

Aug. 16, 1966

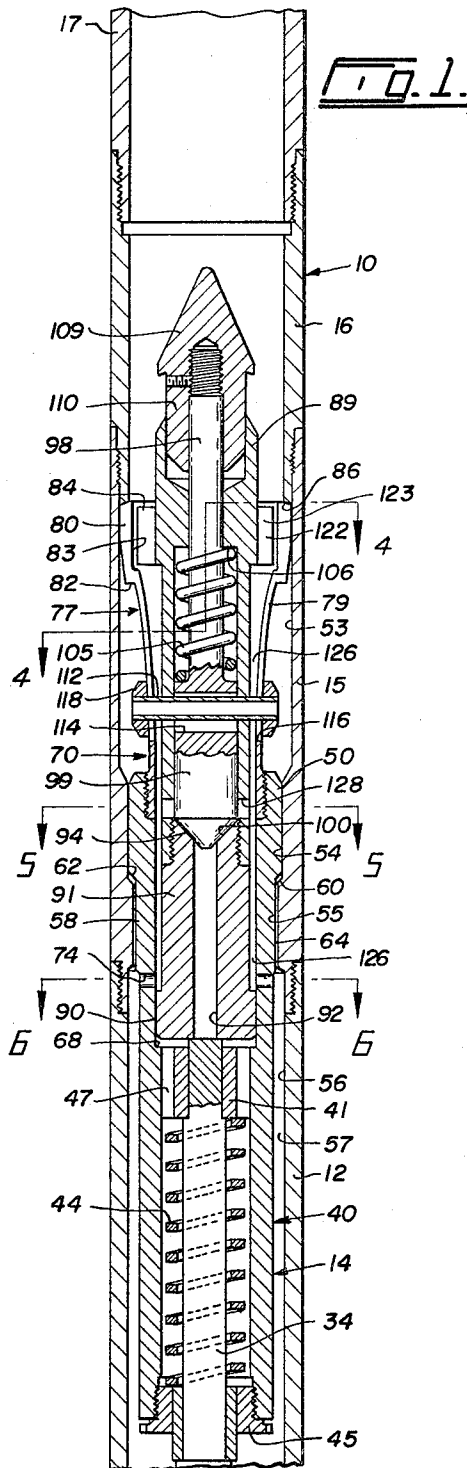
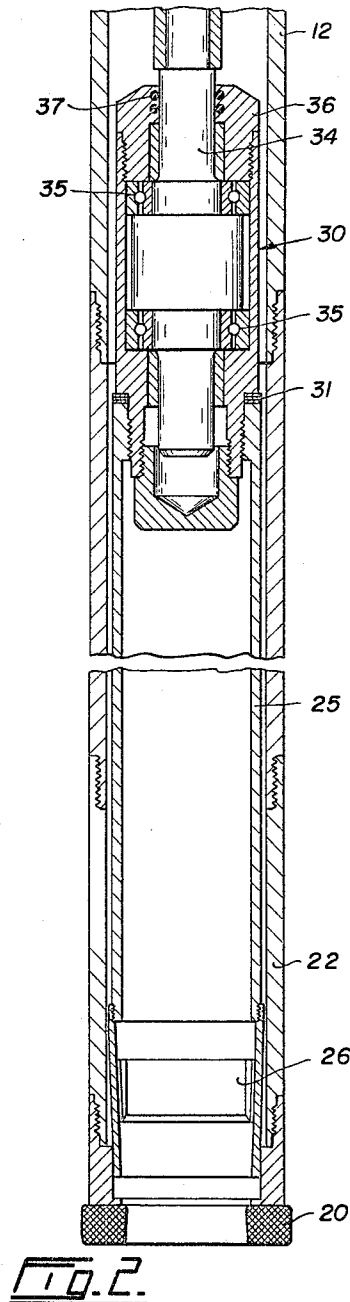
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3,266,835

CORE BARREL LATCH AND BY-PASS ASSEMBLY

Filed Dec. 18, 1963

3 Sheets-Sheet 1



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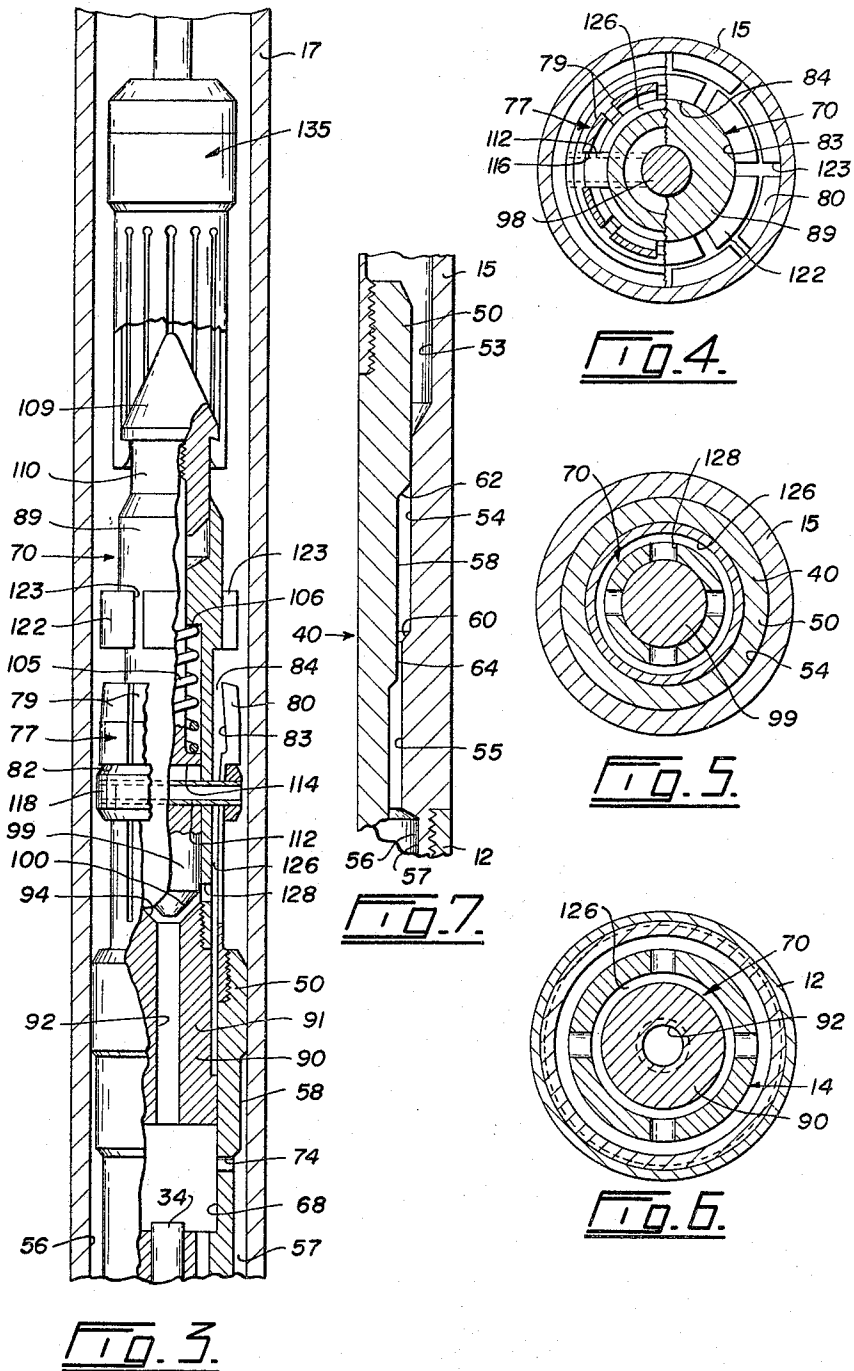
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CORE BARREL LATCH AND BY-PASS ASSEMBLY

