

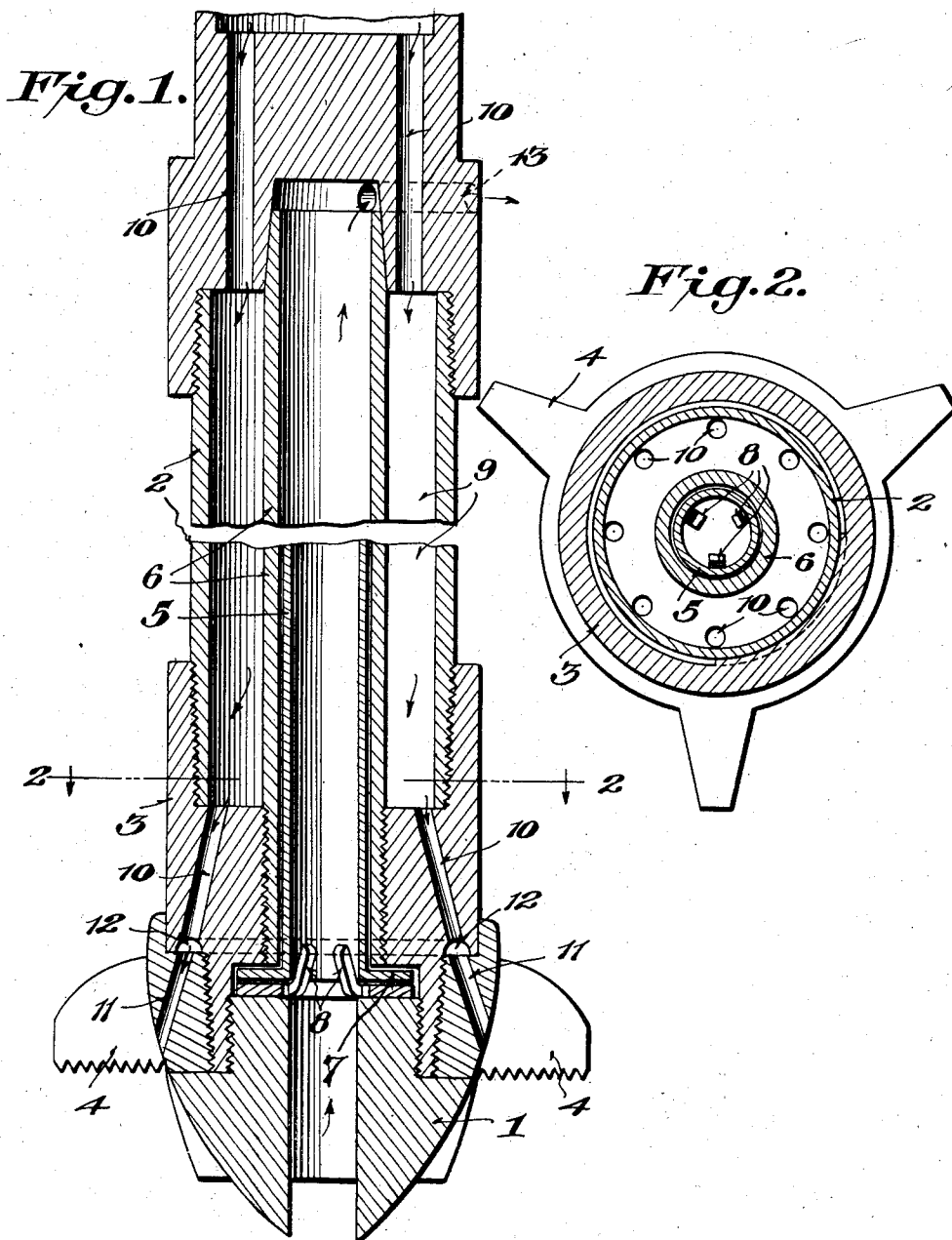
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CORE DRILL

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CORE DRILL

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This invention relates to improvements in core drills. Since this invention obtains especially excellent results in earth boring, the illustrative embodiments herein are chosen from that art.

