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G. C. GATES ET AL

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COUPLING FOR DRILL RODS

Filed June 29, 1929

Fig. 1.

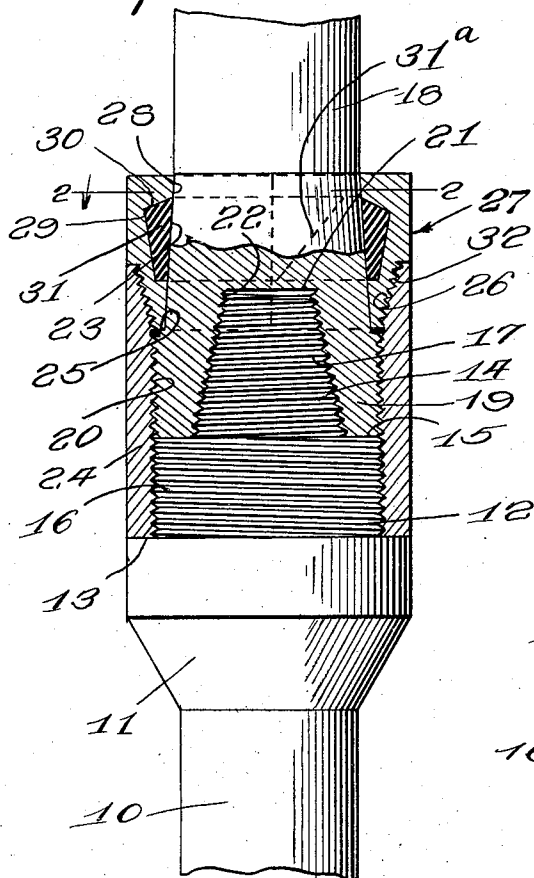


Fig. 3.

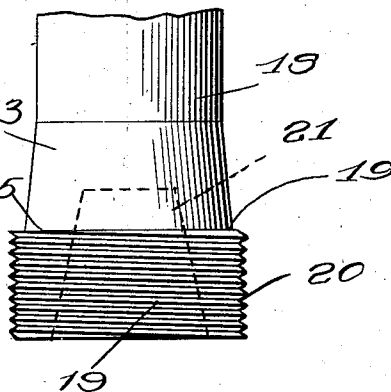


Fig. 4.

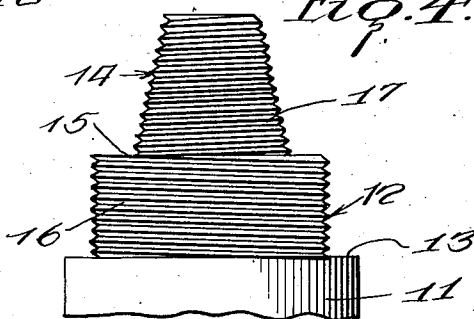


Fig. 2.

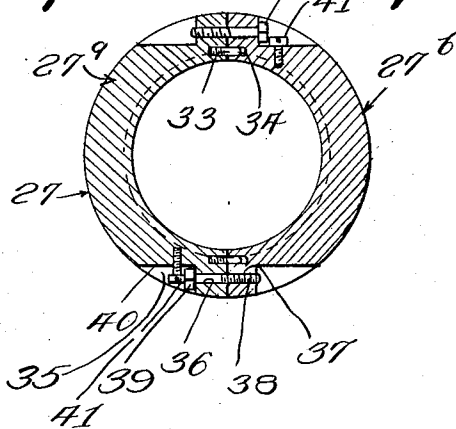
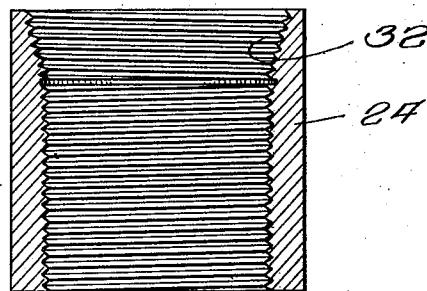


Fig. 5.



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COUPLING FOR DRILL RODS

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This invention relates to improvements in couplings for drill rods and the like and has for an important object thereof the provision of a simple and efficient device of this character whereby the drill and bit shaft may be effectually connected and locked in connected position.

