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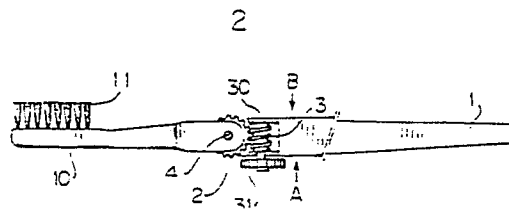
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54 **INTRAORAL SANITARY DEVICE HAVING CONTINUOUSLY BENDABLE AND SETTABLE HANDLE.**

57 This invention relates to an intraoral sanitary device, such as a toothbrush. A worm wheel (2) is fixed to an end surface of one of a handle (1) and a brush (10), and a worm gear (3), which is meshable with the worm wheel (2), to the opposed end surface of the other, a knob (31) being fixed to the shaft of the worm gear (3). When the knob (31) is turned with the handle (1) gripped by the hand, this rotational force causes the worm wheel (2) to be turned with

respect to the worm gear (3). Accordingly, the brush (10) can be displaced at an arbitrary angle with respect to the handle (1) gripped by the hand.



MOUTH HYGIENE DEVICE WITH ADJUSTABLE HEAD

Background of the Invention

The present invention relates to a mouth hygiene device, such as a toothbrush, with an adjustable head which is able to be continuously bent with respect to the handle and fixed at a given angle to the handle.

The term "mouth hygiene device" herein used covers a toothbrush, a toothpick, a mouth mirror, a foam-rubber massage device, and a mouth cleaning spray.

A toothbrush with an adjustable head capable of reaching the backside of a tooth regardless of different jaw structures and/or tooth arrangements has been known.

For example, FIG. 4 shows the adjustable mechanism of a toothbrush such as shown in Japanese U.M. Patent Application Kokoku No. 58-47887. The first handle section 5 has a toothed end 6, and the second handle section 7 has a stopper 8 which engages the toothed end 6. Thus, it is possible to bend and lock the first handle section 5 at a desired angle with respect to the second handle section 7.

More specifically, the first handle section 5 is set at a desired angle by first pressing the stopper 8 in the direction of an arrow B' to release the engagement between the toothed end 6 and the stopper 8, then bending the first handle section 5 to the desired angle from the second handle section 7, and finally returning the stopper 8 for engagement with the toothed end 6.

However, since the stopper 8 engages the toothed end 6 stepwise from valley to valley of the toothed end it is impossible to set the first handle section 5 at a given angle in a strict sense of the word. In addition, in order to set the first handle section at a desired angle, it is necessary to use both hands; one for holding the first handle section 5 and the other for operating the stopper 8. Moreover, because of the presence of a backlash between the stopper 8 and the toothed end 6, it is impossible to fix the first handle section without clattering.

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When this toothbrush is used to clean the teeth, a large force is applied to the meshing point between the stopper 8 and the toothed end 6 and to the pivot of the stopper 8 so that the pivoted portion between the first and second handle sections and the stopper 8 itself become rickety or crests of the toothed end 6 and/or a tip of the stopper 8 is broken, making the toothbrush useless.

Summary of the Invention

Accordingly, it is an object of the invention to provide a mouth hygiene device with a brush, massage foam-rubber plate, toothpick, mouth mirror, or mouth cleaning spray, which is free of the above backlash problem.

It is another object of the invention to provide a mouth hygiene device which has a head section continuously adjustable and set at a given angle with only one hand.

According to the invention there is provided a mouth hygiene device with an adjustable head, which includes a handle; an adjustable head rotatably connected to the handle; a worm wheel unit secured to an end of either the handle or the adjustable head; a worm rotatably mounted on an end of the other component for engagement with the worm wheel; and a knob secured to the worm.

The adjustable head may have a brush, massage foam-rubber member, toothpick, mouth mirror, mouth cleaning spray, or any other mouth hygiene component. The worm wheel unit may be a worm wheel or any toothed end of the adjustable head or handle so as to mesh with the worm in the range of bending the adjustable head with respect to the handle.

When the knob is turned with the thumb of the hand gripping the handle to turn the worm, the worm wheel is turned to bend the adjustable head which is secured to the worm wheel. Since no power is transmitted to the worm from worm wheel, the bending angle of the adjustable head is not changed by an external force applied to the adjustable head.

