United States Patent [19]

Brien

[11] **3,847,167**

[45] **Nov. 12, 1974**

[54] **FLOSSOMATIC**

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[22] Filed: **June 25, 1973**

[21] Appl. No.: **373,176**

[52] **U.S. Cl.** ..... **132/92 R**
[51] **Int. Cl.** **A61c 15/00**
[58] **Field of Search** ..... 132/93, 92, 91, 92 R

[56] **References Cited**

UNITED STATES PATENTS

3,667,483 6/1972 McCabe ..... 132/92 A

Primary Examiner—Robert Peshock
Attorney, Agent, or Firm—LeBlanc & Shur

[57] **ABSTRACT**

A hand-held dental floss applicator is described. The applicator includes a generally cylindrical handle having two, spaced, elongated guide arms projecting longitudinally from an end thereof. A reciprocal drive means, preferably capable of being powered by either direct or alternating current is contained within the handle and operably coupled to a drive pulley also mounted therein. A ring of dental floss is utilized in the device. The floss makes at least one turn around the drive pulley and extends along the guide arms and between the ends thereof. A retractable idle pulley is also provided in the handle for engaging the dental floss ring to apply the necessary tension thereto. In operation the guide is positioned with its arms astraddle the user's teeth while the floss is reciprocated between adjacent teeth by the drive means. The ring of floss is advanced to bring a clean section into the area between the arms manually after the idle pulley is retracted.