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3 Sheets-Sheet 2



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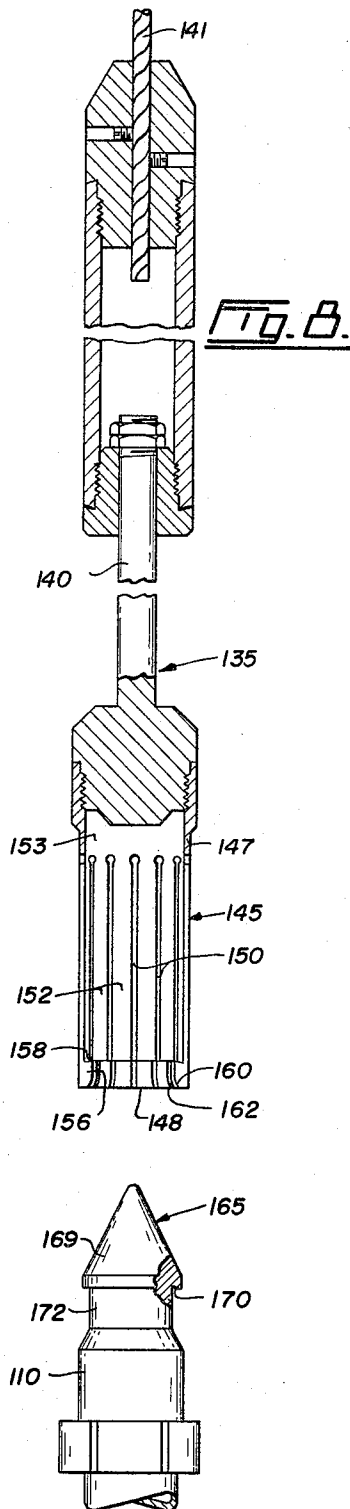
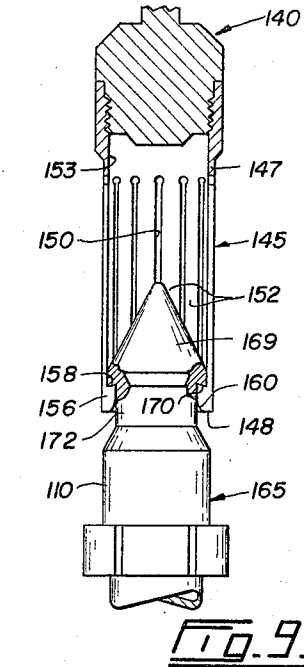
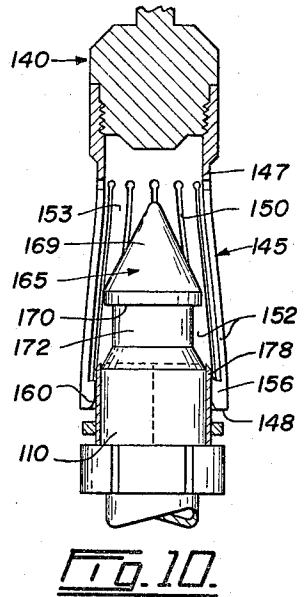
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CORE BARREL LATCH AND BY-PASS ASSEMBLY

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3 Sheets-Sheet 3



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1

3,266,835 CORE BARREL LATCH AND BY-PASS ASSEMBLY

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Filed Dec. 18, 1963, Ser. No. 331,565
39 Claims. (Cl. 294—86.24)

This invention relates to core barrels for what are commonly known as rock drills used in deep drilling.

This apparatus includes a core barrel outer tube secured to the lower end of a hollow drill rod, said outer tube having the usual drilling bit at its outer end with a reaming shell just above the bit. An inner core barrel assembly is movable through the drill rod into and out of the outer tube. The inner tube assembly has the usual core tube at its lower end which, when in operation, is positioned just inside the bit to receive a core cut by the latter, said core tube having the usual core retainer associated therewith.

An object of the present invention is the provision of a novel latch arrangement for removably securing the inner tube assembly in place within the outer tube.

Another object is to provide a valve-controlled by-pass system within the inner tube assembly which permits water to flow through said assembly as it is moved upwardly or downwardly through the drill rod.

A further object is the provision of a flow indicator system in the inner tube assembly which restricts the flow of water which is normally pumped down through the drill rod, through the assembly when the inner tube is forced back by the action of the core, or when a block occurs at the bit, thereby indicating to the operator that the drilling should be stopped.

A further object is the provision of a by-pass system in the inner tube assembly which allows the flow of water through the assembly during the down or up trip through the drill rods to reduce the resistance caused by the water, thereby increasing the rate of descent or ascent.

