

[54] DENTAL FLOSS HOLDER

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1,083,770	1/1914	Swope et al.	132/92 R
2,962,033	11/1960	Lew	132/92 R
3,340,881	9/1967	Cowan	132/92 R
3,672,377	6/1972	Greenacre	132/92 R

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[57] **ABSTRACT**

A strand of dental floss to be worked between interdental surfaces for dental hygiene is held under tension between the ends of a pair of forked prongs on a handle. A supply of dental floss to replenish the worked strand is wound on a spool that is removably

attached by a catch pin inserted through a mounting hole in the handle. The point of the catch pin is split, to spread by spring action and catch on the rim of the mounting hole, locking it. In a first position of the catch pin the spool is locked against rotation and serves as anchor point for one end of the strand. In a second position of the catch pin the spool is free to rotate, permitting a fresh length of dental floss to be reeled off the spool. The catch pin is selectively shifted between the first and second positions by endwise forces applied by the thumb and forefinger on the head or point of the pin, respectively. A knife for cutting off spent dental floss is protectively recessed in the heel of the handle. To prepare the dental floss holder for use, the dental floss is strung from the locked spool along the outside of the near prong to and through an eyelet in the end of that prong, across the span between the ends of the prongs to and through an eyelet in the other prong, returning along the outside of that prong to the catch pin where the free end is anchored by winding between the head of the catch pin and the face of the spool. Excess dental floss is cut off by directing the strand across a notch in the heel of the handle, to encounter the blade of the protected knife.

