May 29, 1928. 1,671,136

J. C. STOKES

SAMPLE TAKING DEVICE FOR DRILLING APPARATUS

Filed Aug. 21, 1924 2 Sheets-Sheet 1

Fig. 1.

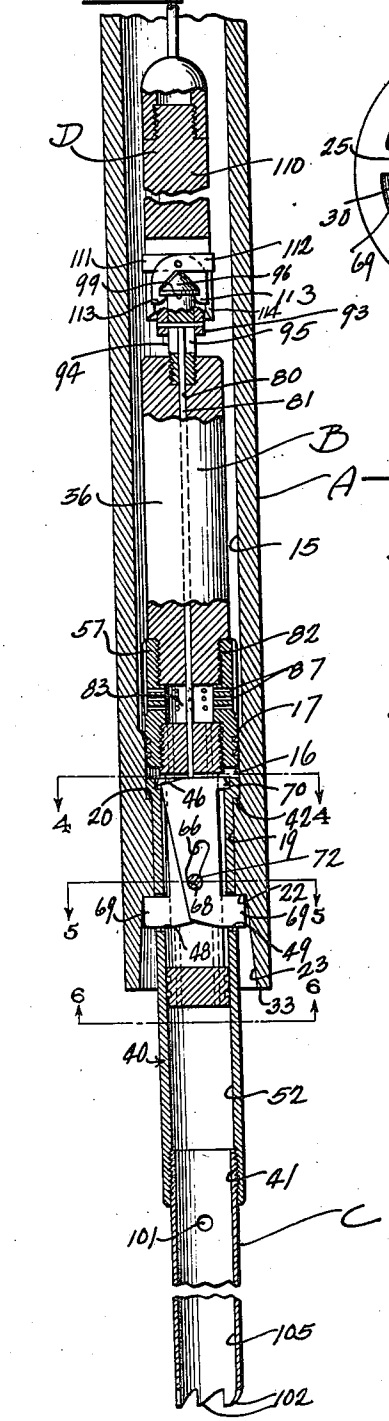


Fig. 6.

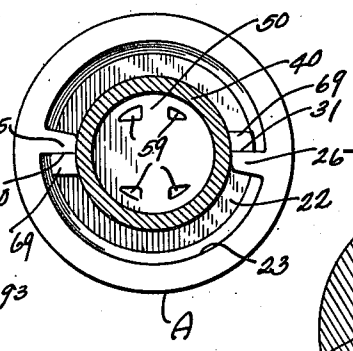


Fig. 4.

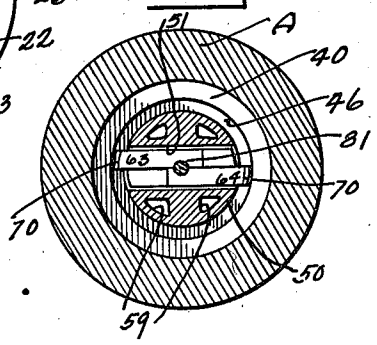


Fig. 9.

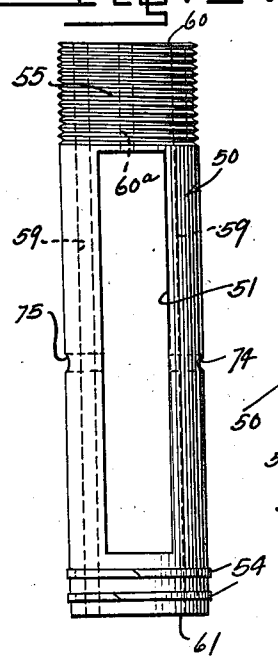
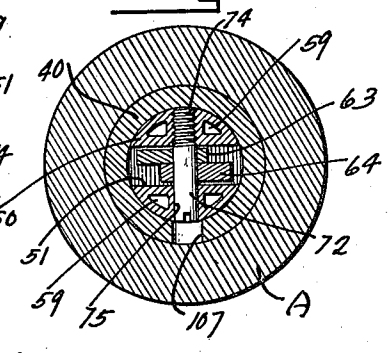


Fig. 5.



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Fig. 2.

