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<p>(21) International Application Number: PCT/DK98/00470</p> <p>(22) International Filing Date: 29 October 1998 (29.10.98)</p> <p>(30) Priority Data: 08/962,172 31 October 1997 (31.10.97) US</p> <p>(71)(72) Applicant and Inventor: KERT, Jimmie [DK/DK]; Nørrevænget 76, DK-3500 Værløse (DK).</p> <p>(74) Agent: BUDDE, SCHOU & CO. A/S; Vestergade 31, DK-1456 København K (DK).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>
<p>(54) Title: ENDODONTIC DEVICE AND METHOD FOR APPLYING FILLER MATERIAL TO ROOT CANALS</p>		
<p>(57) Abstract</p> <p>A dental device (10) and method are provided for applying gutta percha to a root canal of a tooth. The device includes an elongate filler member (14) made of a bio-compatible material capable of being cut so that the length of the filler member (14) can be reduced to a desired length by a user of the device, in accordance with the length of the root canal, prior to insertion of the device into the root canal. A head portion of the filler member is of uniform thickness throughout the length thereof, and a distal end (14b) portion is uniformly tapered along the length thereof in a direction away from the head portion such that the filler member (14) is without any discrete area of weakness throughout the length thereof. An outer sheath (16) of thermoplastic gutta percha surrounding a portion of the distal end of the filler member. An indicator at the proximal end of the filler member assists the user in determining the portion thereof to be cut off to achieve the desired length.</p> <div data-bbox="1209 1249 1422 1865" data-label="Image"> </div>		

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ENDODONTIC DEVICE AND METHOD FOR APPLYING FILLER MATERIAL TO
ROOT CANALS

FIELD OF THE INVENTION

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The present invention relates to dental devices or tools used in filling an endodontically prepared root canal or the like, and to methods for applying the filler material.

BACKGROUND OF THE INVENTION

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In U.S. Patent Nos. 4,758,156 to Johnson, 4,894,011 to Johnson, and 5,118,297 to Johnson, there are described devices or tools for applying filler material, such as gutta percha or the like, to an endodontically prepared root canal of a tooth of a patient. The devices disclosed in these patents generally comprise a filler member or
15 body, also referred to as obturator, in the form of an elongated shaft having a proximal handle portion. The proximal and distal portions of the obturator are severed or broken apart after the obturator is placed into the root canal so as to leave the distal portion in the canal.

20

In the first two patents mentioned above, the severing or breaking of the body portion of the obturator is made manually at a preformed, weakened point in the body. This approach is not practical because of the very high risk of prematurely breaking the obturator at the weakened point when inserting the obturator into a curved root canal. Further, because the weakened point is predetermined, the dentist has no
25 discretion in choosing the length of the remaining distal portion of the obturator.

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In the third patent mentioned above, U.S. Patent No. 5,118,297, severing of the body must be carried out by use of either a heating instrument or a burr, and this also has drawbacks given the limited space in the root canal and pulpal chamber in which the dentist has to work.

A further device of this type is disclosed in U.S. Patent No. 5,588,835 to Kert. This device includes a central filler body which surrounds an insertion rod, and the latter

is withdrawn after insertion, leaving the filler body in the canal. However, the filler body in the canal still must be trimmed after withdrawal of the central insertion rod.

SUMMARY OF THE INVENTION

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In accordance with the present invention, a device or tool is provided which overcomes the problems of prior art devices discussed hereinbefore. The device has a core filler member which is surrounded by thermoplastic gutta percha and which is of a length that can be adjusted prior to insertion so that it is no longer necessary to sever or cut a filler body after the insertion thereof into a root canal. Preferably, the
10 filler member has an elongated body which is of sufficient length to accommodate the majority of root canals and which is tapered to fit the majority of endodontically prepared root canals.

