



US 20060115786A1

(19) **United States**

(12) **Patent Application Publication**  
**Matsutani et al.**

(10) **Pub. No.: US 2006/0115786 A1**

(43) **Pub. Date: Jun. 1, 2006**

(54) **ROOT CANAL TREATMENT TOOL**

(30) **Foreign Application Priority Data**

Nov. 29, 2004 (JP) ..... 2004-344717(PAT.)

(76) Inventors: **Kanji Matsutani**, Tochigi-ken (JP);  
**Kaoru Ohgane**, Tochigi-ken (JP);  
**Toshiyuki Takase**, Tochigi-ken (JP)

**Publication Classification**

(51) **Int. Cl.**  
*A61C 5/02* (2006.01)

(52) **U.S. Cl.** ..... 433/102

Correspondence Address:  
**Law Office of Townsend & Banta**  
**c/o PortfolioIP**  
**P.O. Box 52050**  
**Minneapolis, MN 55402 (US)**

(57) **ABSTRACT**

A file A acting as a root canal treatment tool has a rod-shaped needle portion 1 that includes a working portion 4 of a predetermined length from a tip 3 and a shank 5 formed continuously to the working portion 4 and is composed of Ni—Ti alloy, wherein at a part of the working portion or the entire working portion is subjected to heat treatment paying attention to durability to rotation fatigue.