A further object of this invention is to provide the inner tube assembly with means whereby the rate of descent of the inner assembly in the drill rods can be altered to the desired velocity.

Another object is to provide the inner tube assembly with a particular configuration whereby an increased diameter for a predetermined distance is slightly smaller than the inside diameter of the drill rods to form a restriction for the purpose of retarding the descent, and if the inner tube assembly should stop during a downward trip before it reaches its proper latching position with respect to the outer tube, the pressure of the water which is used to pump the inner tube assembly down rises suddenly, indicating to the operator that the inner tube assembly has not reached its proper position for drilling.

A further object is to provide a positive means of locking a one piece latch in place once the inner tube assembly has been latched in the proper position in the outer tube.

Yet another object is the provision of co-acting shoulders on the inner surface of the outer tube and on the inner tube assembly which approach each other as the inner tube assembly is nearing in its proper drilling position to provide a dash-pot action to arrest the descent of the inner tube assembly with a minimum of impact upon the outer tube.

Yet another object is the provision of a simple, one piece latch for locking the inner tube assembly within the outer tube and which has a comparatively large contacting surface for engaging a shoulder within the outer

2

tube, thereby reducing the wear between the contacting elements as compared to prior latches for this purpose.

A still further object is the provision of a simple over-shot latch which quickly and easily grips the core barrel spearhead when the latch is moved over said head, and which does not include springs and other operating parts which can become fouled, and which, if any part breaks, puts the latch out of commission.

The invention is illustrated in the accompanying drawings, in which,

FIGURE 1 is a vertical section through the top half of a core barrel incorporating the present invention with the parts in position for normal operation,

FIGURE 2 is a vertical section through the lower half of the core barrel,

FIGURE 3 is a view similar to FIGURE 1 with the parts in the positions they assume when the inner tube assembly is moving downwardly through a drill rod,

FIGURE 4 is a cross section taken on the line 4—4 of FIGURE 1,

FIGURE 5 is a cross section taken on the line 5—5 of FIGURE 1,

FIGURE 6 is a section taken on the line 6—6 of FIGURE 1,

FIGURE 7 is a fragmentary longitudinal sectional view through the top part of the core barrel with parts thereof shifted out of the position shown in FIGURE 1,

FIGURE 8 is a longitudinal section through an over-shot body with a latch attached thereto, and in line with the spearhead of the core barrel,

FIGURE 9 is a section through the latch gripping the spearhead, and

FIGURE 10 is a section through the latch gripping a ring mounted on the spearhead shank.

Referring to the drawings, 10 is a drill core barrel consisting of a core barrel outer tube 12 and an inner tube assembly generally designated by the numeral 14.

The upper end of outer tube 12 is connected to a guide coupling 15 which, in turn, is secured at its upper end to an adaptor guide coupling 16 as is customary in core barrels. The core barrel operates in a drill hole at the lower end of a hollow drill rod, a portion of a drill rod 17 being shown in FIGURES 1 and 3. A standard drill bit 20 is connected by a reaming shell 22 to the lower end of outer tube 12.

The inner tube assembly 14 includes the usual inner or core tube 25 which has a standard core retainer assembly 26 at its lower end just above the bit 20.

The upper end of inner or core tube 25 is attached to a bearing housing 30 with shims 31 therebetween for length adjustment. Bearing housing 30 is rotatably mounted on a spindle 34 by means of thrust bearings 35 and is held in place by a retaining plug 36 having oil seals 37 therein.

Spindle 34 extends upwardly into a spring housing 40 and has a collar 41 fastened to its upper end. Below this collar is a helical spring 44 surrounding spindle 34 and contained in housing 40 by a retainer 45. Collar 41 is keyed to housing 40 by keys 47 which prevent the spindle from turning while allowing it to move axially.

It will be noted that spring housing 40 has an enlarged head 50 at its upper end. FIGURE 7 illustrates housing 40 in a position just above its normal operating position in guide coupling 15. This coupling has a main large bore 53, a second reduced bore 54 therebeneath, and a third reduced bore 55 beneath the second bore. The lower part of coupling 15 has a bore 56 which is of approximately the same diameter as bore 53 to form an annular passage 57 between said coupling 15 and said housing 40. The head 50 of housing 40 slidably fits within second bore 54 of the guide coupling, and said head 50 has a reduced section 58 which is of a slightly

smaller diameter than the inner diameter of third bore 55. A shoulder 60 is formed between second and third bores 54 and 55, and is opposed to a shoulder 62 between housing enlargement 50 and reduced section 58. With this arrangement, when housing 40 moves downwardly towards outer tube 12, head 50 enters second bore 54 of coupling 15 to trap water in the space between shoulders 60 and 62. This water can flow out through the very small annular space 64 between reduced section 58 and third bore 55 and through the slight clearance between head 50 and bore 54 so that a dash-pot effect is attained to slow the downward movement of the housing as it nears its final position.

The head 50 of housing 40 has a counterbore 68 therein to receive the lower end of a spearhead assembly 70. The diameter of spring housing 40 being less than the inner diameter of outer tube 12, annular water passage 57 is formed in the outer tube around the housing. A plurality of radial ports 74 connect passage 57 to counterbore 68 in the upper end of housing 40.

A tapered tubular spring latch 77 is threaded into counterbore 68 and projects upwardly therefrom. This spring latch is in the form of a tapered tube which is slotted in an axial direction to form spring fingers 79 that normally spring outwardly in a radial direction. Each finger has an offset outer end 80 forming an outer shoulder 82 facing downwardly of the apparatus, and an inner recess 83 which combines with the recesses of the other fingers to form a bore 84 opening outwardly from the upper end of latch 77. When fingers 79 of latch 77 are in their normal outwardly expanded position, they engage a shoulder 86 formed by the lower end of adaptor guide coupling 16 to prevent the spearhead assembly 70 from moving upwardly in the core barrel.

The spearhead assembly 70 includes a sleeve 89 having an enlargement or head at its lower end which acts as a flow indicator valve 90. This valve slidably fits into counterbore 68 of housing 40, and has a section 91 extending upwardly within sleeve 89, said valve and sleeve having a central passage 92 extending therethrough. A valve seat 94 is formed in section 91 at the upper end of passage 92. The lower end of valve 90 normally engages the top end of spindle 34.

