June 6, 1950 J. COOPER 2,510,865

CORE BARREL COUPLING

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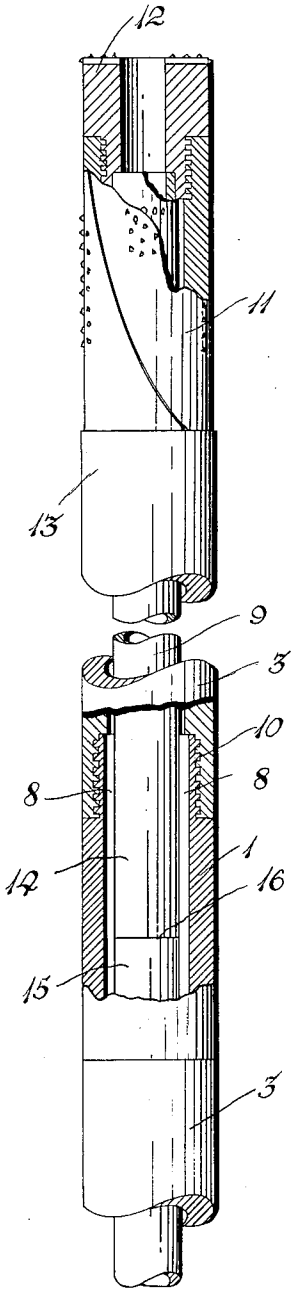


FIG 2

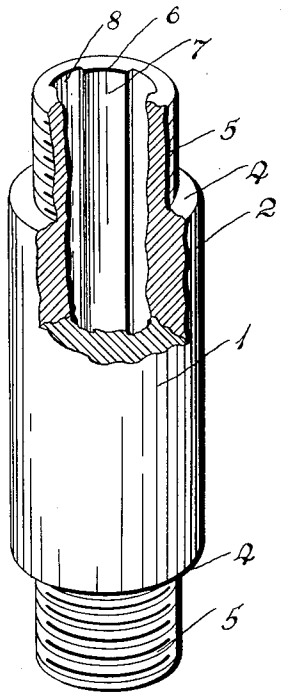


FIG 1

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CORE BARREL COUPLING

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3 Claims. (Cl. 255—72)

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My invention relates to new and useful improvements in the art of drill core barrel couplings, more specifically for use in diamond rock drilling, and the principal object of my invention is to provide a means whereby a plurality of conventional outer and inner core barrels may be connected to the drill bit, thus increasing the length of core recovered from each run.

A further object of my invention is to provide a device of the character herewithin described which will minimize vibration of the inner core barrel thus lessening the possibility of premature blocking taking place with the attendant loss of rock cores.

A still further object of the invention is to provide a device of the character herewithin described whereby rock drilling and sampling can be carried out in a confined or restricted area underground without the necessity for slashing thus giving faster core recovery.

A still further object of my invention is to provide a device of the character herewithin described whereby blocking is reduced thus extending the life of the drill bit and shell diamonds, as well as minimizing core wastage, as it will be appreciated that the possibility of loss is evident each time the core is blocked.

Another object of my invention is to provide a device of the character herewithin described which is economical to manufacture and which, by virtue of the simplicity of its construction, can be adapted for use to any form of rock drilling.

A still further object of my invention is to provide a device of the character herewithin described whereby the length of the individual inner and outer core barrels may be reduced without detracting from their operating efficiency thus assisting materially in overcoming the inherent difficulties encountered in transportation of the standard core barrel units.

Another object of the invention is to provide a device of the character herewithin described, the utilization of which will result in a considerable saving of labor and time as well as materially speeding up core recovery.

With the foregoing objects in view, and such other objects and advantages as will become apparent to those skilled in the art to which this invention relates as this specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly explained, reference being had to the accompanying drawings in which:

Figure 1 is a perspective view of my drill barrel coupling sectioned in part to show the interior thereof.

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Figure 2 is a side elevational representation of a drill bit and shell assembled with two adjacent lengths of outer core barrelling connected together with my coupling and sectioned in part to show the interior thereof.

In the drawings like characters of reference indicate corresponding parts in the different figures.

