US 20070271760A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2007/0271760 A1**

NANDA (43) **Pub. Date: Nov. 29, 2007**

(54) **ELECTRIC TOOTHBRUSH**

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(21) Appl. No.: **11/839,158**

(22) Filed: **Aug. 15, 2007**

Related U.S. Application Data

(62) Division of application No. 11/054,466, filed on Feb. 9, 2005.

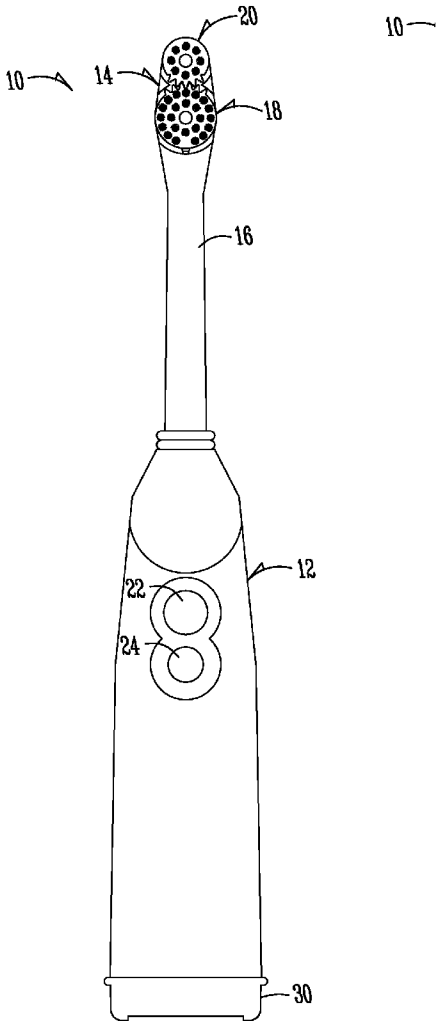
Publication Classification

(51) **Int. Cl.**
B21D 39/00 (2006.01)

(52) **U.S. Cl.** **29/428**

(57) **ABSTRACT**

An electric toothbrush has a first brush that oscillates and a second brush that oscillates opposite the first brush. The electric toothbrush also has a shaft assembly that includes a moveable pin that creates an oscillating motion of a first brush on a head of the toothbrush. The method of assembly inserts a shaft assembly of the toothbrush through a bottom hole of an elongated hollow body of the toothbrush head to come in contact with a top hole of the elongated body.



