

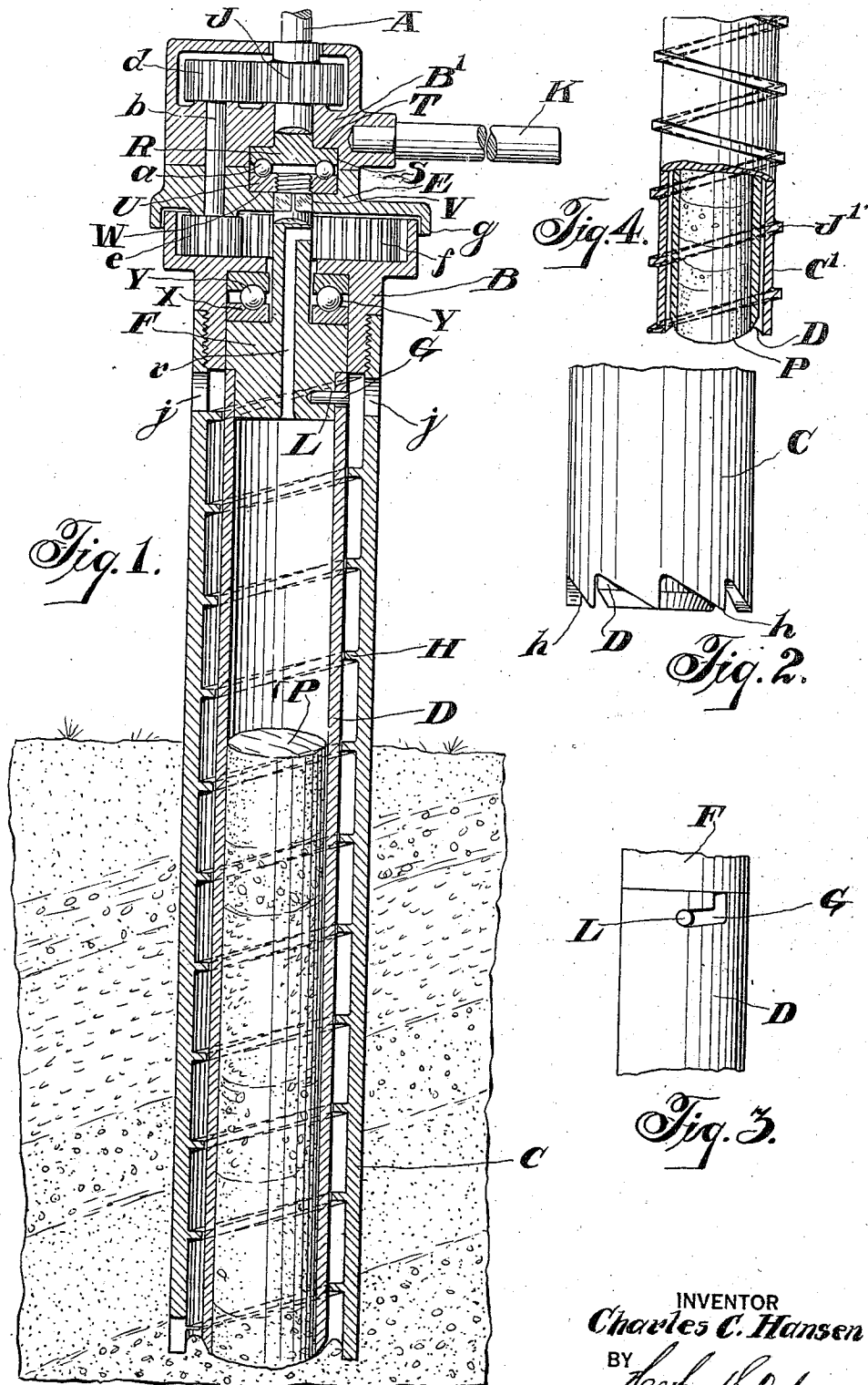
May 29, 1923.

C. C. HANSEN

1,456,983

SOIL CORING TOOL

Filed Nov. 2, 1921



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Patented May 29, 1923.

1,456,983

UNITED STATES PATENT OFFICE.

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SOIL-CORING TOOL.

Application filed November 2, 1921. Serial No. 512,239.

To all whom it may concern:

Be it known that I, CHARLES C. HANSEN, a citizen of the United States, and a resident of Easton, county of Northampton, State of Pennsylvania, have invented a certain Soil-Coring Tool, of which the following is a specification, accompanied by drawings.

This invention relates to soil coring tools, and particularly to a tool in the nature of of a core drill of this general type adapted to extract cores from earth or other material which is more or less dry and loose in formation.

Heretofore it has been extremely difficult to obtain satisfactory specimens of earth formation where the subsoil or other material is dry and loose, particularly where several different strata are encountered at one location. These strata may comprise clay, loose earth, sand, stone, ashes, and gravel, which will not hold together en masse for extraction by the usual or standard form of core drill. This is mainly due to the fact that rotation of the core barrel of the drill tends to separate the strata and loosen the material. Means have been devised for extracting such combined specimens by loosening the material and conveying it as cut into a so-called "calyx" bit by hydraulic means, a reversed loose core being thus obtained, but this method has many drawbacks and is moreover expensive.

