Aug. 23, 1932. H. C. BREWSTER 1,873,814

COUPLING FOR DRILL BITS

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FIG. 1.

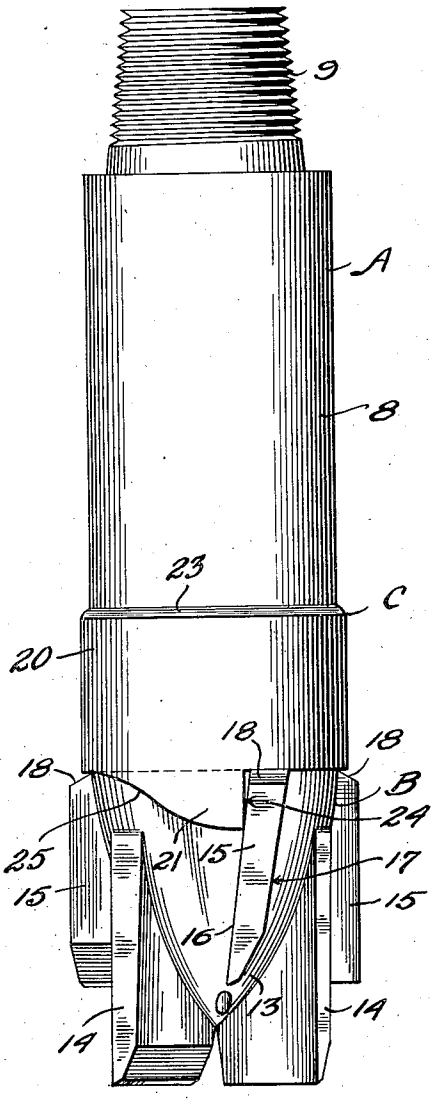

FIG. 2.

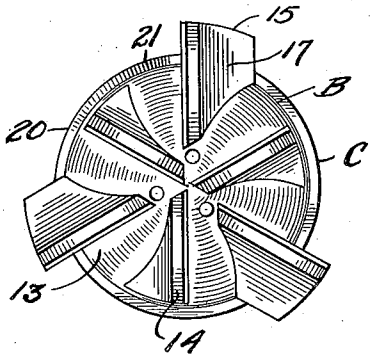

FIG. 3.

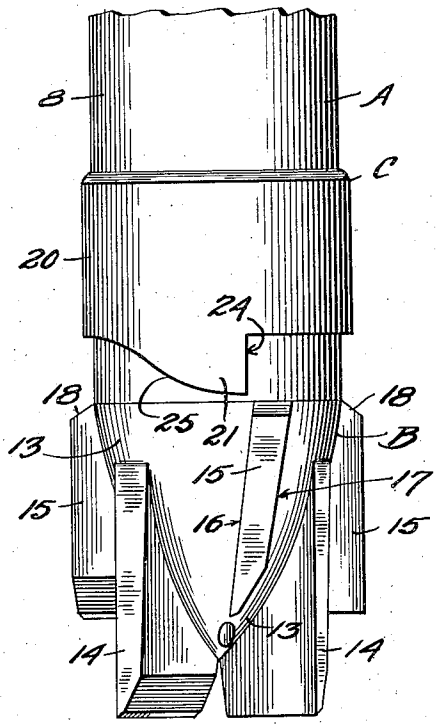

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FIG. 4.

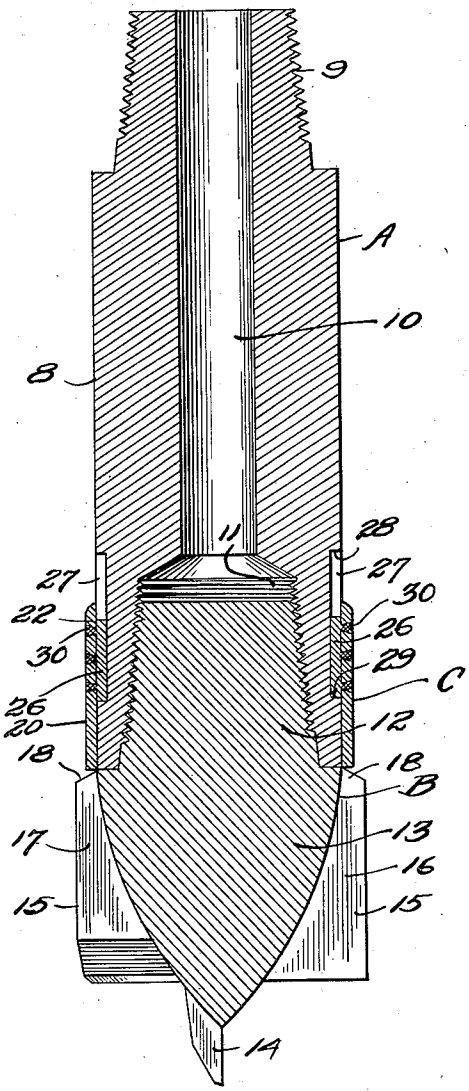


FIG. 5.