(21) Appl. No.: 11/287,771

(22) Filed: Nov. 28, 2005

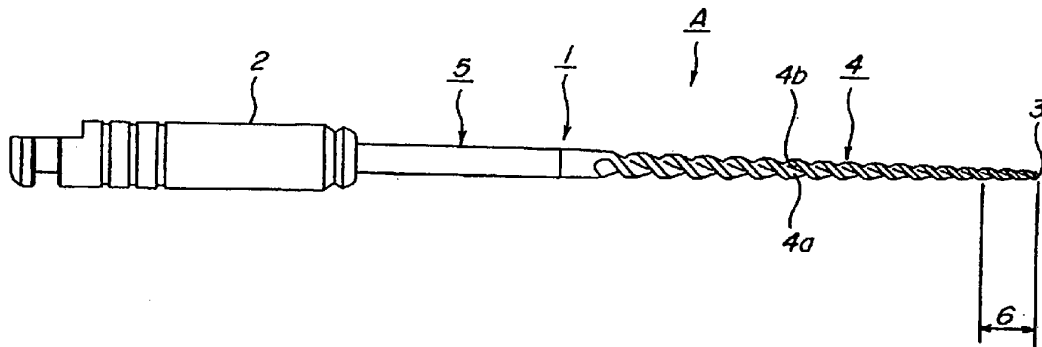


FIG. 1