In the art of rock sampling it is conventional practice to use an outer core barrel coaxially jacketing a corresponding inner core barrel, both being of a standard length of 15 ft. Attached to one end of the unit is a drill shell and bit containing diamond chips embedded therein. The opposite end, designated as the water back end is connected to the cylindrical driving shafts, conventionally called drill rods, which are sufficient in number to reach the rock face where the drilling unit is located. These drill rods are of a diameter substantially less than the aforementioned outer core barrels in order to prevent frictional interference thereof with the sides of the rock drilling. Cooling and lubrication of the drill bit and shell is provided by water fed through the interior of the drill rods and thence between the outer and inner core barrels to the shell. The shell and the adjacent portion of the inner core barrel are provided with a plurality of radially disposed apertures in order to permit even distribution of the water around the drilling area.

As drilling proceeds the rock core enters the inner core barrel until it abuts against the water back-end. This materially reduces the supply of water at the drilling face thus causing partial seizure of the core within the inner core barrel, thereby effecting detachment of the core from the rock mass at the drill bit facial plane. This process, conventionally known as blocking, entails considerable skill and care by the operator in order to prevent pulverization of the core and consequent loss thereof when the assembly is withdrawn.

The inner core barrel is subject to torsional whip at high rotational speeds due to the clearance existing between the inner and outer core barrels, thereby causing premature blocking as well as destroying the diamonds embedded in the drill shell and bit. As it is important to recover a high percentage of the rock core in order that a comprehensive cross-sectional assay of the strata may be carried out, it will be realized that if blocking can be reduced and torsional whip

eliminated, a substantial saving in time and labor will result.

Accordingly I have designed my coupling in order to overcome these disadvantages as far as possible as will hereinafter be explained.

Upon reference to the accompanying drawings it will be observed that the coupling, generally designated by the reference character 1, comprises a relatively short open-ended barrel or cylinder 2 having an external configuration similar to the conventional outer core barrel 3. The external diameter of the coupling is reduced at its extremities to form the shoulders 4, and the plug ends so formed are threaded externally at 5 for attachment to the outer core barrels 3.

Formed longitudinally in the interior of the coupling are splines 6 comprised of what I designate as the lands 7 and the striations or grooves 8. The former act as supporting means or centering guides for the inner core barrel 9 while the latter are utilized as fluid transmitting channels or passages, and permit the fluid to flow from the water back-end (not shown) to the drill bit 12.

When manufactured each end of the outer core barrels 3 is threaded internally, as shown by the reference character 10, in order when necessary to receive the shell 11 on one end thereof and the conventional water back-end and drill rod connection (not illustrated) on its opposite end. The aforementioned external or male screw threads on my couplings are so formed as to complement these internal or female threads on the outer core barrel in order that a plurality of outer core barrels may be connected adjacently. These extra or extension core barrels may, of course, be manufactured in convenient lengths ranging from, for example, two feet up to the standard length of fifteen feet.

The associated inner core barrels 9 should be manufactured in lengths substantially longer than the corresponding outer core barrels 3 so that the ends project to such an extent that, when a coupling is assembled and tightened, they abut substantially upon the transverse axial plane of the coupling in order that the aforementioned lands 7 may provide longitudinal rigidity to the assembly.

Having thus described the construction of my invention, its method of operation will now be presented.

From Figure 2 in the accompanying drawings it will be seen that my coupling is shown in an assembled position between two adjacent lengths of outer core barrelling 3, and that the drill shell 11, with the drill bit 12 attached thereto, is connected to the foremost end of the leading core barrel specifically designated 13. Assembled in coaxial and jacketed relationship with the outer core barrels are the associated lengths of inner core barrel 14 and 15 and it will be noted that the adjacent ends 16 thereof abut substantially upon the axial plane of the coupling for the reason hereinbefore specified.

Proceeding first to describe my invention in relation to surface drilling, it will be appreciated that the drill shell and bit would be attached to one end of a length of standard outer core barrel, and that drilling would proceed until the core registered against the opposite end of the inner core barrel where it attaches to the water back-end. The core would now be blocked, the assembly withdrawn and the core transferred to the core box. If conventional practice were followed, this operation would occur at the end of

every fifteen feet of rock drilled, whereas by utilizing my coupling further lengths of inner and outer core barrelling may now be attached thus enabling thirty feet of rock to be drilled at one time. Under favorable conditions this figure may be exceeded, but it will be realized that even with two lengths of core barrelling in use, the labor involved in core recovery may be halved and the effective life of the diamonds may be doubled.