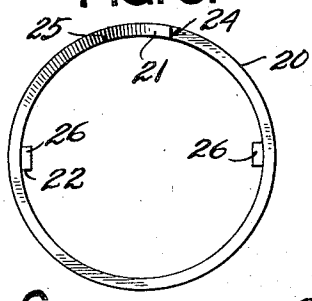


FIG. 6.

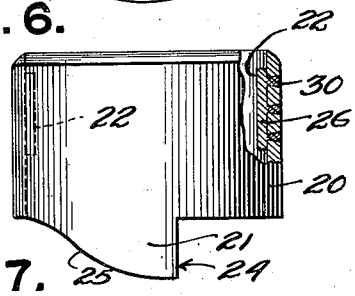
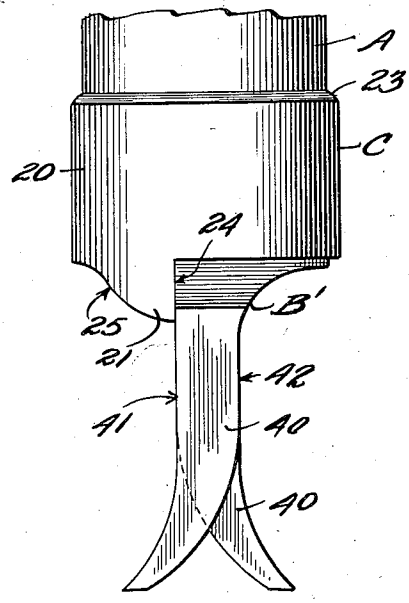


FIG. 7.



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UNITED STATES PATENT OFFICE

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COUPLING FOR DRILL BITS

Application filed October 9, 1930. Serial No. 487,553.

The present invention relates to drilling apparatus and more particularly to a safety drill bit coupling for use with the driving part, such as the drill collar on the end of the drill stem, and the bit of hydraulic rotary drilling apparatus.

The rotary system of drilling is now so extensively used that problems incident to recovery of drill bits which have become detached while in the wells are perhaps well known. A bit off the stem in a well presents one of the most difficult fishing problems in the art of recovering lost equipment. This is due, to some extent at least, to the peculiar formation of the rotary drilling bits which have cutting wings extending laterally from a main body part and thru which body part there are ways for water or mud delivered thru the drill stem and collar, and thru the bit to or adjacent the cutting edges of the wings. At times the inability to complete the well is due to the inability to recover a bit lost in the hole. Days, weeks, and even months may be spent, and large sums of money expended in such fishing operations. The present invention aims to prevent loss of time and money by so coupling the bit to the collar that it will not become accidentally detached.

The principal objects of the invention are, to provide safety drill bit couplings which, while permitting easy application of the drill bits to the driving parts will prevent these driven parts from becoming unscrewed from the driving parts while in the well holes, or in other words, to prevent the accidental "backing off" of the bits with respect to the drill collars; to provide safety drill bit couplings which may be applied for use with conventional drill bits, such as the ordinary fishtail bits, or those having cutting wings extending laterally beyond the main body portions of the bits, without altering or adding to such bits, the safety devices being carried by the drill collars: and, to provide such safety devices which may be used with different makes or models of such winged bits.

Another object of the invention is to provide safety devices which are simple in construction and inexpensive to make and assemble, and which will remain in good condition after extensive use.

Other objects and advantages of the invention will appear in the following detailed description, taken in connection with the accompanying drawings forming a part of this specification, and in which drawings:

Figure 1 is a side elevation of a drill collar and bit of the type shown in co-pending application for patent filed by me March 24, 1930, Serial Number 438,542, carried by the collar and with a coupling device, constructed according to my invention, in place to prevent unscrewing of the bit from the collar.