A rod 98 extends longitudinally through the centre part of sleeve 89, said rod having an enlargement at its lower end forming a by-pass valve 99 having a lower inclined surface 100 adapted to rest on valve seat 94. Valve 99 slidably fits within sleeve 89, and a coil spring 105 extends between the upper end of this valve and an annular shoulder 106 formed on and projecting inwardly from sleeve 89. A spearhead 109 is fixedly secured to the upper end of rod 98 and has a shank 110 slidably fitting within the upper end of said sleeve 89.

A pin 112 extends diametrically through a slot 114 in valve 99. Pin 112 also extends through slots 116 in latch 77, the outer ends of said pin being secured to a ring 118 which surrounds spring fingers 79. Slot 114 permits a small amount of movement of valve 99 relative to pin 112.

An annular shoulder 122 is formed on the outer surface of sleeve 89 near the outer end thereof and fits into recess 83 of latch 77 when the fingers 79 are expanded and in engagement with shoulder 86 of guide coupling 16. Shoulder 122 is provided with a plurality of circumferentially spaced slots 123 extending longitudinally therethrough to permit water to flow through said shoulder. An annular passage 126 extends downwardly from slots 123 in shoulder 122 and surrounding sleeve 89. This passage extends into the head 50 of housing 40, and a plurality of radial ports 128 extend through sleeve 89 spaced above the lower end thereof and just above seat 94 of valve 90 to bring said passage 126 into communication with central passage 92 within said valve 90. When valve 99 rests on seat 94, ports 128 are closed to central passage 92. However, when valve 90 is in its lowermost position, ports 74

are uncovered and keep passage 126 in communication with passage 57 around the outside of housing 40. If valve 90 is moved upwardly a little by spindle 34, it closes off ports 74, but if said valve 90 is drawn upwardly by spearhead 109, it is moved above said ports 74 so that they remain open.

Before inner tube assembly 14 is inserted into the drill rods at the top end of the hole being drilled, spearhead 109 is pulled out to the full extent relative to sleeve 89. This causes pin 112 to move latch ring 118 upwardly along spring fingers 79 to retract these fingers so that they fit within the inside diameter of the drill rods.

Assembly 14 is then placed in the drill rods and dropped through said rods. When the assembly is dropped through the rods the piston action, as it descends, causes the water pressure below it to increase thus causing valve 99 to lift off seat 94 so that water from below the assembly is now free to pass through ports 74, passage 92, seat 94, ports 128, passage 126 and slots 123. This feature of by-passing the water past the inner assembly enables the assembly to descend at a faster rate than would otherwise be possible. As stated above, as the assembly nears its operational position, water is trapped between shoulders 60 and 62 to provide a dash-pot action which comparatively gradually slows the downward speed of the assembly before it arrives in its proper position.

When the assembly reaches its final position, valve 99 seats on seat 94 to close ports 128. The flow of water through assembly 14 is stopped momentarily, causing an increase in pressure above spearhead 109 which forces the spearhead assembly downwardly causing valve 90 to move below ports 74 to permit water to flow from passage 126 through said ports and along passage 57. The downward movement of spearhead 109 shifts pin 112 and ring 118 in the same direction to allow fingers 79 to spring outwardly to engage shoulder 86 at the lower end of coupling 16. At the same time, shoulder 122 moves into recess 83 within the spring fingers to lock the latch in place. The inner tube assembly is now engaged, and the drilling can commence.

When the inner tube 25 is filled with core or the upper end of said tube is forced upwardly against the loading of spring 44, spindle 34 is caused to move valve 90 upwardly and close ports 74, thus restricting the flow of circulating fluid that is being pumped down the drill rods and through the inner assembly 14. This is an indication to the operator that the drilling must be stopped immediately, and the inner tube assembly brought to the surface.

In order to retrieve the inner tube assembly 14, an over-shot 135 is lowered or pumped through the drill rods at the end of a wire line or cable until it engages and grasps spearhead 109. The first pull on the spearhead lifts valve 99 off seat 94, and the bottom of slot 114 engages pin 112. Further upward movement lifts the spearhead sleeve 89 and moves latch ring 118 upwardly to withdraw latch fingers 79 from shoulder 86. When sleeve 89 has reached a point where shoulder 122 is completely out of latch recess 83, the latch is fully released so that it will pass through the drill rods. The spearhead has reached the limit of its travel when latch ring 118 engages shoulder 82 of latch 77 so that the entire inner tube assembly is now moved upwardly.

When the spearhead has reached this limit, valve 90 is above port 74 and valve 99 is lifted off seat 94 so that ports 128 are uncovered. The water above the inner assembly now flows through slots 123, passage 126, ports 128, passage 92, ports 74 and passage 72. This by-passing of the water permits the inner tube assembly to be hoisted at a faster rate than would otherwise be possible, and it greatly reduces the load on the hoist since the assembly is not attempting to lift the column of water above it in the drill rods.

The valve and by-pass arrangement of the inner tube assembly is such that if the assembly, while descending

under the force of gravity or pressure of water, stops on the way down before it reaches its operational position, valve 99 is pressed by spring 105 on to seat 94, thereby closing ports 128. This stops the by-passing of the water, resulting in the pressure of the water above the assembly increasing. When this increase pressure is shown on the gauge at the pump, the operator knows that there is trouble, and no attempt would be made to do any drilling until the problem was eliminated.

Spring latch 77 is an improvement over latches for the same purpose in the prior art. The upper ends of spring fingers 79 engage almost the entire shoulder 86 at the lower end of coupling 16. This spreads the load over practically the entire shoulder, thereby preventing grooves from being worn into it. Furthermore, existing latches depend upon springs to lock the inner tube assembly in place. Latch 77 is in effect a single piece so that the parts cannot be misplaced relative to each other, and shoulder 122 positively locks the spring fingers 79 in their locking position.

The by-pass and valve arrangement of inner tube assembly 14 is such that water flows through the assembly as the latter moves upwardly or downwardly, thus permitting faster movement of the assembly than usual, and when it is being drawn upwardly, the load on the hoisting mechanism is lessened since no attempt is made to lift the column of water above the assembly.