A further object of the invention is to provide a device of this character which is extremely simple in its construction and arrangement, durable in service and in which the separate parts by their coaction with one another serve to so lock the device as to practically preclude all possibility of accidental disengagement of the same.

These and other objects we attain by the construction and arrangement shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of our invention and wherein like reference characters designate like parts throughout.

In the drawings:—

Figure 1 is a view partly in section and partly in elevation illustrating a coupling or lock joint for drill rods constructed in accordance with an embodiment of our invention;

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1;

Figure 3 is a fragmentary view in elevation of the lower end portion of the drill shaft;

Figure 4 is a fragmentary view in elevation of the upper end portion of the bit shaft;

Figure 5 is a sectional view taken through the locking sleeve unapplied.

Referring now more particularly to the drawings, the numeral 10 designates a bit shaft, the upper end of which is provided with an enlarged portion 11 having a reduced extension 12. Formed at the upper end of the enlarged portion 11 is a shoulder 13. The extension 12 is provided at its upper end with an axially arranged conical extension 14, the base of which is of less size than the upper end of the extension 12 and which accordingly provides an upwardly directed annular shoulder 15. The extension 12 is provided upon its exterior with left hand screw-threads

16 and the conical extension 14 is provided with right hand screw-threads 17.

The drill shaft 18 is provided at its lower end with a circular head 19 having the same external diameter as the extension 12 and which is provided with left hand screw-threads 20. In its lower face the head 19 is provided with a conical bore 21 adapted to receive the conical extension 14 and having right hand screw-threads 22 for coaction therewith. When the conical extension 14 is fully seated in the bore 21, the lower end of the head 19 firmly abuts the shoulder 15 and at this time the threads 20 of the head 19 and the threads 16 of the extension 12 form a continuous left hand thread. The head 19 is connected with the drill shaft 18 by an upwardly tapering shank or neck 23.

The numeral 24 designates a locking sleeve provided with left hand screw-threads for coaction with the screw-threads of the head 19 and extension 12. When the locking sleeve 24 is in position upon the head 19 and extension 12, the lower end thereof abuts the shoulder 13 very firmly so as to tighten the same against the threads of the extension 12 and head 19. When the sleeve is in position with the lower end thereof abutting the shoulder 13, the upper end thereof projects above the upper end of the head 19 which is in the form of a shoulder 25 and this portion of the sleeve projecting above the shoulder 25 has its inner face formed with a tapered bore which increases upwardly and which is adapted for the reception of the conical lower end 26 of a cap 27. The cap 27 has a tapered bore 28 corresponding to the taper of the tapered neck 23 connecting the head 19 and shaft 18, and this bore is increased at a point spaced from the lower and upper ends of the cap to provide about the tapered neck 23 an annular recess 29, the upper wall 30 of which inclines upwardly toward the shaft 18. Within this recess is arranged a packer 31 formed of some resilient material, such as rubber, and is of a size greater than the space represented by the space between the tapered neck 23 and the outer wall of the recess when the cap is in fully seated position. When this cap is fully seated, the lower end thereof abuts

the shoulder 25 at the upper end of the head for a purpose presently to appear. Each section 27^a and 27^b of the cap 27 has affixed to an edge thereof a dowel 33, the projecting end of which is adapted to engage in a socket 34 formed in the other of the sections to align the sections. As a means for maintaining the sections in assembled relation and for drawing the sections together about the packer, each section is provided adjacent the edge thereof in its periphery with a notch or recess 35, one wall of which substantially parallels the edge of the section and is in communication therewith by a bore 36. The opposed portion of the other section has formed therein a threaded bore 37 and a screw 38 having its shank rotatable in the bore 36 and the threaded portion engaging the bore 37 is extended through the bore 36 and employed to draw these sections together, each of the sections being thus provided. When the bolt is in position within the bore 36, the head 39 thereof extends into close proximity to the inner wall 40 of the recess. This wall is provided with a threaded socket in which is extended a headed screw-threaded member 41, the head of which abuts against the head 39 of the screw 38 to prevent retraction thereof and accordingly to prevent any separation of the sections of the head.

