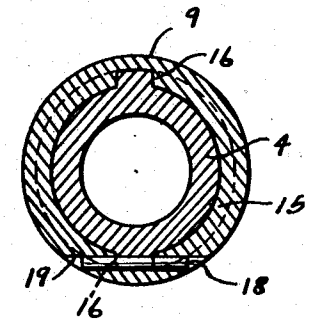


Fig. 3.

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SAFETY JOINT

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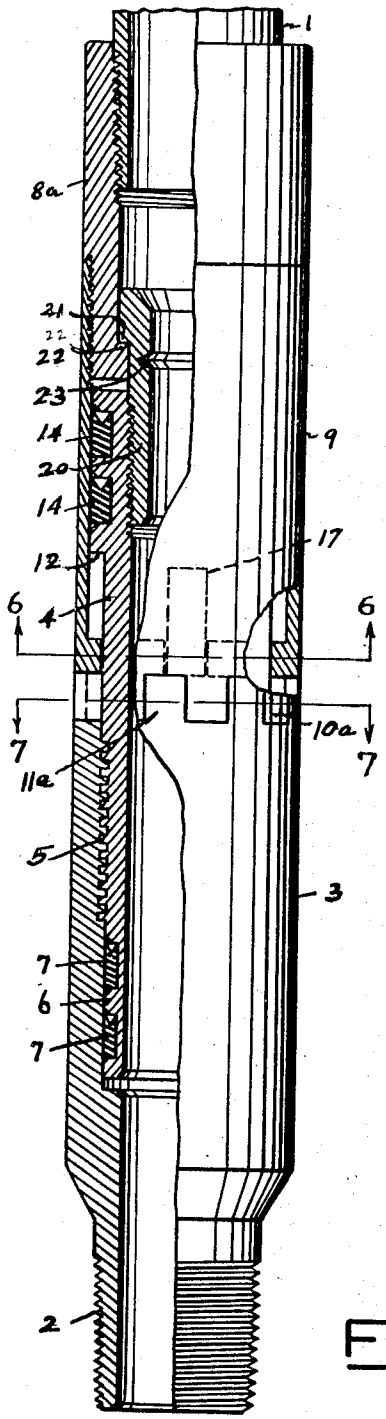


Fig. 5.

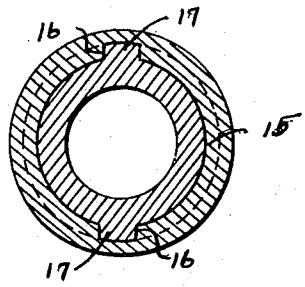


Fig. 6.

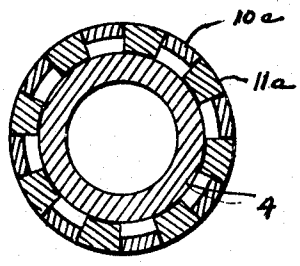


Fig. 7.

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SAFETY JOINT

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Application March 9, 1944, Serial No. 525,731

1 Claim. (Cl. 285—146)

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This invention relates to a safety joint.

An object of the invention is to provide a joint designed to be connected into an operating string, such as a string of rods or a tubular string of pipe and which may be readily disconnected.

The safety joint has been specially designed for use in a tubular operating string which may be used in well drilling or other operations carried on in a well bore.

It often becomes necessary to separate a drill stem or other operating string in order to remove it from the well as for example when a drill or packer or other similar tool or appliance becomes stuck in a well bore so that it cannot be withdrawn, it then becomes desirable to unscrew the operating string, at the safety joint, so that it can be removed and saved.

The type of joint herein described has been designed for the purpose above indicated.

With the above and other objects in view, this invention has particular relation to certain novel features of construction, arrangement of parts and use, an example of which is given in this specification and illustrated in the accompanying drawings, wherein—

Figure 1 shows a side elevation of the joint partly in section.

Figure 2 shows a cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 shows a cross sectional view taken on the line 3—3 of Figure 1.

Figure 4 shows a fragmentary perspective view of one of the coupling members.

Figure 5 shows a side elevation of another embodiment of the joint partly in section.