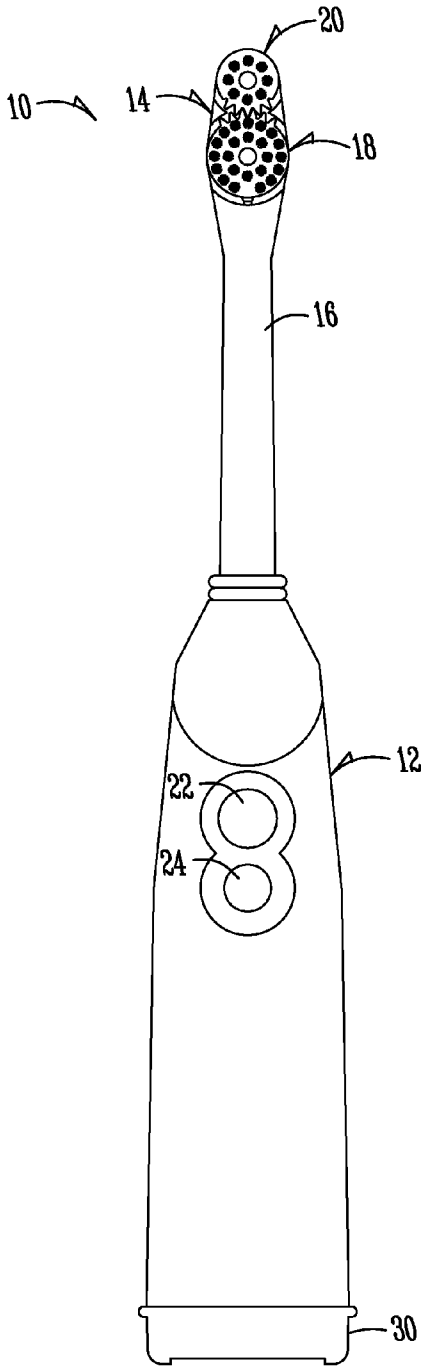

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Fig. 1

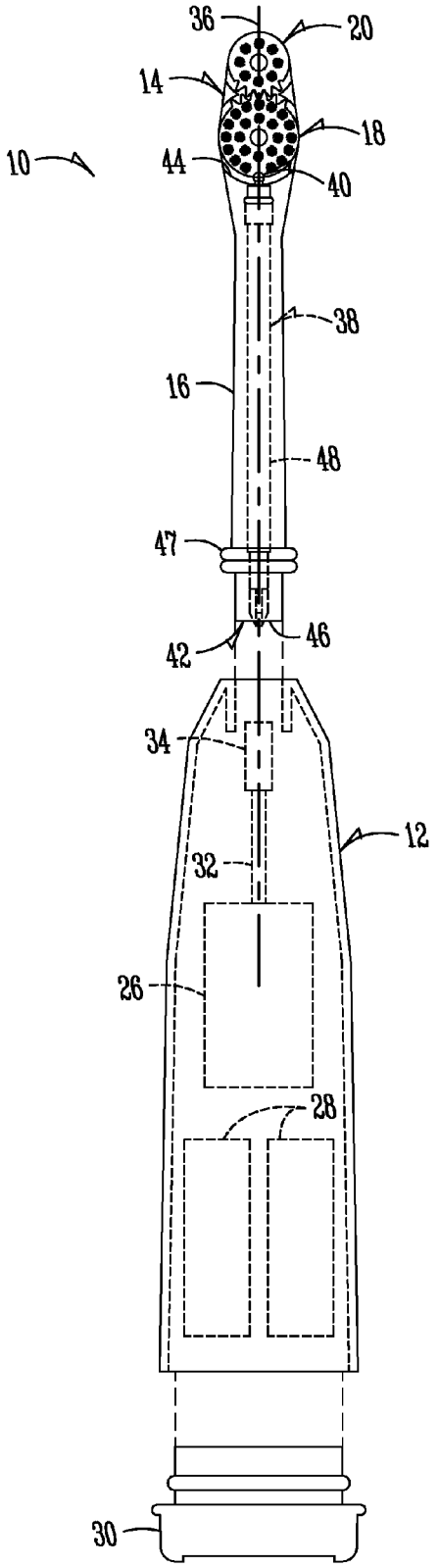
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Fig. 2

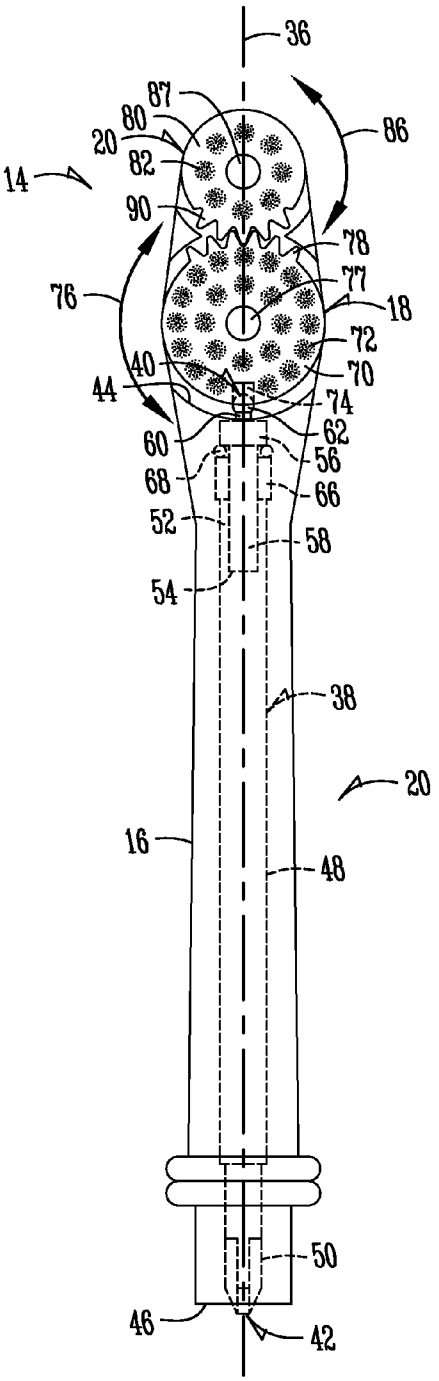
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Fig. 3

