

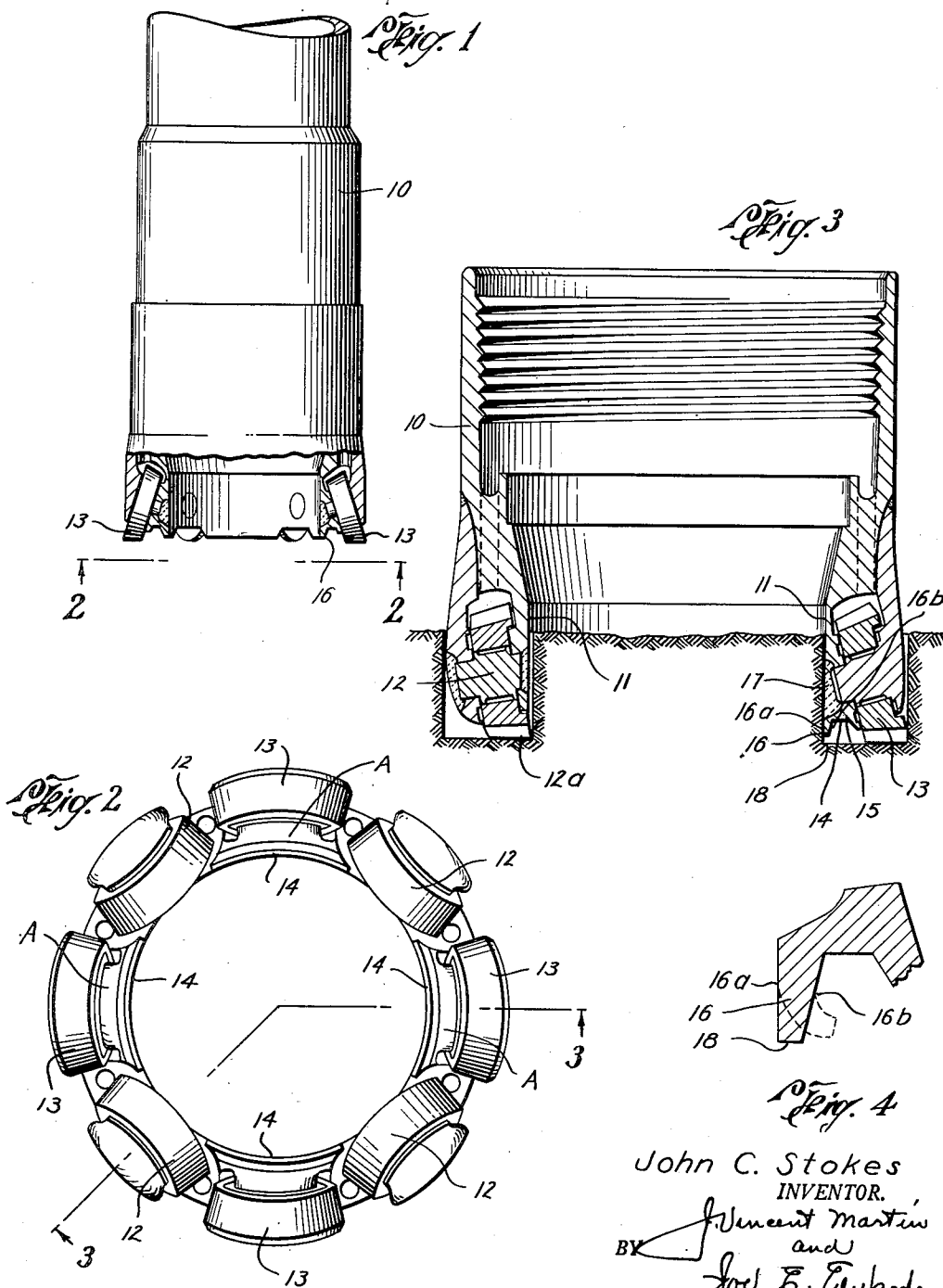
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CORE BIT

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CORE BIT

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This invention relates to new and useful improvements in core bits.

In core drilling with the usual type of roller cutter core bits, difficulty has been encountered in recovering cores in those stratas where sandy or broken formations exist. In these softer formations the material tends to be displaced outwardly through the spaces between the inner cutters of the bit rather than entering the axial bore of said bit which communicates with the core barrel.

It is one object of the present invention to provide an improved core bit which will efficiently drill cores in the softer formations and direct the cored material into the core barrel to assure maximum recovery of said core.

An important object is to provide a core bit having arcuate ridges or projections on its under-surface adjacent the axial bore of the bit and spanning the space between the inside cutters of the bit; the arcuate ridges or projections co-acting with each other to provide a substantially annular rib which generally follows the path traversed by the inner side of the inside cutters and which functions to prevent escape of cored material through the space between said inside cutters.

Another object is to provide a bit, of the character described, wherein the arcuate ridges or projections normally direct the cored material into the bore of the bit and into the core barrel and also wherein the shape and thickness of each projection is such that when drilling in abrasive formations the projections are readily worn away and when drilling in non-abrasive formations, said projections are rolled or displaced outwardly, whereby the projections do not interfere with the normal cutting action of the bit.

Other objects will hereinafter appear.

