

June 24, 1947.

C. F. DUFFIELD

2,422,955

CORE RECOVERING DEVICE

Filed July 18, 1944

2 Sheets-Sheet 1

FIG. 1

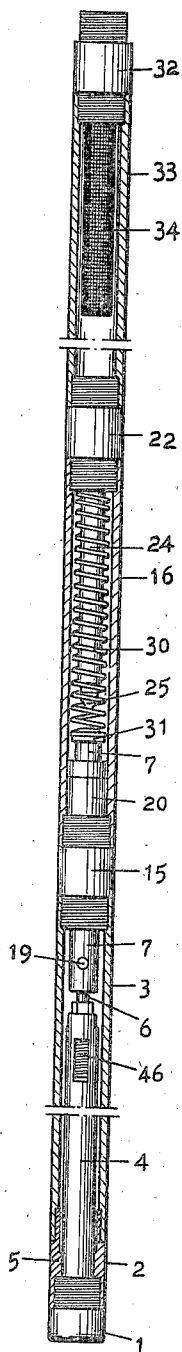


FIG. 2

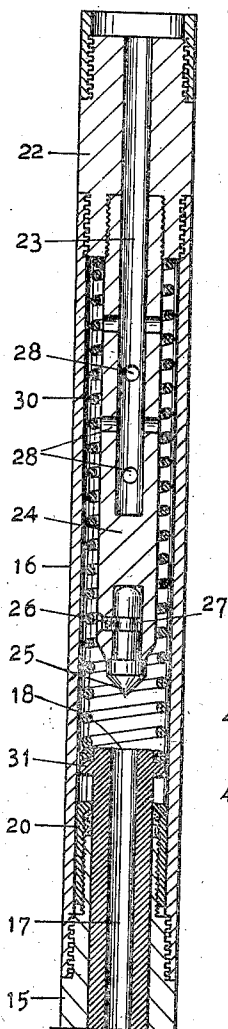
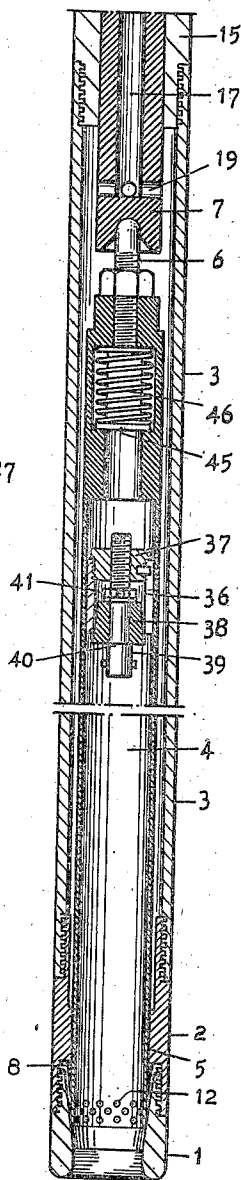


