(No Model.)

S. W. DOUGLASS.

CORE BARREL FOR ROCK DRILLS.

No. 474,337. Patented May 3, 1892.

Fig. 1.

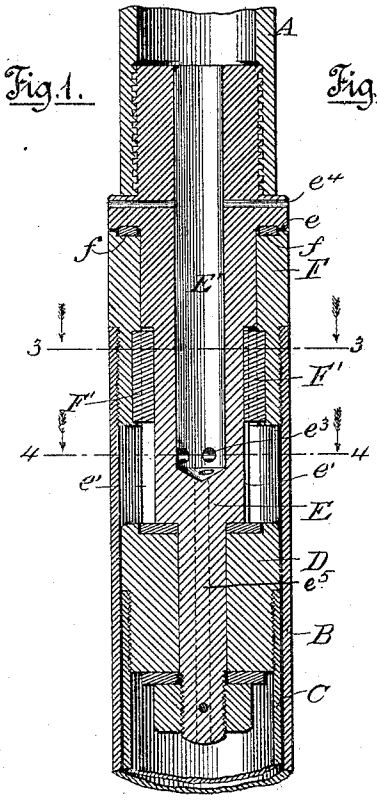


Fig. 2.

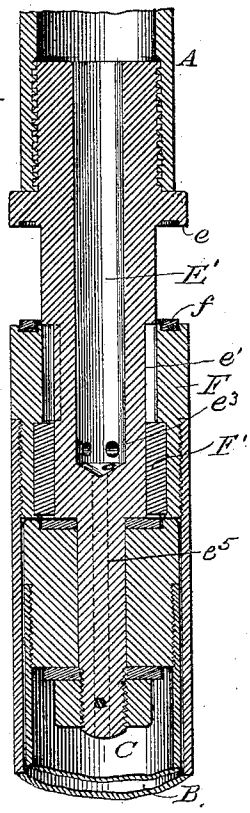


Fig. 3.

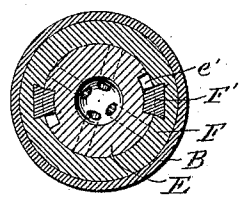


Fig. 4.

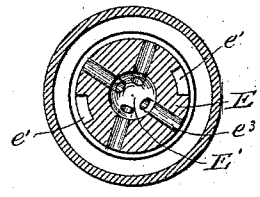
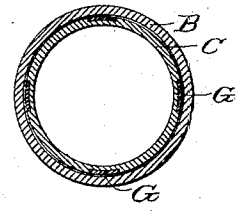
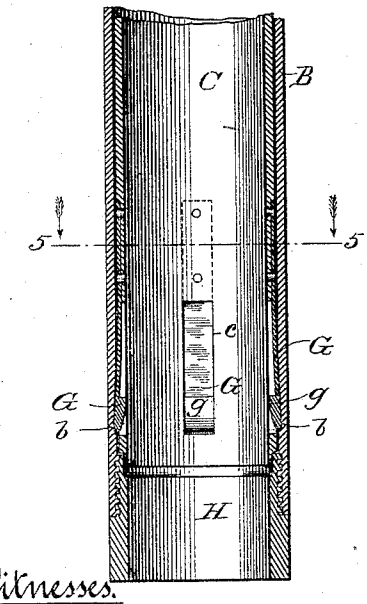


Fig. 5.





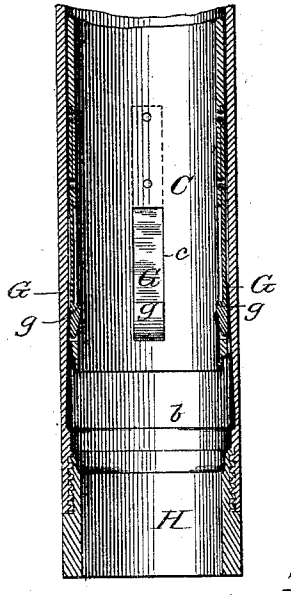
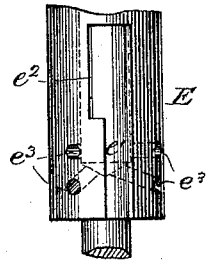


Fig. 6.



