

[54] **CUTTER KNIFE FOR EARTH CORING**

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[22] Filed: **Nov. 22, 1971**

[21] Appl. No.: **200,895**

[52] U.S. Cl. **175/53, 175/404**

[51] Int. Cl. **G21c 15/00**

[58] Field of Search **175/403-407, 53, 19, 62**

[56] **References Cited**

UNITED STATES PATENTS

3,482,641	12/1969	Atkins et al.	175/53 X
1,648,225	11/1927	Hall	175/404

1,445,289	2/1923	Bron	175/406
2,281,614	5/1942	Ogran	175/407 X
2,664,273	12/1953	Merrick	175/53 X
2,837,324	6/1958	Aschacker	175/53
2,843,362	7/1958	Degen	175/385 X

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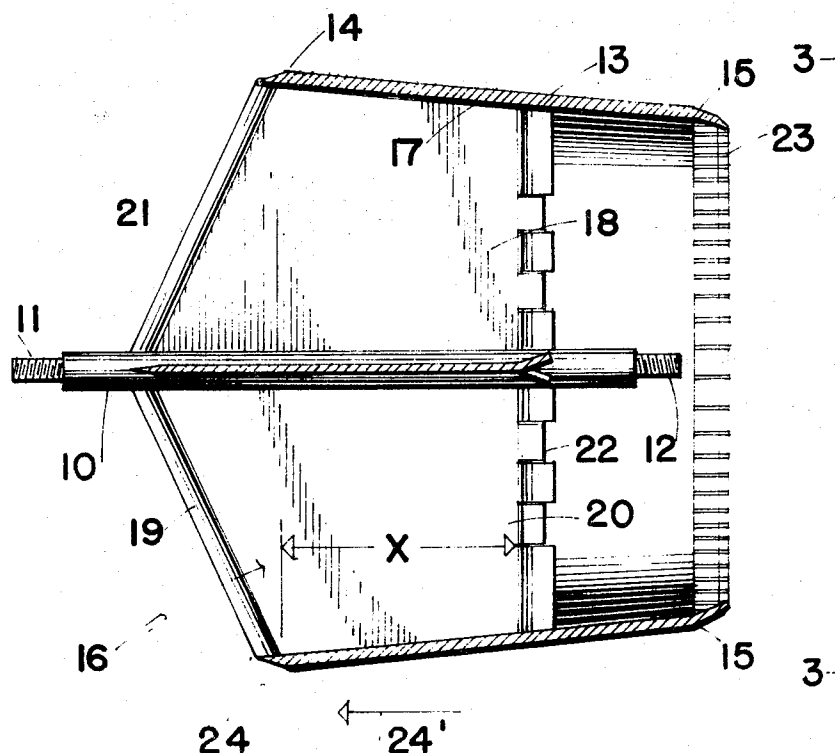
Attorney—S. G. Ade et al.

[57]

ABSTRACT

A knife component for push-pull type earth coring includes a central shaft and a surrounding shroud or shell held concentrically to the shaft by a plurality of cutter blades or webs. The shroud or shell tapers from the front to the back to compress the cut core slightly and the rear side of the cutter blades are provided with off-set teeth to thrustably engage the core during the core pushing or extruding phase.