The construction designed to carry out the invention will be hereinafter described together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown, and wherein:

Figure 1 is a view, partly in section and partly in elevation of a core bit constructed in accordance with the invention,

Figure 2 is a bottom view of the bit,

Figure 3 is a transverse sectional view, taken on the line 3—3 of Figure 2, and

Figure 4 is an enlarged sectional detail of the arcuate rib.

In the drawings, the numeral 10 designates the

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body of a core bit which is constructed in the usual manner. The bit body is provided with an axial bore or opening 11 (Figure 3), and suitably mounted on the body are a plurality of inside roller cutters 12. The roller cutters are spaced at various radial points circumferentially about the bit body and the inner cutting edge indicated at 12a of each cutter extends a slight distance inwardly of the plane in which the bore 11 of the body is disposed. A plurality of outside cutters 13 are mounted on the bit body and are spaced alternately with respect to the cutters 12. By observing Figure 2, it will be evident that upon rotation of the bit body the inside cutters 12 will traverse a circumferential path adjacent the bore 11 of the bit body while the outside cutters will cut the outer wall of the bore. In the usual construction, the periphery of each roller projects downwardly the same distance below the bit body so that all of said rollers lie in substantially the same plane transversely of the bit body as they engage the formation in advance of said bit body.

The core bit above described and illustrated in the drawings is of usual construction and it has been found that in operation, as the inside cutters 12 cut a core, the cored material tends to be displaced outwardly through the spaces indicated at A between the inside cutters 12. It is evident that in core drilling it is desirable that the cored material pass upwardly through the bore 11 and into the usual core barrel (not shown). In softer strata where sandy or broken formations exist, the tendency for the displacement of material radially outwardly through the spaces A is increased and in order to assure passage of the cored material into the bore 11 of the bit the present improvement has been provided.

The present invention is clearly shown in Figures 2 and 3 and comprises a plurality of arcuate elements or projections 14 which are arranged to span the spaces A between the inside cutters 12. Each element 14 is in the form of an arcuate segment 15 which is provided with a downwardly extending arcuate rib 16, which is preferably disposed in the circumferential path traversed by the inside cutting edge 12a of the inside cutters. The projection has its outer portion abutting the outside cutter 13 while the inner arcuate surface 16a of its rib 16 is preferably aligned with the bore 11 of the bit body. Welding material 17 connects the element 14 with the body and it is desirable that the welding material fill up the space between the rib and the body as is indicated in Figure 3. The lower edge or bottom surface 18 of each rib does not extend beyond the plane

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in which the cutters engage the formation, and it is preferable that this edge lie in the transverse plane which is slightly above the plane in which the cutting edges of the cutters 12 and 13 are located. Each rib 16 has its inner surface 16a in substantial alignment with the bore 11 of the bit and in effect forms a continuation thereof. The outer surface 16b of the rib is inclined so that the rib is tapered or reduced in thickness toward its lower end. The angle of the inclination 16b is such that the rib is relatively thin at its lower end so that if the bit is cutting in a relatively hard non-abrasive formation the rib will be readily rolled back or bent outwardly, as indicated by dotted lines in Figure 4 to prevent its interfering with the drilling action of the cutters. Of course, if operation is being carried out in a hard abrasive formation the edge 13 of the rib wears off at the same rate as the cutters dull and thus a contact between the rib and formation is maintained at all times.

The arcuate ribs or projections 16 substantially span each space A between two of the inside cutters 12 and function in effect to extend the bore 11 of the bit body. When the bit is operated in a strata where sandy or broken formations exist the ribs or projections 16 confine the material being cored and effectively prevent the displacement or flow of such material outwardly through the areas or spaces A. This assures that the cored material is guided into the bore 11 of the bit and then into the core barrel (not shown).

In the event that the bit drills through the relatively soft formation and contacts a relatively hard non-abrasive formation, the ribs 16 will be flattened or rolled outwardly to allow maximum penetration of the teeth of the roller cutters. On the other hand, if soft or broken formation or hard abrasive formation is cored continuously the arcuate ribs will abrade or wear away at approximately the same rate that the teeth on the cutters dull, so that the edge 13 of each rib maintains a relatively tight contact with the bottom of the hole to retain the core and prevent displacement thereof through the areas A. It is pointed out that the arcuate ribs 16 coact with each other to form a substantially annular projection which is interrupted only by the inside cutters 12.

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The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

Having described the invention, I claim:

1. A core bit comprising a bit body having an axial bore, circumferentially spaced inside cutters on said body, circumferentially spaced outside cutters on said body, said inside cutters and said outside cutters being disposed alternately with respect to each other to form a circumferential cutting surface for cutting a longitudinal groove about a central core, said inside cutters cutting the inner portion of the groove and said outside cutters cutting the outer portion thereof, each of said outside cutters being mounted upon an upwardly inclined shaft, arcuate displacement elements mounted inside said outside cutters to substantially span the distance between said inside cutters, said displacement elements each including an elongate arcuate rib of tapered cross-section with the lower end thereof relatively thin, said arcuate rib being out of contact with said shaft and inwardly and downwardly spaced therefrom, whereby said lower end of said rib is permitted to be displaced or rolled outwardly when the bit is operating in a hard non-abrasive formation without exerting a bending force on said shaft.

2. The core bit as set forth in claim 1, wherein said rib has an inclined outer surface merging with a substantially transverse surface to form a corner of a groove, said corner being spaced below said shaft to assure that outward bending of said arcuate rib does not exert a bending force on said shaft.

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