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CORE DRILL CONSTRUCTION

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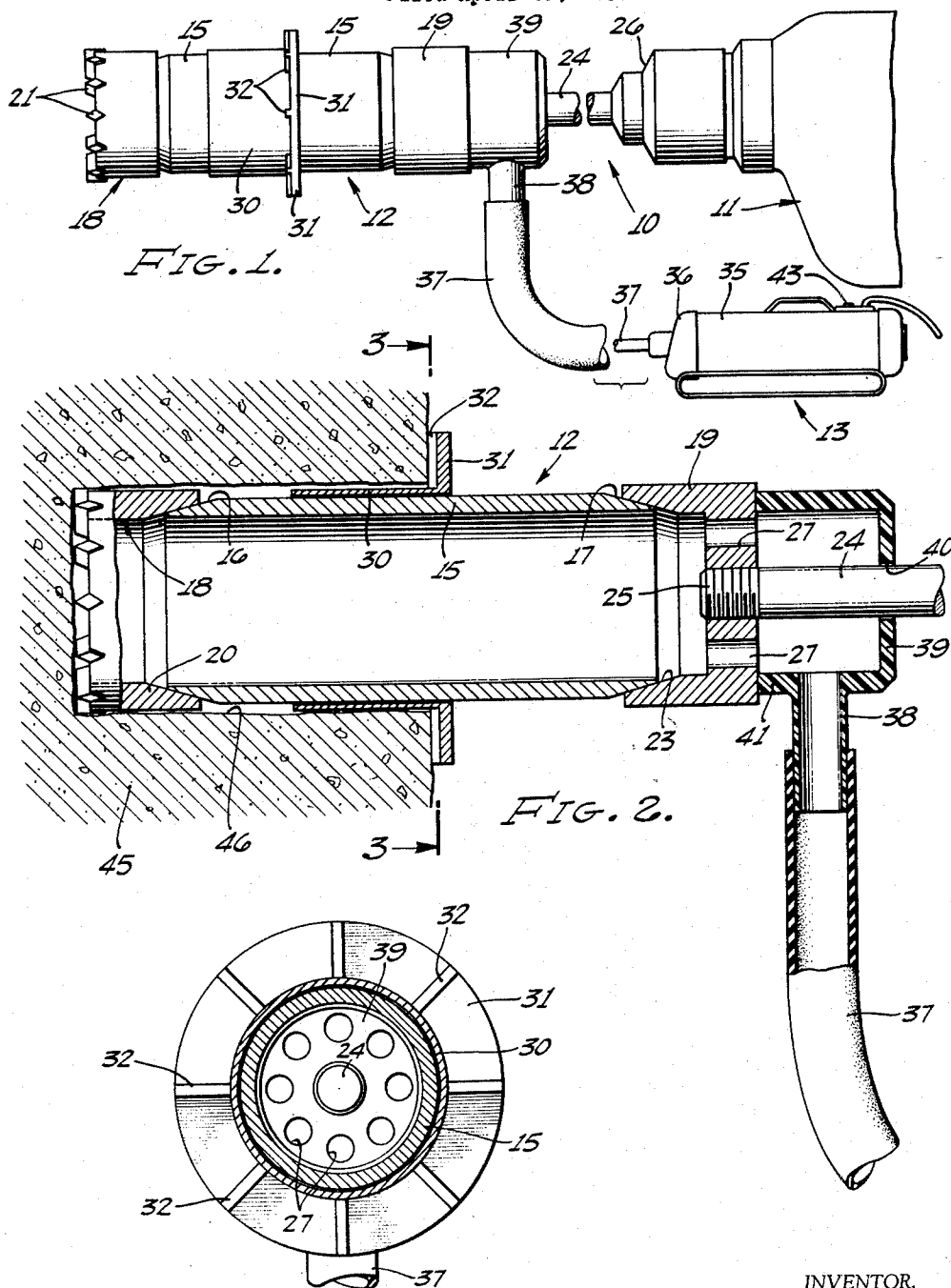


FIG. 3.

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1

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CORE DRILL CONSTRUCTION

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6 Claims. (Cl. 255—50)

2

This invention relates to drills for drilling holes in hard rock and the like and more particularly to an improved core drill having a simple but effective provision for the removal by air of cuttings with a minimum of interference with the drilling operation.

In the drilling of stone, brick, concrete and like brittle materials it has been common practice for many years to employ a core drill which cuts a narrow ring into the brittle material leaving a central core which can be broken out in large chunks. This manner of drilling is effective and fast but produces large quantities of fine cuttings much of which is airborne. It is essential that these cuttings be flushed away from the base of the bore and it has been common practice to feed water to the drill head for the purpose of carrying away the cuttings in the space surrounding the drill barrel. While water is effective for the purpose, a source of pressurized water is not always available. Furthermore, the discharging stream of water is not readily controlled and, in many instances, the use of water cannot be tolerated as, for example, where the drilling is to be carried on inside a building or dwelling.