Various means for extracting cores in earth drilling have employed a rotary drill such that the core is contained in the drill barrel. After removal from the boring, the core has been extracted either by pushing it from the barrel by a powerful screw or by pumping out the core hydraulically. The first method is exceedingly laborious, while the second destroys the full value of the core by leakage of water past the hydraulic pusher head. Both require special and powerful equipment and involve cumbersome manipulation of the heavy drill elements. Moreover, secrecy is difficult as to the nature of the sample, and the sample itself often is deformed so as not to present a correct picture of the strata being studied. Similar difficulties are encountered by other previous methods, particularly, where a more or less laborious dismantling of the drill has been involved.

An object of this invention is to improve core drilling structures to obtain more simple core retention and extraction; also to obtain a more efficient cooperation of parts so that the core sample may present a more accurate picture of the drilling. Specifically, an improved core container assemblage is contemplated by the invention. Also there results a new mode of extracting the core from the drill barrel. In particular the invention pertains to an improved removable liner for the core barrel, and to the combinations of parts and to the improved art of core extraction more fully set forth herein.

In a specific embodiment, the invention may be illustrated by the provision of a light gage core container. Preferably, this is free to rotate easily within the core barrel, yet prevented from being pushed into the barrel. Also there is provision to relieve the core from such pressure as might alter the natural condition of the sample; or impede its extraction from the barrel. The arrangement further requires only the removal of a simple key element, for instance the core cutter proper,

to permit easy extraction of the container with the sample concealed against unauthorized inspection.

An embodiment of this invention is illustrated by the accompanying drawing.

Figure 1 is a vertical section of an assembled drill.

Figure 2 is a horizontal section along the line 2—2 of Figure 1, through the lower part of the drill sub, core barrels and core retainer.

The pilot drill or core cutter proper is designated as 1. This is removably secured to an outer or main barrel 2 of the tool. Preferably, as shown, the cutter is screwed into a collar 3 while the collar is threaded to the barrel 2. Threaded externally to the bottom of the collar above the cutter 1 there is shown a reamer or hole size cutter 4. In some forms of the invention the cutter 1 could be threaded directly to the reamer 4 but this particular fastening is not the essence of this invention. An essential is that by a simple operation the interior of the drill barrel is exposed so that a separate core container 5 may be inserted and removed. As shown, the pilot cutter in place serves to hold the container in normal position, and removal of the container requires first only that the relatively light pilot drill be unscrewed from the sub or collar 3.

An inner core barrel 6 preferably is retained within the collar 3 to encircle and protect the core container. In the particular embodiment illustrated, this inner core barrel is screwed into the collar, and at its top is provided with a taper seat.

The collar 3 is of less internal diameter at its lower portion than at the upper, since the upper portion is threaded internally to receive the outer core barrel. The core cutter 1 is threaded into the collar so as to provide a support for the container 5. Preferably an external flange 7, secured to the lower end of the container serves to support the container and also to limit its up and down motion. In the embodiment illustrated the extent of upward motion is determined by the lower end of the inner core barrel or by the inner diameter of the collar above the flange, as the case may be.

The core container need be only of light material, for it is subjected to very little strain, particularly if combined with other features of the invention, to be described.

5 Tin sheet has been used, and light gage metal in general is satisfactory. In commercial practice the term sheet has an accepted significance to designate metal below approximately one-eighth of an inch thick. With
10 such material, the container may be split by hand with a small wire retained inside its walls, or by a hatchet or light mechanical cutter. In some instances a boiler flue is suitable. The range of materials will be a matter
15 of choice, and need not necessarily be metal; this invention makes possible a satisfactory core container of less strength than heretofore has been necessary.

Preferably, the core container is a single
20 cylinder intact, designed to be cut or otherwise opened lengthwise when the core finally is inspected. Split or sectional types with suitable fastening, are possible, but should be of such construction that no impediment
25 is offered to the rotatability of the container in the inner core barrel during drilling, nor to the simple extraction of the container and core as a whole. Freedom of rotation, absence of jamming, and ease of extraction, are
30 features of this invention with respect to the core retainer.

Suitably positioned between the core cutter and the container flanges 7, is an annular element bearing spring prongs 8 to project into
35 the container. In operation the core by pressing back these prongs is held in a friction grip. In the claims this is designated as a core retaining device.