Figure 2 is a bottom plan view of the assembly shown in Figure 1.

Figure 3 is a fragmentary side elevation similar to Figure 1, but showing the safety device lifted to permit unscrewing of the drill bit.

Figure 4 is a central vertical sectional view thru the assembly shown in Figure 1.

Figure 5 is a bottom plan view of the safety device.

Figure 6 is a side elevation of the safety device, a portion being broken away to disclose characteristics thereof.

Figure 7 is a fragmentary side elevation of a drill collar and ordinary fishtail bit carried thereby, showing the application of my invention thereto.

In the drawings, where like characters designate like parts thruout the views, A designates a drill collar, B a drill bit, and C a safety coupling device constructed according to the present invention.

The drill collar A includes a cylindrical body portion 8 and an externally screw threaded shank 9 at its upper end for connection with a drill stem, not shown in the drawings. There is a water way 10 longitudinally of the body 8 and shank 9, and an internally screw threaded socket 11 open at the bottom of the body 8 for reception of the externally screw threaded shank 12 of the bit B.

The bit B includes the screw threaded shank 12, which in the example shown is right hand threaded, a body part 13 therebelow, and as shown in Figures 1–4, a plu-

rality of main or pilot blades 14 and a plurality of wing-like reamer blades 15. The face of each blade 15 which leads as the bit is rotated in a direction to drill, is indicated at 16 and is called the leading face in contra-distinction to the face 17 which trails in the path of rotation. The shank 12 is provided with a right hand thread so that the rotation of the drill collar A in a direction for drilling, that is, in a counter clockwise direction as viewed in Figure 2, will, upon the leading faces 16 encountering material, tend to turn the bit B tight on the collar A. If the collar is rotating in a direction counter to that described, that is, clockwise as viewed in Figure 2, and the trailing faces 17 encounter material, that tends to unscrew or "back off" the bit B from the collar A.

The wing-like blades 14 extend laterally from the body 13 and beyond the peripheral plane of the body part 8 of collar A, as shown at 18, in Figures 1, 3 and 4, so as to ream a hole larger than the diameter of the collar and drill stem.

The safety coupling device B comprises a body part 20, in the example shown, in the form of a sleeve slidable longitudinally of the cylindrical body part 8, a detent 21 to fit between or engage one of the blades 15, and means 22 for compelling the detent to rotate with the collar A at least while the detent is between the bit blades 15. The sleeve 20 may have its upper marginal portion beveled as at 23 so as to not present an abrupt shoulder to the wall of the well when the collar A is being withdrawn from the well. The detent 21 is preferably formed integral with the lower marginal portion of the sleeve 20 and is shaped to provide a stop shoulder 24, preferably in right angular relation to the lower margin of the sleeve 20, and an inclined face 25 opposite shoulder 24 against which the wings 15 may ride as the drill bit B is being screwed into place if the safety coupling device is not held in a retracted position as shown in Figure 3. The means 22, in the example shown comprise keys, carried by the sleeve 20, movable in elongated slots 27 extending longitudinally of the cylindrical body part 8 of drill collar A. It is preferred to provide the slots 20 with end walls 28 and 29 so that the collar 20 will have limited slidable movement longitudinally of the drill collar and yet will not drop off if there is no drill bit carried by the collar. In the example shown, the keys 26 are welded as at 30 to the collar and as an example of a typical assembly, the drill collar A may be provided with one or more of the slots 27, a key 26 may be placed loosely therein and the safety sleeve 20 placed about the cylindrical body portion of the drill collar. The drill bit to be used with the collar may then be screwed home, the sleeve 20 moved downwardly upon the drill collar until the detent 21 engages the leading face 16 of one of the wing-like blades 15, and finally spot welding the key 26 to the sleeve 20. By this procedure the detent 21 will engage one of the blades altho it may act as a safety device even tho it merely fits between two of the wing-like blades 15, with its stop shoulder 24 confronting, but not necessarily engaging the leading face of the blade, when the drill bit is screwed home, since slight relative circumferential movement between the bit and collar would not permit the two to become detached and the detent between adjacent blades would prevent excessive unscrewing movement.

In Figure 7 the safety coupling device is shown in engagement with an ordinary fishtail bit B', provided with wing-like blades 40 which extend laterally beyond the peripheral plane of the drill collar A, the blades having leading faces 41 and trailing faces 42. In this view, the detent 21 is shown with its stop shoulder 24 engaging the leading face 41 of the blade 40, but it is not essential that these parts so engage when the fishtail bit is screwed home on the collar A, since slight relative movement in a direction to normally separate the parts would be resisted by the detent even tho positioned intermediate the blades 40.

