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M. W. VANNICE

2,622,260

TOOTHBRUSH WITH REMOVABLE HEAD

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Fig. 1

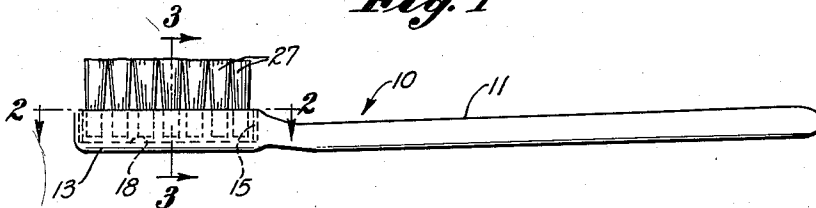


Fig. 2

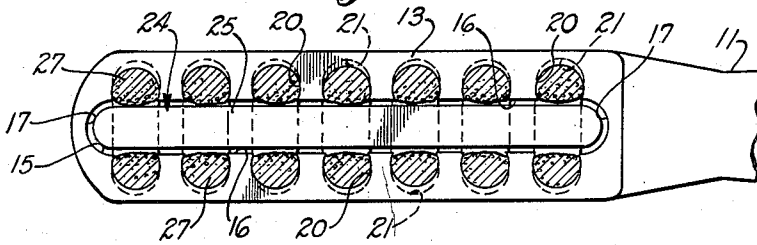


Fig. 4

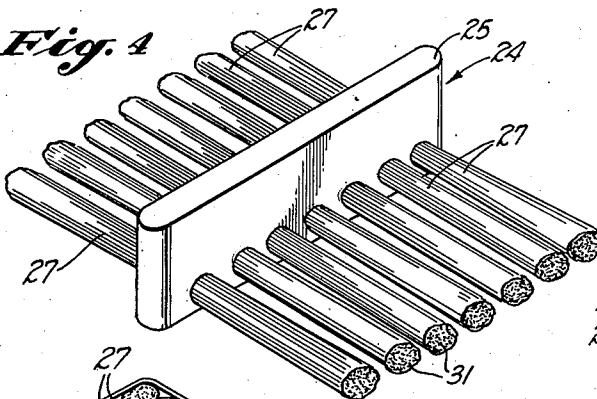


Fig. 3

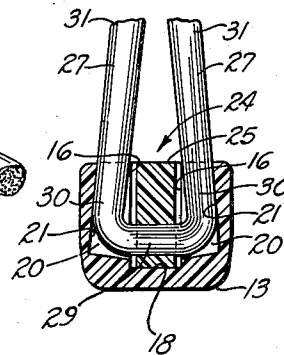


Fig. 6

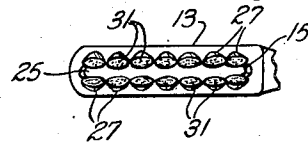
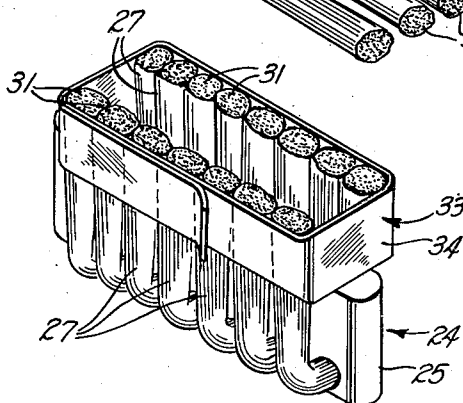


Fig. 5



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TOOTHBRUSH WITH REMOVABLE HEAD

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8 Claims. (Cl. 15—176)

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This invention relates to improvements in brushes and more particularly to improvements in brushes having replaceable brush means which are adapted to be removed from the brush when soiled, unsanitary or worn to such an extent that they are no longer sufficiently effective to perform the function for which they are designed.

My invention is exemplified in a toothbrush for the purpose of illustrating its manner of construction and mode of operation but it is obvious that the principles thereof may be embodied in a wide variety of different types of brushes adapted to perform a similarly wide variety of different functions.