FIG. 3



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FIG. 4

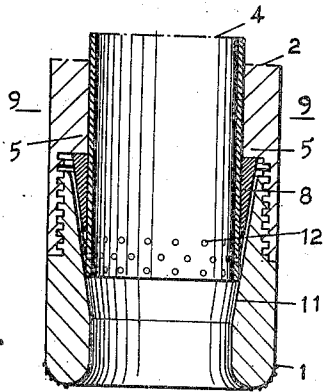


FIG. 7

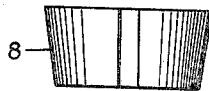


FIG. 8

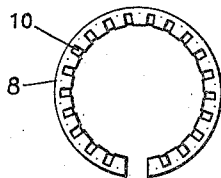


FIG. 5

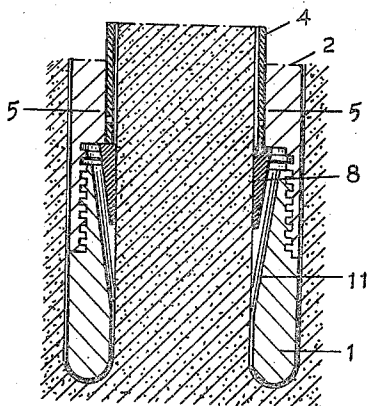


FIG. 9

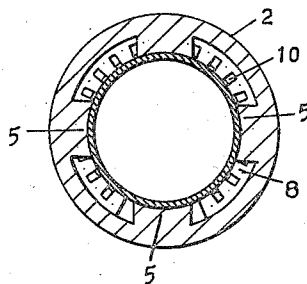
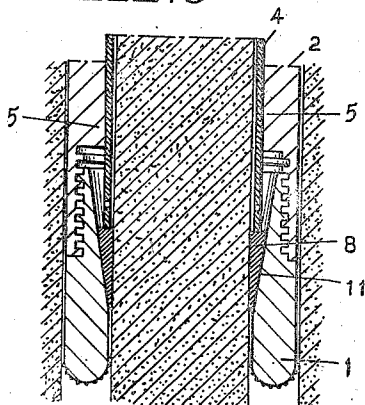


FIG. 6



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CORE RECOVERING DEVICE

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Australia, AustraliaApplication July 18, 1944, Serial No. 545,518
In Australia August 16, 1943

6 Claims. (Cl. 255-72)

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This invention relates to a core recovering device for use in diamond and rotary drilling.

When drilling to recover a core it is customary to use a rotary diamond drill which makes an annular cut and which recovers a core by allowing the core to pass up inside of the device, the core being broken off when the desired length has been obtained or when a given amount of drilling has been effected.

When operating in friable rock or where different cleavage planes are encountered, it is found that, unless special precautions are taken, the drilling device will wear away the softer sections of the core and a true picture of the exploration will thus not be obtained.

To obviate this disadvantage it has been proposed to provide an inner core tube into which the core passes as it is cut, this core tube protecting the core and at the same time preventing the water from passing over same and wearing or washing away the softer sections.

It is the object of this invention to provide certain improvements in drilling mechanisms of this type, one of the objects being to so arrange the device that the outer member or barrel extending upwardly from the bit will be of uniform diameter and free of obstruction. A further object is to so arrange the device that the core tube will terminate as close as possible to the bit to ensure maximum protection. A further object is to so arrange the device that the mechanism which regulates the core grip will be of simple and effective construction and will be readily accessible when the device is dismantled. A still further object is to allow varying lengths of core to be recovered. Other objects will be apparent from the detailed description which will be made hereafter.

In brief the device according to this invention comprises a bit from which a hollow member extends upwardly and within which hollow member is a core tube into which the core being cut passes, the core tube being disposed to actuate a valve member which regulates the cutting off of the water when the required length of core has been obtained, the core tube also actuating a core grip which is normally disposed on the lower end of the core tube but which is pushed off the tube on to the core when the desired length of core has been cut, spring means being provided whereby

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the core tube is forcibly projected downwards to cause the core grip to be forced into a conical section in the bit for the purpose of effecting a tight grip of this member upon the core.

To enable the invention to be more fully understood it will now be described with reference to the accompanying drawings in which is shown an embodiment of the invention.

In the drawings:

Fig. 1 is a sectional view of a diamond drilling tool embodying the invention,

Fig. 2 is an enlarged section of the central portion of the mechanism shown in Fig. 1,

Fig. 3 is a similar section but showing the lower portion of the mechanism shown in Fig. 1,

Fig. 4 is an enlarged central section of the immediate lower end of the device showing the core tube and split ring in its ordinary working position in which the core passes freely up the tube,

Fig. 5 is a view corresponding to Fig. 4 but showing the core tube raised by the core as when drilling is completed, the split ring having been pushed off the tube on to the core,

Fig. 6 shows the split ring pushed into its locking position by the tube in which position the core will be broken off when the drill is raised,

Fig. 7 is an elevation of the split ring,

Fig. 8 is a plan of same, and

Fig. 9 is a section on line 9-9 of Fig. 4.

