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United States Patent [19]
Farzin-Nia et al.

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[45] **Date of Patent:** ***Nov. 21, 2000**

[54] **SUPERELASTIC ENDODONTIC INSTRUMENT, METHOD OF MANUFACTURE, AND APPARATUS THEREFOR**

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[73] Assignee: **Kerr Corporation**, Orange, Calif.

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **09/014,139**

[22] Filed: **Jan. 27, 1998**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/938,507, Sep. 26, 1997, Pat. No. 5,984,679.

[51] Int. Cl.⁷ **B24B 1/00**

[52] U.S. Cl. **451/48; 451/540**

[58] Field of Search 451/28, 48, 102, 451/224, 165, 225, 540; 433/81, 102, 224, 20

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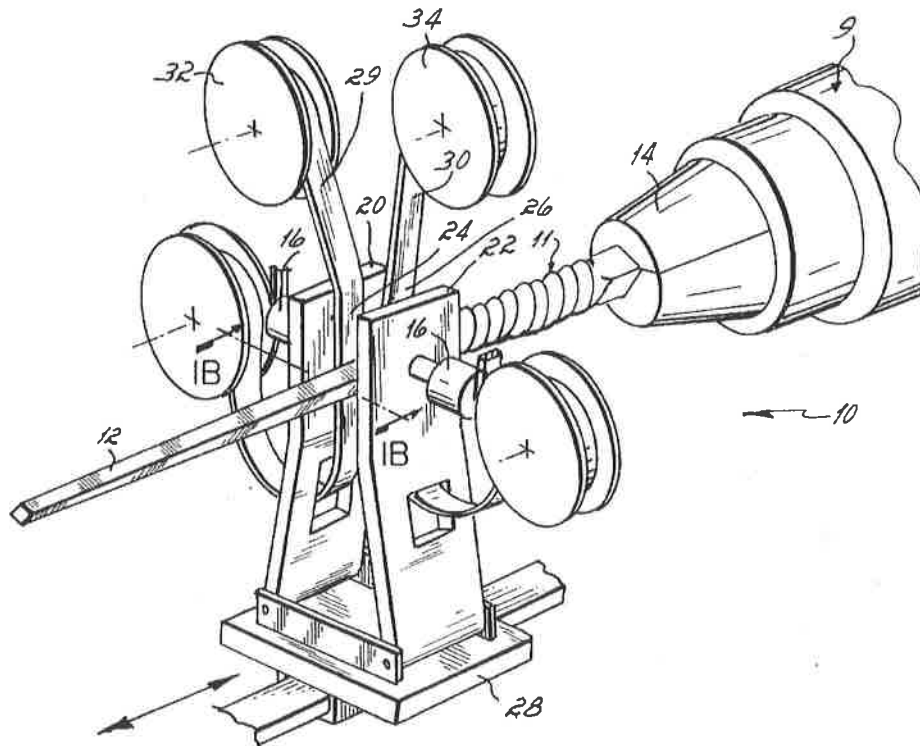
Primary Examiner—Derris H. Banks

Attorney, Agent, or Firm—Wood, Herron & Evans, L.L.P.

[57] **ABSTRACT**

A superelastic endodontic instrument, such as a file, is formed by grinding a superelastic wire to form a file preform or blank, and rotating a first end of the blank while preventing rotation of a second end of the blank. The file blank is maintained in the austenite phase at least until twisted to form a stress induced martensite which is plastically deformed by the twisting. A heat treatment step may be performed prior to twisting, during twisting or after twisting of the preform. The file blank may be heated by electrical heating methods or by submerging the blank in a heated liquid.