Attempts to use air or gas as the flushing medium have also been made but these require the use of motor-driven compressors. Furthermore, large quantities of dust and fine cuttings issuing from the bore will be breathed by the drill operator unless precautions are taken to wear a face mask. Additionally, fine dust is deposited about the surrounding area which is objectionable. Suction devices heretofore provided for carrying away the dust and fine cuttings have been unsatisfactory, cumbersome, unreliable, and have interfered objectionably with the operation and manipulation of the drill proper.

These and other serious objections applicable to prior devices are entirely overcome by the present invention which contemplates the provision of a simple core drill readily separable into a few essential components and preferably held together by friction joints. Essentially, the drill of this invention features a device for carrying away cuttings in a suction air stream provided by any convenient means such as a portable suction cleaner. To this end a suction hose connected with the cleaner includes a hood fitting loosely about the shank of the drill and held sealed to its outer end by the suction so long as the cleaner is operating. When the drill is not in operation and the suction source is deenergized, all parts of the drill including the suction hood are readily separable. Another feature is the provision of a simple bushing carried by the barrel of the drill and serving to center the drill in the bore as well as to assure a supply of flushing air to the bottom of the bore being drilled.

Accordingly it is a primary object of the present invention to provide an improved drill for use in drilling hard, brittle materials and incorporating effective and efficient means for flushing away the cuttings to a collecting receptacle.

Another object of the invention is the provision of an improved core drill for rock-like materials in which the principal components are readily separable from one another and normally coupled together by friction fit.

Another object of the invention is the provision of a core drill having loose fitting bushing means mounted thereon and cooperating with the entrance end of the hole to hold the drill centered and including provision for assuring flow of a flushing fluid to the bottom of the drill hole.

Another object of the invention is the provision of a rock drill making use of a suction source to carry away the cuttings in a stream of air leading to a filtering receptacle.

These and other more specific objects will appear more clearly upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

Figure 1 is a side elevational view of a drill incorporating the present invention assembled in readiness for use;

Figure 2 is a fragmentary enlarged view in longitudinal section showing the drill cutting a hole in concrete; and

Figure 3 is a transverse sectional view on line 3—3 of Figure 2.

In Figures 1 to 3 there is shown a device designated generally 10 for cutting holes in rock-like brittle materials and including as principal components a driving motor 11, a core drill assembly 12, and a portable suction source designated generally 13. The drill assembly is best illustrated in Figure 2 wherein it is seen to comprise a tubular core drill barrel 15 having tapered ends 16 and 17 having a close frictional fit with a cutting head assembly and an end cap respectively. The cutting head assembly 18 includes a ring 20 having a plurality of cutting teeth 21 brazed or otherwise securely fixed radially of the rim of the ring. The teeth illustrated are diamond shaped in cross-section and project slightly beyond the inner and outer surfaces of ring 20 for the purpose of cutting an annular ring of greater width than the thickness of the cutter head. This assures that the drill will not bind either against the side wall of the bore or against the core extending centrally into the core barrel. End cap 19 has a flaring inner rim 23 forming a friction fit with tapered end 17 of the barrel. Projecting axially from cap 19 and fixed thereto by threads 25 is a driving shank 24 the outer end of which is shaped to be detachably clamped in a chuck 26 carried by the shaft of the portable driving motor 11. Cap 19 is provided with a number of perforations 27 providing flow passages for a flushing medium as will be described more fully presently.

Loosely journaled about the exterior of core barrel 15 is a bushing 30 which is longitudinally displaceable on the drill between the cutting head 18 and end cap 19. Bushing 30 has a thin-walled cylindrical skirt provided at its outer rim with a radial flange 31. Suitable means, such as ribs 32, project from the surface of flange 31 facing toward the skirt and may extend along the latter to support the bushing in spaced relation to the adjacent wall portions of the material 45 being drilled. Additionally and importantly, these ribs provide flow passages for admitting a flushing fluid downwardly into the bore about the exterior of the drill.

The means for flushing away and collecting the cuttings produced by the operation of the drill comprises any simple and suitable suction source conveniently provided by a suction cleaner such as the canister type generally indicated at 13 in Figure 1. This cleaner comprises a casing 35 housing a multiple stage high suction fan at one end and a filter bag at the other. The removable end cap 36 of the cleaner casing serves to clamp the filter bag in place and to conduct a cutting-laden air stream into the filter bag, the clean air escaping through the bag walls passing into the suction fan from which it is ex-

3

hausted exteriorly of the casing. The described components of the suction source are not illustrated in detail since they are well known and, in and of themselves, form no part of the present invention.

The suction air stream is conveyed into the cleaner through a flexible hose 37 having its inlet end telescoped over a nipple 38 projecting from the side of a suction hood 39 provided with an opening 40 fitting loosely about the shank 24 of the drill assembly. Hood 39 may be made of any suitable material but preferably from soft resilient material such as rubber or plastic. Annular rim 41 of the hood is shaped to abut and seal against end cap 19 in the manner depicted in Figure 2, and may be provided with a suitable bearing ring to reduce wear and friction with end cap 19. It is pointed out, however, that a bearing ring is not essential to the operation of the device.