The core barrel is provided with the water flow indicator valve 90 which is actuated by either the inner tube or spearhead 109. When the inner tube is full or an obstruction within the inner tube prevents free entry of the core, the inner tube is moved up against preload spring 44 and the end of spearhead assembly 70. When the inner tube has moved upwardly a predetermined distance, valve 90 closes ports 74 to stop the flow of water thus restricting the flow of circulating fluid.

When the inner tube assembly has reached its operative position in outer tube 12, spearhead 109 drops downwardly, opening ports 74. If latch 77 does not engage properly, the spearhead cannot drop down to open valve 90 so that the flow of water is stopped. This causes a sharp increase of pressure at the gauge which must be relieved immediately or the relief valve in the pumping system will blow off. This makes it impossible to drill with the inner tube assembly not properly engaged. The same action takes place if the inner tube assembly stops on the way down through the drill rods.

The dash-pot action which takes place between shoulders 60 and 62 at the reduced section 58 of housing 40 absorbs the impact of the descending inner tube assembly and locates it in the required position.

Referring to FIGURES 8 to 10, 140 is a standard overshot body which is lowered and raised through the drill rods by means of cable 141 connected to the upper end thereof. A tubular spring latch 145 is secured to and projects outwardly in an axial direction from the lower end of body 140.

The spring latch is preferably in the form of a tube 147 having an outer end 148. This tube has a plurality of slits 150 extending inwardly from its outer end 148 in an axial direction. These slots form spring fingers 152 therebetween. Fingers 152 completely surround the bore 153 of tube 147, said bore opening out from the tube at its outer end 148. Each finger has a projection 156 near the outer end thereof and extending radially into bore 153. Each projection 156 is formed with a locking shoulder 158 at an inner end thereof and a surface 160 inclined outwardly from said shoulder to the outer end of the finger to combine with similar surfaces of the other fingers to form a lead-in 162 for bore 153.

Spearhead 165 has the usual conical head 169 with an annular shoulder 170 at its inner end. This shoulder or inner end of the head is connected by a reduced section 172 to a shank 110.

Assuming that spearhead 35 is in operational position

within the core barrel, when it is desired to remove the inner tube assembly from said barrel, the overshot body 140 is lowered through the drill rods connected to the barrel by means of cable 141. When latch 145 reaches spearhead 138, fingers 152 move over the inclined surface of the spearhead, springing outwardly until projections 156 clear said head, at which time the fingers snap the projections with the shoulders 158 thereof behind and engaging shoulder 170 of the spearhead. Then when overshot 140 is hoisted upwardly by cable 141, the latch grips the spearhead and draws the inner tube assembly with it.

When it is desired to remove latch 145 from spearhead 135, a split ring 178 is placed on shank 110. Then the overshot is lowered until the ends of fingers 152 ride on to this ring to grip the ring. The inside diameter of the ring is greater than the maximum diameter of spearhead 135 so that when the overshot is hoisted, ring 178 rides over spearhead 135 keeping the latch fingers clear of it.

Split ring 178 is usually used when the latch is to be removed from the spearhead above the hole being drilled. However, when it is desired to lower the spearhead through the drill rods into the core barrel, a ring 178 is used that is not split so that there is no danger of the ring falling off the spearhead shank during the journey down through the drill rods. At this time, latch 145 is gripping the spearhead. When the spearhead stops in its operational position within the core barrel, the continued lowering of the overshot causes the spring fingers to ride on to ring 178 to grip the latter so that when the overshot is drawn upwardly, the ring keeps the spring fingers clear of the spearhead.

What we claim as our invention is:

1. In a core barrel, a spearhead assembly for movement in an outer tubular arrangement comprising a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, and movable longitudinally thereof, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, and means connected to the spearhead rod and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead inwardly and outwardly respectively relative to said sleeve.

2. In a core barrel, a spearhead assembly for movement in an outer tubular arrangement comprising a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve and movable longitudinally thereof, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers in to the sleeve and to allow said fingers to spring outwardly therefrom, and means connecting the ring to the spearhead rod to shift said ring to move the fingers inwardly and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch.

3. In a core barrel, a spearhead assembly for movement in an outer tubular arrangement comprising a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat, an inner passage in the sleeve in communication with said ports and extending through

said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the ports from said passage, and means connecting the valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat.

4. In a core barrel, a spearhead assembly for movement in an outer tubular arrangement comprising a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat, an inner passage in the sleeve in communication with said ports and extending through said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the ports from said passage, means connecting the valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat, a stationary tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers in to the sleeve and to allow said fingers to spring outwardly therefrom, and means connecting the ring to the spearhead rod to shift said ring to move the fingers inwardly and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch.

5. In a core barrel, a spearhead assembly for movement in an outer tubular arrangement comprising a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat, an inner passage in the sleeve in communication with said ports and extending through said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the ports from said passage, a stationary tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers in to the sleeve and to allow said fingers to spring outwardly therefrom, a pin extending diametrically through the sleeve to move therewith and having ends connected to the ring to shift said ring to move the fingers inwardly and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch, said pin extending through slots in the valve to connect the latch to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat.

6. In a core barrel, a housing adapted to move in an outer tubular arrangement and having a counterbore in and opening outwardly from an end of said housing, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a water passage, ports in the housing opening into the counterbore near said valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof

remote from the spearhead, ports through the sleeve near said seat and communicating with said water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage, and means connecting the member to the sleeve while permitting relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the by-pass valve from the valve seat.

7. In a core barrel, a housing adapted to move in an outer tubular arrangement and having a counterbore in and opening outwardly from an end of said housing, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a water passage, ports in the housing opening into the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat and communicating with said water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage, means connecting the by-pass valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the by-pass valve from the valve seat, a tubular spring latch connected to said end of the housing and completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, and means connected to the spearhead rod and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead inwardly and outwardly respectively relative to said sleeve.

8. In a core barrel, a housing adapted to move in an outer tubular arrangement and having a counterbore in and opening outwardly from an end of said housing, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a water passage, ports in the housing opening into the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat and communicating with said water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage, means connecting the by-pass valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the by-pass valve from the valve seat, a tubular spring latch connected to said end of the housing and completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers in to the sleeve and to allow said fingers to spring outwardly therefrom, and means connecting the ring to the sleeve to shift said ring to move the fingers inwardly

and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch.