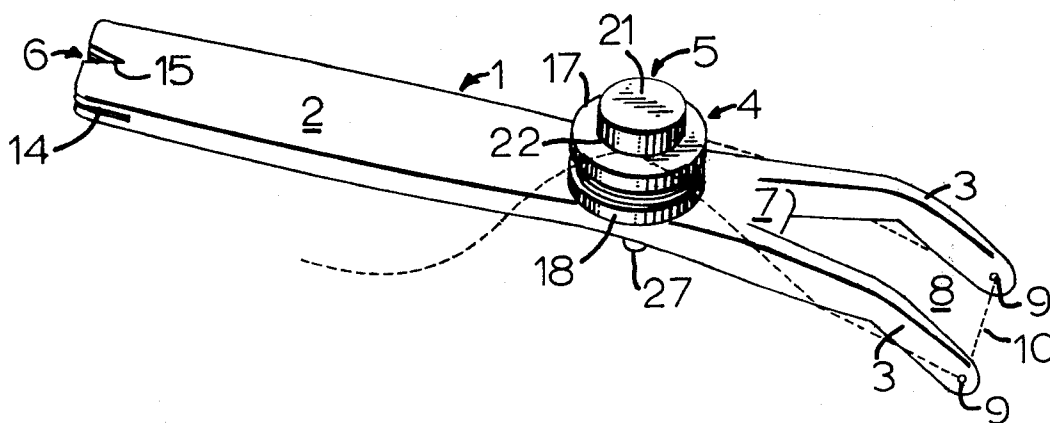
2 Claims, 6 Drawing Figures

FIG. 1

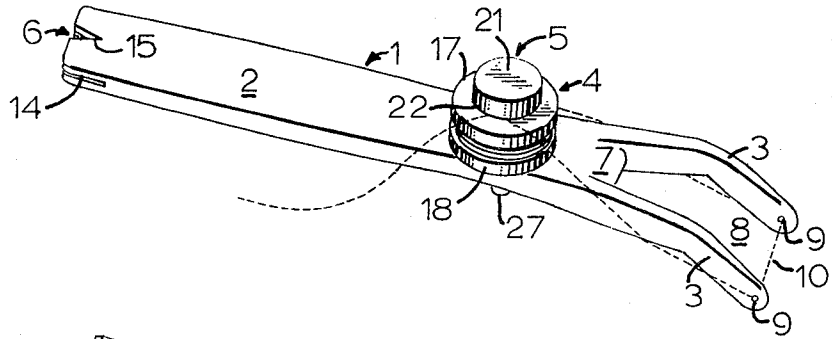


FIG. 2

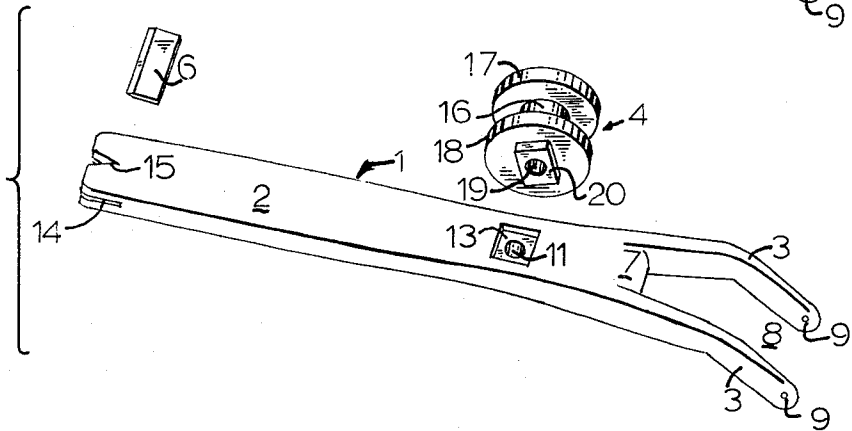


FIG. 3

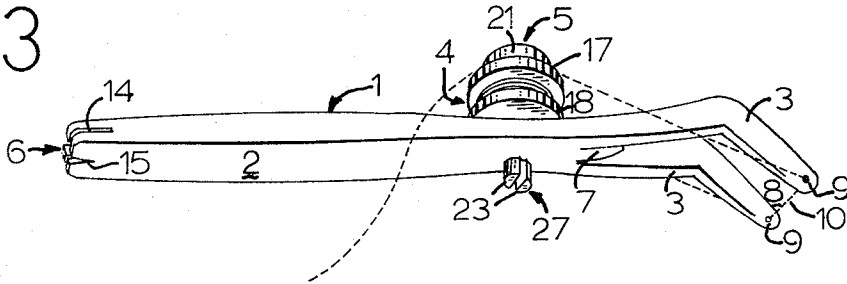


FIG. 4

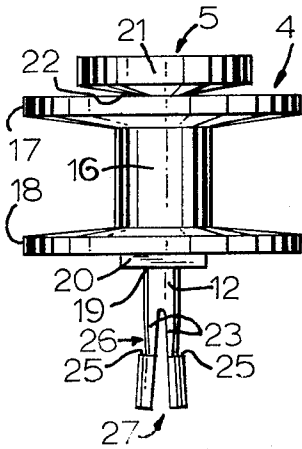


FIG. 5

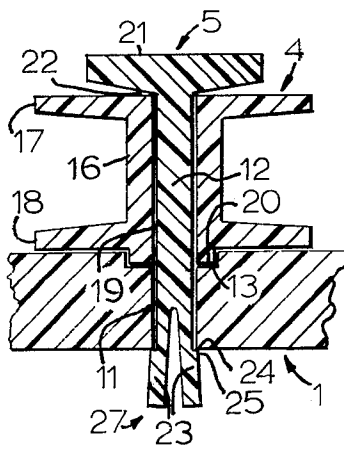
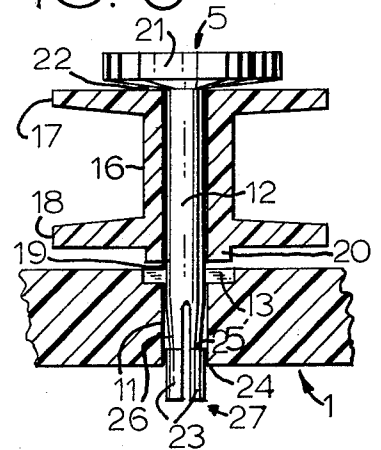


FIG. 6



DENTAL FLOSS HOLDER

BACKGROUND OF THE INVENTION

1. Field of the Invention

My invention relates generally to devices used by persons in making their toilet (Class 132) for removing particles of food, etc., from between the teeth (Subclass 89), in which the device holds a thread, rubber band, dental floss, etc., while drawing the latter through the teeth (Subclass 91) and includes a spool, reel, or other thread supply holder, in which the thread is fed or pulled out as used (Subclass 92) from a rotatably mounted spool (Subclass 92A).

The term dental floss, or simply "floss" as used in this disclosure is intended to include the substantially inelastic threads and tapes, whether waxed or unwaxed, medicated or non-medicated, of the types suitable for dental application.

2. Description of the Prior Art

Substantial activity in the general field of my invention is recorded in the patent literature and is evidenced by products found in the marketplace. Of all of this, the most relevant prior art known to me is disclosed in the following U.S. Patents:

754,841	3/1904	Bessonnet
1,083,770	1/1914	Swope et al.
1,257,864	2/1918	Hochstader
1,417,518	5/1922	Henerlau
1,582,000	4/1926	Gesell
1,986,371	1/1935	Sharp
2,962,033	11/1960	Lew
3,814,114	6/1974	Roberts.

