



US005224540A

**United States Patent** [19]

Streich et al.

[11] Patent Number: **5,224,540**[45] Date of Patent: **Jul. 6, 1993****[54] DOWNHOLE TOOL APPARATUS WITH NON-METALLIC COMPONENTS AND METHODS OF DRILLING THEREOF****[75] Inventors:** Steven G. Streich; Donald F. Hushbeck; Kevin T. Berscheidt; Rick D. Jacobi, all of Duncan, Okla.**[73] Assignee:** Halliburton Company, Duncan, Okla.**[21] Appl. No.:** 883,619**[22] Filed:** May 12, 1992**Related U.S. Application Data****[63]** Continuation-in-part of Ser. No. 719,740, Jun. 21, 1991, which is a continuation-in-part of Ser. No. 515,019, Apr. 26, 1990, abandoned.**[51] Int. Cl.<sup>5</sup>** ..... **E21B 33/129****[52] U.S. Cl.** ..... **166/118; 166/123; 166/128; 166/134; 166/382****[58] Field of Search** ..... **166/387, 376, 118, 135, 166/138, 179, 192****[56] References Cited****U.S. PATENT DOCUMENTS**

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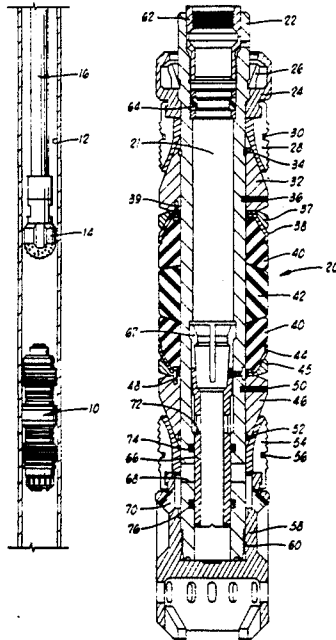
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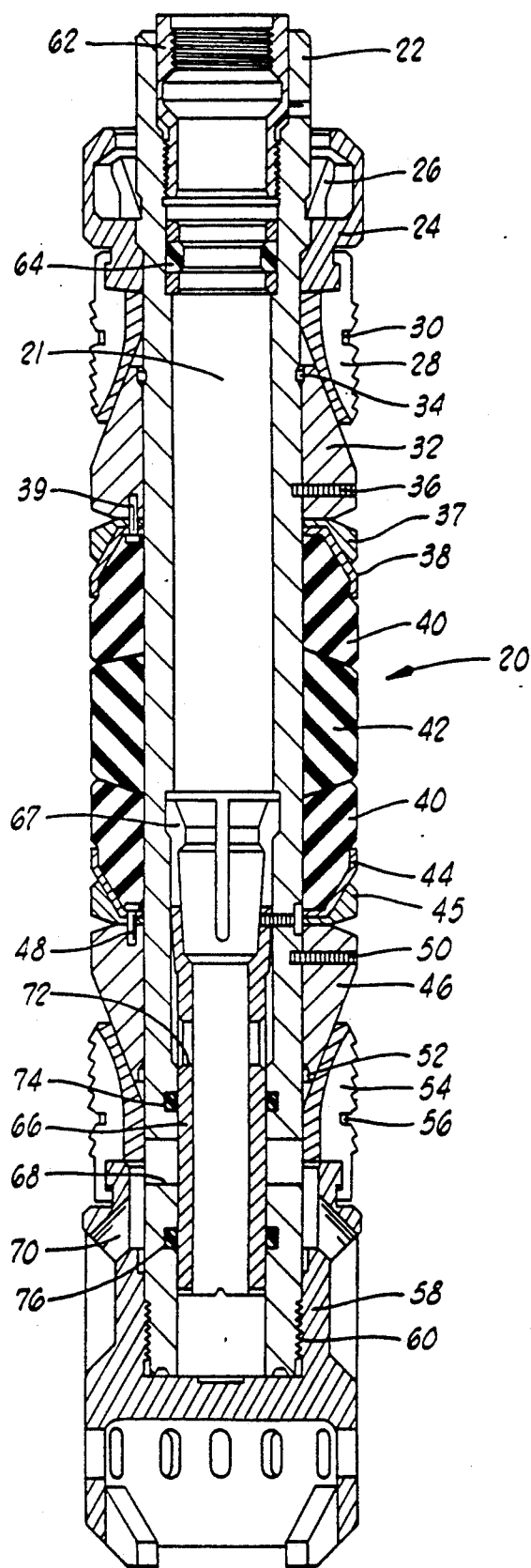
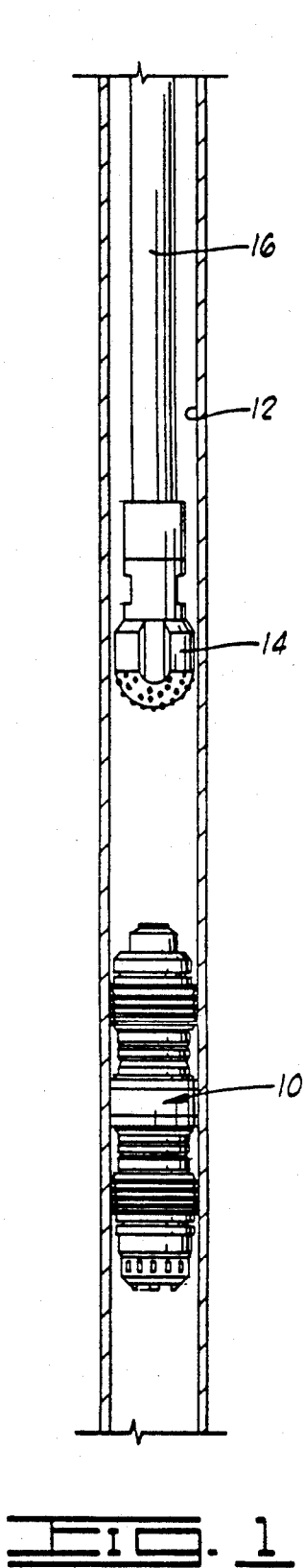