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UNITED STATES PATENT OFFICE.

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CORE-BARREL FOR ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 474,337, dated May 3, 1892.

Application filed February 6, 1888. Serial No. 263,158. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL W. DOUGLASS, of Fort Collins, in the county of Larimer and State of Colorado, have invented certain new and useful Improvements in Rock-Drills; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of rock-drills which are provided with hollow cutter-heads and core-barrels and which are provided with means for lifting out of the hole the core left by the annular cutter.

More particularly stated, the invention relates to a duplex construction of the core-barrel as a feature of the mechanism for seizing and raising the core, to a cushion for the drill-head, to provision of a passage or passages for delivering water directly from the interior of the drill-rod about the upper exterior of the core-barrel, and to the material of which the interior shell of the core-barrel is made.

In the accompanying drawings, Figure 1 is a central vertical section of the duplex core-barrel and of the lower end of the drill-tube to which it is attached, showing the relatively movable parts of the barrel in their working relation or in the relative positions which they occupy when being let down into the hole and when drilling. Fig. 2 shows the duplex core-barrel in the same section as Fig. 1, but with the relatively movable parts thereof in the positions they assume when being lifted from the hole as when a section of rock-core is being removed. Fig. 3 is a transverse section on the line 3 3 of Fig. 1. Fig. 4 is a transverse section on the line 4 4 of Fig. 1. Fig. 5 is a transverse section on the line 5 5 of Fig. 1. Fig. 6 is a side view of a portion of the connection which joins the drill-rod to the interior shell of the double core-barrel, showing the offset form of one of the keyways therein and the orifices provided for the outflow of water from the interior of the drill-rod to the space between the two shells of the core-barrel and thence to the bottom and interior of the core-barrel.

A represents the lower end of a tubular drill-rod of a rotary rock-drill.

B is the outer shell of a double core-barrel.

C is the inner shell of the double core-barrel.

D is a head secured in the upper end of the interior shell C.

E is a contracted stem or plug threaded into the drill-tube A and connected with the head D.

F is a hollow head screwed into the upper end of the outer shell B of the core-barrel around the contracted portion of the stem E and forming a stop for the upward movement of the head D, and G G are spring-dogs for the purpose of seizing the core and raising it when the core-barrel is lifted by the drill-rod from the hole.

H is the drill-head, provided with diamonds or other cutters and secured removably to the outer shell B in the usual way.

The outer and inner shells or tubes B and C of the core-barrel have a slight space between them to allow free vertical movement of the outer shell with respect to the inner one and at the same time forming a channel to convey water to the cutters. The range of such movement of the outer shell is limited to the difference in length between the hollow head F on the outer tube B and the contracted portion of the stem E between its shoulder at *e* and the shoulder formed by the head D. A rotary movement is imparted to the outer shell B of the core-barrel from the stem E by means of keys F′, fixed in the lower part of the hollow head F and working in vertical keyways *e′* in the stem E. These keyways are longer than the keys and are provided in their upper portion with offsets e^2, Fig. 6, on that side of the ways opposite that which will bear against the keys when the drill is at work, so that in letting the core-barrel back into a hole the outer tube B may be retained in its higher or working position with the keys resting on the shoulders, as shown in Figs. 1 and 3. The spring-dogs G are secured at their upper ends to the inner tube C flush therewith, as shown in Figs. 1, 2, and 5, and at their lower ends are provided with inwardly and upwardly directed hooks or projections *g g*, which may be pressed inward through slots *c c* of the tube C, so as to project into the bore of said tube, that they may seize and lift a core to be withdrawn