The bending angle of the adjustable head with

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respect to the handle may be set with one hand at a given angle in a strict sense of the word because of the continuous meshing characteristics of the worm gear. Since the worm wheel meshes with the worm at a few points in the crest and valley, the adjustable head may be fixed at a given angle without any backlash even after a long period of service under a relatively large force applied to the adjustable head.

Other objects, features, and advantages of the invention will be apparent from the following description when taken in conjunction with the accompanying drawings.

Brief Description of the Drawings

FIG. 1 is a perspective view of a toothbrush according to an embodiment of the invention;

FIG. 2 is a partially cutaway side view of the toothbrush;

FIG. 3 is a perspective view showing how to use the toothbrush; and

FIG. 4 is a longitudinal section of part of the handle of a conventional toothbrush.

Description of the Preferred Embodiment

A toothbrush is taken as an example in the following description. However, it is noted that the invention is not limited to the illustrated example alone.

In FIGS. 1 and 2, a head 10 with bristles 11 planted thereon is rotatably connected to a handle 1 with a shaft 4. A worm wheel 2 is fixedly secured to an end of the head 10. A worm 3 is rotatably mounted on an end of the handle 1 for engagement with the worm wheel 2. A knob 31 is attached to a worm shaft 30 of the worm 3.

In FIG. 3, when the knob 31 is turned clockwise or counterclockwise with the thumb of the hand which is gripping the toothbrush, the head is bent upward or downward as shown by an arrow C.

When a conventional toothbrush with a straight handle is used to brush the backside of a lower front tooth,

for example, it is necessary to raise the elbow in an uncomfortable posture. However, with the toothbrush according to the invention, it is possible to brush such an area by moving only the wrist with the elbow resting on the body side. This feature is especially advantageous for the aged people with limited abilities.

By turning the knob 31 it is possible to set the brush head 10 at the best angle for any tooth or any tooth arrangement of different individuals. Since it is possible to make a small worm gear with a small worm and a worm wheel, the bending portion of the toothbrush is made more compact than that of the conventional toothbrush which uses a larger gear.

Alternatively, the knob 31 mounted on the backside of the handle 1 as shown by an arrow A in FIG. 2 may be mounted on the front side indicated by an arrow B. The worm wheel 2 may be secured to an end of the handle 1 while the worm 3 may be mounted on an end of the head 10.

Examples of other changes and variations which may be made to the toothbrush according to the invention are as follows:

(1) The adjustable head may be made detachable from the handle so that a variety of adjustable heads or their spares may be replaced without difficulty.

(2) Preferably, adjustable heads of different lengths are made for adult people and children. Part of the adjustable head and the handle may be curved.

(3) The gear ratio may be changed by providing another gear in the worm gear to change the ratio of the bending angle of the adjustable head to the turning angle of the knob. With a large ratio, it is possible to quickly set the adjustable head at the desired angle by turning the knob only to a small extent.

(4) The worm wheel may be replaced with a crown or helical gear wheel.

(5) Preferably, either the adjustable head or the

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handle at the bending portion is graduated in angles on a side perpendicular to the back side A or front side B while the other part is marked with a pointer so that reading of the best angle for a hygiene operation in a specific area of the mouth is taken for the future operation.

As has been described above, according to the invention, a worm wheel is secured to an end of either the adjustable head or the handle while a worm is pivoted to an end of the other part for engagement with the worm wheel, with a knob secured to the worm, so that the adjustable head has no backlash problem, and only one hand is necessary to continuously bend and set the adjustable head at the desired angle.