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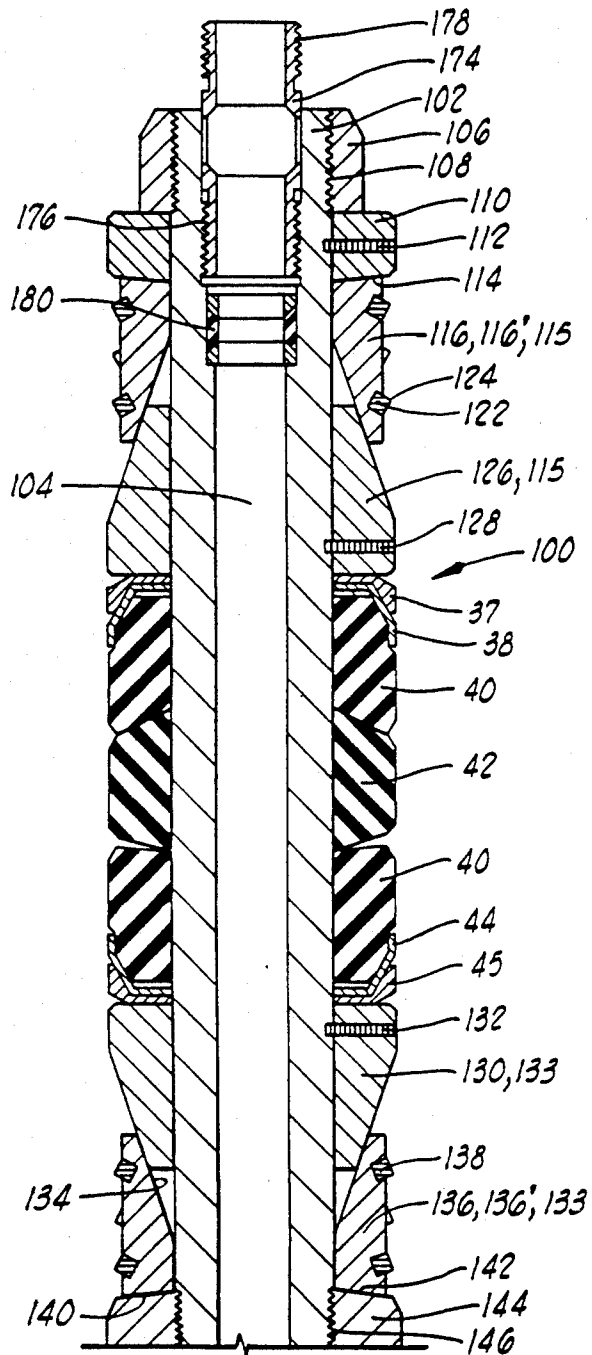
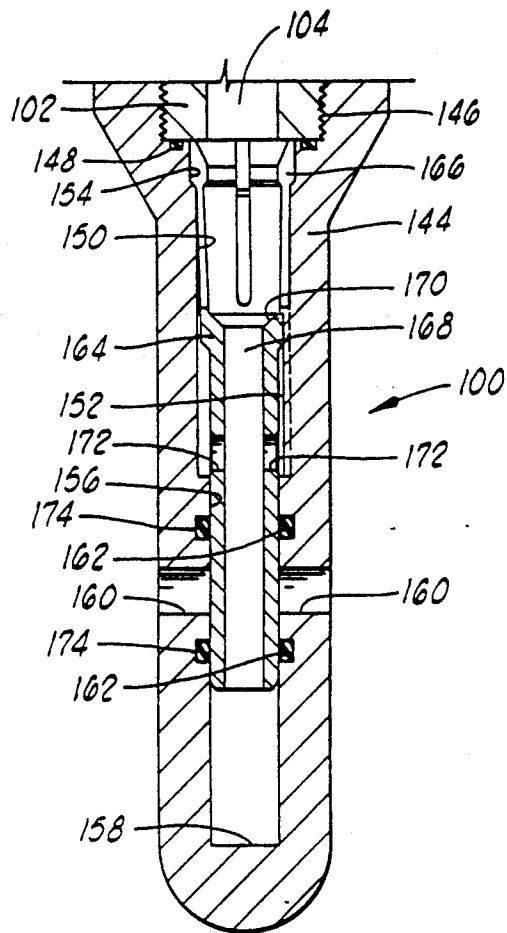
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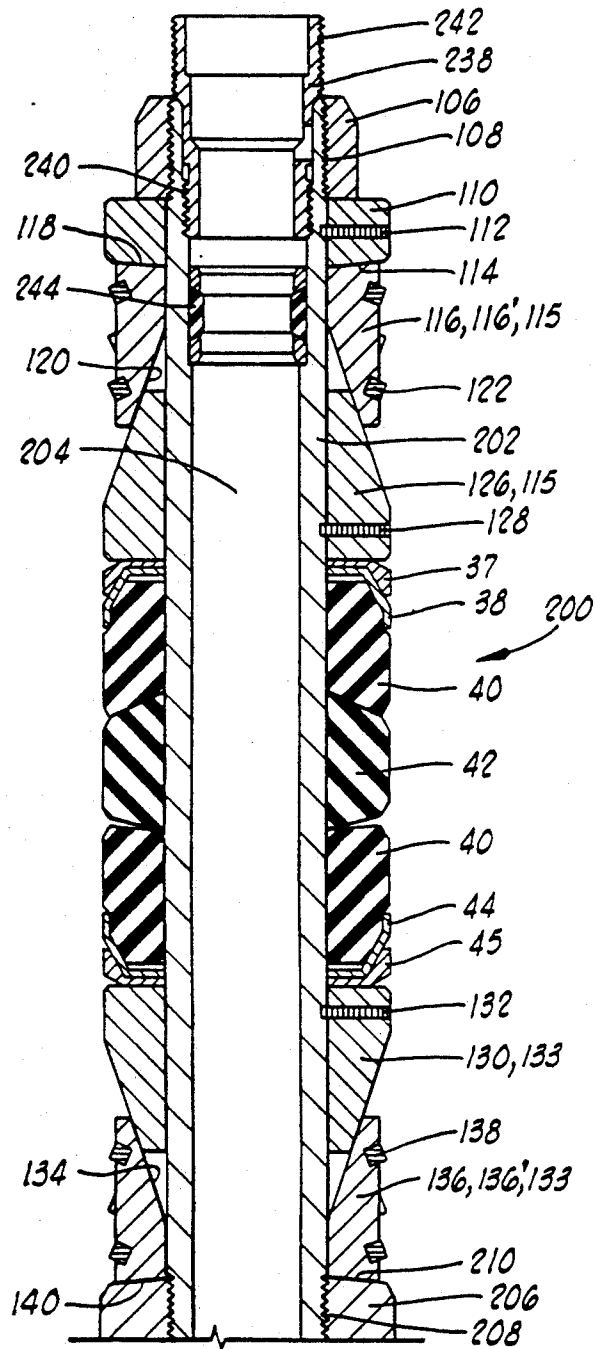
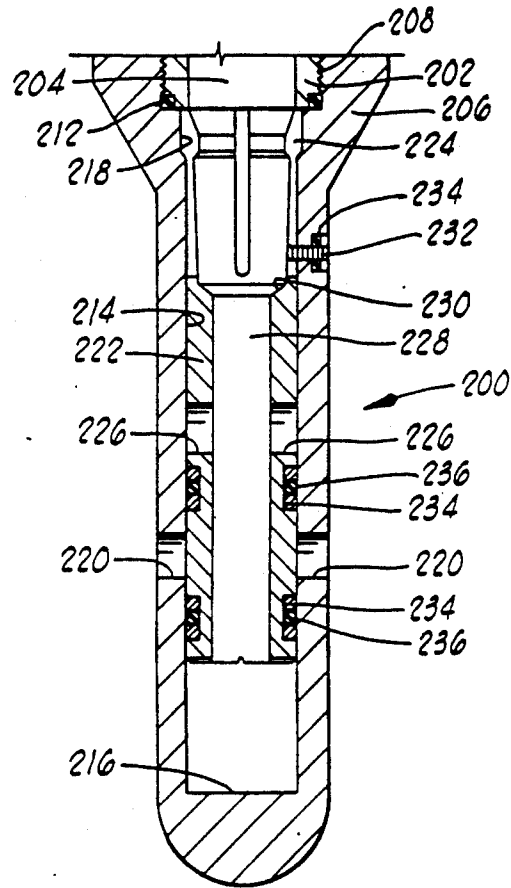
*Primary Examiner*—Stephen J. Novosad*Attorney, Agent, or Firm*—James R. Duzah; Neal R. Kennedy**[57] ABSTRACT**