6 Claims, 3 Drawing Figures



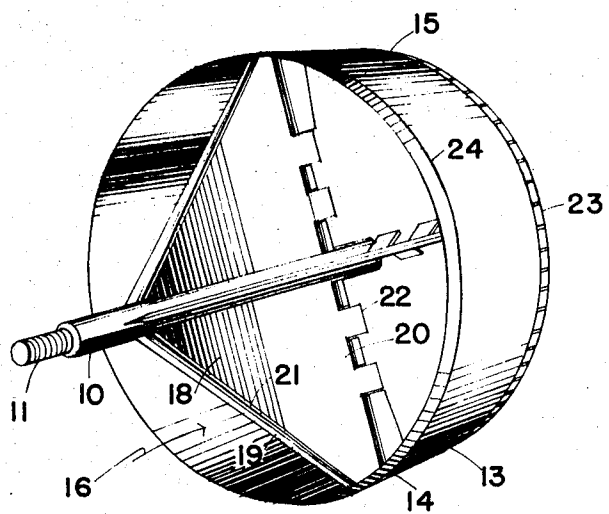


FIG. 1

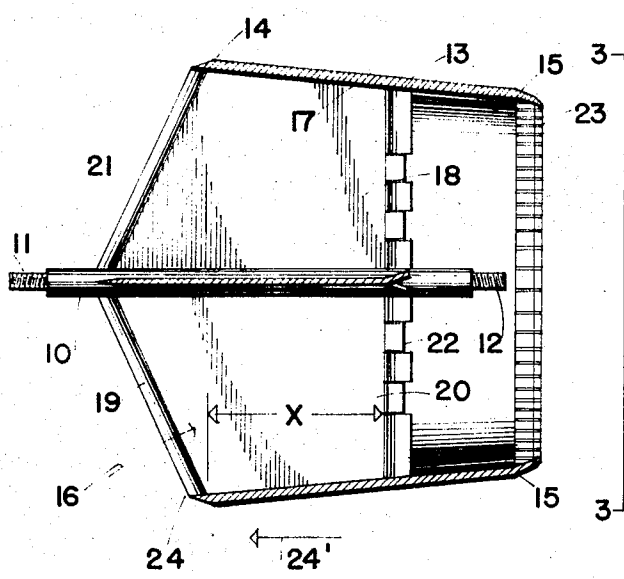


FIG. 2

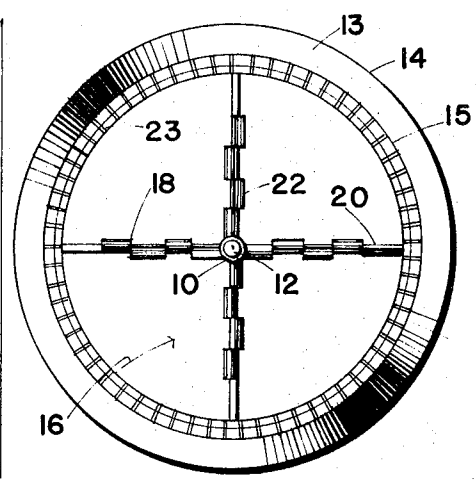


FIG. 3

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CUTTER KNIFE FOR EARTH CORING

BACKGROUND OF THE INVENTION

This invention is designed for use with the apparatus and method for earth coring described and claimed in our U.S. Pat. Nos. 3,482,641, 3,443,649 and 3,469,638.

In these patents, after a pilot hole has been formed in the earth, the cylindrical cutter is pulled through which forms a core cut into segments and after the cutter has been pulled clear through, the motion is reversed so that the cutter then thrusts the cut core rearwardly from the hole. Under certain circumstances, it has been found that the suction between the cut core and the surrounding earth is such that difficulty is experienced in extruding the core. Under these circumstances and if the core is relatively soft, the cutter is merely thrust rearwardly through the core rather than engaging same and pushing it out of the hole formed by the core cutter.

SUMMARY OF THE INVENTION

This invention overcomes these disadvantages by providing a knife cutter assembly which can be used with apparatus and methods described in the above patents, under circumstances of heavy suction and relatively loose or porous soil.

The principal object and essence of the invention is to provide a knife cutter for such earth coring which, as the core is formed and segmented by the cutter, compresses the core considerably thus reducing the suction and increasing the adhesion of the earth forming the core, and which furthermore includes means to thrust against the face of the core during the extruding action and reduces the tendency of the cutter to embed within the core during this action.

Another object of the invention is to provide a device of the character herewithin described, in conjunction with the foregoing object which includes offset thrust teeth formed on the rear side of the cutter blades which engage the face of the core during the thrusting or extruding action.

A yet further object of the invention is to provide a device of the character herewithin described which enables the device and processes described in the above patents, to be used on soils of relative porosity and/or heavy suction.

A yet further object of the invention is to provide a device of the character herewithin described which is simple in construction, economical in manufacture, and otherwise well suited to the purpose for which it is designed.

With the foregoing objects in view, and such other or further purposes, advantages or novel features as may become apparent from consideration of this disclosure and specification, the present invention consists of the inventive concept which is comprised, embodied, embraced, or included in the means, method, process, product, construction, composition, arrangement of parts, or new use of any of the foregoing, herein exemplified in one or more specific embodiments of such concept, reference being had to the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of the cutter knife component.

FIG. 2 is a vertical section of FIG. 1.

FIG. 3 is a view substantially along the lines 3-3 of FIG. 2.

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

DETAILED DESCRIPTION

Proceeding therefore to describe the invention in detail, reference character 10 illustrates a central shaft being threaded at either end 11 and 12 by which means it may be connected along the run of push-pull types or the like normally used in this form of earth coring. Inasmuch as these connections are illustrated and described in the above mentioned patents, it is not believed necessary to show same in the present application.