The diamond cutting bit 1 is screwed into the end of the shell 2 which is in turn screwed to a hollow member formed by the tube 3 and the shell 2 by means of which the bit is revolved when drilling.

Disposed within the outer tube 3 is a core tube 4 which has its lower end located by lugs 5 formed upon the shell 2. At the upper end of the core tube 4 is a threaded stem or pivot 6 which engages the sliding valve member 7.

Normally encircling the core tube 4 is a core grip 8 which is shown as a split ring and which has within it a series of channels 10 to allow water to flow past same during drilling.

The outer face of the core grip 8 is tapered to engage a complementary taper or conical face 11 within the bit 1 when the ring is forced down into the position shown in Fig. 6.

Perforations 12 through the lower end portion of the core tube 4 ensure that water will at

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all times be free to flow to the cutting surface of the bit 1.

The valve member 7 is slidable in a guide 15 which also serves as a coupling between the tube 3 and the valve housing 16, the valve member 7 being slidable in the coupling 15 and having a central aperture 17 through which the water may flow.

The valve member 7 has at its top a seat 18, and has apertures 19 at its lower end to place the central aperture 17 into communication with the inside of the tube 3.

A packing gland 20 is secured to the guide 15 and seals between the guide and the valve member 7.

The tube 16 has its upper end screwed on to a coupling 22 which has within it a hollow 23 which opens into a hollow stem 24. The lower end of the stem carries closure member 25 which is adapted to engage the aforesaid seat 18 when the closure member 25 is moved downwardly relative to valve member 7 and to close off the flow of water down the aperture 17. The closure member 25 is rotatable within the end of the stem 24 but is held in position by a set screw 26 which engages an annular notch 27 in the stem of the member 25. Orifices 28 permit water to flow from the hollow 23 into the inside of the tube 16.

A spring 30 is confined between the coupling 22 and a flange 31 upon the valve member 7 and exerts a downward pressure upon the member 7 and normally holds the member 7 away from the valve member 25 so that the water has an unobstructed flow through the valve member 7 to the drilling face, the spring also serving to provide the locking force which is applied to the ring 8 when withdrawal of the drilling bit from the hole takes place. The spring 30 also serves to force the core tube down to its lowest position in the bit and keep it in that position when drilling. This spring also serves as a safety device in that it is compressed immediately any obstruction takes place in the core tube.

The coupling 22 is connected to the coupling 32 through a strainer housing 33 within which is disposed a strainer 34 for the purpose of removing sediment from the water being pumped down to the drilling bit so as to ensure that the mechanism will at all times work freely.

To adjust the length of core recovered in any drilling operation, an adjustable stop member is provided within the core tube 4, which member comprises an expandable split tube 36 having at one end a threaded member 37 and at the other end a wedge member 38. The wedge member is disposed on a threaded stem 39 which engages the member 37 and has the wedge 38 confined upon it between a shoulder 40 and a fixed collar 41.

The member just described can be moved into any position in the core tube and can then be locked by expanding the split tube 36 by moving the wedge member 38 inwards by rotating the stem 39.

To prevent damage to the mechanism, and also to prevent upward movement of the core tube to force the ring off its end when lowering the drill, a valve 45 is provided which is disposed within the upper end of the core tube 4 and is loaded by a spring 46 to normally prevent the water being pumped to the drill from entering the core tube, but allowing air or water to leave the core tube so that this tube will not be deflected upwardly if it suddenly strikes water when the drill is being lowered down the bore hole.

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The operation of my invention is as follows. The cutting bit 1 is unscrewed from the end of the shell 2 and the core tube 4 is inserted into position in the tube 3 until the threaded pivot 6 enters the lower end of the valve member 7.