The object of the present invention is to efficiently and expeditiously extract cores composed of loose earth or other incohesive material, to protect the core while the tool is being advanced, to convey the debris from the hole during the drilling, and to permit the core barrel to be detachably mounted in the drill so that the operating parts may be quickly removed from the core barrel, after which the core barrel and its contained core may be readily removed from the hole.

Further objects of the invention will hereinafter appear, and to all of these ends the invention consists of a soil coring tool having the features of construction, arrangement of parts and combinations of elements substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawing, in which:

Figure 1, is a longitudinal sectional elevation of a preferred form of the drill as it appears in operation.

Figure 2, is a fragmentary elevation of the lower end of the drill showing the cutting edges of the bit and the lower end of the core barrel,

Figure 3, is a view similar to Figure 2 of portions of the head piece and core barrel showing the connection between these parts, and

Figure 4, is a side elevation partly broken away and partly in longitudinal section showing a modified form of core barrel.

In the drawings I have shown a core drill having a rotatable spindle A, a cap piece B¹, a casing B rotated through the agency of the spindle A, and an outer cylindrical cutting bit C preferably threaded to the casing B and rotatable therewith. Within the bit C is a normally non-rotatable core barrel D. This core barrel D is detachably mounted upon a normally stationary support which consists of a housing E and a head piece F secured in the housing E, the core barrel D being secured to the head piece F by a separable connection which may be in the form of a bayonet joint formed by the slot G on the core barrel and the pin L on the head piece F.

A spiral conveyor H is formed on the inner wall of the cutting bit C for removing the debris as the bit rotates during the progress of the drilling operation, the edges of the conveyor being spaced sufficiently from the wall of the core barrel D to prevent any frictional contact with the barrel D which might tend to rotate it,

The cap piece B¹, the housing E and the head piece F are normally held stationary and non-rotatable by a handle K secured to the cap piece B¹. When the drilling of the hole has been completed, and it is desired to extract the core, the handle K is manipulated to partially rotate the cap piece B¹, this movement being effected independently of the spindle and having the effect of also imparting rotative movement to the housing E and the head piece F, with the result that the pin L on the head piece moves in the slot G of the core barrel D to unlock the bayonet joint and disengage the core barrel D. The drill is then lifted from the hole leaving the core barrel D around the core P, after which the core barrel and the contained core are removed from the hole.

Driving connections for effecting the rotation of the casing B and bit C include a

gear J on the spindle A, this gear J rotating in a chamber in the upper portion of the cap piece B¹. The spindle A has a head portion R fitted into a recess S in the under side of the cap piece B¹, and bearing against shoulders T forming the back of the recess S. The head piece F is rigidly secured in the housing E so that it does not rotate with respect to the housing E, by means of a head U threaded to the squared neck V of the head piece F and secured in a recess W in the housing E.

The casing B rotates on the head piece F through the interposition of a ball bearing comprising the bearing blocks X and balls Y. Another ball bearing formed by the balls a is located between the heads R and U on the spindle A and neck of the head piece F, respectively, forming an end bearing for the spindle A and also serving to prevent the transmission of rotative movement from the spindle to the head piece F. The head U it will be seen is threaded to the squared neck V so that it is adjustable to raise and lower the head piece F within small limits to obtain the proper adjustment between the head piece F, casing B and housing E.

A longitudinal shaft b is mounted adjacent the spindle A, having pinions d and e one at each end. The driving gear J on the spindle A meshes with the pinion d while the pinion e in turn meshes with an internal gear f formed within the casing B. Since the shaft b passes through both the cap piece B¹ and housing E, relative rotation of the cap and housing is prevented. The housing E is preferably formed with a downturned flange g overlapping the upper end of the casing B, thus enclosing and protecting the internal gearing.

The bit C has the usual cutting edges h at the lower end and at the upper end openings j are provided for the escape of cuttings carried up by the spiral conveyor H. A longitudinal passage r in the head piece F communicates with the interior of the internal gear f and allows the air forced up by the rise of the core in the barrel D during the drilling to escape to atmosphere between the housing E and casing B.

In the operation of the tool, the spindle A, shaft b, casing B and bit C rotate simultaneously, the spiral conveyor H carrying the debris upward and out through the openings j. The cap piece B¹, housing E, head piece F and core barrel D do not rotate, but as the core barrel is carried downwardly, the core P is formed and when the core has attained the desired length the drilling is stopped and the handle K is manipulated to partially rotate the cap piece B¹ and housing E, and by reason of the rigid relationship between the upper end V of the head piece F and the housing E,

the head piece F will also be partially rotated. This has the effect of moving the pin L in the slot or groove G, and unlocking the bayonet joint connection between these parts, so that the drill and bit may be raised, leaving the barrel around the core. The inner core barrel D is thus removed from the drill through the agency of the external manual means K without removing the cutting bit C from the casing B or exposing the inner core barrel D. The core barrel and core are then removed from the hole in any suitable or desired manner.