Concentrically surrounding the shaft 10 is a shroud or a shell 13 which is in the form of a substantially truncated cone having a larger diameter end 14 adjacent one end 11 of the shaft 10 and a narrower diameter end 15 adjacent the other end 12 of the shaft 10 as clearly shown in the drawings. The shell or shroud 13 is maintained in concentric relationship spaced from the shaft 10, by means of a plurality of cutter knives or means collectively designated 16 and these are in the form of substantially rectangular flat plates secured by one end to the exterior of shaft 10 and by the other ends thereof to the interior 17 of the shell or shroud 13, once again as clearly shown.

These flat plate members specifically designated 18, are secured with one edge 19 adjacent the end 11 of the shaft 10 and the other edge 20 adjacent the end 12 of the shaft 10 so that the plates lie with the wide axis "X" parallel to the longitudinal axis of the shaft 10.

The edges 19 are edge sharpened as at 21 and edges 20 are provided with a plurality of oppositely offset thrust teeth 22 as clearly shown in FIGS. 1 and 3.

The narrower diameter end 15 of the shell 13 inclines inwardly slightly and is provided with serrated teeth 23 which forms striations on the earth core formed by the cutter knife.

In operation, the cutter knife is first drawn through a pilot hole, in the earth, in the direction of arrow 24 as illustrated and described in the above mentioned patents, so that the larger diameter edge 14, which is edge sharpened as at 24, forms a core and the cutter blades 18 segment this core. The narrower diameter end 15 in conjunction with the serrated teeth 23 compresses this core as it is formed and forms striations on the outer surface both of which reduce the suction between the core and the surrounding earth, as the core is formed.

Once the cutter has been drawn completely through the area to be cored, it is reversed in direction so that it moves opposite to arrow 24 whereupon the reduced diameter end 15 together with the thrust teeth 22 on the edges 20 of the knife blades, thrust against the core and extruded from the hole. The combination of the narrower diameter end 15 and the offset thrust teeth 22 reduce the tendency of the cutter knife component to be forced into the core and instead act to thrust against the core and extrude same.

Various modifications may be constructed or performed within the scope of the inventive concept disclosed. Therefore what has been set forth is intended to illustrate such concept and is not for the purpose of limiting protection to any herein particularly described embodiment thereof.

What we claim as our invention is:

1. A cutter knife for push-pull type earth coring comprising in combination a central shaft for attaching the cutter knife to associated driving rods, a surrounding shell, and knife means extending between said shaft and said shell to maintain said shell concentrically spaced from said shaft, said shell being in the form of a truncated cone, with the narrower diameter in adjacent one end of said shaft and the wider diameter in adjacent the other end of said shaft, said knife means being edge sharpened on the edge adjacent said wider diameter end.

2. The device according to claim 1 in which said knife means takes the form of a plurality of flat plate members secured by the ends thereof to the interior of said shell and to the exterior of said shaft, said plate members being aligned with one edge adjacent said wider diameter end of said shell and the other edge adjacent said narrower diameter end of said shell, said edge adjacent said wider diameter end of said shell being edge sharpened, said edge adjacent said narrower diameter end of said shell being provided with offset thrust teeth formed on said edge to facilitate thrusting engagement of said cutter knife against the core of soil cut thereby.

3. The device according to claim 1 in which said shell is edge sharpened on said wider diameter end.

4. The device according to claim 3 in which said knife means takes the form of a plurality of flat plate

members secured by the ends thereof to the interior of said shell and to the exterior of said shaft, said plate members being aligned with one edge adjacent said wider diameter end of said shell and the other edge adjacent said narrower diameter end of said shell, said edge adjacent said wider diameter end of said shell being edge sharpened, said edge adjacent said narrower diameter end of said shell being provided with offset thrust teeth formed on said edge to facilitate thrusting engagement of said outer knife against the core of soil cut thereby.

5. The device according to claim 1 in which said shell is provided with serrated teeth formed on said narrower diameter end.

6. The device according to claim 5 in which said knife means takes the form of a plurality of flat plate members secured by the ends thereof to the interior of said shell and to the exterior of said shaft, said plate members being aligned with one edge adjacent said wider diameter end of said shell and the other edge adjacent said narrower diameter end of said shell, said edge adjacent said wider diameter end of said shell being edge sharpened, said edge adjacent said narrower diameter end of said shell being provided with offset thrust teeth formed on said edge to facilitate thrusting engagement of said outer knife against the core of soil cut thereby.

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