15 Claims, 4 Drawing Figures

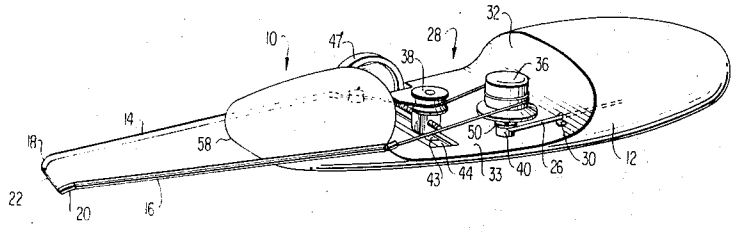


FIG. 1

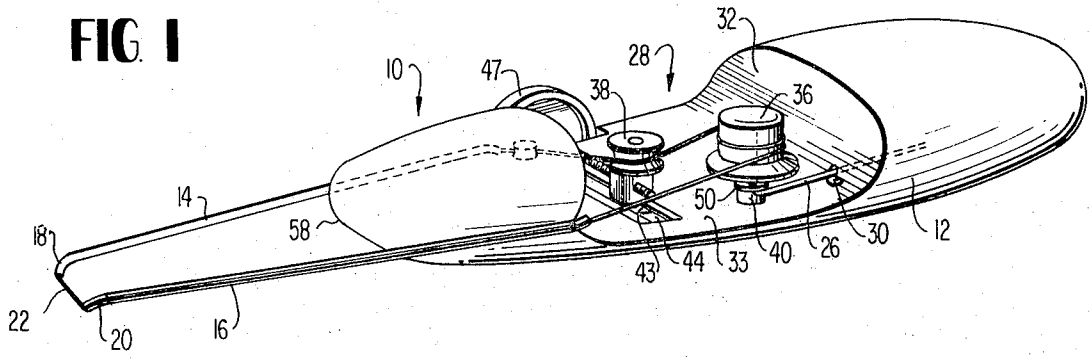


FIG. 2

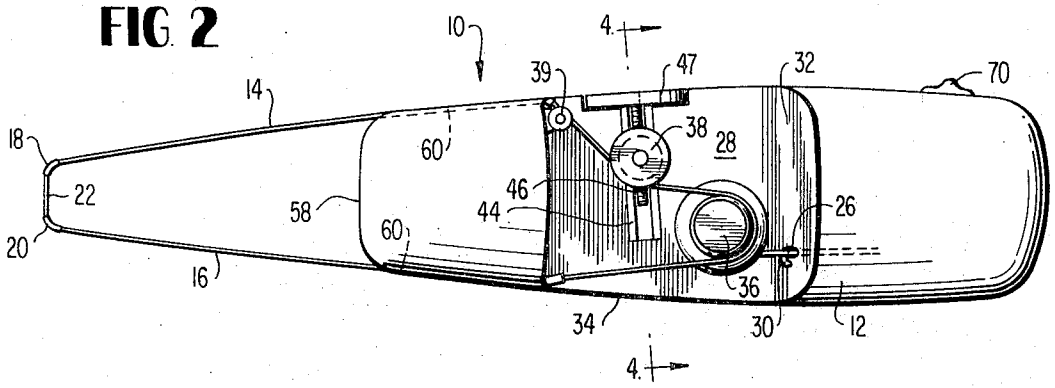
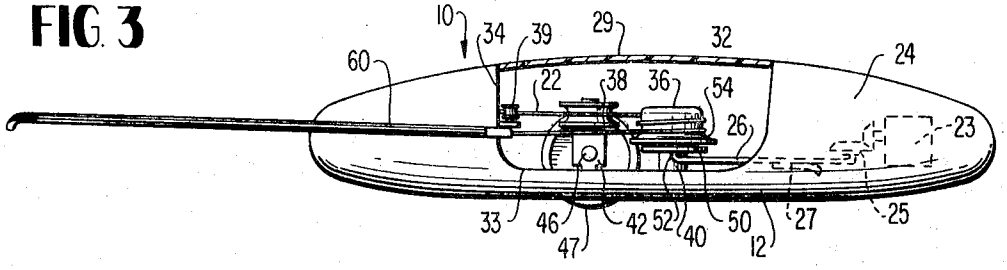


FIG. 3



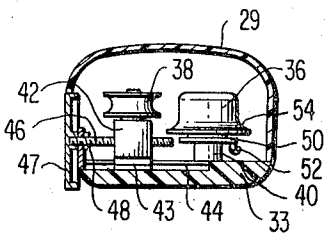


FIG. 4

FLOSSOMATIC

This invention relates to an apparatus for cleaning the areas between teeth and specifically to a dental floss applicator which will guide a segment of floss between the teeth and reciprocate the floss to remove food, plaque and other decay producing agents from these areas.

Various clamping or guiding devices for holding dental floss as it is manually applied to clean the areas between the teeth are well known. While these devices avoid the awkward manual procedure of gripping both ends of a length of dental floss, they still require time consuming manual application of the floss for cleaning.

Various hand-held vibrators and the like used to vibrate a length of dental floss in the area between the teeth are also well known. While these devices have the advantage of being able to clean the teeth more rapidly than manual devices, they have the disadvantage of being difficult to control.

U.S. Pat. No. 3,667,438 describes another type of applicator whereby dental floss is reciprocated between the teeth rather than merely vibrated. This device uses supply and take-up spools for the dental floss. The floss extends from the supply spool, through twin, spaced guide members, to the take-up spool. The angular movement imparted to the spools, to reciprocate the floss, by the drive mechanism is also used to advance the floss from the supply spool to the take-up spool. In each cycle of reciprocation the angular movement imparted in a forward direction is greater than the return movement in the backward direction so that the floss is automatically advanced as the device is used.

These prior devices, however, have several disadvantages which militate against their general acceptance. Although devices with vibrating drive systems are inexpensive and dependable from mechanical standpoint, placement and movement of the floss between the teeth is difficult to control without injuring the user's gums.

The reciprocating device described in the above patent overcomes the difficulties associated with control and the likelihood of injury to the user's gums, but this desirable result is achieved with a relatively complicated, bulky, and expensive drive mechanism. The driven supply and take-up reels described therein will be subject to jamming and wear caused by uneven distribution of floss on the take-up reel. In addition, the differences in diameter between the reels as the device is operated will result in an undesirable, varying amount of tension applied to the floss increasing drive system wear and the likelihood of breakage, back-lash, and jamming.

However, it has now been discovered that by utilizing a ring of dental floss in the device of this invention the problems above noted relative to prior floss applicators may be overcome. Accordingly, the device of the instant invention utilizes only a single reciprocating drive pulley which may be rotated manually when it is desired to advance the dental floss.