It is a well known fact that toothbrushes, the bristles of which normally remain in a damp condition because of being frequently immersed in water, have a comparatively short effective life and it is frequently necessary to discard the entire brush even though the only portion of the brush which is worn are the tufts which perform the brushing function of the brush. In order to eliminate the wasteful discarding of the entire brush, toothbrushes having embodied therein replaceable brush elements would be desirable.

It is a primary object of my invention to provide a toothbrush or other brush which has a handle portion adapted to receive and hold a replaceable brush means in a novel way and which is so constituted that the necessity of mechanical latching means to retain the brush means in the handle portion is eliminated.

Another object of my invention is the provision of a brush having a replaceable brush means which is adapted to be inserted in the handle or base of the brush with a modicum of difficulty and which is also adapted to be removed therefrom with relative ease.

The utilization of mechanical latching means for retaining and locking the replaceable brush means in toothbrushes frequently results in the shifting of the brush means while in use or its falling from the receptacle or member in which it is secured in the handle of the toothbrush. When such dislodgement of the replaceable brush means or the latching means occurs while the toothbrush is in use, it frequently results in damage to the gums or mouth tissues of the user.

A further object of my invention is the provision of a toothbrush having replaceable brush means which, while it is adapted to be easily installed in the handle of the brush and as relatively easily removed therefrom, nevertheless is securely positioned in the handle so no shifting of the replaceable brush means or no danger of its falling from the handle may occur.

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An additional object of my invention is the provision of a brush having a replaceable brush means which is adapted to be secured within a recess or receptacle in the brush handle by means of the dynamic and frictional action of the tufts embodied in the brush means.

Another object of my invention is the provision of a brush having a replaceable brush means which includes a central bar member adapted to be inserted in a central recess provided in the handle and which mounts a plurality of tufts which are themselves adapted to retain the brush means in the recess without the utilization of any other mechanical expedients to hold the brush means within the handle.

A further object of my invention is the provision of a brush with a handle providing a recess adapted to receive a replaceable brush means, said recess being provided with walls designed to seize upon the tuft means embodied in the brush means of the toothbrush to compress or deform the tuft means and cause them to be frictionally and dynamically locked against the walls of the recess to hold the brush means securely but removably therein.

It is desirable that each member of a family group have allotted to him a toothbrush having a handle of distinctive color in order to prevent the inadvertent use of the toothbrush of one person by another. The provision of a toothbrush having replaceable brush units permits each member of a family group to retain the handle of a toothbrush having a distinctive color for an indefinite period and prevents the confusion that results when one member of a group purchases a toothbrush similar in color to the toothbrush of another member.

When conventional toothbrushes are in use for a certain period of time the bristles thereof tend to splay and diverge from the vertical or parallel attitude in which they were arranged when the toothbrush was first used. This splaying action is due, in large part, to the fact that considerable sideward pressure is brought to bear upon the bristles when they are in a moist condition and they thus tend to set in a spread attitude after the brush has been in use for a moderate period of time.

It is an additional object of my invention to provide a toothbrush having a replaceable brush means and incorporating a plurality of tufts mounted in a mounting bar, said tufts being adapted to be so oriented when the brush means is inserted in the handle of the toothbrush, that the tufts at their upper portions are inwardly inclined to counteract the splaying effect en-

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countered when the brush is placed in use. Another object is to provide a brush in which the tufts in their initial position converge toward each other, irrespective of how such tufts are secured in place.

An additional object of my invention is the provision, as an article of manufacture, of a brush unit in which the tufts provide intermediate portions molded or otherwise fixedly secured in a mounting bar. By so mounting the tufts the possibility of the bristles pulling out of the mounting bar is eliminated and the effective life of the brush prolonged.

A further object of my invention is the provision of a toothbrush having replaceable brush means which can be readily removed from the recess in which it is retained to permit deposits of a dentifrice or other accumulated foreign matter to be flushed from the base of the tufts and the recess itself, thus insuring a more sanitary tooth brush.

Other objects and advantages of my invention will become apparent from a consultation of the following specification and the accompanying drawing, which is for the purpose of illustration only, and in which:

Fig. 1 is a vertical elevational view of a toothbrush constructed in accordance with my invention;

Fig. 2 is a partly sectional, partly plan view taken along the broken line 2—2 of Fig. 1;

Fig. 3 is a vertical, partly section, partly elevational, enlarged view taken on the broken line 3—3 of Fig. 1;

Fig. 4 is an enlarged perspective showing the brush means in its expanded stage;

Fig. 5 is a perspective view of the brush means in a sanitary package prior to insertion in the handle of the toothbrush; and

Fig. 6 is a top plan view showing the manner in which the top portions of the tufts spread out to increase the surface coverage of the tufts.