It is to be observed that no alteration of the drill bit is necessary in order to adapt the invention thereto, and that no addition is necessary to such drill bit. Furthermore, the milling or otherwise providing of one or more slots 27 is a simple operation. The safety coupling device may be easily assembled on the drill collar in a manner that it cannot accidentally drop therefrom or be removed by a careless workman. The safety coupling device may be used with different makes and models of drill bits of the conventional type, or special type where there is some element extending laterally beyond the peripheral plane of the drill collar.

Changes may be made in details and arrangements of parts without departing from the spirit of the invention as set forth in the following claims:

I claim:

1. The combination with a drill collar and a drill bit having means whereby relative movement of one with respect to the other in one direction will couple the two and movement in a counter direction will uncouple the two, the bit including wing-blades extending beyond the plane of the periphery of the collar, of a detent rotatable with the collar and extending between adjacent bit blades to prevent uncoupling movement between the collar and bit.

2. The combination with a drill collar and a drill bit having means whereby relative movement of one with respect to the other in one direction will couple the two and move-

ment in a counter direction will uncouple the two, the bit including wing blades extending beyond the plane of the periphery of the collar, of a retractable detent rotatable with the collar and extending between adjacent bit blades to prevent uncoupling movement between the collar and bit.

3. The combination with a drill collar and a drill bit having means whereby relative movement of one with respect to the other in one direction will couple the two and movement in a counter direction will uncouple the two, the bit including wing blades extending beyond the plane of the periphery of the collar, of a detent rotatable with the collar and engaging one of the said bit blades to prevent uncoupling movement between the collar and bit.

4. The combination with a drill collar and a drill bit having means whereby relative movement of one with respect to the other in one direction will couple the two and movement in a counter direction will uncouple the two, the bit including wing blades extending beyond the plane of the periphery of the collar, of a retractable detent rotatable with the collar and engaging one of the said bit blades to prevent uncoupling movement between the collar and bit.

5. In combination with a drill collar and a drill bit having screw threaded connection therewith and wing-like blades on the bit extending laterally beyond the peripheral plane of the collar, of a sleeve slidable longitudinally of the collar and coupled for rotation therewith, provided with a detent means to engage at least the leading edge of one of said blades to resist unscrewing detachment of the collar and bit.

6. In combination with a drill collar and a drill bit having screw threaded connection therewith and wing-like blades on the bit extending laterally beyond the peripheral plane of the collar, of a sleeve slidable longitudinally of the collar and coupled for rotation therewith, provided with detent means to engage between adjacent bit blades to prevent unscrewing detachment of the collar and bit.

7. The combination with a drill collar and a drill bit, the bit having a screw threaded shank fitting a screw threaded socket of the collar so that rotation of the collar in one direction will tend to keep the bit tight on the collar and rotation in a counter direction will tend to loosen the bit from the collar when the bit meets material tending to retard its rotation, said bit having wing blades extending beyond the peripheral plane of the collar, of a sleeve about said collar slidable longitudinally thereof, key means carried by the sleeve movable in slots extending longitudinally of the collar to limit the sliding movement of the sleeve longitudinally of the collar, and compel it to turn with the collar, and a detent extending from the sleeve between the blades to prevent unscrewing separation of the collar and bit.

8. The combination with a drill collar and a drill bit having means whereby relative movement of one with respect to the other in one direction will couple the two and movement in a counter direction will uncouple the two, the bit including wing blades extending beyond the plane of the periphery of the collar, of a sleeve about said collar slidable longitudinally thereof, key means between the collar and sleeve to compel the latter to rotate with the former, and a detent on the sleeve extending between adjacent bit blades to prevent uncoupling movement between the collar and bit.

9. The combination with a drill collar and a drill bit having means whereby relative movement of one with respect to the other in one direction will couple the two and movement in a counter direction will uncouple the two, the bit including wing blades extending beyond the plane of the periphery of the collar, of a sleeve about said collar slidable longitudinally thereof, key means between the collar and sleeve to compel the latter to rotate with the former, and a detent on the sleeve engaging one of said bit blades to prevent uncoupling movement between the collar and bit.

HARRY C. BREWSTER.