9. In a core barrel, an outer tube, a housing adapted to move axially in the outer tube, said housing having a counterbore in and opening outwardly from an end thereof, a head formed on said end of the housing and slidably fitting in a portion of the bore of the outer tube when said housing is in a normal working position, said tube having an inner reduced bore section spaced from the housing head, said reduced bore section and head having opposed shoulders to form a dash pot therebetween when the housing moves towards and reaches the working position thereof, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a water passage, ports in the housing opening into the counterbore near said valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat, and communicating with said water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage and means connecting the member to the sleeve while permitting relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat.

10. In a core barrel, an outer tube, a housing adapted to move axially in the outer tube, said housing having a counterbore in and opening outwardly from an end thereof, a head formed in said end of the housing and slidably fitting in a portion of the bore of the outer tube when said housing is in a normal working position, said tube having an inner reduced bore section spaced from the housing head, said reduced bore section and head having opposed shoulders to form a dash pot therebetween when the housing moves towards and reaches the working position thereof, a sleeve having an end slidably mounted in the housing counterbore, a spearhead projecting from an opposite end of the sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat communicating with the housing counterbore, an inner passage in the sleeve in communication with said ports and extending through said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the ports from said passage, and means connecting the valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat.

11. In a core barrel, an outer tube, a housing in the outer tube extending longitudinally of and spaced from said tube to form a first water passage therebetween, said housing being adapted to move axially in the outer tube and having a counterbore in and opening outwardly from an end of the housing, a head formed on said end of the housing and slidably fitting in the outer tube, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a second water passage, means limiting relative movement between the sleeve and the housing, ports in the housing bringing the first water passage into communication with the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near

the end thereof remote from the spearhead ports through the sleeve near said seat and communicating with the second water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve to close off the sleeve ports from said inner passage, and means connecting the by-pass valve to the sleeve while permitting relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove by-pass valve from the valve seat.

12. In a core barrel, an outer tube, a housing in the outer tube extending longitudinally of and spaced from said tube to form a first water passage therebetween, said housing being adapted to move axially in the outer tube and having a counterbore in and opening outwardly from an end of the housing, a head formed on said end of the housing and slidably fitting in the outer tube, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a second water passage, ports in the housing bringing the first water passage into communication with the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat and communicating with the second water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage means connecting the by-pass valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat, a tubular spring latch connected to said end of the housing and completely surrounding said sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, and means connected to the spearhead rod and engaging the spring fingers to cause said fingers to move outwardly into locking position engaging locking means in said outer tube and inwardly to unlocking position free of said locking means upon movement of the spearhead inwardly and outwardly respectively relative to said sleeve.

13. In a core barrel, an outer tube, a housing in the outer tube extending longitudinally of and spaced from said tube to form a first water passage therebetween, said housing being adapted to move axially in the outer tube and having a counterbore in and opening outwardly from an end of the housing, a head formed on said end of the housing and slidably fitting in the outer tube, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a second water passage, ports in the housing bringing the first water passage into communication with the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat and communicating with the second water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage, means connecting the by-pass valve to the sleeve while permitting relative movement therebetween when the spearhead is

drawn outwardly relative to the sleeve to remove the by-pass valve from the valve seat, a tubular spring latch connected to said end of the housing and completely surrounding said sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position engaging locking means in said outer tube and inwardly to unlocking position free of said locking means upon movement of the spearhead inwardly and outwardly respectively relative to said sleeve, and means co-acting between the sleeve and said spring fingers for limiting relative movement between the sleeve and said housing.

14. In a core barrel, an outer tube, a housing in the outer tube extending longitudinally of and spaced from said tube to form a first water passage therebetween, said housing being adapted to move axially in the outer tube and having a counterbore in and opening outwardly from an end of the housing, a head formed on said end of the housing and slidably fitting in the outer tube, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a second water passage, ports in the housing bringing the first water passage into communication with the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat and communicating with the second water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage, means connecting the by-pass valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the by-pass valve from the valve seat, a tubular spring latch connected to said end of the housing and completely surrounding said sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position engaging locking means in said outer tube and inwardly to unlocking position free of said locking means upon movement of the spearhead inwardly and outwardly respectively relative to said sleeve, and means on the sleeve adapted to fit into the tubular latch when said spring fingers are in the locking position.

15. In a core barrel, an outer tube, a housing in the outer tube extending longitudinally of and spaced from said tube to form a first water passage therebetween, said housing being adapted to move axially in the outer tube and having a counterbore in and opening outwardly from an end of the housing, a head formed on said end of the housing and slidably fitting in the outer tube, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a second water passage, means limiting relative movement between the sleeve and the housing, ports in the housing bringing the first water passage into communication with the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat and communicating with the second water passage, an inner passage in the sleeve in communication with said sleeve ports

and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage, means connecting the valve to the sleeve while permitting relative limited movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the by-pass valve from the valve seat, a tubular spring latch connected to said end of the housing and completely surrounding said sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers towards the sleeve and to allow said fingers to spring outwardly therefrom to engage locking means in said outer tube, and means connecting the ring to the spearhead rod to shift said ring to move the fingers inwardly and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch.

16. In a core barrel, an outer tube, a housing in the outer tube extending longitudinally of and spaced from said tube to form a first water passage therebetween, said housing being adapted to move axially in the outer tube and having a counterbore in and opening outwardly from an end of the housing, a head formed on said end of the housing and slidably fitting in the outer tube, a sleeve having an enlargement on one end thereof forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a second water passage, ports in the housing bringing the first water passage into communication with the counterbore near said indicator valve, a spearhead projecting from the opposite end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat and communicating with the second water passage, an inner passage in the sleeve in communication with said sleeve ports and extending through said seat to the adjacent end of the sleeve, a by-pass valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the sleeve ports from said inner passage, means connecting the valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the by-pass valve from the valve seat, a tubular spring latch connected to said end of the housing and completely surrounding said sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers towards the sleeve and to allow said fingers to spring outwardly therefrom to engage locking means in said outer tube, means connecting the ring to the sleeve to shift said ring to move the fingers inwardly and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch, and means co-acting between the sleeve and said spring fingers for limiting relative movement between the sleeve and said housing.