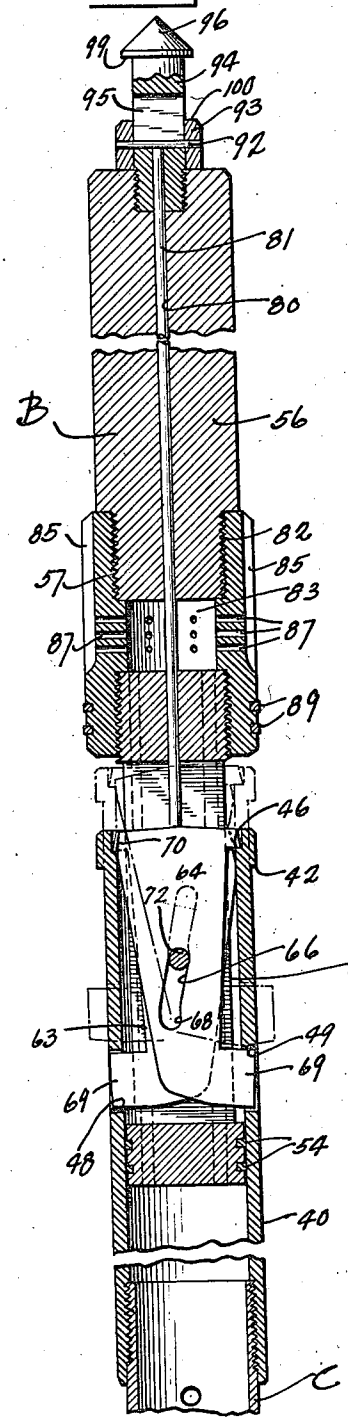


Fig. 3.

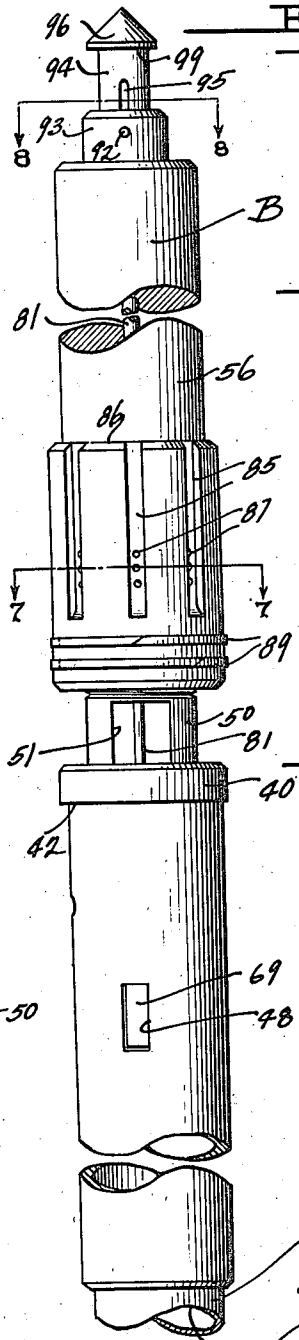


Fig. 7.

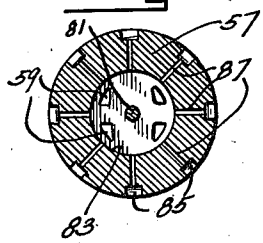
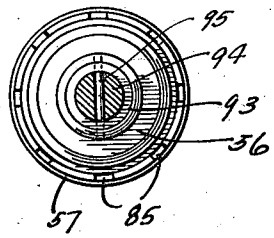


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SAMPLE-TAKING DEVICE FOR DRILLING APPARATUS.

Application filed August 21, 1924. Serial No. 733,402.

This invention relates to improvements in well drilling equipment.

The primary object of this invention is the provision of novel apparatus to facilitate the taking of samples in advance of a drilling operation, in order to determine the characteristics of the soil being drilled.

A further object of this invention is the provision of a novel type of earth sampling device, embodying certain improved features originally set forth in my co-pending application, Serial No. 404,240, filed August 17, 1920 issued September 14, 1924, as Patent No. 1,511,640.

A further and important object of the invention is the provision of an earth sampling device for well drilling equipment, primarily adapted for use where deep wells are being sunk, and whereby the earth sampling device may be lowered and elevated in a drill stem, without necessity of pulling the drill stem every time a core of earth is taken.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a cross sectional view taken through the improved earth sampling device, showing it in a locked relation with the drill stem with which it cooperates.