15 According to one aspect of the invention, a dental device is provided for applying gutta percha to a root canal of a tooth, the device comprising an elongate filler member made of a biocompatible material capable of being cut so that the length of said filler member can be reduced to a desired length by a user of the device in accordance with the length of the root canal prior to insertion of the device into the
20 root canal, the filler member having a proximal head portion and a distal end portion, the head portion being of uniform thickness throughout the length thereof, and the distal end portion being uniformly tapered along the length thereof in a direction away from the head portion such that the filler member is without any discrete area of weakness throughout the length thereof, and an outer sheath of thermoplastic
25 gutta percha surrounding at least a portion of the distal end of the filler member.

Preferably, the filler member includes indicator means at the proximal end thereof for assisting a user in determining the portion thereof to be cut off to achieve said desired length. Advantageously, the indicator means comprises a plurality of longi-
30 tudinally spaced, circular grooves in the proximal end of the filler member.

In one embodiment, the proximal end is solid, and a handle device is preferably affixed to that proximal end, the handle device including a tubular shank portion in which the proximal end is received.

- 5 In another embodiment, the proximal end includes a longitudinal bore therein, and a handle device is preferably affixed to that proximal end, the handle device including a shank portion received in the bore in the proximal end.

10 In accordance with a further aspect of the invention, a method of filling an endodontically prepared root canal is provided, the method comprising comparing an endodontically prepared root canal with an elongate, tapered filler member adapted for insertion into the root canal so as to determine a desired length for said filler member, said filler member being made of biocompatible material capable of being cut, having a proximal end and a distal end and being surrounded over a portion of the
15 distal end thereof by a sheath of gutta percha, cutting off a portion of the proximal end of the filler member so that the filler member is of said desired length, softening the gutta percha, and inserting the cut filler member into the root canal.

20 In one embodiment, the filler member includes a longitudinal bore therein, and the inserting of the filler member comprises engaging the bore of the filler member with an instrument having a portion which is received in said bore and using the instrument to insert the filler member into the root canal. As noted above, the instrument preferably comprises a handle device including a handle and a solid shank, extending outwardly from the handle, of a size permitting receipt thereof in the bore.

25

In another embodiment, the filler member is of a solid construction, and inserting of the filler member comprises using an instrument to engage an outside surface portion of the proximal end of the filler member and employing the instrument to insert the filler member into the root canal. As above, in this embodiment, the instrument
30 preferably comprises a handle device including a handle and a tubular shank extending outwardly from the handle.

Other features and advantages of the invention will be set forth in, or apparent from, the detailed description of preferred embodiments thereof found below.

BRIEF DESCRIPTION OF THE DRAWINGS

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Fig. 1 is a front elevational view of a first embodiment of the device or tool of the present invention, shown in combination with an advantageous handle device;

Fig. 2 is a front elevational view of an alternative embodiment of that shown in Fig. 1;

10 Fig. 3 is a cross-sectional view of the handle device also shown in Fig. 1 and suitable for use with the embodiments of Figs. 1 and 2;

Fig. 4 is a front elevational view of a further embodiment of the invention;

Fig. 5 is a front elevational view of an alternative embodiment of that shown in Fig. 4; and

15 Fig. 6 is a cross-sectional view of a further embodiment of a handle device, suitable for use with the embodiments of Figs. 4 and 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Referring to Fig. 1, there is shown a first embodiment of the tool or device of the invention, which is generally denoted as 10, in combination with a special handle 12, shown in more detail in Fig. 3. Although handle 12 provides advantages, it is to be understood that tool 10 can be inserted in ways other than by using handle 12, i.e., another instrument such as a pair of tweezers can be used for this purpose. In
25 the embodiment of Fig. 1, device 10 comprises a tapered, elongate filler member 14 of solid construction made of a biocompatible material such as a thermoplastic polymer or a mixture of polymers. Filler member 14 includes a generally cylindrical proximal end 14a and a tapered distal end 14b, and the length thereof is sufficient to accommodate the majority of root canals. Further, the tapering of distal end 14b
30 is such as to be accommodated in, i.e., to fit into, the majority of endodontically prepared root canals.