The applicator of this invention includes a handle which houses the drive system, and two, spaced, elongated channel shaped guide arms which extend longitudinally from the handle. The distal portions of the arms are curved inwardly for more efficient use of the floss, as will be subsequently explained.

A first chamber in the handle houses a conventional reciprocal drive system which may be powered, as desired, with batteries, or with alternating current. A rod operably coupled to the drive system extends from the first chamber into the second chamber. A drive pulley is rotatably mounted in the second chamber, and a freely rotatable idle pulley is also mounted in the second chamber, adjacent the drive pulley. The distal portion of the rod is coupled to the drive pulley so that reciprocal motion of the rod drives the pulley.

The ring of dental floss extends along each of the guide arms, across the ends thereof, and into the second chamber where it makes preferably one turn around the drive pulley. The idle pulley normally engages the dental floss to supply tension thereto. Accordingly, when the applicator is energized the drive pulley imparts reciprocating motion to the dental floss so that when the ends of the guide arms are astraddle the teeth the floss will clean the space therebetween with a back-and-forth motion.

When it is desired to advance a clean length of dental floss into the area between the guide arm ends, the cover is removed to expose the idle and drive pulleys. The idle pulley is then retracted by rotating a rachet wheel coupled thereto and the floss is manually advanced.

If it is desired to replace the ring of dental floss the idle pulley is again retracted to relase the tension on the floss. The soiled ring of dental floss is then merely lifted out, and a clean ring inserted in the guide arm channels and wrapped around the drive pulley. The rachet wheel is then rotated to move the idle pulley into engagement with the floss until the desired tension has been applied to the dental floss. The cover is then replaced and the device of this invention is ready to use.

Accordingly, it is an object of this invention to provide a compact, lightweight dental floss applicator for efficiently cleaning the spaces between the user's teeth.

It is another object of this invention to provide an efficient and dependable apparatus for imparting reciprocal motion to dental floss, and for guiding the dental floss into the spaces between the teeth.

It is another object of this invention to provide a dental floss applicator for imparting reciprocal motion to a ring of floss which extends from a drive pulley through spaced channel-shaped guide arms and across the ends thereof.

It is still another object of this invention to provide a dental floss applicator having a handle at one end and a working area at an opposite end formed by two guide arms having arcuate end portions for holding a length of dental floss therebetween, said applicator adapted to reciprocate said dental floss in said working area.

It is yet another object of this invention to provide a dental floss applicator having a handle with a first and a second chamber therein, said first chamber housing a reciprocal drive means, and said second chamber housing a drive pulley and an idle pulley so that when dental floss extends from said drive pulley through said spaced guide arms projecting from said handle, and said idle pulley engages said floss, said dental floss may be reciprocated by said drive means to clean the space between teeth as desired.

These and other objects will become readily apparent with reference to the drawings and following description wherein:

FIG. 1 is a view in perspective of the dental floss applicator of this invention having the cover portion of the handle removed;

FIG. 2 is a top view of the applicator of FIG. 1;

FIG. 3 is a plan view of the applicator of FIG. 1 having a portion of the cover removed; and

FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 2.

With attention to the drawings and to FIGS. 1 and 2 in particular, the device of this invention 10 includes a generally cylindrical handle 12 with two channel-shaped guide arms 14 and 16 projecting therefrom. The guide arms 14 and 16 terminate in arcuate or curved end portions 18 and 20, respectively. Curved end portions 18 and 20 form a working area whereby dental floss 22 connected therebetween may be inserted into the space between adjacent teeth and reciprocated to clean the space.

With attention to FIG. 3 the reciprocal action for the dental floss 22 is provided by a conventional reciprocal drive mechanism housed in the rear portion 24 of handle 12. The drive system may, if desired, be battery powered and/or powered by alternating current whereby the rotary motion of an electric motor 23 is translated in any well known manner through an appropriate cam 25 to reciprocal motion of the drive rod 26. Rod 26 is biased upwardly by for example, a leaf spring 27.

