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(54) **HAIR CARE DEVICE WITH STROKE COUNTER**

(57) Hair care device (B) for treating hair, the hair care device having a stroke counter (SC) that comprises a motion sensor; a proximity detector; and a control unit for counting strokes based on an output of the motion sensor when the proximity detector detects that the hair care device is within a predefined range from the hair.

The control unit may be arranged for only counting a stroke after a movement away from the hair has been detected. The control unit may be arranged for only counting a subsequent stroke if after counting a stroke, the proximity detector indicates that the hair care device has been away from the hair.

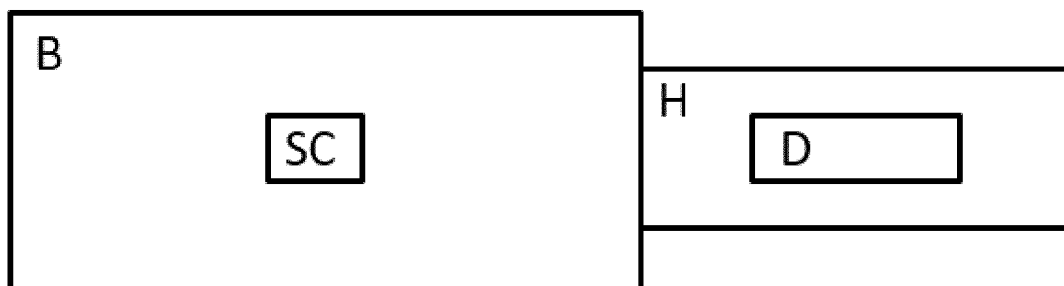


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a hair care device (e.g. brush, comb) having a stroke counter.

BACKGROUND OF THE INVENTION

[0002] US 2,981,963 discloses a brush having means therein for counting the strokes taken with the brush.

[0003] US 5,485,646 discloses a hairbrush with electronic stroke counter. The number of strokes is displayed on a digital read out which is mounted to the brush handle for easy reference. The brush can be used as a training aid it assists children in building counting skills.

SUMMARY OF THE INVENTION

[0004] It is, inter alia, an object of the invention to provide an improved hair care device with a stroke counter. The invention is defined by the independent claims. Advantageous embodiments are defined in the dependent claims.

[0005] In accordance with an aspect of the invention, the stroke counter comprises a motion sensor (e.g. an accelerometer), a proximity detector (e.g. an IR sensor), and a control unit for counting strokes based on an output of the accelerometer when the proximity detector detects that the hair care device is within a predefined range (e.g. less than 0.5 cm) from the hair. In this way, strokes are only counted when the hair care device is actually treating the hair. So, some movement in the air is not counted as a stroke.

[0006] Preferably, the control unit is arranged for only counting a stroke after a movement away from the hair has been detected. At the end of a stroke, the user moves the hair care device away from the hair. By detecting if the hair care device is moved away from the hair (e.g. by means of a 3D accelerometer), the strokes are counted more accurately.

[0007] Preferably, the control unit is arranged for only counting a subsequent stroke if after counting a stroke, the proximity detector indicates that the hair care device has been away from the hair. This again results in a more accurate measurement of the number of strokes.

[0008] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Fig. 1 shows an embodiment of a hair brush in accordance with the invention; and

Fig. 2 shows a flow chart describing a method in accordance with an embodiment of the invention.

DESCRIPTION OF EMBODIMENTS

[0010] Fig. 1 shows an embodiment of a hair brush in accordance with the invention. The hair brush has a body B having a plurality of bristles (not shown), a stroke counter SC for counting strokes, an optional handle H, and an optional display D for displaying the counted number of strokes. The stroke counter SC may be a printed circuit board having a motion sensor formed by e.g. an accelerometer, a proximity detector formed by e.g. an IR sensor, and a control unit formed by e.g. a suitably programmed processor. The processor may also process other signals from other sensors, e.g. to determine hair health as a result of a measured friction between the brush and the hair, a force applied to the hair while brushing or combing to warn the user if the applied force is too high, and/or a need to use certain hair care products as e.g. described in US 2015/0342515. Instead of having a display D, the hair brush may send (e.g. using Bluetooth) information to a user's smartphone so that the user can see the stroke count on the smartphone.