Referring to the drawing, I show a toothbrush 10 which includes an elongated handle portion 11 having integrally formed at one end thereof a base or head portion 13. In the present embodiment of my invention the handle portion 11 and the head portion 13 are formed of a translucent colored plastic but it is conceivable that any other desirable material may be utilized.

The head portion 13 of the brush 10 is provided with an elongated, central recess 15 which may be molded within the head portion 13 simultaneously with the molding thereof or which may be subsequently formed therein as by drilling or by use of any other suitable process. The elongated central recess 15 is defined by side walls 16 and end walls 17, the end walls 17 being formed on an arc, and a bottom wall 18 serving to unite the side walls 16 and the end walls 17. Although the recess 15 has been described as being of an elongated nature, it is conceivable that a recess having a different configuration may be utilized and it is not intended that I be limited to the specific configuration of the recess as shown.

The side walls 16 which define the elongated central recess 15 preferably comprise a plurality of longitudinally spaced grooves or concavities 20, said concavities having outer walls 21 which are inwardly and upwardly inclined, for a purpose which will be described in greater detail below. The remaining portions of the side walls 16 may be similarly inclined or undercut or may

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be parallel. In either event the side walls 16 and the end walls 17 extend to the upper face of the head portion 13 and define a restricted-width passage opening on the recess 15.

The central recess 15 is adapted to serve as a receptacle for a brush unit or brush means 24 which is designed to be removably inserted therein. The brush means 24 includes a tuft-retaining element shown as an elongated bar 25 which has fixedly secured and preferably molded therein a plurality of tufts 27. The tufts 27 are secured in the lower portion of the elongated mounting bar 25 and are spaced longitudinally therealong, extending from opposite sides thereof. The thickness of the bar is preferably slightly less than the distance between the side walls 16 and the length of the bar is preferably slightly less than the distance between the end walls 17 so that the bar itself does not bind in the recess 15 when placed therein.

When the brush means 24 is in its expanded state, the tufts 27 lie with their longitudinal axes normal to the longitudinal plane of the mounting bar 24. As best shown in Figs. 3 and 4 of the drawing, the tufts 27 are molded or secured in the lower portion of the elongated mounting bar 24 at their intermediate portions 29 and thus two tufts which are oppositely disposed are formed from the same bristles. The tufts 27 are preferably composed of a plurality of bristles which are made of nylon, a synthetic polymeric amide, or other thermo-plastic materials currently used as bristles in brushes.

Shown in Fig. 5 of the drawing is a contemplated holder 33 which is adapted to hold the tufted bristles in substantially U-shape and to keep the brush means 24 in a sanitary condition until it is inserted in the head portion 13 of the toothbrush 10. The holder 33 includes a transparent or translucent wrapper holder 34, which may be formed as a band of suitable plastic material or which may be a plastic sealing tape adhered to itself about the brush means 24. The holder 33, in addition to preserving the brush means 24 in a sanitary condition until it is used, serves to hold the brush means and the tufts 27 in a position in which they may more easily and readily be grasped to insert the brush means 24 in the receptacle 15 provided in head portion 13 of the toothbrush 10. After insertion of the brush means 24 in the receptacle 15, the holder is stripped or otherwise removed from the brush means if the holder has not previously been renewed or has not been released during the insertion of the brush means.