After the insertion of the core tube into the tube 3, the core grip 8 is placed over the end of the core tube in the position shown approximately in Fig. 4.

The bit 1 is then screwed into position and serves as a stop to prevent the core tube from falling out of the assembly or from being forced out by the spring 30.

The device is now lowered to the drilling locality and drilling commenced, the core tube 4 passing freely over the core as it is being cut until the drill reaches such a level that the upper end of the core contacts the end of the core tube or the adjustable stop within same if this latter is being used.

As soon as the top of the core tube rests upon the core, movement of the core tube in a downward direction will be arrested but drilling will continue in a normal manner until the closure member 25 engages the seat 18 upon the member 7 due to the downward movement of the member 25 with the barrel, whereupon the flow of water to the drilling head is cut off. The object of the water being cut off is to indicate to the operator by a sudden increase in pressure, as shown on a pressure gauge, that the core grip has been forced off the core tube and that the drill must be withdrawn from the bore hole and the core extracted from the tube.

Just prior to the cutting off of the water the downward movement of the barrel will have caused the lugs or stop means 5 to push the core grip 8 off the end of the core tube 4 on to the core as shown more particularly in Fig. 5.

Immediately upon the water being cut off the barrel is withdrawn, and when such withdrawal commences the spring 30 forces the valve member 7 downward so that the core grip 8 is wedged on to the core by the tapered face 11 of the bit 1, the necessary locking action being facilitated by the pressure of the spring 30 acting through the core tube 4 which then bears upon the upper edge of the core grip 8.

Immediately the drill is raised, the core in its wedged position breaks below the core grip. The assembly can then be lifted with the core intact inside the tube, a dry pull being ensured as the closure member 25 leaves the seat 18 under action of the spring 30 as soon as lifting of the barrel commences.

What I claim is:

1. For use in diamond and rotary drilling, a core recovering device comprising a bit, a hollow member extending upwardly from said bit, a core tube within the said hollow member coaxial with the hollow member and slidable therein, a guide extending upwardly from the said hollow member, a hollow valve member slidable in the guide, said valve member having a central aperture opening outwardly of the valve member at its upper and lower ends, a pivot on the core tube engaging the valve member, a valve housing extending upwardly from said guide, a closure member stationarily secured to the valve housing in the path of said valve member and arranged to close the upper end of the central aperture in the said valve member when the core tube has been moved upwardly a certain distance by the core building up in the core recovering device while the device is being rotated to take a core,

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a spring between the valve member and the valve housing, urging the valve member downward, a conical face in the bit adjacent the lower end of the core tube, a core grip positioned on said conical face and surrounding said core tube, and stop means on the hollow member above the core grip in the path of the core grip operable, when the core being cut has risen to a predetermined height within the core recovering device and has raised the core tube above the core grip, to release the core grip from the core tube for core gripping action.

2. For use in diamond and rotary drilling, a core recovering device comprising a bit, a hollow member extending upwardly from said bit, a core tube within the said hollow member coaxial with the hollow member and slidable therein, an opening through the top of the core tube, a valve over said opening normally closing said opening, opening through the wall of the core tube near its lower end, a guide extending upwardly from the said hollow member, a hollow valve member slidable in the guide, said valve member having a central aperture opening outwardly of the valve member at its upper and lower ends, a pivot on the core tube engaging the valve member, a valve housing extending upwardly from said guide, a closure member stationarily secured to the valve housing in the path of said valve member and arranged to close the upper end of the central aperture in the said valve member when the core tube has been moved upwardly a certain distance by the core building up in the core recovering device while the device is being rotated to take a core, a spring between the valve member and the valve housing urging the valve member downward, a conical face in the bit adjacent the lower end of the core tube, a core grip positioned on said conical face and surrounding said core tube, and stop means on the hollow member above the core grip in the path of the core grip operable, when the core being cut has risen to a predetermined height within the core recovering device and has raised the core tube above the core grip, to release the core grip from the core tube for core gripping action.