from the hole. These springs normally press slightly outward at their lower free and armed ends to give suitable space for their retraction out of the way of the core when the drill is at work, while at the same time providing for their inward movement, so as to seize the core when the drill-rod is lifted, the interior of the outer tube B is provided with an upwardly-contracted enlargement *b*. The hooked lower ends of the spring-dogs G bear yieldingly against the inclined walls of this enlargement *b* and, being of proper thickness for the purpose, stand clear of the core passage or space within the inner tube C when the drill is at work, but are brought into such space and into engagement with the core when the inner tube C is raised relatively to the outer one in the first movement toward lifting the drill-rod and its core-barrel out of the hole. The keys when the drill is put to work are first borne to the straight side of the keyways, so that in the first upward movement of the drill-rod the outer tube B is allowed to remain by its gravity at the bottom of the hole. As soon, however, as the head D strikes the hollow head F, or as soon as the spring-dogs shall by further impenetrability of the core have wedged with sufficient force against the outer tube B to lift the latter, the outer tube B rises with the inner one and the core is brought to the surface for removal. The core is released from the dogs G by forcing the outer tube B upward. Said tube B is then secured in its elevated position on the stem by such rotation thereof as will bring the keys F′ into the offsets e^2 of the keyways e'. This is done in order that in lowering the core-barrel over any stump of core that may have been left in the hole the dogs may not encounter such stump of core and be injured thereby.

The stem E is provided with a recess E′ in extension of the interior passage of the drill-tube A, by which water is fed down the cutters of the drill. From the recess E′ the water finds escape through the laterally-directed holes e^3 e^3 into the annular space between the two tubes of the core-barrel, and thence downwardly within the cutter-head to the rock surfaces being acted upon by the cutters. Water thus supplied to the lower part of a hole being cut may be expected to rise exteriorly to the core-barrel; but to insure a supply of fresh water destitute of cuttings about the upper end of the core-barrel I have provided passages e^4, leading from the recess E′ laterally through the stem. Dotted lines at e^5 indicate a passage leading directly from the space above to that below the stem E.

To cushion the cutter-head somewhat in order that the working strain upon the diamonds may be less rigorous, I have shown the upper end of the annular head E provided with a hard-rubber ring *f*, which abuts against the shoulder *e* when the tubes of the core-barrel are in the working position shown in Fig. 1. Such rubber ring (or other similar or suitable material) will have a degree of elasticity sufficient to relieve shocks upon the cutters and will favor the preservation of the diamonds and their settings. Incidentally this cushioning-ring may also serve to preserve a water-tight joint and prevent the introduction of water from the hole-bearing cuttings into the keyways and the surfaces of the stem E and hollow head F, which are in contact.

I claim as my invention—

1. In a hollow rock-drill, the combination, with a drill-rod, of a duplex core-barrel comprising an inner tube attached to the drill-rod and an outer tube having a longitudinal movement with respect to the inner one and with respect to the drill-rod, said inner tube being provided with gripping-dogs, which are engaged with the core by the longitudinal movement of the outer tube, substantially as specified.

2. The combination, with a drill-rod and a cutter-head, of a duplex core-barrel comprising an inner tube attached to the drill-rod, provided with inwardly and outwardly movable gripping-dogs, and an outer tube carrying the cutter-head and freely movable longitudinally with respect to the inner tube, which outer tube has an interior upwardly-contracting recess into which said dogs normally project when the inner tube is depressed, whereby upon lifting the drill-rod the inner tube is raised and said dogs are caused to grip or seize the core, substantially as specified.

3. The combination, with a drill-rod and a duplex core-barrel, the latter comprising two tubes, the outer one of which is longitudinally movable with respect to the inner one and with respect to the drill-rod, of a plug uniting the inner core-barrel and the drill-rod, said plug having keyways in its periphery, provided with shoulders or offsets, and a head secured in the end of the outer tube, provided with keys suitably arranged to engage said keyways and the shoulders thereof, whereby said tubes may be locked and released, substantially as specified.

4. The combination, with a hollow drill-rod having at its lower end a stem, of a duplex core-barrel comprising two concentric tubes, the inner one of which is attached to the stem and the outer one of which is movable lengthwise relative to the inner tube and to the drill-rod, said stem being provided with one or more passages for water, leading from the interior of the drill-rod to the interior of the core-barrel.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

SAMUEL W. DOUGLASS.

Witnesses:
M. E. DAYTON,
C. C. POOLE.