To insert the brush means 24, the tuft-mounting bar 25 is aligned with the elongated central recess 15 and a downward pressure is brought to bear upon the tufts 27, the holder 33 or the tuft-mounting bar 25 to force this bar downwardly into the recess 15 through the restricted-width passage. Automatically, the inner or lower portions 30 of the tufts 27 are brought into registry with and inserted in the substantially hemispherical concavities 20 which are provided in the side walls 16 of the recess 15. As best shown in Fig. 3 of the drawing, the downward movement of the lower portions 30 of the tufts 27 causes the tufts to be bent upwardly or inwardly by engagement with the inclined walls 21 of the concavities 20 and this is true whether or not the holder 33 was removed prior to the insertion of the brush unit or whether or not such a holder was initially used. When the bottom of the elongated tuft-mounting bar 25 is seated on the bot-

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tom 18 of the elongated recess 15, the main portions of the tufts 27 will have been bent beyond a parallel relationship and into converging relationship, following the convergence of the outer walls 21 of the grooves or concavities 20. Since the tufts 27 are formed of a plastic material having resilient properties, the tufts 27 tend constantly to expand against the sloping walls 21 of the concavities 20 and exert a considerable frictional effect upon these sloping walls tending to resist the dislodgement of the brush means 24 from the central recess 15.

In addition, the frictional effect is increased due to the undercut or sloping relationship of the walls 21 of the opposed grooves or concavities 20. Also, the restricted-width passage, through which the brush means must be forced to enter the recess 15, acts as a detent means to retain the brush means in the recess once it has been forced therein. Any withdrawal of the brush means would necessitate a further bending of some of the bristles to pass through the restricted-width passage and this is resisted by the resilience of these bristles.

Finally, the tufts are held in their converging relationship by a reaction force exerted thereon by the sloping walls 21, this reaction force being perpendicular to the walls 21 and thus having a component exerting a downward force on the tufts tending to force them further into the recess 15. This is quite aside from frictional force and would be present even if the engagement between the bristles and the walls 21 were frictionless. Such downward component tends to establish a definite force holding the bottom surface of the bar 25 in pressural contact with the bottom wall 18 of the recess 15. Correspondingly, the resilience of the tufts 27 and the upward convergence of the walls 21 provide a dynamic holding action retaining the tufts in place in the concavities 20.

As may be best seen from Fig. 2 of the drawing, the tuft-mounting bar 25 can thus be maintained within the central recess 15 in a spaced relationship to the end walls 17 and the side walls 16, the sole means of holding the brush means 24 within the central recess 15 and the concavities 20 being the resilient tufts 27.

In addition to providing a means for holding the brush means 24 within the head portion 13 of the toothbrush 10 the inclined walls 21 of the concavities 20 serve to incline the upper portions 31 of opposed tufts 27 toward each other so that these upper portions 31 converge toward their tips. As best shown in Fig. 3 of the drawing, the upper portions 31 of the tufts 27 can be brought into relatively close contiguity and the tufts tend to resist the splaying action which is induced by the sideward pressure usually applied to the tufts during rocking or turning of the brush to sweep the tufts away from the gums and toward the ends of the teeth. Of course, the continued use of the toothbrush will eventually cause the tufts 27 to splay to some extent but when they do they will assume a substantially parallel relationship which will still permit the brush to be utilized for a much greater time than is possible with conventional brushes in which the tufts are initially in such parallel relationship.

As best shown in Fig. 6 of the drawing, when the brush means 24 is inserted in the head portion 13 of the toothbrush 10 the top portions 31 of the tufts 27, in addition to being caused to diverge from their vertical axes into close lateral con-

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tiguity to each other, are caused to spread out longitudinally of the brush so that the ends of the tufts assume an elliptical shape which permits them to give a more effective area coverage when the toothbrush is in use.

The longitudinal spreading of the top portions 31 of the tufts 27 may be attributed to the compressive effect of the inclined side walls 21 of the concavities 20 upon the outsides of the lower portions 30 of the tufts 27. If desired, the longitudinal spreading of the top portions 31 of the tufts 27 may be accentuated by increasing the width of the tuft-mounting bar 25 sufficiently to cause the insides of the lower portions 30 of the tufts 27 to contact and be compressed by the bar. Usually, however, this is neither necessary nor desirable.

If the bristles forming the tufts 27 are initially of the same length when the brush means is in its forward position, shown in Fig. 4, bending of the tufts into the configuration of Fig. 3 will cause the tips of the bristles to lie in an arcuate path to present an arcuate brushing surface. This is often advantageous but if desired the tips of the tufts can be initially cut at an angle so that when the tufts are deformed into the configuration of Fig. 3 the tips of the tufts will lie substantially in a single plane parallel to the top face of the head portion 13.