My invention shares with the above a common organizational concept: to support a strand of floss between the ends of prongs for introduction into the mouth and to provide therewith a supply of floss on a spool to replenish the strand.

To implement the concept requires the selection of a combination of elements for concerted action to meet several demands or problems that are inherent in the concept: the size, shape and disposition of the spool; the management of unintentional spill-off of floss from the spool; anchoring the supply end of the floss against tension; the means for locking the spool against rotation; the course of the floss to the ends of the prongs; the connection of the floss with the ends of the prongs; the return path of the floss; anchoring the free end of the floss; placing the working strand of floss under tension; management of the spent portion of the floss; designing the device for ease of cleaning, to avoid tunnels, channels, crevices, etc., that are prone to collect saliva, blood and food particles from the mouth for bacterial action; designing to avoid back tracking of soiled floss; designing to afford comfort, safety and convenience in working the device within the mouth and the strand between the teeth; to satisfy all these demands with a device that affords facile replenishment of the working strand; and to do so with a device that is assembled from a few simple parts that are easily manufactured at a cost that will make the article attractive in the competitive marketplace.

The devices disclosed in the patents cited above appear to serve the general concept, but each is readily distinguishable from my invention because of the individual selection and combination of elements and the specific operational features of the devices, which tend to give emphasis to one feature over another which had

importance to the inventor. Taken collectively, the cited patents reveal the standards of novelty and non-obviousness which have been applied in the past to inventions in this field of art, and when examined in the light of those standards, suggest that my invention is likewise worthy of the grant.

SUMMARY

Dental hygiene is of singular importance in the prevention of periodontal disease. Dental floss is an important ally of the toothbrush, since it may be passed between two adjoining teeth to remove debris, particularly meat fibers, wedged between them and it is also helpful in cleaning the edges of the gums between the teeth. The use of floss entails some risk of cutting the gums, but the risk is minimized when only a short segment is carried between the teeth by a lateral motion. See Oral Hygiene by R. W. Bunting, D.D.S. et al., 3rd ed., Lea & Febiger, Phila., 1957, page 285; Dentistry and Its Victims by Paul Revere, D.D.S., St. Martins Press, New York, 1970 at pages 99 and 124; and The Modern Family Guide To Dental Health by A. Norman Cranin, D.D.S., Stein & Day, New York, 1970, at pages 79 and 286. Many persons find it satisfactory to introduce the dental floss into the mouth supported as a strand between the two hands, but doing so requires considerable strength, coordination, and perserverance; blistering of the finger pads may occur from the extreme frictional forces developed by the strand of floss as it is stretched and worked between the fingers of the two hands. Some persons are employed in jobs which cause their hands to become deeply stained with contaminants or odorants, making it undesirable or distasteful for them to place their fingers into their mouths. For example, the hands of the automobile service station worker become deeply grimed with carbon and strongly odored by gasoline, particularly the additive lead tetraethyl. Clearly, a need exists for a device which avoids the use of fingers in flossing the teeth. The object of my invention is to serve that need by a pronged device which will carry a taut strand of floss into the mouth for insertion between the teeth and which affords that the strand be readily replenishable.

My device, like other dental floss holders before, has a handle with forked prongs on which a strand of dental floss is supported under tension. My invention is a combination of those elements which are known with my means for mounting a tenoned spool to a mortised handle by a catch pin, to afford two functionally different spool positions, a first position locking the spool to establish it as an anchor point for the strand of floss and a second position affording rotation of the spool, to reel off floss; wherein the catch pin cooperates with the spool in friction clutch engagement, preventing spill off; wherein the catch pin serves as a fastener, to hold the spool to the handle by expanding spring legs; and wherein the head of the catch pin serves as a hub to retain the spool and as a stud for anchoring the free end of the floss.

My dental floss holder has a number of advantages over those found in the prior art, the most important of these being the facile replenishment of the working strand of floss, controlled by simple manipulation of the catch pin with the device in one hand while the floss is reeled off, anchored and trimmed with the other hand. Further, when empty, the spool is readily replaced by removing the catch pin and reassembling the

device with a refill spool. Finally, the floss holder is assembled from just three basic parts all of which have been designed to avoid accumulation of saliva, blood, food particles, etc., within crevices, elongated apertures, grooves, channels, under studs, and the like. The simplicity of the device lends itself to efficient production by thermoplastic molding using structural plastics.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing the assembled dental floss holder as threaded with floss for use. Note that for illustrative clarity the floss is indicated by a dashed line.