A tapered or conically shaped thermoplastic gutta percha sheath or sleeve 16 surrounds the tapered distal portion 14b of member 14.

5 As shown in Fig. 3, handle device 12 includes a handle portion 12a for gripping by a user and a hollow or tubular shank 12b extending outwardly therefrom which, as shown in Fig. 1, fits around the proximal end 14a of a filler member 14.

Referring to Fig. 2, a further embodiment is shown which is similar to that of Fig. 1 and differs from that of Fig. 1 in the provision therein of a plurality of longitudinally spaced grooves or impressions 18, which form a scale or indicator means. More particularly, grooves 18 provide a user with an indication of the length of the filler member 14 at various points therealong and thus assist the user in cutting off the filler member 14 at a point which produces a filler member of the desired length, based on the length of the root canal to be filled.

15 Referring to Fig. 4, a further embodiment of the invention is shown. This embodiment is similar to that of Fig. 1 but differs therefrom because of the provision of an axial or longitudinal bore 20 in the proximal end 14a of filler member 14. The embodiment of Fig. 5 is similar to that of Fig. 4 but includes grooves 18 corresponding to those of Fig. 2. The bore 20 of the embodiments of Figs. 4 and 5 is used to permit gripping of filler member 14 by, advantageously, an instrument such as the handle device 22 shown in Fig. 6, although different instruments, such as a file or other pointed device, can also be used.

25 As shown in Fig. 6, the handle device 22 includes a handle portion 22a and a solid shank 22b which extends outwardly therefrom and is adapted to be inserted into bore 20.

In the method of the invention, a determination is first made by the dentist, or other user of the desired or preferred length of member 14 based on the length of the root canal being worked on. Once this determination is made, the total length of member 14 is adjusted, i.e., reduced, by cutting off the part of the proximal end 14a necessary to produce this result. In the embodiments of Figs. 2 and 4, the scale formed

30

by annular grooves 18 can be used to facilitate this procedure. With the filler member 14 cut to length and after softening the gutta percha 16, the filler member 14 is inserted into the root canal.

- 5 For the embodiments of Figs. 4 and 5, wherein the proximal end 14a is hollow, i.e., includes bore 20, the dentist can use a file or a part of such a file, in inserting the device 10 into the root canal. Alternatively, and advantageously, the handle device 22 of Fig. 6 can be used for this purpose. As noted above, handle device 22 includes solid shank 22b which fits into bore 20.

10

Although the invention has been described in relation to exemplary preferred embodiments thereof, it will be understood by those skilled in the art that variations and modifications can be effected in these exemplary embodiments without departing from the scope and spirit of the invention.

CLAIMS

1. A dental device for applying gutta percha to a root canal of a tooth, said device comprising
- 5 an elongate filler member (14) made of a biocompatible material capable of being cut so that the length of said filler member can be reduced to a desired length by a user of the device (10) in accordance with the length of the root canal prior to insertion of the device into the root canal, said filler member having a proximal head portion (14a) and a distal end portion (14b), said head portion being of uniform thickness throughout the length thereof, and said distal end portion being uniformly tapered along the length thereof in a direction away from said head portion such that
- 10 said filler member (14) is without any discrete area of weakness throughout the length thereof, and
- an outer sheath of thermoplastic gutta percha surrounding at least a portion of the
- 15 distal end (14b) of said filler member.
2. A device as claimed in claim 1, wherein said filler member (14) includes indicator means at the proximal end (14a) thereof for assisting a user in determining the portion thereof to be cut off to achieve said desired length.
- 20
3. A device as claimed in claim 2, wherein said indicator means comprises a plurality of longitudinally spaced, circular grooves in the proximal end (14a) of said filler member (14).
- 25
4. A device as claimed in claim 1, wherein said proximal end (14a) is solid.
5. A device as claimed in claim 4, further comprising a handle (12) affixed to said proximal end (14a), said handle (12) including a tubular shank (12b) portion in which said proximal end (14a) is received.
- 30
6. A device as claimed in claim 1, wherein said proximal end (14a) includes a longitudinal bore (20) therein.