Of course, there is a wide variety of methods by which the tufts 27 may be fixed or molded in the tuft-mounting bar 25 of the brush means 24. The preferred method is to mold the tuft-forming bristles in place when the bar 25 is molded so that the material of the bar is molded around the tufts. The bar is preferably formed of a thermo-plastic or thermo-setting plastic material.

Although I have shown and described a specific embodiment of my invention for the purpose of illustrating the manner of construction and the mode of operation thereof, it is conceivable that changes and substitutions may be made in the details shown and it is not intended that the invention be limited thereto. I desire, therefore, to be afforded the full scope of the following claims.

I claim as my invention:

1. In a brush, the combination of: a handle comprising a base providing side and end walls defining an elongated recess; and a replaceable brush unit separate from said base and removably received by said recess, said brush unit comprising an elongated rigid bar and a plurality of tufts fixedly embedded in spaced relationship therein and extending from opposite sides thereof, the length of said bar being less than the distance between said end walls and the width of said bar being less than the distance between said side walls, said brush unit being insertable in said elongated recess and said tufts being bent by such insertion to extend away from said base, the bent tufts lying in frictional contact with said side walls and providing substantially the sole means for retaining said bar in said elongated recess.

2. A combination as defined in claim 1, in which said elongated recess opens on a face of said base, and in which the opposed side walls provide tuft-engaging portions converging toward each other in a direction toward said face whereby the opposed tufts extending from opposite sides of said elongated bar provide portions beyond said face which converge toward each other toward the ends of said tufts.

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3. A combination as defined in claim 2 in which said tuft-engaging portions of said side walls comprise converging concavities facing each other on opposite sides of said elongated recess and spaced a distance corresponding to the spacing of said tufts retained by said bar, the opposed concavities providing bottom walls converging in said direction toward said face.

4. A brush as defined in claim 1 in which said base provides a face on which said elongated recess opens and in which said elongated rigid bar provides an upper edge substantially flush with said face of said base.

5. A brush as defined in claim 1 in which said base provides a face on which said elongated recess opens, said elongated recess providing a bottom wall, and in which said elongated rigid bar provides an upper edge substantially flush with said face of said base and a lower edge in contact with said bottom wall when said brush unit is in said elongated recess.

6. In a brush, the combination of: a handle comprising a base having side and end walls defining an elongated recess opening on a face of said base; an elongated rigid bar removably retained in said elongated recess, said bar being of a width materially less than the distance between said side walls and of a length less than the distance between said end walls, said bar being insertable in said elongated recess; and means for holding said bar in said recess, said holding means including a plurality of tufts fixedly secured in said bar and extending from opposite sides thereof to engage and be bent by said side walls during insertion of said bar in said elongated recess, the engagement between the bent tufts and said side walls applying substantially the sole restraining force for retaining said bar in said elongated recess.

7. In a brush the combination of: a base providing a face and an elongated recess opening on said face, said elongated recess being bounded by side walls and by end walls; walls defining a plurality of longitudinally-spaced tuft-receiving grooves on each side wall and opening at opposed positions on said elongated recess, each pair of grooves forming a tuft-receiving space wider than the distance between said side walls, said opposed grooves providing bottom walls converging in a direction toward said face; a tuft-retaining bar of a length less than the distance

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between said end walls and of a width less than the distance between said side walls to move freely into said elongated recess; and a plurality of tufts of bristles providing intermediate portions embedded in said bar at longitudinally-spaced positions corresponding to the longitudinal spacing of said tuft-receiving spaces, said tufts providing end portions extending outwardly and upwardly and lying in said opposed grooves, the converging opposed grooves directing said tufts to converge in a direction away from said face; the frictional engagement between said tufts and said walls of said grooves providing substantially the sole force for retaining said bar in said elongated recess.

8. In a brush, the combination of: a base providing an elongated recess extending inwardly from a face of said base, said base providing side and end walls defining said recess; and a replaceable brush unit inserted in said recess, said brush unit comprising a tuft-mounting element of plastic material, of a width and length to be freely insertable in said recess and a plurality of tufts of plastic bristles extending through and molded at their intermediate portions in said tuft-mounting element, said bristles providing ends extending sidewardly from opposite sides of said tuft-mounting element to form opposed tufts, insertion of said brush unit in said recess bending such opposed tufts by contact with said side walls.

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