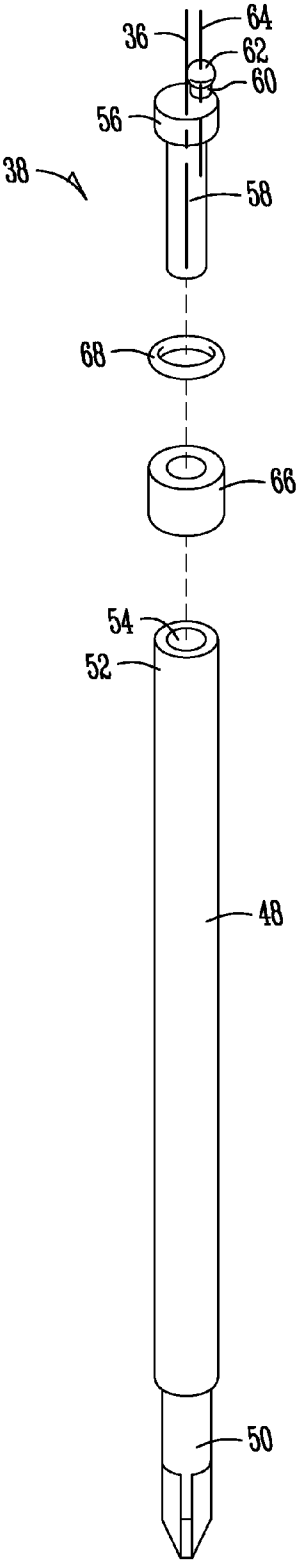
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Fig. 4

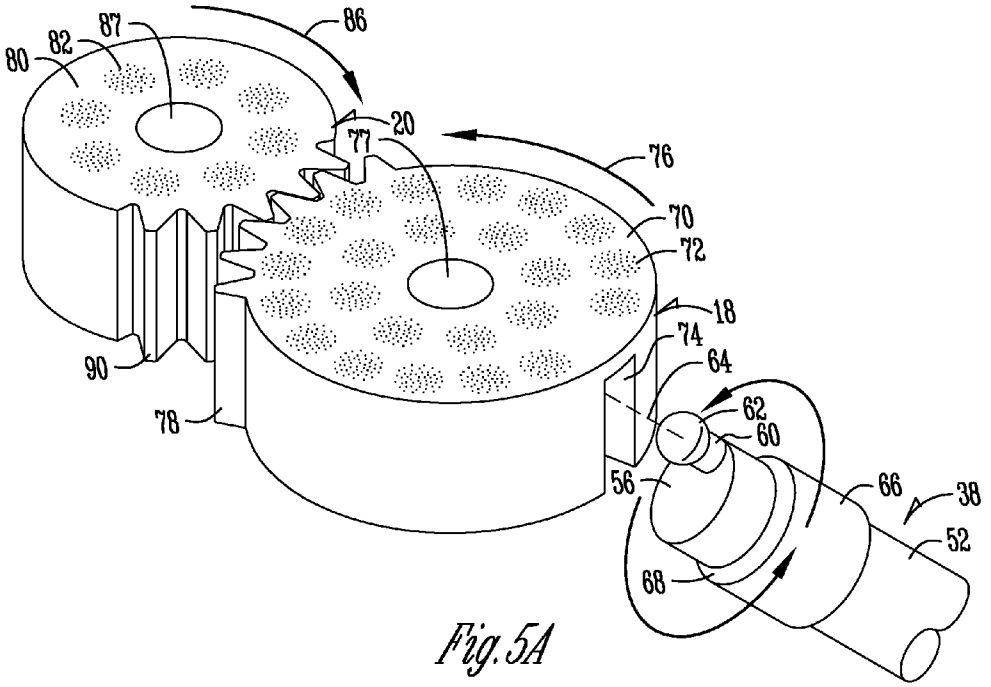
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Fig. 5A