[0011] Fig. 2 shows a flow chart describing a method in accordance with an embodiment of the invention. A stroke is only counted if both the proximity detector signals proximity to hair and a movement away from the hair is noticed.

[0012] In advantageous embodiments, a more reliable brush stroke counter is provided as a result of the following measures:

- Use the proximity detector (e.g. an IR distance sensor) to check whether the brush is close to hair.
- Identify whether there has been a movement away from the hair, as at the end of a stroke, the user will move the brush away from the hair (a small rotation).
- Again use the distance detector as between hair brush strokes, the brush will be away from the hair, so that a new stroke can only be counted if the brush has been away from the hair.

[0013] When people finish brushing a stroke of hair, they need to lift up the brush, and brush from the hair root to hair tip again. The action of lifting up can be measured to distinguish one stroke from the other. Also the proximity detector can be used for doing so, because when the brush is lifted up at the end of one stroke in order to be able to start a new stroke, the distance to the hair is increased.

[0014] Accelerometers are e.g. described in <https://en.wikipedia.org/wiki/Accelerometer>. As mentioned in this article, they are used in smartphones, so that accelerometers that are small enough for incorporation into a hair care device are commercially available. It mentions that the Nokia 5500 sport features a 3D accelerometer that can be accessed from software. It is used for step recognition (counting) in a sport application, and for tap gesture recognition in the user interface. Some other devices provide the tilt sensing feature with

a cheaper component, which is not a true accelerometer.

[0015] Proximity detectors are e.g. described in https://en.wikipedia.org/wiki/Proximity_sensor. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The article mentions use of a proximity sensor in a smartphone, which shows that proximity detectors that are small enough for incorporation into a hair care device are commercially available.

[0016] It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The word "comprising" does not exclude the presence of elements or steps other than those listed in a claim. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. The invention may be implemented by means of hardware comprising several distinct elements, and/or by means of a suitably programmed processor. In the device claim enumerating several means, several of these means may be embodied by one and the same item of hardware. Measures recited in mutually different dependent claims may advantageously be used in combination.

Claims

1. Hair care device (B) for treating hair, the hair care device having a stroke counter (SC) that comprises:

a motion sensor;
a proximity detector; and
a control unit for counting strokes based on an output of the motion sensor when the proximity detector detects that the hair care device is within a predefined range from the hair.

2. Hair care device (B) as claimed in claim 1, wherein the control unit is arranged for only counting a subsequent stroke if after counting a stroke, the motion sensor indicates that a movement away from the hair has been detected.

3. Hair care device (B) as claimed in claim 1, wherein the control unit is arranged for only counting a subsequent stroke if after counting a stroke, the proximity detector indicates that the hair care device has been away from the hair.