17. Core barrel apparatus for releasably gripping the spearhead of the inner tube assembly of a core barrel, said spearhead including a conical head projecting from a shank with an annular shoulder where the head joins the shank, comprising in combination, a ring to be placed over a spearhead shank spaced from the spearhead, said ring having a free outer surface and an internal diameter larger than that of the maximum diameter of the spearhead, and an overshoot body independent of said ring, a tubular spring latch secured to and projecting from an end of the body, said latch having a plurality of spring

13

fingers arranged around and enclosing a central bore and opening outwardly from outer ends of said fingers, and projections on the fingers near the outer ends thereof and extending radially into the bore, said bore being adapted to receive said spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead, said fingers when the overshot body is moved further in the same direction being free to ride on to said outer surface of the ring to grip the latter so that when the overshot body is moved in the opposite direction said ring rides over the spearhead while keeping the spring fingers clear of said spearhead.

18. Core barrel apparatus as claimed in claim 17 in which the ring is a split ring so that it can be applied to the shank while the spearhead is gripped by the spring fingers.

19. Core barrel apparatus as claimed in claim 17 in which the projection of each finger is formed with a locking shoulder at an inner end thereof and a surface inclined outwardly from said shoulder to the end of the finger to combine with similar surfaces of the other fingers to form a lead-in for the bore.

20. Core barrel apparatus for releasably gripping the spearhead of the inner tube assembly of a core barrel, said spearhead including a conical head projecting from a shank with an annular shoulder where the head joins the shank, comprising in combination, a ring to be placed over a spearhead shank spaced from the spearhead, said ring having a free outer surface and an internal diameter larger than that of the maximum diameter of the spearhead, and an overshot body independent of said ring, a tube secured to and projecting co-axially from an end of the body, said tube having an outer end and being slit inwardly part way from said outer end to form spring fingers surrounding the bore of the tube, and projections on the fingers near the outer end of the tube and extending radially into the bore, said bore being adapted to receive a spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead, said fingers when the overshot body is moved further in the same direction being free to ride on to said outer surface of the ring to grip the latter so that when the overshot body is moved in the opposite direction said ring rides over the spearhead while keeping the spring fingers clear of said spearhead.

21. Core barrel apparatus as claimed in claim 17 in which the projection of each finger is formed with a locking shoulder at an inner end thereof and a surface inclined outwardly from said shoulder to the outer end of the tube to combine with similar surfaces of the other fingers to form a lead-in for the bore.

22. A core barrel comprising a sleeve adapted to move within and axially of an outer tubular arrangement, said sleeve projecting from an end of said arrangement, a spearhead projecting from an end of the sleeve remote from the tubular arrangement and having a rod slidably extending longitudinally of the sleeve, a tubular spring latch connected to said end of the tubular arrangement and completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers towards the sleeve and to allow said fingers to spring outwardly therefrom, means connecting the ring to the spearhead rod and the sleeve to shift said ring to move the fingers inwardly and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch, a bore formed within and by the spring fingers adjacent free ends thereof, and shoulder means

14

on the sleeve fitting in the spring finger bore when the fingers are sprung outwardly and moving out of said bore when the spearhead and sleeve shift the ring to move the fingers inwardly.

23. A core barrel as claimed in claim 22 including outer shoulder means formed on outer surfaces of the spring fingers in the path of movement of the ring, said ring engaging said outer shoulder means after the spearhead and sleeve have shifted the ring to move the fingers inwardly.

24. A core barrel comprising a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead inwardly and outwardly respectively relative to said sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat, an inner passage in the sleeve in communication with said ports and extending through said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the ports from said passage, and means connecting the valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat.

25. A core barrel comprising a spearhead assembly for movement in an outer tubular arrangement comprising a sleeve adapted to move with and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat, an inner passage in the sleeve in communication with said ports and extending through said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the ports from said passage, means connecting the valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat, a stationary tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, said fingers tending to spring away from the sleeve, a ring surrounding and slidably mounted on the spring fingers, said ring being movable back and forth along the fingers respectively to move the fingers in to the sleeve and to allow said fingers to spring outwardly therefrom, a pin extending diametrically through the sleeve to move therewith and having ends connected to the ring to shift said ring to move the fingers inwardly and outwardly upon movement of the sleeve and spearhead longitudinally relative to the spring latch, said pin extending through a slot in the valve to connect the latter to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat.

26. A core barrel comprising a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and engaging the spring fingers to cause said fingers to move

outwardly into locking position and inwardly to unlocking position upon movement of the spearhead inwardly and outwardly respectively relative to said sleeve, a housing adapted to move in the outer tubular arrangement and having a counterbore in and opening outwardly from an end of said housing, said sleeve having an enlargement on the end thereof remote from the spearhead forming a flow indicator valve slidably mounted in the housing counterbore, said sleeve being spaced from the housing in the counterbore to form a water passage, and ports in the housing opening into the counterbore near and normally above said indicator valve, said indicator valve being moved above said ports when the spearhead is moved outwardly relative to the sleeve.

27. A core barrel comprising a sleeve adapted to move within an outer tube, a spearhead projecting from an end of said sleeve and having a rod slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead and the sleeve longitudinally inwardly and outwardly respectively relative to the spring latch, a housing adapted to move in the outer tube and having a counterbore in and opening outwardly from an end of said housing, said sleeve having an end slidably mounted in the housing counterbore said spring latch being connected to the housing, and a head formed on said end of the housing and slidably fitting in a portion of the bore of the outer tube when said housing is in a normal working position, said tube having an inner reduced bore section spaced from the housing head, said reduced bore section and head having opposed shoulders to form a dash pot therebetween when the housing moves towards and reaches the working position thereof.

28. A core barrel comprising in combination a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and including a conical head projecting from a shank with an annular shoulder where the head joins the shank, a rod connected to the shank and slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead and the sleeve longitudinally inwardly and outwardly respectively relative to the spring latch, an overshot body, a tubular spring latch secured to and projecting from an end of the body, said latch having a plurality of spring fingers arranged around and enclosing a central bore and opening outwardly from outer ends of said fingers, and projections on the fingers near the outer ends thereof and extending radially into the finger bore, said finger bore being adapted to receive the spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead.