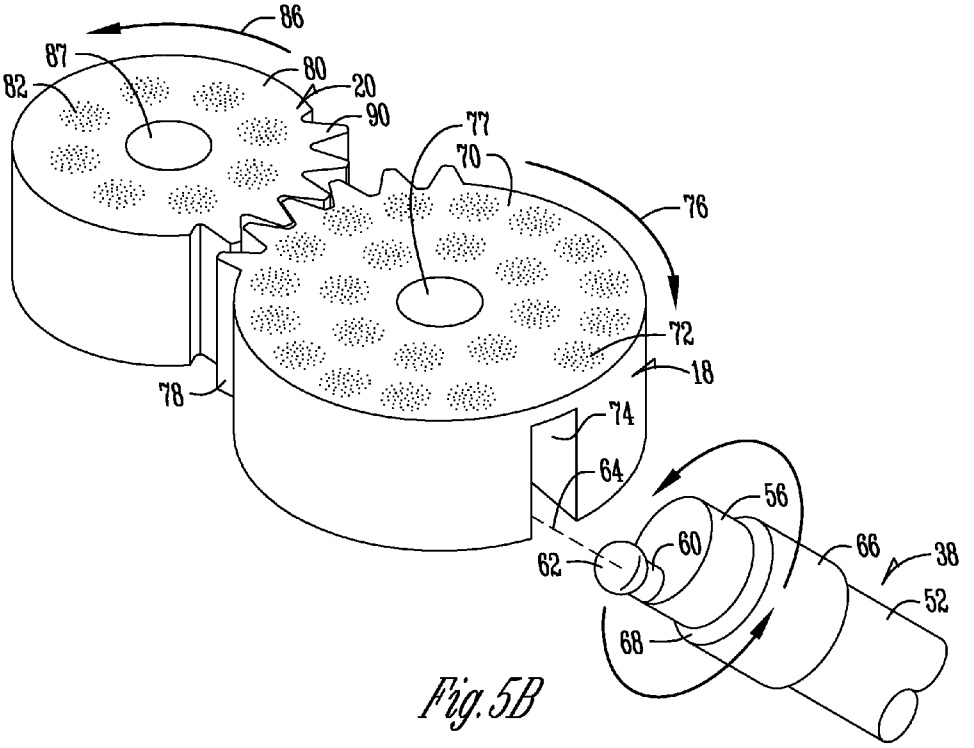
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Fig. 5B

ELECTRIC TOOTHBRUSH

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Divisional Application of co-pending U.S. Ser. No. 11/054,466 filed Feb. 9, 2005, herein incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to an electric toothbrush.

[0003] Electric toothbrushes generally employ a moving brush. One goal of the moving brush is to provide a motion that complements the hand action of a user guiding the brush using a handle of the toothbrush. A rotating motion of the moveable brush has been seen to be particularly well suited to complementing the hand motion of the user. Additionally, when using two moveable brushes it has been found that two circular brushes rotating in opposite directions are particularly well suited to complementing the user's hand motion. Therefore, it is an objective of the current invention to employ a rotating moveable brush. Additionally, it is a further objective of the present invention to employ a second rotatable moving brush that moves in a direction opposite the first brush.

[0004] In the design of a toothbrush, there is also a need for an accurate and reliable interface between a motor that must be connected to the moveable brushes. In the prior art, this often requires the use of gears or other complex connections. Therefore, a further objective of the present invention is a simple yet efficient connection between the motor and the moveable brushes.