This invention is not intended to be limited to any specific drive mechanism for rod 26, and accordingly, in view of the well known nature of said drive systems for powering a wide variety of hand-held appliances the drive system will not be described herein in more detail.

Reciprocating drive rod 26 extends from the drive system housed in the rear portion 24 of handle 12 into the forward portion 28 thereof. Drive rod 26 is biased upwardly by spring 27 in opening 30 formed in wall 32.

As will be obvious to those skilled in the art, in the preferred embodiment, chamber 28 is enclosed by an appropriate U-shaped lid 29 which may be snap-fitted over the peripheral edge portion 34 of chamber 28.

Chamber 28 houses a drive pulley 36, an idle pulley 38, and a freely rotatable guide pulley 39. Pulley 36 is rotatably mounted on post 40 affixed preferably to the base 33 of chamber 28.

Idle pulley 38 is rotatably mounted within chamber 28 preferably on block 42. The lower portion 43 of block 42 is slidably received in slot 44 in base 33 of chamber 28. Threaded shaft 46 extends through block 42 in threaded engagement therewith, and through bushing mount 48 so that rotation of rachet wheel 47 will selectively translate pulley 38 along slot 44 into and out of engagement with the ring of dental floss 22 to maintain the desired tension thereon. As shown in FIGS. 3 and 4 a portion of wheel 47 is preferably exposed below handle 12 to facilitate manual rotation thereof.

In the alternative, any equivalent type of mounting for idle pulley 38 may be utilized in move pulley 38 into and out of engagement with floss 22.

Drive rod 26 has an upward projection 52 at one end which engages a plate 50 fixed to the lower surface of pulley 36 as shown in FIGS. 3 and 4. Rod 26 also has an upward projection 53 at an opposite end which rides in cam 25 as shown in FIG. 3. Therefore, the reciprocal movement of rod 26 will be translated to reciprocal movement of drive pulley 36.

A circumferential shoulder 54 is formed centrally of drive pulley 36 so that the upper capstan portion thereof mounts at least one turn of the floss 22 as shown in FIGS. 1 and 3. A freely rotatable guide pulley 39 maintains the floss in position around pulley 36 so that incoming and outgoing portions thereof will not overlap.

To advance floss 22 cover 29 is removed and rachet wheel 47 rotated until idle pulley 38 is out of engagement with floss 22 as it retracts along shaft 46 and slot 44. The floss 22 is then grasped and manually advanced until a clean length is disposed between the ends 18 and 20 of guide arms 14 and 16. The idle pullye 38 is then moved along slot 44, by rotating wheel 47 until it engages floss 22. Floss ring 22 may carry a colored marker to indicate when it has been advanced a full circle so that all segments thereof have been dispersed in the working area between ends 18 and 20.

The forward end 58 of the device 10 mounts the twin channel arms 14 and 16. As shown in FIGS. 1-3 the arms are preferably recessed in corresponding grooves 60 at either side of end portion 58. As shown in FIG. 3 the rear portion of arm 14 adjacent pulley 39 will be disposed above the corresponding portion of arm 16 so that the floss will feed through pulley 39 and around pulley 36 without overlapping.

In the preferred embodiment of this invention the distal portions 18 and 20 of arms 14 and 16 preferably curve inwardly as shown in FIGS. 1 and 2. In this way, the dental floss 22 is fully supported at the working ends of arms 14 and 16, and the arcuate ends 18 and 20 of arms 14 and 16 provide a convenient angle whereby dental floss 22 may be applied to teeth without placing undue strain on the guide arms 14 and 16, and without having to position handle 12 relative to the mouth in such a way as to block the user's vision. By providing the arcuate, inwardly curved end portions 18 and 20, when the device is utilized, it may be angled downwardly and away from the user's face. Furthermore, lateral forces applied to the dental floss 22 stretched therebetween, will be transmitted more equally through the guide arms 14 and 16 to handle 12.