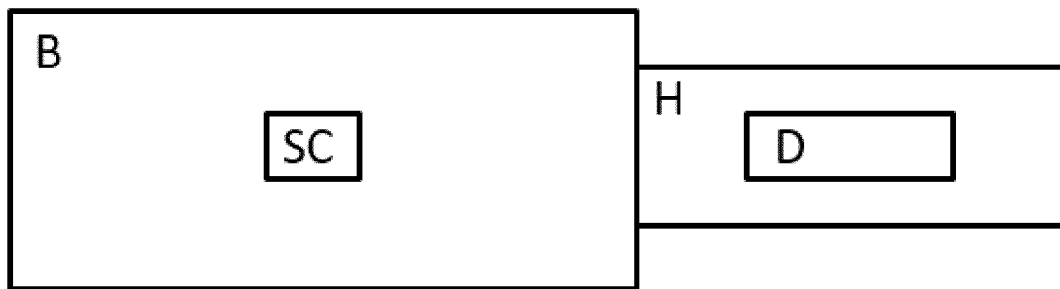


Fig. 1

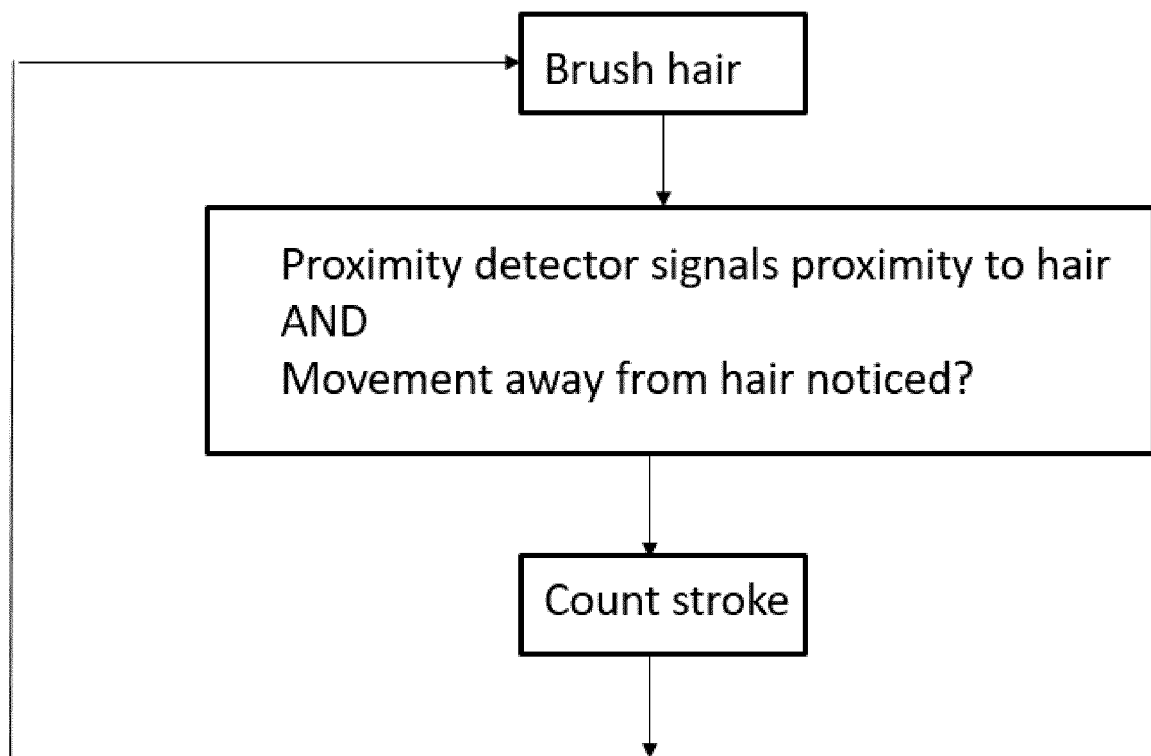


Fig. 2



EUROPEAN SEARCH REPORT

 Application Number
 EP 18 17 8920

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 5 485 646 A (MERRITT ROBERT L [US]) 23 January 1996 (1996-01-23) * page 1, lines 49-51; figure 1 *	1-3	INV. A46B9/02 A46B15/00
A,D	US 2 981 963 A (PEILET LESTER R ET AL) 2 May 1961 (1961-05-02) * claim 1; figures 1-10 *	1-3	
A	US 3 104 056 A (CROSS GROSVENOR M) 17 September 1963 (1963-09-17) * claim 1; figures 1-6 *	1-3	
			TECHNICAL FIELDS SEARCHED (IPC)
			A46B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 November 2018	Examiner Dal Bó, Paolo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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 EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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21-11-2018

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5485646	A	23-01-1996	NONE
US 2981963	A	02-05-1961	NONE
US 3104056	A	17-09-1963	NONE

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2981963 A [0002]
- US 5485646 A [0003]
- US 20150342515 A [0010]