112 Claims, 4 Drawing Sheets



IPB2015 00000 5 1007

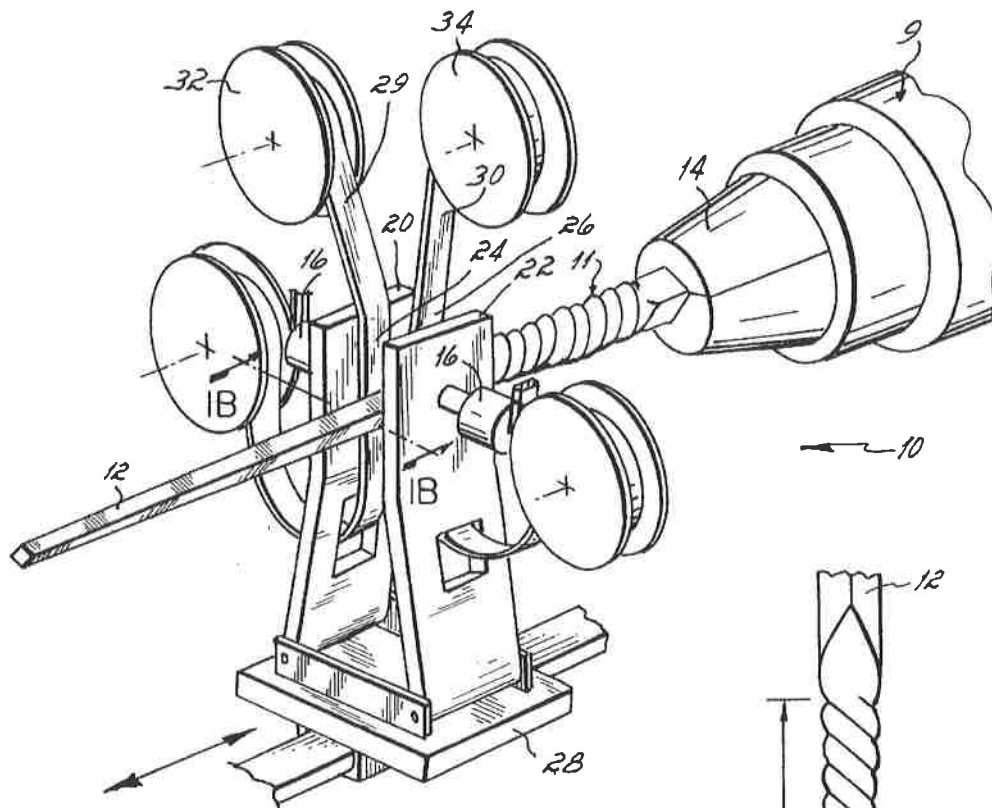


FIG. I

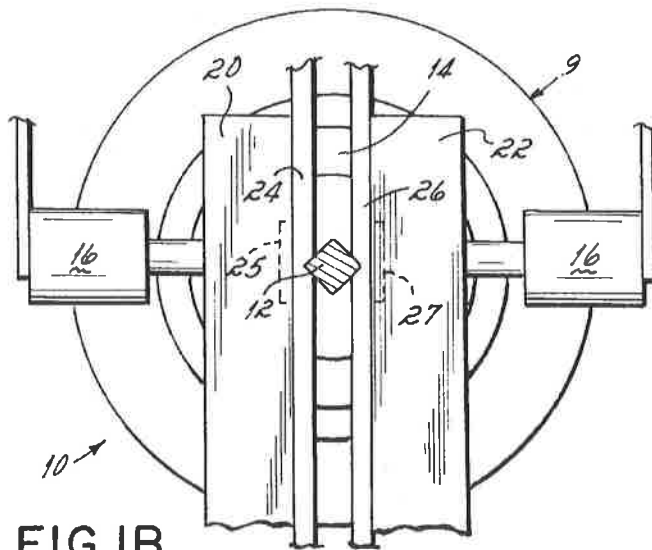


FIG. IB

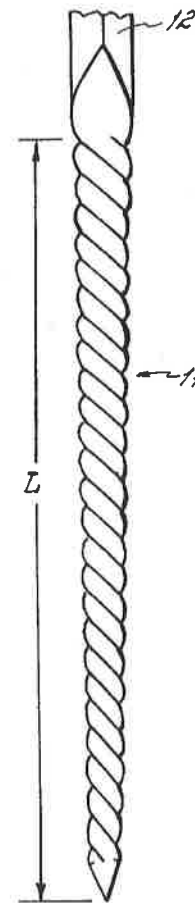


FIG. IA

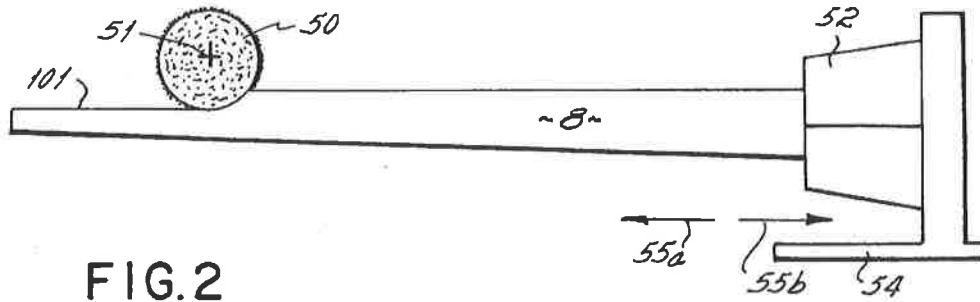


FIG. 2

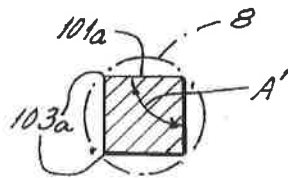


FIG. 2A