The operation of the described rock drill apparatus will be apparent from the foregoing description of its components. The drill is easily and quickly assembled by pressing end cap 19 and cutting head 20 over the opposite tapered ends 16 and 17 of core barrel 15. Suction hood 39 is then assembled over the end of shank 24 and the latter is clutched within chuck 26 of the portable electric driving motor 11. Upon completion of the power supply to motor 11 and the closing of switch button 43 for the suction cleaner, both the cutting drill and the suction fan are rotated. The cutting head of the core drill may then be pressed against the material to be drilled by a pressure exerted through the motor and driving shank 24.

The cutting produced by drill teeth 21 are picked up by the low-pressure high-velocity air stream entering bore 46 exteriorly of the drill and flowing rearwardly through barrel 15, openings 27, and through suction hood 39 and flexible hose 37 into the filter bag of cleaner 13. In this connection it will be understood that the low suction pressure existing within hose 37 is effective, in cooperation with the much higher exterior atmospheric pressure, to hold hood 39 pressed tightly against the end of drill cap 19 while permitting relative rotation between the end cap and the suction hood. As the cutting proceeds, bushing 30 can be pressed into the open end of bore hole 46 until its radial ribs 32 are seated against the surface of the material being drilled. It is pointed out that bushing 30 functions not only to hold the core drill centered in the bore being drilled but, importantly, to provide a free flow of flushing air inwardly about the exterior of the drill. From time to time the drill may be withdrawn while the core of material formed by the advance of the annular drill is broken off and removed thereby providing a freer passage for the airborne removal of cuttings.

It will be recognized that core barrel 15 may be of any length depending on the depth of the bore to be drilled. Accordingly, drills of various lengths may be assembled merely by fitting the cutting head and the end cap to core barrels of different lengths. For this purpose, each barrel is provided with identical tapered ends similar to ends 16 and 17 of the described embodiment.

While the particular rock drilling apparatus herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. In a power-driven drill for drilling rock and the like by the aid of a core drill having a shank end adapted to be detachably coupled to a drill shank driven by a driving motor; that improvement which comprises a core drill having a hollow cutting end and a shank end, flanged

4

bushing means fitting loosely about said drill having provision for admitting a flow of air about the exterior of said drill and into the bore being drilled, suction confining means for sucking air past said flanged bushing into the bore about the exterior of the drill and across freshly formed cuttings to pick up said cuttings and convey them in a suction air stream centrally through said hollow drill to a point of cuttings collection in a path of flow entirely independent of the drill driving motor, said suction confining means including a flexible duct having inlet junction means for coupling the same to the cutting end of said drill adjacent the junction thereof with said drill shank.

2. In combination, a core-type hollow drill for drilling rock and the like hard brittle materials, said drill having a shank adapted to be coupled to a driving motor, a bushing fitting loosely about said drill body and arranged to be supported at the entry of a bore being drilled by said drill and including means for admitting air into the bore from the rim edge thereof, suction means for handling airborne dust and cuttings from said drill, said means including a filter receptacle having a flexible suction air conveying duct connection communicating with a hood resting loosely about the outer end of said core drill adjacent the junction of said shank with said hollow drill to receive airborne dust and cuttings issuing from said hollow drill as the result of the operation of said suction means and for conveying said dust and cuttings from the cutting end of the drill to said filter receptacle along a path by-passing the drill driving motor.

3. In combination, a hollow core drill for use in drilling rocklike brittle materials producing airborne dust and cuttings, said core drill having a perforated end cap provided with a driving shank projecting axially therefrom, said drill having a cutting head of larger diameter than the core barrel whereby air may enter the bore exteriorly of the drill for exit through said hollow drill and perforated end cap, and means including a source of suction for drawing air through said drill, said means including a flexible suction hose secured to a suction hood having its rim seated against the outer surface of said end cap effective to convey a dust laden suction stream of air to a point of dust collection.

4. The combination defined in claim 3 wherein said suction hood has an annular rim adapted to be held seated against the outer end of said drill by the differential pressure between said suction source and the atmospheric air so long as the same is operating and leaving said hood free for separation from said drill when said suction source is not operating.

5. In combination, a core drill adapted to drill brittle stone-like materials comprising, a barrel tapered at its opposite ends, a drill head ring having a frictional fit with one end of said barrel, a driving shank fixed to a perforated cap having a frictional fit with the other end of said barrel, a cupped suction hood having a loose running fit with said shank with its rim positioned to seat against the rim of said cap, and means for connecting a source of suction to said hood to hold the same sealed against said cap and operable to withdraw airborne cuttings through said barrel and to convey them to a point of deposit.

6. The combination defined in claim 5 including a bushing loosely journaled about the body of said barrel and having provision for admitting air between the barrel and the side wall of the bore being drilled.

References Cited in the file of this patent

UNITED STATES PATENTS

1,250,103	Gilman	Dec. 11, 1917
1,891,953	Sellers	Dec. 27, 1932
2,079,417	Markley	May 4, 1937
2,124,609	Dickenson	July 26, 1938
2,310,288	Hokanson	Feb. 9, 1943
2,339,324	Fischer	Jan. 18, 1944