7. A device as claimed in claim 6, further comprising a handle (12) affixed to said proximal end (14a), said handle (12) including a shank (22b) portion received in said bore (20) in said proximal end.

5 8. A device for applying gutta percha to an endodontically prepared root canal of a tooth, said device comprising
an elongate, tapered filler member (14) made of a biocompatible material capable of
being cut so that the length of said filler member (14) can be reduced to a desired
length by a user of the device in accordance with the length of the root canal prior to
10 insertion of the device into the root canal, said filler member (14) tapering between
a proximal head portion and a distal end (14b) and including length indicator means
along a portion of the proximal end (14a) thereof for assisting a user in determining
the portion of the length of said filler member (14) to be cut off to achieve said de-
sired length, and
15 an outer sheath of gutta percha surrounding at least a portion of the distal end of
said filler member.

9. A device as claimed in claim 8, wherein said indicator means comprises a plural-
ity of longitudinally spaced, circular grooves (18) in the proximal end (14a) of said
20 filler member (14).

10. A device as claimed in claim 8, wherein said proximal end is solid.

11. A device as claimed in claim 10, further comprising a handle (12) affixed to said
25 proximal end (14a), said handle including a tubular shank (12b) portion in which
said proximal end is received.

12. A device as claimed in claim 8, wherein said proximal end includes a longitudi-
nal bore therein.

30

13. A device as claimed in claim 6, further comprising a handle (12) affixed to said
proximal end (14a) of the filler member, said handle including a shank portion re-
ceived in said bore in said proximal end.

14. A method of filling an endodontically prepared root canal, said method comprising
comparing an endodontically prepared root canal with an elongate, tapered filler
member adapted for insertion into the root canal so as to determine a desired length
5 for said filler member, said filler member being made of biocompatible material capable
of being cut and having a proximal end and a distal end and being surrounded
over a portion of the distal end thereof by a sheath of gutta percha,
cutting off a portion of the proximal end of said filler member so that said filler mem-
ber is of said desired length,
10 softening the gutta percha, and
inserting the cut filler member into the root canal.

15. A method as claimed in claim 14, wherein said filler member includes a longitudinal
bore therein and inserting of said filler member comprises engaging the bore
15 of the filler member with an instrument having a portion which is received in said
bore and using the instrument to insert the filler member into the root canal.

16. A method as claimed in claim 14, wherein said instrument comprises a handle
device including a handle and a solid shank affixed to the handle and of a size
20 permitting receipt thereof in said bore.

17. A method as claimed in claim 14, wherein said filler member is of a solid con-
struction and said inserting of said filler member comprises using an instrument to
engage an outside surface portion of the proximal end of the filler member and em-
25 ploying the instrument to insert the filler member into the root canal.

18. A method as claimed in claim 17, wherein said instrument comprises a handle
device including a handle and a tubular shank extending outwardly from said han-
dle.