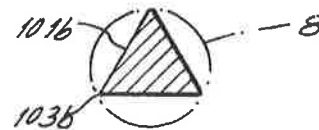


FIG. 2B

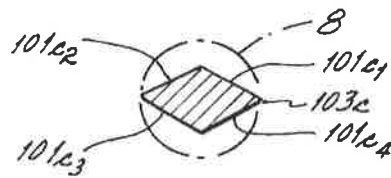


FIG. 2C

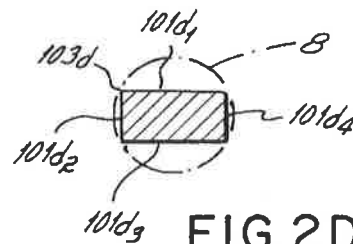


FIG. 2D

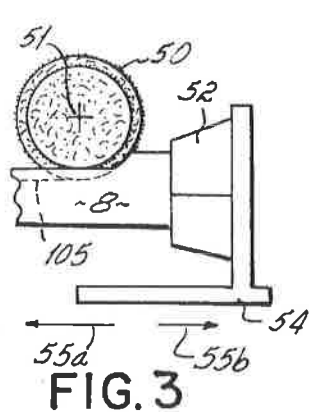


FIG. 3

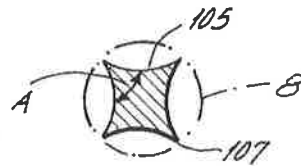


FIG. 3A



FIG. 3B

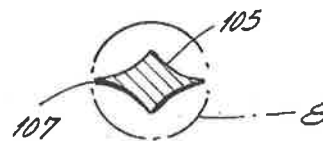