The above described movement of the parts to unlock the core barrel may be performed either while the drill is in operation or when idle.

Figure 4 shows a modified form of cutting bit in which the spiral conveyor J' is located on the exterior surface of the bit C' instead of on the interior. This form is more suitable for use in drilling in certain kinds of material. The operation is in all respects similar to the preferred form except that the debris is conveyed along the outside of the bit instead of around the core barrel D.

I claim:

1. A soil coring tool, comprising a rotatable spindle, an outer cutting bit connected to be rotated by said spindle, a relatively non-rotatable head piece within the upper end of the bit supported from a stationary portion of the rotating mechanism, and an inner core barrel connected to said head piece, which descends without rotating and encloses a core cut by the rotating bit.

2. A soil coring tool, comprising a rotatable spindle, an outer cutting bit connected to be rotated by said spindle, a relatively non-rotatable head piece within the upper end of the bit supported from a stationary portion of the rotating mechanism, and an inner core barrel connected to said head piece, which descends without rotating and encloses a core cut by the rotating bit and enclosed means forming a part of the outer cutting bit for conveying the cuttings and detritus upwardly around the core barrel.

3. A soil coring tool, comprising a rotatable spindle, an outer cutting bit connected to be rotated by said spindle, a relatively non-rotatable head piece within the upper end of the bit supported from a stationary portion of the rotating mechanism, and an inner core barrel connected to said head piece, which descends without rotating and encloses a core cut by the rotating bit and an enclosed spiral conveyor on the outer cutting bit for conveying the cuttings and detritus upwardly around the inner core barrel.

4. A soil coring tool, comprising a spindle,

an outer cutting bit connected to be rotated by said spindle, a detachable inner core barrel, a normally non-rotatable head piece for said core barrel, a spiral conveyor between said outer cutting bit and inner barrel and means independent of the spindle for effecting rotation of said head piece to connect and disconnect the core barrel from the head piece, without exposing the inner core barrel.

5. A soil coring tool, comprising a rotatable spindle, an outer cutting bit connected to be rotated by said spindle, an inner core barrel, a normally non-rotatable head piece for said core barrel, said core barrel being secured to said head piece by a separable connection, a spiral conveyor between said outer cutting bit and inner barrel and manually operated means independent of the spindle for effecting rotation of said head piece to connect and disconnect the core barrel from the head piece without exposing the inner core barrel.

6. A soil coring tool, comprising a spindle, an outer casing having a cutting bit, said casing and bit being connected to be rotated by said spindle, a detachable inner core barrel, a normally non-rotatable head piece for said core barrel, a spiral conveyor on the inner wall of said cutting bit and manually operated means for effecting partial rotation of said head piece relatively to the core barrel to connect and disconnect the core barrel from the head piece, without exposing said inner core barrel.

7. A soil coring tool comprising a cap, a spindle mounted in said cap, a casing having an internal gear, a driving connection between said spindle and gear for effecting rotation of said casing, a housing interposed between said casing and cap, a head piece secured in said housing, an outer rotatable cylindrical cutting bit detachably mounted on said casing, a spiral conveyor formed on said bit, an inner core barrel detachably secured to said head piece and means for imparting simultaneous rotative

movement to the cap, housing and head piece relatively to the core barrel and independently of the rotation imparted by the spindle, whereby the core barrel may be locked to or disengaged from the head piece.

8. A soil coring tool comprising a normally stationary cap, a spindle rotatably mounted in said cap, a casing having an internal gear, a driving connection between said spindle and gear for effecting rotation of said casing, a normally non-rotatable housing interposed between said casing and cap, a head piece secured in said housing, a rotatable cylindrical cutting bit mounted on said casing, a spiral conveyor formed on said bit, an inner non-rotatable core barrel detachably secured to said head piece and means for imparting simultaneous rotative movement to the cap, housing and head piece relatively to the core barrel, whereby the core barrel may be locked to or released from the head piece.

9. A soil coring tool comprising a normally stationary cap, a rotatable spindle mounted in said cap, a casing having an internal gear, a driving connection between said spindle and gear for effecting rotation of said casing, a normally non-rotatable housing interposed between said casing and cap and enclosing the gear in said casing, a head piece secured in said housing, a rotatable cylindrical cutting bit mounted on said casing, a spiral conveyor formed on the inner wall of said bit, an inner normally non-rotatable core barrel detachably secured to said head piece by a bayonet joint connection and manually operated means mounted on the cap for imparting simultaneous rotative movement to the cap housing and head piece relatively to the core barrel and independently of the rotation imparted by the spindle, whereby the core barrel may be locked to or released from the head piece.

In testimony whereof I have signed this specification.

CHARLES C. HANSEN.