Figure 2 is a fragmentary cross sectional view showing internal working details of the improved sampler carrying device.

Figure 3 is a fragmentary side elevation of the improved carrier construction of this invention.

Figures 4, 5 and 6 are cross sectional views taken on their respective lines in Figure 1 of the drawings.

Figures 7 and 8 are cross sectional views taken on their respective lines in Figure 3 of the drawings.

Figure 9 is a side elevation of a detail of this invention.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may designate a drill stem, within which a carrier B is adapted to cooperate in supporting a tool C. A hoisting and lowering device D, such as is set forth in my Patent #1,442,188, granted January 16, 1923 may be employed for lowering and elevating the carrier and tool.

The drill stem A is substantially of the same type set out in my co-pending application, Serial No. 404,240, filed August 17, 1920, and is of hollow cylinder or tubular shape in formation, providing a main passageway 15 therethrough with a restricted passageway 16 immediately below the main passageway 15, and being reduced on a taper 17 at the juncture of the passageways 15 and 16. A further reduced passageway 19 is provided below the passageway 16, of course, in alignment therewith, and at the juncture of the passageways 16 and 19 an annular shoulder 20 is provided, which cooperates materially with the improved carrier B in supporting the same for operation. Below the passageway 19, an annular shoulder 22 is provided, facing downwardly, in contra-distinction to the upwardly facing annular shoulder 20 immediately above the reduced passageway 19. Within the tapered bore 23 below the annular shoulder 22, substantially diametrically opposed lugs 25 and 26 are provided, integral in the drill stem A, which provide flush surfaces 30 and 31, in the same plane, adapted for cooperation with certain pawl or dog locking mechanism of the carrier to be subsequently described. These lugs 25 and 26 extend from the annular shoulder 22 to the bottom marginal edge 33 of the drill stem A.

The carrier B is of novel type, and is especially adapted for carrying a sample taking tool C, although this carrier is not to be limited to the support of such a tool. It includes a substantially cylindrical shaped hollow body 40, which at the lower end thereof is internally screw threaded, at 41, for detachably receiving the tool C, which in this specific instance may be a sampling tool, of hollow cylindrical formation, being externally screw threaded at the top thereof for detachable connection in the screw threads 41 of the body 40. The body 40 upwardly thereof is provided with an annular shoulder 42 extending outwardly from the circumference of the body 40, adapted for cooperation against the upper annular shoulder 20 of the drill stem A to support the carrier in position in the lower part of the drill stem. At the top thereof the body portion is also provided with an upwardly facing interior annular shoul-

der 46 for cooperatively supporting pawls or dogs of the carrier to be subsequently mentioned. Diametrically opposed openings 48 and 49 are provided in the body 40, below the shoulder 42, through which said pawls cooperate, as is illustrated in the drawings.

The carrier B furthermore includes the pawl carrying frame 50, which is of substantially cylindrical formation, providing the relatively wide rectangular opening 51 extending longitudinally therethrough. This frame 50 is adapted for plunger action in the bore or passageway 52 of the body 40, and at its lower end below the opening 51 is preferably grooved for receiving piston rings or packing material 54, substantially as is illustrated in the drawings, which are adapted for contact with the side walls of the passageway 52 to prevent seepage of water along the walls of the passageway 52 past the frame 50. The frame or plunger member 50 above the opening 51 is externally screw threaded, at 55, for detachable connection to a cylindrical shaped weight 56, by means of a coupling 57. Water carrying ducts 59 extend longitudinally through the pawl carrying frame 50, outletting at their upper ends on the top surface 60 of the frame 50, and at their lower ends on the bottom surface 61 of the frame 50.