In assembling the device, the drill shaft 18 is first connected to the bit shaft by engaging the conical extension 14 in the socket or bore 21. The sleeve 24 is then placed in position and firmly seated with the results above set forth. The packer 31 which is formed with a tapered split 31^a is then placed about the shaft and the cap 27 assembled thereon. This cap is, as above stated, formed in two sections 27^a and 27^b assembled about the shaft 18 and packer 31. It is apparent that the packer before mentioned being slightly larger than the inner face of the cap, when the cap is loosened for the purpose of releasing its compression on the wall of the stem, the action would expand the two parts of the cap, therefore, the action of the locking bolt firmly uniting the two parts. Also that the pin serves an extra purpose in holding the two parts on an equal vertical plane eliminating the possibility of mismatching threads on the parts. Furthermore, as the wrenches necessary to breaking and setting the joints rest on the top of the cap, it is apparent that the cap should be strongly reinforced as by the action of these pins hereinbefore described in order that the weight of the wrenches may not displace either portion which might occur should the two halves not be firmly connected. The cap and packer assembly is then moved downwardly until the threads of the lower end of the cap which are right hand engage the right hand threads 32 formed upon the upwardly enlarging portion of the sleeve when it is rotated by means

of a wrench until the lower end thereof firmly abuts the shoulder 25. This abutment causes the cap 27 to exert an upward pull upon the sleeve 24 and a downward thrust upon the head 19 further locking together the threads of the sleeve and head 19 and of the head 19 and the extension 14. In addition this downward movement reduces the size of the annular recess formed by the enlargement of the tapered bore 28 of the cap and the packer 31 is accordingly further compressed and has a tendency to move upwardly within the cap where the tapered upper end 30 forces it inwardly against the tapered neck 23 of the shaft 18. By this means a friction lock is applied to the cap preventing rotation thereof and since the cap is reversely threaded as respects the sleeve 24, rotation of both the cap and sleeve is effectually prevented.

From the foregoing it is believed to be obvious that a coupling constructed in accordance with our invention will effectually prevent disengagement of the drill and bit shafts and is at the same time one which may be very readily applied and cheaply constructed. While we have described the coupling for the specific purpose of connecting these shafts, it will, of course, be obvious that the same may be employed as a connection for sucker rod joints or any other form of rod coupling which may be desired. We, therefore, do not limit ourselves to either the specific use or specific structure hereinbefore set forth except as hereinafter claimed.

We claim:—

1. In a coupling of the class described, the combination with a drill shaft provided upon the lower end thereof with a circular head having formed in the lower face thereof a threaded conical socket, of a bit shaft having an enlarged portion provided with an extension of the same size as the circular head, an annular shoulder formed upon the enlarged portion adjacent the extension, a conical extension formed upon the upper end of said extension and having screw-threads adapted to coact with the screw-threads of said bore, the exterior of said extension and said head being oppositely screw-threaded to the screw-threads of said conical extension and bore, a sleeve having its lower end provided with screw-threads adapted to engage the circular head and extension and having its lower extremity adapted for engagement with said flange, the upper end of said sleeve being oppositely screw-threaded to the lower end thereof, a cap having a central aperture adapted to receive the drill shaft, said cap being exteriorly screw-threaded for engagement with the threads of the upper end of the sleeve, the aperture of the cap being enlarged to form about the shaft when the cap is in position thereon an annular recess, a packing element located in said recess and formed of compressible material, the packing element

being normally of a size greater than the space between the walls of the recess and the bit stem and being compressed by the engagement of the cap with said sleeve, the lower end of said cap abutting the upper end of said circular head.

2. In a coupling of the class described, the combination with a drill and bit shaft, one of which is provided with a reduced threaded extension and the other of which is provided with a threaded socket adapted to receive the extension, the exterior of the shafts adjacent the ends thereof being threaded oppositely to the threads of the socket and extension, a sleeve provided with interior screw-threads at one end thereof and adapted for engagement with the exterior threads of said shafts and at the opposite end upon its interior with an oppositely threaded portion extending about one of the shafts adjacent the exteriorly threaded end thereof, the last named shaft being provided adjacent such threaded portion with a tapered reduction, of a cap having a tapered bore formed in its face with a groove, the tapered bore of the cap being adapted for the reception of the tapered portion of the shaft, the cap being provided upon its exterior with screw-threads adapted for engagement with the last named screw-threads of the sleeve, and a packing element adapted for engagement in the groove of the cap of greater size than said groove, said packing element being compressible.

In testimony whereof we hereunto affix our signatures.

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