[0005] One interconnection between a motor and the moveable brush is seen in McDougall, U.S. Pat. No. 5,625,916. The '916 patent uses a motor in-line with a shaft. The shaft ends with a bend which creates a variety of problems including wear upon a plastic stabilizer point at the head of the toothbrush, assembly complications as the shaft must be fed from a portion of the head to interconnect with a motor at the bottom portion of the head and a wider toothbrush head that must accommodate the bent portion. Therefore, a further objective of the present invention is to provide a shaft structure for a toothbrush that overcomes the difficulties of the prior art.

[0006] These and other objectives will become evident from the following specification and claims.

SUMMARY OF THE INVENTION

[0007] The foregoing objectives may be achieved by an electric toothbrush having a motor driven head with a first brush and a second brush. The first brush rotating in a first direction with the second brush rotating in a second direction opposite the first direction. A feature of this design may include the first brush oscillating in both the first direction and the second direction with the second brush following the first brush but in an opposite direction.

[0008] A further feature of the present invention includes a toothed section on both the first brush and the second brush that reciprocally join the two brushes together.

[0009] A further objective of the present invention is an electric toothbrush that connects a motor to a moveable bristle holder with a plurality of tuffs using a rotatable shaft. The rotatable shaft has a longitudinal axis and is operably connected to the motor. A cylindrical cap is attached to the rotatable shaft and has a pin radially offset from the shaft longitudinal axis. The bristle holder has a slot in its outer circumference that engages the pin of the cylindrical cap. Finally, a switch is provided that is operably connected to the motor that when actuated engages the motor causing the bristle holder to oscillate.

[0010] A further feature of the present invention is a bushing provided between the rotatable shaft and the cylindrical cap that engages a front portion of the head of the toothbrush but permits rotation of the cylindrical cap through the bushing.

[0011] A further feature of the present invention is a gasket between the bushing and the cylindrical cap that prevents water and other debris to enter into the head of the toothbrush.

[0012] The foregoing objectives may also be achieved by a method of assembling an electric toothbrush including providing a toothbrush with a handle and a head having an elongated hollow body, a rotatable shaft, a cylindrical cap that may be received upon the rotatable shaft, and a bushing between the rotatable shaft and the cylindrical cap. The method also comprising the step of fitting the bushing upon a rod of the cylindrical cap and the rod within the rotatable shaft, placing the rotatable shaft within the elongated hollow body entering from a bottom opening and the bushing engaging against the top opening. The method also comprising the steps connecting the rotatable shaft to the motor shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. **1** is a front view of the electric toothbrush of the present invention.

[0014] FIG. **2** is an exploded view of the electric toothbrush of FIG. **1**.

[0015] FIG. **3** is a front view of the head of the present invention illustrating the shaft assembly connected to a moveable brush.

[0016] FIG. **4** is an exploded view of the shaft assembly of FIG. **3**.

[0017] FIGS. **5**A-B are illustrations of the operation of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] Referring to FIG. **1**, **10** generally refers to the electric toothbrush of the present invention that comprises a handle **12** and a head **14** joined to the handle. The head **14** has an elongated hollow body **16** and a first interior moveable brush **18** and a second exterior moveable brush **20**. The handle **12** has an on-button **22** and an off-button **24** used to control the moveable brushes **18**, **20**.

[0019] As seen in FIG. **2**, a motor **26** is provided within the handle **12** that is powered by batteries **28**. The batteries **28**

are accessible by removing battery cover **30**. The motor **26** has extending therefrom a motor shaft **32** that ends in a motor coupling **34**.

[**0020**] The head **14** is in axial alignment with the handle **12** along longitudinal axis **36**. The head **14** has a shaft assembly **38** that generally has a top end **40** that protrudes out a top end **44** of the elongated body **16**. The shaft assembly **38** also has a bottom end **42** that is adjacent the elongated body bottom end **46**. The shaft assembly bottom end **42** attaches to the motor coupling **34**. The motor coupling **34** and shaft assembly bottom end **42** may be interchangeably male or female members. A gasket **49** is provided at the interface between the handle **12** and the elongated body **16**.