The locking dogs or pawls 63 and 64 are of analogous formation, each including a body portion in which a diagonal slot 66 is provided with an offset lower end 68. Each of these dogs provides a lateral locking extension 69 which are adapted for extension through the openings 48 and 49 of the body 40 when the tool carrying device B is in locked position in the drill stem. At their upper ends the pawls 63 and 64 provide relatively small lateral extensions 70 adapted to cooperate on the upper annular shoulder 46 of the body 40. A pivot pin 72 is preferably supported in detachable manner in the frame portion 50 of the carrier, including a screw threaded end adapted for detachable connection in a screw threaded opening 74 provided in the frame 50 with an opposite aligning opening 75 in which the head end of the pin 72 is disposed. Thus, the pin 72 extends transversely of the rectangular opening 51 in the frame 50, and the pawls 63 and 64 are pivotally and slidably mounted with respect to this pin 72 in this opening. This locking pawl arrangement is somewhat similar to the bit locking and collapsing structure set forth in my co-pending application above referred to, and the operation of the same in connection with the tool carrier will be hereinafter described.

The weighted body 56 is preferably of cylindrical formation, having a relatively small passageway 80 extending therethrough adapted to reciprocably receive a rod 81 therein. The body 56 at its lower end is reduced, as designated by numeral 82, for detachable connection to the frame or plunger portion 50 of the carrier, by means of the coupling 57. This coupling 57 is interiorly screw threaded at its upper and lower ends for connecting the screw threaded ends 82 and 55 of the carrier details 56 and 50 respectively together, and providing a compartment 83 between the facing ends of the carrier parts 50 and 56, as is illustrated in the drawings. The coupling 57 is exteriorly provided with grooves 85, outletting at the upper edge 86 of the coupling 57, and transverse passageways 87 extend from these grooves in communicating relation with the compartment 83. The plunger rod 80 extends through the compartment 83 into a passageway 60^a provided through the top of the plunger or frame portion 50, and is adapted to rest upon the upper edges of the dogs 63 and 64, as is illustrated in Figures 1 and 4 of the drawings. It is to be noted that the external surfaces of the coupling 57 and the carrier part 56, above the taper 17, are spaced from the walls of the passageway 15, so that water may travel downwardly through the drill stem passageway 15 and through the grooves 85 into the compartment 83 through the passageways 87. The lower end portion of the coupling sleeve 57 is provided with a series of annular grooves adapted to receive packing rings or material 89 which may slidably engage the walls of the passageway portion 16 of the drill stem, below the taper 17 of said drill stem, to prevent leakage of water therein.

At its upper end the plunger rod 81, as is illustrated in Figure 2, contacts with a cross pin 92 which is fixed at its ends in a hollow ring 93 slidably mounted upon a stem 94. The stem 94 is provided with a longitudinal slot 95 within which the intermediate portion of the pin 92 slides, and this stem 94 is screw threaded in rigid relation in the top of the carrier member 56, and has an upwardly tapering head 96 providing a shoulder 99 facing downwardly. The sleeve 93 on the other end provides a shoulder 100 facing towards the shoulder 99.

Referring more particularly to the operation of the improved sample taking device, the carrier B with the tool C attached thereto is lowered through the drill stem A with a special lowering grappling hook device, such as is set forth in my Patent #1,442,188 granted January 16, 1923, and which has not been specifically shown in this invention. This grappling hook, however, includes a pair of supporting pawls which are disengaged from the shoulder 99 of the head 96, when the sleeve 93 slides upwardly on the stem 94 into the position illustrated in Figure 1 of the drawings. As the carrier is lowered into the lower portion of the drill stem

or holder A, the tool C will of course strike the ground from which a sample of earth is to be extracted, and upon continued lowering of the carrier, the weighted portion of the carrier, which consists of the frame 50, body 56, and coupling 57 will be lowered with respect to the body 40, with the frame 50 acting in plunger like manner within the body 40. It is to be observed that during the lowering of the carrier in the drill stem the pawls 63 and 64 are in a retracted relation in so far as the extensions 69 thereof are concerned, so that these pawls do not extend laterally of any portion of the carrier. They therefore do not interfere with the lowering movement of the carrier, since incident to their weight the pawls 63 and 64 under such circumstances are supported in the passageway 52 of the body 40, upon the pin 72 which engages in the upper ends of the slots 66. When the carrier has been lowered so that the annular shoulder 42 of the body 40 engages the annular shoulder 20 in the lower portion of the drill stem A, upon continued movement of the weighted portion of the carrier, the pin 72 will ride downwardly through the slots 66 of the pawls 63 and 64, tending to relatively expand the lower portions of the pawls 63 and 64, so that the extensions 69 ride through the openings 48 and 49 into the bore or passageway 23 below the annular shoulder 22 of the drill stem A. The lowering of the weighted portion of the carrier after the body 40 has settled onto the annular shoulder 42 of the drill stem permits the plunger rod 81 to rise in the passageway 80 and this forces the ring 93 upwardly for releasing the lowering grappling device.