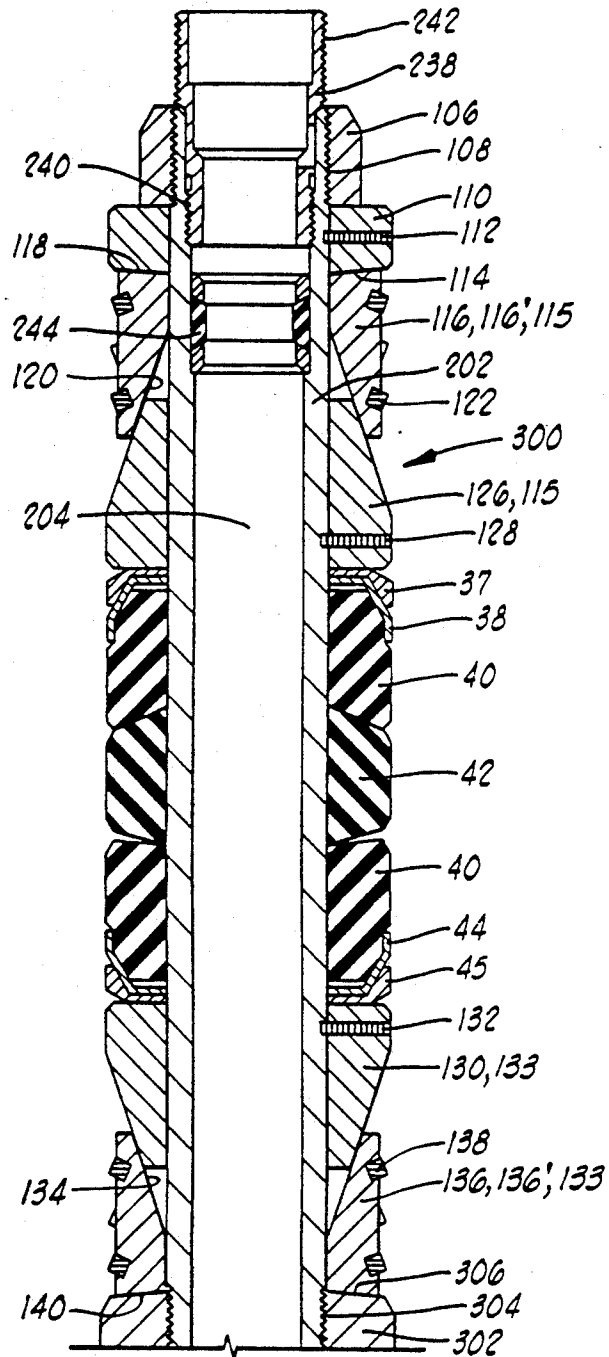
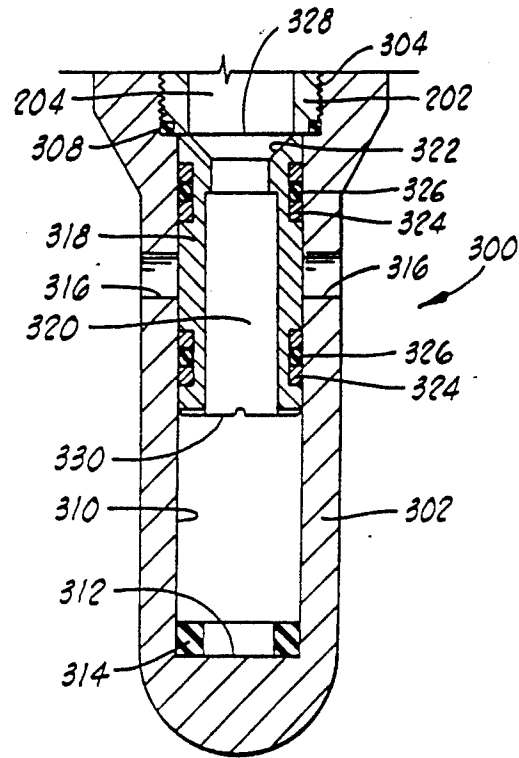
A downhole tool apparatus and methods of drilling the apparatus. The apparatus may include, but is not limited to, packers and bridge plugs utilizing non-metallic slip components. The non-metallic material may include engineering grade plastics. In one embodiment, the slips are separate and held in place in an initial position around the slip wedge by a retainer ring. In another embodiment, the slips are integrally formed with a ring portion which holds the slips in the initial position around the wedge; in this embodiment, the ring portion is made of a fractureable non-metallic material which fractures during a setting operation to separate the slips. Methods of drilling out the apparatus without significant variations in the drilling speed and weight applied to the drill bit may be employed. Alternative drill bit types, such as polycrystalline diamond compact (PDC) bits may also be used.

**41 Claims. 7 Drawing Sheets**



FIG. 3AFIG. 3B

FIG. 4AFIG. 4B

**FIG. 5A****FIG. 5B**

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