[**0021**] As seen in FIGS. **3** and **4**, the shaft assembly **38** has a shaft **48** having a bottom end **50** and a top end **52**. The shaft top end **52** has a hollow **54** defined therein for connecting to a cylindrical cap **56**. The cylindrical cap **56** has a rod **58** extending from a bottom end of the cap **56** and a radially offset pin **60** extending from the top end of the cylindrical cap **56**. The pin **60** may end in a spherical ball **62**. The pin **60** has a longitudinal axis **64** that is offset from the shaft assembly longitudinal axis **36**. A bushing **66** and gasket **68** are also provided with the shaft assembly **38**.

[**0022**] The shaft assembly **38** is connected together by placing gasket **68** first upon rod **58** and then sliding the bushing **66** upon the rod **58**. The rod **58** is then placed into the hollow **54** of the shaft **48**.

[**0023**] The pin **62** is connected to the first brush **18**. The brush **18** has a generally circular bristle holder **70** having a plurality of tufts **72**. The bristle holder **70** has a rectangular slot **74** that extends radially inward into the bristle holder **70**. The rectangular slot **74** is configured to permit the pin **62** to move up and down through it as it rotates about a circle, thus moving the bristle holder **70** in an oscillating, side-to-side motion about its pivot point **77**. Brush **18** has a first toothed section **78** along its outer circumference. The first toothed section **78**, as illustrated, is opposite and centered upon the rectangular slot **74**.

[**0024**] The first toothed section **78** drives a second brush **20**. The second brush **20** has a second bristle holder **80** and second tufts **82**. The second brush **20** has an oscillating motion **86** opposite the oscillating motion **76** of the first brush **18** as it turns about its pivot point **87**. Motion from the first brush is translated to the second brush from the first tooth section **78** to a second tooth section **90**.

[**0025**] The geometry of the first tooth section **78** and the second tooth section **90** may vary relative the circumference of the first brush **18** and second brush **20**, respectively. As best seen in FIGS. **3**, **5**A and **5**B the second tooth section **90** is slightly more inset than the first tooth section **78**.

[**0026**] As seen in FIGS. **5**A and **5**B in operation, the motor **26** creates a rotational movement of motor shaft **32** which moves shaft assembly **38** having pin **60**. The pin **60** moves up and down within rectangular shaft slot **74** to create oscillating motion **76**. An opposite oscillating motion **86** results from the reciprocal interconnection between the first and second toothed sections **78**, **90**.

[**0027**] Also unique to the present invention is the method of assembling the shaft assembly **38** within the elongated hollow body **16**. As stated previously, the elongated hollow body **16** has a top open end **44** and a bottom open end **46**. Once the shaft assembly **38** is assembled it may be placed within the bottom open end **46** into the elongated hollow body **16** until the bushing **66** comes to rest within the top open end **44**. In this position, the shaft **48** and the cylindrical cap freely rotate within the bushing **66** that is held adjacent the top open end **44**.

[**0028**] The drawings and specification there has been set forth a preferred embodiment of the invention, and those specific terms are employed, their use is in a generic descriptive sense only and not for purposes of limitation. Changes in the form and the proportion of parts as well as in the substitution of equipment are contemplated as circumstances may suggest or render expedient without departing from the spirit or scope of the invention in the following claims. For example, the present invention contemplates variations in the shaft assembly, the size and positioning of the first brush and the second brush, the number of brushes used, the interface between the first brush and the second brush, variations in the cylindrical cap, and other variations in structural and function.

What is claimed is:

1. A method of assembling a toothbrush including:

providing a toothbrush comprising:

(a) a handle having a motor disposed within, a motor shaft extending from the motor;

(b) a head having at least one brush pivotally attached and an elongated hollow body adjacent the brush with a bottom opening and a top opening;

(c) a shaft assembly having a shaft and cylindrical cap;

(d) the shaft having a first end for matingly engaging the motor shaft and a second end;

(e) a cylindrical cap having a rod extending from one end and a pin on an opposite end;

(f) a bushing for placement upon the rod;

fitting the bushing upon the rod and the rod within the shaft second end;

placing the shaft assembly within the elongated hollow body entering from the bottom opening, engaging the bushing against the top opening, and coupling the pin to the brush;

connecting the rotatable assembly shaft first end to the motor shaft.

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