After the carrier has been lowered into the drill stem into the position illustrated in Figure 1 of the drawings, the device is ready for operation, since the carrier is then locked in the drill stem, with the projections 69 of the pawls 63 and 64 engaging below the annular shoulder 22 to prevent any upward rising of the carrier in the drill stem as the latter is rotated and forced downwardly to accomplish the sampling operation. The core barrel C is preferably provided with a transverse opening 101 below the body 40 for the release of water therethrough when drilling soft formation, but this opening 101 may be omitted if drilling in hard formation, and the fluid allowed to go to the bottom of core barrel and up on the outside. The lower marginal edge of the hollow cylindrical shaped tool C is provided with teeth 102 for cutting into earth or other soil.

The drill stem A is rotated during the sample taking operation, and it is of course understood that upon rotation the lugs 25 and 26 of said drill stem will engage the locking projections 69 of the pawls 63 and 64, and rotate the sampling tool C so that the teeth 102 will cut into the earth material and fill the bore thereof. The water supplied to the exterior and interior surfaces of the tool C lubricates the operation of the tool or bit C and this water is supplied first to the passageway 15 of the drill stem A, and from thence flows downwardly through the grooves 85 into the compartment 83 and thence through the long ducts 59 into the passageway of the earth sampling tool or bit C. The water may reach the exterior surface of the tool C as above mentioned. The packings 54 and 89 prevent seepage of water except in the course above described. It is to be particularly noted that the dogs or pawls 63 and 64 cannot become detached from the frame portion 50, and they in fact hold the body 40 in connected relation with the frame 50, since even when these pawls are collapsed the projections 69 extend into the openings 48 and 49 of the body 40, although they do not project outwardly of the exterior surface of said body 40 when they are so collapsed, as is illustrated in Figure 2 of the drawings.

After the sample of earth has been taken the same forming a core in the passageway 105 of the tool C, it will be desirable to release the carrier from the bottom of the drill stem. This is accomplished by lowering the grappling device D, which is more specifically described in my patent above referred to, which consists of a body 110 having grappling hooks 111 and 112 pivoted therein and provided with relatively small heads 113. These heads 113 extend inwardly toward each other within a suitable recess 114 provided in the body 110, and the hooks normally by the weight of the heads 113 extending inwardly towards each other. As the elevating device D is lowered to engage the tapered head 96 the hook ends 113 will spread apart and permit their snapping beneath the head to engage the shoulder 99. These heads 113 are shallow, and will fit between the facing margins 99 and 100 of the head 96 and ring 93 respectively, so that notwithstanding the fact that the ring 93 is elevated with respect to the stem 94 the elevating hooks 111 and 112 may engage the head 96 in the relation shown in Figure 1 of the drawings. Upon upward movement of the elevating device D, the weight member 56 together with the frame 50 coupled thereto will be immediately lifted, which will move for a short distance while the body 40 remains seated on the annular shoulder 20 of the drill stem. During this upward movement of the weighted part, the pin 72 will ride upwardly through the slots 66 of the pawls 63 and 64, retracting the pawl projections 69 of said pawls or dogs, so that said projections 69 are removed from beneath the annular shoulder 22 of the drill stem A. When the retaining pin 72 engages

the upper ends of the slots 66, the pawls 63 and 64, which are now retracted, together with the body 40 and the tool C which holds the sample of earth, will me moved upwardly in the passageway of the drill stem A, and the entire carrier may then be elevated without interference from any part of the drill stem. The structure D is to be used as an elevator for the carrier B, but for lowering or setting the tool holder B, the hooks 111 and 112 may be replaced by a similar shaped pair of hooks with long jaws, however, so that when the carrier reaches its setting position in the drill collar or tool holder, the rod 81 raises the ring 93 and forces the long jawed hooks or dogs to release their hold on a head 96. After the release of the long jawed dogs, however, sufficient room is left for the application of the pair of short jawed dogs 111 and 112, in order to enable the removal of the carrier from the well. These features are set forth in my Patent #1,442,-188, granted January 16, 1923.