Between the inner and outer core barrels
40 is an annular space 9 connected to conduits 10 in the upper tool portions and communicating below with conduits 11 through the sub 3 and preferably also through the reamer blades 4. Thus fluid may be pumped to
45 the cutting members. In prior practice the hydraulic pressure of this fluid acted detrimentally on the core. For this reason the conduits 10 are provided to cooperate with the upper joint of the inner core barrel in
50 keeping the fluid pressure from the upper part of the core or core container. In order further to relieve the core or core container from the indirect effects of the hydraulic pressure through entrapped fluid, a conduit
55 13 through the upper tool portion provides communication between the upper portion of the inner core barrel 5 and an upper portion of the drill hole, preferably as shown at approximately such upper level of the inner
60 drill barrel as is at or above the top of the core on removal, such as through the upper drill head.

In operation the core as it is cut feeds into the core container and there is held and pro-
65 tected. The container will provide for such

length of core as is desired. During the cutting there will be such rotation of the cutter relatively to the container as the frictional forces require. However the container flange
70 will assist to prevent rising or jamming. After drilling, the core barrel is brought up to the rig floor. There only the pilot cutter head proper need be removed to allow the container with the core to be pulled out
75 as a relatively easy operation. The core practically is concealed normally and may be stored intact in the container if desired. Ordinarily, a new container is inserted and the drilling continued after but a minimum loss
80 of time.

Where the container flange is at the bottom it serves further as a means to grip for removal of the container, but other conformations preferably toward the bottom end of the container likewise will facilitate extrac-
85 tion, and limit vertical play of the container. It will be observed that in order to avoid crushing of the container there is no pressure imposed downwardly upon its upper positions.
90

It may be noted that the elements of this drill are simple and may be assembled or replaced in a simple manner. They are separate so that parts may be replaced easily, but except the pilot cutter need not be removed
95 other than for replacement.

Modifications from these illustrative embodiments will be within the scope of this invention. For instance features thereof may be utilized in other than rotary drills. 100 Also the position of the bearing flange may be altered, and other means to be grasped be provided. Other features likewise may be varied within the scope of the appended claims. The invention has been set forth in accordance with the patent statutes; what particularly is claimed is:

1. A core drill having a tubular drill barrel, and a thin gage core container extending freely and loosely into said barrel and freely
110 withdrawable therefrom with vertical play limited solely through the conformation of the bottom portion of said core container, and a wall surrounding said container to protect it from external pressure upon its own
115 walls.

2. A core drill having inner and outer drill barrels, and a thin gage core container extending freely and loosely into said inner barrel and freely withdrawable therefrom with
120 vertical play limited solely through the conformation of the bottom portion of said core container.

3. In combination, a core drill having inner and outer drill barrels, a thin gage core container extending freely and loosely into said
125 inner barrel and freely withdrawable therefrom with vertical play limited solely by a flange at its bottom, a detachable core bit supporting said core container, and a core grip-
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ping device retained at the bottom of said core container by means preventing locking engagement between said core gripping device and said core bit.

5 4. In combination, a core drill comprising an upper drill head from which depend inner and outer drill barrels embodying a fluid conduit having communication with the drilling surfaces, a detachable core bit having
10 exposed portions to facilitate detachment, a sheet metal core container extending freely and loosely into said inner barrel and freely withdrawable therefrom, said core container having rotary play and being limited in
15 vertical play solely by a flange at its bottom that is supported between said detachable core bit and said inner drill barrel, the upper interior of said core container communicating through said upper drill head with the ex-
20 terior of said drill but closed to said fluid conduit.

5. In a core drill comprising spaced inner and outer drill barrels and a thin gage core container extending freely and loosely into
25 said inner barrel and freely withdrawable therefrom with vertical play limited solely by a flange at its bottom, a removable collar secured to the bottom of said outer core barrel and having an annular conduit communi-
30 cating with the space between said inner and outer drill barrels, reamer blades detachably secured to said collar and having spaced conduits communicating with said annular conduit, and a detachable pilot drill secured to
35 said collar to support said core container flange and having portions extending below said reamer blades to facilitate detachment of said pilot drill and to prevent washing of the core by fluid flowing from said reamer
40 blades.

In witness whereof I affix my signature.

CHARLES A. DEAN.

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