FIG. 3C

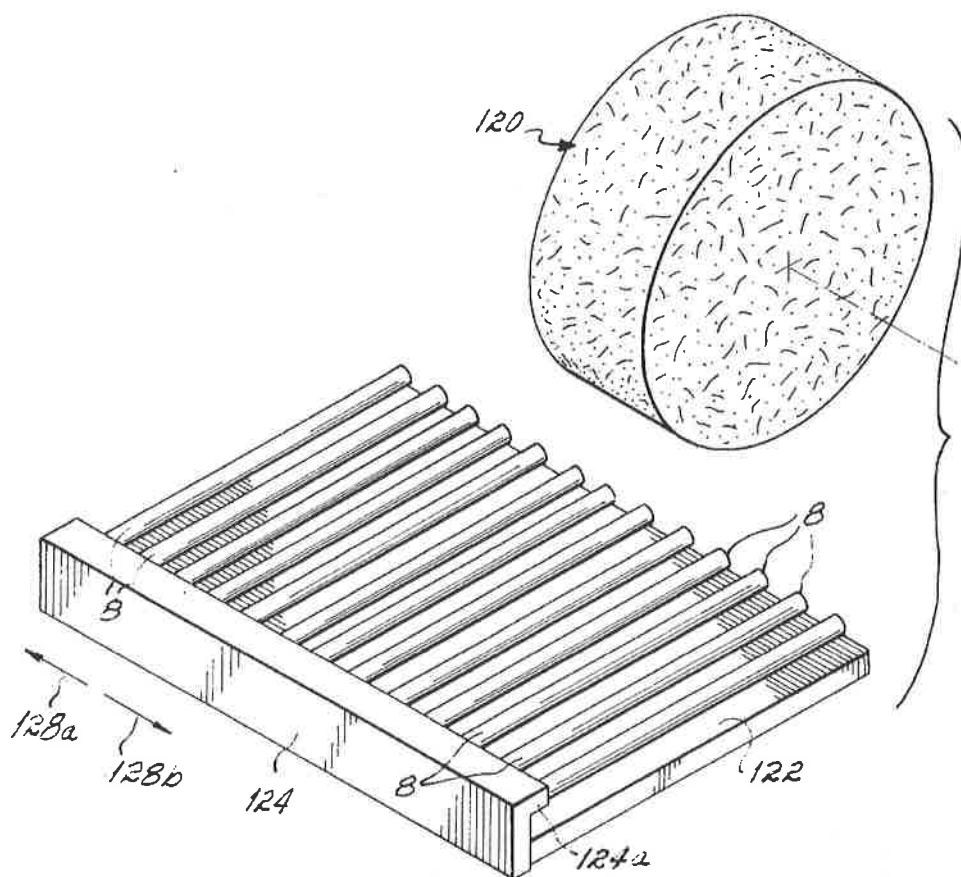


FIG. 5

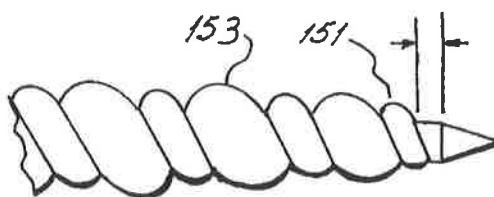


FIG. 4

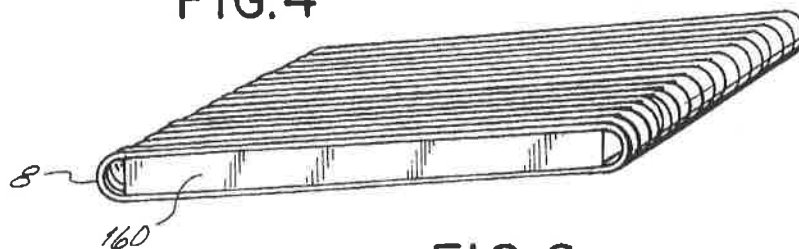


FIG. 6

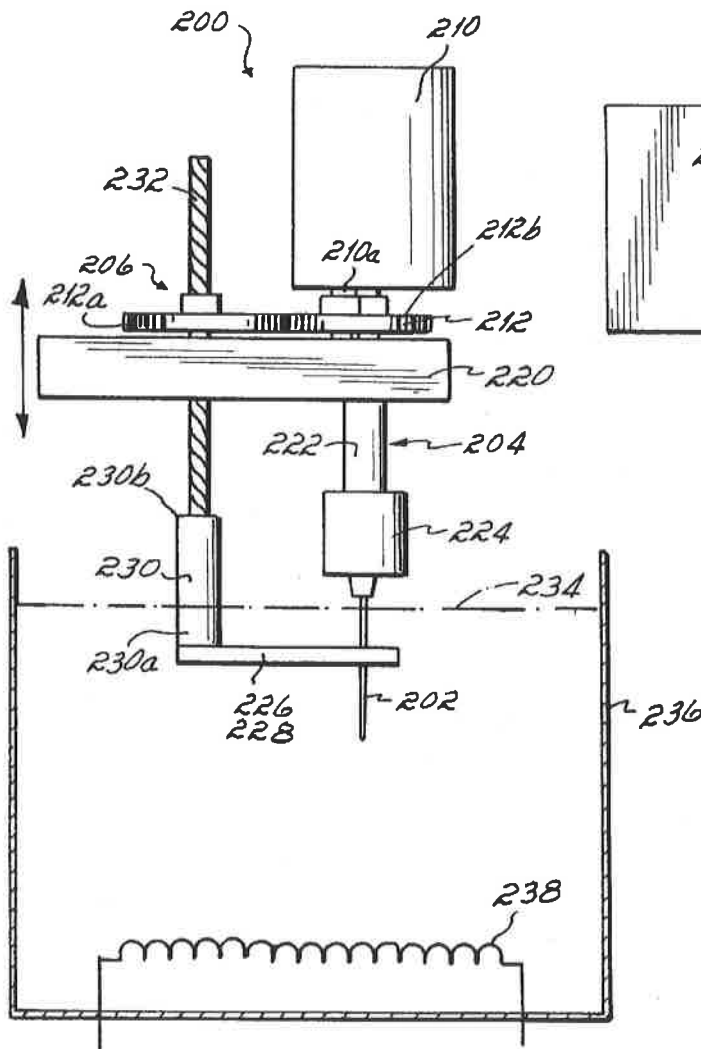


FIG. 7

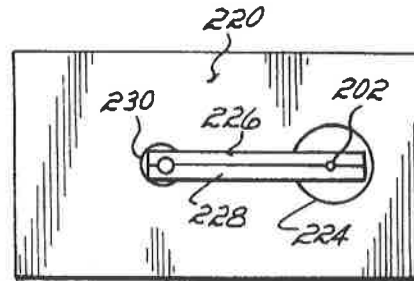


FIG. 8

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