A very important feature of the invention is the fact that the relatively small diametered sample taking tool C is disposed for a considerable distance below the lower margin of the drill stem A, and can take cores of testings far ahead of the full size hole being drilled. The water lubricating feature of this invention cooperates in permitting such taking of cores of earth, in that full water pressure may be fed directly to either an earth sampling device or a small bit if desirable to use for drilling a small hole ahead.

To facilitate detachment of the pin 72 for release of the pawls 63 and 64, the body 40 may be provided with an aperture 107 which may be aligned with the pin 72 to enable release of the latter.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein described, without departing from the spirit thereof or the scope of the claims.

I claim:

1. As an article of manufacture a drill bit carrier comprising a body having a passageway therethrough and a lateral opening communicating with said passageway, a plunger device operating in said passageway having a pin therethrough, a pawl in said plunger device provided with a slit slidably receiving said pin therethrough whereby upon movement of the pin relative to the pawl the pawl may be projected or retracted through said opening of the body with respect to the exterior surface of said body, and a sample taking cylinder secured to said body below said pawl.

2. As an article of manufacture a bit carrier comprising a substantially cylindrical shaped body providing a passageway therethrough and having lateral openings therein, a plunger frame in the passageway of the body provided with a transverse opening therein, a pin carried by the frame extending transversely across the opening therein, a pair of pawls pivotally and slidably mounted in the opening of said frame on said pin, said pawls having locking projections normally held in the lateral openings of said body so that they may be extended or retracted with respect to the outer circumference of the body, said body at the upper end having an exterior downwardly facing annular shoulder thereon, said plunger frame being provided with ducts extending longitudinally therethrough, a weight member, a coupling connecting the weight member with the upper end of said frame providing a compartment between the weight member and frame, said coupling having transverse passageways therethrough, a headed stem secured with the upper end of said weight member, a ring slidable on said stem, and a plunger connected with said ring and operable against said pawls.

3. As an article of manufacture a drill bit carrier comprising a body having a passageway therethrough and at the extreme upper edge thereof having an annular outwardly extending shoulder projecting therefrom, said body having a lateral opening therethrough extending to the passageway, a plunger device including a portion reciprocably operating in said passageway and including an upper portion exteriorly of the passageway above said body, a pawl member collapsibly disposed in the plunger device having a locking lug thereon adapted to extend laterally thru the opening of said body, said locking lug of the pawl being disposed in said body opening so that upon lifting of the plunger device the pawl will be held against longitudinal movement with respect to the body to collapse said locking lug thereof, said plunger device having passageways therethrough above the pawl to permit water to pass by the pawl from above the pawl to below the pawl, and piston means supported by said plunger device below said pawl snugly operating in the passageway of said carrier body as a seal for said passageway to compel the water to pass downwardly through the passageway of the body below said plunger device.

4. In a drill device the combination of a drill stem having a passageway therethrough, said passageway at the lower end of the drill stem having an annular inwardly extending portion to reduce the passageway, said portion providing an upwardly facing shoulder and a downwardly facing shoulder, said drill stem below the downwardly facing shoulder having the passageway annularly enlarged with vertical locking lugs extending into said enlarged portion as recessed, a tubular carrier slidable in

said passageway thru the passageway of the annular inwardly extending portion at the lower end of the drill stem, and having an upper annular flange thereon adapted to rest upon the upwardly facing annular shoulder above mentioned, said carrier below the annular flange thereof having lateral openings adapted to communicate with the enlarged passageway portion at the lower end of the drill stem when the flange thereof rests upon the upwardly facing annular shoulder, pawls collapsibly carried in said carrier having locking lugs which are adapted to extend into the lateral openings of the carrier and project into the enlarged recess portion of the drill stem for abutment against the vertical lugs therein and against the downwardly facing shoulder of the drill stem, and means operating in the passageway of the drill stem above said carrier for collapsing said pawls to permit the retraction of the locking lugs thereof into the carrier.

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