3. For use in diamond and rotary drilling, a core recovering device comprising a bit, a hollow member extending upwardly from said bit, a core tube within the said hollow member coaxial with the hollow member and slidable therein, an adjustable stop member within the core tube, a guide extending upwardly from the said hollow member, a hollow valve member slidable in the guide, said valve member having a central aperture opening outwardly of the valve member at its upper and lower ends, a pivot on the core tube engaging the valve member, a valve housing extending upwardly from said guide, a closure member stationarily secured to the valve housing in the path of said valve member and arranged to close the upper end of the central aperture in the said valve member when the core tube has been moved upwardly a certain distance by the core building up in the core recovering device while the device is being rotated to take a core, a spring between the valve member and the valve housing urging the valve member downward, a conical face in the bit adjacent the lower end of the core tube, a core grip positioned on said conical face and surrounding said core tube, and stop means on the hollow member above the core grip in the path of the core grip operable, when the core being cut has risen to a predetermined height within the core recovering device and has

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raised the core tube above the core grip, to release the core grip from the core tube for core gripping action.

4. For use in diamond and rotary drilling, a core recovering device comprising a bit, a hollow member extending upwardly from said bit, a core tube within the said hollow member coaxial with the hollow member and slidable therein, a guide extending upwardly from the said hollow member, a hollow valve member slidable in the guide, said valve member having a central aperture opening outwardly of the valve member at its upper and lower ends, a pivot on the core tube engaging the valve member, a valve housing extending upwardly from said guide, a closure member stationarily secured to the valve housing in the path of said valve member and arranged to close the upper end of the central aperture in the said valve member when the core tube has been moved upwardly a certain distance by the core building up in the core recovering device while the device is being rotated to take a core, a spring between the valve member and the valve housing urging the valve member downward, a conical face in the bit adjacent the lower end of the core tube, a split ring core grip positioned on said conical face and surrounding said core tube, channels in the inner face of the core grip, and lugs on the hollow member above the core grip in the path of the core grip, operable when the core being cut has risen to a predetermined height within the core recovering device and has raised the core tube above the core grip to release the core grip from the core tube for core gripping action.

5. For use in diamond and rotary drilling, a core recovering device comprising a bit, a hollow member extending upwardly from said bit, a core tube within the said hollow member coaxial with the hollow member and slidable therein, an opening through the top of the core tube, a valve over said opening normally closing said opening, openings through the wall of the core tube near its lower end, a guide extending upwardly from the said hollow member, a hollow valve member slidable in the guide, said valve member having a central aperture opening outwardly of the valve member at its upper and lower ends, a pivot on the core tube engaging the valve member, a valve housing extending upwardly from said guide, a closure member stationarily secured to the valve housing in the path of said valve member and arranged to close the upper end of the central aperture in the said valve member when the core tube has been moved upwardly a certain distance by the core building up in the core recovering device while the device is being rotated to take a core, a spring between the valve member and the valve housing urging the valve member downward, a conical face in the bit adjacent the lower end of the core tube, a split ring core grip positioned on said conical face and surrounding said core tube, channels in the inner face of the core grip, and lugs on the hollow member above the core grip in the path of the core grip, operable when the core being cut has risen to a predetermined height within the core recovering device and has raised the core tube above the core grip, to release the core grip from the core tube for core gripping action.

6. For use in diamond and rotary drilling, a core recovering device comprising a bit, a hollow member extending upwardly from said bit, a core tube within the said hollow member coaxial with the hollow member and slidable therein, a conical

face in the bit adjacent the lower end of the core tube, a core grip positioned on said conical face and surrounding said core tube, and stop means on the hollow member above the core grip in the path of the core grip operable, when the core being cut has risen to a predetermined height within the core recovering device and has raised the core tube above the core grip, to release the core grip from the core tube for core gripping action.

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