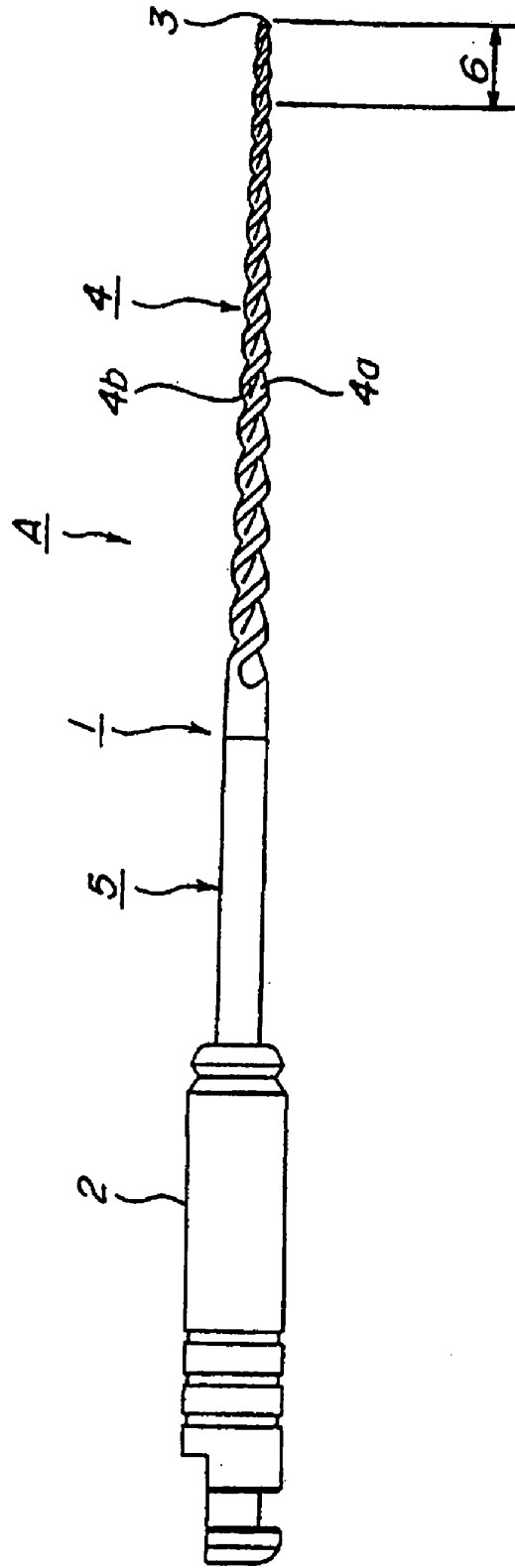
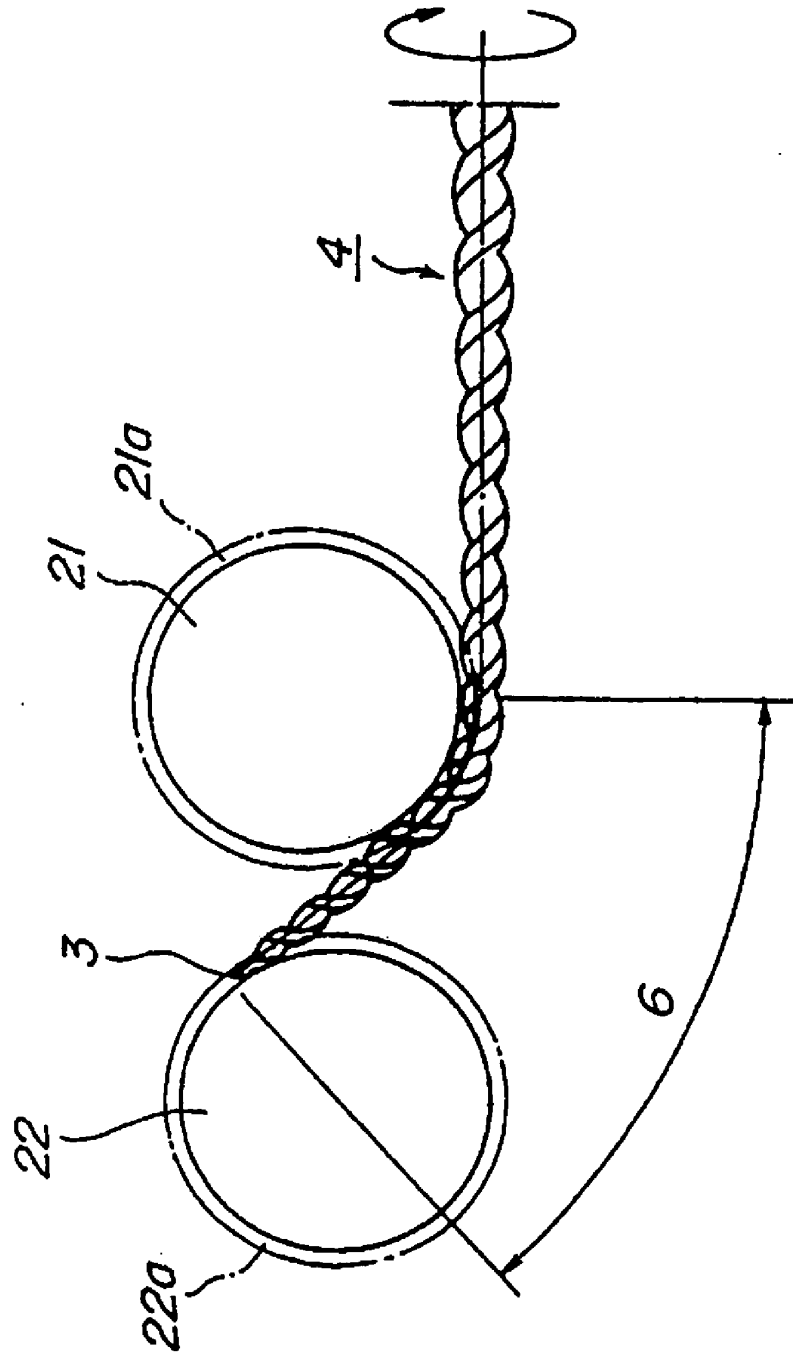
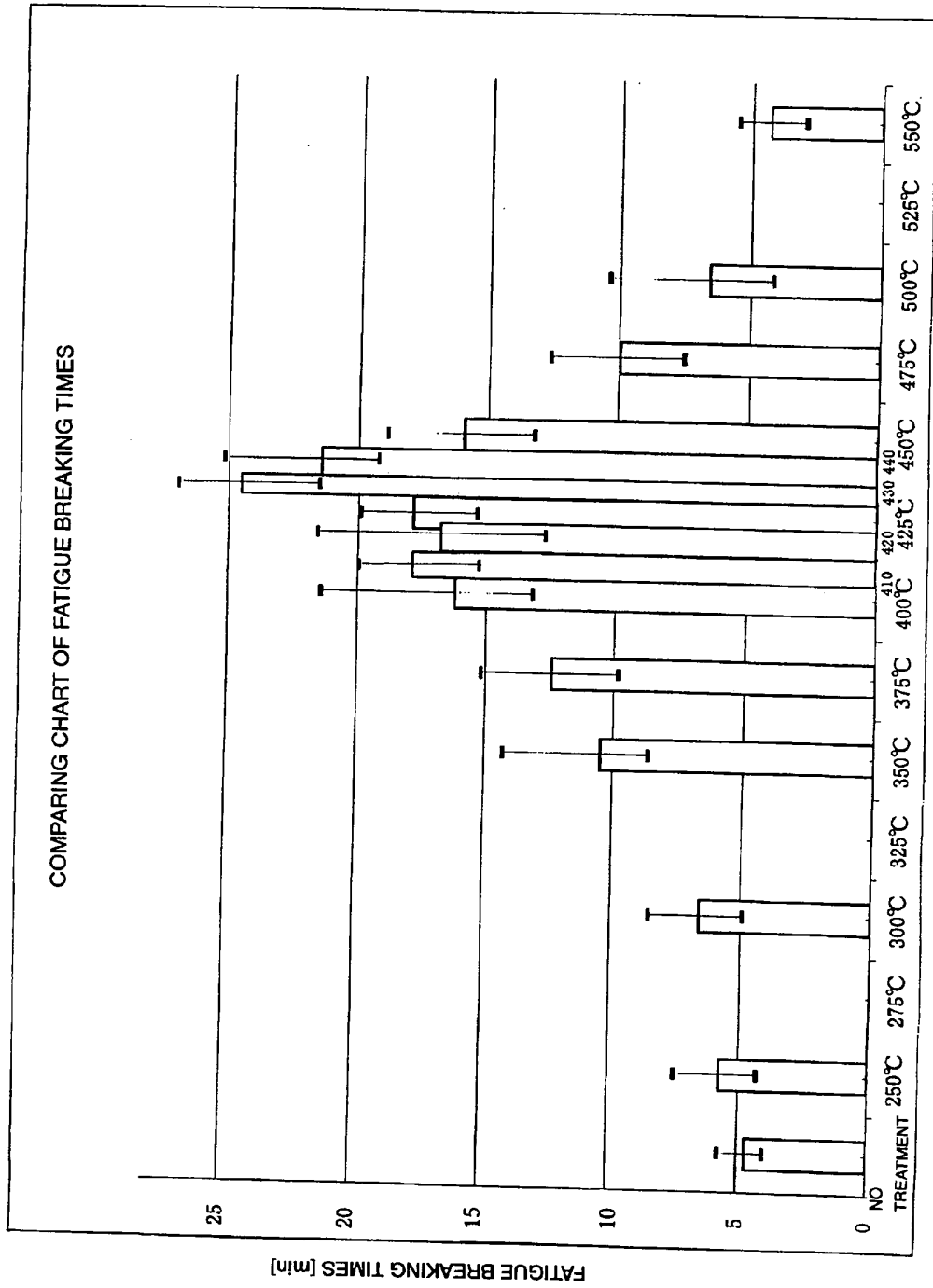