When it is desired to change the dental floss 22 in the device 10, cover 29 is removed, and wheel 47 rotated to move pulley 38 out of engagement with floss 22. A clean ring of dental floss is then substituted in arms 14 and 16 and wrapped at least one turn around pulley 36.

Idle pulley 38 is then moved into engagement with dental floss 22 by rotating wheel 47 in an opposite direction to maintain the desired tension on dental floss 22. Finally cover 29 is replaced, and the device is then ready for use when energized by turning, for example, switch 70.

In conclusion, the device of this invention is a compact lightweight hand-held implement for reciprocating dental floss to clean the spaces between the user's teeth. The device utilizes a ring of dental floss which may be continuous, or may be merely a length of dental floss knotted as desired at a desired length. Preferably the dental floss is marked either with a color spot or another convenient indicator to indicate that the entire ring thereof has been advanced through the device.

The device includes generally a handle with two guide arms extending longitudinally therefrom. The distal portions of the guide arms preferably are angled downwardly and inwardly to form opposing mutually spaced ends which, in use, are disposed on either side of the teeth. Any well known conventional reciprocal drive mechanism may be adapted for use with this invention, and the drive mechanism is mounted preferably in the rear portion **24** of the handle **12.**

When switch **70** is turned on the drive mechanism reciprocates a drive rod **26** which extends into chamber **28** through opening **30** in the rear wall thereof. An upward projection **52** on rod **26** engages plate **50** on the lower surface of drive pulley **36.** The dental floss **22** then extends from the guide arms into chamber **28** and makes at least one turn around drive pulley **36.** Therefore, as the rod **26** reciprocates, the reciprocal action is transmitted through drive pulley **36** to the dental floss **22.** A retractable idle pulley **38** is also provided. Pulley **38** normally engages the dental floss **22** to provide the desired amount of tension thereon.

In order to advance the dental floss **22** relative to ends **18** and **20,** or, if desired, in order to remove the entire ring of dental floss **22** from the device **10** the ratchet wheel **47** is rotated moving pulley **38** out of engagement with floss **22.** Idle pulley **38** is moved out of engagement with dental floss **22** along slot **44.** The dental floss **22** is then manually advanced, if desired, or the dental floss is merely unwrapped from pulley **36** and removed from guide arms **14** and **16** to be discarded.

By utilizing a ring of dental floss, according to this invention, a lightweight and compact floss applicator may be provided whereby a dependable drive mechanism may be utilized which will not be subject to undue wear or excessive strain as the device is used, and hence a dependable and efficient applicator is provided.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A dental floss applicator for cleaning the area between adjacent teeth comprising:

an elongated, hollow handle;

first and second spaced, channel-shaped guide arms mounted on said handle and projecting longitudinally therefrom, the distal portion of said arms adapted to be received in the mouth astraddle the teeth on either side of the area to be cleaned;

releasable means carried by said applicator for retaining a ring of dental floss therein with a segment thereof contained within said handle and another segment extending along the guide arm channel and across the distal end portions of said arms, said releasable means including tension means mounted in said handle for selectively engaging a portion of a dental floss ring when said ring is retained in said handle to develop a predetermined amount of tension thereon;

power drive means mounted in said handle and adapted to be coupled to a segment of a dental floss ring retained therein for imparting reciprocal motion to said dental floss so that when a ring of dental floss is retained in said applicator and said drive means is energized a segment thereof between the ends of said guide arms will be reciprocated relative thereto.

2. The applicator of claim **1** wherein the distal portions of said first and second guide arms are angled inwardly relative to the longitudinal axis of said handle.

3. The applicator of claim **2** wherein said guide arms are substantially C-shaped in cross-section, opening laterally and outwardly to receive a segment of a ring of dental floss therein.

4. The applicator of claim **1** wherein said drive means includes a reciprocating power source; a drive pulley rotatably mounted in said handle and coupled to said power source, said pulley adapted to receive a segment of a ring of dental floss wrapped therearound.