FIG. 2 is an exploded view showing the body of the floss holder, the knife and the spool; the knife is lateral to its position as fixed in the body; the spool is turned out of the plane of its working position through a right angle, to reveal the relationship of mortise and tenon.

FIG. 3 is a perspective view of the assembled floss holder, viewed from the side and below.

FIG. 4 is an elevation view of the spool and catch pin subassembly.

FIG. 5 is a sectional view showing the spool and catch pin mounted in the locked position in the handle.

FIG. 6 is a side elevation of the spool, catch pin and handle, with the spool and handle in section, as mounted in the position to afford rotation of the spool.

DESCRIPTION OF THE PREFERRED EMBODIMENT

My device (FIGS. 1, 3) supports a strand of dental floss under tension, to aid a person in working the floss when cleaning the interdental surfaces in the course of cleansing the teeth.

The dental floss holder (FIG. 1) is assembled from the following parts: a body 1 having a handle 2 and forked prongs 3 (FIG. 2), a spool 4 (FIG. 2), a catch pin 5 (FIG. 6) and a knife 6 (FIG. 2). These parts will now be described in detail:

Molded in one piece from a structural plastic such as acetal copolymer or nylon, the body 1 (FIG. 2) has an elongate handle 2 of length (typically four inches) to conformably fit an adult's hand, of width (typically five eighths inch) to afford powerful manipulative sidewise leverage, and of thickness (typically three eighths inch) to afford stiffness for control. Projecting longitudinally from one end of the handle 2 is a pair of equal forked prongs 3, the prongs being joined near the handle 2 by a structural web 7, and the prongs extending spaced apart at a gently spreading mutual angle. Each prong 3 diminishes in cross section toward the extreme ends. About midway in their length, the prongs 3 turn downward out of the plane of the handle at an angle of substantially 45°. It has been said that the prongs turn "downward" to permit the upper and lower surfaces of the body 1 to be distinguished for descriptive purposes. The length of the prongs 3 is selected to afford to afford a bow 8 of adequate size to reach over a row of teeth as found in the adult mouth, typical dimensions being: the prongs, one and five eighths inches long; the span between the ends of the prongs, seven eighths inch; and the downward offset, five eighths inch. The web 7 is beveled upward (FIG. 3) to afford a greater effective reach in the downward working direction of the prongs 3. The edges of the handle 2 and prongs 3 are rounded to provide comfort against the hand and soft parts of the mouth. The handle 2 is substantially broader than

the common tooth brush; the breadth is needed in order that the strand, which lies parallel with the width of the handle, may be fully under the control of the hand as actions are directed to sweep the taut strand laterally through the interdental surfaces; the breadth of the handle permits the device to be secure against sidewise rocking. The underlying skeletal anatomy of the hand includes a substantially parallel array of metacarpal bones defining a plane, the palm of the hand; when the flat handle of the floss holder is grasped in position diagonally across the surface of the palm, it gains stability against twisting and the powerful muscles of the forearm and upper arm may be brought to bear on the taut strand, to force it between tightly adjoining teeth.

On a common axis and at approximately right angles through the ends of the prongs 3 are the eyelets 9, small apertures whose diameter (typically 0.05 inch) permits facile threading of floss 10 therethrough.

Near the juncture of the handle 2 with the prongs 3 is the mounting hole 11, a cylindrical aperture in the symmetrical midplane of the body 1 with its axis at right angles to the upper surface of the body 1, of diameter (typically 0.20 inch) to accommodate the catch pin 5 (see below). Centered on the mounting hole 11 and opening on the upper surface of the body 1 is a noncircular recess or mortise, illustrated by the square mortise 13, being typically three eighths inch at the widest part (e.g., the diagonal of the square mortise 13) and of depth about one fourth the thickness of the handle (typically three thirty-seconds of an inch).

Fabricated from structural plastic, the spool 4 has a cylindrical barrel 16 (typically three eighths inch in diameter and five sixteenths inch in height) with two equal circular flanges 17, 18 (typically seven eighths inch in diameter), one at each end of the barrel 16. The end of a length (typically twenty-five feet) of dental floss is fixed onto the barrel and the spool is filled with floss by winding on successive helical layers. The user may load the spool with dental floss from a bulk supply or he may use a prefilled spool supplied by the vendor as a "refill". Central in the spool 4 is a cylindrical aperture, the axial hole 19, of diameter equal to that of the mounting hole 11 on which it is superposable (FIG. 2). The outside circular face of flange 17 is flat, but the opposite flange 18 has a projection or tenon, illustrated by the square tenon 20, centered on the axial hole 19 and of dimensions to fit conformably and removably into the non-circular recess in the body 1 as illustrated by the square mortise 13.