Proceeding next to explain the operation of my invention in a subterranean chamber such as would be necessary for entering the rock from an underground point, it will be appreciated that the length of the outer core barrel will be determined by the space available. It is conventional practice to establish drilling space by means of slashing in order that the single standard length of core barrel may be used, however by utilizing my coupling, drilling may be undertaken without the necessity for this laborious work. Simply by utilizing a plurality of conveniently short lengths of inner and outer core barrelling high speed recovery of the core is ensured. Thus the method adopted is essentially that resorted to in surface drilling except for the differences in barrel length, and by its employment the necessity of withdrawing the core after every few feet of drilling is eliminated. It will be realized from the foregoing that the incorporation of my coupling will result in a substantial saving of time and labor as well as lessening the possibility of core loss, and it is believed that the advantages and use of the invention will be clearly apparent, and accordingly further description thereof is deemed unnecessary.

Since various modifications can be made in my invention as hereinabove described, and many apparently widely different embodiments of same made within the spirit and scope of the claims without departing from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

What I claim as my invention is:

1. In the art of mining, means for drilling through rock to the extent of two or more pairs of longitudinally aligned, inner and outer core barrel sections in coaxial and jacketed relationship prior to the retraction thereof to the surface of entry with the core therein, comprising a core barrel coupling cooperating with said sections to unite the same in the stated relationship, said coupling constituting an open-ended cylinder having an outer surface in diametrical conformity with that of said barrel, outer core barrels attaching upon the ends thereof, an inner cylindrical surface having at least one continuous fluid transmitting striation thereon, said inner core barrel projecting beyond the ends of said outer core barrel to the extent of approximately half the length of said coupling, the projecting ends aforesaid of two adjacent inner barrels being receivable within said coupling from the opposite ends thereof to abut substantially upon the transverse axial plane.

2. In the art of mining, means for drilling through rock to the extent of two or more pairs of longitudinally aligned, inner and outer core barrel sections in coaxial and jacketed relationship prior to the retraction thereof to the surface of entry with the core therein, comprising a core barrel coupling cooperating with said sections to unite the same in the stated relationship, said coupling constituting an open-ended cylinder

having an outer surface in diametrical conformity with that of said barrel, the ends of said coupling being diametrically reduced and externally screw-threaded whereby shoulders are formed to receive the perimeters of the internally screw-threaded ends of said sections in abutting relationship, outer core barrels attaching upon the ends thereof, and an inner cylindrical surface having at least one continuous fluid transmitting striation thereon, said inner core barrel projecting beyond the ends of said outer core barrel to the extent of approximately half the length of said coupling, the projecting ends aforesaid of two adjacent inner barrels being receivable within said coupling from the opposite ends thereof to abut substantially upon the transverse axial plane.

3. In the art of mining, means for drilling through rock to the extent of two or more pairs of longitudinally aligned, inner and outer core barrel sections in coaxial and jacketed relationship prior to the retraction thereof to the surface of entry with the core therein, comprising a core barrel coupling cooperating with said sections to unite the same in the stated relationship, said coupling constituting an open-ended cylinder having an outer surface in diametrical conformity with that of said barrel, the ends of said coupling being diametrically reduced and externally screw-threaded whereby shoulders are

formed to receive the perimeters of the internally screw-threaded ends of said sections in abutting relationship, outer core barrels attaching upon the ends thereof, and an inner cylindrical surface having a plurality of longitudinal fluid transmitting channels thereon, said fluid transmitting channels having lands therebetween, said inner core barrel projecting beyond the ends of said outer core barrel to the extent of approximately half the length of said coupling, the projecting ends aforesaid of two adjacent inner barrels being receivable within said coupling from the opposite ends thereof to abut substantially upon the transverse axial plane, said lands acting as centering guides for the projecting ends of said inner core barrels as and for the purpose specified.

JEREMIAH COOPER.

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