5. A dental floss applicator for cleaning the area between adjacent teeth comprising:

an elongated hollow handle;

first and second spaced guide arms mounted on said handle and projecting longitudinally therefrom, the distal portion of said arms adapted to be received in the mouth astraddle the teeth on either side of the area to be cleaned;

releasable means carried by said applicator for retaining a ring of dental floss therein with a segment thereof contained within said handle and another segment extending along the guide arm channels and across the distal end portions of said arms;

power drive means mounted in said handle and adapted to be coupled to a segment of a dental floss ring retained therein, said drive means including a reciprocating power source; a drive pulley rotatably mounted on said handle and coupled to said power source, said pulley adapted to receive a segment of a ring of dental floss wrapped therearound for imparting reciprocal motion to said dental floss;

releasable tension means mounted in said handle adjacent said guide pulley for engaging a portion of a dental floss ring when said ring is retained in said handle to develop a predetermined amount of tension thereon so that when a ring of dental floss is retained in said applicator and said guide means is energized the segment thereof extending between the ends of said guide arms will be reciprocated relative thereto.

6. The drive means of claim **5** wherein said tension means comprises an idle pulley slideably mounted in said handle.

7. A dental floss applicator for cleaning the area between adjacent teeth comprising:

an elongated, hollow handle;

a first and second spaced, channel-shaped guide arms mounted on said handle and projecting longitudinally therefrom, the distal portion of said arms adapted to be received in the mouth astraddle the teeth on either side of the area to be cleaned;

releasable means carried by said applicator for retaining a ring of dental floss therein with a segment thereof contained within said handle and another

segment extending along the guide arms and across the distal end portions of said arms;

power drive means including motor means mounted in said handle for supplying rotational motion; a drive pulley rotatably mounted in said handle, said pulley adapted to receive a segment of a ring of dental floss wrapped therearound; a drive rod extending between said pulley and said motor means; cam means coupled to said motor means and to said drive rod for translating rotational motion of said motor to reciprocal longitudinal movement of said rod; means carried by said applicator for coupling said drive pulley to said rod and for transmitting reciprocal movement of said rod to said drive pulley so that when a ring of dental floss is retained in said applicator and said drive means is energized the segment thereof extending between the ends of said guide arms will be reciprocated relative thereto.

8. The drive means of claim **7** further comprising releasable tension means mounted in said handle adjacent said drive pulley for engaging a portion of a ring of dental floss when said ring is retained in said handle to develop a predetermined amount of tension thereon.

9. The drive means of claim **8** wherein said tension means is an idle pulley slideably mounted in said handle.

10. The applicator of claim **8** wherein said handle defines front and rear chambers, the front chamber housing said drive pulley and tension means and the rear chamber housing said motor and cam means.

11. The applicator of claim **10** wherein the front and rear chambers are separated by a dividing wall having an opening therethrough and said drive rod is disposed extending from said motor and cam means through the opening in said wall to said drive pulley.

12. The applicator of claim **11** further comprising a cylindrical drive pulley; a plate member mounted on the lower portion of said pulley and extending radially from the vertical axis thereof; an upwardly directed projection mounted on the end portion of said drive rod extending into the front chamber said end portion engaging said plate so that reciprocal longitudinal movement of said rod will be translated to said pulley through said plate.

13. The device of claim **9** wherein said pulley is rotatably mounted on said block, said block being slidably received in a horizontal guide slot in said handle; a ratchet wheel rotatably mounted on said handle; means carried by said wheel and coupled to said block for sliding said block and pulley along said slot responsive to rotational movement of said wheel.

14. The applicator of claim **5** wherein the distal portions of said first and second guide arms are angled inwardly relative to the longitudinal axis of said handle.

15. The applicator of claim **14** wherein said guide arms are substantially C-shaped in cross-section, opening laterally and outwardly to receive a segment of a ring of dental floss therein.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,847,167 Dated November 12, 1974

Inventor(s) James J. Brien

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 3, line 61, "in move" should read --to move--.

Col. 6, line 60, claim 7, "a first" should read --first--.

Col. 8, line 17, claim 13, "on said block" should read --on a block--.

Signed and sealed this 4th day of March 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
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