In describing the means by which the spool is keyed to the body, I have illustrated and described the square mortise 13 and corresponding square tenon 20. Such means represent the best mode of practicing my invention, since this permits the spool 4 to be stopped at any quarter turn position. However, I wish to make it clear that in referring to mortise and tenon in the claims that follow, the meaning intended is "mortise means" and "tenon means" and that by mortise I mean a non-circular projection and by tenon I mean a corresponding non-circular recess to receive the non-circular projection, such that when the non-circular projection is received in the non-circular recess, relative rotation is interferentially prohibited. Other configurations that the non-circular projection and recess might take include the rectangle, the triangle, the pentagon, the hexagon, etc.

The catch pin 5 is made of structural plastic; the shank 12 of the catch pin inserts frictionally into the axial hole 19 of the spool 4, holding these parts together (FIG. 4) except when a translational force or a torque is applied to overcome the frictional union. Fixed integrally on one end of the shank 12 is the circular head 21 having a diameter (typically five eighths inch) to limit the position of the spool 4 (FIGS. 4, 5, 6). The outside end of the head is bounded by a flat surface but the inside surface of the head is bluntly conical, so that when the head 21 is adjacent to the flange 17 a circular slot, the tether post 22 exists therebetween, a space bounded by the cone above and the circular plane below.

The other end of the catch pin is the point 27 which is split by a plane intersecting the axis and dividing the end of the catch pin into two equal segments, the legs 23 (FIGS. 4, 5, 6). To afford spring latching action (see below) the legs 23 are sprung apart at a small angle as illustrated in FIG. 4. When the spool 4 is placed on the body 1 with the tenon 20 inserted into the mortise 13, if the catch pin 5 is inserted through the axial hole 19 and the mounting hole 11 a portion of the legs 23, the point 27, will protrude (typically one eighth inch) from the lower surface of the body 1 (FIGS. 3, 5).

The margin of the mounting hole 11 at the lower surface of the body 1 is defined by the circular rim 24. When the catch pin is inserted as described in the above paragraph, the rim 24 is adjacent to the legs 23 at the level of the latch shoulders 25. The diameter of neck 26 of the shank 12 on the head side of the latch shoulders 25 being reduced, the legs 23 spring apart to cause the latch shoulders 26 to engage the rim 24 thereby locking the catch pin 5 and with it the spool 4 onto the body 1.

When the catch pin 5 is fully inserted and thus latched, the spool 4 is locked against rotation by the engagement of the tenon 20 in the mortise 13 and the catch pin 5 is secure against extraction by any force on the head 21. But if the legs 23 at the point 27 of the catch pin are pinched together the latch shoulders 26 are freed from the rim 24 and the catch pin 5 may be urged upward in the mounting hole 11 by an endwise force on the point 27. The catch pin 5 remains secure in the mounting hole by reason of the spring force of the legs 23 against the inside walls of the mounting hole 11 (FIG. 6). When the legs 23 are pressed in a distance equal to the height of the tenon 20, the tenon is disengaged from the mortise 13, permitting the spool 4 to rotate on the shank 12 to reel off a length of fresh dental floss when the free end of the floss is pulled. Since the excursion of the legs 23 in being pushed together is not enough to exceed the elastic limit of the structural plastic, the legs 23 retain the spring latch action for the useful life of the catch pin 5.

At the heel end of the handle 2 is a kerf 14 (FIG. 2) lying parallel with the upper surface of the handle and in mid-plane position between between the upper and lower surfaces; the depth and width of the kerf 14 is sufficient to receive fixedly therein a small rectangular blade, the knife 6, shielding the cutting edge. Also in the heel end of the handle 2 at mid-line but at right angles to the kerf 14 is a V-shaped notch 15 exposing a small midlength of the cutting edge of the knife 6 for action against a strand of floss but keeping the knife safe against injury to the person.