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CLAIMS

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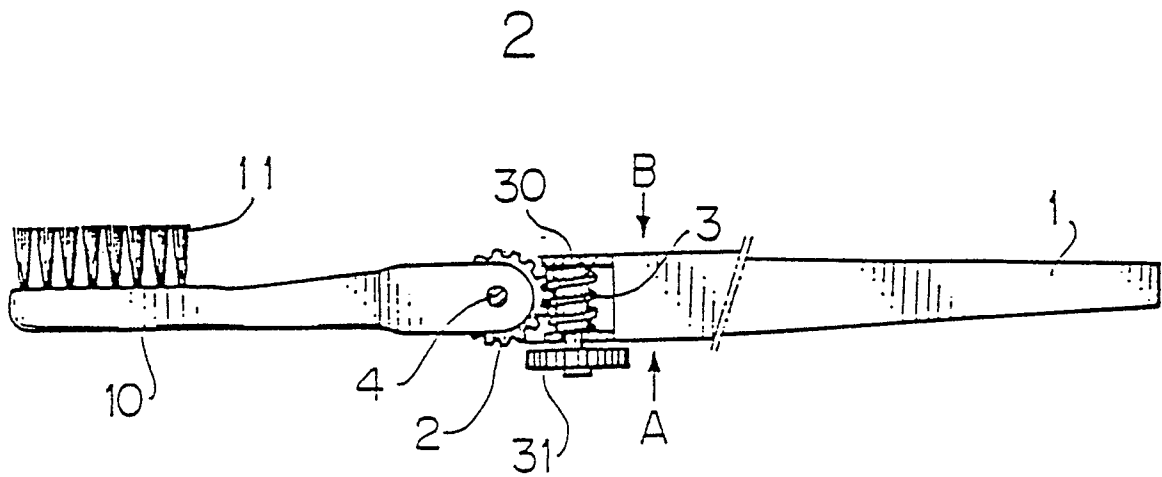
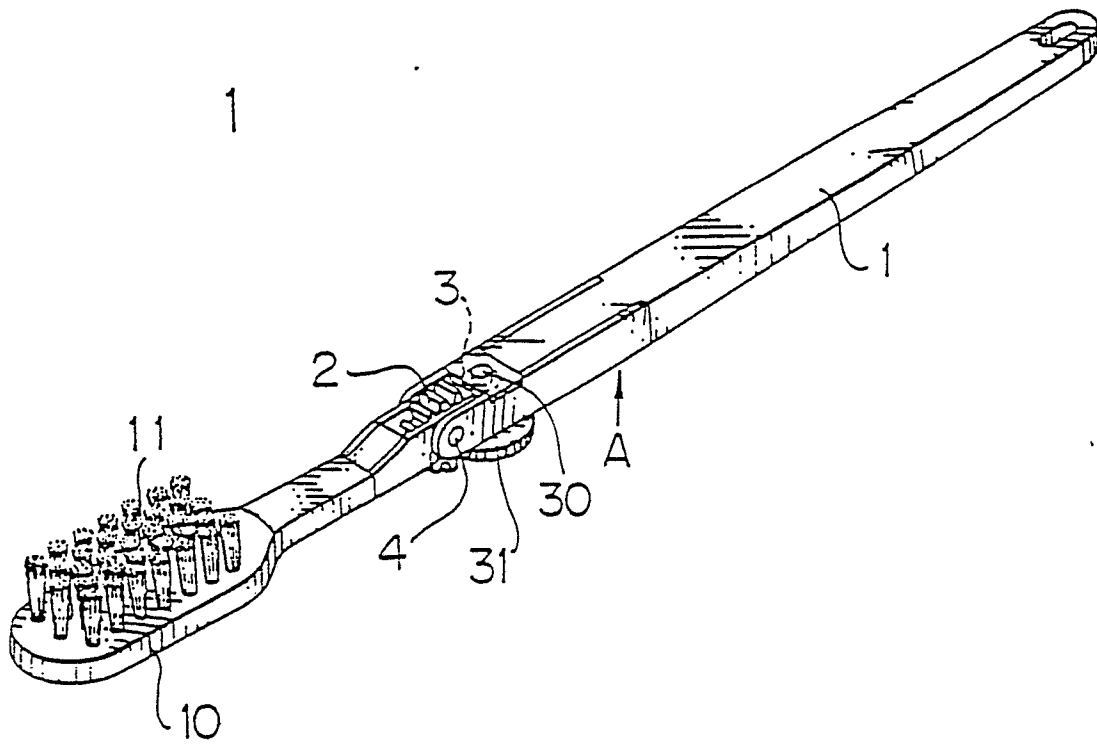
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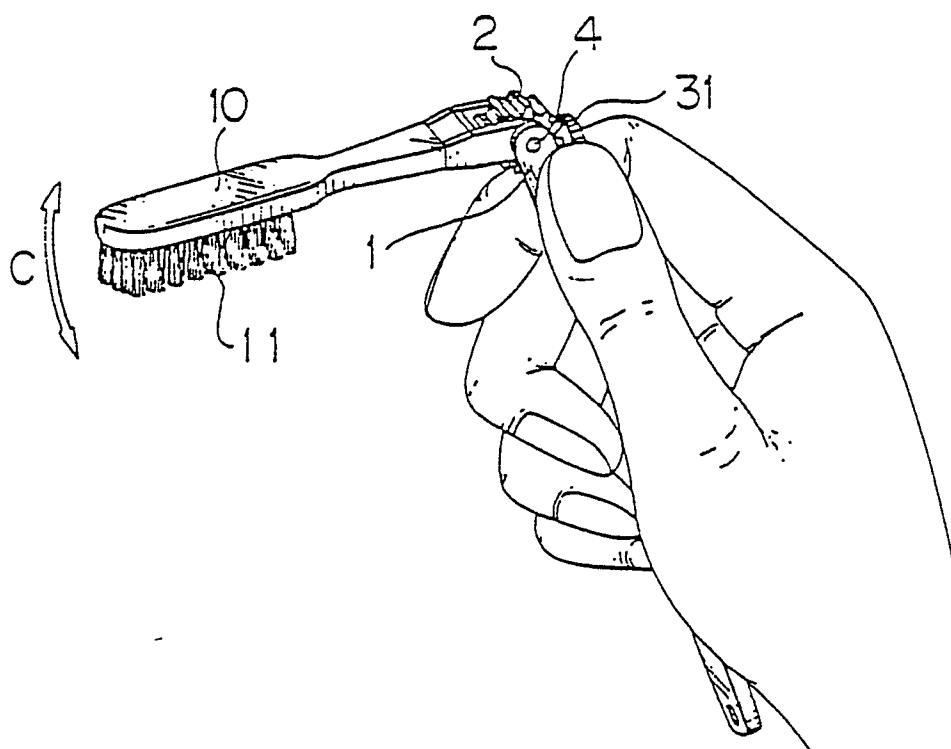
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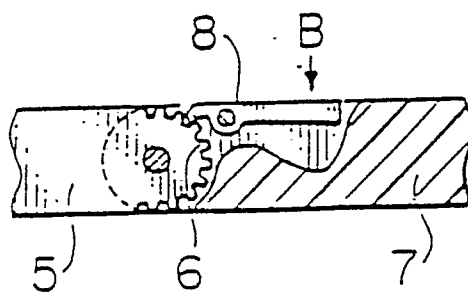
1. A mouth hygiene device with adjustable head, which comprises:
a handle;
an adjustable head having bristles rotatably connected to said handle;
worm wheel means fixedly secured to an end of either said handle or said adjustable head;
a worm rotatably mounted on an end of the other component for engagement with said worm wheel means; and
knob means secured to said worm, whereby by turning said knob means it is possible to continuously adjust an angle of said adjustable head with respect to said handle.
2. The mouth hygiene device of claim 1, wherein said adjustable head is composed a part having either the worm or the worm wheel means and a part having bristles, whereby these the part having bristles is removably secured to the part having either the worm or the worm wheel means.



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INTERNATIONAL SEARCH REPORT

International Application No PCT/JP89/00952

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl ⁴	A46B5/00	
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC	A46B1/00-A46B17/08	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸		
Jitsuyo Shinan Koho 1926 - 1989 Kokai Jitsuyo Shinan Koho 1971 - 1989		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	JP, U, 63-47727 (Haku Hirofumi) 31 March 1988 (31. 03. 88) (Family: none)	1, 2
Y	JP, U, 63-13025 (Hirata Yoichi) 28 January 1988 (28. 01. 88) (Family: none)	1, 2
Y	JP, U, 54-76864 (Funaki Sadaichi) 31 May 1979 (31. 05. 79) (Family: none)	1, 2
Y	JP, U, 47-16666 (Yamagishi Shizue) 26 October 1972 (26. 10. 72) (Family: none)	1, 2
Y	JP, Y2, 58-47887 (Kusano Masao) 1 November 1983 (01. 11. 83) (Family: none)	1, 2
[*] Special categories of cited documents: ¹⁰ "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 "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 "Z" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
December 4, 1989 (04. 12. 89)		December 25, 1989 (25. 12. 89)
International Searching Authority		Signature of Authorized Officer
Japanese Patent Office		