Figure 6 shows a cross sectional view taken on the line 6—6 of Figure 5, and

Figure 7 shows a transverse sectional view taken on the line 7—7 of Figure 5.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a tubular operating string. This string is made up of a number of sections which are connected by couplings, usually having right hand threads and the string is connected to the drill collar or other appliance to be operated by right hand threads 2 carried by the lower tubular coupling member 3. The numeral 4 designates an upper coupling member which is screwed into the lower coupling member by means of coarse left hand threads 5. The extreme lower end 6 of the upper coupling member 4 is not externally threaded but has, countersunk therein, the upper and lower annular packing rings 7, 7 which form fluid tight joints with the inner wall of the lower coupling member 3.

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Accordingly when the coupling member 4 is turned to the right, it will be unscrewed from the lower coupling member 3.

Screwed onto the lower end of the string 1 there is a collar 8 whose lower end is reduced and externally threaded and screwed onto said reduced lower end there is a tubular skirt, or housing, 9.

The abutting ends of the skirt 9 and the lower coupling member 3 are formed with the jaws 10 and 11, respectively, which are shaped to interlock, as shown in Figure 1, when the safety joint is assembled. On the opposite side of the safety joint, from that shown in Figure 1, are interengaging jaws similar to the jaws 10 and 11, shown in Figure 1, as illustrated in Figure 4.

The upper end of the upper tubular member 4 is outwardly thickened thus forming an external annular downwardly facing shoulder 12 and above said shoulder this coupling member has the external countersunk packing rings 14, 14 forming seals with the skirt 9.

The lower end of the skirt has an annular inside rib 15 spaced beneath the shoulder 12 and having the vertical keyways 16, 16 therein.

The upper coupling member 4 has the vertical keys 17, 17 which work in said keyways.

In assembly, the upper coupling member 4 may be inserted downwardly through the skirt 9 with the keys, or splines, fitted through said keyways and the upper coupling member may then be screwed into the lower coupling member to home position, as shown in Figure 1 and the upper end of the skirt 9 then connected to the collar 8.

In this position the clutch jaws 10 and 11 will be interengaged and a frangible pin 18 may then be driven through the transverse keyway 19 extending through the skirt 9 and through one of the keys 17 so as to secure the skirt 9 and the operating string against longitudinal movement relative to the coupling members during rotation or other normal operations of the string and tool or appliance connected to it.

Should the drill, or other tool, or appliance become stuck in the well so that the same cannot be removed, an upward pull may be taken on the string 1 and the pin 18 sheared and the skirt pulled upwardly, so as to disengage the jaws 10 from the jaws 11 and the operating string may then be turned to the right. The keys or splines 17 will still remain in the notches 16 so that as the operating string is turned to the right, the upper coupling member 4 will also be turned to the right and the left hand threads 5 may

thereby be unscrewed and the drill stem or other operating string will be detached and may then be withdrawn and thus recovered.

In the embodiment illustrated in Figure 5, the jacket 9 may be clutched with the coupling member 3 by the clutch jaws 10*a* and 11*a* as shown.

In this embodiment, the shear pin 18 has been dispensed with and a frangible nipple 20 is used to accomplish the same purpose.

The upper end of this nipple has an external, annular, downwardly facing shoulder 21 which is engageable with an inside, annular, upwardly facing shoulder 22 in the collar 8*a*. This nipple is screwed into the upper coupling member 4 and holds the clutch jaws 10*a*, 11*a* in clutching relation during a normal operation of the tool.

The nipple 20 has a deep, inside, annular groove 23 which weakens it so that should the drill, or other tool on appliance, become stuck in the well upon an upward pull being taken on the operating string, the nipple 20 will separate at said weakened point permitting the clutch jaws to disengage so that the coupling member 4 may be unscrewed from the coupling member 3 and separated.

In other respects, the safety joint shown in Figure 5 is the same as that shown in Figure 1.

It is desirable that the safety joint be incorporated into the stem or string at the lower end thereof so that all of the stem or string may be detached and removed from the well.

This type of safety joint makes it unnecessary to turn the string or stem to the left to disconnect it so that none of the other couplings connecting the sections of the string or stem are liable to be unscrewed.

What I claim is:

A safety joint comprising two coupling members screwed together, a tubular connecting connecting member adapted to be connected to an operating string and having an inside, annular, rib provided with a vertical keyway, a longitudinal key on one of the coupling members slidable in the keyway, a clutch between the connecting member and the other coupling member arranged to be engaged and disengaged by movements of the connecting member and a frangible pin through said coupling member and key, accessible for installation externally of the safety joint and normally holding said clutch engaged.

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