My dental floss holder is assembled for use by placing a spool 4 of dental floss in position on the body 1 (FIG. 2); inserting, but not latching, the catch pin 5 through the spool 4 and the mounting hole 11 to withhold the tenon 20 from the mortise 13 (as in FIG. 6) and permit free rotation of the spool 4 on the shank 12 as an axle; reeling off from the spool a length (about ten inches) of dental floss; setting the tenon 20 in the mortise 13 and fully inserting the catch pin 5 (as in FIG. 5) thereby locking the spool against rotation, this action being accomplished by applying a force on the head of the catch pin while reeling off the last inch or so of the length of floss; extending the dental floss along the outside of the nearest prong 3 to the eyelet 9 therein, threading the floss 10 through that eyelet and directing it across the bow 8 to and through the opposite eyelet 9 in the other prong 3; returning the free end of the floss to the tether post 22 and securing it thereon by three or four circular windings.

The tension on the strand 10 between the prongs 3 is determined by the tension on the free end of the floss at the time it is wound onto the post 22, except that the tension may be enhanced by pinching together the ends of the prongs 3 prior to winding the free end of the floss on the post 22, the tension on the dental floss then being determined by the elastic qualities and displacement of the prongs.

To introduce a length of fresh dental floss in the span between the prongs 3, the free end of the dental floss is unwound from the post 22; pinching and pushing the point 27, the catch pin 5 is urged upward and the spool 4 is simultaneously lifted out of its engagement with the body; the free end of the dental floss is pulled to reel off the desired length of fresh floss; the head 21 is pressed in, resetting the spool in the body and latching the legs 23 on the by the latch shoulders 25 on the rim 24; the tension of the floss is set (by pinching the prongs together); the free end of the floss is secured by winding on the post 22, and the excess floss is cut off by leading the stretched free end into the notch 15 and against the knife 6. The operation described above is accomplished quickly, in a fraction of the time that it takes to read this description of it. Facile replenishment of the floss is an important feature of my invention.

I claim:

1. A dental floss holder for use in dispensing and supporting a strand of dental floss under tension for cleaning the teeth, comprising the combination of the following elements:

a body, being a flat elongate handle with a pair of equal forked prongs projecting longitudinally from one end thereof, with eyelets through the ends of the prongs for threading the strand of dental floss therethrough, the body having a cylindrical mounting hole therethrough at right angles to the plane of the handle and prongs, the location of the mounting hole being nearby the juncture of the prongs, the body having a mortise recessed in the upper surface thereof, the mortise being centered on the mounting hole;

a spool, having a cylindrical barrel with equal circular end flanges, to carry a supply of dental floss wound thereon, the spool having a cylindrical axial hole, one flange having a tenon projecting from the outer circular face thereof, the tenon centered on the axial hole and having dimensions to fit receiveably into the mortise of the body, with the axial

hole aligned with the mounting hole and the tenon inserted in the mortise;

a catch pin, for removable attachment of the spool to the body, the catch pin having a cylindrical shank of diameter to frictionally fit through both the axial hole of the spool and the mounting hole of the body when the spool is supermounted upon the body, the catch pin having a head at one end to limit the position of the spool, the head having a blunt conical surface adjacent to the plane surface of the spool flange, affording between the head and the spool a post for tethering the free end of the dental floss, the shank being of a length to protrude substantially beyond the lower surface of the body when fully inserted for attachment of the spool to the body, the point of the catch pin being split longitudinally into two equal legs, the legs being sprung apart to cause them to tend to expand in the mounting hole, the length of shank standing in the lower half of the mounting hole being necked down to the level of the rim of the mounting hole to afford latch shoulders;

wherein full insertion of the catch pin through the spool and body results in expansion of the legs and catching of the latch shoulders on the rim of the mounting hole, securing the catch pin against ex-

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traction, maintaining the position of the tenon in the mortise to make the spool secure against rotation, and establishing the spool as an anchor point for the supply end of the dental floss; and

wherein the catch pin may be unlatched by pinching and pushing the point into the mounting hole, the spool lifting concertedly on the shank to free the tenon from the mortise and permitting the spool to be rotated on the shank when the free end of the dental floss is pulled, to reel off a length of fresh dental floss.

2. A dental floss holder as described in claim 1, provided with a dental floss knife, comprising:

a knife blade, being a steel rectangle with one cutting edge, the knife blade being completely recessed and fixed in a kerf lying parallel with the flat upper surface of the body, the cutting edge outward of and parallel with the heel end of the handle, and a notch in the end of the handle at mid-line, cut at right angles to the flat surface of the body to give access to a small mid-length of the cutting edge; wherein the used or excess dental floss hanging from the tether post may be led through the notch and severed by the cutting edge.

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