FIG 2



**FIG. 3**



**ROOT CANAL TREATMENT TOOL****BACKGROUND OF THE INVENTION**

[0001] 1. Field of the Invention

[0002] The present invention relates to a root canal treatment tool for dental use, and more particularly, to a root canal treatment tool having improved durability against fatigue caused by the rotation of the root canal treatment tool that performs a treatment purpose by being rotated, inserted and extracted in a lengthwise direction, and repeatedly rotated forward and rearward about  $\frac{1}{4}$ .

[0003] 2. Description of the Related Art

[0004] Tools for treating the root canal of a tooth while being rotated include a file and reamer that cut and form a root canal. These root canal treatment tools are composed of a member having a working portion provided with a cutting blade or piercing protrusion formed to a slender tapered rod so as to be appropriate for a treatment purpose or composed of a member having a working portion formed by molding a tapered rod in a spiral shape. Further, some kind of tool includes a handle or a grip which is integrated with an end of the member and gripped and manipulated by a dentist so that it is gripped by a chuck of a hand piece and the like or directly manipulated by the dentist.

[0005] The root canal is excessively thin and has a variety of shapes and sizes and is very different between persons. For this reason, many tools of different sizes are provided even for the same kind of root canal treatment tools. For example, in the case of cutting and forming a root canal by using a file, the file is required to be deformed along the shape of the root canal, that is, to have appropriate elasticity so that it should not hurt the surrounding of the root canal.

[0006] A technology disclosed in Japanese Patent No. 3375765 is proposed as a root canal treatment tool having extremely high elasticity and shape restoration property as described above. This technology relates to a root canal treatment tool having a working portion formed and manufactured by applying a removing process to a rod-shaped raw material that is subjected to shape memory heat treatment and has a superelastic characteristic while holding it under a memory treatment temperature.

[0007] In the above root canal treatment tool, the rod having the working portion formed thereon is flexibly deformed in response to an external force applied thereto and is quickly restored to an original shape with the removal of the external force. For this reason, this tool can extremely follow up the shape of the root canal with an extremely high follow-up property and form the root canal with high accuracy.

[0008] In the root canal treatment tool relating to Japanese Patent No. 3375765, the working portion has a uniform superelastic characteristic along the whole length. Accordingly, when the working portion is bent, a tip of a free end also has an action of returning to an original shape, thereby stress is generated when the tip is inserted into and bent in the root canal for the treatment of the root canal. In particular, when the root canal is to be formed, the tool is rotated in a state that a tip portion of the working portion is mainly bent, from which a problem arises in that there is a high

possibility that the slender tip portion is damaged because stress acts on the working portion repeatedly.

**SUMMARY OF THE INVENTION**

[0009] Accordingly, an object of the present invention is to provide a root canal treatment tool which has a less possibility of being damaged even if it is bent repeatedly by being rotated to form a root canal, that is, which has high durability.

[0010] To solve the above problem, there is provided a rod-shaped root canal treatment tool composed of Ni—Ti alloy and having a working portion of a predetermined length from a tip as well as a shank formed continuously to the working portion, wherein at least a part of the working portion or the entire working portion is subjected to heat treatment at predetermined treating temperature and treating time decided by paying attention to durability against rotation fatigue.

[0011] Since the root canal treatment tool of the present invention is subjected to the heat treatment paying attention to the rotation fatigue at least in a part of the working portion or in the entire working portion, the treatment tool can exhibit high durability against repeated bending caused when it is rotated to treat a root canal.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0012] **FIG. 1** is a view showing a file as an example representative of a root canal treatment tool;

[0013] **FIG. 2** is a schematic view explaining an arrangement of the file when a fatigue breakage test of a tip portion of the file is performed; and

[0014] **FIG. 3** is a graph showing a result of test of a fatigue breakage time when the same material is subjected to heat treatment at different temperatures.

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

[0015] A root canal treatment tool according to the present invention is a tool for treating a root canal by being rotated and includes all the tools formed of a rod-shaped material composed of nickel-titanium (Ni—Ti) alloy. In this root canal treatment tool, a working portion having a shape capable of performing a treatment purpose most reasonably is formed at one end portion and a manipulating portion manipulated by a dentist is formed at the other end portion. When the dentist directly manipulates the tool, this manipulating portion is formed of a handle and when a tool such as a hand piece is used, the manipulating portion is provided with a grip formed in a shape suitable for the structure of a handle of the tool.

[0016] In particular, heat treatment is performed paying attention to the durability of a part of the working portion or the entire working portion to thereby eliminate a possibility of breakage of the tool by improving the durability of the portion thereof repeatedly bent when a root canal is treated by the tool.

**Embodiment 1**

[0017] A preferable embodiment of a root canal treatment tool according to the present invention will be explained

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