29. A core barrel as claimed in claim 28 in which the projection of each finger is formed with a locking shoulder at an inner end thereof and a surface inclined outwardly from said shoulder to the end of the finger to combine with similar surfaces of the other fingers to form a lead-in for the bore.

30. A core barrel comprising in combination a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said

sleeve and including a conical head projecting from a shank with an annular shoulder where the head joins the shank, a rod connected to the shank and slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead and the sleeve longitudinally inwardly and outwardly respectively relative to the spring latch, an overshot body, a tube secured to and projecting coaxially from an end of the body, said tube having an outer end and being slit inwardly part way from said outer end to form spring fingers surrounding the bore of the tube and projections on the fingers near the outer end of the tube and extending radially into the bore, said bore being adapted to receive the spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead.

31. A core barrel comprising in combination a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve, and including a conical head projecting from a shank with an annular shoulder where the head joins the shank, a rod connected to the shank and slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead and the sleeve longitudinally inwardly and outwardly respectively relative to the spring latch, a ring to be placed over the spearhead shank spaced from the spearhead, said ring having an internal diameter larger than that of the maximum diameter of the spearhead, an overshot body, a tubular spring latch secured to and projecting from an end of the body, said latch having a plurality of spring fingers arranged around and enclosing a central bore and opening outwardly from outer ends of said fingers, and projections on the fingers near the outer ends thereof and extending radially into the finger bore, said finger bore being adapted to receive said spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead, said fingers when the overshot body is moved further in the same direction riding on to said ring to grip the latter so that when the overshot body is moved in the opposite direction said ring rides over the spearhead while keeping the spring fingers clear of said spearhead.

32. Core barrel apparatus as claimed in claim 31 in which the ring is a split ring so that it can be applied to the shank while the spearhead is gripped by the spring fingers.

33. Core barrel apparatus as claimed in claim 31 in which the projection of each finger is formed with a locking shoulder at an inner end thereof and a surface inclined outwardly from said shoulder to the end of the finger to combine with similar surfaces of the other fingers to form a lead-in for the bore.

34. A core barrel comprising in combination a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and including a conical head projecting from a shank with an annular shoulder where the head joins the shank, a rod connected to the shank and slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring

fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead and the sleeve longitudinally inwardly and outwardly respectively relative to the spring latch, a ring to be placed over the spearhead shank spaced from the spearhead, said ring having a diameter larger than that of the maximum diameter of the spearhead, an overshot body, a tube secured to and projecting coaxially from an end of the body, said tube having an outer end and being slit inwardly part way from said outer end to form spring fingers surrounding the bore of the tube and projections on the fingers near the outer end of the tube and extending radially into the finger bore, said finger bore being adapted to receive a spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead, said fingers when the overshot body is moved further in the same direction riding on to said ring to grip the latter so that when the overshot body is moved in the opposite direction said ring rides over the spearhead while keeping the spring fingers clear of said spearhead.

35. Core barrel apparatus as claimed in claim 30 in which the projection of each finger is formed with a locking shoulder at an inner end thereof and a surface inclined outwardly from said shoulder to the outer end of the tube to combine with similar surfaces of the other fingers to form a lead-in for the bore.

36. A core barrel comprising in combination a sleeve adapted to move within and axially of an outer tubular arrangement, a spearhead projecting from an end of said sleeve and including a conical head projecting from a shank with an annular shoulder where the head joins the shank, a rod connected to the shank and slidably extending longitudinally of the sleeve, a tubular spring latch completely surrounding the sleeve, said latch having spring fingers around the sleeve extending towards the spearhead end of said sleeve, means connected to the spearhead rod and to the sleeve and engaging the spring fingers to cause said fingers to move outwardly into locking position and inwardly to unlocking position upon movement of the spearhead and the sleeve longitudinally inwardly and outwardly respectively relative to the spring latch, a valve seat within the sleeve near the end thereof remote from the spearhead, ports through the sleeve near said seat, an inner passage in the sleeve in communication with said ports and extending through said seat to the adjacent end of the sleeve, a valve connected to the spearhead rod spring loaded normally to engage the valve seat to close off the ports from said passage, means connecting the valve to the sleeve while permitting limited relative movement therebetween when the spearhead is drawn outwardly relative to the sleeve to remove the valve from the valve seat, an overshot body, a tubular spring latch secured to and projecting from an end of the body, said latch having a

plurality of spring fingers arranged around and enclosing a central bore and opening outwardly from outer ends of said fingers, and projections on the fingers near the outer ends thereof and extending radially into the finger bore, said finger bore being adapted to receive the spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead.

37. Core barrel apparatus as claimed in claim 24 including a housing adapted to move in the outer tubular arrangement and having a counterbore in and opening outwardly from an end of said housing, said sleeve having an end slidably mounted in the housing counterbore, and a head formed on said end of the housing and slidably fitting in a portion of the bore of the outer tubular arrangement when said housing is in a normal working position, said tubular arrangement having an inner reduced bore section spaced from the housing head, said reduced bore section and head having opposed shoulders to form a dash pot therebetween when the housing moves towards and reaches the working position thereof.

38. Core barrel apparatus as claimed in claim 26 including a head formed on said end of the housing and slidably fitting in a portion of the bore of the outer tubular arrangement when said housing is in a normal working position, said tubular arrangement having an inner reduced bore section spaced from the housing head, said reduced bore section and head having opposed shoulders to form a dash pot therebetween when the housing moves towards and reaches the working position thereof.

39. Core barrel apparatus as claimed in claim 26 in which the spearhead includes a conical head projecting from a shank with an annular shoulder where the head joins the shank, and including an overshot body, a tubular spring latch secured to and projecting from an end of the body, said latch having a plurality of spring fingers arranged around and enclosing a central bore and opening outwardly from outer ends of said fingers, and projections on the fingers near the outer ends thereof and extending radially into the finger bore, said finger bore being adapted to receive the spearhead when the overshot body is moved in the direction of said spearhead, at which time the fingers spring outwardly until the projections thereof snap behind the spearhead shoulder to grip the spearhead.

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