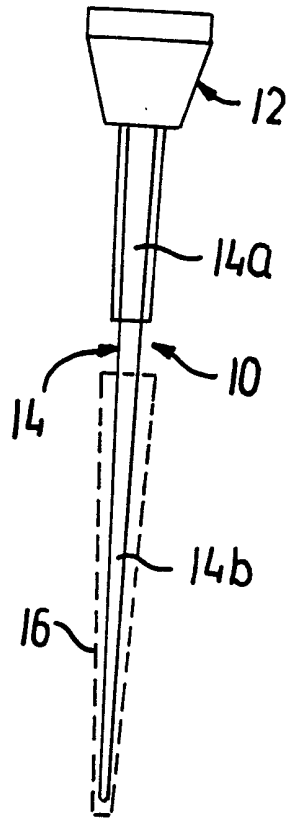


FIG. 1

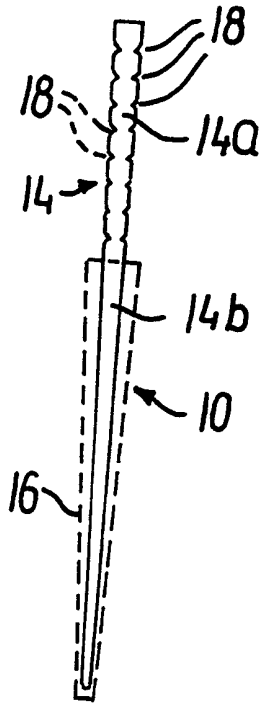


FIG. 2

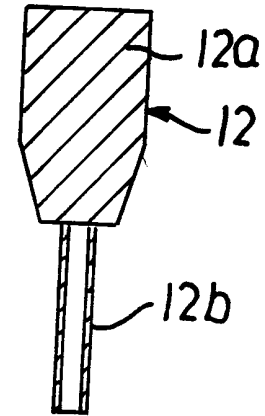


FIG. 3

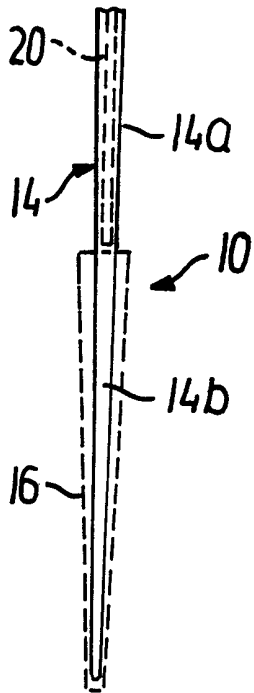


FIG. 4

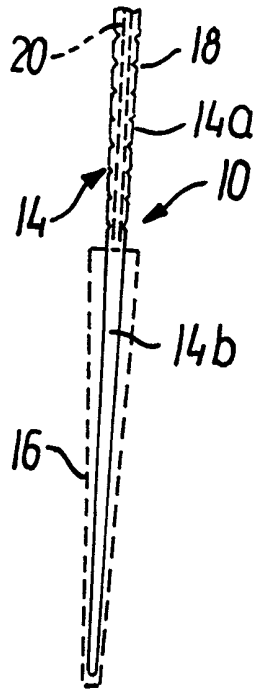


FIG. 5

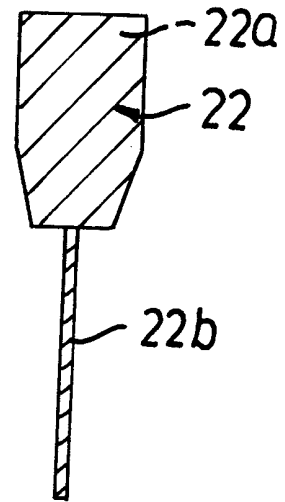


FIG. 6

INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK 98/00470

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61C5/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 118 297 A (JOHNSON WILLIAM B) 2 June 1992 cited in the application see column 2, line 8-12 see column 3, line 29-32 see column 4, line 6-24 see figures	1,2,4,8, 10
A	---	3,5-7,9, 11-13
X	WO 93 14714 A (MCSPADDEN JOHN T) 5 August 1993 see page 12, line 23-37 see page 17, line 17-20 see figures 7,10,14,17,18	1,4,5
A	-----	8,10,11

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

11 February 1999

Date of mailing of the international search report

18/02/1999

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 98/00470

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: 14-18
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

...formation on patent family members

International Application No

PCT/DK 98/00470

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5118297 A	02-06-1992	NONE	
WO 9314714 A	05-08-1993	US 5275562 A	04-01-1994
		EP 0691826 A	17-01-1996